

9.27 BANGOR BOROUGH

This section presents the jurisdictional annex for Bangor Borough.

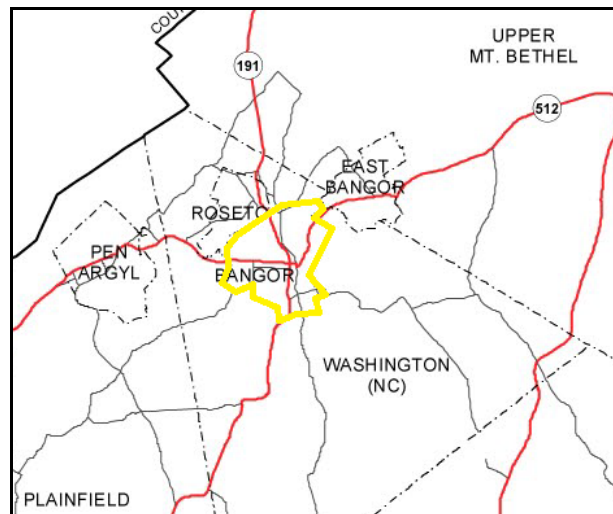
A. HAZARD MITIGATION PLAN POINT OF CONTACT

Primary Point of Contact		Alternate Point of Contact	
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B. MUNICIPAL PROFILE

Bangor Borough is located in the northeastern part of Northampton County. It encompasses an area of approximately 1.6 square miles, and has a population of 5,273 (2010 Census). As shown in Figure 1, the borough is bordered by the Borough of Roseto to the north and the Borough of East Bangor to the northeast. Bangor is otherwise surrounded by Washington Township.

Figure 1



(Source: <http://www.lvpc.org/pdf/maps/baseMap-LehighNorthamptonCounties.pdf>)

Martin's Creek passes north-south through the middle of the Borough. There are also several small bodies of water in former mine pits.

PA Route 191 (1st Street) and Main Street/Ridge Road are the major north-south roadways. PA Route 512 also runs north-south from East Bangor Borough to the middle of Bangor Borough, where it then turns westward towards Pen Argyl Borough. Broadway is the other major east-west roadway through the borough.

B.1 Known or Anticipated Future Development

The following table summarizes major residential/commercial development and major infrastructure development that are identified for the next five (5) to ten (10) years in the municipality. Refer to the map at the end of this annex which illustrates the hazard areas within the municipality.

Property Name	Type (Residential or Commercial)	Number of Structures	Location	Known Hazard Zone*	Description / Status
Deer Trac Estates	Residential	6	South Sixth Street	No	Single Dwelling Homes
Fifth Street Apartments	Residential	1	North Fourth and North Fifth Street	No	7 units Apartments
Bangor Business Park	Commercial	In planning stage	Ridge Road and Route 512	Within or near NFIP Floodplain	Offices and Businesses

* Only location-specific hazard zones or vulnerabilities identified. With the exception of flood, wildfire, landslides, and land subsidence/sinkholes, all locations within the Lehigh Valley are exposed to the natural hazards addressed in this plan.

C. NATURAL HAZARD EVENT HISTORY SPECIFIC TO BANGOR BOROUGH

Type of Event and Date	FEMA Disaster # (if applicable)	Local Damage and Losses
Flooding \ 1955		Entire Downtown Area Under 4' Water \$1,000,000 Damage
Flooding \ 1967		Entire Downtown Area Under 3' - 4' Water \$1,000,000 Damage
Severe Winter Storm 1994\1995		Entire Borough Without Power for Several Days
Messinger Street Box Culvert		Slate Box Culvert Collapsed Causing Flooding to Area Homes -- \$200,000 Damage
Flooding \ 2007		Hurricane Damage - Messinger and South Main Streets – Homes and Streets\Sidewalks Damaged
Notice of Violation \ April 2011		Weakened Box Culvert - Flooding Capital Boulevard
Flooding \ August 28, 2011	FEMA 4025 DR-PA	Downtown Flooding \ Dam Breakage (Roseto Borough) Flooding North Ninth Street \ Heavy Water Infiltration – Sewer Plant \ Power Outages – Hurricane Irene
Flooding \ August 30, 2011	FEMA 4030-DR- PA	Box Culvert Collapsed Flooding Capital Boulevard Tropical Storm Lee
Sinkholes		Borough Wide – 1 Incident Every 12-18 Months

