



9.23 TOWNSHIP OF WEST ORANGE

This section presents the jurisdictional annex for the Township of West Orange. The annex includes a general overview of the Township; an assessment of the Township’s risk, vulnerability, and mitigation capabilities; and a prioritized action plan to implement prior to a disaster to reduce future losses and achieve greater resilience to natural hazards.

9.23.1 Hazard Mitigation Planning Team

The following individuals are the Township of West Orange’s identified HMP update primary and alternate points of contact and NFIP Floodplain Administrator.

Table 9.23-1. Hazard Mitigation Planning Team

Primary Point of Contact	Alternate Point of Contact
Name / Title: Dominic Allegrino / OEM Coordinator Address: Township of West Orange Fire Department, 415 Valley Road, West Orange, NJ 07052 Phone Number: 973-325-4175 Email: nickallegrino@wopd.org	Name / Title: Leonard Lepore / Director, Municipal Engineer Address: Township of West Orange Municipal Building, 66 Main Street, West Orange, NJ 07052 Phone Number: 973-325-4160 Email: llepore@westorange.org
NFIP Floodplain Administrator	
Name / Title: Leonard Lepore / Director, Municipal Engineer Address: Township of West Orange Municipal Building, 66 Main Street, West Orange, NJ 07052 Phone Number: 973-325-4160 Email: llepore@westorange.org	

9.23.2 Jurisdiction Profile

According to the U.S. Census Bureau, the Township has a total land area of 12.171 square miles, of which 12.046 square miles is land and 0.125 square miles is water. The Township of West Orange is in central Essex County and is bordered to the north by the Townships of Montclair and Verona; to the east by the City of Orange; to the south by the Townships of South Orange, Millburn, and Maplewood; and to the west by the Townships of Essex Fells, Roseland, and Livingston.

West Orange was part of the City of Newark until November of 1806. The first planned community in America, Llewellyn Park, is located in West Orange. West Orange operates under the Mayor-Council form of municipal government. Every four years in even-numbered years, two or three council seats along with the mayoral seat are up for re-election. (Township of West Orange 2014). The next mayoral election is in 2022, when two council seats also will be up for election. In 2020, three council seats will be up for election.

According to the U.S. Census, the 2010 population for the Township of West Orange was 46,207. The estimated 2017 population was 47,609, a 3.0 percent increase from the 2010 Census. Data from the 2017 U.S. Census American Community Survey indicate that 5.2 percent of the population is 5 years of age or younger and 17.4 percent is 65 years of age or older. Communities must deploy a support system that enables all populations to safely reach shelters or to quickly evacuate a hazard area.

9.23.3 Growth/Development Trends

Understanding how past, current, and projected development patterns have or are likely to increase or decrease risk in hazard areas is a key component to understanding a jurisdiction’s overall risk to its hazards of concern. Table 9.23-2 summarizes recent and expected future development trends, including major residential/commercial development and



major infrastructure development. Figure 9.23-1 at the end of this annex illustrates the geographically-delineated hazard areas and the location of potential new development, where available.

Table 9.23-2. Recent and Expected Future Development

Type of Development	2015	2016	2017	2018	2019
Number of Building Permits for New Construction Issued Since the Previous HMP					
Single Family	12	5	12	7)	unknown
Multi-Family	0	299	0	100	unknown
Other (commercial, mixed-use, etc.)	1	0	0	0	unknown
Property or Development Name	Type of Development	# of Units / Structures	Location (address and/or block and lot)	Known Hazard Zone(s)*	Description / Status of Development
Recent Major Development and Infrastructure from 2015 to Present					
Harvard Development Urban Renewal Associates	Residential	228 Units	B: 9 L: 56	1% Flood: A Zone	See Orange SP 061113
Harvard Development Urban Renewal Associates	Residential	228 Units	B: 9 L: 50	1% Flood: A Zone	See Orange SP 061113
Harvard Development Urban Renewal Associates	Residential	228 Units	B: 9 L: 1	1% Flood: A Zone	See Orange SP 061113
Harvard Development Urban Renewal Associates	Residential	228 Units	B: 9 L: 7	1% Flood: A Zone	See Orange SP 061113
Harvard Development Urban Renewal Associates	Residential	228 Units	B: 9 L: 44	1% Flood: A Zone	See Orange SP 061113
Prism Green Urban Renewal Associates	Residential	334 units	B: 66 L: 5	None	App/Rej.
Prism Green Urban Renewal Associates	Residential	334 units	B: 66 L: 1	1% Flood: A Zone	App/Rej.
Prism Green Urban Renewal Associates	Residential	334 units	B: 66 L: 7	None	App/Rej.
Known or Anticipated Major Development and Infrastructure in the Next Five (5) Years					
Not available					

* Only location-specific hazard zones or vulnerabilities identified.

Note: Development data from <https://www.westorange.org/DocumentCenter/View/5037/Master-Plan-Reexamination-Presentation-3-12-19>. Single Family Units calculated by 1 & 2 Family Units – Residential Demolition Permits.

9.23.4 Capability Assessment

The Township of West Orange performed an inventory and analysis of existing capabilities, plans, programs, and policies that enhance its ability to implement mitigation strategies. Section 5 (Capability Assessment) describes the components included in the capability assessment and their significance for hazard mitigation planning. This section summarizes the following findings of the assessment:

- An assessment of legal and regulatory capabilities.
- Development and permitting capabilities.
- An assessment of fiscal capabilities.
- An assessment of education and outreach capabilities.
- Information on National Flood Insurance Program (NFIP) compliance.
- Classification under various community mitigation programs.
- The community's adaptive capacity for the impacts of climate change.



Areas that mitigation is currently integrated are summarized in this subsection. The Township of West Caldwell identified specific integration activities that will be incorporated into municipal procedures are included in the updated mitigation strategy. Refer to Appendix X for the results of the planning/policy document review and the answers to integration survey questions.

PLANNING, LEGAL AND REGULATORY CAPABILITY

The table below summarizes the legal and regulatory tools that are available to the Township of West Orange.

Table 9.23-3. Planning, Legal and Regulatory Capability

	Do you have this? (Yes/No)	Is this applicable Countywide or for a specific jurisdiction? If jurisdiction specify which one	Local Authority	Other Jurisdiction Authority and specify (e.g., District, State, Federal)	State Mandated	Has this been integrated? If yes- how?	
						If yes-how? Describe in comments	If no - can it be a mitigation action? If yes, add Mitigation Action #.
Codes, Ordinances, & Requirements							
Building Code	Yes	Township of West Orange	Construction Official	State	Yes	No	No
Comment: West Orange Revised General Ordinance (WORG) 13-1; State adopted codes-10/2010							
Zoning Code	Yes	Township of West Orange	Zoning Official	No	Yes	Yes	-
Comment: Land Use Regulations of the Township of West Orange. WORG 25. Adopted June 26, 2012; effective July 16, 2012. Land use policies discourage development in hazard areas.							
Subdivisions	Yes	Township of West Orange	Planning and Zoning Boards	No	Yes	No	No
Comment: The Land Subdivision Ordinance of the Township of West Orange. WORG 32.							
Stormwater Management	Yes	Township of West Orange	Municipal Engineer	NJDEP	Yes	No	No
Comment: WORG 25-29.1							
Post-Disaster Recovery	No	-	-	-	No	-	-
Comment:							
Real Estate Disclosure	No	-	-	-	No	-	-
Comment:							
Growth Management	No	-	-	-	No	-	-
Comment:							
Site Plan Review	Yes	Township of West Orange	Planning and Zoning Boards	No	Yes	No	No
Comment: WORG 25							
Environmental Protection	No	-	-	-	No	-	-
Comment:							
Flood Damage Prevention	Yes	Township of West Orange	Construction Official	FEMA	No	Yes	-
Comment: WORG 24							
Emergency Management	No	-	-	-	No	-	-
Comment:							



