



## Appendix 24: Township of Woodbridge

The Township of Woodbridge participated in the 2015 Middlesex County Hazard Mitigation Plan (HMP) update. This appendix includes the locally-specific information about the Township. The following sections detail the planning process and participants; the current population, building stock, and land development trends; hazards that specific to the Township and corresponding risk assessments; the Township’s mitigation strategy, and a local capability assessment.

### 1. Plan Development

On March 25, 2015, the Business Administrator signed an “Intent to Participate” letter and assigned the OEM Director as a point of contact for the HMP update. This individual worked with other municipal employees through the formation of a Local Planning Committee, as listed below. The local planning committee filled out the municipal worksheets included in Appendix E and worked to gather the necessary information to support the plan update. The LPC met with the Plan consultant to review the risk assessment and mitigation strategy for the Township.

In addition to the information provided by the LPC, the Township Master Plan, and Codified Ordinances were used in the update.

**Table 24-1: Township of Woodbridge Local Planning Committee Members**

Name	Title	Organization
Patrick Kenny	OEM Director	Township of Woodbridge
Dennis Henry	Director of Public Works	Township of Woodbridge
Scott Thompson	Engineer	Township of Woodbridge
Stacy Hofmann	Grant Writer	Township of Woodbridge



## 2. Community Profile

### 2.1 Physical Location

The Township of Woodbridge has a total area of 24.51 square miles and is located in the northeast region of Middlesex County, New Jersey. Woodbridge borders Edison, Perth Amboy and Sayreville in Middlesex County, as well as Clark, Linden and Rahway in Union County. A portion of Woodbridge Township borders the Arthur Kill waterway, with Staten Island as the border on the other side.

Woodbridge has many primary transportation routes passing through the Township, to include Route 1, Route 9, Route 27, The Garden State Parkway, the New Jersey Turnpike, and two bridges over the Raritan River. New Jersey Transit provides bus service and the New Jersey Turnpike is accessible via Exit 11, along with the Grover Cleveland and Thomas Edison rest areas. There are three train stations in Woodbridge: Avenel, Metropark and Woodbridge. The Avenel and Woodbridge stations serve the Jersey Coast Line and the Metropark Station serves the Northeast Corridor Line for both NJ Transit and Amtrak.

#### 2.1.1 Hydrography and Hydrology

Woodbridge Township is located entirely in the Raritan River Basin. Within Woodbridge Township there are two major watercourses. Woodbridge Creek flows north to south, is tidally influenced, and drains into the Arthur Kill. The northeastern and central sections of the Township drain into this system, which is located in the Woodbridge Creek subwatershed. The South Branch of Rahway River flows south from Edison Township and then crosses into Rahway Township before ending in the Rahway River. The southern portion of Woodbridge Township drains directly into the Raritan River, and observes direct effects of tide changes.

### 2.2 History and Governance

The Township of Woodbridge was formally incorporated on February 21, 1798. Woodbridge was the first township in what is now New Jersey, and was incorporated in 1798 from the original charter and parts of what are now Edison and Carteret. The Township is governed under the Mayor-Council form of government, and has an elected Mayor and nine Council members. The Mayor is elected directly to a four-year term of office. Town Council members are elected with four (4) at-large and five (5) elected to from Township Wards. They serve four-year terms on a staggered basis, with two seats coming up for election every year. The Township Council holds monthly meetings open to the public where it discusses legislation under consideration.



## 2.3 Demographics

### 2.3.1 Population Trends

According to the U.S. Census Bureau, the population in 2010 was 99,585.<sup>1</sup> This is a 2.5% increase from 2000. The Township of Woodbridge has a population density of 4,290 persons per square mile. It is the 11th densest municipality within the County. A summary of major population and household characteristics may be found in the following tables.

**Table 24-2: Township of Woodbridge Population Summary Estimates (2010 Census)<sup>2</sup>**

Population	Quantity	Percent of Municipal Population
Total Population	99,585	100
Median Age	38.6	N/A
17 years and under	21,556	21.6
65 years and over	12,591	12.6
<b>Race</b>		
White	58,935	59.2
Black/African-American	9,810	9.9
Native American/Alaskan Native	321	0.3
Asian	22,324	22.4
Native Hawaiian/Pacific Islander	39	0.0
Other Race (unspecified)	5,254	5.3
Two or More Races	2,902	2.9
Hispanic or Latino	15,562	15.6

Population statistics may further reveal potential vulnerabilities in the community. The following table details the distribution of two groups included in vulnerable population analyses (children and the elderly) according to household description. Residents living alone, particularly the elderly, may have fewer coping mechanisms and resource than those in household groups, therefore may constitute a demographic that could require assistance in mitigating their vulnerability.

**Table 24-3: Township of Woodbridge Household Characteristics Summary Estimates (2010 Census)<sup>3</sup>**

Households	Quantity	Percent of Total
Total Households	34,615	100
Family Households (related)	25,752	74.4
Family Households w children under 18	11,622	33.6
Non-Family Households (unrelated)	8,863	25.6
Non-Family Households, living alone	7,414	21.4
Non-Family Households, living alone Male over 65 years	830	2.4
Non-Family Households, living alone Female over 65 years	2,285	6.6

<sup>1</sup> U.S. Bureau of the Census. American Fact Finder "Woodbridge Township, NJ". <http://factfinder.census.gov/>. Retrieved 9/8/15.

<sup>2</sup> Ibid.

<sup>3</sup> Ibid.



### 2.3.2 Vulnerable Populations

Vulnerable populations include those groups that may require special assistance, considerations, accommodation or other needs during emergency events to facilitate their effective and safe compliance with emergency instructions. This includes, but is not limited to, those individuals needing mobility assistance (strollers, wheelchairs, etc.), those with financial needs (cannot afford hotel rooms, food, necessities, during evacuation periods, etc.), those requiring translation or interpretation services to understand emergency information (non-English-speaking populations, Deaf and hard of hearing), persons considered legal minors, those persons with cognitive impairments, persons with specialized medical needs (electric dependent equipment, refrigerated medications, use of Personal Assistants for routine and basic care, medical transportation needs, etc.), and populations with social disadvantages other needs that may require unique considerations during emergency events.

Identifiable vulnerable populations in Woodbridge include (but may not be limited to) the following:

**Table 24-4: Township of Woodbridge Vulnerable Population Estimates (2010)**

Population Type	Population Estimate (2010 Census) <sup>4</sup>
Under 5 years of age	6,187
Under 18 years of age	21,556
Over 65 years of age	12,591
Limited English Proficiency (LEP)	14,119 (equals 15.1% of population over 5 years old)
Institutionalized	3,091
Living in Group Quarters	29

In addition to these statistics, approximately 6.4% of the population lives below the poverty line. The mean household income is \$89,668, with the per capita income at approximately \$31,569 (2013 estimates).<sup>5</sup>

## 2.4 Land Use and Development

Woodbridge is a large municipality comprised of several regions and neighborhoods. Nearly 80 percent of the land area has been classified as urban, which includes a mixture of industrial, commercial, and residential land uses. The Township is highly active in ongoing redevelopment projects of its underutilized parcels and older industrial areas. As seen in the table below, the urbanized land cover is not growing substantially, but the composition of the Township is changing. The Township is also actively pursuing acquisitions and mitigation projects to reduce future vulnerability. These recent endeavors are not reflected in the numbers below.

