Appendix 12: City of Rahway

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

1. Planning Process and Participation

The County formed a Steering Committee, which was responsible for key decisions during the plan update. This committee sent a letter to the Mayor of each municipality within the County. The Mayors and local officials selected a single individual to represent the town in the broader process. This person was the point of contact for the plan update, but worked with other municipal employees, consultants, volunteers, and other stakeholders throughout the planning process. This collection of participants, considered the local planning committee, is listed below. The committee was responsible for various decisions that informed the development of this appendix, including: prioritizing the natural hazards that can affect the community, reviewing and prioritizing the mitigation actions that are included in Table 12-1, and informing community leaders about the status of the County mitigation plan update, including this appendix

The City of Rahway 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 attended the kickoff meeting held by Princeton Hydro in May 2014. To further the plan development, the City Planning Committee met with Princeton Hydro to review the plan documents and revise the mitigation strategy in a workshop format on July 24th, 2014. 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 12-1
Local Planning Committee (Source: City of Rahway)

Name	Title	Organization
Tim Dunn	Deputy OEM Coordinator	City of Rahway
John Rodger	Chief of Police	City of Rahway
Jim Housten	City Engineer	Bohler Engineering
Samson Steinman	Mayor	City of Rahway
Cherron Rountree	Business Administrator	City of Rahway
	City Council	City of Rahway

2. Community Profile

The City of Rahway has a total area of 4.03 square miles and is located in southeastern Union County, New Jersey. Major transportation routes in Rahway include Route 1 and Route 27, and there is a railway station for the NJ Transit Northeast Corridor line. The Rahway River is a major feature, including the Rahway River Park that spans into neighboring Clark, NJ.

Rahway is the 6th most populous municipality in Union County. As of 2013, the population was estimated at 28,384. This is a 7.15 percent increase from the 2000 population, which was estimated at 26,500. See Section 3 of the 2016 Plan update for a map of Union County.

This City of Rahway began as outlying settlements of Elizabethtown and Woodbridge, and is possibly named for a Lenape Chief from the area. The area was important during the Revolutionary War, and Abraham Clark, one of the signers of the Declaration of Independence, is buried in the Rahway Cemetery. The construction of the railroad in the early 19th century contributed to the growth and development as an important stagecoach hub, to include an economic foundation on factories that produced stagecoach parts.[1] This industrial character continued through the first half of the 20th century with companies such as Merck, Purolator and others.

The Township of Rahway was created in 1804, and the City of Rahway was incorporated on March 12, 1858. Rahway follows the form of government with an elected Mayor and City Council. The Council consists of 9 members, six of whom are elected from Rahway's six wards, with the remaining three elected at-large.

2.1 Land Use and Development

Rahway is a community of mixed use development, with nearly 88.86 percent of its 4.04 square miles of land area classified as urban/developed. Over 85 percent of the parcels within Rahway are classified as residential, based on tax assessment data. Between 2004 and 2012, 1113 building permits were issued for residential homes within the City. This is 13.54 percent of the total building permits issued for Union County during this time period. Almost 23 percent of these permits were for 1- and 2-family homes. An additional 3800 permits have been issued since January Rahway has a population density of 7,026 people per square mile. The 2010 census estimates that 40.5 percent of the housing within the City was renter-occupied, higher than the County average of 30.5 percent renter-occupied properties.

The City reports that there are a number of redevelopment efforts within the jurisdiction, some of which are within floodprone areas. There are infill projects and new subdivisions, creating new commercial and residential opportunities within the City. The City reports at the time of this plan update there have been six new development projects, three of which are in floodprone areas. The City

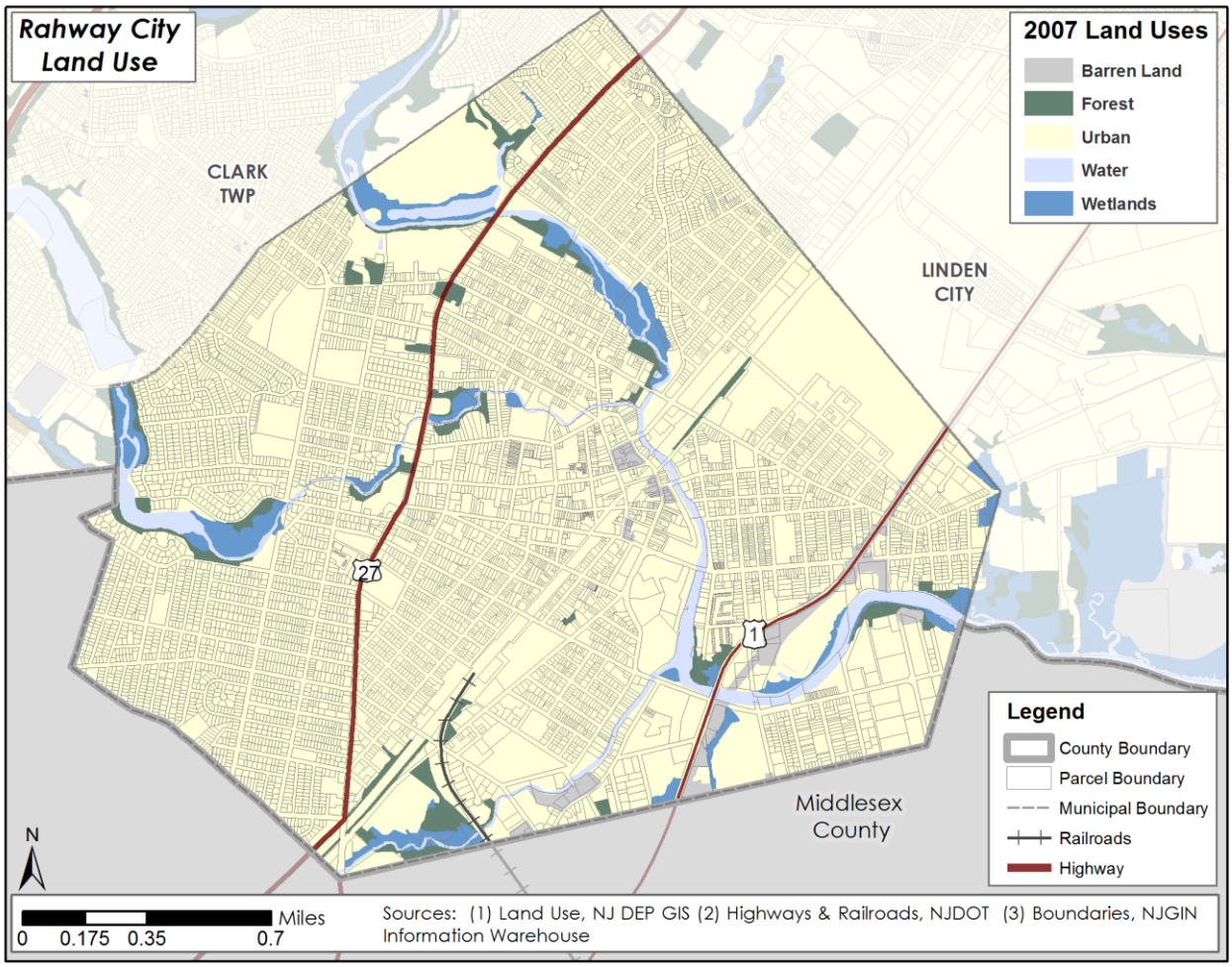
[1] Rahway History. http://www.cityofrahway.com/history1.htm.

has waterfront development regulations and floodplain development standards that meet State requirements to reduce risk to properties located in hazard areas.