	Do you have this? (Yes/No)	Is this applicable Countywide or for a specific jurisdiction? If jurisdiction specify which one	Local Authority	Other Jurisdiction Authority and specify (e.g., District, State, Federal)	State Mandated	Has this been integrated? If yes- how?	
						If yes- how? Describe in comments	If no - can it be a mitigation action? If yes, add Mitigation Action #.
Climate Change	No	-	-	-	No	-	-
<i>Comment:</i>							
Disaster Recovery Ordinance	No	-	-	-	No	-	-
<i>Comment:</i>							
Disaster Reconstruction Ordinance	No	-	-	-	No	-	-
<i>Comment:</i>							
Other Ordinances in Land Use	Yes	Township of West Orange	Planning and Zoning Boards	No	No	No	No
<i>Comment: Conservation District (WORG 25-26), Tree Protection and Removal (WORG 25-27), Steep Slope and Natural Features (WORG 25-28), Historic Preservation Commission WORG 25-30.</i>							
Planning Documents							
Comprehensive / Master Plan	Yes	Township of West Orange	Planning Department	No	Yes	No	Yes
<i>Comment: The Township's Planning Board is preparing a Master Plan Update available at http://westorange.org/527/Planning-Board.</i>							
Capital Improvement Plan	Yes	Township of West Orange	Finance	Yes/No	Yes/No	Yes/No	Yes/No
<i>Comment: Completed annually for a 5 year period.</i>							
Disaster Debris Management Plan	No	-	-	-	No	-	-
<i>Comment:</i>							
Floodplain or Watershed Plan	No	-	-	-	No	-	-
<i>Comment:</i>							
Stormwater Management Plan	Yes	Township of West Orange	Engineer	NJDEP	Yes	No	No
<i>Comment: Stormwater Management Plan and Stormwater PPP</i>							
Stormwater Pollution Prevention Plan	Yes	Township of West Orange	Engineer	NJDEP	Yes	No	No
<i>Comment: Stormwater Management Plan.</i>							
Urban Water Management Plan	No	-	-	-	No	-	-
<i>Comment:</i>							
Habitat Conservation Plan	No	-	-	-	No	-	-
<i>Comment:</i>							
Economic Development Plan	No	-	-	-	No	-	-
<i>Comment:</i>							
Shoreline Management Plan	No	-	-	-	No	-	-
<i>Comment:</i>							
Community Wildfire Protection Plan	No	-	-	-	No	-	-
<i>Comment:</i>							



	Do you have this? (Yes/No)	Is this applicable Countywide or for a specific jurisdiction? If jurisdiction specify which one	Local Authority	Other Jurisdiction Authority and specify (e.g., District, State, Federal)	State Mandated	Has this been integrated? If yes- how?	
						If yes- how? Describe in comments	If no - can it be a mitigation action? If yes, add Mitigation Action #.
Forest Management Plan	Yes	Township of West Orange	Forester	DEP	No	Yes/No	Yes/No
<i>Comment: Community Forestry Management Plan</i>							
Transportation Plan	Yes	Township of West Orange	Planning	No	No	Yes/No	Yes/No
<i>Comment: Circulation Element of The Master Plan Amendment (2016). Complete Streets Concept Plan (2015). Pedestrian Safety Action Plan (2015).</i>							
Agriculture Plan	No	-	-	-	No	-	-
<i>Comment:</i>							
Climate Action Plan	No	-	-	-	No	-	-
<i>Comment:</i>							
Tourism Plan	No	-	-	-	No	-	-
<i>Comment:</i>							
Business Development Plan	No	-	-	-	No	-	-
<i>Comment:</i>							
Other: Open Space and Recreation Plan	Yes	Township of West Orange	Municipal Engineer and Planning Director and Open Space Committee	No	No	No	No
<i>Comment: Published 2010, Update March 12, 2019. https://www.westorange.org/DocumentCenter/View/5038/Open-Space--Recreation-Plan-Update-Presentation-3-12-19</i>							
Response/Recovery Planning							
Comprehensive Emergency Management Plan	Yes	Township of West Orange	OEM	County, State	Yes	No	No
<i>Comment: Emergency Operations Plan</i>							
Threat & Hazard Identification & Risk Assessment (THIRA)	No	-	-	-	-	-	-
<i>Comment:</i>							
Post-Disaster Recovery Plan	No	-	-	-	-	-	-
<i>Comment:</i>							
Continuity of Operations Plan	No	-	-	-	-	-	-
<i>Comment:</i>							
Public Health Plan	No	-	-	-	-	-	-
<i>Comment:</i>							
Other:	No	-	-	-	-	-	-
<i>Comment:</i>							



Table 9.23-4. Development and Permitting Capability

Criterion	Response
Does your jurisdiction issue development permits? - If no, who does? If yes, which department?	Yes Building Department
Does your jurisdiction have the ability to track permits by hazard area?	No
Does your jurisdiction have a buildable lands inventory? -If yes, please describe briefly. -If no, please quantitatively describe the level of buildout in the jurisdiction.	Yes Vacant land inventory of lots ½ acre or larger, including lists of environmental constraints

ADMINISTRATIVE AND TECHNICAL CAPABILITY

The table below summarizes potential staff and personnel resources available to the Township of West Orange.

Table 9.23-5. Administrative and Technical Capabilities

Staff/Personnel Resource	Available?	Department/Agency/Position
Administrative Capability		
Planning Board	Yes	Planning Board
Mitigation Planning Committee	No	-
Environmental Board / Commission	Yes	Environmental Committee
Open Space Board / Committee	Yes	Open Space Commission
Economic Development Commission / Committee	Yes	Economic Committee
Warning Systems / Services (reverse 911, outdoor warning signals)	Yes	SwiftReach
Maintenance program to reduce risk	Yes	DPW for municipal streets (not county or state roads)
Mutual aid agreements	Yes	Fire, EMS, Police
Technical/Staffing Capability		
Planners or engineers with knowledge of land development and land management practices	Yes	Public Works & Planning
Engineers or professionals trained in building or infrastructure construction practices	Yes	Public Works & Building Department
Planners or engineers with an understanding of natural hazards	Yes	Public Works & Building Department
Staff with training in benefit/cost analysis	Yes	Public Works & Finance
Staff with training in green infrastructure	No	-
Staff with education/knowledge/training in low impact development	No	-
Surveyors	Yes	Outside Contractors
Stormwater Engineer	No	-
Personnel skilled or trained in GIS applications	Yes	Public Works
Local or state water quality professional	No	-
Scientist familiar with natural hazards in local area	No	-
Emergency manager	Yes	OEM
Watershed Planner	No	-
Environmental Specialist	No	-
Grant writers	Yes	Outside Contractors
Resilience Officer	No	-



Staff/Personnel Resource	Available?	Department/Agency/Position
Other Community Emergency Response Team	Yes	OEM

FISCAL CAPABILITY

The table below summarizes financial resources available to the Township of West Orange.

Table 9.23-6. Fiscal Capabilities

Financial Resource	Accessible or Eligible to Use?
Community Development Block Grants (CDBG, CDBG-DR)	Yes, Public Works
Capital Improvements Project Funding	Yes, Public Works
Authority to Levy Taxes for Specific Purposes	Yes, Finance
User Fees for Water, Sewer, Gas or Electric Service	Yes, Finance
Incur Debt through General Obligation Bonds	Yes, Finance
Incur Debt through Special Tax Bonds	Yes, Finance
Incur Debt through Private Activity Bonds	Yes, Finance
Withhold Public Expenditures in Hazard-Prone Areas	No
State-Sponsored Grant Programs	Yes
Development Impact Fees for Homebuyers or Developers	Yes, Finance
Clean Water Act 319 Grants (Nonpoint Source Pollution)	No
Other	No

EDUCATION AND OUTREACH CAPABILITY

The table below summarizes the education and outreach resources available to the Township of West Orange.

Table 9.23-7. Education and Outreach Capabilities

Criterion	Response
Do you have a public information officer or communications office?	Yes
Do you have personnel skilled or trained in website development?	Yes, Contractor
Do you have hazard mitigation information available on your website? • If yes, briefly describe.	Yes. OEM website https://www.westorange.org/552/Office-of-Emergency-Management
Do you use social media for hazard mitigation education and outreach? • If yes, briefly describe.	Yes. Facebook, township website
Do you have any citizen boards or commissions that address issues related to hazard mitigation? • If yes, briefly describe.	Yes. Community Emergency Response Site, Environmental Committee
Do you have any other programs already in place that could be used to communicate hazard-related information? • If yes, briefly describe.	Yes. Street fair tabling with information. Electronic boards at Town Hall and West Orange High School. TV 36 local feed.
Do you have any established warning systems for hazard events? • If yes, briefly describe.	Yes. SwiftReach

COMMUNITY CLASSIFICATIONS

The table below summarizes the classifications for community programs available to the Township of West Orange.

Table 9.23-8. Community Classifications

Program	Participating?	Classification	Date Classified
Community Rating System	No	_____	-



Program	Participating?	Classification	Date Classified
Building Code Effectiveness Grading Schedule (BCEGS)	No	_____	-
Public Protection (Fire ISO Protection Class)	Yes	3	2018
Storm Ready Certification	No	_____	-
Firewise Community Classification	No	_____	-

ADAPTIVE CAPACITY

Adaptive capacity is defined as “the ability of systems, institutions, humans and other organisms to adjust to potential damage, to take advantage of opportunities, or respond to consequences” (IPCC 2014). In other words, it describes a jurisdiction’s current ability to adjust to, protect from, or withstand a hazard event. This term is often discussed in reference to climate change; however, adaptive capacity also includes an understanding of local capacity for adapting to current and future risks and changing conditions. The Township’s Planning Board is preparing a Master Plan Update that includes an updated Green Buildings and Sustainability Plan Element, which has some discussion and recommendations related to this topic. The draft is available at <http://westorange.org/527/Planning-Board>. Table 9.23-9 summarizes the adaptive capacity for climate change and the jurisdiction’s rating.

