

9.30 BETHLEHEM TOWNSHIP

This section presents the jurisdictional annex for Bethlehem Township.

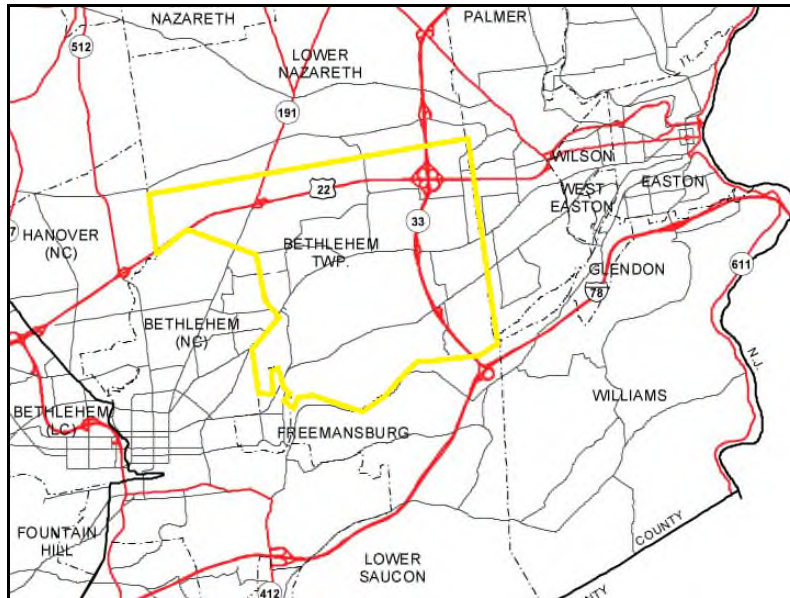
A. HAZARD MITIGATION PLAN POINT OF CONTACT

Primary Point of Contact		Alternate Point of Contact	
<u>Name</u>	Stephen Gallagher	<u>Name</u>	Howard Kutzler
<u>Title/</u>	Fire Marshal	<u>Title/</u>	Township Manager
<u>Department</u>	Bethlehem Township	<u>Department</u>	Bethlehem Township
<u>Address</u>	4225 Easton Avenue, Bethlehem, PA 18020	<u>Address</u>	4225 Easton Avenue, Bethlehem, PA 18020
<u>Telephone</u>	610-814-6475	<u>Telephone</u>	610-814-6402
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<u>Email</u>	sgallagher@bethlehemtp.com	<u>Email</u>	hkutzler@bethlehemtp.com

B. MUNICIPAL PROFILE

Bethlehem Township is mainly a residential township with some agriculture, industrial, and commercial property and is located in the southeastern part of Northampton County. It encompasses an area of approximately 14.7 square miles, and has a population of 23,730 (2010 Census). As shown in Figure 1, the township is bordered by Bethlehem City and Freemansburg Borough to the southwest; Hanover Township to the west; Lower Nazareth Township to the north; Palmer Township to the east; Easton to the southeast; and Lower Saucon Township to the south.

Figure 1



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

The Lehigh River forms the township’s southern border with Lower Saucon Township. The Monocacy Creek flows from Lower Nazareth Township south through the northwestern part of the township, and

into Bethlehem City. Nancy Run also flows through the township, beginning in the central portion of the township and flowing south into the Lehigh River.

US Route 22 travels east-west through the northern part of the township. It has an interchange with PA Route 33, which runs north-south through the eastern portion of the township, in the township's northeast corner. PA Route 191 is another north-south roadway, found in the northwestern part of the township. Other major east-west roadways include Freemansburg Avenue in the south, and the William Penn Highway in the central portion of the township.

A railroad operated by Norfolk Southern passes through the Township's Northwest boundaries with roadway crossings at Christian Springs Road and Brodhead Road. Numerous types of goods transported include but are not limited to industrial products, chemicals, agriculture, construction products, coal, metals, paper, and clays.

Lehigh Valley Industrial Parks four and six are located in the Township. LVIP four is located on the Northwest boundaries bordered by Lower Nazareth and Hanover Township's and LVIP six is located on the Southeast portion of Bethlehem Township. Both Industrial parks maintain properties of industrial manufacturing, factories, storage and distribution facilities as well as high hazard facilities with storage and manufacturing of reportable hazardous materials.

