



## Appendix 1: Township of Berkeley Heights

### 1. Planning Process and Participation

This appendix is part of the 2016 Union County Hazard Mitigation Plan (HMP) update, and includes only jurisdiction-specific information about Berkeley Heights Township, which is one of the 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.

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, and informing community leaders about the status of the County mitigation plan update, including this appendix.

The Berkeley Heights Township Planning Committee prioritized 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, Berkeley Heights Township attended the kickoff meeting held by Princeton Hydro in May 2014. To further the plan development, the Berkeley Heights Planning Committee met with the Consultant to review the plan documents and revise the mitigation strategy in a workshop format on July 23th, 2014. Local ordinances, site plan requirements, emergency procedures and response plans, and stormwater management plans were reviewed for integration into this plan update. Members of the Local Planning Committee (LPC) attended a workshop with the Consultant on February 24, 2015 to review the plan draft and make any necessary revisions and additions. As the plan was developed, the LPC reviewed all of the drafts and provided input on this individual appendix.

**Table 1-1**  
**Local Planning Committee (Source: Township of Berkeley Heights)**

Name	Title	Organization
Robert Bocchino	Township Engineer/DPW Director	Berkeley Heights
Linda Cavanaugh	Township Administrator	Berkeley Heights
Anthony Padovano, Jr.	OEM Coordinator	Berkeley Heights



## 2. Community Profile

The Township of Berkeley Heights has a total area of 6.26 square miles and is located in the western edge of Union County, New Jersey. It is situated in the Watchung Mountains in the Passaic River Valley. As of 2010, the population was estimated at 13,183. This is a 1.67 percent decrease from the 2000 population, which was estimated at 13,407. Figure 1-2 is a map of the Township. See Section 3 for a map of Union County.

The Township of Berkeley Heights was created from New Providence Township, which was part of the original townships in Union County. The original name was New Providence Borough, but it was changed to Berkeley Heights by referendum on November 6, 1951. Early businesses included a paper factory and industries that optimized the riverine resources: grist mills, sugar mills and cider mills. Brickmaking and pottery were also economically important, and as the Township grew it also became a retreat location with hotel amenities.<sup>1</sup> In 1888 a railroad station was built in Plainfield Avenue, helping advance the growth of the Township. Technological industries arrived in the 20<sup>th</sup> century with Bell Labs and the development of the transistors at the Murray Hill site.

Berkeley Heights has a Mayor-Council-Administrator form of government, with an elected mayor and council, and an appointed town administrator.<sup>2</sup> The Mayor serves a four-year term exercising Executive powers in the Township. The six members of the Town Council serve three-year terms that are staggered in pairs, and they execute the Legislative functions of the Township.

### 2.1 Land Use and Development

Berkeley Heights is a community of mixed use development, with nearly 70 percent of its 6.25 square miles of land area classified as urban/developed. Over 88 percent of the parcels within Berkeley Heights are classified as residential, based on tax assessment data. Between 2004 and 2012, 170 building permits were issued for residential homes within the Township. This is 2.07 percent of the total building permits issued for Union County during this time period. Almost 86 percent of these permits were for 1- and 2-family homes. Berkeley Heights has a population density of 2109 people per square mile. The 2010 census estimates that 8.9 percent of the housing within the Township was renter-occupied, much lower than the County average of 30.5 percent renter-occupied properties.

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<sup>1</sup> The Historical Society of Berkeley Heights website: <https://sites.google.com/site/hsofbh/home/town-history> Retrieved 10/7/14.