Table 9.23-9. Adaptive Capacity of Climate Change

Hazard	Adaptive Capacity (Capabilities) - High/Medium/Low
Coastal Erosion and Sea Level Rise	Medium
Coastal Storm	Medium
Drought	Low
Earthquake	Medium
Extreme Temperature	Medium
Flood (<i>riverine / flash flood, SLR</i>)	Medium
Geological Hazards (<i>landslides and subsidence/sinkholes</i>)	Low
Severe Storm (<i>high wind, tornado, TSTM, and hail</i>)	Medium
Winter Storm (<i>heavy snow, blizzards, and ice storms</i>)	Medium
Wildfire	Low
Civil Disorder	Low
Cyber Attack	Low
Disease Outbreak	Medium
Economic Collapse	Low
Hazardous Substances	Low
Utility Interruption	Medium
Terrorism	Low
Transportation Failure	Medium

Notes:

High = Capacity exists and is in use; Medium = Capacity may exist, but is not used or could use some improvement;

Low = Capacity does not exist or could use substantial improvement; Unsure = Not enough information is known to assign a rating.

NATIONAL FLOOD INSURANCE PROGRAM

This section provides specific information on the management and regulation of the regulatory floodplain.



Table 9.23-10. National Flood Insurance Program Compliance

Criterion	Response
What local department is responsible for floodplain management?	Engineering
Who is your floodplain administrator? (department/position)	Engineering
Are any certified floodplain managers on staff in your jurisdiction?	No
What is the date that your flood damage prevention ordinance was last amended?	Insert appropriate information
Does your floodplain management program meet or exceed minimum requirements?	Meet
• If exceeds, in what ways?	N/A
When was the most recent Community Assistance Visit or Community Assistance Contact?	CAV: 07/20/1993 GTA: 04/29/2013
Does your jurisdiction have any outstanding NFIP compliance violations that need to be addressed?	No
• If so, state what they are.	N/A
Are any RiskMAP projects currently underway in your jurisdiction?	No
• If so, state what they are.	N/A
Do your flood hazard maps adequately address the flood risk within your jurisdiction?	No
• If no, state why.	Some error might exist.
Does your floodplain management staff need any assistance or training to support its floodplain management program?	Yes
• If so, what type of assistance/training is needed?	CFM training
Does your jurisdiction participate in the Community Rating System (CRS)?	No
• If yes, is your jurisdiction interested in improving its CRS Classification?	N/A
• If no, is your jurisdiction interested in joining the CRS program?	No
How many flood insurance policies are in force in your jurisdiction? ^a	197
• What is the insurance in force?	\$53,500,400
• What is the premium in force?	\$335,849
How many total loss claims have been filed in your jurisdiction? ^a	151
How many claims are still open or were closed without payment?	0
What were the total payments for losses?	\$901,606.21
Do you maintain a list of properties that have been damaged by flooding?	No
Do you maintain a list of property owners interested in flood mitigation?	No

^aPolicies and Claims from <https://bsa.nfipstat.fema.gov/reports/1011.htm> and <https://bsa.nfipstat.fema.gov/reports/1040.htm> as of 09/30/2018.

ADDITIONAL AREAS OF EXISTING INTEGRATION

In the performance period since adoption of the 2015 HMP, the Township of West Orange made progress on integrating hazard mitigation into other initiatives. The following plans and programs currently integrate components of the HMP and strategy:

- The Township of West Orange participates in the Sustainable Jersey program and achieved Bronze certification. Actions for certification on November 1, 2019 with 250 points were provided in the certification report at http://www.sustainablejersey.com/certification/participating-communities/certification-report/?tx_sjcert_certification%5Bcertification%5D%5B__identity%5D=805&tx_sjcert_certification%5Baction%5D=show&tx_sjcert_certification%5Bcontroller%5D=Certification&cHash=49abc319ba7214281ebd17dc70539534.



9.23.5 Hazard Event History Specific to the Jurisdiction

Essex County has a history of hazard events, as detailed in Section 4 (Risk Assessment) of this plan. A summary of historical events is provided in each of the hazard profiles in Section 4.3 (Hazard Profiles) and includes a chronology of events that affected Essex County and its jurisdictions. The Township of West Orange's history of federally-declared (as presented by FEMA) and significant hazard events (as presented in NOAA-NCEI) is consistent with that of Essex County; refer to Appendix E (Risk Assessment Supplement). Table 9.23-11 provides details regarding municipal-specific loss and damages the Township experienced during hazard events from 2014 to 2019. Information provided in the table below is based on reference material or local sources.

Table 9.23-11. Hazard Event History

Date(s) of Event	Event Type (disaster declaration if applicable)	Essex County Designated?	Summary of Event	Summary of Local Damages and Losses
January 22-23, 2016	Winter Storm, Blizzard DR-4264	Yes	Low pressure moving across the deep South on January 21 and January 22 intensified and moved off the Mid Atlantic coast on January 23, bringing heavy snow and strong winds to northeast New Jersey, and blizzard conditions to the urban corridor and some nearby areas. At Newark Airport, the storm total snowfall was 24.5 inches, where winds gusted to 39 mph.	The Township did not report any losses for this event.
7/14/16	Thunderstorm Wind	No	A line of strong to severe storms moved across Northeast New Jersey. A large tree snapped and landed on a car on Maple Street just east of West Orange. \$7.5K in property damages were reported. A large tree snapped and fell on a fence between West Orange and Glen Ridge. \$2K in property damages were reported. A tree fell on a car along Branch Brook Drive just west of Belleville. \$6K in property damages were reported.	The Township did not report any losses for this event.
3/2/17	Strong Wind	No	Gusty northwest winds occurred behind a strong cold front. The broadcast media reported a downed tree in West Orange at 819 am. The tree was knocked down onto Prospect Ave. southbound between Rock Ave. and Route 280. Nearby, Newark International Airport measured a gust to 56 mph at 746 am. \$50K in property damages were reported.	The Township did not report any losses for this event.
3/14/17	Winter Storm	No	Rapidly deepening low pressure tracked up the eastern seaboard on March 14, bringing 8 to 13 inches of heavy snow and sleet, along with	The Township did not report any losses for this event.



Date(s) of Event	Event Type (disaster declaration if applicable)	Essex County Designated?	Summary of Event	Summary of Local Damages and Losses
			strong winds across Northeast New Jersey.	
1/4/18	Winter Storm	No	The low pressure rapidly intensified through January 4, as it moved north-northeast along the coast. The rapid intensification of the storm led to heavy snow, strong winds, and near-blizzard conditions across northeast New Jersey, with 8.4 inches of snow and winds gusts of 44 MPH reported at Newark Liberty Airport.	The Township did not report any losses for this event.
3/7/18	Winter Storm	No	A strong low-pressure system tracked along the coast through late March 7 and early morning on March 8 bringing heavy wet snow, strong gusty winds, and thundersnow across northeast New Jersey. Snowfall rates ranged from 1 to 3 inches per hour at times, resulting in 1 to 2 feet, which brought down trees and some power lines.	The Township did not report any losses for this event.
5/15/18	Thunderstorm Wind	No	An approaching cold front triggered numerous severe thunderstorms over northeastern New Jersey. Large trees were reported down in Caldwell. \$4K in property damages were reported. Large tree reported down on Maple Street in West Orange. \$4K in property damages were reported.	The Township did not report any losses for this event.
11/15/18	Winter Storm	No	A wave of low pressure developed along the Middle Atlantic coast November 15. The heavy, wet snow significantly impacted the evening rush hour with 1-2 inch per hour snowfall rates. Hundreds of trees, tree limbs, and branches were brought down by the weight of the snow, causing many power outages. Newark Airport reported 6.4 inches of snow.	The Township did not report any losses for this event.
1/30/19	Strong Wind	No	Strong winds occurred behind low pressure and cold front, with 30 mph sustained winds measured at Caldwell Airport.	The Township did not report any losses for this event.
3/15/19	Thunderstorm Wind, Hail	No	A cold front moved through the region triggering strong to severe thunderstorms across northeast New Jersey.	The Township did not report any losses for this event.



9.23.6 Jurisdiction-Specific Vulnerabilities and Hazard Ranking

The hazard profiles in Section 4 (Risk Assessment) provide detailed information regarding each plan participant's vulnerability to the identified hazards. Table 9.23-12 summarizes the hazards of greatest concern and risk to the Township of West Orange.

A gradient of certainty was developed to summarize the confidence level regarding the input used to populate the hazard ranking. A certainty factor of high, medium or low was selected and assigned to each hazard to provide a level of transparency and create increased understanding of the data used to support the resulting ranking. The following scale was used to assign a certainty factor to each hazard:

- High—Defined scenario/event to evaluate; probability calculated; evidenced-based/quantitative assessment to estimate potential impacts through hazard modeling.
- Moderate—Defined scenario/event or only a hazard area to evaluate; estimated probability; combination of quantitative (exposure analysis, no hazard modeling) and qualitative data to estimate potential impacts.
- Low—Scenario or hazard area is undefined; there is a degree of uncertainty regarding event probability; majority of potential impacts are qualitative.

REPETITIVE FLOOD LOSSES

The following summarizes the repetitive and severe repetitive flood losses in the Township of West Orange.

