



Appendix 17: City of Summit

This appendix is part of the 2016 Union County Hazard Mitigation Plan (HMP) update, and includes only jurisdiction-specific information about the City of Summit, 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.

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 municipality 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 plan update, including this appendix.

The City of Summit 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, the City of Summit attended the kickoff meeting held by Princeton Hydro in May 2014. To further the plan development, the Planning Committee met with the Consultant to review the plan documents and revise the mitigation strategy in a workshop format on February 22nd 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 17-1
Local Planning Committee

Name	Title	Organization
Mr. Aaron Schragger	City Engineer	City of Summit – Department of Community Services
Mr. Chris Cotter	City Administrator	City of Summit
Mr. Paul Cascais	DPW Supervisor	City of Summit - DPW



2. Community Profile

The City of Summit has a total area of 6.046 square miles and is located in the Watchung Mountains in the northwest corner of Union County, New Jersey. Summit is adjacent to Interstate 78 and Route 28, and is home to the Summit Station on the NJ Transit Morris and Essex Line.

As of 2010, the population was estimated at 21,457. This is a 1.54 percent increase from the 2000 population, which was estimated at 21,131. Figure 17-1 is a map of the City of Summit. See Section 2 for a map of Union County.

The area occupied by Summit was originally part of Springfield Township and New Providence, with settlers arriving after the 1720's establishing small farms. The development of the railroad through Summit drove the character of Summit we see today, and by the mid-1800's Summit served as a vacation spot for residents of New York City. Development grew after WWII, and today Summit is both a commuter community and home to a thriving business community.¹

The City of Summit was officially incorporated on March 8, 1899 from Summit Township, which was originally part of New Providence and Springfield Townships. Summit is governed by an elected Mayor and Common Council. The six members of the Common Council are elected to three-year terms with three council members from each of two wards. The Mayor is elected to a four-year term. The Common Council holds the majority of policy-making and administrative oversight in the City.

2.1 Land Use and Development

Summit is a residential and commercially-developed community, with 82.47 percent of its 6.04 square miles of land area classified as urban/developed. Over 88 percent of the parcels within Summit are classified as residential, based on tax assessment data. Between 2004 and 2012, 235 building permits were issued for residential homes within the City. This is 2.86 percent of the total building permits issued for Union County during this time period. Almost 64 percent of these permits were for 1- and 2-family homes. Summit has a population density of 3552 people per square mile. The 2010 census estimates that 31.9 percent of the housing within the City was renter-occupied, similar to the County average of 30.5 percent renter-occupied properties.