<sup>4</sup> Ibid.

<sup>5</sup> U.S. Bureau of the Census. American Fact Finder “Woodbridge Township, NJ”. <http://factfinder.census.gov/> . Retrieved 9/8/15.



**Table 24-5: Township of Woodbridge Land Cover Summary**

Land Cover Class	Percent of Total Land <sup>6</sup>	2002 (acres)	2007 (acres)	2012 (acres)	Percent Change <sup>7</sup>
Agriculture	0.00%	2.38	2.38	0.00	-100.00%
Barren Land	1.90%	293.47	310.16	292.63	-0.29%
Forest	7.53%	1381.12	1191.37	1157.91	-16.16%
Urban	79.71%	11976.87	12165.70	12250.15	2.28%
Water	3.67%	543.32	555.62	563.90	3.79%
Wetlands	7.18%	1170.88	1142.81	1103.45	-5.76%

### 2.4.1 Open Space

Woodbridge is a large Township with several parks and conservation areas. The data used for this plan update was prepared by the County and the State of New Jersey, it does not include acquisition of land after 2012. At the time of this data, the Township had less than 10 percent of its Special Flood Hazard Area preserved. The Township has undergone acquisitions through the New Jersey Blue Acres program in three target neighborhoods: Watson Crampton Neighborhood, South Roberts Neighborhood, and the Saints Field Neighborhood. In 2015 the Township had plans prepared for all three neighborhoods as part of the expansion of open space areas in these neighborhoods. The Township will continue to work the County and the State to acquire additional repetitive loss properties in these high-risk areas.

### 2.4.2 Building Stock Overview

Woodbridge is an older community, built to maximize the access to waterfront for regional industry. The adjacent neighborhoods were built to support these industrial waterfront operations. Over 75 percent of the homes had been built before 1979, which means these properties are likely pre-FIRM.

**Table 24-6: Township of Woodbridge Housing Statistics**

Housing Characteristics	Estimate
Total Occupied Housing Units	34,204
Percent Owner-occupied	66.56
Percent Renter-occupied	33.44
Percent built after 2000	5.5
Percent built before 1979	77.4

<sup>6</sup> Percent based on acres of land in 2012

<sup>7</sup> Change is calculated between 2002 and 2012



### **2.4.3 Recent and Expected Development**

The Township of Woodbridge has a dynamic land use pattern at present. There are a number of redevelopment areas and other areas that are being restored to natural open space. The Township has protections in place to minimize the risk to future buildings and is working to mitigate existing structures with vulnerabilities to flooding, storm-surge, and sea level rise.

## **2.5 Critical Facilities and Infrastructure**

### **2.5.1 Essential Facilities**

The Township owns and operates several facilities for municipal services including a Municipal complex, which houses the Police Department and Emergency Operations Center. There is also a Department of Public Works facility, community centers, fire stations, and rescue squad buildings. The Township has worked to install generators in fire stations and other critical facilities to ensure back-up power and continued operation of critical services during hazard events.

### **2.5.2 Transportation**

Woodbridge Township has a number of transportation routes that run through the municipality. Major roadways include the Garden State Parkway, the New Jersey Turnpike, U.S. Routes 1 and 9, and State Route 35. The extension of 287 that turns into 440 in Woodbridge, before crossing the Outerbridge Crossing into Staten Island. There are also both passenger and freight railroad lines in the Township. NJ Transit operates a number of bus lines through areas of Woodbridge.

### **2.5.3 Critical Utilities and Infrastructure**

The Township's water supply is serviced through the Middlesex Water Company, with the exception of a small number of people who use private wells. The Water Company uses surface water from the Delaware and Raritan Canal for the majority of its water. This water is supplemented by the Company's provisions of groundwater. The Township has worked with Middlesex Water Company to clean and reline the waterlines throughout sections of the Township. PSE&G is the sole provider of electricity in Woodbridge, while Elizabethtown Gas provides natural gas to residents.

Wastewater collection is provided by both the Rahway Valley Sewerage Authority (RVSA) and Middlesex County Utility Authority (MCUA). The Township owns 20 pump stations.



### 3. Hazard Identification and Risk Assessment

This section describes the natural hazards and risks that can affect the Township of Woodbridge. Like all the other municipalities in Middlesex County, Woodbridge is potentially subject to the effects of all the hazards that are considered in this mitigation plan. However, only a few of these hazards have significant impacts that are unique to the community. The remaining hazards are discussed in detail in the County part of 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 Middlesex County HMP update includes separate appendices for each municipality, this requirement is met in the appendices, while risks that affect the entire County uniformly are discussed in the County part of the HMP.

**Table 24-7**  
**Township of Woodbridge**  
**Hazard Identification and Prioritization**

<b>Hazard</b>	<b>Priority</b>
Coastal Erosion	-
Dam/Levee Failure	-
Drought	L
Earthquakes	L
Extremely High Temps	M
Extremely Low Temps	M
Floods*	H
Hurricanes/Tropical Storms*	H
Nor’easters	H
Power Outages	H
Severe Weather	M
Hazardous Substances	L
Wildfire	-
Winter Storm	M

#### 3.1 Background and Hazard Rankings

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. The planning team also reviewed hazard-specific data at the jurisdiction level to provide communities with insight about which hazards would be afforded detailed risk assessments. Municipalities ranked the list of hazards as high, medium, low, or no concern.

Table 24-7 shows community hazard rankings. To the extent possible, the level of discussion and detail about specific hazards in this section are based on these rankings. However, in many cases there is insufficient hazard information available at the level of the jurisdiction to allow detailed discussion or risk estimates. For some hazards there is limited jurisdiction-level tabular data included in the County portion of the HMP, and users should refer to those subsections for more detail. The hazards marked with asterisks in the table above are included in this appendix; the others are included in the County portion of this HMP, but not discussed in detail here.



## 3.2 Flood Hazard

### 3.2.1 Type, Location, and Extent

The Township of Woodbridge is located in northern Middlesex County. Geographically it is one of the larger jurisdictions in Middlesex County. There are multiple flood sources, including Arthur Kill to the southeast; the Raritan River to the south; the south Branch of the Rahway River, in the northwest corner of the Township; Woodbridge Creek in the eastern third of the jurisdiction; and Heards Brook in the central area. The community is exposed to tidal and surge flooding from Arthur Kill and the Raritan River, and overbank (and to some degree, surge) from the other flood sources.