D. NATURAL HAZARD RISK/VULNERABILITY RISK RANKING

The following relative ranking of natural and non-natural hazard risks in this municipality was developed using PEMA's Risk Factor methodology described in Section 4, "Risk Assessment"

HAZARD RISK	NATURAL HAZARDS	RISK ASSESSMENT CATEGORY					RISK FACTOR (RF)
		PROBABILITY	IMPACT	SPATIAL EXTENT	WARNING TIME	DURATION	
HIGH	Flood	3	3	2	3	3	2.8
	Winter Storm	3	2	4	1	3	2.7
MODERATE	Radon Exposure	4	1	2	1	4	2.4
	Extreme Temperatures	4	1	2	1	3	2.3
	Drought	2	1	4	1	4	2.2
	Wildfire	3	1	2	3	3	2.2
	Hailstorm	3	1	3	2	1	2.1
	Wind, incl. Tornado	1	3	2	4	1	2.1
	Subsidence / Sinkholes	2	2	3	2	1	2.1
	Lightning	4	1	1	2	1	2
LOW	Earthquake	1	1	4	4	1	1.9
	Landslide	1	1	1	4	1	1.3

HAZARD RISK	MAN-MADE HAZARDS	RISK ASSESSMENT CATEGORY					RISK FACTOR (RF)
		PROBABILITY	IMPACT	SPATIAL EXTENT	WARNING TIME	DURATION	
HIGH	Fire (Urban / Structural)	4	2	1	4	2	2.6
	Env. Hazard and Explosion	3	2	2	4	3	2.6
	Utility Interruption	3	1	3	4	3	2.5
MOD-ERATE	Transportation Accident	4	1	1	4	1	2.2
	Mass Gathering and Civil Disturbance	3	1	1	4	2	2
LOW	Terrorism	1	3	1	4	1	1.9
	Building Collapse	1	3	1	4	1	1.9
	Dam Failure	1	2	2	4	2	1.9
	Nuclear Incident	1	1	1	4	2	1.4
	Levee Failure	0	0	0	0	0	0

E. CAPABILITY ASSESSMENT

This section identifies the following capabilities of the local jurisdiction:

- Planning and Regulatory capability
- Administrative and Technical capability
- Fiscal capability
- Community classifications

E.1 Planning and Regulatory Capability

Tool / Program	Status			Dept./Agency Responsible	Effect on Loss Reduction: + Support O Neutral - Hinder	Change Since Last Plan: + Positive - Negative	Comments
	In Place	Date Adopted or Updated	Under Development				
Hazard Mitigation Plan	X	2006		Bangor	+	+	Updated 2008
Emergency Operations Plan	X	11/2010		Bangor	+	+	
Disaster Recovery Plan	X	11/2010		Bangor	+	+	
Evacuation Plan	X	11/2010		Bangor	+	+	
Continuity of Operations Plan	X	11/2010		Bangor	+	+	
NFIP	X						See County for Info
NFIP – Community Rating System			X				See County for Info
Floodplain Regulations (spec. NFIP Flood Damage Prevention Ordinance)	X			Bangor	+	+	
Floodplain Management Plan			X	Bangor		+	
Zoning Regulations	X	2005		Bangor	+	+	
Subdivision Regulations	X	1985		Bangor	+	+	
Comprehensive Land Use Plan (or General, Master or Growth Mgt. Plan)	X	10/2005					
Open Space Management Plan (or Parks/Rec or Greenways Plan)	X	12/09		Bangor	+	+	
Stormwater Management Plan / Ordinance	X			Bangor	+	+	
Natural Resource Protection Plan							
Capital Improvement Plan	X	12/10		Bangor	+	+	
Economic Development Plan	X	Unknown		Bangor	+	+	