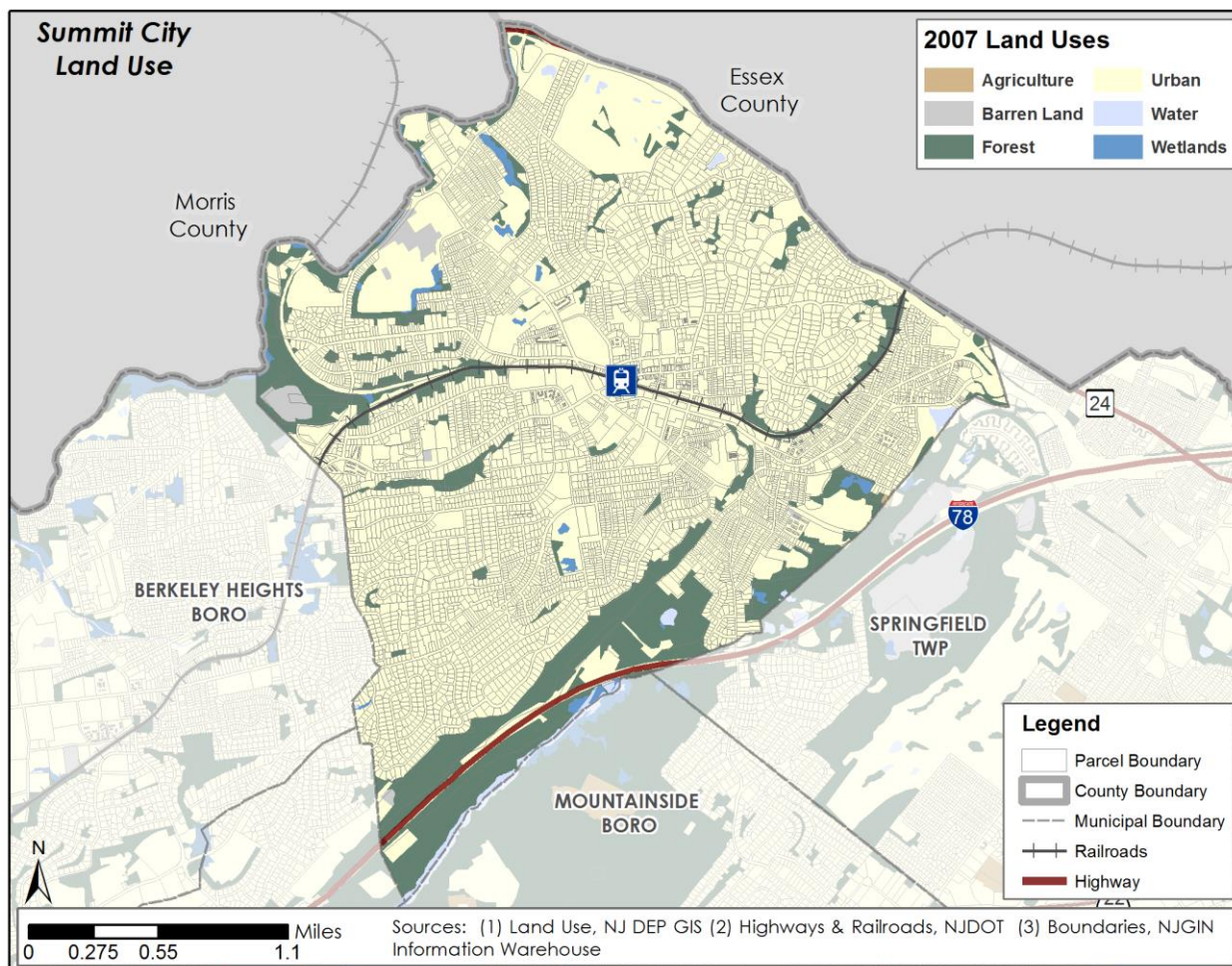
¹ Summit Historical Society. "The City of Summit". <http://summitnjhistory.org/AboutSummit.php>



Table 17-2
Land Use/Land Cover Trends (NJDEP GIS, 2007)

Land Cover Class	2002 (acres)	2007 (acres)	Percent Change	Percent of Total Land ²
Agriculture	0.71	0.71	0.00%	0.02%
Barren Land	27.77	34.53	24.32%	0.89%
Forest	569.58	564.56	-0.88%	14.60%
Urban	3,193.12	3,190.14	-0.09%	82.47%
Water	37.66	40.08	6.44%	1.04%
Wetlands	39.24	38.06	-3.02%	0.98%

Figure 17-1
Land Use/Land Cover Map City of Summit



² Uses the 2007 land cover values



3. Hazard Identification and Risk Assessment

This section of the Summit 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 (versus the County as a whole) are included in detail in this appendix.

3.1 Background and Hazard Rankings

Like all the other jurisdictions in Union County, the City of Summit 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 17-3 shows Summit’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*

Table 17-3
City of Summit
Hazard Identification and
Prioritization

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

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



and *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 Tornadoes

3.2.1 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 City of Summit, and there are no aspects of the hazard that are unique to this jurisdiction.

3.2.2 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), and for reasons of brevity are not repeated here. There are no meaningful differences between the County as a whole versus City of Summit with regard to occurrences or the future probability of this hazard.

3.2.3 Tornado Impacts and Vulnerabilities to Tornadoes

Because of the size of the sample area and the nature of the built environment, tornado impacts in City of Summit 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 17-4 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 tornadoes in this area.

Table 17-4
Tornado Risks, City of Summit
Annual, 50- and 100-year Planning Horizons

Horizon	Direct Damage	Injuries	Deaths
Annual risk	\$58,012	\$50,702	\$164,269
50-year risk	\$800,564	\$699,685	\$2,266,913
100-year risk	\$827,830	\$723,515	\$2,344,120

3.3 Severe Storms – Winter Weather, Ice Storms, Extreme Cold

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 City of Summit, and there are no aspects of the hazard that are unique to this jurisdiction.

