



Hazus: Flood Global Risk Report

Region Name: MontourCounty_PA

Flood Scenario: 100year

Print Date: Monday, November 9, 2020

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 approximately 0 square miles and contains 1,254 census blocks. The region contains over 7 thousand households and has a total population of 18,267 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 7,708 buildings in the region with a total building replacement value (excluding contents) of 1,888 million dollars. Approximately 92.00% of the buildings (and 77.00% of the building value) are associated with residential housing.



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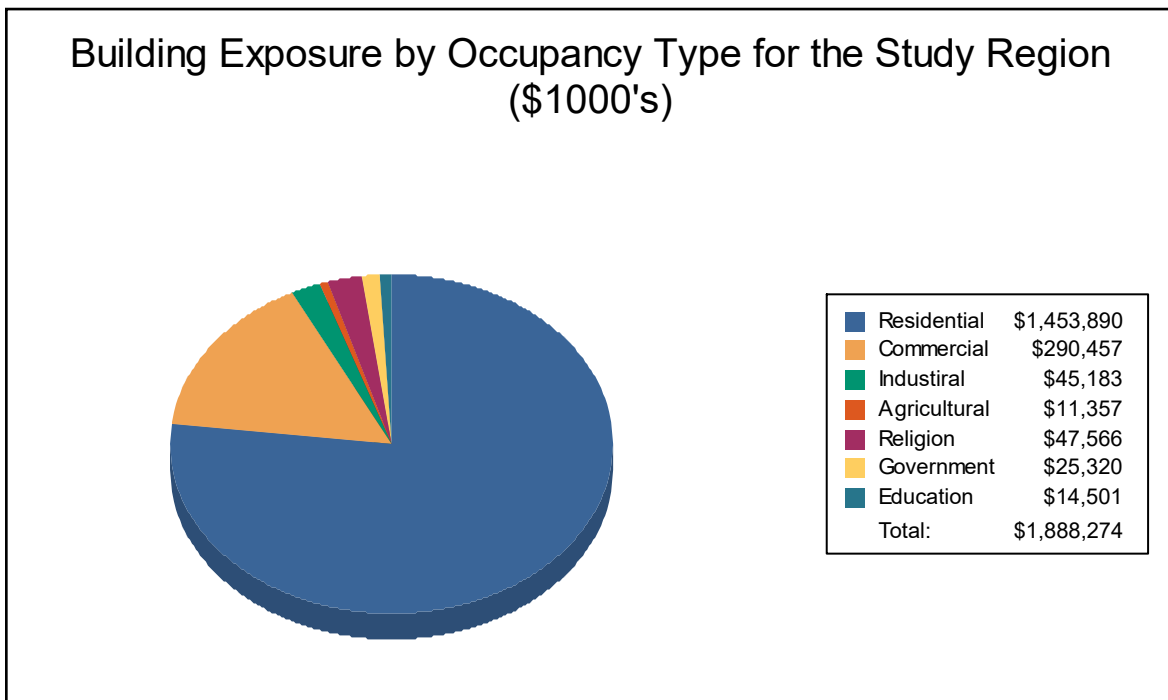
Building Inventory

General Building Stock

Hazus estimates that there are 7,708 buildings in the region which have an aggregate total replacement value of 1,888 million 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	1,453,890	77.0%
Commercial	290,457	15.4%
Industrial	45,183	2.4%
Agricultural	11,357	0.6%
Religion	47,566	2.5%
Government	25,320	1.3%
Education	14,501	0.8%
Total	1,888,274	100%