Table 12-2
Land Use/Land Cover Trends (*NJDEP GIS, 2007*)

Land Cover Class	2002 *(acres)*	2007 *(acres)*	Percent Change	Percent of Total Land[2]
Agriculture	-	-	-	-
Barren Land	24.13	43.32	79.54%	1.67%
Forest	75.04	72.21	-3.76%	2.79%
Urban	2,315.29	2,298.78	-0.71%	88.86%
Water	88.71	88.95	0.26%	3.44%
Wetlands	83.02	82.92	-0.12%	3.21%

Figure 12-1
Land Use/Land Cover Map City of Rahway



3. Hazard Identification and Risk Assessment

This section of the Rahway 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 City of Rahway is potentially subject to the effects of all the hazards that are considered in this 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 appendices for each municipality, this requirement is met in the appendices, while risks that affect the entire County uniformly are discussed in the Section 4.

One of the first steps in developing these appendices was for the 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 12-3 shows Rahway's 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, 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 *none* are not addressed in this appendix because they are discussed in the Section 4, and there are no significant differences in risk between the County and the municipality.

Table 12-3
City of Rahway Hazard Identification and Prioritization

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

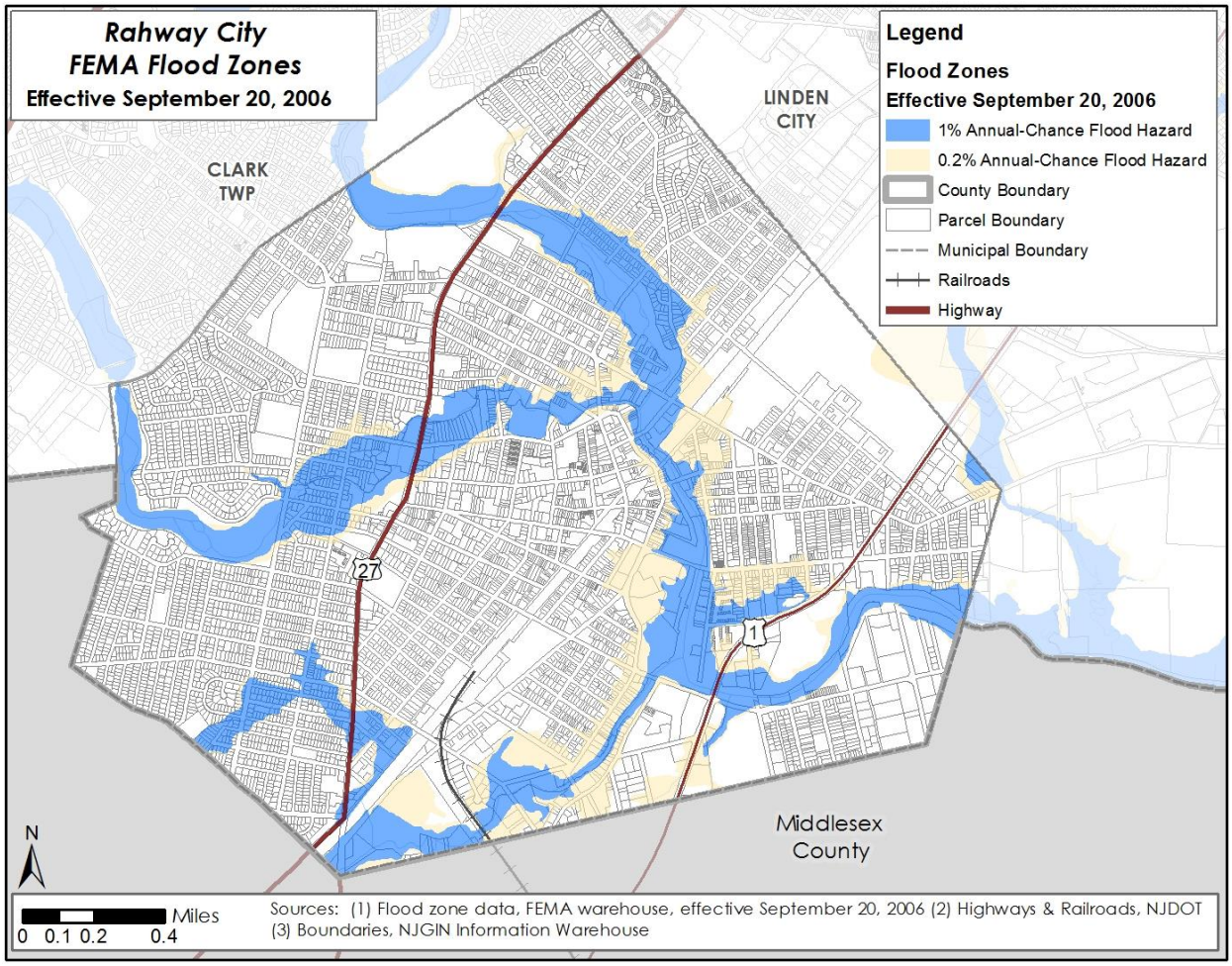
**Only the hazards ranked high and medium are analyzed in this appendix*

3.2 Flood Hazard

3.2.1 Type, Location and Extent

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. The effective FIRM is the official map of a community on which FEMA has delineated both the special hazard areas and the risk premium zones applicable to the community. The DFIRM data released in 2006 included updates to the Flood Insurance Study (FIS) based on revised hydrologic and hydraulic analysis for the Rahway River that was completed in March 2006. This map is shown in Figure 12-2 below.

