

## 9.7 EMMANUS BOROUGH

This section presents the jurisdictional annex for Emmaus Borough.

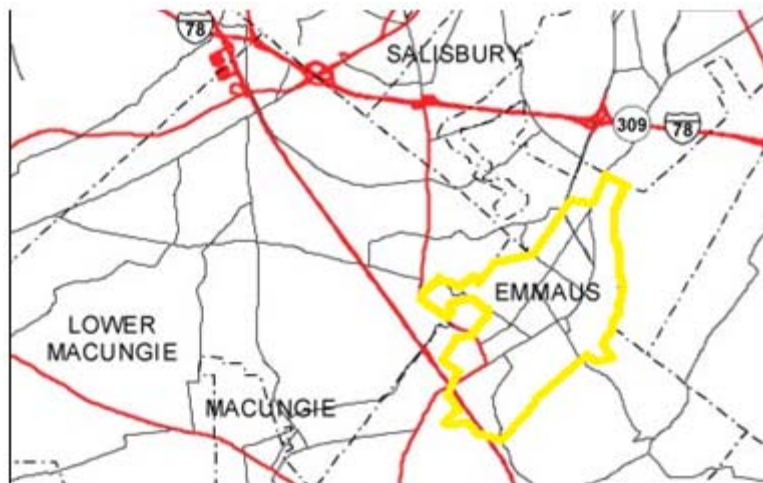
### A. HAZARD MITIGATION PLAN POINT OF CONTACT

Primary Point of Contact		Alternate Point of Contact	
<u>Name</u>	Shane Pepe	<u>Name</u>	Kevin Farnish
<u>Title/</u>	Borough Manager	<u>Title/</u>	Emergency Management Coordinator
<u>Department</u>		<u>Department</u>	
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### B. MUNICIPAL PROFILE

Emmaus Borough is located in the southern part of Lehigh County. It encompasses a land area of 2.9 square miles, and has a population of 11,211 (2010 Census). As shown in Figure 1, the borough is bordered by Upper Milford Township (Lehigh County) to the south; Lower Macungie Township (Lehigh County) to the west; Salisbury Township and Allentown (both Lehigh County) to the north; and Upper Saucon Township (Lehigh County) to the east.

Figure 1



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

Leibert Creek, a tributary to Little Lehigh Creek, runs through the western part of the borough, and another unnamed creek runs north through the eastern part of the borough. A small dam and stocked fishing pond are located in the south-western area of the borough at Furnace Dam recreation area.

State Route 476/PA Turnpike cuts through the southwest corner of the borough. Route 29 runs southwest-northeast as Chestnut Street, Main Street, and State Avenue through the borough, changing to a north-northeast direction as Lehigh Street as it exits the northeastern part of the borough. Harrison Street also runs southwest-northeast through the borough, intersecting with SR 29 (State Avenue) just east of the

Norfolk Southern Railroad tracks. Both the Norfolk Southern and East Penn Railroad run through the Borough.

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

No known or anticipated development has been identified in the Borough at this time.

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

Type of Event and Date	FEMA Disaster # (if applicable)	Local Damage and Losses

**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	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	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
	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 classification.

## 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		Lehigh County	+	+	
Emergency Operations Plan	X	9/2005		Emergency Management			
Disaster Recovery Plan							
Evacuation Plan	X	9/2005		Emergency Management			
Continuity of Operations Plan							
NFIP							
NFIP – Community Rating System							
Floodplain Regulations (spec. NFIP Flood Damage Prevention Ordinance)	X	6/5/06 1/7/02 1/7/02		Planning Zoning Engineer			Ordinance 1011 Ordinance 940 – Zoning Ordinance 940 – SALDO
Floodplain Management Plan	X	Same		Same			
Zoning Regulations	X	1/7/02					
Subdivision Regulations	X	1/7/02					
Comprehensive Land Use Plan (or General, Master or Growth Mgt. Plan)	X	2004		Southwestern Lehigh County Comprehensive	+		Includes recommendations on the adoption of carbonate