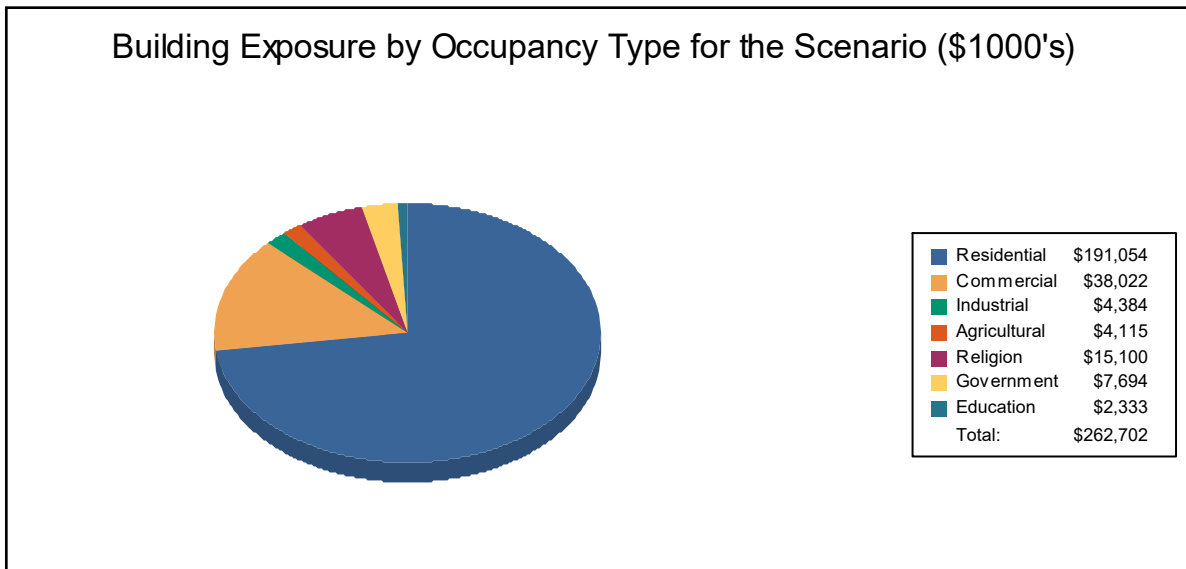
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Table 2
Building Exposure by Occupancy Type for the Scenario

Occupancy	Exposure (\$1000)	Percent of Total
Residential	191,054	72.7%
Commercial	38,022	14.5%
Industrial	4,384	1.7%
Agricultural	4,115	1.6%
Religion	15,100	5.7%
Government	7,694	2.9%
Education	2,333	0.9%
Total	262,702	100%



Essential Facility Inventory

For essential facilities, there are 4 hospitals in the region with a total bed capacity of 656 beds. There are 14 schools, 8 fire stations, 3 police stations and 1 emergency operation center.