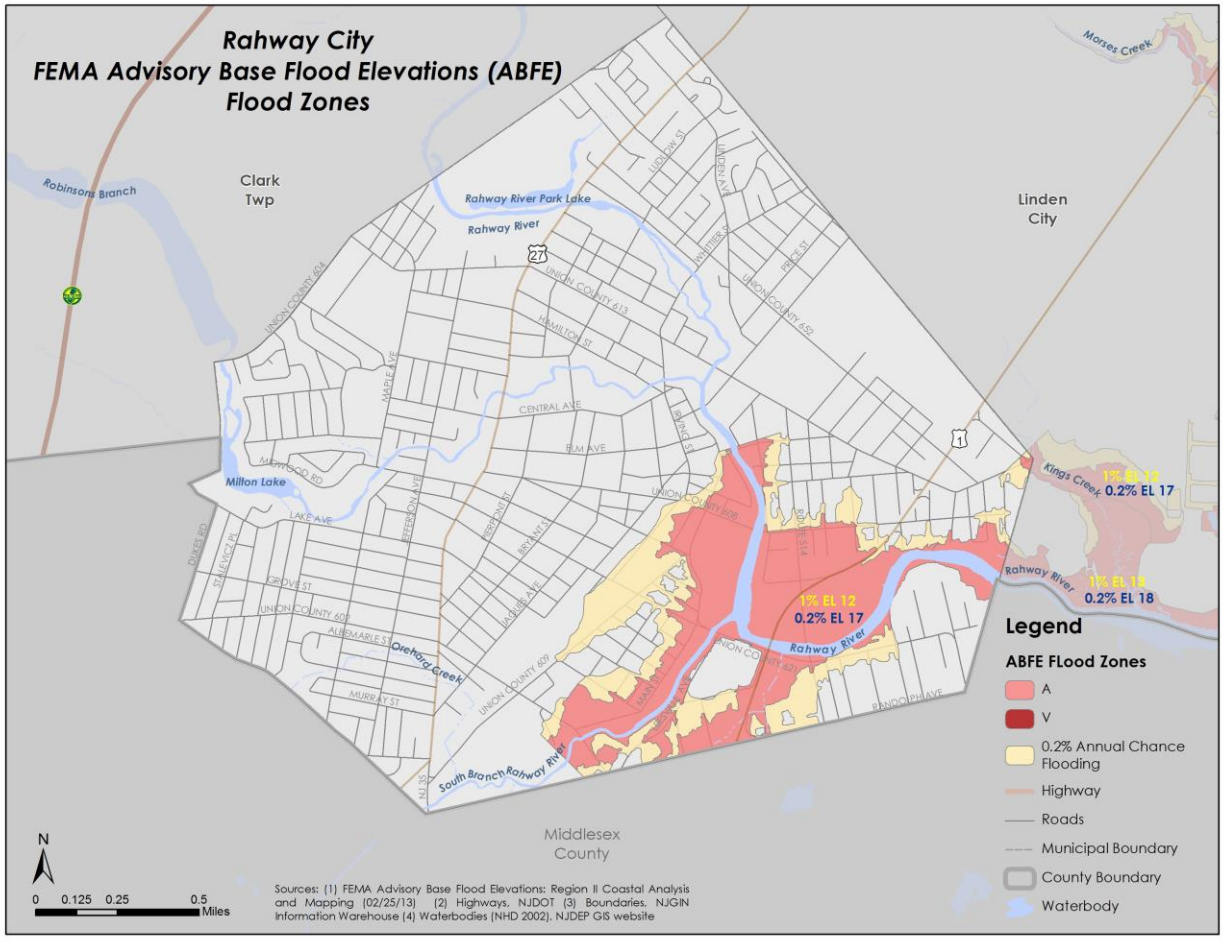
Figure 12-2
Effective FIRM City of Rahway



After Sandy, FEMA released *Advisory Base Flood Elevation (ABFE) maps* for certain communities based on the partially completed flood study that were designed to help with rebuilding and recovery efforts. The City of Rahway was one of these communities within Union County. The ABFEs are updated estimates of the 1% chance flood elevations derived from new coastal flood analysis and data. The data from the February 2013 release of the ABFE data is shown in Figure 12-3.[3]

As part of this mapping effort, the impoundment on the Rahway River was determined to be a levee-like structure and was not included in the modeling. This expands the Special Flood Hazard Area significantly along the eastern half of the River within the City. This is not necessarily the final Flood Hazard data for the City, but. at the time the mapping was done for this plan update, the data mapped was the best available. For the most recent information on the flood zones within the City, please contact City Hall.

Figure 12-3
ABFE Map City of Rahway



[3] At the time this analysis was performed for this plan update, this was the best data available.

Figure 12-4 compares the Effective FIRM with the ABFE flood zones. The pink areas cover land that was not previously designated as the 1% floodplain or Special Flood Hazard Area. If the ABFEs are adopted these areas would become subject to NFIP requirements and flood hazard regulations.

Figure 12-4
Comparison of FEMA Flood Maps
City of Rahway

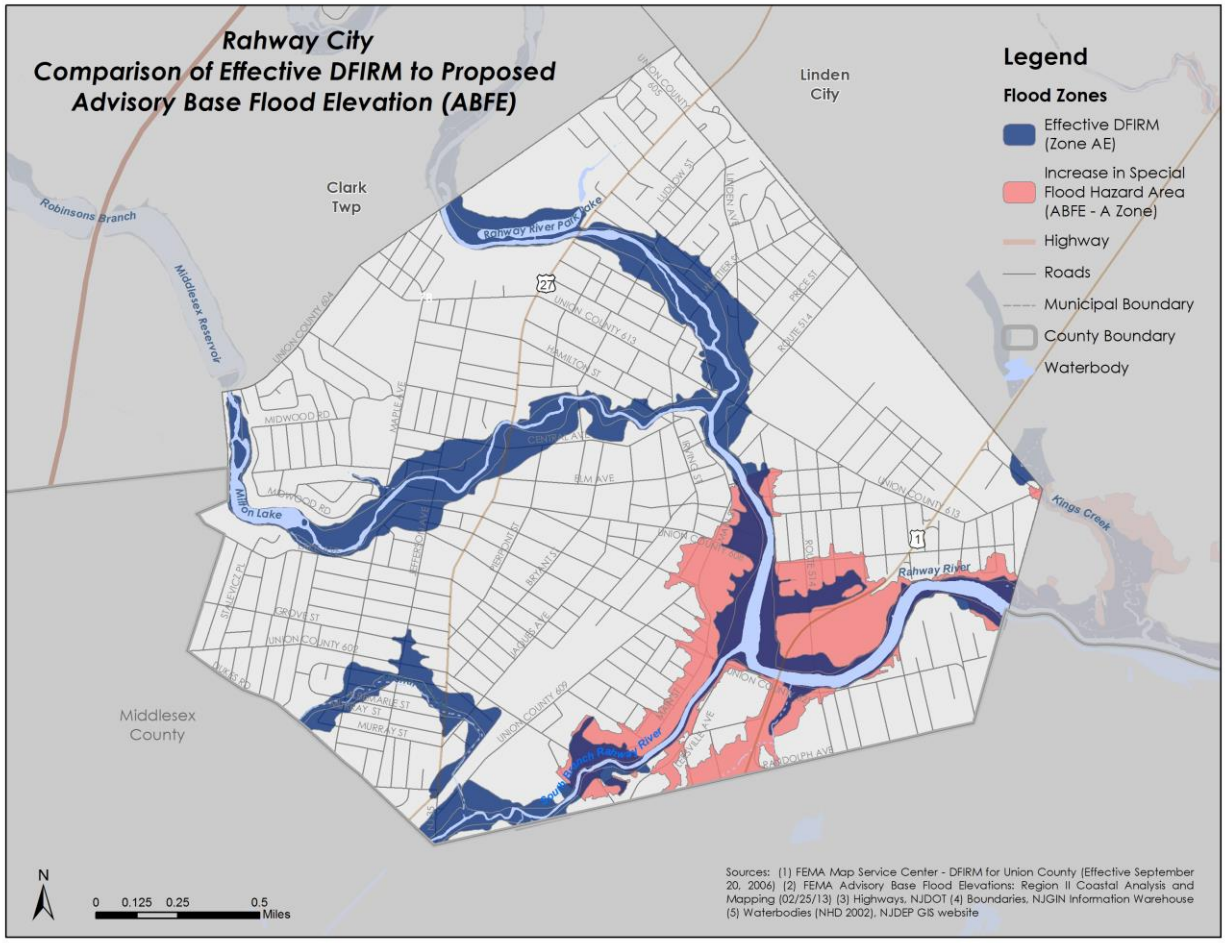
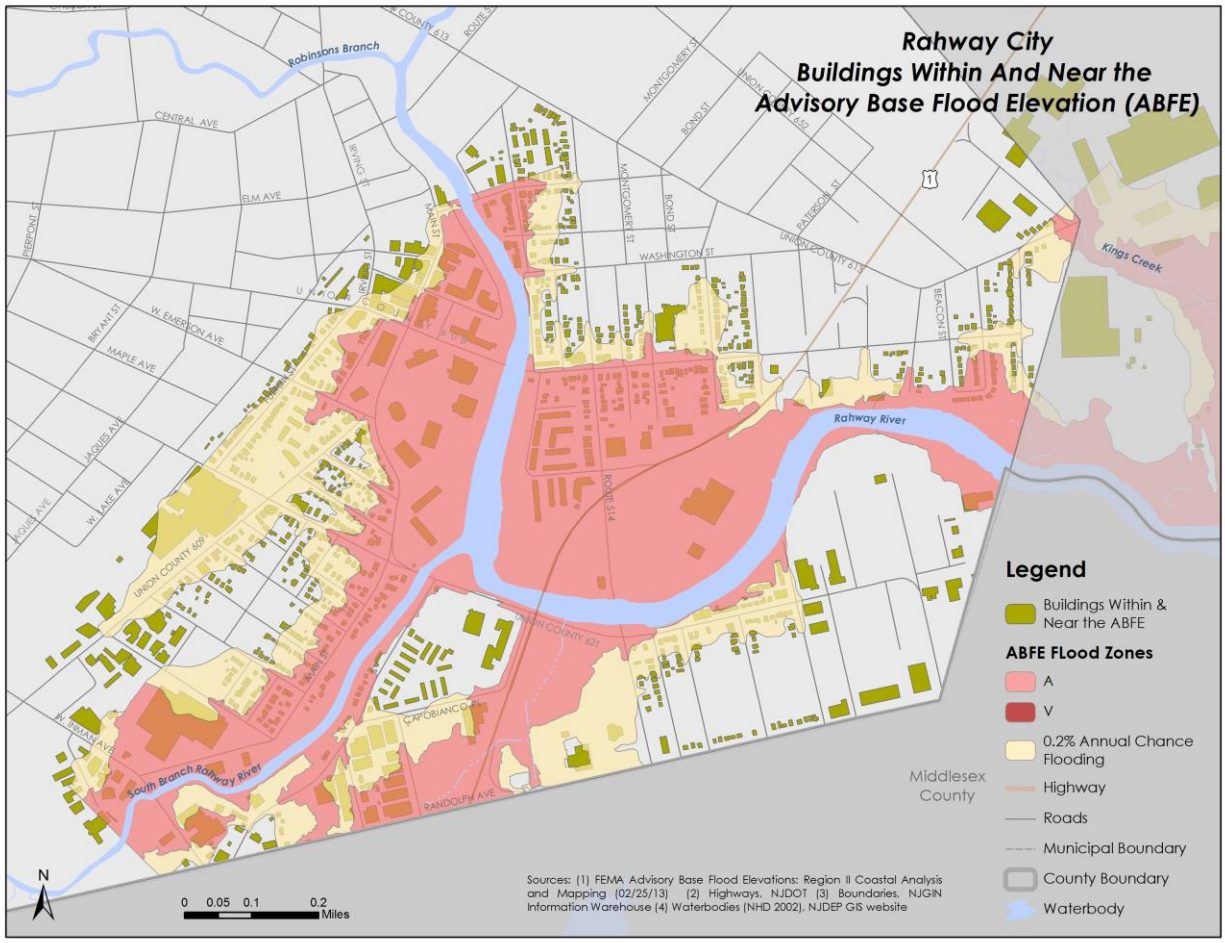