3.3.2 Previous Occurrences and the Probability of Severe Storms

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 City of Summit with regard to occurrences or the future probability of these hazards.

3.3.3 Impacts on the Community, and Community Vulnerabilities to the Hazard

The impacts from these three hazards in City of Summit 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 City of Summit 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 City of Summit are displayed in the table below. Refer to the County portion of this mitigation plan for source citations and an explanation of the methodology.

Table 17-5
Winter Storm-related Risks (traffic injuries and fatalities), City of Summit
50- and 100-year Planning Horizons

	Injuries (combined)	Deaths
Snow/sleet	\$2,947,028	\$334,669
Icy pavement	\$2,292,810	\$252,416
Snow/sleet	\$2,210,004	\$222,387
Total annual risk (all hazards)	\$7,449,843	\$809,472
50-year risk	\$102,807,834	\$11,170,708
100-year risk	\$106,309,260	\$11,551,160



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 17-6
Risks from Hypothermia City of Summit
Annually and 50- and 100-year Planning Horizons

2010 Population	% of US	Annual Death \$	50-year Horizon	100-year Horizon
21,457	0.0068%	\$578,990	\$7,990,059	\$8,262,184

3.4 Straight-Line Winds

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 City of Summit.

3.4.2 Previous Occurrences and the Probability of Future Occurrences

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

3.4.3 Straight Line Wind Impacts and Vulnerabilities to the Hazard

City of Summit 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 17-7 below summarizes annual straight-line wind risks and cumulative risks over 50- and 100-year planning horizons in City of Summit. 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 City of Summit, 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 17-7: Straight-line Wind Risks
City of Summit, Annualized and 50- and 100-year Planning Horizons**

Occupancy Class	Total Square Feet	Total Annualized Damages	50-year Risk	100-year Risk
Residential	11,683,981	\$228,881	\$3,158,783	\$3,265,899
Commercial	3,234,870	\$31,054	\$428,572	\$443,105
Industrial	649,946	\$6,242	\$86,153	\$89,074
Agricultural	52,529	\$472	\$6,512	\$6,733
Religious	339,140	\$3,140	\$43,333	\$44,803
Government	35,870	\$304	\$4,195	\$4,337
Education	315,170	\$2,326	\$32,108	\$33,197
Total	16,311,506	\$272,419	\$3,759,655	\$3,887,147

**Table 17-8
Straight-line Wind Risks for Power Losses,
City of Plainfield, Annualized and 50- and 100-year Planning Horizons**

Period	Risk Value
Annual	\$216,024
50-year planning horizon	\$2,981,292
100-year planning horizon	\$3,082,501

3.6 Erosion

3.6.1 Type, Location and Extent

The City of Summit has ranked erosion, meaning riverine and not coastal erosion, as a high hazard because of its imminent concern within the municipality. All streambanks have the potential for erosion due to the volume and rate of peak flows and steep slopes along the streambeds.

3.3.2 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 City. There is not a record of previous occurrences. Erosion will continue to be a potential hazard within streamsheds where banks have become unstable from increased runoff and flows.

3.3.3 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 Summit. 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.



3.5 Flood

3.5.1 Type, Location and Extent

There are several potential flood hazards in the City of Summit, but only few flood the properties surrounding them. The jurisdictional boundaries of Summit are defined by water bodies; on the north, the Passaic River, flowing in south-westerly direction; in the south, Surprise Lake and Bryant Brook, which flows in north-easterly direction. None of them constitute a direct flood hazard. In addition to the streams named above, as is shown in Figure 17-2 below, the City of Summit has four significant areas of Special Flood Hazard Area (100-year floodplain). Three of them are the unnamed tributaries of the Passaic River itself, on the north side of the main Conrail line intersecting the area; the fourth SFHA belongs to Salt Brook, which flows from the central Summit area, south of Conrail line, in westerly direction, into the neighboring City of New Providence.