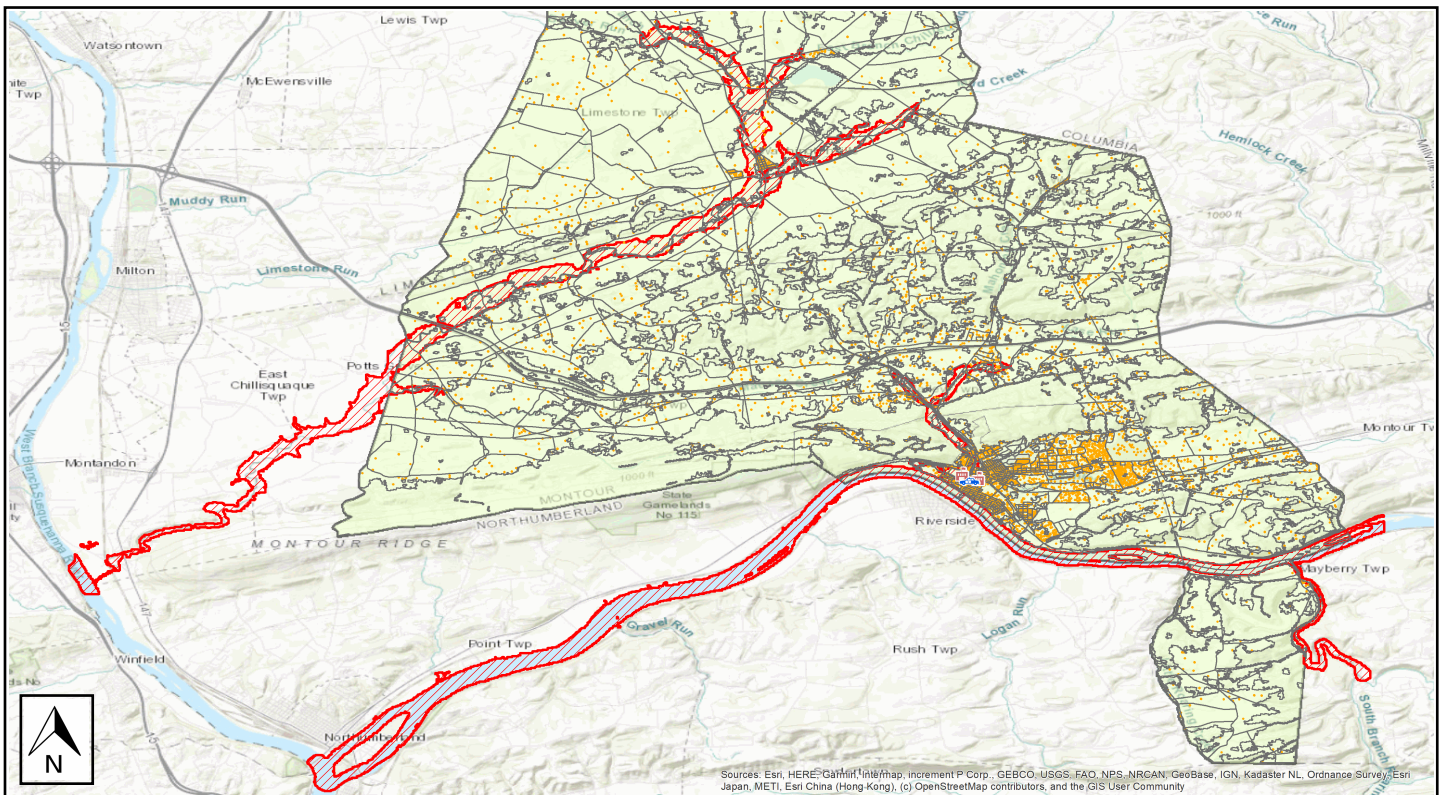
Flood Scenario Parameters

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

Study Region Name:	MontourCounty_PA
Scenario Name:	100year
Return Period Analyzed:	100
Analysis Options Analyzed:	No What-Ifs

Study Region Overview Map

Illustrating scenario flood extent, as well as exposed essential facilities and total exposure