Figure 12-5 is a map of the ABFE data with the building footprints that were developed by NJDEP during this update of the flood mapping. At this time, building footprints are only available within the ABFE coastal study area from the NJDEP. Though the County has developed a GIS layer for the entire county.

At the time this plan was developed, the ABFEs were the best data available. As of January 30th, 2015 the PFIRM for Union County was released. There were no changes from the Effective FIRM to the PFIRM for the City of Rahway.

Figure 12-5
Sample of Building Footprints
Within the Advisory Base Flood Elevations



Current FEMA guidance uses the term extent as analogous to potential severity. Compared to most other jurisdictions in Union County, Rahway has a relatively large area of floodplain. Although it is difficult to deduce potential severity accurately, it is safe to assume that the extent of flooding in Rahway is significant; in more severe events such as tropical cyclones and nor'easters some areas can expect to have flooding of two feet or more. The current engineering design standard for the jurisdiction is a 25-year event (i.e. one with a 4% annual chance of occurring), so events more significant than that have the potential to inundate specific areas.

Table 12-4
Flood-prone Properties

Flood hazard area	Number of Parcels
100-year (1%) floodplain	600
500-year (0.2%) floodplain	428

Table 12-4 shows the number of parcels in The City of Rahway 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.

3.2.2 Previous Occurrences and the Probability of Future Floods

Minor flooding occurs in the City of Rahway 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, and can result in significant flooding. Notwithstanding the potential effects of climate change on weather 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 Rahway.

3.2.3 Flood Impacts and Vulnerability to Flooding

As discussed elsewhere, flood impacts in the City of Rahway are significant compared to other jurisdictions in Union County. Usually these impacts are limited to flooding of structures (especially basements) and roads. 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. As shown in Figure 12-, this community has numerous NFIP repetitive loss properties, distributed across most areas of floodplain. A basic review of NFIP claims for Rahway shows a wide range of claims

Table 12-5
NFIP Policies and Claims

Number of Parcels:	
Rahway:	8161
Union County:	199,489
Number of Policies In-Force:	
Rahway:	97
Union County:	6,055
Number of Claims:	
Rahway:	788
Union County:	5,560
Total Paid Claims	
Rahway:	$17,729,300
Union County:	$96,782,279
Repetitive Loss Properties:	
Rahway:	123
Union County:	729
Total Building	
Rahway:	
Union County:	$46,560,646
Total Contents	
Rahway:	
Union County:	$46,560,646
Number of Claims	
Rahway:	
Union County:	2,115
Average Claim	
Rahway:	$18,177.81
Union County:	$18,759,126

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.

3.2.4 National Flood Insurance Program and Repetitive Loss Properties

To provide a sense of the flood risk in a community it is also beneficial to summarize the policies in force and claims statistics from the National Flood Insurance Program (NFIP). The U.S. Congress established the NFIP with the passage of the National Flood Insurance Act of 1968. The NFIP is a Federal program enabling property owners in participating communities to purchase insurance as a protection against flood losses in exchange for State and community floodplain management regulations that reduce future flood damages. Participation in the NFIP is based on an agreement between communities and the Federal Government. If a community adopts and enforces a floodplain management ordinance to reduce future flood risk to new construction in floodplains, the federal government will make flood insurance available within the community as a financial protection against flood losses. The City of Rahway has been a member of the NFIP since 1971.

FEMA NFIP statistics indicate that as of February 2014, federal flood insurance policies were in-force on 97 properties in the City of Rahway. This represents a dollar value of property and contents coverage totaling $153,748,700. Between 1978 and 2014, there have been a total of 788 NFIP insurance claims in the City of Rahway with a total claims value of $17,729,300. Table 12-5 compares the number of policies in-force and paid claims in the jurisdiction. The Table shows that Rahway comprises 10.6% of the NFIP policies in-force in Union County.

