



Hazus: Flood Global Risk Report

Region Name: CalvertFI

Flood Scenario: Flood1

Print Date: Thursday, July 20, 2023

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):

- Maryland

Note:

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

The geographical size of the region is approximately 217 square miles and contains 2,965 census blocks. The region contains over 31 thousand households and has a total population of 88,737 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 34,304 buildings in the region with a total building replacement value (excluding contents) of 12,667 million dollars. Approximately 93.47% of the buildings (and 88.25% of the building value) are associated with residential housing.



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Building Inventory

General Building Stock

Hazus estimates that there are 34,304 buildings in the region which have an aggregate total replacement value of 12,667 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	11,178,644	88.3%
Commercial	950,976	7.5%
Industrial	220,538	1.7%
Agricultural	27,499	0.2%
Religion	151,453	1.2%
Government	36,747	0.3%
Education	100,757	0.8%
Total	12,666,614	100%

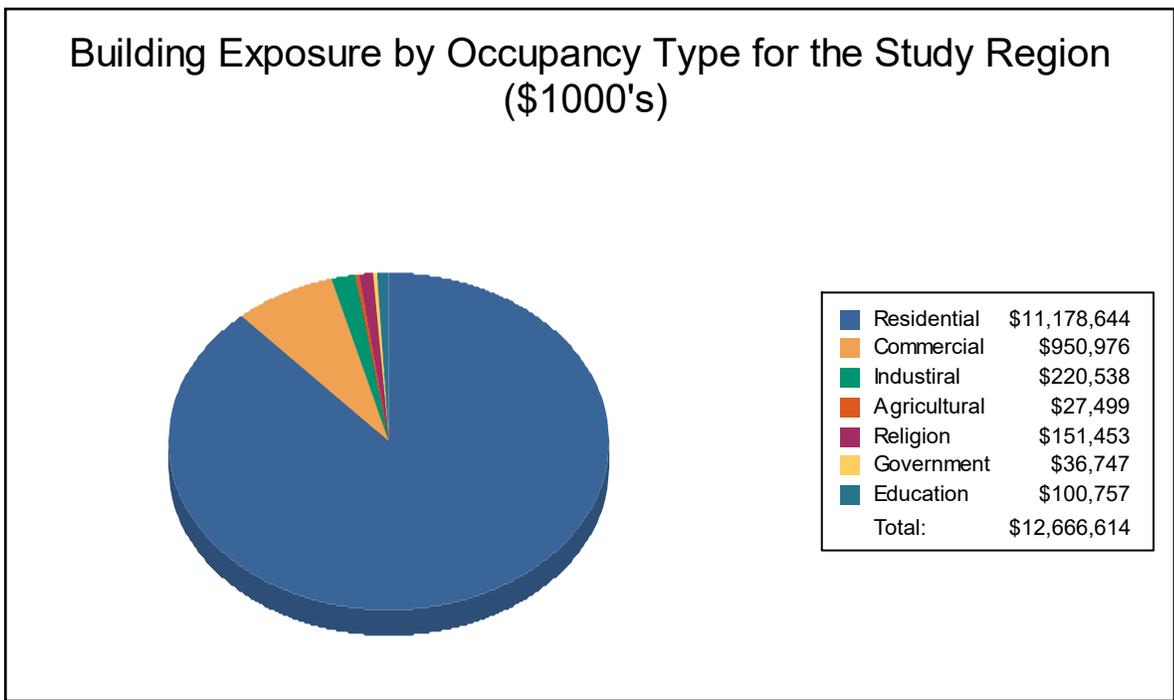
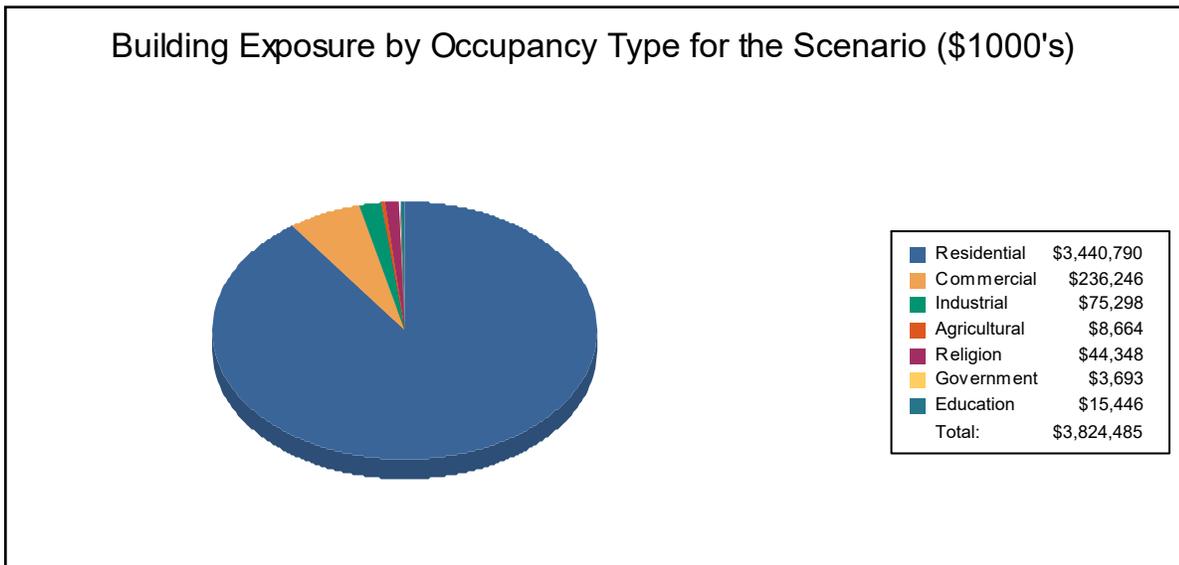