- Number of repetitive loss (RL) properties: 11
- Number of severe repetitive loss (SRL) properties: 0
- Number of RL/SRL properties that have been mitigated: Unknown

Note: The number of SRL properties excludes RL properties.

Policies and Claims from <https://bsa.nfipstat.fema.gov/reports/1011.htm> and <https://bsa.nfipstat.fema.gov/reports/1040.htm> as of 09/30/2018

RL and SRL as of 03/31/2019; SRL includes SRL properties that have been verified only (SRL_Indicator = V).



Table 9.23-12. Summary of Risk Assessment Results

Hazard of Concern	Hazard/ Scenario Area Evaluated	Population		Buildings		Economy (Loss)		Certainty Factor
Coastal Erosion and Sea Level Rise	Coastal Erosion: CEHA	CEHA:	0	CEHA:	0	CEHA:	\$0	High
		SLR +1ft:	0	SLR +1ft:	0	SLR +1ft:	\$0	
	Sea Level Rise: NOAA +1ft and +3ft rise	SLR +3ft:	0	SLR +3ft:	0	SLR +3ft:	\$0	
Coastal Storm	100- and 500- MRP Hurricane Wind	Category 1:	0	Category 1:	0	100-year Wind Loss:	\$4,063,879	High
		Category 2:	0	Category 2:	0			
	Category 1 through Category 4 SLOSH	Category 3:	0	Category 3:	0	500-year Wind Loss:	\$28,409,745	
		Category 4:	0	Category 4:	0			
Drought	Drought event	Majority of the County is serviced by water supplies who get water from surface water.		Droughts are not expected to cause direct damage to buildings.		Losses would be limited, due to lack of major agricultural industry.		Low
Earthquake	100, 500-, 2,500- Year Mean Return Period Event	NEHRP D&E:	486	NEHRP D&E:	133	100-year Loss:	\$0	High
		Liquefaction Class 4:	0	Liquefaction Class 4:	0	500-year Loss:	\$4,195,584	
						2,500-year Loss:	\$77,204,865	
Extreme Temperature	Extreme temperature event (heat or cold)	Over 65 Population:	8,277	Physical impacts due to extreme temperatures would be limited.		Loss of business function is possible due to unexpected repairs (i.e. pipes bursting) or power failures.		Low
		Population Below Poverty Level:	3,576					
Flood	100- and 500-Year Mean Return Period Event	100-year	1,230	100-year	212	100-year Loss:	\$230,208,600	High
		500-year	1,230	500-year	545			
Geological	High Landslide Susceptibility Areas	Class A:	256	Class A:	62	Class A:	52442928.17	Moderate
		Class B:	186	Class B:	42	Class B:	\$30,403,393	
Severe Weather	Severe Weather Event	Entire population exposed; The degree of impact to the population depends on the scale of the incident.		Entire building stock is exposed; The degree of impact depends on the scale of the incident.		Economic losses could be similar to those of the coastal storm (wind and surge) and flooding hazards.		Low



Hazard of Concern	Hazard/ Scenario Area Evaluated	Population		Buildings		Economy (Loss)		Certainty Factor
Severe Winter Weather	Severe Winter Weather Event	Entire population exposed; The degree of impact to the population depends on the scale of the incident.		Entire building stock is exposed; The degree of impact depends on the scale of the incident.		The cost of snow and ice removal and repair of roads can impact local operating budgets.		Low
Wildfire	Wildfire Fuel Hazard areas (High, Very High, Extreme)	Wildfire:	69	Wildfire:	17	Wildfire:	\$76,136,926	Moderate
Civil Disorder	Civil disorder event	Population in the immediate vicinity will be impacted.		Buildings in the immediate vicinity will be most impacted.		Economic assets in the immediate vicinity will be most impacted.		Low
Cyber Attack	Cyber-attack event	The degree of impact to the population depends on the scale of the incident.		Damages due to a cyber attack may be limited.		The degree of damages depends on the scale of the incident. Loss of utilities/communication would have widespread economic impacts.		Low
Disease Outbreak	One of the following: West Nile Virus, Eastern Equine Encephalitis, St. Louis Encephalitis, La Crosse Encephalitis, Lyme Disease, Influenza, Ebola Virus	Entire population exposed; The degree of impact to the population depends on the scale of the incident		Disease outbreak would not have a direct impact on buildings.		Impacts to food supply and water supply; Costs of activities and programs implemented to address outbreaks and prevent spread.		Low
Economic Collapse	Recessions, Depressions, Interruption of normal economic conditions	The degree of impact to the population depends on the scale of the incident.		Damages due to economic collapse may be limited; property owners that cannot afford to maintain the structure may become abandoned/rundown.		The degree of damages depends on the scale of the incident. Massive impacts due to loss of jobs, businesses, and tax revenue are possible.		Low



Hazard of Concern	Hazard/ Scenario Area Evaluated	Population	Buildings	Economy (Loss)	Certainty Factor
Hazardous Substances	Port Newark is in Essex County (3 rd largest port in the U.S.) Major highways/rail Pipelines 10 NPL Sites including one in West Orange	Population impacted will depend on the type of material and scale of the incident. May include population within small radii of site.	The degree of damages to a building depends on the scale of the incident.	The degree of damages depends on the scale of the incident.	Low
Utility Interruption	Disruption of power or water supply caused by accident, sabotage, natural hazards, or equipment failure.	The degree of impact to the population depends on the scale of the incident.	The degree of damages to buildings depends on the scale of the incident; Physical impacts to structures may occur if utilities are keeping critical functions online (i.e. sump pumps).	The degree of damages depends on the scale of the incident.	Low
Terrorism	Terrorist Attack	The degree of impact to the population depends on the scale of the incident; Population in the immediate vicinity will be impacted.	The degree of damages to buildings depends on the scale of the incident; Buildings in the immediate vicinity will be most impacted.	The degree of damages depends on the scale of the incident.	Low
Transportation Failure	One accident on any of the following: Roadway/vehicular, Aviation, Rail	The degree of impact to the population depends on the scale of the incident; Population in the immediate vicinity will be impacted.	The degree of damages to asset depends on the scale of the incident; Assets in the immediate vicinity will be most impacted.	The degree of damages depends on the scale of the incident; Assets in the immediate vicinity will be most impacted.	Low

**CRITICAL FACILITIES**

The table below identifies critical facilities and lifelines located in the 1-percent and 0.2-percent annual chance floodplains and presents a mitigation action, if appropriate.

Table 9.23-12. Potential Flood Losses to Critical Facilities

Name	Type	Exposure		Status of Mitigation
		1% Event	0.2% Event	
McLoone's Boathouse Restaurant	County Building	x	-	Do not have the jurisdiction to mitigate
Orange Reservoir Dam	Dam	x	x	Do not have the jurisdiction to mitigate
Orange Water Pumping Station-Well 6	Potable Well	x	x	2020-W ORANGE-006
Solomon Schechter Day School	School	x	x	Do not have the jurisdiction to mitigate

ADDITIONAL IDENTIFIED VULNERABILITIES

According to the preliminary 2014 FEMA Flood Insurance Study (FIS), the Township has been affected by flooding in most of the low-lying areas located along the numerous open stream courses within its boundaries. Several other areas are also affected by flooding due to poor drainage. In 2010, the Township of West Orange passed 2274-10 An Ordinance Amending and Supplementing Chapter 25 Section 28 of the General Ordinances of the Town of West Orange, Entitled "Steep Slope and Natural Features Ordinance" which amended the steep slope ordinance by placing additional restrictions of State open waters, wetlands, wetland transition areas, flood hazard areas, floodways, and riparian zones. This amendment was warranted to prevent flooding, protect water quality, and preserve wildlife and aquatic habitat (FEMA FIS 2014).

The Township of West Orange has identified the following vulnerabilities within their community:

- Although the Liberty Middle School was identified by the New Jersey Forest Fire Service (NJFFS) as a facility in a high Wildfire Fuel Hazard area, the Township confirmed adequate hydrant service to the facility, as well as a 75-foot buffer zone between the school and woodlands.
- A major flood area exists along the East Fork of the East Branch Rahway River in West Orange, east of Valley Road between Freeman Street and Kingsley Street. The flooding problem there, which is due to inadequate channel capacity, has been studied by the USACE (USACE 1973). The upper portions of this stream are steeply sloped but as of the publication of the 2014 countywide FIS report, requests have been made to the USACE and NJDEP to assess whether there is flood storage potential at golf courses and other open spaces as a part of the larger study underway to study flood mitigation alternatives in the Rahway River Basin (FEMA FIS 2014).
- North Branch Wigwam Brook has had serious flooding problems in the vicinity of Harrison and Mississippi Avenues, and along most downstream parts of the improved channel. This is due to excessive velocity and lack of channel capacity, notably at Ashwood Terrace, Whittelsey Avenue, Watson Avenue, and Washington Avenue. South Branch Wigwam Brook has had serious flooding reported in the vicinity of Watchung Avenue, Lakeside Avenue, Standish Avenue, and Ashland Avenue (FEMA FIS 2014).