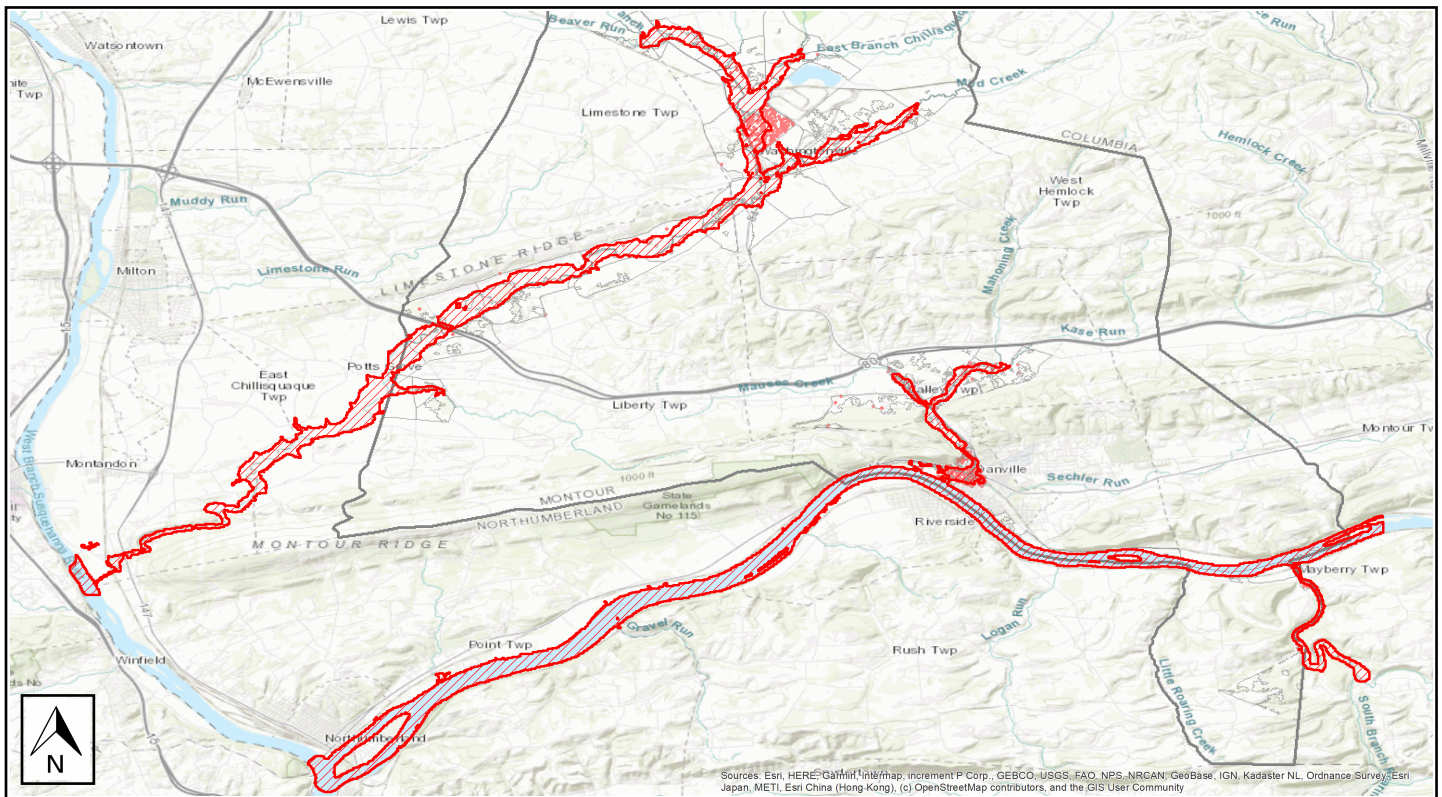


Building Damage

General Building Stock Damage

Hazus estimates that about 61 buildings will be at least moderately damaged. This is over 77% of the total number of buildings in the scenario. There are an estimated 4 buildings that will be completely destroyed. The definition of the 'damage states' is provided in 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.

Total Economic Loss (1 dot = \$300K) Overview Map



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Table 3: Expected Building Damage by Occupancy

Occupancy	1-10		11-20		21-30		31-40		41-50		>50	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Agriculture	0	0	0	0	0	0	0	0	0	0	0	0
Commercial	0	0	0	0	0	0	0	0	0	0	0	0
Education	0	0	0	0	0	0	0	0	0	0	0	0
Government	0	0	0	0	0	0	0	0	0	0	0	0
Industrial	0	0	0	0	0	0	0	0	0	0	0	0
Religion	0	0	0	0	0	0	0	0	0	0	0	0
Residential	12	16	20	27	25	34	9	12	3	4	4	5
Total	12		20		25		9		3		4	