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. At the time the Middlesex County HMP was being updated, the effective FIRM for the Township of Woodbridge is dated July 6, 2010. While the effective FIRM is the approved map and is used for regulatory purposes, the Middlesex County hazard mitigation plan update was developed in 2015, and the best available flood mapping at that time was the FEMA revised Preliminary Flood Map (released on January 30, 2015). This map is shown below in Figure 24-1. There is a significant amount of floodplain in the jurisdiction, including some areas of coastal “V-zone” where high winds may increase wave action.

Table 24-8 provides some basic information about floodplain and parcels in Woodbridge.

**Table 24-8**  
**Floodplain and Parcel Data for Woodbridge Township**  
(Source: FEMA Region II, Coastal Analysis and Mapping, Preliminary FIRM, January 2014)

Data Type	Value
Jurisdiction area in square miles	24.01
Square miles within 100-year floodplain	5.54
Jurisdiction area within 100-year floodplain	18.93%
Number of parcels in jurisdiction	29,474
Number of parcels with centroids within 100-year floodplain	1,193
Parcels with centroids within 100-year floodplain	4.05%

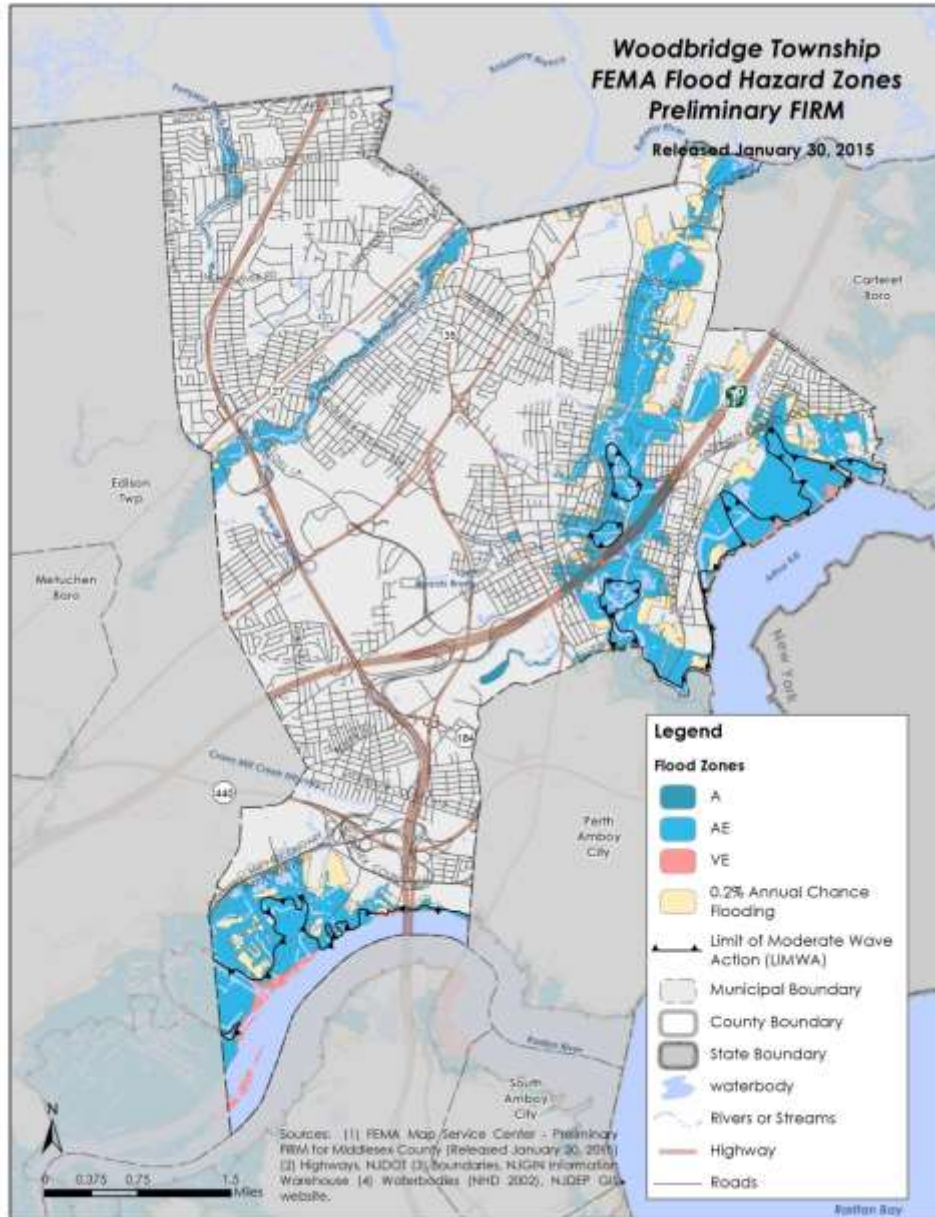
[Note: the table refers to centroids, which are the geographic center of a parcel. This is a better indicator of flood exposure than simple intersection with the floodplain, although it does not necessarily mean that any structures or infrastructure are within the boundaries of the Special Flood Hazard Area].

Current FEMA guidance uses the term *extent* as analogous to potential severity. The extent of the flood hazard in Woodbridge is significant, particularly in localized internal areas where overbank flooding from streams has caused flooding up to several feet deep on numerous occasions.





**Figure 24-1**  
**Woodbridge portion of FEMA Revised Preliminary Flood Insurance Rate Map**  
(Source: FEMA Region II, Coastal Analysis and Mapping, Preliminary FIRM, January 2014)





**Table 24-9  
NFIP Policies and Claims**

<b>Number of Parcels:</b>	
Woodbridge:	29,474
Middlesex County:	283,276
<b>Number of Policies In-Force:</b>	
Woodbridge:	592
Middlesex County:	4,489
<b>Number of Claims:</b>	
Woodbridge:	494
Middlesex County:	3,478
<b>Total Paid Claims</b>	
Woodbridge:	\$14,241,347
Middlesex County:	\$109,727,837

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

Woodbridge Township has experienced many floods over the years, with notable ones in 1999 (related to Hurricane Floyd), 2010 (March Nor'easter), 2011 (Tropical Storm Irene) and 2012 (Hurricane Sandy). These events are described in more detail in the main part of the County hazard mitigation plan. Less serious and localized flooding has occurred in many other years, although the effects have not been nearly as widespread as the events mentioned above. The probability of flooding in some part of Woodbridge will remain very high for the foreseeable future. Although the coastal areas have evidently experienced less damage than inland, the probability of floods in the future will probably increase with the effects of sea level rise.