Table 2
Building Exposure by Occupancy Type for the Scenario

Occupancy	Exposure (\$1000)	Percent of Total
Residential	3,440,790	90.0%
Commercial	236,246	6.2%
Industrial	75,298	2.0%
Agricultural	8,664	0.2%
Religion	44,348	1.2%
Government	3,693	0.1%
Education	15,446	0.4%
Total	3,824,485	100%



Essential Facility Inventory

For essential facilities, there are 1 hospitals in the region with a total bed capacity of 76 beds. There are 32 schools, 8 fire stations, 3 police stations and 1 emergency operation center.



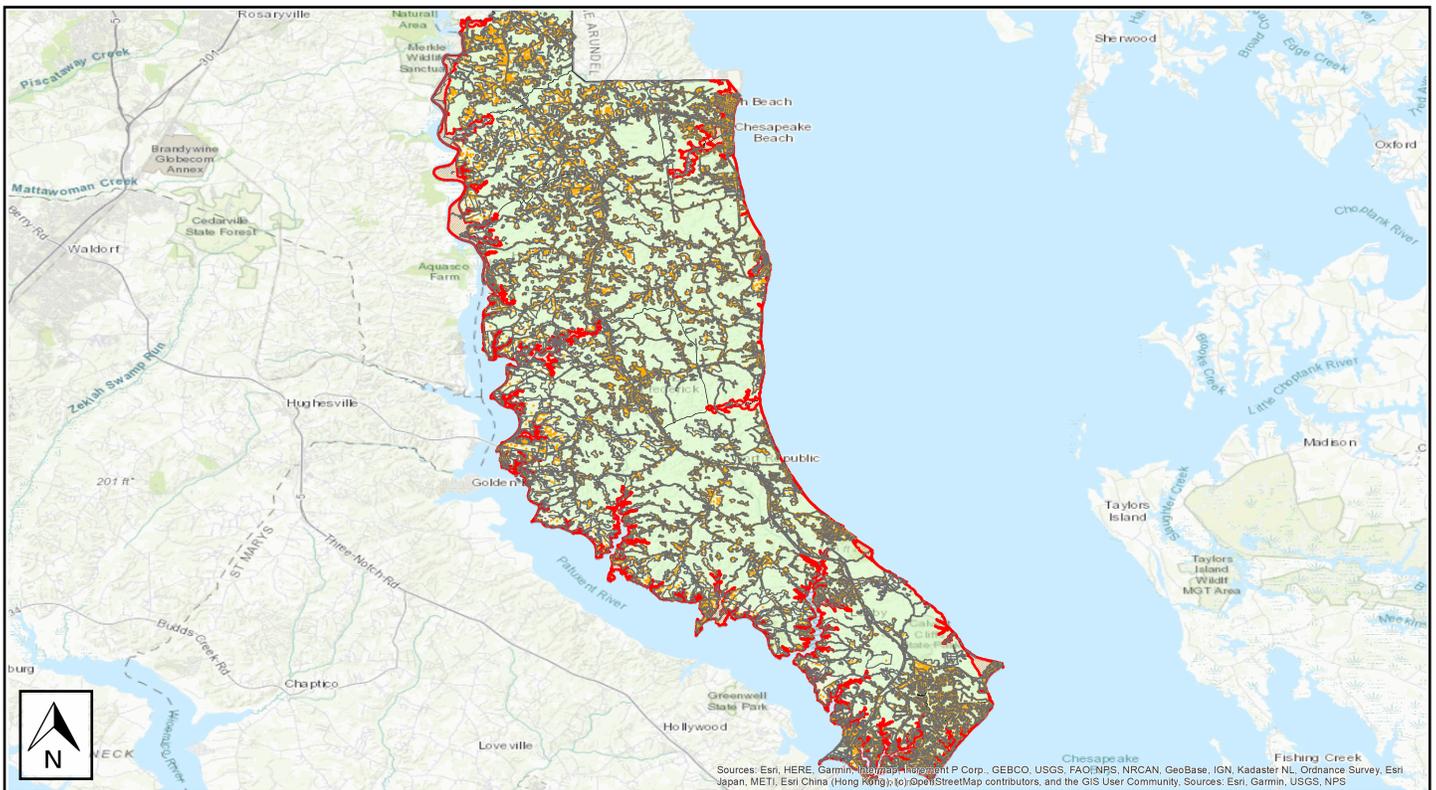
Flood Scenario Parameters

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

Study Region Name:	CalvertFI
Scenario Name:	Flood1
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