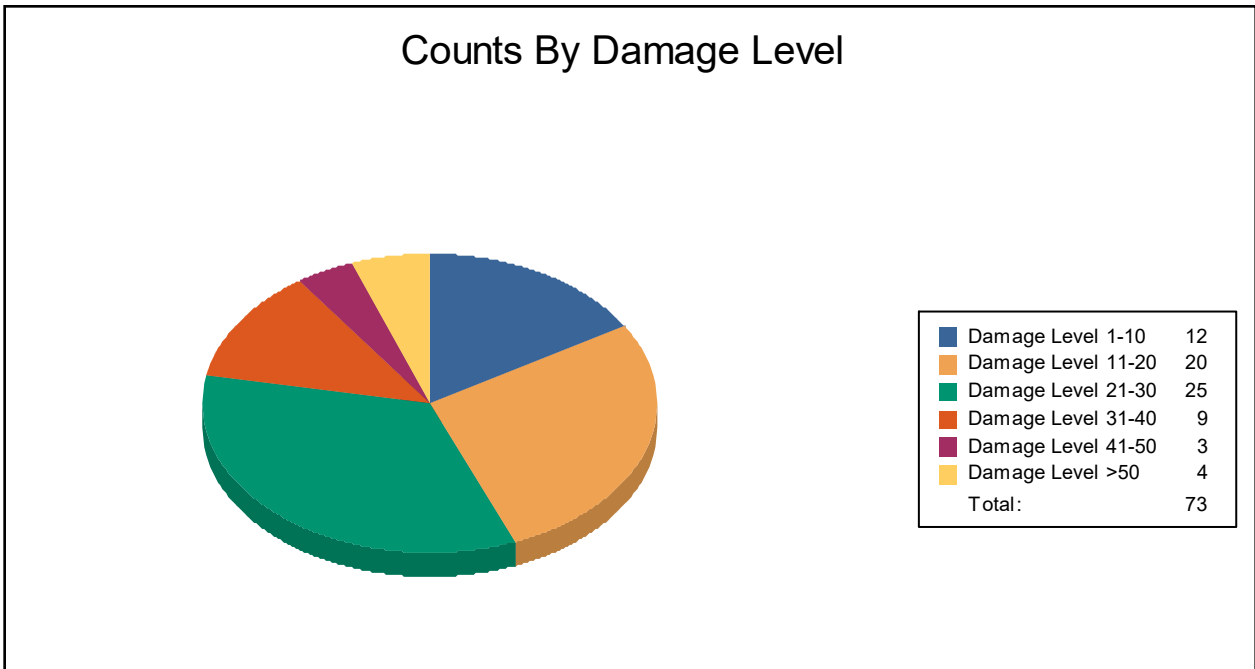




Table 4: Expected Building Damage by Building Type

Building Type	1-10		11-20		21-30		31-40		41-50		>50	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Concrete	0	0	0	0	0	0	0	0	0	0	0	0
ManufHousing	0	0	0	0	0	0	0	0	0	0	1	100
Masonry	4	22	3	17	8	44	1	6	1	6	1	6
Steel	0	0	0	0	0	0	0	0	0	0	0	0
Wood	8	15	17	31	17	31	8	15	2	4	2	4



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Essential Facility Damage

Before the flood analyzed in this scenario, the region had 656 hospital beds available for use. On the day of the scenario flood event, the model estimates that 656 hospital beds are available in the region.

Table 5: Expected Damage to Essential Facilities

Classification	# Facilities			
	Total	At Least Moderate	At Least Substantial	Loss of Use
Emergency Operation Centers	1	0	0	0
Fire Stations	8	0	0	0
Hospitals	4	0	0	0
Police Stations	3	1	0	1
Schools	14	2	0	2

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.



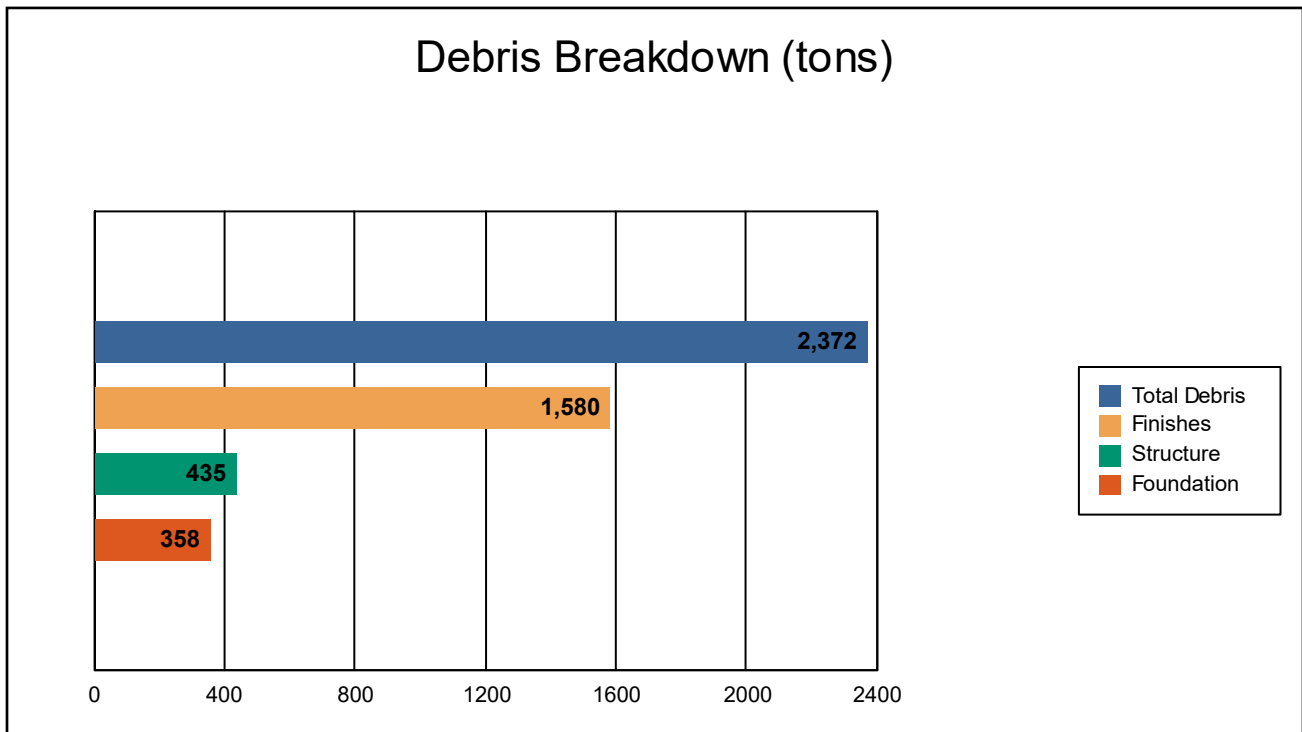
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Induced Flood Damage