### 3.2.3 Flood Impacts and Vulnerabilities to Flooding

The impacts from past floods in this jurisdiction have been very significant, particularly in the east central area depicted in Figure 24-2 below. In that area and a specific location in the northeast part of the jurisdiction, flooding has happened frequently and will severe impacts.

### 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). There is a discussion of the NFIP in the County section of this hazard mitigation plan. Woodbridge has been a member of the NFIP since 1972.

FEMA NFIP statistics indicate that as of February 2015, federal flood insurance policies were in-force on 592 properties in Woodbridge. Between 1978 and 2015, there have been a total of 494 NFIP insurance claims in the jurisdiction, with a total claims value of \$14,241,347.<sup>8</sup> Table 24-9 compares the number of policies in-force and paid claims in the jurisdiction. The table shows that Woodbridge comprises 14% of the NFIP policies in-force in Middlesex County. The average NFIP claim in Woodbridge (\$28,828) is slightly less than the County average of \$31,549.

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

<sup>8</sup> FEMA – Policy and Claim Statistics for Flood Insurance



based on creditable activities.<sup>9</sup> CRS communities are ranked between 1 and 10, with Class 1 communities receiving a 45% premium discount.

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.

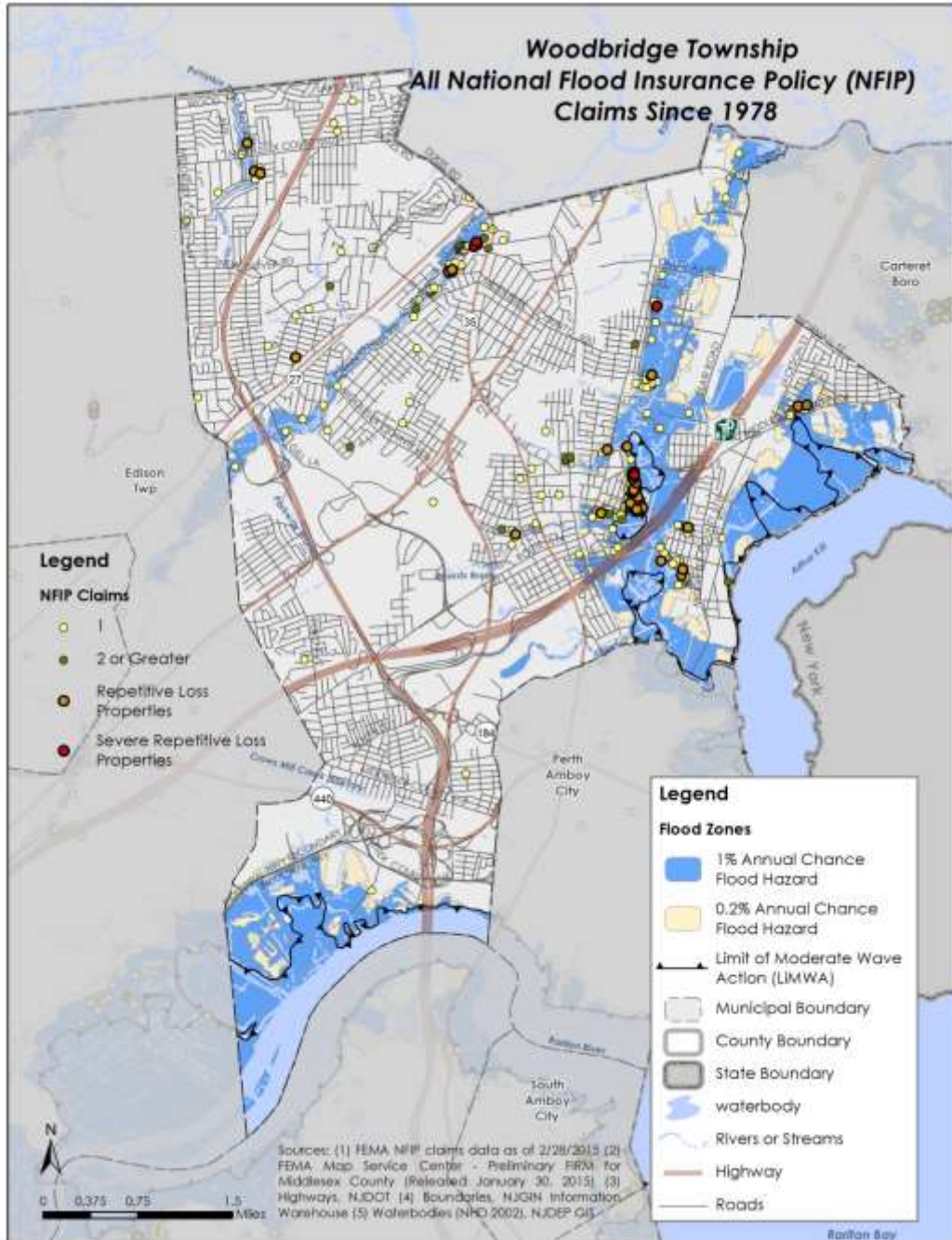
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<sup>9</sup> FEMA – Community Rating System (CRS).



Figure 24-2 shows all NFIP claims in Woodbridge between 1978 and 2015.

**Figure 24-2**  
**Map of NFIP Claims in the Township of Woodbridge (1978 to 2015),**  
**Including Repetitive Loss and Severe Repetitive Loss Properties**  
(Source: FEMA National Flood Insurance Program, February 2015)





### 3.2.5 Flood Risk to Repetitive Loss Properties in Woodbridge

**Table 24-10  
NFIP Policies and Claims**

<b>Repetitive Loss (RL) Properties:</b>	
Woodbridge:	42
Middlesex County:	429
<b>Total Building (RL)</b>	
Woodbridge:	\$7,990,668
Middlesex County:	\$44,015,885
<b>Total Contents (RL)</b>	
Woodbridge:	\$662,668
Middlesex County:	\$5,106,609
<b>Number of Claims (RL)</b>	
Woodbridge:	137
Middlesex County:	1,322
<b>Average Claim (RL)</b>	
Woodbridge:	\$59,198
Middlesex County:	\$37,158
<b>Severe Repetitive Loss (SRL) Properties:</b>	
Woodbridge:	12
Middlesex County:	112
<b>Total Building (SRL)</b>	
Woodbridge:	\$6,632,697
Middlesex County:	\$16,236,097
<b>Total Contents (SRL)</b>	
Woodbridge:	\$25,417
Middlesex County:	\$1,045,153
<b>Number of Claims (SRL)</b>	
Woodbridge:	61
Middlesex County:	541
<b>Average Claim (SRL)</b>	
Woodbridge:	\$105,871
Middlesex County:	\$31,943

FEMA requires a discussion of NFIP Repetitive Loss and Severe Repetitive flood loss statistics in hazard mitigation plans. In 2012, the Biggert Waters act redefined repetitive loss property as a structure covered by a contract for flood insurance made available under the NFIP that has incurred flood-related damage on two occasions, in which the cost of the repair, on average, equaled or exceeded 25% of market value of the structure at the time of each such flood event. This definition is being used to prioritize properties for mitigation funding. The data about Repetitive Loss properties in this subsection are based on the previous definition. Under the revised definition above, Woodbridge has six RL properties. See Section 4 of the County portion of this HMP for more details on repetitive loss properties in the County.