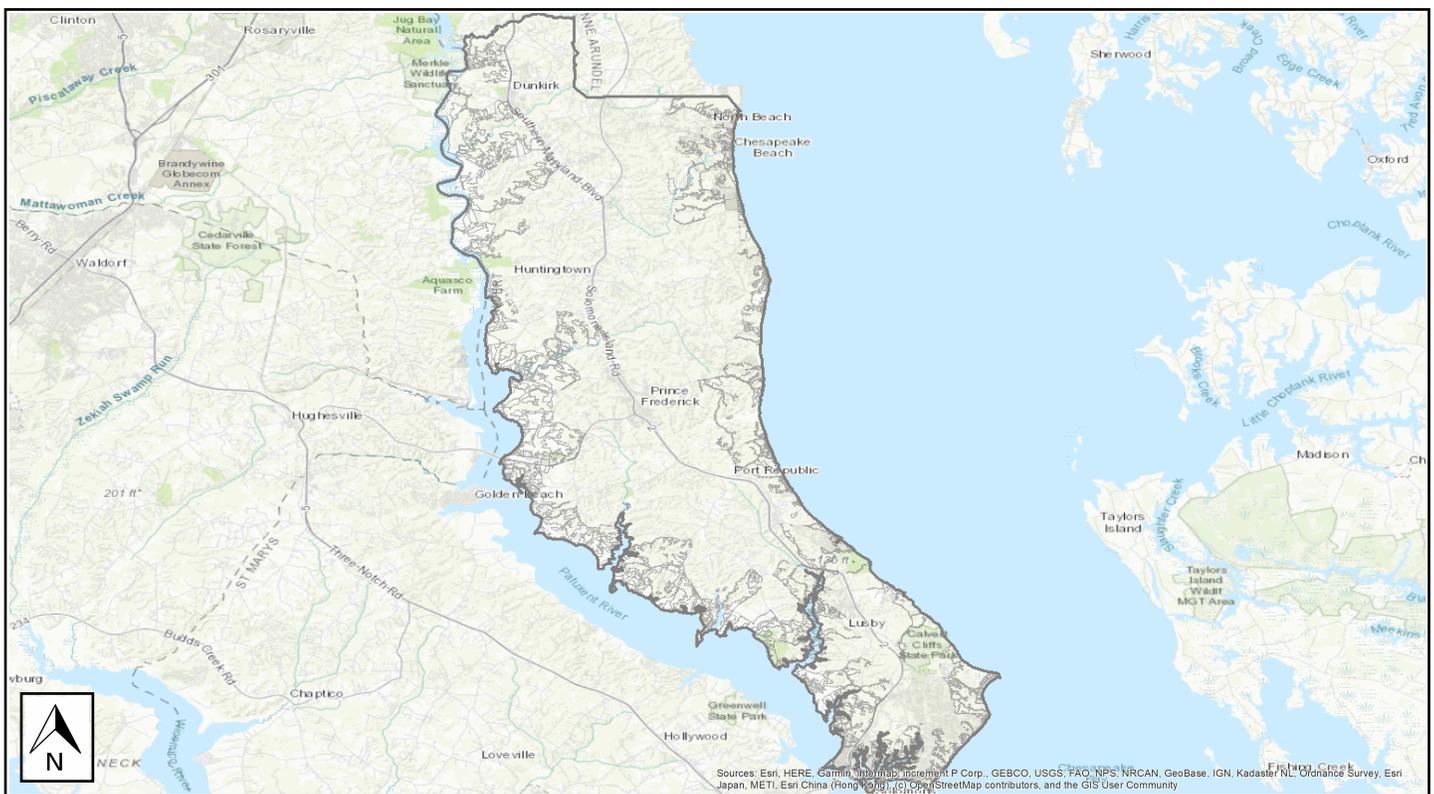


Building Damage

General Building Stock Damage

Hazus estimates that about 97 buildings will be at least moderately damaged. This is over 14% of the total number of buildings in the scenario. There are an estimated 19 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	7	7	50	48	16	15	6	6	6	6	19	18
Total	7		50		16		6		6		19	