Tool / Program	Status			Dept./Agency Responsible	Effect on Loss Reduction: + Support O Neutral - Hinder	Change Since Last Plan: + Positive - Negative	Comments
	In Place	Date Adopted or Updated	Under Development				
Historic Preservation Plan	X		X	Bangor	+		
Farmland Preservation							
Building Code	X			Bangor	+	+	
Fire Code	X			Bangor	+	+	
Other							

E.2 Administrative and Technical Capability

Staff/Personnel Resources	Yes	No	Department/Agency	Comments
Planners (with land use / land development knowledge)	X		Bangor/County	Consultants
Planners or engineers (with natural and/or human caused hazards knowledge)	X		Bangor/County	Consultants
Engineers or professionals trained in building and/or infrastructure construction practices (includes building inspectors)	X		Bangor/County	Consultants
Emergency Manager	X		Bangor/County	Appointed Staff
NFIP Floodplain Administrator	X		Bangor	Appointed Staff
Land Surveyors	X		Bangor	Consultants
Scientists or staff familiar with the hazards of the community	X		Bangor	Consultants
Personnel skilled in Geographic Information Systems (GIS) and/or FEMA's HAZUS program		X		
Grant writers or fiscal staff to handle large/complex grants	X		Bangor/County	Staff
Staff with expertise or training in Benefit-Cost Analysis	X		Bangor/County	
Other				

E.3 Fiscal Capability

Financial Resources	Yes	No	Department/Agency	Comments
Capital Improvement Programming	X		Bangor	
Community Development Block Grants (CDBG)	X		Bangor/County	
Special Purpose Taxes		X		
Gas / Electric Utility Fees		X		
Water / Sewer Fees		X		
Stormwater Utility Fees		X		
Development Impact Fees	X			
General Obligation, Revenue, and/or Special Tax Bonds	X		Bangor/County	
Partnering Arrangements or Intergovernmental Agreements	X		Bangor/County	
Other				

E.4 Community Classifications

Program	Classification	Date Classified
Community Rating System (CRS)	NP	N/A
Building Code Effectiveness Grading Schedule (BCEGS)	TBD	TBD
Public Protection	TBD	TBD
Storm Ready	NP	N/A
Firewise	NP	N/A

N/A = Not applicable. NP = Not participating. TBD = To Be Determined.

The classifications listed above relate to the community's effectiveness in providing services that may impact its vulnerability to the natural hazards identified. These classifications can be viewed as a gauge of the community's capabilities in all phases of emergency management (preparedness, response, recovery and mitigation) and are used as an underwriting parameter for determining the costs of various forms of insurance. The CRS class applies to flood insurance while the BCEGS and Public Protection classifications apply to standard property insurance. CRS classifications range on a scale of 1 to 10 with class one (1) being the best possible classification, and class 10 representing no classification benefit. Firewise classifications include a higher classification when the subject property is located beyond 1000 feet of a creditable fire hydrant and is within 5 road miles of a recognized Fire Station. StormReady communities are better prepared to save lives from the onslaught of severe weather through advance planning, education and awareness.

Criteria for classification credits are outlined in the following documents:

- The Community Rating System Coordinators Manual
- The Building Code Effectiveness Grading Schedule
- The ISO Mitigation online ISO's Public Protection website at <http://www.isomitigation.com/ppc/0000/ppc0001.html>
- The National Weather Service Storm Ready website at <http://www.weather.gov/stormready/howto.htm>
- The National Firewise Communities website at <http://firewise.org/>

F. MITIGATION STRATEGY

F.1 Past Mitigation Activities/Efforts

The following table summarizes progress on the mitigation strategy identified by the Borough in the 2006 plan.

2006 Initiative		Status	Review Comments
Description	Location		
Repair/stabilize viaduct, remove waterway impediments	Viaduct - Blue Ridge Creek through center of Borough	Continuous	This project is to be carried forward.