The flood risk assessment in this section is based in part on analysis of NFIP data on repetitive flood loss properties. As of February 2015, Middlesex County had 429 such properties based on a query of the FEMA BureauNet NFIP interface. Of this total, 42 properties were located within Woodbridge; this comprises 9.8 percent of the County total. Table 24-10 provides a comparison of the residential repetitive loss claims for Middlesex County and Woodbridge. 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 42 repetitive loss properties in Woodbridge were responsible for a total of 137 insurance claims, totaling \$8,110,134. Table 24-11 provides summary repetitive loss statistics for the community.



**Table 24-11**  
**Repetitive Loss Statistics in the Township of Woodbridge and Middlesex County**  
(Source: FEMA National Flood Insurance Program, February 2015)

City/County Name	Properties	Total Building	Total Contents	Total Losses	# of Claims	Average Claim
Township of Woodbridge	42	\$7,990,668	\$119,466	\$8,110,135	137	\$59,198
Middlesex County	429	\$44,015,885	\$5,106,609	\$49,122,494	1,322	\$37,158

The next table shows the streets in Woodbridge with the most repetitive loss insurance claims. For reasons of confidentiality, this mitigation plan does not show specific addresses.

**Table 24-12**  
**Streets in the Township of Woodbridge with Highest Numbers and Amounts of NFIP Claims**  
(Repetitive Loss Properties)  
(Source: FEMA National Flood Insurance Program, February 2015)

Street Name	Building	Contents	Total	# of Claims	Average
Crampton Avenue	\$115,670	\$1,014	\$116,684	8	\$14,585
Ronald Drive	\$5,495,600	\$0	\$5,495,600	30	\$183,187
Vesper Avenue	\$319,709	\$4,474	\$324,183	9	\$36,020
Watson Avenue	\$638,682	\$29,133	\$667,815	27	\$24,734

The next table provides the results of a simple risk projection for repetitive loss properties. This is done by annualizing past insurance claims and using this as the basis for estimating future losses. This method employs standard FEMA statistical techniques, and may be used for developing a sense of flood risk, i.e. total future losses over the 100-year planning horizon. The results below should be considered general and preliminary. It is possible to complete more accurate risk assessments for specific projects using FEMA software and methodologies, combined with information about sites and facilities.

**Table 24-13**  
**100-Year Risk Projection for NFIP Repetitive Loss Properties in the Township of Woodbridge**

Data	Value
Period in years	23
Number of claims	137
Average claims per year	5.96
Total value of claims	\$8,110,135
Average value of claims per year	\$352,615
<b>Projected risk, 100-year horizon</b>	<b>\$5,031,810</b>



### 3.2.6 Flood Risk to Severe Repetitive Loss Properties in Woodbridge

Severe Repetitive Flood Loss was also redefined in the Biggert Waters Act as properties that have “incurred flood-related damage for which four or more separate claims payments have been made under flood insurance coverage under this title, with the amount of each claim exceeding \$5,000, and with the cumulative amount of such claims payments exceeding \$20,000; or for which at least two separate claims payments have been made under such coverage, with the cumulative amount of such claims exceeding the value of the insured structure.” The data about Severe Repetitive Loss properties in this subsection are based on the previous definition. Under the revised definition above, Woodbridge has seven SRL properties. Table 24-14 provides basic information about the SRL properties in this jurisdiction. SRL properties are also shown graphically in Figure 24-2 above.

**Table 24-14**  
**Statistics on NFIP Severe Repetitive Loss Properties in the Township of Woodbridge**  
(Source: FEMA National Flood Insurance Program, February 2015)

City/County Name	Properties	Total Building	Total Contents	Total Losses	# of Claims	Average Claim
Township of Woodbridge	8	\$6,156,714	\$14,680	\$6,171,394	45	\$137,142
Middlesex County	77	\$14,512,761	\$910,122	\$15,422,883	385	\$40,059

The next table shows the street in Woodbridge with the most NFIP severe repetitive loss insurance claims. For reasons of confidentiality, this mitigation plan does not show specific addresses.

**Table 24-15**  
**Street in the Township of Woodbridge with Highest Numbers and Amounts of NFIP Claims**  
**(Severe Repetitive Loss Properties)**  
(Source: FEMA National Flood Insurance Program, February 2015)

Street Name	Building	Contents	Total	# of Claims	Average
Ronald Drive	\$5,495,600	\$0	\$5,495,600	30	\$183,187

The next table shows the results of a simple risk (future losses) projection for severe repetitive loss properties. This is done by annualizing past losses and using this as the basis for estimating future losses. This method uses standard FEMA techniques, and may be used for developing a sense of flood risk. The results below should be considered general and preliminary. It is possible to complete more accurate risk assessments for specific projects using FEMA software and methodologies.



**Figure 24-16**  
**100-Year Risk Projection for NFIP Severe Repetitive Loss Properties in the Township of Woodbridge**

Data	Value
Period in years	21
Number of claims	45
Average claims per year	2.14
Total value of claims	\$6,171,394
Average value of claims per year	\$293,876
<b>Projected risk, 100-year horizon</b>	<b>\$4,193,609</b>