The City of Rahway 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. Rahway has been a member of CRS since 1992, and is current a class 6 community.

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. Figure 12-6 shows all NFIP claims in The City of Rahway 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, 123 were located within Rahway; this comprises 17.4% of the County total. Table 12-5 provides a comparison of the residential repetitive loss claims for Union County and The City of Rahway. 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 City of Rahway has properties, and the total of claims on them is relatively small, as shown in Table 12-5. These properties are also shown in Figure 12-6.

The RL claims can be broken down by focusing on specific areas in the jurisdiction where flood losses are concentrated. Table 12-6 provides a summary of the streets with the most cumulative repetitive loss flood insurance claims in Rahway. The table includes the building, contents, and total claims data for the properties on streets with three or more repetitive loss properties. Address data about individual sites is omitted for reasons of confidentiality.

Table 12-6: Flood-prone Properties

Street Name	# Claims	Average
West Grand Avenue	34	$80,854
Main Street	30	$40,195
Central Avenue	51	$14,500
New Church Street	31	$12,653
Irving Street	14	$26,643
Hamilton Street	15	$21,242
Jefferson Avenue	19	$14,729
St. Georges Avenue	9	$23,826
Essex Street	18	$8,114
West Scott Avenue	11	$10,909
Linden Avenue	13	$7,379
Whittier Street	6	$14,397
Orchard Street	8	$10,288

3.2.5 Flood Risk to Repetitive Loss Properties in Rahway

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

As shown in Table 12-7, there have been 207 flood insurance claims in the 21-year period, for an average number of claims per year of 9.8. 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 $736,225. 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 12-7: Projected 100-year Flood,
Based on Past Flood Insurance Claims**

Data	Value
Period in years	21
Number of claims	207
Average claims per year	9.8
Total value of claims	$1,083,443
Average value of claims per year	$51,592
Projected risk, 100-year horizon	**$1,083,443**

3.2.6 Flood Risk to Severe Repetitive Loss Properties in Rahway

The definition of Severe Repetitive Flood Loss is included in the County portion of this mitigation plan. As of February 2014, the City of Rahway has nine severe repetitive flood loss properties. Claims history for these properties is from 1966 to 2011, a period of 16 years. The next table shows projected 100-year flood risk to SRL properties in Rahway based on the same methodology described in the repetitive loss section above.

**Table 12-8
Projected 100-year Flood Risk to NFIP Severe Repetitive Loss Properties in the City of Rahway
Based on Historic NFIP Claims
(Source: FEMA NFIP query February 2014)**

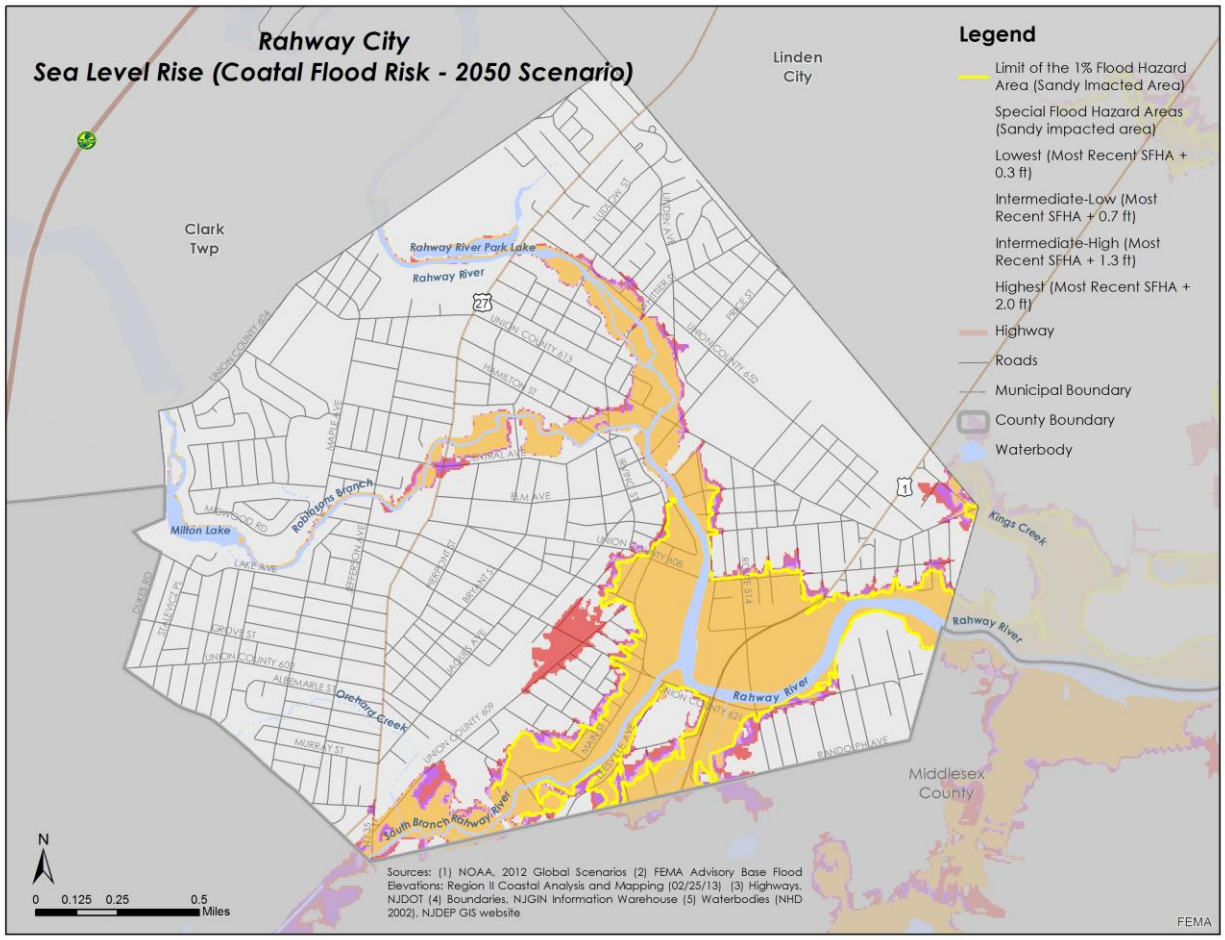
Data	Value
Period in years	16
Number of claims	45
Average claims per year	2.8
Total value of claims	$964,581
Average value of claims per year	$21,435
Projected risk, 100-year horizon	**$305,877**

Sea Level Rise

In addition to the updated flood hazard data (ABFE maps) developed by FEMA there is also the concern of sea level rise and the impacts of future flood events to coastal communities over the next 20 to 50 years and beyond. NOAA, in partnership with FEMA the United States Army Corp of Engineers (USACE) and several other agencies has created a set of map services and related tools to help communities, residents, and other stakeholders consider risks from future sea level rise in planning for reconstruction following Hurricane Sandy. Even if current storm patterns remain the same in the future, sea level rise will increase the impact of coastal flooding during storms. The following map, Figure 12-7, shows the sea level rise scenarios for year 2050. For maps of the entire coastal are for the County, see Section 4.