Further details on mitigation activities completed in the Borough include:

- Drainage improvements
- Acquiring flood-prone parcels
- Ordinances

F.2 Hazard Vulnerabilities Identified

It is estimated that in Bangor Borough, 457 residents live within the 1% annual chance flood area (NFIP Special Flood Hazard Area). Of the municipality's total land area, 8% is located within the 1% annual chance flood area. \$240,768,217 (25.9%) of the municipality's general building stock replacement cost value (structure and contents) is located within the 1% annual chance flood area.

There are 71 NFIP policies in the community. While there are 180 structures located within the 1% annual chance flood area, there are only 55 policies issued to property owners in the 1% annual chance flood area. FEMA has identified 8 Repetitive Loss (RL) including 1 Severe Repetitive Loss (SRL) properties in the municipality.

HAZUS-MH estimates that for a 1% annual chance flood, \$83,770,170 (9%) of the municipality's general building stock replacement cost value (structure and contents) will be damaged, 619 people may be displaced, 493 people may seek short-term sheltering, and an estimated 1,801 tons of debris could be generated.

HAZUS-MH estimates the following damage and loss of use to critical facilities in the community as a result of a 1% annual chance flood event:

Critical Facilities Located in the DFIRM 1% and 0.2% Flood Boundaries and Estimated Potential Damage from the 1% Flood Event

Name	Type	Exposure		Potential Loss from 1% Flood Event		
		1% Event	0.2% Event	Structure Damage	Content Damages	Days to 100-Percent Functional
District Court 03-3-03	User Defined	X	X	0.0	0.0	NA
Learning Locomotion	User Defined	X	X	21.8	24.5	NA
Bangor Public Library	User Defined	X	X	17.5	100.0	NA
BANGOR PD	Police	X	X	17.8	83.2	630
PPL Martins Creek Stream Electric Station	Electric		X	-	-	-
Gaffrey Funeral Home	User Defined		X	-	-	-
United States Post Office	User Defined		X	-	-	-

Source: FEMA, 2004; FEMA, 2011; HAZUS-MH 2.1

Notes:

X = indicates the facility location as provided by Lehigh Valley is located in the DFIRM flood zone.

NA = HAZUS-MH 2.1 does not estimate the days to 100-percent functional for user-defined facilities.

- = There is no damage estimate either because the 0.2% annual chance flood event potential loss estimates were not run in HAZUS or HAZUS did not calculate potential loss estimates for some facilities located in the DFIRM flood hazard zone. This is because even though these facilities are located within the boundary of the flood depth grid generated by HAZUS the depth of flooding does not amount to any damages to the structure or contents according to the depth damage function used in HAZUS.

The following vulnerabilities have been identified by the community, within the risk assessment, or in other plan, reports and documents (e.g. FEMA Flood Insurance Studies, Act 167 Stormwater Management Plans):

- Flooding
 - o Basement flooding
- Stormwater issues

Please refer to the Hazard Profiles in the Risk Assessment Section for additional vulnerability information relevant to this jurisdiction.

F.3 Hazard Mitigation Strategy

Note some of the identified mitigation initiatives in Table F are dependent upon available funding (grants and local match availability) and may be modified or omitted at any time based on the occurrence of new hazard events and changes in municipal priorities.