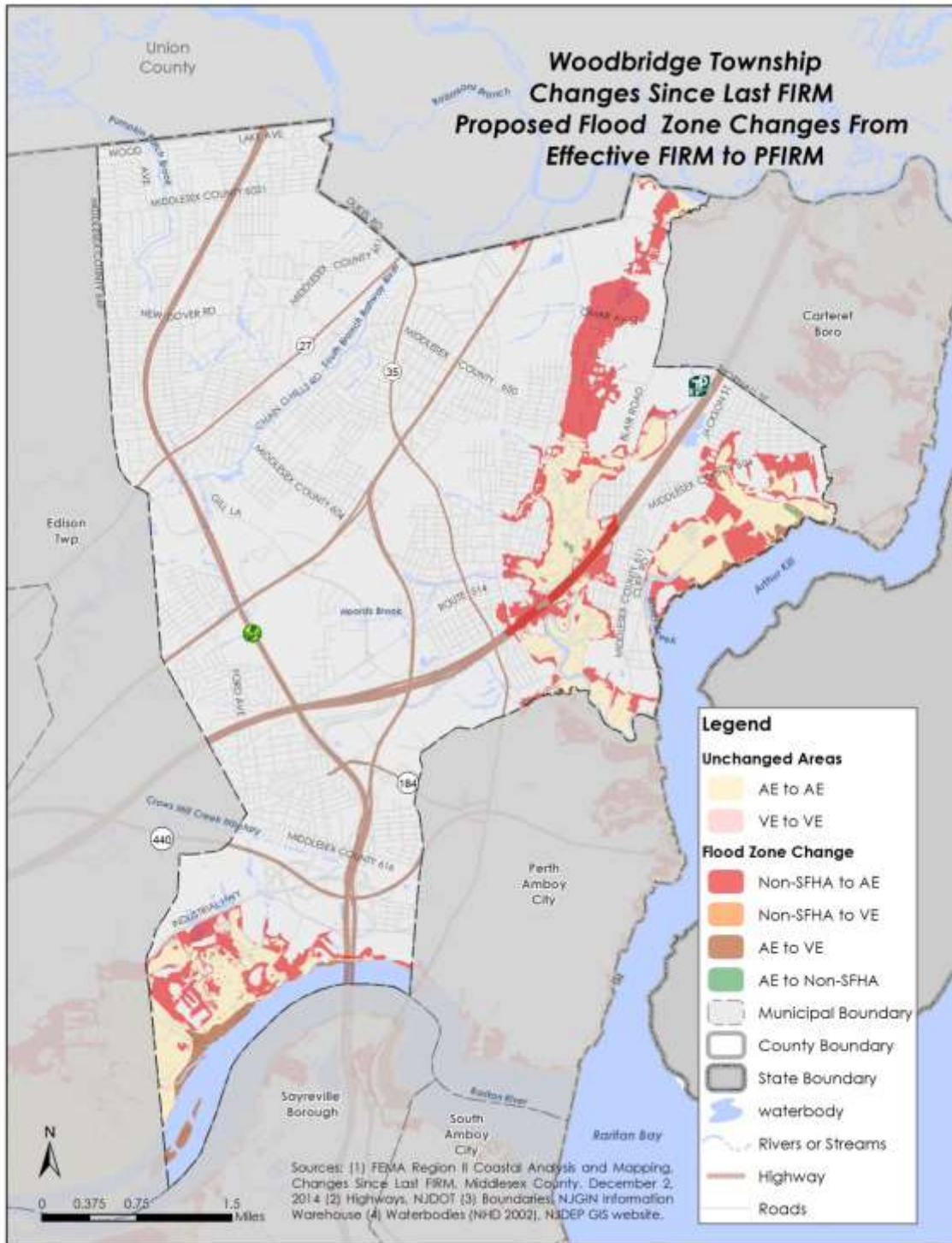
### 3.2.7 Changes in Floodplain Boundaries

Prior to Sandy in 2012, FEMA had begun a coastal flood study to update Flood Insurance Rate Maps (FIRMs) and Flood Insurance Study (FIS) reports for portions of New York and New Jersey, including Middlesex County, using improved methods and data to better reflect coastal flood risk. Much of the resulting information is publicly available from the [FEMA Region II Coastal Analysis and Mapping](#) website. Figure 24-3 below indicates changes in various flood zones in South Amboy. The Changes Since Last FIRM (CSLF) dataset compares information shown on the preliminary FIRM with that of the effective FIRM. This includes a comparison of the floodplain boundaries and zones, Base Flood Elevation changes, and where applicable, the regulatory floodway. See the main body of the 2015 Middlesex County Plan update (Section 3.3.7) for additional information about the CSLF dataset.





**Figure 24-3**  
**Changes in Floodplain Boundaries in the Township of Woodbridge**





### 3.3 Hurricanes and Tropical Storms

Given the recent history of Hurricane Sandy and Irene, the Township considers Hurricanes, Tropical Storms, and Nor'easters to be of significant concern because of intense rain and wind risks. The wind risks are details below.

#### Wind Risk Estimates

There are three significant hazards related to hurricanes, tropical storms, and to a lesser extent, nor'easters. These are: floods, storm surge, and high winds. Both floods and storm surge are addressed in the flood section of the present municipal appendix, as well as the County section of the hazard mitigation plan update. This subsection provides a preliminary quantification of hurricane wind risk based that was generated by FEMA's HAZUS-MH software (version 2.1, 2014). The calculations in Table 24-17 show a range of loss categories across the top row versus "occupancy classes" on the first column. The occupancy classes are various land uses that are represented in HAZUS. The last two columns indicate the projected 50-year and 100-year risks, i.e. the total amount of damage over those planning horizons. The figures are based on annualizing losses, then discounting them to present value using the software. There is more detailed information about the calculations and Countywide results in the main section of this HMP update.

#### FEMA Project Worksheets from Tropical Storm Irene and Hurricane Sandy

Following many natural disasters, FEMA engineers and field teams complete formal assessments of damage to community assets, and document these in project worksheets (PWs). The PWs are the basis of FEMA Public Assistance grants for repairs. There are seven categories of damage, indicated by the letters A through G. These are: A – debris removal; B – emergency protective measures; C – roads and bridges; D – water control facilities; E – public buildings; F – utilities, and; G – recreational facilities/other. The categories and amounts of the PWs are listed in Table 24-19 below for Tropical Storm Irene and Hurricane Sandy. Note that in some cases there are multiple different organizations in a community that are applicants for FEMA Public Assistance. In order to simplify the table, the PW amounts for all applicants in a community are combined.



**Table 24-17**  
**Probabilistic Wind Risk in Woodbridge, 50- and 100-year Planning Horizons**  
(Source: FEMA, HAZUS-MH version 2.1)

Occupancy Class	Total SF	Building Damages	Contents Damages	Inventory Loss	Relocation Cost	Business Income Loss	Rental Loss	Lost Wages
Residential	45,980,990	\$1,054,144	\$271,001	\$0	\$72,007	\$177	\$38,041	\$417
Commercial	14,577,024	\$137,664	\$61,303	\$1,589	\$22,553	\$15,154	\$13,271	\$13,797
Industrial	3,667,353	\$32,766	\$23,423	\$3,285	\$2,143	\$387	\$365	\$610
Agricultural	113,655	\$981	\$504	\$61	\$152	\$10	\$6	\$4
Religious	453,882	\$4,812	\$1,802	\$0	\$675	\$324	\$60	\$761
Government	209,145	\$1,855	\$1,026	\$0	\$405	\$14	\$89	\$1,999
Education	558,389	\$4,648	\$2,017	\$0	\$837	\$180	\$34	\$424
<b>Totals</b>	<b>65,560,437</b>	<b>\$1,236,872</b>	<b>\$361,078</b>	<b>\$4,935</b>	<b>\$98,772</b>	<b>\$16,246</b>	<b>\$51,866</b>	<b>\$18,012</b>

**Table 24-18**  
**Probabilistic Wind Risk in Woodbridge, 50- and 100-year Planning Horizons**  
(Source: FEMA, HAZUS-MH version 2.1)

