

**9.15 MACUNGIE BOROUGH**

This section presents the jurisdictional annex for Macungie Borough.

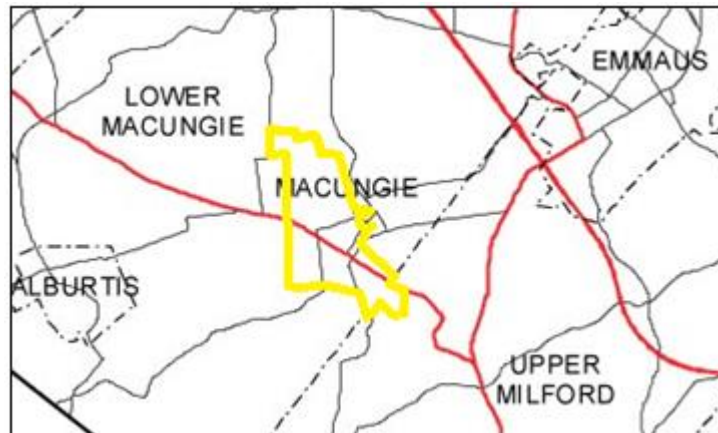
**A. HAZARD MITIGATION PLAN POINT OF CONTACT**

Primary Point of Contact		Alternate Point of Contact	
<u>Name</u>	Chris L. Boehm	<u>Name</u>	Cindy Hartzell
<u>Title/</u>	Borough Manager	<u>Title/</u>	Administrative Assistant
<u>Department</u>		<u>Department</u>	
<u>Address</u>	21 Locust Street, Macungie, PA 18062	<u>Address</u>	21 Locust Street, Macungie, PA 18062
<u>Telephone</u>	610-966-2503	<u>Telephone</u>	610-966-2503
<u>Fax</u>	610-966-2788	<u>Fax</u>	610-966-2788
<u>Email</u>	clboehm@macungie.pa.us	<u>Email</u>	cahartzell@macungie.pa.us

**B. MUNICIPAL PROFILE**

Macungie Borough is located in the southwest corner of Lehigh County, within the Townships of Lower Macungie and Upper Milford. It encompasses an area of approximately 1 square mile, and has a population of 3,074 (2010 Census). As shown in Figure 1, the borough is mostly surrounded by Lower Macungie Township (Lehigh County); however the southeastern tip of Macungie Borough lies within Upper Milford Township (Lehigh County). Other municipalities within relative proximity are Alburkis Borough to the west, and Emmaus Borough to the east (both in Lehigh County).

Figure 1



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

Macungie Borough is located within the Little Lehigh Creek Watershed. Two small tributaries to the Swabia Creek meet in the middle of the borough. The merged Swabia Creek then flows northeast through the borough, meets with Iron Run Creek in Lower Macungie Township, and drains it into the Little Lehigh Creek.

The primary roadway serving Macungie Borough is State Route 100, which crosses the borough northwest-southeast as Main Street, providing routes north through Lower Macungie Township towards SR 309, and routes south to Berks County, via Route 29 in Upper Milford Township. Other outlet streets include Church and Chestnut Streets to the southwest, and Walnut and Lehigh Streets east to Brookside

Road. Willow Street provides an outlet to the north. The Norfolk Southern Reading railroad freight lines also cross east-west through the middle of the borough.

**B.1 Known or Anticipated Future Development**

No development identified in the Borough at this time.

**C. NATURAL HAZARD EVENT HISTORY SPECIFIC TO MACUNGIE BOROUGH**

Type of Event and Date	FEMA Disaster # (if applicable)	Local Damage and Losses
Tornado – August 1984		Property damage; downed trees and wires
Sinkhole – June 1986		Public and private property damage; road closure; size: 75' w x 35' d; cost \$450,000
Blizzard - 1996	DR 1085	Road conditions
Snow Storm – February 18, 2003	EM 3180	Road conditions
Tropical Depression Ivan – September 18, 2004	DR 1557	Severe flooding; property damage; road closures
October Storm – October 2011		Temporary road closures; downed trees, wires and debris; power outage in Borough for 7 – 10 days
Hurricane Sandy – October 29, 2012	DR 4009	Property damage from fallen trees, debris and downed wires; power outage in borough for 7 days

D. 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	Winter Storm	3	2	4	1	3	2.7
	Flood	3	2	2	3	3	2.5
MODERATE	Subsidence / Sinkholes	2	3	3	2	1	2.4
	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
	Lightning	4	1	1	2	1	2
LOW	Earthquake	1	1	4	4	1	1.9
	Landslide	1	2	1	4	1	1.6