Action No.	Action	Mitigation Technique Category	Hazard(s) Addressed	Priority (H/M/L)	Estimated Cost	Potential Funding Sources	Lead Agency / Department	Implementation Schedule	Applies to New and/or Existing Structures*
1	Pennsylvania Avenue Stormwater Improvements at North Main Street - Reconstruct approx. 4,000 linear feet of roadway including reconstruction of stormwater lines. Flood damage and potential relief of sewer inflow/infiltration.								
	See above.	Structural Projects	Flood	High	High	PEMA, FEMA, Bangor Borough	Bangor Borough	Short Term	Existing
2	Viaduct Improvements - Blue Ridge Creek through center of Borough – Stabilize viaduct, remove waterway impediments.	Structural Projects	Flood	High	High	PEMA, FEMA, Bangor Borough	PennDOT	Short Term	Existing
3	Capital Boulevard Culvert Improvements - Reconstruct collapsed drainage culvert and re-route to mitigate flooding of three residential properties.	Structural Projects	Flood	Medium	High	Casino grant, PEMA, FEMA, Bangor Borough; potentially FEMA mitigation grant	Bangor Borough	Short Term	Existing
4	Implement the findings and recommendations of the 2003 Barton-Lawson "Stormwater Facilities Study" which analyzes stormwater facilities and identifies specific upgrades throughout the Borough	Structural Projects; Property Protection	Flood	Medium	High	Bangor Borough; potentially FEMA mitigation grants	Bangor Borough	Long Term DOF	Existing
5	Retrofit structures located in hazard-prone areas to protect structures from	Property Protection	Flood	Medium-High*	High	FEMA Mitigation Grant	Municipality (via Municipal Engineer/NFIP)	Long Term DOF	Existing

Action No.	Action	Mitigation Technique Category	Hazard(s) Addressed	Priority (H/M/L)	Estimated Cost	Potential Funding Sources	Lead Agency / Department	Implementation Schedule	Applies to New and/or Existing Structures*
	<p>future damage, with repetitive loss and severe repetitive loss properties as priority.</p> <p>Phase 1: Identify appropriate candidates for retrofitting based on cost-effectiveness versus relocation.</p> <p>Phase 2: Where retrofitting is determined to be a viable option, work with property owners toward implementation of that action based on available funding from FEMA and local match availability.</p>					Programs and local budget (or property owner) for cost share	Floodplain Administrator) with support from PEMA, FEMA		
6	<p>Purchase, or relocate structures located in hazard-prone areas to protect structures from future damage, with repetitive loss and severe repetitive loss properties as priority.</p> <p>Phase 1: Identify appropriate candidates for relocation based on cost-effectiveness versus retrofitting.</p> <p>Phase 2: Where relocation is determined to be a viable option, work with property owners toward implementation of that</p>	Property Protection	Flood	Medium-High*	High	FEMA Mitigation Grant Programs and local budget (or property owner) for cost share	Municipality (via Municipal Engineer/NFIP Floodplain Administrator) with support from PEMA, FEMA	Long Term DOF	Existing

Action No.	Action	Mitigation Technique Category	Hazard(s) Addressed	Priority (H/M/L)	Estimated Cost	Potential Funding Sources	Lead Agency / Department	Implementation Schedule	Applies to New and/or Existing Structures*
	action based on available funding from FEMA and local match availability.								
7	<p>Maintain compliance with and good-standing in the NFIP including adoption and enforcement of floodplain management requirements (e.g. regulating all new and substantially improved construction in Special Hazard Flood Areas), floodplain identification and mapping, and flood insurance outreach to the community.</p> <p>Further, continue to meet and/or exceed the minimum NFIP standards and criteria through the following NFIP-related continued compliance actions identified below.</p>	Property Protection	Flood	High	Low - Medium	Municipal Budget	Municipality (via Municipal Engineer/NFIP Floodplain Administrator) with support from PEMA, ISO FEMA	On-going	New & Existing
8	<p>Conduct and facilitate community and public education and outreach for residents and businesses to include, but not be limited to, the following to promote and effect natural hazard risk reduction:</p> <ul style="list-style-type: none"> • Provide and maintain links to the HMP website, and regularly post notices on the County/municipal homepage(s) referencing the HMP webpages. • Prepare and distribute informational letters to flood vulnerable property owners and neighborhood associations, explaining the availability of mitigation grant funding to mitigate their properties, and instructing them on how they can learn more and implement mitigation. • Use email notification systems and newsletters to better educate the public on flood insurance, the availability of mitigation grant funding, and personal natural hazard risk reduction measures. • Work with neighborhood associations, civic and business groups to disseminate information on flood insurance and the availability of mitigation grant funding. 								
	See above.	Public Education and Awareness	All Hazards	High	Low-Medium	Municipal Budget	Municipality with support from Planning Partners,	Short Term	N/A