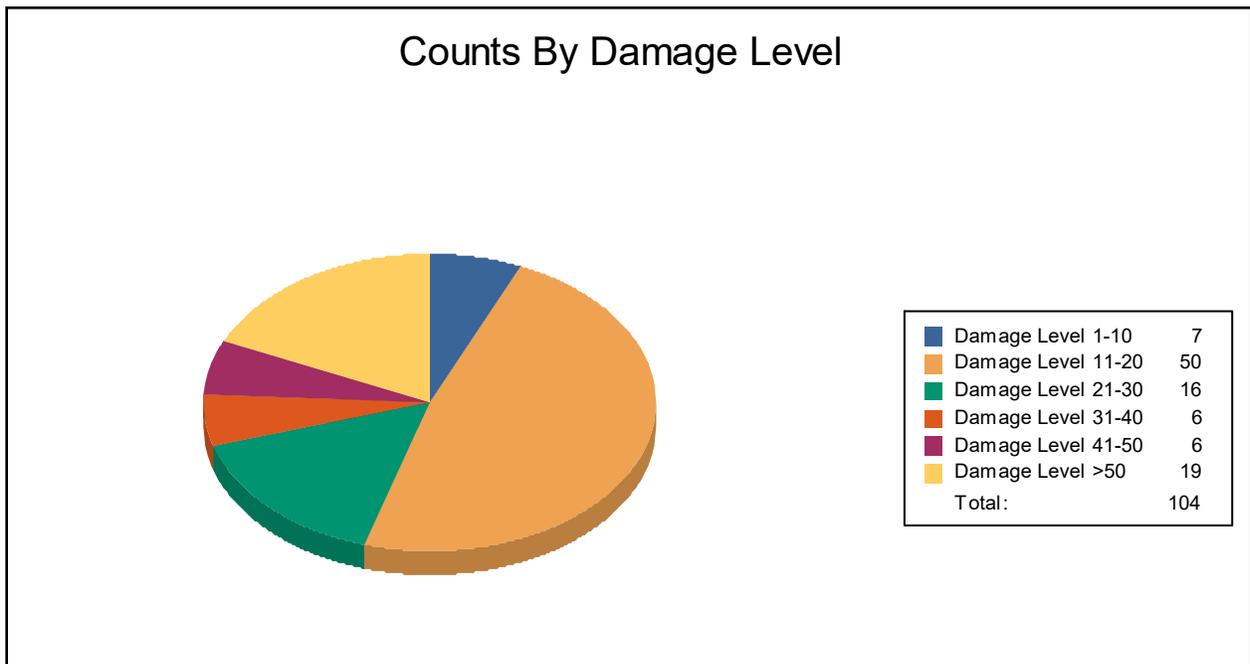




Table 4: Expected Building Damage by Building Type

Building Type	1-10		11-20		21-30		31-40		41-50		>50	
	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	0	0
Masonry	1	4	11	48	5	22	1	4	1	4	4	17
Steel	0	0	0	0	0	0	0	0	0	0	0	0
Wood	6	7	39	48	11	14	5	6	5	6	15	19



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Essential Facility Damage