- West Branch Rahway River has had flooding problems along its entire length from Northfield Avenue to Lake Vincent, although parts of this river flow through undeveloped or country club areas (FEMA FIS 2014).
- An area on the western boundary of the Township of West Orange known as the Merklin District is subject to frequent flooding due to inadequate pipe sewers and insufficient capacity of the existing storm water pumping station. The area flooded is centered between Hunterdon and Morris Roads and Westover and Tappan Terraces. The Mayfair District centered on Mayfair Drive in the north central part of the township is one such location plagued by flooding related to drainage issues. In this location flooding is caused by an inadequate storm water ejector system (Elson T. Killman Associates, Inc. 1972). The Township of West Orange has been moving forward with plans to undertake storm sewer improvements and in 2011 awarded construction contracts to begin the improvements to help alleviate flooding projects on several streets including Nestro Road, Midro Way, Mayfair Drive and Rosemont Terrace and Rosemont Drive. This project has been financed by a grant from the NJDEP and a loan from the New Jersey Environmental Infrastructure Trust (FEMA FIS 2014).
- The Peckman River Basin is located in Essex and Passaic Counties. The Peckman River is a tributary to the Passaic River and originates in the Township of West Orange and flows northeasterly through Verona, Cedar Grove, and Little Falls to its confluence with the Passaic River in West Paterson (USACE 2014). In the Township of West Orange, flooding has occurred between Nicholas Avenue and Kenz Terrace along the Peckman River (FEMA FIS 2014). Extensive development in this Basin has resulted in damages from flooding and ecosystem degradation. The Peckman River Basin experiences frequent flooding from intense thunderstorms and heavy rain events. These storms can deposit large amounts of precipitation in the watershed, producing significant runoff, which quickly surpasses the capacity of the river channel, and bridge and culvert openings. Significant degradation of the ecology of the Basin has occurred as a result of extensive erosion at specific locations along the Peckman River. The development of the watershed has reduced the water-holding capacity of the landscape and altered the natural flow dynamics within the river system. As a result, the habitat suitability and ecological complexity of the River have been moderately impaired (USACE 2014). A favorable reconnaissance report was completed in July 2001. The report recommended a feasibility study to develop alternatives for flood damage reduction and ecosystem restoration in the Peckman River Basin. On March 14, 2002, a Feasibility Cost Sharing Agreement was executed between the USACE and the NJDEP. A draft feasibility report is expected to be completed by July 2015 (USACE 2014).

HAZARD AREA EXTENT AND LOCATION

Hazard area extent and location maps were generated for the Township of West Orange that illustrate the probable areas impacted within the municipality. These maps are based on the best available data at the time of the preparation of this plan and are adequate for planning purposes. Maps have been generated only for those hazards that can be clearly identified using mapping techniques and technologies and for which the Township of West Orange has significant exposure. A map of the Township of West Orange hazard area extent and location is provided in Figures 9.23-1 and 9.23-2. This map also displays the location of the regulatory floodplain, as well as identified critical facilities, lifelines, and RL/SRL properties within the municipality.

HAZARD RANKING

This section includes the community specific identification of the primary hazard concerns based on identified problems, impacts and the results of the risk assessment as presented in Section 4 of the plan. The ranking process involves an assessment of the likelihood of occurrence for each hazard; its potential impacts on people, property, and the economy; and community capability and changing future climate conditions. This input supports the mitigation action development to target those hazards with highest level of concern.



As discussed in Section 4.4 (Hazard Ranking), each plan participant may have differing degrees of risk exposure and vulnerability compared to Essex County as a whole. Therefore, each jurisdiction ranked the degree of risk to each hazard as it pertains to their community. The table below summarizes the hazard risk/vulnerability rankings of potential hazards for the Township of West Orange. During the review of the calculated hazard ranking, the Township adjusted the calculated rankings to incorporate the perceived adaptive capacity of the community with respect to the relevant hazard and any other changes needed. The Township of West Orange has reviewed the Essex County hazard ranking table, as well as its individual calculated results, to reflect the relative risk of the hazards of concern to the community, as reported in Table 9.23-13.

During the review of the hazard ranking, the Township indicated the following:

- The Township changed the hazard ranking for wildfire, disease outbreak, and hazardous substances from low to medium to reflect that there were no changes to the hazard risk from the 2015 HMP.
- The Township changed the hazard ranking for transportation failure from low to medium because state road closures, which have become more frequent, dramatically impact the Township's major arteries.

Table 9.23-13. Township of West Orange Hazard Ranking Input

Coastal Erosion and Sea Level Rise	Coastal Storm	Drought	Earthquake	Extreme Temperature	Flood
Low	Low	Medium	Low	Medium	Low

Geological Hazards	Severe Storm	Winter Storm	Wildfire	Civil Disorder	Cyber Attack
Low	High	High	Medium	Low	Low

Disease Outbreak	Economic Collapse	Hazardous Substances	Utility Interruption	Terrorism	Transportation Failure
Medium	Medium	Medium	High	Low	Medium

9.23.7 Mitigation Strategy and Prioritization

This section discusses past mitigations actions and status, describes proposed hazard mitigation initiatives, and provides action prioritization.

PAST MITIGATION INITIATIVE STATUS

The following table summarizes the jurisdiction's progress on their mitigation strategy identified in the 2015 HMP. Actions that are carried forward as part of this plan update are included in the following subsection in its own table with prioritization. Previous actions that are now on-going programs and capabilities are indicated as such in the following table and can also be found under 'Capability Assessment' presented previously in this annex.



Table 9.23-14. Status of Previous HMP Mitigation Actions

2015 Action Number Action Description	Responsible Party	Status (In Progress, No Progress, Ongoing Capability, or Completed)	Include in the 2020 HMP Update?	
			Check if Yes	Enter 2020 HMP Action #
<p>West Orange-1 To ensure continuity of operations, obtain backup power for critical facilities.</p> <p>The following locations have been updated at this time:</p> <ol style="list-style-type: none"> 1. West Orange Township Hall generator. (In Process) 2. West Orange Fire Station #2 generator project. (In Process) 3. West Orange Fire Station #3 generator project. (In Process) 4. West Orange High School generator project. (Partially complete) 5. West Orange wastewater sewage pump stations (No progress) 6. West Orange public library (Future need – moving locations) 7. West Orange Police Department (No progress) 8. West Orange Roosevelt Middle School (No progress) 9. West Orange Fire Headquarters (Complete) 10. West Orange Fire Station #4 (Complete) 11. West Orange Alex Caprio Animal Control Shelter. (No progress) 	Various	In progress	Yes	2020-W ORANGE-001
<p>West Orange-2 Support the mitigation of vulnerable structures via retrofit (e.g. elevation, flood-proofing) or acquisition/ relocation to protect structures from future damage, with repetitive loss and severe repetitive loss properties as a priority when applicable.</p> <p>Phase 1: Identify appropriate candidates and determine most cost-effective mitigation option (in progress).</p> <p>Phase 2: Work with the property owners to implement selected action based on available funding from FEMA and local match availability. Specifically identified are properties in the following areas:</p> <ul style="list-style-type: none"> • East Branch of Rahway River • West Branch of Rahway River • North Branch Wigwam Brook • Peckman River area 	FPA	No progress	Yes	2020-W ORANGE-002
<p>West Orange-3 Develop and implement an enhanced all-hazards, public outreach / education / mitigation information program on natural hazard risks and what residents can do in the way of mitigation and preparedness, including flood insurance. This program will include:</p> <ul style="list-style-type: none"> • Providing general natural hazard risk, preparedness and mitigation, and related NFIP information in regular newsletter and mailings. • Including natural hazard risk and risk reduction information through social media channels and email blast systems. • Posting of flyers and other readily available NFIP informational materials at Town/Village hall or distributing at regular civic meetings. • Preparation, distribution and analysis of public surveys. • Developing/maintaining a natural hazard risk management webpage on the municipal website where information and mapping can be posted. • Enhance public outreach to residents in NFIP floodplain areas to inform of annual grant opportunities, etc. which may include periodic articles and handouts in the annual newsletter. • Provide public education on eliminating inflow from sump pump and roof leader discharges. 	FPA	In progress.	Yes	2020-W ORANGE-003



2015 Action Number Action Description	Responsible Party	Status (In Progress, No Progress, Ongoing Capability, or Completed)	Include in the 2020 HMP Update?	
			Check if Yes	Enter 2020 HMP Action #
West Orange-4 Support participation in the NFIP Community Rating System (CRS) program by attending CRS workshop(s) if offered within the county. Join the CRS program if adequate resources to support long term participation can be dedicated. See following related Community Assistance Visit (CAV) initiative.	FPA	No progress. Discontinue due to other priorities.	-	-
West Orange-5 Determine if a Community Assistance Visit (CAV) or Community Assistance Contact (CAC) is needed, and schedule if needed. This is a part of the process of joining CRS (above initiative).	FPA	No progress. Discontinue due to other priorities.	-	-
West Orange-6 Make structural improvements to sewer system Township wide to include identifying properties susceptible to sewage backups during flooding events.	Engineer	In progress. Isolated causes of backups, placed homes on ejector systems, and installed backflow preventors.	Yes	2020-W ORANGE-004
West Orange-7 Enhance/expand municipal tree maintenance and identification of preferred species planting program in conjunction with utility companies and PSE&G.	PSEG	Discontinue. Ongoing PSEG tree maintenance program.	-	-

The Township did not identify any other activities that were completed in addition to those in the 2015 HMP mitigation strategy.