Occupancy Class	Total Annualized Loss	50-year Risk	100-year Risk
Residential	\$1,435,788	\$19,815,304	\$20,487,253
Commercial	\$265,332	\$3,661,846	\$3,786,022
Industrial	\$62,980	\$869,182	\$898,656
Agricultural	\$1,719	\$23,727	\$24,532
Religious	\$8,434	\$116,394	\$120,341
Government	\$5,388	\$74,361	\$76,882
Education	\$8,140	\$112,344	\$116,153
<b>Totals</b>	<b>\$1,787,780</b>	<b>\$24,673,157</b>	<b>\$25,509,838</b>

**Table 24-19**  
**FEMA Public Assistance Expenditures in Tropical Storm Irene and Hurricane Sandy, by Category**  
(Source: FEMA Region II, Public Assistance)

Event Name/Public Assistance Category	A	B	C	D	E	F	G	Total
Tropical Storm Irene	\$702,355	\$105,555	\$74,783		\$5,167			\$887,860
Hurricane Sandy	\$2,317,548	\$350,370	\$0		\$10,116	\$0	\$66,118	\$2,744,153
<b>Total</b>	<b>\$3,019,903</b>	<b>\$455,925</b>	<b>\$74,783</b>		<b>\$15,283</b>	<b>\$0</b>	<b>\$66,118</b>	<b>\$3,632,012</b>



## 4. Capability Assessment

Each community within the planning area has a unique set of capabilities and priorities that affect its mitigation strategy. The following tables detail the capabilities assessed for the Township of Cranbury during this plan update.

### 4.1.1 Planning and Regulatory

Tool / Program (code, ordinance, plan)	( Yes/No)	Code Citation and Comments
Master Plan	Y	
Capital Improvements Plan	Y	
Floodplain Management / Basin Plan	Y	
Stormwater Management Plan	Y	
Open Space Plan	Y	
Stream Corridor Management Plan	Y	
Watershed Management or Protection Plan	N	
Economic Development Plan	Y	
Comprehensive Emergency Management Plan	Y	
Emergency Operation Plan	Y	
Post-Disaster Recovery Plan	Y	
Transportation Plan	Y	
Strategic Recovery Planning Report	Y	
Zoning Ordinance	Y	
Subdivision Ordinance	Y	
NFIP: Cumulative Substantial Damages	Y	
Growth Management Ordinances	N	
Site Plan Review Requirements	Y	
Stormwater Management Ordinance	N	
Municipal Separate Storm Sewer System (MS4)	Y	
Combined Sewer Overflows (CSO)	N	
Natural Hazard Ordinance	N	
Post-Disaster Recovery Ordinance	N	
Real Estate Disclosure Requirement	Y	
Other [Special Purpose Ordinances (i.e., sensitive areas, steep slope)]	Y	

### 4.1.2 Staff/Personnel

Resources	Is this in place? (Y/N)	Department/ Agency/Position
Planning Board	Y	
Mitigation Planning Committee	Y	
Environmental Board/Commission	N	
Open Space Board/Committee	Y	
Economic Development Commission/Committee	Y	
Maintenance Programs to Reduce Risk	Y	
Mutual Aid Agreements	Y	
Planner(s) or Engineer(s) with knowledge of land development and land management practices	Y	



Resources	Is this in place? (Y/N)	Department/ Agency/Position
Engineer(s) or Professional(s) trained in construction practices related to buildings and/or infrastructure	Y	
Planners or engineers on staff with a strong understanding of natural hazards	Y	
NFIP Floodplain Administrator	Y	Engineer
Surveyors	Y	
GIS layers and maps	Y	
Personnel trained in GIS	Y	
Personnel trained in HAZUS	Y	
Emergency Manager	Y	
Grant Writer	Y	
Staff with expertise in cost/benefit analysis	Y	
Professionals trained in conducting damage assessments	Y	

#### 4.1.3 Education/Outreach and Community Classifications

Program	Do you Participate in/Use this Program (Yes/No)	Classification (if applicable)	Date Classified (if applicable)
Community Rating System (CRS)	In process		
Building Code Effectiveness Grading Schedule (BCEGS)	Y		
Public Protection (ISO Fire Protection Classes 1 to 10)	Y		
Storm Ready	Y		
Firewise	Y		
Disaster/Safety Programs in/for Schools	Y		
Organizations with Mitigation Focus (advocacy group, non-government)	Y		
Public Education Program/Outreach (through website, social media)	Y		
Public-Private Partnerships	Y		

#### 4.1.4 Fiscal Capabilities

	Yes/No
Do you have a line item in your operating budget for mitigation project funding?	Y
If no, will you look at mitigation actions when allocating funding in the future?	-
Do you have a line item in the Capital Improvement Budget for mitigation project funding?	N
Have you provided funding for mitigation projects identified in the hazard mitigation plan?	Y
Does your town have the authority to Levy Taxes for specific purposes?	N
Does your town have user fees for water, sewer, gas or electric service?	Y – sewer
Do you impose impact Fees for homebuyers or developers of new development/homes?	N
Does your community have an open space acquisition fund?	County
Do you use bonds to finance projects (general obligation bonds, special tax bonds, private activity bonds)	Y



## 5. Mitigation Strategy

This section describes what projects, initiatives, and other actions the Township has undertaken or plans to implement to reduce risk and loss within its jurisdiction. This includes the status of previously identified actions and any other projects that have been completed since the 2010 Plan was adopted. The additional actions were determined by the LPC based on self-determined priorities and experience.

### 5.1 Past Mitigation Actions

The table below lists the mitigation projects and actions that were included in the original 2010 Plan.

Mitigation action, program or project	Hazard(s) addressed	Existing or new structures	Existing implementation mechanism	Responsible Party	Target Date	Estimated cost (\$)	Funding Source	Priority (3)	Status
<b>Woodbridge 1:</b> Reconstruction of Rt. 35 culvert over the Herds Brook between North and South Park Drive (non-maintenance related costs only)	Flood	Existing	Floodplain Management Plan	Woodbridge Township OEM	2 years	\$20 million	FMA, PDM-C & HMGP if available	High	Not completed due to lack of funding
<b>Woodbridge 2:</b> Reconstruction of Cove Creek culvert on Saints Boulevard (non-maintenance related costs only)	Flood	Existing	Floodplain Management Plan	Woodbridge Township OEM	1 Year	\$10 million	FMA, PDM-C & HMGP if available	High	There have been several buy-outs in this area. This project is now a low priority for the Township. It has not been completed to date because of lack of resources due to other efforts.