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				
				Plan Committee			bedrock standards.
Open Space Management Plan (or Parks/Rec or Greenways Plan)	X	3/09					
Stormwater Management Plan / Ordinance	X	Act 167 6/5/06					
Natural Resource Protection Plan							
Capital Improvement Plan	X	12/11					
Economic Development Plan							
Historic Preservation Plan							
Farmland Preservation							
Building Code	X	1/10					
Fire Code	X	1/10					
Firewise							
Storm Ready	X			Lehigh County			
Other							

**E.2 Administrative and Technical Capability**

Staff/Personnel Resources	Yes	No	Department/Agency	Comments
Planners (with land use / land development knowledge)	X			
Planners or engineers (with natural and/or human caused hazards knowledge)	X			
Engineers or professionals trained in building and/or infrastructure construction practices (includes building inspectors)	X			
Emergency Manager	X			
NFIP Floodplain Administrator				
Land Surveyors	X			
Scientists or staff familiar with the hazards of the community				
Personnel skilled in Geographic Information Systems (GIS) and/or FEMA's HAZUS program				
Grant writers or fiscal staff to handle large/complex grants	X			
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		Administration	
Community Development Block Grants (CDBG)	X		Lehigh County	
Special Purpose Taxes	X		Council	
Gas / Electric Utility Fees		X	(PPL / UGI)	
Water / Sewer Fees	X		Public Works	
Stormwater Utility Fees		X		
Development Impact Fees		X		
General Obligation, Revenue, and/or Special Tax Bonds	X		Council	
Partnering Arrangements or Intergovernmental Agreements	X		Administration	
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 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. 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

- Community Park – Riparian Buffer Project

### F.2 Hazard Vulnerabilities Identified

It is estimated that in Emmaus Borough, 107 residents live within the 1% annual chance flood area (NFIP Special Flood Hazard Area). Of the municipality's total land area, 4.1% is located within the 1% annual chance flood area. \$7,940,438 (0.4%) of the municipality's general building stock replacement cost value (structure and contents) is located within the 1% annual chance flood area.

There are 25 NFIP policies in the community. While there are 103 parcels located within the 1% annual chance flood area, there are only 11 policies issued to property owners in the 1% annual chance flood

area. FEMA has identified no Repetitive Loss (RL) or Severe Repetitive Loss (SRL) properties in the municipality.

HAZUS-MH estimates that for a 1% annual chance flood, \$,6184,000 (0.3%) of the municipality's general building stock replacement cost value (structure and contents) will be damaged, 200 people may be displaced, 49 people may seek short-term sheltering, and an estimated 192 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
CITIZENS FIRE CO	Fire	X	X	0.0	0.0	0.0
BORO OF EMMANUS	User Defined (Gov)	X	X	11.1	68.3	11.1
GOLDSTEIN LEE A ET AL	Communication	X	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):

- Numerous properties in the flood zone.

