Hazus-MH: Flood Event Report

Region Name: Monroe_20150910

Flood Scenario: MonreoAll

Print Date: Sunday, September 13, 2015

Disclaimer:
This version of Hazus utilizes 2010 Census Data.
Totals only reflect data for those census tracts/blocks included in the user's study region.

The estimates of social and economic impacts contained in this report were produced using Hazus loss estimation methodology software which is based on current scientific and engineering knowledge. There are uncertainties inherent in any loss estimation technique. Therefore, there may be significant differences between the modeled results contained in this report and the actual social and economic losses following a specific Flood. These results can be improved by using enhanced inventory data and flood hazard information.

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General Description of the Region

Hazus is a regional multi-hazard loss estimation model that was developed by the Federal Emergency Management Agency (FEMA) and the National Institute of Building Sciences (NIBS). The primary purpose of Hazus is to provide a methodology and software application to develop multi-hazard losses at a regional scale. These loss estimates would be used primarily by local, state and regional officials to plan and stimulate efforts to reduce risks from multi-hazards and to prepare for emergency response and recovery.

The flood loss estimates provided in this report were based on a region that included 1 county(ies) from the following state(s):

- Pennsylvania

Note:
Appendix A contains a complete listing of the counties contained in the region.

The geographical size of the region is 0 square miles and contains 6,015 census blocks. The region contains over 61 thousand households and has a total population of 169,842 people (2010 Census Bureau data). The distribution of population by State and County for the study region is provided in Appendix B.

There are an estimated 78,643 buildings in the region with a total building replacement value (excluding contents) of 19,034 million dollars (2010 dollars). Approximately 95.43% of the buildings (and 83.58% of the building value) are associated with residential housing.

Building Inventory

General Building Stock

Hazus estimates that there are 78,643 buildings in the region which have an aggregate total replacement value of 19,034 million (2010 dollars). Table 1 and Table 2 present the relative distribution of the value with respect to the general occupancies by Study Region and Scenario respectively. Appendix B provides a general distribution of the building value by State and County.

Table 1
Building Exposure by Occupancy Type for the Study Region

Occupancy	Exposure ($1000)	Percent of Total
Residential	15,908,602	83.6%
Commercial	2,227,049	11.7%
Industrial	495,758	2.6%
Agricultural	29,773	0.2%
Religion	165,444	0.9%
Government	82,676	0.4%
Education	124,226	0.7%
Total	**19,033,528**	**100.00%**

Table 2
Building Exposure by Occupancy Type for the Scenario

Occupancy	Exposure ($1000)	Percent of Total
Residential	7,024,999	82.6%
Commercial	1,005,856	11.8%
Industrial	301,196	3.5%
Agricultural	15,744	0.2%
Religion	77,149	0.9%
Government	25,809	0.3%
Education	53,490	0.6%
Total	**8,504,243**	**100.00%**

Essential Facility Inventory

For essential facilities, there are 1 hospitals in the region with a total bed capacity of 192 beds.
There are 47 schools, 14 fire stations, 8 police stations and no emergency operation centers.

Flood Scenario Parameters

Hazus used the following set of information to define the flood parameters for the flood loss estimate provided in this report.

Study Region Name:	Monroe_20150910
Scenario Name:	MonreoAll
Return Period Analyzed:	100
Analysis Options Analyzed:	FloodWarning,

Building Damage

General Building Stock Damage

Hazus estimates that about 418 buildings will be at least moderately damaged. This is over 4% of the total number of buildings in the scenario. There are an estimated 124 buildings that will be completely destroyed. The definition of the 'damage states' is provided in Volume 1: Chapter 5 of the Hazus Flood Technical Manual. Table 3 below summarizes the expected damage by general occupancy for the buildings in the region. Table 4 summarizes the expected damage by general building type.