These maps provide best available elevation information for post-Sandy planning and rebuilding, as well as to support federal agency planning, as needed and applicable. These maps are not intended to support regulatory flood hazard zone designation, insurance ratings, or other legal or regulatory constraints. Rather, these maps and services support scenario planning that may help decision makers prepare for and adapt to uncertainties surrounding the future risks posed by sea level rise. They help make transparent the level of risk accepted under different scientific assumptions underlying the expected rate of sea level rise in the 21st century.[4]

Figure 12-7
Sea Level Rise in Rahway City

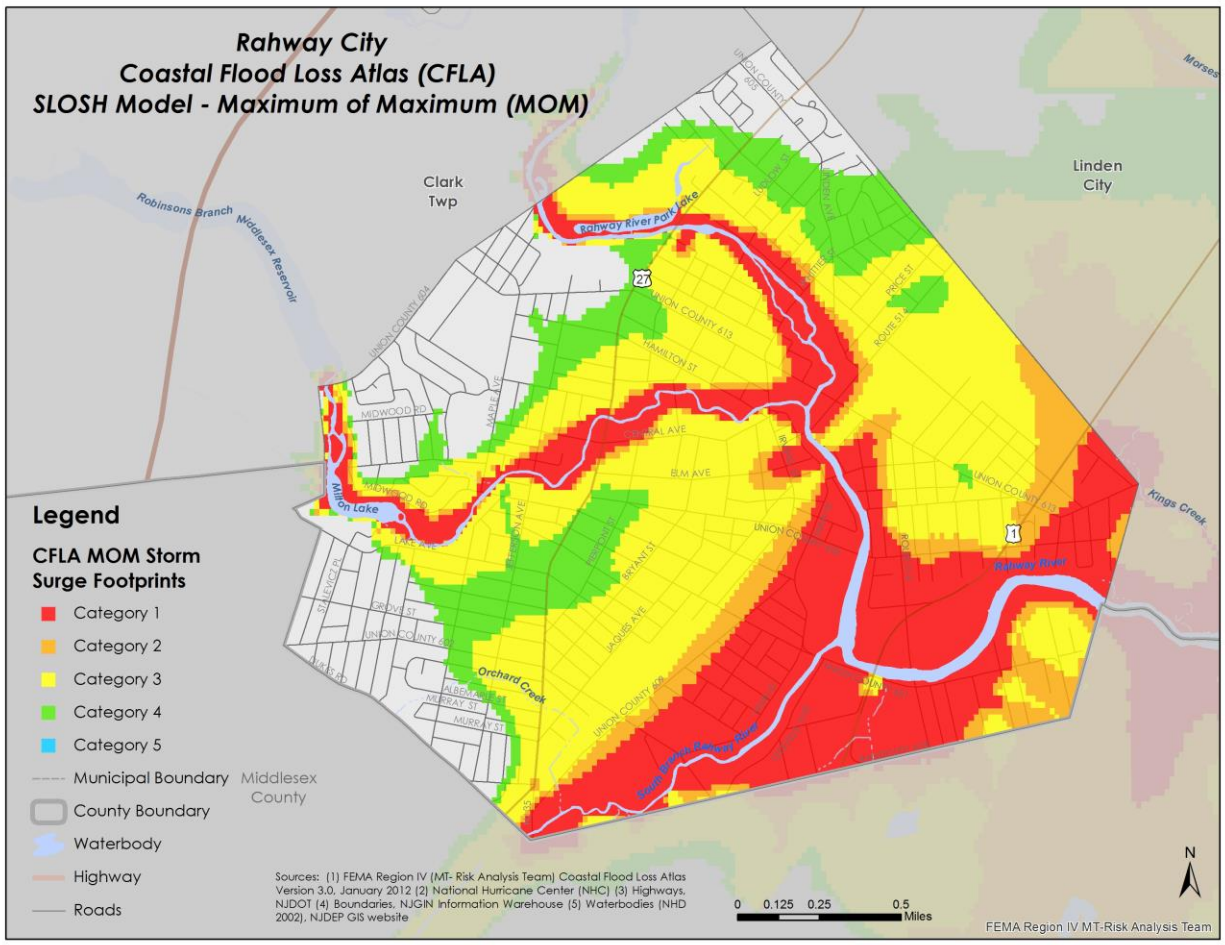


[4] NOAA – GeoPlatform. Sea Level Rise Planning Tool – New Jersey and New York

3.5 Storm Surge

As shown in Figure 12-8 below, the City of Rahway is subject to significant inundation related to storm surge, even during relatively high-probability Category 1 events. Based on this modeling (SLOSH – see main County plan for additional description), expected surge from Hurricane Category 1 and 2 events is closely related to mapped floodplains, but Category 3+ events extend over a much wider area, encompassing the majority of the City. A large percentage of the community is vulnerable to surge effects.

Figure 12-8
Storm Surge Map City of Rahway



3.4 Straight Line Wind Hazard

3.3.1 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 the City of Rahway.

3.4.1 Previous Occurrences and the Probability of Future Occurrences

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

3.4.2 Straight Line Wind Impacts and Vulnerabilities to the Hazard

The City of Rahway 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 12-9 below summarizes annual straight-line wind risks and cumulative risks over 50- and 100-year planning horizons in the City of Rahway. Risks are in seven discreet categories: building damages, contents damages, inventory loss, relocation costs, business income lost, rental income lost and wages lost.

Table 12-9
Straight-line Wind Risks for Range of Loss Types,
City of Rahway
Annualized and 50- and 100-year Planning Horizons

Occupancy Class	Total SF	Total Annualized Damages	50-year Risk	100-year Risk
Residential	$13,174,949	$335,151	$4,625,415	$4,782,265
Commercial	$3,504,392	$59,463	$820,648	$848,477
Industrial	$1,651,284	$25,212	$347,954	$359,754
Agricultural	$26,653	$395	$5,446	$5,631
Religious	$281,267	$4,535	$62,594	$64,716
Government	$119,692	$2,249	$31,045	$32,098
Education	$210,745	$3,276	$45,215	$46,749
Total	$18,968,982	$430,282	$5,938,317	$6,139,689

The next table shows power loss risks in the City of Rahway, 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 12-10
Power Loss Horizons

Period	Risk Value
Annual	$329,574
50-year planning horizon	$4,548,367
100-year planning horizon	$4,702,774

3.4 Dam Failure

As indicated in the County Section of the Plan, Robinson's Branch Reservoir Dam is listed as one of the three high hazard dams. Even though the reservoir and the dam are located in Clark Township, vast majority of the exposed lives and property are located in the downstream are of City of Rahway.

Figure 12-9 is a map of Robinson's Branch Reservoir Dam located along Robinson's Branch. The map identifies the land use/land cover for the census blocks intersecting a 500-foot wide stream buffer.