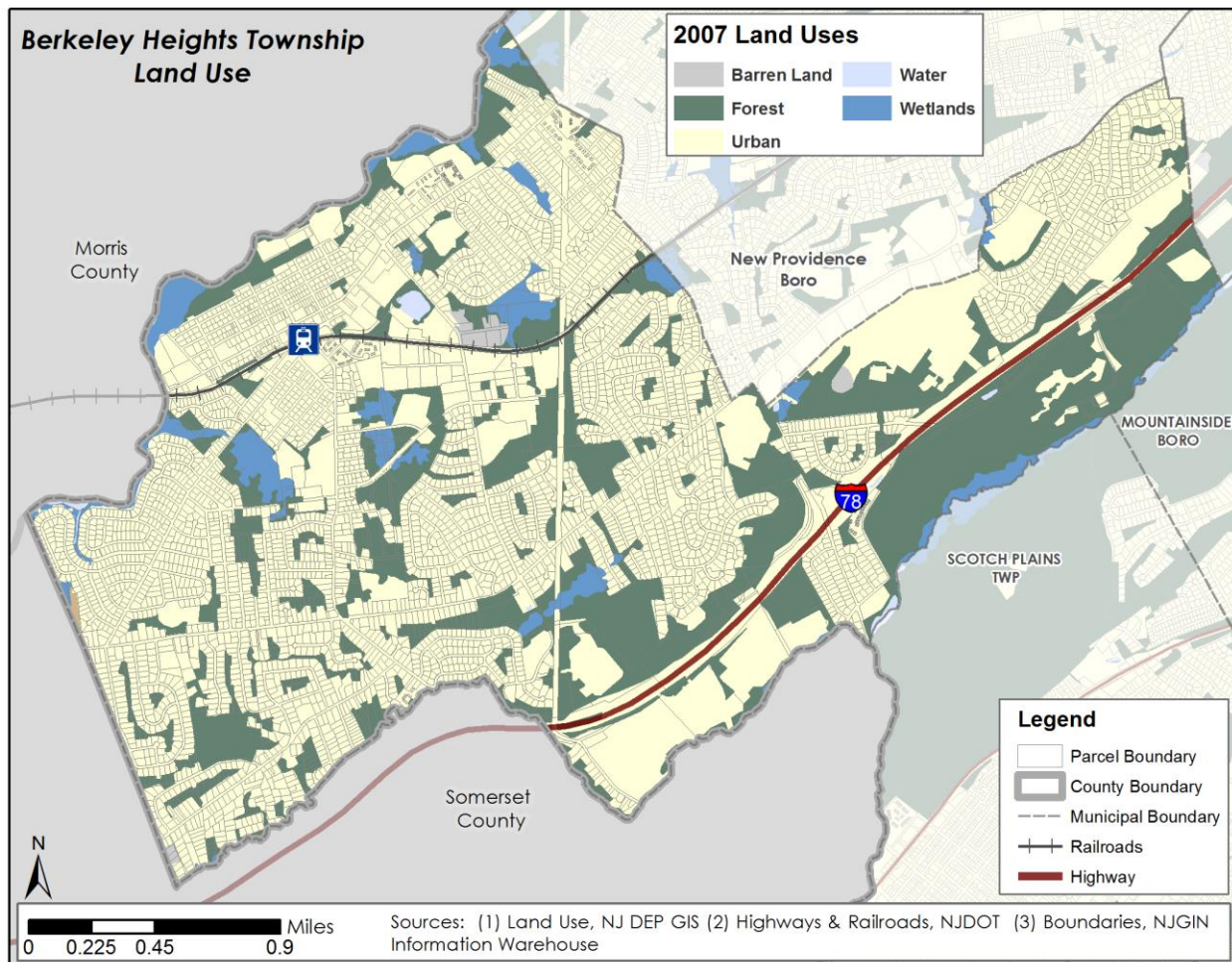
<sup>2</sup> Administrative Code of the Township of Berkeley Heights. <http://www.berkeleyheightstwp.com/> Retrieved 10/7/14.



**Table 1-2**  
**Land Use/Land Cover Trends (NJDEP GIS, 2007)**

Land Cover Class	2002	2007	Percent Change	Percent of Total Land <sup>3</sup>
Agriculture	2.60	2.60	0.00%	0.07%
Barren Land	9.22	15.77	70.98%	0.39%
Forest	1,059.87	1,026.97	-3.10%	25.66%
Urban	2,743.03	2,770.50	1.00%	69.22%
Water	26.21	26.24	0.13%	0.66%
Wetlands	161.83	160.68	-0.71%	4.01%

**Figure 1-1:**  
**Land Use/Land Cover Map Township of Berkeley Heights**



<sup>3</sup> Uses the 2007 land cover values



### 3. Hazard Identification and Risk Assessment

This section of the Berkeley Heights 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 Berkeley Heights 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 there 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 the County part of the HMP.

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. Jurisdictions ranked the list of hazards as either high, medium, low, or no concern.

Table 1-3 shows the Township’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, i.e. likely future damages in the community based on the likelihood of occurrence. 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

**Table 1-3  
Township of Berkeley Heights  
Hazard Identification and  
Prioritization**

<b>Hazard</b>	<b>Priority</b>
Flood	High
Ice Storm	High
Severe storm - winter	High
Straight-line Winds	High
Extreme temperature – cold	Med
Hazmat release – fixed site	Med
Hazmat release – transportation	Med
High wind – tornado	Med
Wildfire	Med
Dam failure	Low
Drought	Low
Earthquake/Geological	Low
Erosion	Low
Extreme temperature-heat	Low
Hail	Low
Severe Storm – lightening	Low
Landslide (non-seismic)	Low
Storm Surge	Low

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



*none* are not addressed in this jurisdictional appendix because they are discussed in the County part of the HMP, and there are no significant differences in risk between the County and the municipality.