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.



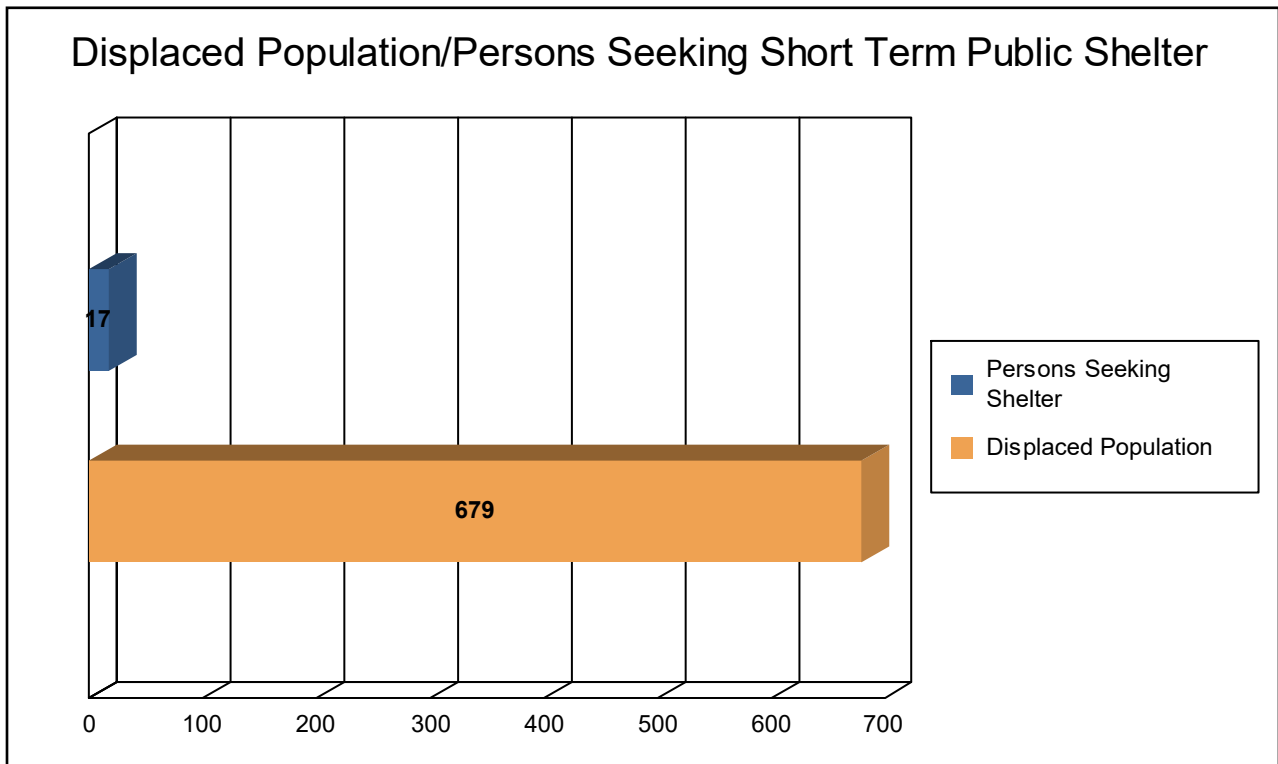
The model estimates that a total of 2,372 tons of debris will be generated. Of the total amount, Finishes comprises 67% of the total, Structure comprises 18% of the total, and Foundation comprises 15%. If the debris tonnage is converted into an estimated number of truckloads, it will require 95 truckloads (@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 226 households (or 679 of people) will be displaced due to the flood. Displacement includes households evacuated from within or very near to the inundated area. Of these, 17 people (out of a total population of 18,267) will seek temporary shelter in public shelters.