Figure 12-9
Robinson's Branch Reservoir Dam
Land Use / Land Cover for Census Blocks Intersecting a 500 Foot-Wide Buffer (Source: NJDEP)

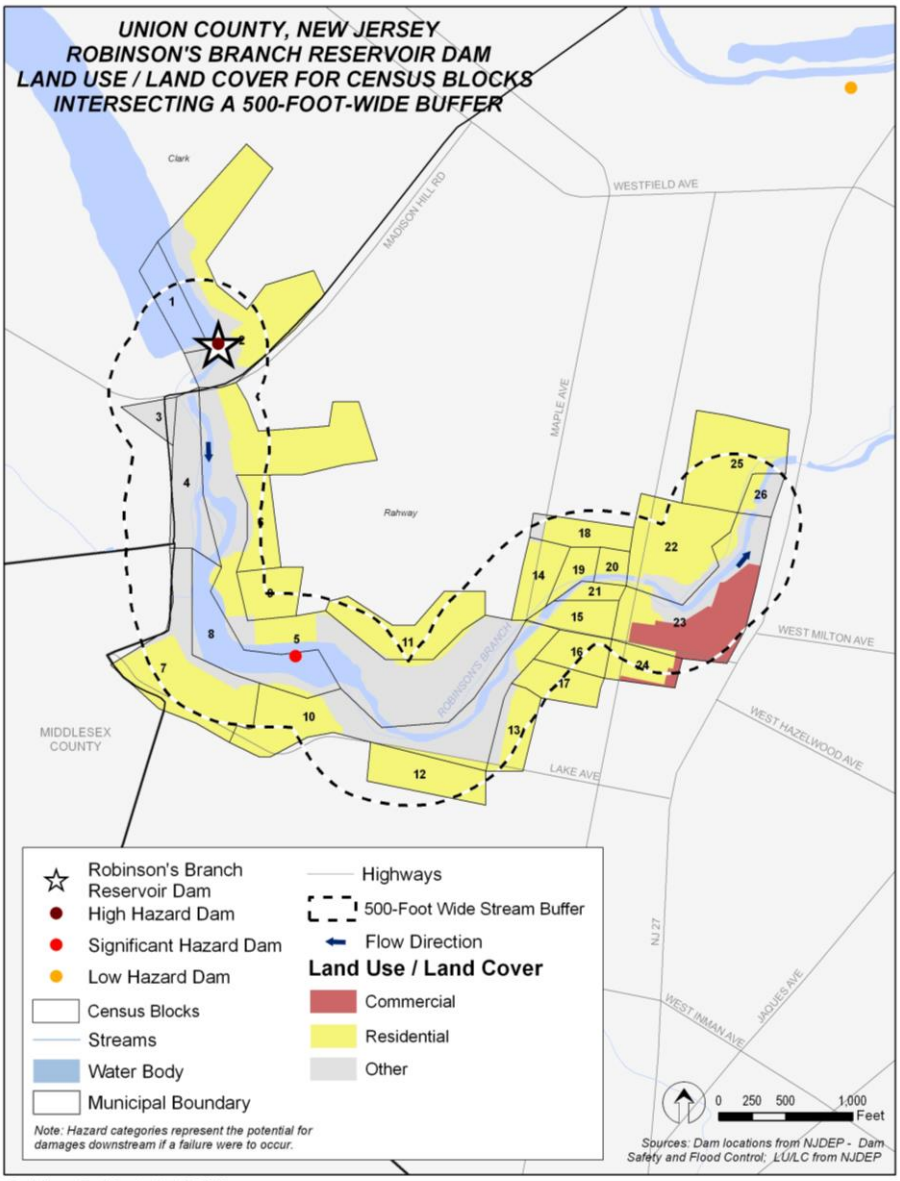


Table 12-11 identifies the population and housing units for each of the 26 census blocks included on the Robinson's Branch Reservoir Dam map. There are a total of 1,256 residents and 477 housing units within the selected census blocks located along the 500-foot-wide stream buffer downstream of Robinson's Branch Reservoir Dam.

Table 12-11
Population and Housing Units for Selected Census Blocks Intersecting the 500-Foot-Wide Stream Buffer Downstream of Robinson's Branch Reservoir Dam
(Source: US Census Bureau – 2000 Population)

Map ID	Block Number	Population	Housing Units
1	4997	0	0
2	4006	184	64
3	4023	0	0
4	2012	0	0
5	2006	168	66
6	2005	66	24
7	2011	24	11
8	2999	0	0
9	2007	41	12
10	2010	98	38
11	2008	69	25
12	3000	67	27
13	4003	46	18
14	3005	38	13
15	3009	50	15
16	3010	0	0
17	4002	47	18
18	3004	75	27
19	3006	19	7
20	3007	0	0
21	3008	15	8
22	3002	91	33
23	3001	23	9
24	3011	40	27
25	2015	97	35
26	2016	0	0
Total	**----**	**1,258**	**477**

Table 12-12 identifies the number of acres within each of the 26 census blocks for the four land use categories identified on the Robinson's Branch Reservoir Dam map. The table shows that the residential land use category has the highest acreage within the selected census blocks.

Table 12-12
Land Use/Land Cover (in acres) for Selected Census Blocks Intersecting the 500-Foot-Wide Stream Buffer Downstream of Robinson's Branch Reservoir Dam
(Source: NJDEP – Land Use Land Cover)

Map ID	Block Number	Commercial (Acres)	Other (Acres)	Residential (Acres)	Grand Total
1	4997	0	3.77	0	3.77
2	4006	0	6.76	13.22	19.97
3	4023	0	1.72	0	1.72
4	2012	0	6.58	0.01	6.59
5	2006	0	24.17	14.77	38.94
6	2005	0	0.37	3.46	3.83
7	2011	0	3.88	9.28	13.16
8	2999	0	8.61	0.51	9.11
9	2007	0	0.04	3.64	3.68
10	2010	0	9.54	7.67	17.21
11	2008	0	0.07	7.47	7.53
12	3000	0	0.00	5.55	5.55
13	4003	0	0.93	2.95	3.88
14	3005	0	0.05	3.50	3.55
15	3009	0	0.35	2.80	3.16
16	3010	0	0	3.00	3.00
17	4002	0	0.02	3.34	3.37
18	3004	0	0.44	2.92	3.36
19	3006	0	0.09	1.81	1.90
20	3007	0	0.24	1.18	1.42
21	3008	0	0.21	1.04	1.26
22	3002	0	1.63	8.83	10.46
23	3001	7.27	4.32	2.94	14.53
24	3011	0.58	0	2.65	3.23
25	2015	0	0.30	9.19	9.49
26	2016	0	1.14	0.69	1.82
Total	**----**	**7.85**	**75.24**	**112.40**	**195.49**

3.6 Winter Weather Hazard in the Community

3.6.1 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 the City of Rahway, 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 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 The City of Rahway with regard to occurrences or the future probability of these hazards.

3.6.3 Severe Storm – Winter Weather Impacts and Vulnerabilities to the Hazard

The impacts from these three hazards in the City of Rahway 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 the City of Rahway 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 the City of Rahway 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 12-13
Winter Storm-related Risks (traffic injuries and fatalities), City of Rahway
50- and 100-year Planning Horizons

	Injuries (combined)	Deaths
Snow/sleet	$3,755,857	$426,520
Icy pavement	$2,922,086	$321,693
Snow/sleet	$2,816,553	$283,423
Total annual risk (all hazards)	$9,494,496	$1,031,636
50-year risk	$131,024,049	$14,236,574
100-year risk	$135,486,462	$14,721,443

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 12-14
Risks from Hypothermia, City of Rahway
Annually and 50- and 100-year Planning Horizons

2010 Population	% of US	Annual Death $	50-year Horizon	100-year Horizon
27,346	0.0086%	$737,897	$10,182,978	$10,529,789

3.7 Public and Critical Facilities

Facility Name	Street Address
Rahway Hospital	865 Stone St.
Rahway Sta.	
G. Cleveland Sch.	486 E. Milton Ave.
Rahway H.S.	1012 Madison Ave.
Rahway Sta.	
Mun. Bldg. & Police H.Q.	1 City Hall Plaza
Franklin Sch.	1809 St. Georges Ave.
Pub. Lib.	
Madison Sch.	944 Madison Ave.
Fire H.Q.	1300 Main St.
P.O. 07065	123 E. MiltonAve.
Rahway M.S.	Kline Place
Roosevelt Sch.	811 St. Georges Ave.
Walter Ulrich Memorial Pool	St. Georges Ave.