<b>Woodbridge 3:</b> Stream bank stabilization/conveyance of the South Branch of the Rahway River from Merrill Park to New Dover Road.	Flood	Existing	Floodplain Management Plan	Woodbridge Township OEM	1 Year	\$8 million	FMA, PDM-C & HMGP if available	High	The next two projects are also part of the same effort, which has not completed due to lack of funding, but is a very high priority.
<b>Woodbridge 4:</b> Cleaning of the River from Merrill Park to the culvert at Home Depot	Hazmat	Existing	Capital Improvement Plan	Woodbridge Township OEM	3 years	\$4-5 million	NJDEP USDA	Low	The next two projects are also part of the same effort, which has not completed due to lack of funding, but is a very high priority.
<b>Woodbridge 5:</b> Stream Bank stabilization of the Pumpkin Patch Brook from Inwood Way to the Municipal Boundary.	Flood	Existing	Capital Improvement Plan	Woodbridge Township OEM	1 year	\$5 million	FMA, PDM-C & HMGP if available	High	The next two projects are also part of the same effort, which has not completed due to lack of funding, but is a very high priority.
<b>Woodbridge 6:</b> Dredging of Smith's Creek from the Municipal Marina to the outlet at the Arthur Kill.	Flood	Existing	Capital Improvement Plan	Woodbridge Township OEM	1 year	\$15 million	NJDEP, Army Corps of Engineers, USDA	Low	Completed
<b>Woodbridge 7:</b> Dredging of the Woodbridge Creek from the intersection with the railroad to the Trailer Court	Flood	Existing	Capital Improvement Plan	Woodbridge Township OEM	1 year	\$5 million	NJDEP, Army Corps of Engineers, USDA	Low	In process of acquiring permits.



<p><b>Woodbridge 8:</b> Construction of berm and tide gate along the Woodbridge Creek at Woodbridge Avenue to prevent flooding in the Crampton Avenue area.</p>	Flood	New	Capital Improvement Plan	Woodbridge Township OEM	1 year	\$10 million	NJDEP, Army Corps of Engineers, USDA	High	In process of securing funding.
<p><b>Woodbridge 9:</b> Reconstruction of Port Reading Avenue and the Woodbridge Creek culvert to eliminate flooding (non-maintenance related costs only).</p>	Flood	Existing	Capital Improvement Plan	Woodbridge Township OEM	2 years	\$7 million	NJDEP, Army Corps of Engineers, USDA	High	This is a County Road, the project has not completed due to lack of funding.
<p><b>Woodbridge 10:</b> Continued restoration of remaining sections of the Woodbridge Creek tidal wetlands area from Port Reading Avenue to the outfall at the Arthur Kill.</p>	Flood	Existing	Capital Improvement Plan	Woodbridge Township OEM	2 years	\$10 million	NJDEP, Army Corps of Engineers, USDA	Medium	This is an ongoing effort performed through regular maintenance and desnagging program.
<p><b>Woodbridge 11:</b> Evaluation/analysis of Green Street Detention Basin Dam located southwest of the Intersection of US Route 1 and Green Street.</p>	Flood	Existing	Capital Improvement Plan	Woodbridge Township Engineering	1 Year	\$75,000	FMA, PDM-C & HMGP if available	High	This project has not been completed due to lack of funding.





<b>Woodbridge 12:</b> Improved conveyance/dredging (Going into Raritan Bay), waterway bank repairs, of Rahway River.	Flood	Existing	Floodplain Management Plan	Woodbridge Township	2 Years	\$4 million	NJDEP, Army Corps of Engineers, USDA	Low	Funding has been secured.
<b>Woodbridge 13:</b> Improved retention and engineering study to assess risk of dams.	Flood	Existing	Floodplain Management Plan	Woodbridge Township Engineer	3 year	\$75,000 <i>Note #1</i>	FMA, PDM-C & HMGP if available	High	This project has not been completed due to lack of funding.
<b>Woodbridge 14:</b> Envelope hardening, securing external infrastructure, securing roof ballast and public outreach and education programs of Senior Citizen Complex.	Wind	Existing	Capital Improvement Plan	Woodbridge Township OEM	1 year	\$1 million	FMA, PDM-C & HMGP if available	High	Funding has been secured.



## 5.2 Other Mitigation Actions

The Township is in the process of entering the CRS program. As of April 15, 2015 the Township had not had a recent Community Assistance Visit. The Township has also secured a generator for Community Center. The Township has worked on several post-Sandy planning activities including the Strategic Recovery Planning Report and neighborhood plans in repetitive loss areas.

## 5.3 Proposed Mitigation Actions

The table below details the mitigation initiatives the Township of Woodbridge would like to pursue to minimize future effects of hazard events. These actions have been determined through a local assessment of current risk and needs. The LPC met with the Plan Consultant to review all hazard and risk assessment data and evaluate the strategy. These initiatives are dependent upon funding and may change based on municipal priorities and future hazard events.

For each new mitigation action, the Township has ranked as 'High', 'Medium', or 'Low', based on the evaluation criteria outlined in Section 5.

Proposed Action	Anticipated Benefits	Responsible Party	Funding or Implementation Mechanism	Timeline	Priority
Acquisition or elevation of repetitive loss properties	Reduction of property loss	OEM	Grants	1-5 years	High
Continue to work on resiliency planning efforts including Post-Sandy Planning Activities and Sustainable Jersey Resiliency Planning Efforts.	Increased resilience for neighborhoods and municipality	Administration	Grants	1-3 years	High



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Ensure energy duplicity at all critical facilities and critical utilities.	Allow for continued operation of critical municipal services during and after a hazard event	OEM	Grants/Capital	1-3 years	High
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## 6. Plan Implementation

The LPC shall document, as needed and appropriate:

- Hazard events and losses in Woodbridge 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,
- All public and stakeholder input and comment on the Plan that has been received by the Township.
- Copies of any grant applications filed on behalf of the Township

### Continued Public Input

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

All public comments and input on the plan will be recorded and addressed, as appropriate. Opportunity to comment on the plan will be provided directly through the County's website. Public comments can also be submitted in writing to the County's HMP Coordinator. All public comments shall be addressed to: Middlesex County Office of Emergency Management c/o All Hazards Pre-disaster Mitigation Plan Coordinator, 1001 Fire Academy Drive, Sayreville, NJ 08872.

The Township of Woodbridge's LPC shall ensure that:

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

### Plan Adoption

On [insert date] Middlesex County submitted the initial draft of the 2015 Plan Update to NJOEM for

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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 Middlesex County Board of Chosen Freeholders for adoption, which occurred on [insert date].

The Township Council approved the plan on [insert date]. The Township resolution for adoption is provided below, the County's adoption resolution is provided as Appendix F of the 2014 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 G.

## Plan Maintenance

The Township of Woodbridge 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 Emergency Management Coordinator 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 H. 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 Emergency Management Coordinator will convene a meeting of the LPC to review and approve all changes. The Township retains the discretion to implement minor changes to the document without formal procedures involving the Township Council subject to local policies and regulations.

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