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Economic Loss

The total economic loss estimated for the flood is 89.25 million dollars, which represents 33.97 % 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 40.82 million dollars. 54% of the estimated losses were related to the business interruption of the region. The residential occupancies made up 25.41% of the total loss. Table 6 below provides a summary of the losses associated with the building damage.



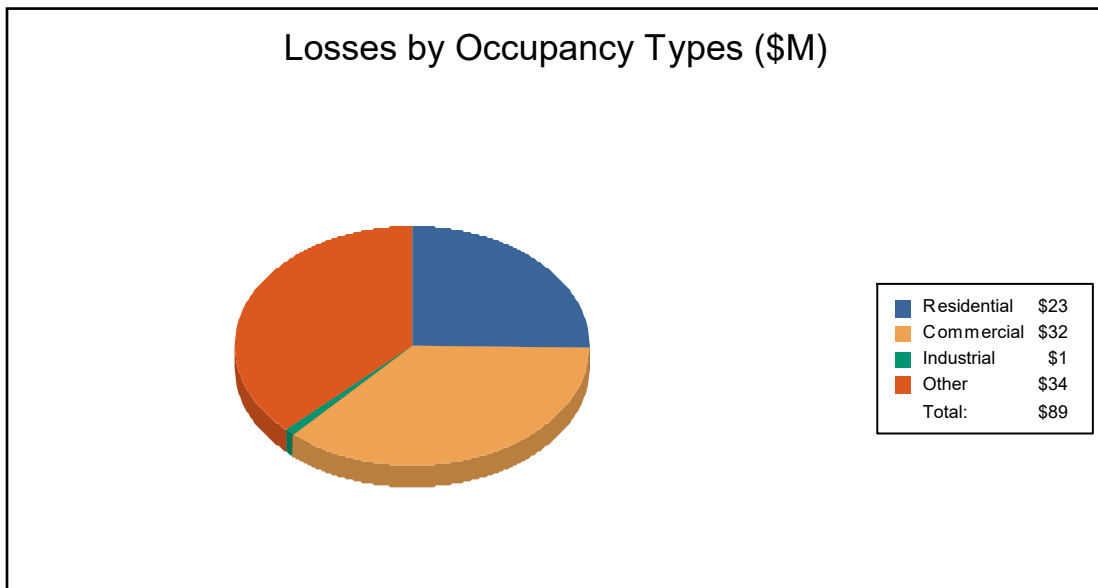
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Table 6: Building-Related Economic Loss Estimates
(Millions of dollars)

Category	Area	Residential	Commercial	Industrial	Others	Total
<u>Building Loss</u>						
	Building	11.82	3.78	0.24	0.94	16.77
	Content	5.93	11.88	0.42	5.28	23.51
	Inventory	0.00	0.45	0.05	0.05	0.54
	Subtotal	17.75	16.10	0.70	6.27	40.82
<u>Business Interruption</u>						
	Income	0.00	5.95	0.01	1.33	7.29
	Relocation	3.37	2.21	0.01	0.87	6.46
	Rental Income	1.54	1.65	0.00	0.10	3.28
	Wage	0.01	6.42	0.01	24.96	31.40
	Subtotal	4.92	16.22	0.03	27.25	48.43
ALL	Total	22.68	32.32	0.74	33.52	89.25





Appendix A: County Listing for the Region

Pennsylvania
- Montour



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Appendix B: Regional Population and Building Value Data

	Population	Building Value (thousands of dollars)		
		Residential	Non-Residential	Total
Pennsylvania				
Montour	18,267	1,453,890	434,384	1,888,274
Total	18,267	1,453,890	434,384	1,888,274
Total Study Region	18,267	1,453,890	434,384	1,888,274



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