PROPOSED HAZARD MITIGATION INITIATIVES FOR THE PLAN UPDATE

The Township of West Orange participated in a risk assessment workshop in September 2019 in which detailed information was provided about assets exposed and vulnerable to the identified hazards of concern. The Township of West Orange participated in a mitigation action workshop in October 2019 and was provided a Mitigation Toolbox that included a mitigation catalog developed specifically for Essex County and its hazards of concerns; challenges and opportunities identified during the capability and risk assessments; and the following FEMA publications to use as a resource as part of their comprehensive review of all possible activities and mitigation measures to address their hazards: FEMA 551 *Selecting Appropriate Mitigation Measures for Floodprone Structures* (March 2007) and FEMA *Mitigation Ideas – A Resource for Reducing Risk to Natural Hazards* (January 2013). Section 6 (Mitigation Strategy) and Appendix H (Mitigation Strategy Supplement) provide a more complete description of the Mitigation Toolbox and its resources.

Table 9.23-15 summarizes the comprehensive-range of specific mitigation initiatives the Township of West Orange would like to pursue in the future to reduce the effects of hazards. Some of these initiatives might be previous actions carried forward for this HMP update. Initiatives are dependent upon available funding (grants and local match availability) and can be modified or omitted at any time based on the occurrence of new hazard events and changes in municipal priorities. Both the four (4) FEMA mitigation action categories and the six (6) CRS mitigation action categories are listed in the table below to further demonstrate the wide-range of activities and mitigation measures selected.

As discussed in Section 6 (Mitigation Strategy), 14 evaluation/prioritization criteria are used to complete the prioritization of mitigation initiatives. For each new mitigation action, a numeric rank is assigned (-1, 0, or 1) for each of the 14 evaluation criteria to assist with prioritizing actions as *High*, *Medium*, or *Low*. Table 9.23-16 provides a summary of the



prioritization of all proposed mitigation initiatives for this HMP update and Table 9.23-18 summarizes the actions by type across hazards of concern.

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Table 9.23-15. Proposed Hazard Mitigation Initiatives

Initiative Number	Mitigation Initiative Name	Description of the Problem	Description of the Solution	New or Existing Assets?	Hazard(s) to be Mitigated	Goals Met	Lead and Support Agencies	Potential Funding Sources	Estimated Benefits	Estimated Cost	Timeline	Priority	Mitigation Category	CRS Category
2020-W ORANGE -001	Backup power for continuity of operations of critical facilities	The 2015 HMP included planning for backup power at 11 critical facilities. Although the West Orange Fire Headquarters and West Orange Fire Station #4 received backup power since the 2015 HMP, nine critical facilities still require generators.	Complete the generator projects in the following locations: a. Town Hall (In Progress) b. Fire Station #2. (In Progress) c. Fire Station #3 (In Progress) d. High School (Partially complete) e. Wastewater sewage pump stations (No progress) f. Police Dept (No progress) g. Roosevelt Middle School (No progress) h. Alex Caprio Animal Control Shelter. (No progress) i. Public library (Future – moving)	Existing	Utility Interruption	1.2, 2.1, 4.1, 6.1, 6.2	<u>Township OEM</u>	HMGP, PDM, Municipal Budget	High	High	Long	High	SIP	PP, ES
2020-W ORANGE -002	Mitigation of vulnerable structures via retrofit or acquisition/relocation to protect structures from future damage, with repetitive loss properties as a priority	FEMA reports 11 repetitive loss properties in the Township.	Phase 1: Identify properties that flood and determine most cost-effective mitigation option (in progress). Phase 2: Work with property owners to implement selected action with available funding from FEMA and local match for properties in the following areas: • East Branch of Rahway River • West Branch of Rahway River • North Branch Wigwam Brook • Peckman River	Existing	Flood	1.2, 2.2, 4.2	<u>Municipal OEM, FPA</u>	HMGP, PDM, Municipal Budget	High	High	Long	High	SIP	PP, SP



Initiative Number	Mitigation Initiative Name	Description of the Problem	Description of the Solution	New or Existing Assets?	Hazard(s) to be Mitigated	Goals Met	Lead and Support Agencies	Potential Funding Sources	Estimated Benefits	Estimated Cost	Timeline	Priority	Mitigation Category	CRS Category
2020-W ORANGE -003	Develop and implement an enhanced all-hazards, public outreach / education / mitigation information program on natural hazard risks and actions residents can do for preparedness and mitigation, including flood insurance.	West Orange strives to provide residents with actions to take when faced with hazards.	Provide general natural hazard risk, preparedness, mitigation, and NFIP information on the website, in newsletters, and mailings, through social media channels, and email blasts. Post flyers at Town Hall. Distribute info. at civic meetings. Administer public surveys. Post available natural hazard risk mapping. Enhance public outreach to residents in NFIP floodplain areas to inform of annual grant opportunities. Provide public education on eliminating inflow from sump pump and roof leader discharges.	Existing	All	1.2, 2.2, 3.1, 3.3	<u>Township Administrator, Public Information Officer</u>	Municipal budget	Medium	Low	Short	High	EAP	PI
2020-W ORANGE -004	Inventory of impacted properties and structural improvements to the sanitary sewer system.	Properties are susceptible to sewage backups during flooding events. Previously isolated causes of backups, placed homes on ejector systems, and installed backflow preventors.	Make structural improvements to sewer system Township-wide, including identifying properties susceptible to sewage backups during flooding events and providing a menu of BMPs to implement.	Existing	Flood - Sanitary Sewer	1.2, 3.1	<u>Township Engineering</u>	Municipal Budget	High	Low	Short	High	SIP, EAP	PR, PI
2020-W ORANGE -005	Master Plan and HMP Integration	Master Plan does not integrate Essex County HMP	Include discussion of Essex County HMP in next update.	New	All	4.1, 5.4	<u>Planning Board</u>	Municipal Budget	Medium	Low	Long	Medium	LPR	PP, PI
2020-W ORANGE -006	Orange Water Pumping Station-Well 6	Orange Water Pumping Station-Well 6 is in the floodplain.	Determine extent of flooding expected to the well and plan mitigation.	New	Flood	1.2, 2.1	<u>Township Engineering</u>	Municipal Budget	High	TBD	Short	High	SIP	PR, PP

Notes:



Acronyms and Abbreviations:

CAV	Community Assistance Visit
CRS	Community Rating System
DPW	Department of Public Works
FEMA	Federal Emergency Management Agency
FPA	Floodplain Administrator
HMA	Hazard Mitigation Assistance
N/A	Not applicable
NFIP	National Flood Insurance Program
OEM	Office of Emergency Management

Potential FEMA HMA Funding Sources:

FMA	Flood Mitigation Assistance Grant Program
HMGP	Hazard Mitigation Grant Program
PDM	Pre-Disaster Mitigation Grant Program

Timeline:

The time required for completion of the project upon implementation

Cost:

The estimated cost for implementation.

Benefits:

A description of the estimated benefits, either quantitative and/or qualitative.

Mitigation Category:

- *Local Plans and Regulations (LPR)* – These actions include government authorities, policies or codes that influence the way land and buildings are being developed and built.
- *Structure and Infrastructure Project (SIP)* - These actions involve modifying existing structures and infrastructure to protect them from a hazard or remove them from a hazard area. This could apply to public or private structures as well as critical facilities and infrastructure. This type of action also involves projects to construct manmade structures to reduce the impact of hazards.
- *Natural Systems Protection (NSP)* – These are actions that minimize damage and losses and preserve or restore the functions of natural systems.
- *Education and Awareness Programs (EAP)* – These are actions to inform and educate citizens, elected officials, and property owners about hazards and potential ways to mitigate them. These actions may also include participation in national programs, such as StormReady and Firewise Communities.

CRS Category:

- *Preventative Measures (PR)* - Government, administrative or regulatory actions, or processes that influence the way land and buildings are developed and built. Examples include planning and zoning, floodplain local laws, capital improvement programs, open space preservation, and storm water management regulations.
- *Property Protection (PP)* - These actions include public activities to reduce hazard losses or actions that involve (1) modification of existing buildings or structures to protect them from a hazard or (2) removal of the structures from the hazard area. Examples include acquisition, elevation, relocation, structural retrofits, storm shutters, and shatter-resistant glass.
- *Public Information (PI)* - Actions to inform and educate citizens, elected officials, and property owners about hazards and potential ways to mitigate them. Actions include outreach projects, real estate disclosure, hazard information centers, and educational programs for school-age children and adults.
- *Natural Resource Protection (NR)* - Actions that minimize hazard loss and preserve or restore the functions of natural systems. Actions include sediment and erosion control, stream corridor restoration, watershed management, forest and vegetation management, and wetland restoration and preservation.
- *Structural Flood Control Projects (SP)* - Actions that involve the construction of structures to reduce the impact of a hazard. Structures include dams, setback levees, floodwalls, retaining walls, and safe rooms.
- *Emergency Services (ES)* - Actions that protect people and property during and immediately following a disaster or hazard event. Services include warning systems, emergency response services, and the protection of essential facilities.