## 3.2 Flood Hazard

### 3.2.1 Type, Location and Extent

As shown in Figure 1-2 below, the Township of Berkeley Heights has six significant areas of Special Flood Hazard Area (100-year floodplain). Four of them are tributaries to the Passaic River, which constitutes the northern border of the community and generally flows in north-east to south-west direction; the streams are called Chaucer Drive Brook and its unnamed tributary, Snyder Avenue Brook, and Robin Avenue Brook. The other two SFHA zones are associated are the Branch of Green Brook, which is found along the southern border of the Township; and the Branch of Blue Brook, a stream that constitutes the other part of southern Township boundary and is a tributary to the Green Brook. Both the Green Brook Branch and the Blue Brook Branch intersect the Township; they flow in south-western and south eastern direction, respectively. Berkeley Heights is subject to flooding from overbank from the three flood sources noted above, but primarily from the four northern streams being severely backed up by the Passaic River flood waters. There are significant concentrations of NFIP insurance claims (including properties classified as repetitive loss (see below) along the banks of all four of these sources.

The number of flood insurance claims (85) and the average amount of the claims (\$4,447) in Berkeley Heights suggests a relatively low to moderate level of vulnerability to floods in this community, in terms of both the numbers of claims versus the overall number of parcels (4,887) and the presumed severity of flooding based on the claims amounts.

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. The effective FIRM date for Union County is September 20th, 2006 and is shown in Figure 1-2. The Preliminary FIRM was released on January 30<sup>th</sup>, 2015. The area of Berkeley Heights was not restudied as part of this map update and has not changed from the Effective FIRM.

Current FEMA guidance uses the term extent as analogous to potential severity. Compared to most other jurisdictions in Union County, Berkeley Heights has a relatively small area of floodplain, but numerous flooding sources. Although it is difficult to deduce potential severity accurately, it is safe to assume that the extent of flooding in Berkeley Heights is low to moderate; in more severe events such as tropical cyclones and nor'easters some areas along the northern Township boundary can expect to have more severe flooding, but that would be predominantly in function of Passaic River.

Table 1-4 shows the number of parcels in The Township of Berkeley Heights 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.

**Table 1-4: Flood-prone Properties**

Flood hazard area	Number of Parcels
100-year (1%) floodplain	243
500-year (0.2%) floodplain	346

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

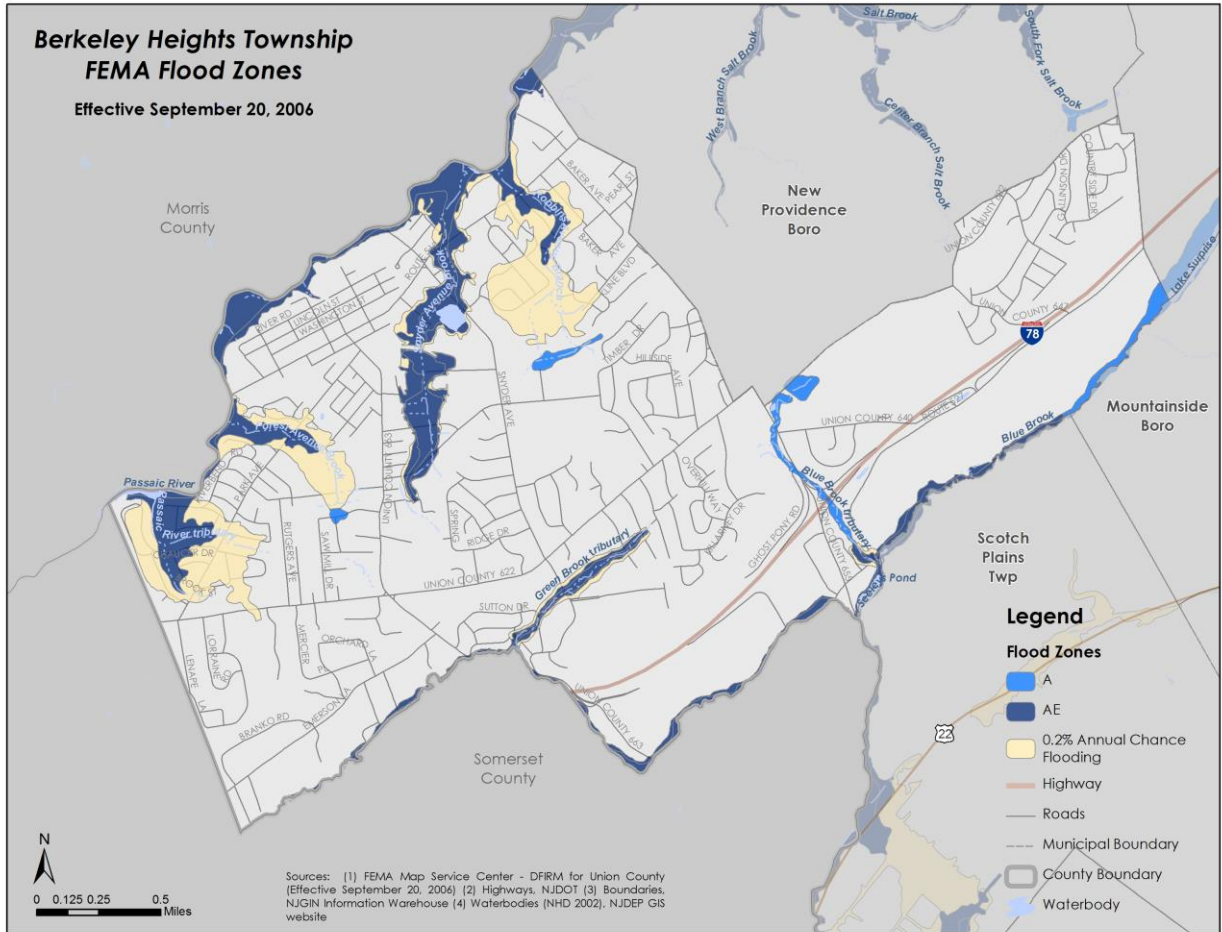
Minor flooding occurs in the Township of Berkeley Heights at least annually, although the severity of these frequent events is minimal. As discussed in Section 4, more significant events like tropical cyclones and nor-easters occur every few years (section citation to main plan), and can result in significant 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. The main (County) part of this HMP discusses past occurrences in detail, and that history and statistics are generally the same as for Berkeley Heights.