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
	Environmental Hazard and	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 0 Neutral - Hinder	Change Since Last Plan: + Positive - Negative	Comments
	In Place	Date Adopted or Updated	Under Development				
Hazard Mitigation Plan	X	1/1/2006		Lehigh County	+		Updating 2013
Emergency Operations Plan	X	2013		Macungie Borough Emergency Management Coordinator	0	-	
Disaster Recovery Plan				Macungie Borough Emergency Management Coordinator			
Evacuation Plan	X	2013		Macungie Borough Emergency Management Coordinator			
Continuity of Operations Plan				Macungie Borough Administration			
NFIP							
NFIP – Community Rating System							
Floodplain Regulations (spec. NFIP Flood Damage Prevention Ordinance)	X	7/21/08		Macungie Borough Administration/Code Enforcement	0		
Floodplain Management Plan	X			Macungie Borough Administration/Code Enforcement			
Zoning Regulations	X	2/2/09		Macungie Borough Zoning	0		Updating 2013

**SECTION 9.15: MACUNGIE BOROUGH**

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				
Subdivision Regulations	X	2011		Macungie Borough Code Enforcement	0		
Comprehensive Land Use Plan	X	2/7/05		Macungie Borough (plan prepared by Southwestern Lehigh County Comprehensive Plan Committee)	0		Currently updating
Open Space Management Plan (or Parks/Rec or Greenways Plan)	X	2008		Macungie Borough Planning Commission/Borough Council	0		
Stormwater Management Plan / Ordinance	X	6/6/05		Macungie Borough Administration	0		
Natural Resource Protection Plan							
Capital Improvement Plan	X	12/31/12		Macungie Borough Administration/Borough Council	0		
Economic Development Plan							
Historic Preservation Plan							
Farmland Preservation							
Building Code	X	2009		Macungie Borough	+		



**SECTION 9.15: MACUNGIE BOROUGH**

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				
Fire Code							
Firewise							
Storm Ready	X	2012		Lehigh County			
Carbonate Bedrock Standard	X	2008		Macungie Borough	+	+	



## E.2 Administrative and Technical Capability

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



**E.3 Fiscal Capability**

Financial Resources	Yes	No	Department/Agency	Comments
Capital Improvement Programming	X		Macungie Borough Administration	
Community Development Block Grants (CDBG)	X		Macungie Borough Administration	
Special Purpose Taxes		X		
Gas / Electric Utility Fees		X		
Water / Sewer Fees	X		Macungie Borough Council/Authority	
Stormwater Utility Fees		X		
Development Impact Fees		X		
General Obligation, Revenue, and/or Special Tax Bonds	X		Macungie Borough Council	
Partnering Arrangements or Intergovernmental Agreements	X		Macungie Borough Council	
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	Lehigh County	TBD
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 it’s 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. Storm Ready communities are better prepared to save lives from the onslaught of severe weather through advanced 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 Borough adopted a Carbonate Bedrock Standard in 2008 to mitigate the risk of sinkholes on new construction.

The following table provides a summary of progress on the mitigation strategy identified in the 2006 plan for the Borough.

2006 Initiative		Status	Review Comments
Description	Location		
Flood control	150 Locust St.	No progress / Unknown	



2006 Initiative		Status	Review Comments
Description	Location		
Flood control	100, 138, 140 W. Main St.	No progress / Unknown	
Flood control	50, 50 Rear, 74-76 Race St.	No progress / Unknown	
Flood control	Norfolk Southern Railroad	No progress / Unknown	
Flood control	235 S. Walnut St.	No progress / Unknown	
Flood control	101 N. Church St.	No progress / Unknown	
Flood control	200 Cotton St.	No progress / Unknown	
Flood control	143 E. Main St.	No progress / Unknown	
Flood control	50 N. Poplar St.	No progress / Unknown	

**F.2 HAZARD VULNERABILITIES IDENTIFIED**

It is estimated that in Macungie Borough, 10 residents live within the 1% annual chance flood area (NFIP Special Flood Hazard Area). Of the municipality's total land area, 4% is located within the 1% annual chance flood area. \$5,252,628 (1%) of the municipality's general building stock replacement cost value (structure and contents) is located within the 1% annual chance flood area.

There are 13 NFIP policies in the community. While there are 10 parcels located within the 1% annual chance flood area, there are only 2 policies issued to property owners in the 1% annual chance flood area. FEMA has identified 3 Repetitive Loss (RL) including no Severe Repetitive Loss (SRL) properties in the municipality.

HAZUS-MH estimates that for a 1% annual chance flood, \$55,203 (0%) of the municipality's general building stock replacement cost value (structure and contents) will be damaged, 73 people may be displaced, 65 people may seek short-term sheltering, and an estimated 31 tons of debris could be generated.