The floodplains of the three unnamed tributaries are inundated by the backflow from Passaic River; of them, the westernmost tributary (the one flowing along the West End Avenue) directly affects the surrounding properties. The other two tributaries flood fewer structures that are also farther away from the immediate floodplain area. The Salt Brook also floods several small clusters of structures, but some additional ones are farther away from the stream and probably inundated by the inadequate drainage overflow or by drainage channels not identified on FEMA maps.

Flooding in City of Summit most often occurs during extreme rain events. These can be simply intense inland storms, tropical cyclones (including hurricanes and their remnants), and sometimes nor'easters.

The number of flood insurance claims (81) and the average amount of the claims (\$5,210) in Summit 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 (6,802) and the presumed severity of flooding based on the claims amounts.

Table 17-9
Number of Parcels with at least 60% of
Area in the Floodplain, The City of Summit

Flood hazard area	Number of Parcels
100-year (1%) floodplain	81
500-year (0.2%) floodplain	0



**Table 17-10
NFIP Policies and Claims**

Number of Parcels:

Summit:	6,802
Union County:	199,489

Number of Policies In-Force:

Summit:	123
Union County:	6,055

Number of Claims:

Summit:	81
Union County:	5,560

Total Paid Claims

Summit:	\$422,006
Union County:	\$96,782,279

Repetitive Loss Properties:

Summit:	4
Union County:	707

Total Building

Summit:	\$151,474
Union County:	\$46,560,646

Total Contents

Summit:	\$0
Union County:	\$46,560,646

Number of Claims

Summit:	12
Union County:	2,115

Average Claim

Summit:	\$12,623
Union County:	\$18,759,126

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.³ The effective FIRM date for Union County is September 20th, 2006. The effective FIRM is shown in Figure 17-2. While the effective FIRM is the best data available for the City of Summit, due to the topography within the City, some of the parcels that fall within the extent of the floodplain are not actually at risk from flooding. There have been a number of Letters of Map Amendment filed for residents within the floodplain areas of the City. These steep sloping areas protect the residents from overbank flooding along stream channels, but also increase the risk of riverine erosion.

Current FEMA guidance uses the term *extent* as analogous to potential severity. Compared to most other jurisdictions in Union County, Summit 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 Summit is low to moderate; in more severe events such as tropical cyclones and nor'easters some areas along the northern City boundary can expect to have more severe flooding, but that would be predominantly in function of Passaic River, and to some extent, the Salt Brook.

Table 17-10 shows the number of parcels in the city of Summit 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.

3.5.2 Previous Occurrences and the Probability of Future Floods

Minor flooding occurs in the City of Summit at least annually, although the severity of these frequent events is minimal. As discussed in the main (County) section of the mitigation plan, 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

³ FEMA online - Floodplain Management. Flood Insurance Rate Map (FIRM) definition



patterns, the City 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 Summit.

3.5.3 Flood Impacts and Community Vulnerabilities to Flooding

As discussed elsewhere, flood impacts in the City of Summit 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 Passaic River tributary along West End Avenue and Salt Brook. A basic review of NFIP claims for Summit 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.

3.5.4 National Flood Insurance Program and Repetitive Loss

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 City of Summit has been a member of the NFIP since 1977.

FEMA NFIP statistics indicate that as of February 2014, federal flood insurance policies were in-force on 123 properties in the City of Summit. This represents a dollar value of property and contents coverage totaling \$35,118,200. Between 1978 and 2014, there have been a total of 81 NFIP insurance claims in the City of Summit with a total claims value of \$422,006.⁴ Table 17-10 compares the number of policies in-force and paid claims in the jurisdiction. The Table shows that Summit comprises 2.1% of the NFIP policies in-force in Union County.