### 3.2.3 Flood Impacts and Vulnerability to Flooding

As discussed elsewhere, flood impacts in the Township of Berkeley Heights are not significant compared to other jurisdictions in Union County. Usually these impacts are limited to flooding of structures (especially basements) and roads. There is no significant history of flood damage to critical facilities or populations in the jurisdiction. As expected, the most frequent and serious damages appear to be related to structures that are well within the boundaries of the floodplain, i.e. close to the stream or river center line, particularly along the northern four tributaries to Passaic River. This community has numerous NFIP repetitive loss properties, distributed across most areas of floodplain. A basic review of NFIP claims for Berkeley Heights shows a wide range of claims dates, with some concentrations related to the remnants of Hurricane Floyd in 1999, and Irene in 2011. The main County HMP includes more information about events that have impacted this area.



**Figure 1-2**  
**Effective FIRM, dated September 20, 2006**  
**(Source: FEMA)**





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

**Table 1-5  
NFIP Policies and Claims**

<b>Number of Parcels:</b>	
Berkeley Heights:	4,887
Union County:	199,489
<b>Number of Policies In-Force:</b>	
Berkeley Heights:	222
Union County:	6,055
<b>Number of Claims:</b>	
Berkeley Heights:	85
Union County:	5,560
<b>Total Paid Claims</b>	
Berkeley Heights:	\$378,043
Union County:	\$96,782,279
<b>Repetitive Loss Properties:</b>	
Berkeley Heights:	5
Union County:	729
<b>Total Building</b>	
Berkeley Heights:	\$144,437
Union County:	\$46,560,646
<b>Total Contents</b>	
Berkeley Heights:	\$11,359
Union County:	\$46,560,646
<b>Number of Claims</b>	
Berkeley Heights:	13
Union County:	2,115
<b>Average Claim</b>	
Berkeley Heights:	\$11,984
Union County:	\$18,759,126

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. The Township of Berkeley Heights 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 222 properties in the Township of Berkeley Heights. This represents a dollar value of property and contents coverage totalling \$56,937,500. Between 1978 and 2014, there have been a total of 85 NFIP insurance claims in the Township of Berkeley Heights with a total claims value of \$378,043. Table 1-5 compares the number of policies in-force and paid claims in the jurisdiction. The Table shows that Berkeley Heights comprises 3.7% of the NFIP policies in-force in Union County.

The Township of Berkeley Heights is a member of FEMA's Community Rating System (CRS), a voluntary program for communities participating in the NFIP. The CRS is an 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. CRS communities are ranked between 1 and 10, with Class 1 communities receiving a 45% premium discount. Berkeley Heights has been a member of CRS since 1994, and is current a class 10R community (rescinded).





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. Table 1-5 shows all NFIP claims in The Township of Berkeley Heights between 1978 and 2014.

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 707 such properties based on a query of the FEMA BureauNet NFIP interface. Of this total, five (5) were located within Berkeley Heights; this comprises 0.7% of the County total. Table 1-5 provides a comparison of the residential repetitive loss claims for Union County and The Township of Berkeley Heights. The tables below include the number of repetitive loss properties, building and contents damages, the total number of claims, and the average claim amounts. The Township of Berkeley Heights has properties, and the total of claims on them is relatively small, as shown in Table 1-5.

In general, the RL claims can be broken down by focusing on specific areas in the jurisdiction where flood losses are concentrated. For the reasons of practicality, the areas of concentration are defined as streets with three or more repetitive loss properties. There are no such concentrated areas within the municipality of Berkeley Heights Township.

### **3.2.5 Flood Risk to Repetitive Loss Properties in Berkeley Heights**

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 1991 and 2012, a period of 22 years.

As shown in Table 1-6, there have been 13 flood insurance claims in the 22-year period, for an average number of claims per year of 0.59. 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 \$101,055. 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.