Table 3: Expected Building Damage by Occupancy

	1-10		11-20		21-30		31-40		41-50		Substantially	
Occupancy	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**
Agriculture	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Commercial	0	0.00	12	85.71	2	14.29	0	0.00	0	0.00	0	0.00
Education	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Government	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Industrial	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Religion	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Residential	0	0.00	23	5.69	26	6.44	110	27.23	121	29.95	124	30.69
Total	**0**		**35**		**28**		**110**		**121**		**124**	

Table 4: Expected Building Damage by Building Type

Building Type	1-10		11-20		21-30		31-40		41-50		Substantially	
	Count	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**
Concrete	0	0.00	1	100.00	0	0.00	0	0.00	0	0.00	0	0.00
ManufHousing	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	1	100.00
Masonry	0	0.00	8	9.30	6	6.98	22	25.58	25	29.07	25	29.07
Steel	0	0.00	5	83.33	1	16.67	0	0.00	0	0.00	0	0.00
Wood	0	0.00	20	6.17	22	6.79	88	27.16	96	29.63	98	30.25

Essential Facility Damage

Before the flood analyzed in this scenario, the region had 192 hospital beds available for use. On the day of the scenario flood event, the model estimates that 192 hospital beds are available in the region.

Table 5: Expected Damage to Essential Facilities

		# Facilities		
Classification	Total	At Least Moderate	At Least Substantial	Loss of Use
Fire Stations	14	0	0	0
Hospitals	1	0	0	0
Police Stations	8	0	0	0
Schools	47	0	0	0

If this report displays all zeros or is blank, two possibilities can explain this.

(1) None of your facilities were flooded. This can be checked by mapping the inventory data on the depth grid.

(2) The analysis was not run. This can be tested by checking the run box on the Analysis Menu and seeing if a message box asks you to replace the existing results.

Induced Flood Damage

Debris Generation

Hazus estimates the amount of debris that will be generated by the flood. The model breaks debris into three general categories: 1) Finishes (dry wall, insulation, etc.), 2) Structural (wood, brick, etc.) and 3) Foundations (concrete slab, concrete block, rebar, etc.). This distinction is made because of the different types of material handling equipment required to handle the debris.

Analysis has not been performed for this Scenario.

Social Impact

Shelter Requirements

Analysis has not been performed for this Scenario.

Economic Loss

The total economic loss estimated for the flood is 485.45 million dollars, which represents 5.71 % of the total replacement value of the scenario buildings.

Building-Related Losses

The building losses are broken into two categories: direct building losses and business interruption losses. The direct building losses are the estimated costs to repair or replace the damage caused to the building and its contents. The business interruption losses are the losses associated with inability to operate a business because of the damage sustained during the flood. Business interruption losses also include the temporary living expenses for those people displaced from their homes because of the flood.

The total building-related losses were 483.67 million dollars. 0% of the estimated losses were related to the business interruption of the region. The residential occupancies made up 50.93% of the total loss. Table 6 below provides a summary of the losses associated with the building damage.

Table 6: Building-Related Economic Loss Estimates

(Millions of dollars)

Category	Area	Residential	Commercial	Industrial	Others	Total
Building Loss						
	Building	154.68	37.18	17.35	4.70	213.92
	Content	92.43	105.72	43.61	20.75	262.51
	Inventory	0.00	1.71	5.42	0.11	7.25
	Subtotal	**247.11**	**144.61**	**66.39**	**25.56**	**483.67**
Business Interruption						
	Income	0.01	0.32	0.00	0.02	0.35
	Relocation	0.06	0.06	0.00	0.01	0.13
	Rental Income	0.03	0.04	0.00	0.00	0.07
	Wage	0.04	0.36	0.00	0.82	1.22
	Subtotal	**0.15**	**0.78**	**0.01**	**0.85**	**1.78**
ALL	**Total**	**247.25**	**145.39**	**66.39**	**26.41**	**485.45**

Appendix A: County Listing for the Region

Pennsylvania

- Monroe

Appendix B: Regional Population and Building Value Data

		Building Value (thousands of dollars)		
	Population	Residential	Non-Residential	Total
Pennsylvania				
Monroe	169,842	15,908,602	3,124,926	19,033,528
Total	**169,842**	**15,908,602**	**3,124,926**	**19,033,528**
Total Study Region	**169,842**	**15,908,602**	**3,124,926**	**19,033,528**