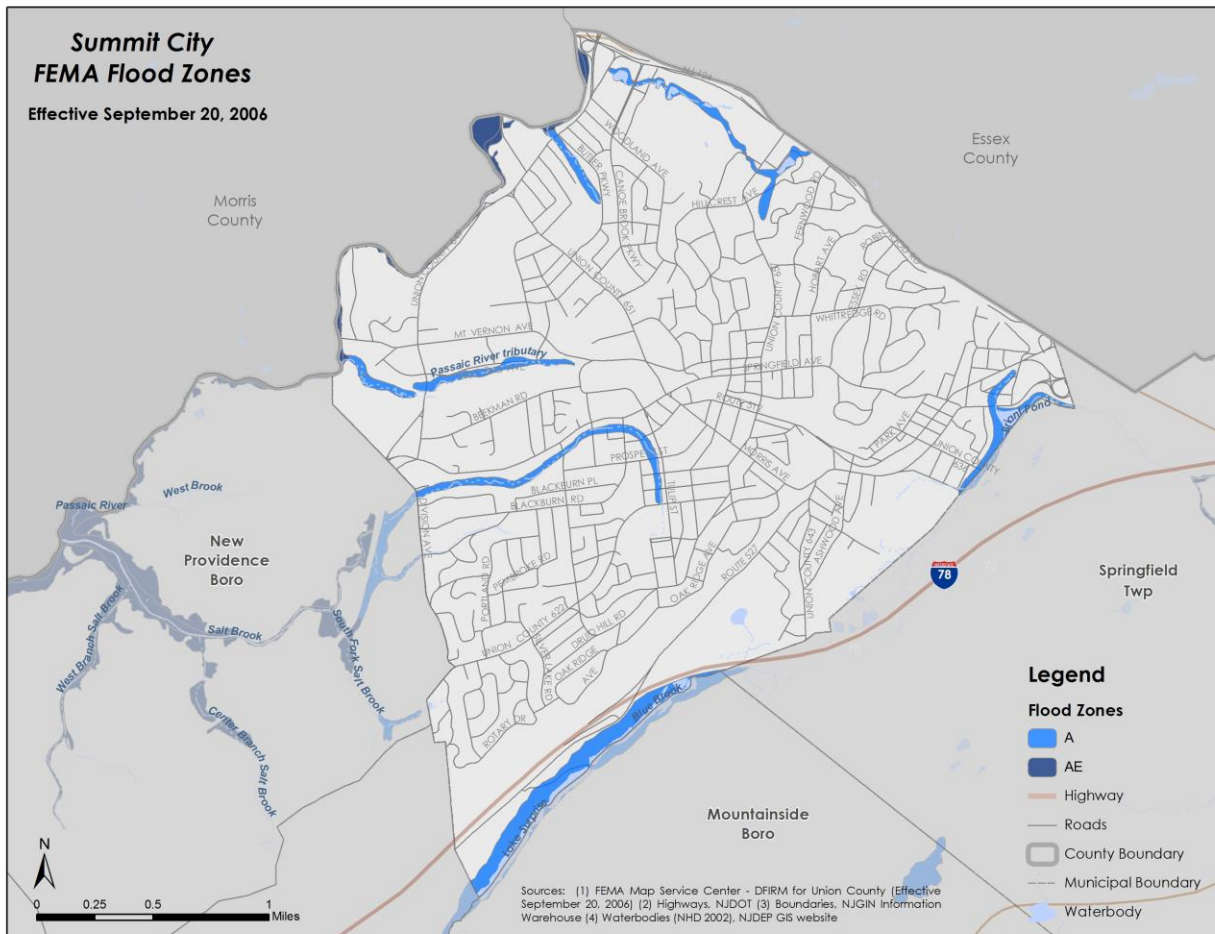
The City of Summit is not a member of FEMA's Community Rating System (CRS), a voluntary program for communities participating in the NFIP. The CRS is an incentive program that recognizes and encourages community floodplain management activities that exceed the minimum NFIP requirements. For CRS participating communities, flood insurance premium rates are discounted in increments of 5%

⁴ FEMA – Policy and Claim Statistics for Flood Insurance



based on credible activities.⁵ CRS communities are ranked between 1 and 10, with Class 1 communities receiving a 45% premium discount. The City is currently pursuing an application for the CRS program, which is noted in its mitigation strategy.

Figure 17-2
Effective FIRM, City of Summit



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.

⁵ FEMA – Community Rating System (CRS).



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, four (4) were located within Summit (3 of them are individual units in the apartment building); this comprises 0.6% of the County total. Table 17-10 provides a comparison of the residential repetitive loss claims for Union County and The City of Summit. The tables below include the number of repetitive loss properties, building and contents damages, the total number of claims, and the average claim amounts.