Table 9.23-16. Summary of Prioritization of Actions

Initiative Number	Mitigation Initiative Name	Life Safety	Property Protection	Cost Effectiveness	Technical	Political	Legal	Fiscal	Environmental	Social	Administrative	Multi-Hazard	Timeline	Agency Champion	Other Community Objectives	Total	High / Medium / Low
2020-W ORANGE-001	Backup power for continuity of operations of critical facilities	1	0	1	1	1	1	0	1	1	1	1	1	1	1	12	High
2020-W ORANGE-002	Mitigation of vulnerable structures via retrofit or acquisition/ relocation to protect structures from future damage, with repetitive loss properties as a priority	1	1	1	1	0	1	0	1	1	1	1	0	1	1	11	High
2020-W ORANGE-003	Develop and implement an enhanced all-hazards, public outreach / education / mitigation information program on natural hazard risks and actions residents can do for preparedness and mitigation, including flood insurance.	1	1	1	1	1	1	0	0	1	1	1	1	1	1	12	High
2020-W ORANGE-004	Inventory of impacted properties and structural improvements to the sanitary sewer system.	1	1	1	1	1	1	0	1	1	1	1	0	1	1	12	High
2020-W ORANGE-005	Master Plan and HMP Integration	0	1	0	1	0	1	1	1	0	0	1	1	0	1	8	Medium
2020-W ORANGE-006	Orange Water Pumping Station-Well 6	1	1	1	1	1	1	0	1	1	1	1	1	1	0	12	High

Notes: Section 6 (Mitigation Strategy) conveys guidance on prioritizing mitigation actions.
Low (0-4), Medium (5-8), High (9-14).



Table 9.23-17. Analysis of Mitigation Actions by Hazard and Category

Hazard	Prevention	Property Protection	Public Education and Awareness	Natural Resource Protection	Emergency Services	Structural Projects	Climate Resilient	Community Capacity Building
Coastal Erosion / Sea Level Rise	-	-	X	-	-	-	-	-
Coastal Storm	-	X	X	X	X	X	X	X
Drought	-	-	X	-	-	-	-	-
Earthquake	-	-	X	-	-	-	-	-
Extreme Temperature	-	-	X	-	-	-	-	-
Flood	X	X	X	X	X	X	X	X
Geological hazards	-	-	X	-	-	-	-	-
Severe Weather	-	X	X	X	X	X	X	X
Severe Winter Weather	-	X	X	X	X	X	X	X
Wildfire	-	-	X	-	-	-	-	-
Civil Disorder	-	-	X	-	-	-	-	-
Cyber Attack	-	-	X	-	-	-	-	-
Disease Outbreak	-	-	X	-	-	-	-	-
Economic Collapse (new)	-	-	X	-	-	-	-	-
Hazardous Substances	-	-	X	-	-	-	-	-
Utility Interruption	X	X	X	X	X	X	X	X
Terrorism	-	-	X	-	-	-	-	-
Transportation Failure	-	-	X	-	-	-	-	-

Note: Section 6 (Mitigation Strategy) provides an explanation of the mitigation categories.

9.23.8 Staff and Local Stakeholder Involvement in Annex Development

The Township of West Orange followed the planning process described in Section 2 (Planning Process). This annex was developed over the course of several months with input from many jurisdiction representatives. All departments were asked to contribute to the annex development through reviewing and contributing to the capability assessment, reporting on the status of previously identified actions, and participating in action identification and prioritization. The following table summarizes who participated and in what capacity. In addition, several municipal representatives were asked to review and contribute to the draft annex as documented on the annex sign-off sheets in Appendix B (Participation Documentation). Additional documentation on the municipality's planning process through Planning Partnership meetings is included in Section 2 (Planning Process) and Appendix C (Meeting Documentation).

Table 9.23-18. Contributors to the Annex

Entity	Title	Method of Participation
Daniel Shelley	OEM Coordinator	Primary POC, Attended meeting 1, reviewed notes
Paul Wannemacher	Deputy OEM Coordinator	Attended meeting 1, reviewed notes
Leonard Lepore	DPW Director/Municipal Engineer	Attended meeting 1, reviewed notes, hazard discussion
Nick Allegrino	OEM Coordinator	Hazard discussion, reviewed notes
Anthony Vecchio	Fire Chief	Hazard discussion, reviewed notes



Figure 9.23-1. Township of West Orange Hazard Area Extent and Location Map

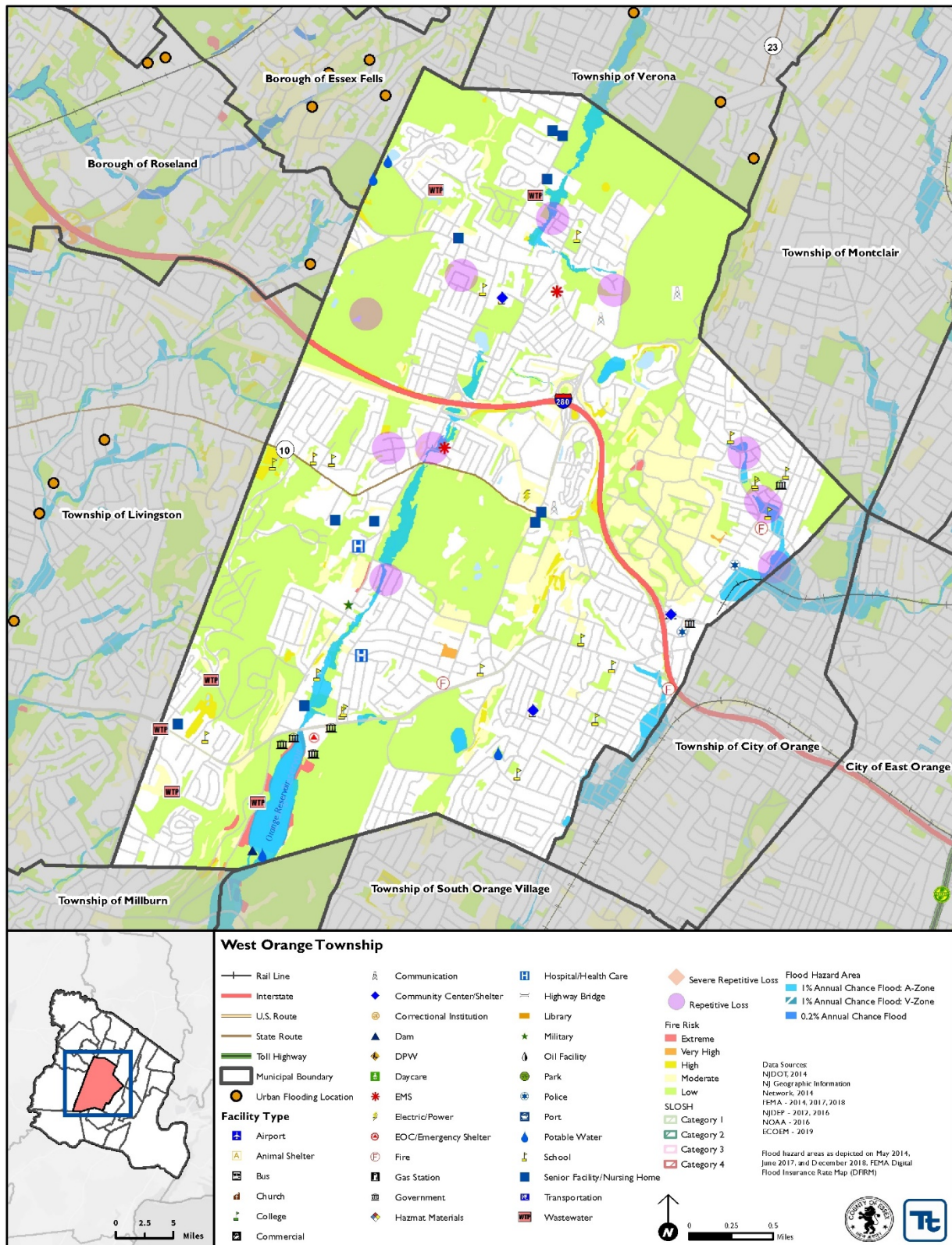
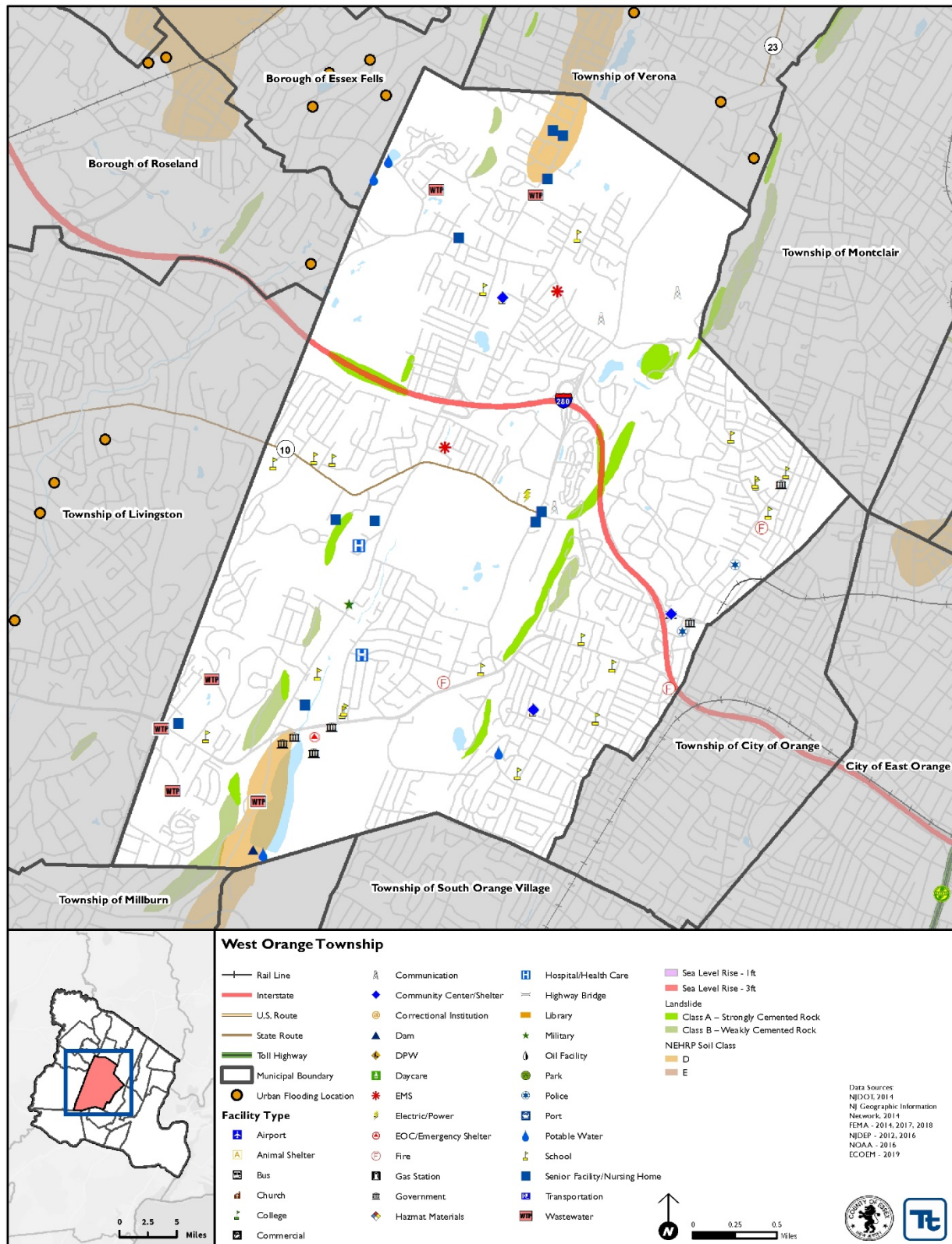