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 along Mountain Creek and Swabia Creek

Please refer to the Hazard Profiles 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	Stream bank stabilization	Structural Projects; Natural Resource Protection	Flood	Medium	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
2	Implement flood control projects as identified in the 2006 plan, specifically at the following locations: <ul style="list-style-type: none"> <li>• 150 Locust Street</li> <li>• 100, 138 and 140 W. Main Street</li> <li>• 50, 50 rear, 74-76 Race Street</li> <li>• Norfolk Southern Railroad</li> <li>• 235 S. Walnut Street</li> <li>• 101 N. Church Street</li> <li>• 200 Cotton Street</li> <li>• 143 E. Main Street</li> <li>• 50 N. Poplar Street</li> </ul>	Property Protection; Structural Projects	Flood	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
3	Address flood problems along Mountain Creek and Swabia Creek	Structural Projects; Natural Resource	Flood	High	High	FEMA Mitigation Grant Programs	Municipality (via Municipal Engineer/NFIP Floodplain	Long Term DOF	Existing

**SECTION 9.15: MACUNGIE BOROUGH**

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*
		Protection				and local budget (or property owner) for cost share	Administrator) with support from PEMA, FEMA		
4	Work with Lehigh County EMA to install backup power at the Macungie Well #1/Public Works Building – 301 South Church Street. This project part of the Lehigh Countywide Generator Project, funded through 2008 LPDM.	Emergency Services	All Hazards	High	Low – Medium (local share of LPDM grant)	2008 LPDM grant; local budget for match	Municipal public works, working with Lehigh County EMA	Short Term	Existing
5	Retrofit structures located in hazard-prone areas to protect structures from future damage, with repetitive loss and severe repetitive loss properties as priority.  Phase 1: Identify appropriate candidates for retrofitting based on cost-effectiveness versus relocation.  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.	Property Protection	Flood	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
6	Purchase, or relocate structures located in hazard-prone areas to protect	Property Protection	Flood	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>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 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		
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	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:								



**SECTION 9.15: MACUNGIE BOROUGH**

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*
	Provide and maintain links to the HMP website, and regularly post notices on the County/municipal homepage(s) referencing the HMP webpages. Work with neighborhood associations, civic and business groups to disseminate information on flood insurance and the availability of mitigation grant funding.								
9	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
10	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
11	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
12	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-keeping	Public Education and Awareness, Emergency Services	All Hazards	Medium	Medium	Municipal budget	Municipality with support from County, PEMA, FEMA	Short Term	NA
13	Work with regional agencies (i.e. County and PEMA) to help develop damage assessment capabilities at	Public Education and Awareness,	All Hazards	Medium	Medium	Municipal budget, FEMA HMA and	Municipality with support from County, PEMA	Short Term DOF	NA



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 local level through such things as training programs, certification of qualified individuals (e.g. code officials, floodplain managers, engineers).	Emergency Services				HLS grant programs			

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 have been reasonably estimated:

Low = < \$10,000

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

High = > \$100,000

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

Low = Possible to fund under existing budget. Project is part of, or can be part of an existing on-going program.

Medium = Could budget for under existing work-plan, but would require a reapportionment of the budget or a budget amendment, or the cost of the project would have to be spread over multiple years.

High = Would require an increase in revenue via an alternative source (i.e., bonds, grants, fee increases) to implement. Existing funding levels are not adequate to cover the costs of the proposed project.

**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	Stream Bank Stabilization	+	+	+	+	-	+	+	+	+	+	N	+	+	N	+	-	-	N	-	+	N	+	-	14(+) 5(-) 4(N)	18(+) 5(-) 4(N)
2	Flood Control Projects	+	+	+	+	+	N	+	+	N	+	N	N	+	+	N	+	+	+	+	+	+	N	18 + 0- 7 N	20+ 0- 7 N	
3	Mountain and Swabia Creek flooding	+	+	+	+	-	+	+	+	+	+	N	+	+	N	+	+	N	N	+	+	+	+	-	17 (+) 2 (-) 4 (N)	21 (+) 2 (-) 4 (N)



**SECTION 9.15: MACUNGIE BOROUGH**

4	Lehigh County Generator Project	+	+	-	N	+	+	N	N	+	+	N	+	+	N	+	N	N	N	N	+	N	+	N	11+ 1- 11N	17+ 1- 11N
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	Support Plan Maintenance and Update	+	+	+	+	+	+	+	+	+	+	+	+	+	+	N	N	N	N	+	+	+	+	19 (+) 0 (-) 4 (N)	23 (+) 0 (-) 4 (N)	
10	Update CEMP	+	+	+	+	+	+	+	+	+	+	+	+	+	+	N	N	+	N	+	+	+	+	20 (+) 0 (-) 3 (N)	24 (+) 0 (-) 3 (N)	
11	Enhance Mutual Aid Agreements	+	+	+	+	+	+	+	+	+	+	+	+	+	+	N	N	+	N	+	N	+	+	19 (+) 0 (-) 3 (N)	23 (+) 0 (-) 3 (N)	
12	Identify Post-Disaster Capabilities	+	+	+	+	-	+	+	+	+	+	+	+	+	+	+	N	N	N	+	N	+	+	18 (+) 1 (-) 4 (N)	22 (+) 4 (-) 4 (N)	
13	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 Macungie Borough to illustrate the probable areas impacted within Macungie 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 Macungie Borough has significant exposure. The Planning Area maps are provided in the hazard profiles within Section 4, Volume I of this Plan.

## **J. ADDITIONAL COMMENTS**

No additional comments at this time.

**SECTION 9.15: MACUNGIE BOROUGH**