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. Table 17-11 provides a summary of the streets with the most cumulative repetitive loss flood insurance claims in Summit. The table includes the building, contents, and total claims data for the properties. Address data about individual sites is omitted for reasons of confidentiality.

Table 17-11
Summary of Residential NFIP Repetitive Loss Statistics, City of Summit
(Source: FEMA NFIP query February 2014)

Street Name	Building	Contents	Total	# Claims	Average
Morris Avenue	\$143,831	\$0	\$143,831	10	\$14,383

3.5.5 Flood Risk to Repetitive Loss Properties in the City of Summit

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 1999 and 2011, a period of 13 years.

As shown in Table 17-12, there have been 12 flood insurance claims in the 13-year period, for an average number of claims per year of 0.92. 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 \$166,272. 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 17-12
Projected 100-year Flood Risk to NFIP Repetitive Loss Properties in the City of Summit,
Based on Historic NFIP Claims
(Source: FEMA NFIP query February 2014)

Data	Value
Period in years	13
Number of claims	12
Average claims per year	0.92
Total value of claims	\$151,474
Average value of claims per year	\$11,652
Projected risk, 100-year horizon	\$166,272

3.5.6 Flood Risk to Severe Repetitive Loss Properties in the City of Summit

The definition of Severe Repetitive Flood Loss is included in the County portion of this mitigation plan. As of February 2014, the City of Summit has no severe repetitive flood loss properties.

3.6 Lightning

3.6.1 Type, Location and Extent

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 City of Summit, and there are no aspects of the hazard that are unique to this jurisdiction.

3.6.2 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 City of Summit with regard to occurrences or the future probability of this hazard.

3.6.3 Lightning Impacts and Vulnerabilities to the Hazard

Lightning impacts in City of Summit 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 City of Summit from lightning deaths and damages based on statistics described in this publication.

Table 17-13
Lightning-related Risks, City of Summit
Annual, 50- and 100-year Planning Horizons

Horizon	Deaths	Damages
Annual risk	\$11,880	\$7,652
50-year risk	\$163,943	\$105,602
100-year risk	\$169,526	\$109,199

3.6 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. Summit 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. 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.⁶ 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 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

⁶ National Park Service. Fire and Fuel Management: Definitions, ambiguous terminology and references.



- Moderate
- Low

Table 17-14 summarizes the fuel hazard for the City of Summit. 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 17-14
Wildfire-related Fuel Hazards in Summit
(Source: NJDEP (GIS), New Jersey Forest Fire Service)

Fuel Hazard	Square Miles	Acres
Extreme	0.04	22.67
Very high	0.03	17.99
High	3.55	2,272.36
Medium	0.51	324.26
Low	0.01	9.17
Total	4.14	2,646.44

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 Summit. 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.

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.



4. City of Summit Mitigation Strategy

This section contains goals, objectives, and action items for the City of Summit, 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 7.2 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: Work towards increasing the integration of mitigation principles and activities in a range of local regulations, plans, ordinances and activities.
- Objective 3.E: 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

The table below lists prioritized mitigation projects and actions identified by the City of Summit. This list was updated and prioritized through the Local Planning Committee.

4.3.1 Existing Mitigation Actions

Mitigation Action, Program, or Project	Hazard	Priority	Implementation Mechanism	Responsible Party	Target Start Date	Project Duration	Estimated Cost	Current Status
Backup generator for Department of Public Works	Extreme Weather / Flood	High	FEMA - HMGP	Engineering	Dec., 2014	3 months	\$100,000	Estimated start date for project is December 2014
Site Work/equalization tank at Department Of Public Works	Flood	Low	Floodplain Management	Summit DPW	2016	1- year	\$250,000	Not started
Retrofitting/reconstruction of Fire Department	High wind	High	Capital Improvement	Summit Fire Chief	Oct., 14	1-year	To be determined by engineer & architect	Currently in planning stage with an anticipate start date of October, 2015
Upgrade and improve channelization of the Salt Brook/West End Brook	Flood and Erosion	Low	NRCS	Engineering	2016	2-years	\$2 million-\$4 million	Partially complete. Completed Salt Brook at rear of #17, Sunset Drive. Slope stabilization and channel re-established.