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	Implement stormwater management projects to alleviate street flooding.	Structural Projects	Flood	Medium	High	Borough Budget	Engineering / Public Works	Long-term DOF	Existing
2	Work with local electric utility to improve utility line clearing.	Property Protection	Severe Storms	High	Medium	Borough Budget	Borough working with the electric utilities	Short	Existing
3	Maintain adequate fleet of vehicles and equipment to handle emergency response.	Emergency Services	All	High	Medium	Borough Budget; public protection and emergency services grant programs	Borough	Ongoing	N/A
4	<p>Retrofit 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 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</p>	Property Protection	Flood, Severe Storm, Earthquake	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*
	based on available funding from FEMA and local match availability.								
5	<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 action based on available funding from FEMA and local match availability.</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
6	<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</p>	Property Protection	Flood, Severe Storms	High	Low - Medium	Local Budget	Municipality (via Municipal Engineer/NFIP Floodplain Administrator) with support from PEMA, ISO FEMA	Ongoing	New & 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*
	and/or exceed the minimum NFIP standards and criteria through the following NFIP-related continued compliance actions identified below.								
7	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: <ul style="list-style-type: none"> <li>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.</li> <li>Work with neighborhood associations, civic and business groups to disseminate information on flood insurance and the availability of mitigation grant funding.</li> </ul>								
	See above.	Public Education and Awareness	All Hazards	High	Low-Medium	Municipal Budget	Municipality with support from Planning Partners, PEMA, FEMA	Short	N/A
8	Archive elevation certificates	Public Education and Awareness	Flood, Severe Storm	High	Low	Local Budget	NFIP Floodplain Administrator	On-going	NA
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)	Local 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	Ongoing	New & Existing
10	Complete the ongoing updates of the Comprehensive Emergency Management Plans	Emergency Services	All Hazards	High	Low	Local Budget	Municipality with support from PEMA	Ongoing	New & Existing
11	Work with regional agencies (i.e. County and PEMA) to help develop damage assessment capabilities at	Public Education and Awareness,	All Hazards	Medium	Medium	Local budget, FEMA HMA and	Municipality with support from County, PEMA	Short – Long-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				
		(+)					(-)					(N)														
		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	Implement stormwater management projects to alleviate street flooding	+	+	+	-	-	-	+	-	+	+	+	-	+	-	+	+	+	+	+	N	+	+	16 (+) 6 (-) 1 (N)	19 (+) 8 (-) 2 (N)	
2	Work with local electric utility to improve utility line clearing	+	-	+	+	-	+	+	-	N	-	N	+	+	N	-	-	-	N	N	N	N	+	+	9 (+) 7 (-) 7 (N)	13 (+) 7 (-) 7 (N)
3	Maintain adequate fleet of	+	+	-	N	-	+	N	N	N	N	+	+	N	+	N	N	N	N	N	N	+	N	7(+) 2(-) 14(N)	11(+) 2(-) 14(N)	



## SECTION 9.7: EMMAUS BOROUGH

	vehicles and equipment to handle emergency response																									)
4	Retrofit Vulnerable Structures	+	+	+	-	-	+	+	+	+	+	+	+	+	-	+	+	+	N	+	N	+	+	18 (+)	22 (+)	
																								3 (-)	3 (-)	
																								2 (N)	2 (N)	
5	Acquire Vulnerable Structures	+	+	+	-	-	-	+	-	+	+	+	+	+	-	+	+	+	+	+	N	+	+	17 (+)	21 (+)	
																								5 (-)	5 (-)	
																								1 (N)	1 (N)	
6	Maintain NFIP compliance	+	+	+	+	+	-	+	+	+	+	+	+	+	+	+	+	N	+	+	N	+	-	19 (+)	23 (+)	
																								2 (-)	2 (-)	
																								2 (N)	2 (N)	
7	Public Education and Outreach	+	+	+	+	+	+	+	+	+	+	+	+	+	+	N	N	N	N	N	N	+	+	17 (+)	21 (+)	
																								0 (-)	0 (-)	
																								6 (N)	6 (N)	
8	Archive Elevation Certificates	+	+	+	+	+	+	+	+	+	N	+	+	+	N	+	N	N	N	N	+	N	+	+	16 (+)	20 (+)
																								0 (-)	0 (-)	
																								7 (N)	7 (N)	
9	Support Plan Maintenance and Update	+	+	+	+	+	+	+	+	+	+	+	+	+	+	N	N	N	N	+	+	+	+	19 (+)	23 (+)	
																								0 (-)	0 (-)	
																								4 (N)	4 (N)	
10	Update CEMP	+	+	+	+	+	+	+	+	+	+	+	+	+	+	N	N	+	N	+	+	+	+	20 (+)	24 (+)	
																								0 (-)	0 (-)	
																								3 (N)	3 (N)	
11	Develop Post-Disaster Capabilities	+	+	+	-	-	+	+	+	+	+	+	+	-	+	-	+	N	N	N	+	N	+	+	15 (+)	17 (+)
																								4 (-)	4 (-)	
																								4 (N)	6 (-)	
																									4 (N)	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

Regional risk maps are provided in the hazard profiles within Section 4, Volume I of this Plan.

## I. HAZARD AREA EXTENT AND LOCATION

A hazard area extent and location map has been generated and is provided below for Emmaus Borough to illustrate the probable areas impacted within Emmaus 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 Emmaus 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.

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