4. City of Rahway Mitigation Strategy

This section contains goals, objectives, and action items for the City of Rahway, 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 City of Rahway in the 2010 HMP planning process.

Mitigation Action, Program, or Project	Hazard	Priority	Implementation Mechanism	Responsible Party	Project Duration	Estimated Cost	Current Status
Storm-water management system upgrade and improvement along Central and St. George's Streets (Robinson's)	Flood	High	Floodplain Management	Rahway DPW	1-2 Years	$400,000	Awaiting funding
Storm-water management system upgrade and improvement along the upper end section of Irving Street	Flood	High	Floodplain Management	Rahway DPW	1-2 Years	$450,000	Awaiting funding
Flood proofing of homes along Central Avenue, Lawrence Street, Elm Avenue, Main Street, Whittier Street, Orchard Street, Plainfield Avenue, Minna Street, Monroe Street, Irving Street, Hamilton Street, New Church Street, St Georges Avenue, Jefferson Avenue, W Scott Avenue, Linden Avenue, Essex Street, W Milton.	Flood	High	Floodplain Management	Rahway	2-10 Years	$100,000 per unit	*The City has applied for grants for acquisition and elevation projects in these areas. This effort is ongoing.*
Conduct all-hazards public education and outreach program for hazard mitigation and preparedness.	All	High	Emergency Management	OEM Coordinator, in coordination with SCOEM	One Year	Staff Time	*Public outreach has been done since it will result in additional protection of people and property form flooding hazards. Outreach has been accomplished by sharing of existing information on flood hazards in the City through new mediums including the City's Cable Station and Website.*
City Hall and Rahway Police Department - replace existing generator and elevate same above flood level; provide mobile connector for emergency generator hook-up; install sewer check valve to eliminate basement flooding	Flood		Capital improvement	DPW	1-2 Years	$200,000	*Complete*

Mitigation Action, Program, or Project	Hazard	Priority	Implementation Mechanism	Responsible Party	Project Duration	Estimated Cost	Current Status
Dock Street Sanitary Sewer - replace existing generator and elevate same above flood level; raise electrical controls above flood level	Flood		Capital improvement	DPW	1-2 Years	$200,000	*Complete*
Maple Ave Firehouse- replace existing generator	All		Capital improvement	DPW	1-2 Years	$100,000	*Complete*
Main Street Firehouse- provide mobile connector for emergency hook-up	All		Capital improvement	DPW	1-2 Years	$25,000	*Complete*
Recreation Center - replace gymnasium hardwood floor with vinyl floor, which is more flood-resistant	Flood		Capital improvement	DPW	1-2 Years	$450,000	*Complete*
Acquire traffic signal and trailer-mounted emergency generators	All		Capital improvement	DPW	1-2 Years		*Some trailer-mounted generators have been acquired, however the effort is 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
At this time, the City is planning to adopt in the near future an ordinance to allow the City to more definitively limit what property owners are permitted to do in terms in changing the direction or quantity of stormwater on their properties that may impact downstream or adjacent properties, which the City has identified as having a compounding effect.	Flood		Regulations	Administration/ Code Enforcement		1-2 years	Staff time
Work with adjacent municipalities to reduce flooding within the watershed. The City is an active participant in the Mayor's Council on Watershed Flood Control Project, which was formed after Hurricane Irene's devastation. The Council works to prevent future flooding, one of the options is to consider additional detention within the South Mountain Reservoir.	Flood			Administration			Staff time
Acquisition and/or elevation of properties in floodplain areas	Flood	High		Administration/NJDEP			Varies

4.3.3 Additional Mitigation Actions

In addition to the new actions and original actions above, there are a few projects that have been implemented since 2010.

Action Item: Inspection and maintenance of drainage systems have been increased from twice a year to every three months, on or about March 15th, June 15, September 15th, and December 15th. Implementation: Inspection and maintenance of the City's drainage systems are conducted by the Department of Public on a routine basis. Further, the City is currently completing the cleaning of a 6 'x8' storm sewer culvert.

a) Action Item: The City will continue its on-going maintenance of the Flood Control projects including:

1. Re-leveling the levee – ***complete***
2. Replacement of sluice gates along the levee
3. Vegetation control – *continues annually*
4. Elevation of generators and float controls at storm stations – ***complete***
5. Service and/or replacement of sluice gates at storm stations – ***complete***
6. Flood control panels are stored in one vehicle to efficiently install the flood panels as needed – ***complete***
7. Elevate pump controls at the stormwater pump stations

Action Item: The City continues to conduct yearly Emergency Flood Control Drills to test the response and functioning of the Emergency Operations Plan for the City's flood control levee project during significant flood events. The drill is a valuable tool to identify any potential aspects of the Emergency Operations Plan that are need of modification. Since the drills have been conducted on a yearly basis and adjustments, have been made, the response time has dropped from 4-hours to only 1-hour, including setup of the entire flood gate system. In addition, the City has upgraded their emergency response vehicles.

Action Item: The County has completed the rehabilitation of the Central Avenue bridge, the replacement of the Maple Avenue bridge, the replacement of the Milton Avenue and Lawrence Street bridges, and the proposed replacement of the Jefferson, E. Inman A venue and Monroe Street bridges will allow for continued access to the areas served by these bridges in times of flooding, thereby eliminating or minimizing a public safety hazard. Currently, the County is planning to reconstruct the East Hazelwood Avenue Bridge to elevate it further above the flood stage

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	City 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)	N
Stormwater Management Plan/Ordinance	Y
Comprehensive Plan / Master Plan	Y (2003)
Capital Improvements Plan	Y
Site Plan Review Requirements	Y
Habitat Conservation Plan	N
Economic Development Plan	Y
Local EOP	Y (9/16/14)
Continuity of Operations Plan	Y
Post Disaster Recovery Plan or Ordinance	FEMA
Wildfire Protection Plan	State DEP
Real Estate Disclosure req.	State
Other (e.g. steep slope ordinance, local waterfront revitalization plan)	N
Freeboard	Y
Cumulative Substantial Damages	Y
Shoreline Management Plan	N

4.4.2 Communication and Emergency Response

	Does the City 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	Y – limited
Shallow water boats	Y - County

4.4.3 Staff/Personnel

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

4.4.4 Fiscal Capabilities

Fiscal Mechanism	Does the City 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	Y
Impact Fees for homebuyers or developers of new development/homes	Y
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 Rahway 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 Rahway 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:

- Any changes to mitigation actions and strategies as a result of the new mapping,
- Hazard events and losses in Rahway 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 Rahway 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 post a link on its website to the plan update.

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 Rahway'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 Rahway 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.

5.2 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 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.