Mitigation Action, Program, or Project	Hazard	Priority	Implementation Mechanism	Responsible Party	Target Start Date	Project Duration	Estimated Cost	Current Status
Improve drainage/conveyance along Plymouth Road, Memorial Field House, Laurel Avenue, Community Pool, Waldron venue, Kent Place Boulevard, Edgemont Avenue, W End Avenue	Flood	High	Floodplain Management	Engineering	2015	2-years	\$1 million	Completed section at Plymouth and Waldron Community Pool.
Spillway improvements at River Road (repair cycle - 2013)	Flood	Low	Floodplain Management	Engineering	2016	1-year	\$500,000	Project has been designed and permitting complete.
Conduct all-hazards public education and outreach program for hazard mitigation and preparedness.	All	High	Emergency Management	OEM Coordinator, in coordination with NJOEM		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
Undersized culverts and channels (Corridor between Golf Course and Spillway at River Road) Includes Canoe Brook Golf Course, Wallace Road, Canoe Brook Parkway	Flood	High	Local CIP	Engineering	2017	5 years	\$2 million
West End Sanitary Sewer Pump Station and holding tank to prevent sewage backups during rainfall events.	Flood	Medium	Local CIP	Engineering	2017	1 year	\$1 million



Mitigation Action, Program, or Project	Hazard	Priority	Implementation Mechanism	Responsible Party	Target Start Date	Project Duration	Estimated Cost
The Dell. City water discharges onto private property on Hobart Ave. and Edgewood Drive ID solution	Flood	Medium	Local CIP	Engineering	2019	1 year	\$500,000
Educate public about risks associated with tornadoes and actions to take in advance of tornado warning	High Winds/ Tornado	Medium	City Funds	Summit – OEM	2015	1 year	Minimal Resources and Staff time
Tree Survey/Inventory assessment along City ROWs	High Winds/ Winter Weather (ice)	Medium	City Funds	Engineering/D PW	2015	1-year	\$500,000
Join the CRS program	Flood	High	City Funds	Engineering	2015	1-year	Staff time and 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	CityHas (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 – State reqs
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
Real Estate Disclosure req.	Y – State reg
Other (e.g. steep slope ordinance, local waterfront revitalization plan)	Y – Steep Slopes
Freeboard	N
Cumulative Substantial Damages	N
Shoreline Management Plan	NA

4.4.2 Communication and Emergency Response

	Does the Borough have this (y/n)
Outdoor warning system	N
Nixle	Y
Auto-Dialer/Reverse 911/Emailer	Y
Social Media	Y
Website Updates	Y
Other Emergency Communications	Y
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 City have this expertise on staff?
Staff with expertise or training in benefit/cost analysis	N
Grant Writer(s)	N –in house
Emergency Manager	Y Coordinator
Professionals trained in conducting damage assessments	Y – Code Official
Scientist familiar with natural hazards in the municipality.	N
Personnel skilled or trained in “GIS” applications	Y
Surveyor(s)	N
NFIP Floodplain Administrator	Y – Engineer
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 City have this capability?
Community development Block Grants (CDBG)	N
Capital Improvements Project Funding	Y
Authority to Levy Taxes for specific purposes	Y
User fees for water, sewer, gas or electric service	Y
Impact Fees for homebuyers or developers of new development/homes	Not for mitigation purposes
Incur debt through general obligation bonds	Y
Incur debt through special tax bonds	N
Incur debt through private activity bonds	N
Withhold public expenditures in hazard-prone areas mitigation grant programs	N



5. Plan Maintenance and Adoption

5.1 Plan Maintenance

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

In addition to the annual progress report, the City of Summit 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 Linden 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 City.
- Copies of any grant applications filed on behalf of the City



5.1.2 Continued Public Input

The City of Summit 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 City 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 City of Summit's LPC shall ensure that:

- Copies of the latest approved Plan are available for review at City 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 City of Summit will post a notice on the City's website and invite the public to review and comment.
- For major changes involving City Council approval, the City 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 City Council approved the plan on [insert date]. The City'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.