



Schuylkill County, Pennsylvania – 2013 Hazard Mitigation Plan Update
Appendix G

APPENDIX G

HAZUS Results

Hazus-MH: Flood Event Report

Region Name: SchuylkillCounty040313

Flood Scenario: Schuylkill_all2

Print Date: Monday, July 15, 2013

Disclaimer:

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

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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 778 square miles and contains 6,199 census blocks. The region contains over 61 thousand households and has a total population of 150,336 people (2000 Census Bureau data). The distribution of population by State and County for the study region is provided in Appendix B .

There are an estimated 66,185 buildings in the region with a total building replacement value (excluding contents) of 10,454 million dollars (2006 dollars). Approximately 92.59% of the buildings (and 72.96% of the building value) are associated with residential housing.

General Building Stock

Hazus estimates that there are 66,185 buildings in the region which have an aggregate total replacement value of 10,454 million (2006 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	7,627,348	73.0%
Commercial	1,481,281	14.2%
Industrial	809,995	7.7%
Agricultural	37,858	0.4%
Religion	243,151	2.3%
Government	153,120	1.5%
Education	101,032	1.0%
Total	10,453,785	100.00%

Table 2
Building Exposure by Occupancy Type for the Scenario

Occupancy	Exposure (\$1000)	Percent of Total
Residential	3,247,474	71.1%
Commercial	644,494	14.1%
Industrial	450,615	9.9%
Agricultural	23,373	0.5%
Religion	101,005	2.2%
Government	63,898	1.4%
Education	36,673	0.8%
Total	4,567,532	100.00%

Essential Facility Inventory

For essential facilities, there are 4 hospitals in the region with a total bed capacity of 568 beds. There are 62 schools, 87 fire stations, 32 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:	SchuylkillCounty040313
Scenario Name:	Schuylkill_all2
Return Period Analyzed:	100
Analysis Options Analyzed:	No What-ifs

General Building Stock Damage

Hazus estimates that about 1,606 buildings will be at least moderately damaged. This is over 49% of the total number of buildings in the scenario. There are an estimated 359 buildings that will be completely destroyed. The definition of the 'damage states' is provided in Volume 1: Chapter 5.3 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

Occupancy	1-10		11-20		21-30		31-40		41-50		Substantially	
	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	1	3.45	20	68.97	2	6.90	3	10.34	2	6.90	1	3.45
Education	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Government	2	100.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Industrial	0	0.00	12	32.43	4	10.81	3	8.11	16	43.24	2	5.41
Religion	0	0.00	6	100.00	0	0.00	0	0.00	0	0.00	0	0.00
Residential	0	0.00	95	6.19	154	10.03	482	31.40	448	29.19	356	23.19
Total	3		133		160		488		466		359	

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	3	60.00	0	0.00	0	0.00	2	40.00	0	0.00
ManufHousing	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	23	100.00
Masonry	1	0.24	28	6.62	35	8.27	137	32.39	131	30.97	91	21.51
Steel	2	5.00	17	42.50	4	10.00	3	7.50	12	30.00	2	5.00
Wood	0	0.00	75	6.78	121	10.94	346	31.28	322	29.11	242	21.88

Essential Facility Damage

Before the flood analyzed in this scenario, the region had 568 hospital beds available for use. On the day of the scenario flood event, the model estimates that 568 hospital beds are available in the region.

Table 5: Expected Damage to Essential Facilities

Classification	Total	# Facilities		
		At Least Moderate	At Least Substantial	Loss of Use
Fire Stations	87	14	0	14
Hospitals	4	0	0	0
Police Stations	32	5	0	5
Schools	62	5	0	4

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.

The model estimates that a total of 76,818 tons of debris will be generated. Of the total amount, Finishes comprises 47% of the total, Structure comprises 30% of the total. If the debris tonnage is converted into an estimated number of truckloads, it will require 3,073 truckloads (@25 tons/truck) to remove the debris generated by the flood.

Social Impact

Shelter Requirements

Hazus estimates the number of households that are expected to be displaced from their homes due to the flood and the associated potential evacuation. Hazus also estimates those displaced people that will require accommodations in temporary public shelters. The model estimates 5,769 households will be displaced due to the flood. Displacement includes households evacuated from within or very near to the inundated area. Of these, 11,644 people (out of a total population of 150,336) will seek temporary shelter in public shelters.

Economic Loss

The total economic loss estimated for the flood is 933.85 million dollars, which represents 20.45 % 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 927.62 million dollars. 1% of the estimated losses were related to the business interruption of the region. The residential occupancies made up 34.39% 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
<u>Building Loss</u>						
	Building	207.18	64.01	85.77	12.31	369.26
	Content	113.74	170.03	184.03	60.10	527.89
	Inventory	0.00	4.46	25.44	0.57	30.46
	Subtotal	320.92	238.49	295.23	72.98	927.62
<u>Business Interruption</u>						
	Income	0.00	0.76	0.13	0.08	0.98
	Relocation	0.25	0.15	0.08	0.05	0.54
	Rental Income	0.02	0.09	0.02	0.00	0.13
	Wage	0.01	0.88	0.08	3.63	4.60
	Subtotal	0.28	1.89	0.32	3.76	6.24
ALL	Total	321.19	240.38	295.55	76.73	933.85

Appendix A: County Listing for the Region

- Pennsylvania
 - Schuylkill

Appendix B: Regional Population and Building Value Data

	Building Value (thousands of dollars)			Total
	Population	Residential	Non-Residential	
Pennsylvania				
Schuylkill	150,336	7,627,348	2,826,437	10,453,785
Total	150,336	7,627,348	2,826,437	10,453,785
Total Study Region	150,336	7,627,348	2,826,437	10,453,785