Action No.	Action	Mitigation Technique Category	Hazard(s) Addressed	Priority (H/M/L)	Estimated Cost	Potential Funding Sources	Lead Agency / Department	Implementation Schedule	Applies to New and/or Existing Structures*
							PEMA, FEMA		
9	Begin the process to adopt higher regulatory standards to manage flood risk (i.e. increased freeboard, cumulative substantial damage/improvements).	Prevention	Flood	High	Low	Municipal Budget	Municipality (via Municipal Engineer/NFIP Floodplain Administrator) with support from PEMA, FEMA	Short Term	New & Existing
10	Determine if a Community Assistance Visit (CAV) or Community Assistance Contact (CAC) is needed, and schedule if needed.	Prevention, Property Protection	Flood	Medium	Low	Municipal Budget	NFIP Floodplain Administrator with support from PADEP, PEMA, FEMA	Short Term	N/A
11	Have designated NFIP Floodplain Administrator (FPA) become a Certified Floodplain Manager through the ASFPM, and pursue relevant continuing education training such as FEMA Benefit-Cost Analysis.	Public Education and Awareness	Flood	High	Low	Municipal Budget	NFIP Floodplain Administrator	Short Term DOF	N/A
12	Participate in the Community Rating System (CRS) to further manage flood risk and reduce flood insurance premiums for NFIP policyholders. This shall start with the submission to FEMA-DHS of a Letter of Intent to join CRS, followed by the completion and submission of an application to the program once the community's current compliance with	Prevention, Property Protection, Public Education and Awareness	Flood	Medium	Low	Municipal Budget	NFIP Floodplain Administrator with support from PADEP, PEMA, FEMA	Short Term	N/A

Action No.	Action	Mitigation Technique Category	Hazard(s) Addressed	Priority (H/M/L)	Estimated Cost	Potential Funding Sources	Lead Agency / Department	Implementation Schedule	Applies to New and/or Existing Structures*
	the NFIP is established.								
13	Archive elevation certificates	Public Education and Awareness	Flood, Severe Storm	High	Low	Municipal Budget	NFIP Floodplain Administrator	On-going	N/A
14	Continue to support the implementation, monitoring, maintenance, and updating of this Plan, as defined in Section 7.0	All Categories	All Hazards	High	Low – High (for 5-year update)	Municipal Budget, possibly FEMA Mitigation Grant Funding for 5-year update	Municipality (via mitigation planning point of contacts) with support from Planning Partners (through their Points of Contact), PEMA	On-going	New & Existing
15	Complete the ongoing updates of the Comprehensive Emergency Management Plans	Emergency Services	All Hazards	High	Low	Municipal Budget	Municipality with support from PEMA	On-going	New & Existing
16	Create/enhance/ maintain mutual aid agreements with neighboring communities for continuity of operations.	Emergency Services	All Hazards	High	Low	Municipal Budget	Municipality with support from Surrounding municipalities and County	On-going	New & Existing
17	Identify and develop agreements with entities that can provide support with FEMA/PEMA paperwork after disasters; qualified damage assessment personnel – Improve post-disaster capabilities – damage assessment; FEMA/PEMA paperwork compilation, submissions, record-	Public Education and Awareness, Emergency Services	All Hazards	Medium	Medium	Municipal Budget	Municipality with support from County, PEMA, FEMA	Short Term	N/A

Action No.	Action	Mitigation Technique Category	Hazard(s) Addressed	Priority (H/M/L)	Estimated Cost	Potential Funding Sources	Lead Agency / Department	Implementation Schedule	Applies to New and/or Existing Structures*
	keeping								
18	Work with regional agencies (i.e. County and PEMA) to help develop damage assessment capabilities at the local level through such things as training programs, certification of qualified individuals (e.g. code officials, floodplain managers, engineers).	Public Education and Awareness, Emergency Services	All Hazards	Medium	Medium	Municipal Budget, FEMA HMA and HLS grant programs	Municipality with support from County, PEMA	Short/Long Term DOF	N/A

Notes:

*Does this mitigation initiative reduce the effects of hazards on new and/or existing buildings and/or infrastructure? Not applicable (NA) is inserted if this does not apply.