### 3.2.6 Flood Risk to Severe Repetitive Loss Properties in Berkeley Heights

The definition of Severe Repetitive Flood Loss is included in the County portion of this mitigation plan. As of February 2014, the Township of Berkeley Heights has a singular severe repetitive flood loss property. Data for this property is insufficient to perform a meaningful risk assessment.

**Table 1-6**  
**Projected 100-year Flood**  
**based on Past Flood Insurance Claims**

Data	Value
Period in years	22
Number of claims	13
Average claims per year	.59
Total value of claims	\$155,796
Average value of claims per year	\$7,082
<b>Projected risk, 100-year horizon</b>	<b>\$101,055</b>

## 3.3 Severe Storms – Winter Weather, Ice Storms, and Extreme Cold Temperatures

### 3.3.1 Type, Location, and Extent

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 Berkeley Heights Township, and there are no aspects of the hazard that are unique to this jurisdiction.

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

Previous occurrences of the severe storm-winter weather/ice storm/extreme temperature - cold hazards are discussed in Section 4, and for reasons of brevity are not repeated here. There are no meaningful differences between the County as a whole versus Berkeley Heights Township with regard to occurrences or the future probability of these hazards.

### 3.3.3 Winter Weather Impacts and Vulnerabilities to the Hazard

The impacts from these three hazards in Berkeley Heights 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 Berkeley Heights 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 Berkeley Heights Township are displayed in the table above. Refer to the County portion of this mitigation plan for source citations and an explanation of the methodology.

**Table 1-7**  
**Winter Storm-related Risks,**  
**Berkeley Heights Township**  
**50- and 100-year Planning Horizons**

	<b>Injuries (combined)</b>	<b>Deaths</b>
Snow/sleet	\$1,810,629	\$205,618
Icy pavement	\$1,408,683	\$155,082
Snow/sleet	\$1,357,808	\$136,633
Total annual risk (all hazards)	\$4,577,121	\$497,333
50-year risk	\$63,164,267	\$6,863,189
100-year risk	\$65,315,514	\$7,096,935

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.

**Table 1-8:**  
**Risks from Hypothermia, Annually and 50- and 100-year Planning Horizons**

<b>2010 Population</b>	<b>% of US</b>	<b>Annual Death \$</b>	<b>50-year Horizon</b>	<b>100-year Horizon</b>
13,183	.0042	355,726	\$4,909,025	\$5,076,216



## 3.4 Straight Line Wind Hazard

### 3.4.1 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 Berkeley Heights Township.

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

Previously occurrences and the probability of future events are the same for Berkeley Heights Township as for Union County, with the exception of severe thunderstorm wind, recorded on May 18<sup>th</sup>, 2000. According to the source (NCDC), the top speed was at 75 mph. No injuries, deaths or property damage was reported according to the same source. For the information at a County level, refer to Section 4.

**Table 1-9**  
**Straight-line Wind Risks for Range of Loss Types,**  
**Berkeley Heights Township, Annualized and 50- and 100-year Planning Horizons**

Occupancy Class	Total SF	Total Annualized Damages	50-year Risk	100-year Risk
Residential	8,020,426	\$129,973	\$1,793,751	\$1,854,578
Commercial	1,677,625	\$10,311	\$142,299	\$147,124
Industrial	528,683	\$2,713	\$37,449	\$38,719
Agricultural	44,936	\$269	\$3,714	\$3,840
Religious	109,598	\$709	\$9,782	\$10,114
Government	33,944	\$384	\$5,294	\$5,473
Education	104,086	\$518	\$7,144	\$7,386
<b>Total</b>	<b>10,519,298</b>	<b>\$144,876</b>	<b>\$1,999,432</b>	<b>\$2,067,234</b>

### 3.4.2 Straight Line Wind Impacts and Vulnerabilities to the Hazard

Berkeley Heights 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 1-9 below summarizes annual straight-line wind risks and cumulative risks over 50- and 100-year planning horizons in Berkeley Heights Township. Risks are in seven discreet categories: building damages, contents damages, inventory loss, relocation costs, business income lost, rental income lost and wages lost.

The next table shows power loss risks in Berkeley Heights 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 1-10: Power loss Horizons**

Period	Risk Value
Annual	\$121,133
50-year planning horizon	\$1,671,726
100-year planning horizon	\$1,728,477





### 3.5 Hazardous Materials Releases – Fixed Sites and Transportation

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 Berkeley Heights indicated it has 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 Berkeley Heights, these tended to be in five categories: Soil contamination, Underground tanks (presumably leakage), Illegal dumping, Improper storage/disposal, and Abandoned containers.