Figure 9.23-2. Township of West Orange Hazard Area Extent and Location Map 2





Name of Jurisdiction:

West Orange

Name and Title Completing Worksheet:

Daniel Shelley, OEM Coordinator

Action Worksheet			
Project Name:	Mitigation of vulnerable structures via retrofit or acquisition/ relocation to protect structures from future damage, with repetitive loss properties as a priority		
Project Number:	2020-W ORANGE-002		
Risk / Vulnerability			
Hazard(s) of Concern:	Flood		
Description of the Problem:	Property damage, road closures, and flooded basements during storms.		
Action or Project Intended for Implementation			
Description of the Solution:	Identify appropriate candidates, and work with property owners to implement selected action.		
Is this project related to a Critical Facility or Lifeline?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>	
Level of Protection:	100-year	Estimated Benefits (losses avoided):	Flooding avoided
Useful Life:	n/a	Goals Met:	1.2, 2.2
Estimated Cost:	Medium	Mitigation Action Type:	SIP
Plan for Implementation			
Prioritization:	High	Desired Timeframe for Implementation:	Short
Estimated Time Required for Project Implementation:	Medium	Potential Funding Sources:	HMGP, PDM. Municipal Budget
Responsible Organization:	Municipal OEM	Local Planning Mechanisms to be Used in Implementation if any:	HMP
Three Alternatives Considered (including No Action)			
Alternatives:	Action	Estimated Cost	Evaluation
	No Action	\$0	Current problem continues
	Provide stormwater retention	High	Not feasible
	Increase stream capacity	High	Not feasible
Progress Report (for plan maintenance)			
Date of Status Report:			
Report of Progress:			
Update Evaluation of the Problem and/or Solution:			



Name of Jurisdiction:

West Orange

Name and Title Completing Worksheet:

Daniel Shelley, OEM Coordinator

Action Worksheet		
Project Name:	Mitigation of vulnerable structures via retrofit or acquisition/ relocation to protect structures from future damage, with repetitive loss properties as a priority	
Project Number:	2020-W ORANGE-002	
Criteria	Numeric Rank (-1, 0, 1)	Provide brief rationale for numeric rank when appropriate
Life Safety	1	Will protect homeowners
Property Protection	1	Will protect structure
Cost-Effectiveness	1	Cost share with federal grants, a benefit cost analysis must be completed
Technical	1	This initiative is technically feasible
Political	0	Neutral
Legal	1	This is a legal initiative
Fiscal	0	Funding sources are needed
Environmental	1	Supports open space
Social	1	Community supports
Administrative	1	Administratively the Township can support
Multi-Hazard	1	Several hazards will be mitigated for structure
Timeline	0	Dependent upon funding
Agency Champion	1	OEM will spearhead this initiative
Other Community Objectives	1	Supports community objectives to protect life and property
Total	11	
Priority (High/Med/Low)	High	



Name of Jurisdiction:

West Orange

Name and Title Completing Worksheet:

Daniel Shelley, OEM Coordinator

Action Worksheet			
Project Name:	Inventory of impacted properties and structural improvements to the sanitary sewer system.		
Project Number:	2020-W ORANGE-004		
Risk / Vulnerability			
Hazard(s) of Concern:	Flood, Severe Weather		
Description of the Problem:	Flooding of roadways and back up of storm water and sewer system		
Action or Project Intended for Implementation			
Description of the Solution:	Make structural improvements to sewer system Township wide to include identifying properties susceptible to sewage backups during flooding events.		
Is this project related to a Critical Facility or Lifeline?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	
Level of Protection:	High	Estimated Benefits (losses avoided):	Flood
Useful Life:	TBD	Goals Met:	1.2, 2.1, 2.2
Estimated Cost:	High (\$1.6M)	Mitigation Action Type:	SIP
Plan for Implementation			
Prioritization:	High	Desired Timeframe for Implementation:	Short
Estimated Time Required for Project Implementation:	Short	Potential Funding Sources:	HMA Grants, State and County Grants, Municipal Budget
Responsible Organization:	Township Engineer, FPA, Township Administrator	Local Planning Mechanisms to be Used in Implementation if any:	HMP
Three Alternatives Considered (including No Action)			
Alternatives:	Action	Estimated Cost	Evaluation
	No Action	\$0	Current problem continues
	Structural Improvements	High	Cost effective choice to help with future loss.
	Install new Separate Storm Sewer System	High	Not cost effective or environmentally-friendly.
Progress Report (for plan maintenance)			
Date of Status Report:			
Report of Progress:			
Update Evaluation of the Problem and/or Solution:			



Name of Jurisdiction:

West Orange

Name and Title Completing Worksheet:

Daniel Shelley, OEM Coordinator

Action Worksheet		
Project Name:	Inventory of impacted properties and structural improvements to the sanitary sewer system.	
Project Number:	2020-W ORANGE-004	
Criteria	Numeric Rank (-1, 0, 1)	Provide brief rationale for numeric rank when appropriate
Life Safety	1	Can support life safety due to damage to homes and hazards
Property Protection	1	Will protect property
Cost-Effectiveness	1	Benefit cost analysis must be completed with application
Technical	1	Project requires technical expertise
Political	1	Township government supports
Legal	1	Legal authority
Fiscal	0	Budget must be identified
Environmental	1	Supports environment
Social	1	Community support
Administrative	1	Township is capable of supporting
Multi-Hazard	1	Addresses several hazards
Timeline	1	Dependent upon funding and this project is a priority
Agency Champion	1	Township Administrator, FPA and engineer support this project
Other Community Objectives	0	
Total	12	
Priority (High/Med/Low)	High	