Located on the Southeast boundary is a hospital, cancer center, and medical office building owned and operated by St. Luke's Health Network and has been operational since 2011.

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
Madison Farms	Residential and Commercial	Unknown	Unknown	None	Planning

* 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 BETHLEHEM TOWNSHIP

Type of Event and Date	FEMA Disaster # (if applicable)	Local Damage and Losses
Hurricane Ivan (2004)		Local flooding, Major structural and personal property losses to Willow Park Road residents and business owners. Willow Park Road damaged and closed for several weeks.
Hurricane Irene (2011)		Local flooding, Moderate losses to resident and business owner personal property
Snow Storm (October 2011)		Wide Spread Power Outages lasting long durations (over one week) in areas, Road Closures due to downed trees

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	Radon Exposure	4	1	2	1	4	2.4
	Subsidence / Sinkholes	2	2	4	2	1	2.3
	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
	Env. Hazard and Explosion	3	2	2	4	3	2.6
	Utility Interruption	3	1	3	4	3	2.5
MODERATE	Transportation Accident	4	1	1	4	1	2.2
	Dam Failure	1	3	2	4	2	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
	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			+	+	Updating 2012
Emergency Operations Plan	x	7/2011		Township Administration	+	+	Updated in July of 2011
Disaster Recovery Plan							
Evacuation Plan							
Continuity of Operations Plan							
NFIP	x	1993		Township Manager			Updated in 1993
NFIP – Community Rating System	x	1993		Township Manager	0		Updated in 1993
Floodplain Regulations (spec. NFIP Flood Damage Prevention Ordinance)	x	1993		Township Manager	0		Updated in 1993
Floodplain Management Plan	x	1993		Township Manager	0		Updated in 1993
Zoning Regulations	x	2004		Township Administration			Updated in 2004
Subdivision Regulations	x	1989		Township Administration			Adopted 1989
Comprehensive Land Use Plan (or General, Master or Growth Mgt. Plan)	x	2004		Township Administration			Updated 2004
Open Space Management Plan (or Parks/Rec or Greenways Plan)	x	1995		Township Administration			Adopted 1995
Stormwater Management Plan / Ordinance	x	1988		Township Administration			Adopted 1988

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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				
Natural Resource Protection Plan							
Capital Improvement Plan							
Economic Development Plan							
Historic Preservation Plan							
Farmland Preservation							
Building Code	X	April 2004		Township Administration	+		PA UCC regulated
Fire Code	X	July 2009		Township Fire Marshal	+		Ord. 08-09 with update from Ord. 11-11
Carbonate Bedrock Standards	X						



E.2 Administrative and Technical Capability

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

E.3 Fiscal Capability

Financial Resources	Yes	No	Department/Agency	Comments
Capital Improvement Programming		x		
Community Development Block Grants (CDBG)		x		
Special Purpose Taxes		x		
Gas / Electric Utility Fees		x		
Water / Sewer Fees	x		Township Administration	
Stormwater Utility Fees		x		
Development Impact Fees	x		Township Administration and Township Engineers	Traffic, Stormwater, Recreation
General Obligation, Revenue, and/or Special Tax Bonds	x		Township Administration	
Partnering Arrangements or Intergovernmental Agreements		x		
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	4/8B	2011
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 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. StormReady 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 following table summarizes progress on the mitigation strategy identified by the Township in the 2006 plan.

2006 Initiative		Status	Review Comments
Description	Location		
Nancy Run Creek - Rebank creek to prevent flooding of Willow Park Rd	Willow Park Rd. along Nancy Run Creek	No progress / Unknown	
Stormwater Management (Swales, retention ponds,	Throughout the Twp. - planning in progress	In Progress / Not Yet Complete;	Township continues to provide active routine maintenance to



culverts)		Continuous	its stormwater management system as time and resources permit.
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Further details on mitigation activities completed in the Township include:

- The Township adopted Carbonate Bedrock Standards to mitigate the risk of sinkholes on new construction.

F.2 Hazard Vulnerabilities Identified

It is estimated that in Bethlehem Township, 254 residents live within the 1% annual chance flood area (NFIP Special Flood Hazard Area). Of the municipality's total land area, 4.5% is located within the 1% annual chance flood area. \$70,803,684 (1.2%) of the municipality's general building stock replacement cost value (structure and contents) is located within the 1% annual chance flood area.