#### 3.5.1 Fixed Sites

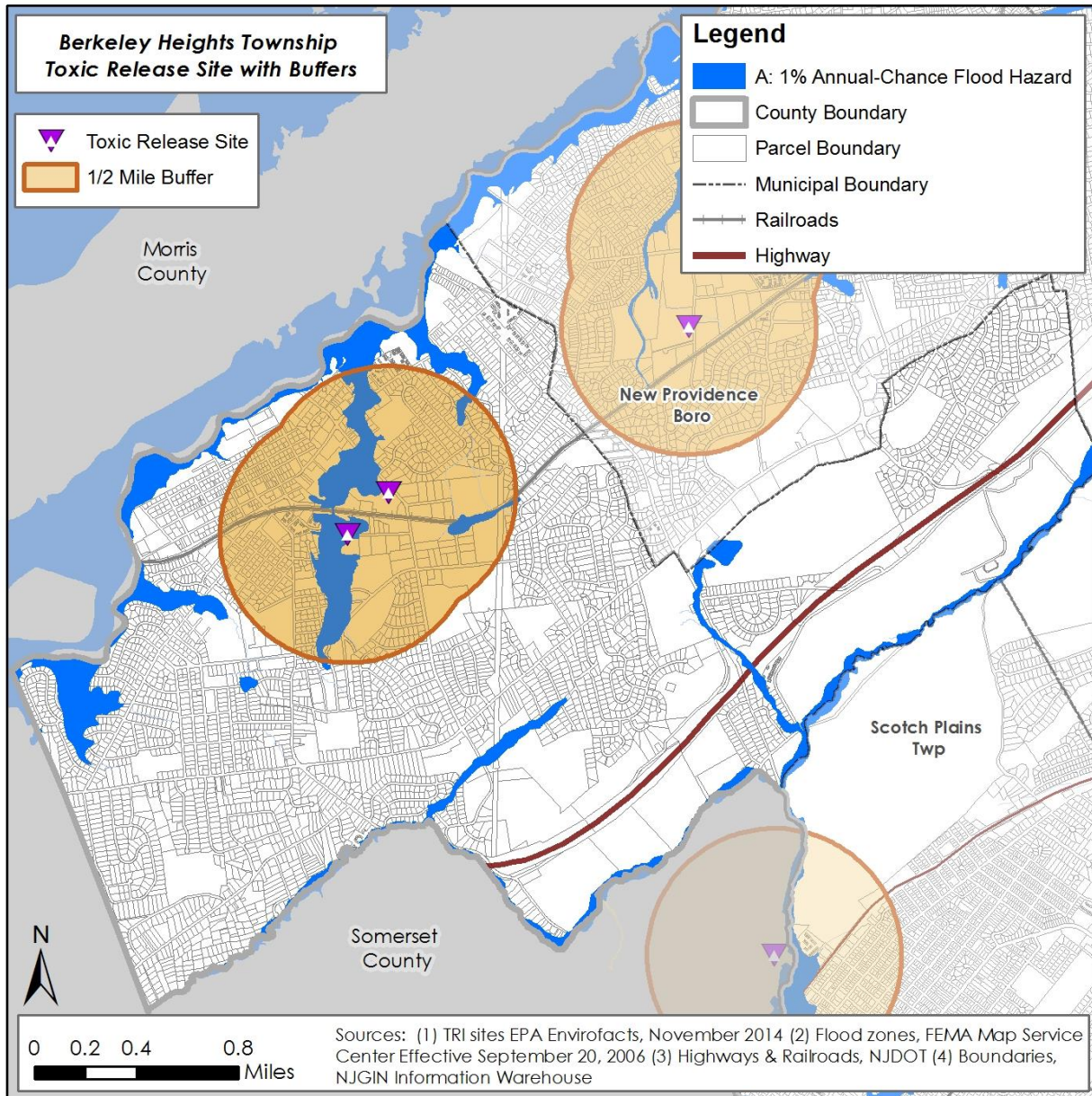
The United States Environmental Protection Agency maintains a database of toxic releases by site. The database is known as the Toxic Release Inventory (TRI), and provides basic information about the locations, types and amounts of releases of hazardous materials. This is explained in detail in the County section of this mitigation plan. Union County has 138 such sites, two of which are in Berkeley Heights Township. 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.

#### 3.5.2 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.



Figure 1-4  
Map of Toxic Release Inventory Sites



### 3.6 Tornadoes

#### 3.6.1 Type, Location, and Extent

Tornado 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 Berkeley Heights Township, and there are no aspects of the hazard that are unique to this jurisdiction.



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

Previous occurrences of the tornado hazard are discussed in detail in the County portion of this hazard mitigation plan (see Section 4). For the Berkeley Heights Township, the most significant previous occurrence of this hazard was recorded on 07/01/2013, as a tornado with magnitude EF0. The tornado did not cause any injuries or deaths, while it caused damages reported at \$20,000. There are no meaningful differences between the County as a whole versus Berkeley Heights Township with regard to occurrences or the future probability of this hazard.