Costs:

Where actual project costs cannot reasonably be established at this time:

Low = < \$10,000

Medium = \$10,000 to \$100,000

High = > \$100,000

Potential FEMA HMA Funding Sources:

PDM = Pre-Disaster Mitigation Grant Program

FMA = Flood Mitigation Assistance Grant Program

RFC = Repetitive Flood Claims Grant Program

SRL = Severe Repetitive Loss Grant Program

HMGP = Hazard Mitigation Grant Program

Timeline:

Short = 1 to 5 years. Long Term = 5 years or greater. OG = On-going program.

DOF = Depending on funding.

G. ANALYSIS OF MITIGATION ACTIONS

Municipal mitigation actions were evaluated and prioritized primarily using the PA STEEL methodology discussed in Section 6 of this plan. Per the cost-benefit weighted PA STEEL methodology, those actions receiving 20 or more favorable ratings were generally considered high-priority actions. However, other factors beyond the PA STEEL numeric ranking may have been considered by the municipality during project prioritization. For example, a project might be assigned a medium priority because of the uncertainty of a funding source, and could be changed to high once a funding source has been identified such as a grant.

Mitigation Action		PA STEEL CRITERIA CONSIDERATIONS																				Results			
		(+) Favorable						(-) Less favorable						(N) Not Applicable											
		P Political			A Administrative			S Social		T Technical			E Economic			E Environmental					L Legal			SUMMARY (EQUAL WEIGHTING)	SUMMARY (BENEFITS & COSTS PRIORITIZED)
Political Support	Local Champion	Public Support	Staffing	Funding Allocation	Maintenance / Operations	Community Acceptance	Effect on Segment of Population	Technically Feasible	Long-Term Solution	Secondary Impacts	Benefit of Action (x3)	Cost of Action (x3)	Contributes to Economic Goals	Outside Funding Required	Effect on Land / Water	Effect on Endangered Species	Effect on HAZMAT / Waste Site	Consistent w/ Community Environmental Goals	Consistent w/ Federal Laws	State Authority	Existing Local Authority	Potential Legal Challenge			
1	Pennsylvania Avenue Stormwater Improvements	+	+	+	+	+	N	+	+	N	+	N	N	+	+	N	+	+	+	+	+	+	N	18 + 7 N 0 -	
2	Viaduct Improvements - Blue Ridge Creek (Messinger St. Viaduct)	+	+	+	N	+	N	+	+	+	+	N	+	-	+	N	+	+	+	+	+	+	N	17 + 6 N 3 -	3 -
3	Capital Boulevard Culvert Improvements	+	+	+	+	N	-	+	+	N	+	+	-	N	+	+	N	N	+	+	+	+	N	16 + 4 - 7 N	