There are 63 NFIP policies in the community. While there are 100 structures located within the 1% annual chance flood area, there are only 12 policies issued to property owners in the 1% annual chance flood area. FEMA has identified 5 Repetitive Loss (RL) properties in the municipality.

HAZUS-MH estimates that for a 1% annual chance flood, \$13,134,031 (0.2%) of the municipality's general building stock replacement cost value (structure and contents) will be damaged, 459 people may be displaced, 285 people may seek short-term sheltering, and an estimated 1,379 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:

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

- Flooding
 - o Residential and commercial businesses along Nancy Run Creek at and around Willow Park Road. Damage to bridges connecting roadways to Willow Park Road along Nancy Run Creek.
 - o Flash flooding and flooding of Santee Road at Easton Avenue, Santee Road at Clifton Avenue, Hecktown Road at Oakland Road.
 - o Commercial and residential properties along Monocacy Creek at Nazareth Pike (Route 191).
 - o Christian Springs Road between Nazareth Pike (Route 191) and Brodhead Road. Damage to bridge on Christian Springs Road crossing Monocacy Creek.

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	Stormwater management programs, mitigation efforts.	Property Protection, Education and Outreach	Flooding	Medium	High	Federal, State, County Grant funding	Township Engineer	Short Term DOF	New & Existing
2	Hazardous Materials Release, education, prevention, certification of emergency responders to control and mitigate hazardous materials releases	Property Protection, Education	All Hazards	Medium	Low	Federal, State and Local Training Programs	Emergency Services	On-going	New & Existing
3	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.	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
4	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: Willow Park Road, LVIP four and six <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	All Hazards	High	Low-	Municipal	Municipality	Short Term	N/A



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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*
		Education and Awareness			Medium	Budget	with support from Planning Partners, PEMA, FEMA		
5	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
6	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
7	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
8	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	N/A
9	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	Public Education and Awareness, Emergency Services	All Hazards	Medium	Medium	Municipal Budget, FEMA HMA and HLS grant	Municipality with support from County, PEMA	Short/Long Term DOF	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*
	officials, floodplain managers, engineers).					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 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	Stormwater Management	+	N	+	N	-	+	+	+	-	-	N	+	+	N	+	-	+	+	-	-	N	+	+	12(+) 6(-) 5(N)	18(+) 6(-) 5(N)
2	Hazardous Materials Release, education, prevention, certification Program	+	N	+	+	-	+	+	+	+	+	N	+	+	N	+	-	-	+	N	N	N	+	+	14(+) 3(-) 6(N)	20(+) 3(-) 6(N)
3	Maintain NFIP compliance	+	+	+	+	+	-	+	+	+	+	+	+	+	+	+	+	+	N	+	+	N	+	-	19 (+) 2 (-) 2 (N)	23 (+) 2 (-)



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																									2 (N)	
4	Public Education and Outreach	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	N	N	N	N	N	N	+	+	17 (+) 0 (-) 6 (N)	21 (+) 0 (-) 6 (N)
5	Support Plan Maintenance and Update	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	N	N	N	N	+	+	+	+	19 (+) 0 (-) 4 (N)	23 (+) 0 (-) 4 (N)
6	Update CEMP	+	+	+	+	+	+	+	+	+	+	+	+	+	+	N	N	+	N	+	+	+	+	20 (+) 0 (-) 3 (N)	24 (+) 0 (-) 3 (N)	
7	Enhance Mutual Aid Agreements	+	+	+	+	+	+	+	+	+	+	+	+	+	+	N	N	+	N	+	N	+	+	19 (+) 0 (-) 3 (N)	23 (+) 0 (-) 3 (N)	
8	Identify Post-Disaster Capabilities	+	+	+	+	-	+	+	+	+	+	+	+	+	+	+	N	N	N	+	N	+	+	18 (+) 1 (-) 4 (N)	22 (+) 4 (-) 4 (N)	
9	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 Bethlehem Township to illustrate the probable areas impacted within Bethlehem Township. 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 Bethlehem Township has significant exposure. Regional risk maps are provided in the hazard profile.

J. ADDITIONAL COMMENTS

No additional comments at this time.

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