### 3.6.3 Tornado Impacts and Vulnerabilities to the Hazard

Because of the size of the sample area and the nature of the built environment, tornado impacts in Berkeley Heights Township are substantially similar to the County as a whole. The most significant potential impacts from this hazard are damage to structures (and to a lesser degree, infrastructure), injuries and deaths. The results of the risk assessment are shown in Table 1-11 below. The figures were calculated using the FEMA Benefit-Cost Analysis software Version 5.0, which incorporates statistical probabilities of tornadoes in by State and County, and uses historical data and algorithms to calculate direct damages, injuries and deaths expected from tornados in this area.

**Table 1-11**  
**Tornado Risks for Berkeley Heights Township**  
**Annual, 50- and 100-year Planning Horizons**

Horizon	Direct Damage	Injuries	Deaths
Annual risk	\$105,617	\$99,985	\$323,943
50-year risk	\$1,457,510	\$1,379,798	\$4,470,414
100-year risk	\$1,507,150	\$1,426,791	\$4,622,668

## 3.7 Wildfire

### 3.6.1 Type, Location, and Extent

Wildfire risks are discussed in detail in Section 4 of the County portion of this mitigation plan. Berkeley Heights is predominantly suburban in nature, with medium-size residential lots over much of the area, with a normal density of trees interspersed with structures, creating some wildland-urban intermix. Passaic River Park also makes up part of the northwest border of the jurisdiction, meaning that there is some wildland-urban interface area as well. One means of characterizing the wildfire hazard at the local level is to review *wildfire fuel hazard* statistics. Fuel hazard refers to the risks associated with the amount of biomass that will burn under a given set of conditions. Moisture content and fuel size are the primary determinants of availability. Arrangement and compactness of fuel may also determine availability.<sup>4</sup> The data was obtained from the New Jersey Forest Fire Service (NJFFS) a division of the New Jersey Department of Environmental Protection (NJDEP) website. The NJFFS developed the Wildfire

<sup>4</sup> National Park Service. Fire and Fuel Management: Definitions, ambiguous terminology and references.



Fuel Hazard data based upon NJDEP's 2002 Land Use/Land Cover (LU/LC) datasets and NJDEP's 2002 10-meter Digital Elevation Grid datasets (considering both land use and slope to determine rankings).

The wildfire fuel hazard data was released for the State of New Jersey in May, 2009. It includes five fuel related categories and several other non-fuel related categories such as urban and agricultural lands. The five fuel hazard categories include

- Extreme
- Very High
- High
- Moderate
- Low

Table 1-12 summarizes the fuel hazard for the Township of Berkeley Heights. The data cannot be directly translated to risk, but instead provides some insight into the relative amounts of fuel at the time of the study.

**Table 1-12**  
**Wildfire-related Fuel Hazards in Berkeley Heights**  
(Source: NJDEP (GIS), New Jersey Forest Fire Service)

Fuel Hazard	Square Miles	Acres
Extreme	0.01	9.55
Very high	0.02	10.73
High	0.08	53.10
Medium	0.41	262.87
Low	4.01	2,565.21
<b>Total</b>	<b>4.53</b>	<b>2,901.46</b>

Because of the relatively flat topography, normal antecedent conditions (the area has not been prone to drought), and the fuel present, the extent (potential severity) of the wildfire hazard here is very low.

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

A review of open data sources (including NOAA's National Climatic Data Center, and the New Jersey Forest Fire Service) shows no evidence of any previous wildfire occurrences in Berkeley Heights. This is a densely developed area with a professional fire department, and there are many citizens present at most times who would presumably notice a fire and notify authorities, so the probability of future occurrences is considered very low.



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### 3.6.3 Wildfire Impacts and Vulnerabilities to the Hazard

There have been no wildfire impacts in the past in this jurisdiction. Although there are many areas where structures and vegetation are in close proximity, for the reasons noted in the subsection above, vulnerabilities to wildfire are low or very low.





### 3.7 Critical and Public Facilities

The Township does not have any critical or public facilities in the Special Flood Hazard Area.

Facility Name	Street Address
Gov. Livingston High School	175 Watchung Blvd.
Columbia Middle School	345 Plainfield Ave.
Public Library	290 Plainfield Ave
T. P. Hughes School	446 Snyder Ave.
P.O. 07922	364 Springfield Ave.
Berkeley Heights Station	
Mountain Park School	55 Fairfax Dr.
Runnells Specialized Hospital	40 Watchung Way
Hamilton Terrace School	651 Mountain Ave.
W. Woodruff Sch.	Briarwood Dr. West
Municipal Building & Police Headquarters	29 Park Ave.
Deserted Village of Feltville	
Fire Headquarters	41 Hamilton Ave.
Rescue Squad	378 Snyder Ave
DPW Facility	
Wastewater Treatment Plant	



## 4. Township of Berkeley Heights Mitigation Strategy

This section contains goals, objectives, and action items for the Township of Berkeley Heights, as part of the Union County Plan Update. 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 Berkeley Heights. Actions that have been ~~struck through~~ are no longer a priority.