4	Borton Lawson Study (Flooding)	+	+	+	N	-	-	+	+	N	+	+	+	N	+	+	+	N	N	+	+	+	+	N	16 + 2 - 6 N	
5	Retrofit Vulnerable Properties	+	+	+	-	-	+	+	+	+	+	+	+	+	-	+	+	+	N	+	N	+	+	18 (+) 3 (-) 2 (N)	22 (+) 3 (-) 2 (N)	
6	Acquire Vulnerable Properties	+	+	+	-	-	-	+	-	+	+	+	+	+	-	+	+	+	+	+	N	+	+	17 (+) 5 (-) 1 (N)	21 (+) 5 (-) 1 (N)	
7	Maintain NFIP compliance	+	+	+	+	+	-	+	+	+	+	+	+	+	+	+	+	N	+	+	N	+	-	19 (+) 2 (-) 2 (N)	23 (+) 2 (-) 2 (N)	
8	Public Education and Outreach	+	+	+	+	+	+	+	+	+	+	+	+	+	+	N	N	N	N	N	N	+	+	17 (+) 0 (-) 6 (N)	21 (+) 0 (-) 6 (N)	
9	Higher Regulatory Standards	+	+	-	+	+	-	-	-	+	+	+	+	+	+	+	N	N	+	+	+	+	-	16 (+) 5 (-) 2 (N)	20 (+) 5 (-) 2 (N)	
10	Community Assistance Visit	+	+	+	+	+	-	+	+	+	N	N	+	+	+	N	N	N	N	+	N	+	-	14 (+) 2 (-) 7 (N)	18 (+) 2 (-) 7 (N)	
11	NFIP FPA become a Certified Floodplain Manager	+	+	+	+	-	+	+	+	+	N	+	+	+	+	N	N	N	N	N	N	+	+	15 (+) 1 (-) 7 (N)	19 (+) 1 (-) 7 (N)	
12	Join Community Rating System	+	+	+	+	-	-	+	+	+	+	+	+	+	+	+	+	N	+	+	N	+	+	19 (+) 2 (-) 2 (N)	23 (+) 2 (-) 2 (N)	
13	Archive Elevation Certificates	+	+	+	+	+	+	+	+	+	N	+	+	+	N	+	N	N	N	N	+	N	+	+	16 (+) 0 (-) 7 (N)	20 (+) 0 (-) 7 (N)
14	Support Plan Maintenance and Update	+	+	+	+	+	+	+	+	+	+	+	+	+	+	N	N	N	N	+	+	+	+	19 (+) 0 (-) 4 (N)	23 (+) 0 (-) 4 (N)	

15	Update CEMP	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	N	N	+	N	+	+	+	+	20 (+) 0 (-) 3 (N)	24 (+) 0 (-) 3 (N)
16	Enhance Mutual Aid Agreements	+	+	+	+	+	+	+	+	+	+	+	+	+	+	N	N	+	N	+	N	+	+	19 (+) 0 (-) 3 (N)	23 (+) 0 (-) 3 (N)	
17	Identify Post-Disaster Capabilities	+	+	+	+	-	+	+	+	+	+	+	+	+	+	+	N	N	N	+	N	+	+	18 (+) 1 (-) 4 (N)	22 (+) 4 (-) 4 (N)	
18	Develop Post-Disaster Capabilities	+	+	+	-	-	+	+	+	+	+	+	-	+	-	+	N	N	N	+	N	+	+	15 (+) 4 (-) 4 (N)	17 (+) 6 (-) 4 (N)	

H. FUTURE NEEDS TO BETTER UNDERSTAND RISK/VULNERABILITY

A more detailed flood loss analysis could be conducted on a structural level (versus the Census block analysis conducted for the HMP). The location of each building, details regarding the building (see additional data needed below) and the assessed or fair market value could be included in HAZUS-MH. The FEMA DFIRM boundaries, FEMA Flood Insurance Study detailed studies, base flood elevations and available Light Detection and Ranging (LiDAR) data or digital elevation models (DEM) could be used to generate a more accurate flood depth grid and then integrated into the HAZUS model. The flood depth-damage functions could be updated using the U.S. Army Corps of Engineer damage functions for residential building stock to better correlate HAZUS-MH results with FEMA benefit-cost analysis models. HAZUS-MH would then estimate more accurate potential losses per structure.

Additional data needed to perform the analysis described above:

- Specific building information – first-floor elevation (elevation certificates), number of stories, foundation type, basement, square footage, occupancy type, year built, type of construction etc.
- Assessed or fair market value of structure
- LiDAR or high resolution DEM

I. HAZARD AREA EXTENT AND LOCATION

A hazard area extent and location map has been generated and is provided below for Bangor Borough to illustrate the probable areas impacted within Bangor Borough. This map is based on the best available data at the time of the preparation of this plan, and is considered to be adequate for planning purposes. Maps have only been generated for those hazards that can be clearly identified using mapping techniques and technologies, and for which Bangor Borough has significant exposure. Regional risk maps are provided in the hazard profiles within Section 4, Volume I of this Plan.

J. ADDITIONAL COMMENTS