Mitigation Action, Program, or Project	Hazard	Priority	Implementation Mechanism	Responsible Party	Target Start Date	Project Duration	Estimated Cost	Current Status
Flood proofing of homes along 400 and 600 River Road	Flood	High	Capital Improvement Plan	Berkeley Heights Engineer		1- year	\$150,000 per unit	Not completed due to lack of resources
Storm-water management system upgrade and improvement along Shadow Lane, Chaucer Drive, Stuart Lane, Cornwell Court, Brook Street, Roosevelt Avenue	Flood	High	Capital Improvement Plan	Berkeley Heights Engineer/		3-years	\$300,000	Not completed due to lack of resources
Acquisition of homes at Robin's Avenue and Springfield intersection	Flood	High	Capital Improvement Plan	Berkeley Heights OEM	2016	1-year	\$1 – \$2 million	Not started
Flood proofing of Town Hall Building which houses Police Department/Data Storage	Flood	Medium	Capital Improvement Plan	Berkeley Heights Engineer/	N/A	1-year	\$200,000	Not completed due to lack of resources.
Flood proofing of Department of Public Works	Flood	High	Capital Improvement Plan	Berkeley Heights DPW	N/A	3-4 years	\$150,000	Not completed due to lack of resources



Mitigation Action, Program, or Project	Hazard	Priority	Implementation Mechanism	Responsible Party	Target Start Date	Project Duration	Estimated Cost	Current Status
Storm-water management system upgrade and improvement for the Berkeley Hall Nursing Home	Flood/High Winds	High	Capital Improvement Plan	Berkeley Heights Engineer & facility administrator	2016	2-Years	\$180,000	Not started
Storm-water management system upgrade and improvement for Berkeley Heights Con. Nursing Home	Flood	High	Capital Improvement	Berkeley Heights OEM	2016	2- Years	\$150,000	Not started
Conduct all-hazards public education and outreach program for hazard mitigation and preparedness.	All	High	Emergency Management	OEM Coordinator, in coordination with County OE		One Year	Staff Time	Ongoing

### 4.3.2 New Mitigation Actions

Mitigation Action, Program, or Project	Hazard	Priority	Implementation Mechanism	Responsible Party	Target Start Date	Project Duration	Estimated Cost
De-snagging debris along streams/rivers	Flood	High	NJDEP Grant	Engineering/DPW	2013	2013- 2018	\$400,000
Municipal Facility Relocation. Relocation of Police Department, Town Hall, DPW and Library	Flood	High	CIP	Township Administrator	2015	2015-2017	\$5,000,000
Hazardous Tree Removal	Wind/Ice Storm	High	Public Works	DPW	2013	2013-2018	\$500,000
Acquisition of properties in flood-prone areas	Flood	High	Grants	OEM/ Administration	2016	1-3 years	Varies



## 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 is an initial capability assessment; it should be updated and improved upon as part of the ongoing maintenance process. As the new maps become adopted, comprehensive plan updates occur, or new stormwater permits come into place, it may be an opportunity to reevaluate capabilities and enhance capacity to respond to and manage hazard events.

### 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)	
Stormwater Management Plan/Ordinance	Y
Comprehensive Plan / Master Plan	Y
Capital Improvements Plan	
Site Plan Review Requirements	Y
Habitat Conservation Plan	
Economic Development Plan	Y
Local EOP	Y
Continuity of Operations Plan	
Post Disaster Recovery Plan or Ordinance	
Wildfire Protection Plan	
Real Estate Disclosure req.	Y
Other (e.g. steep slope ordinance, local waterfront revitalization plan)	
Freeboard	Y
Cumulative Substantial Damages	
Shoreline Management Plan	

### 4.4.2 Communication and Emergency Response

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





#### 4.4.4 Staff/Personnel

	Does this Township have this expertise on staff?
Staff with expertise or training in benefit/cost analysis	
Grant Writer(s)	Y
Emergency Manager	Y
Professionals trained in conducting damage assessments	Y
Scientist familiar with natural hazards in the municipality.	
Personnel skilled or trained in "GIS" applications	Y
Surveyor(s)	
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

#### 4.4.5 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	Y
User fees for water, sewer, gas or electric service	
Impact Fees for homebuyers or developers of new development/homes	-
Incur debt through general obligation bonds	Y
Incur debt through special tax bonds	
Incur debt through private activity bonds	
Withhold public expenditures in hazard-prone areas mitigation grant programs	



## 5. Plan Maintenance and Adoption

### 5.1 Plan Maintenance

The Township of Berkeley Heights 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 Berkeley Heights 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 Berkeley 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 Berkeley Heights 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. The Township will place a link to the plan on its municipal website.

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 Berkeley Heights's LPC shall ensure that:

- Copies of the latest approved Plan are available for review at Township 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 Berkeley Heights will post a notice on the Township's website and invite the public to review and comment.
- For major changes involving Township Council approval, the Township 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].



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The Township 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.