Before the flood analyzed in this scenario, the region had 76 hospital beds available for use. On the day of the scenario flood event, the model estimates that 76 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	1	0	0	0
Police Stations	3	0	0	0
Schools	32	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.



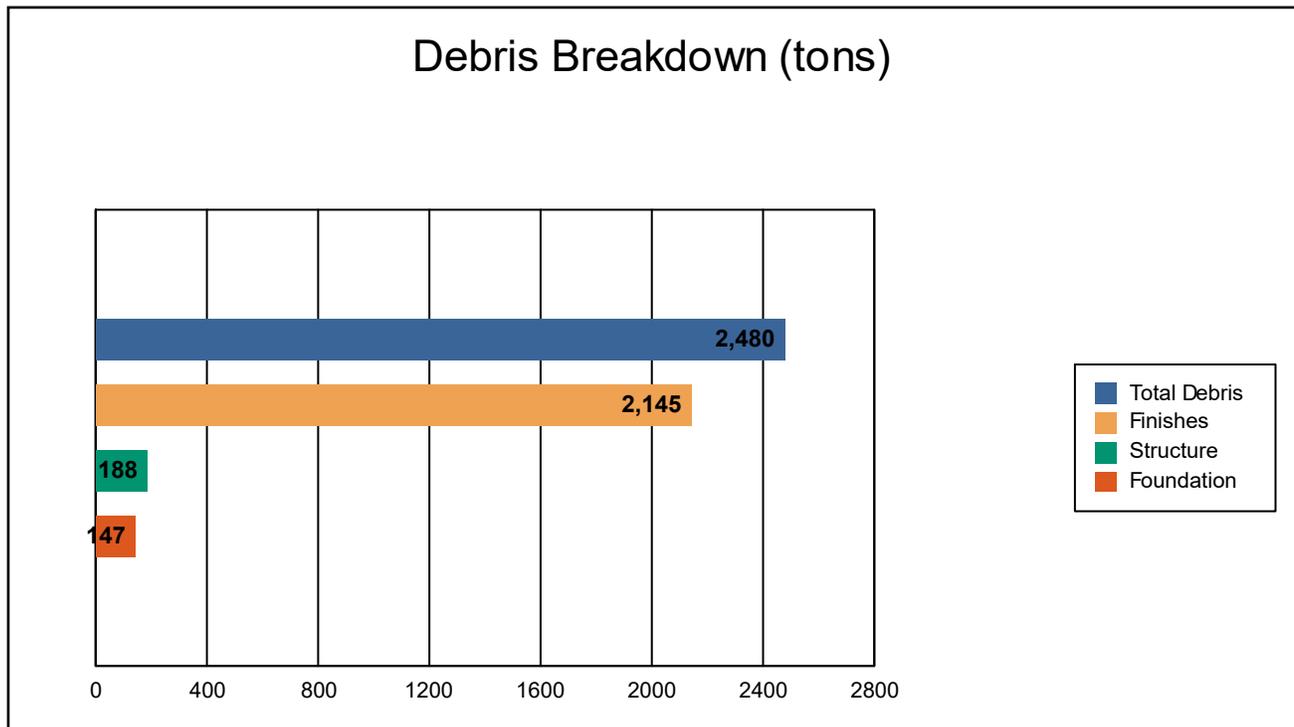
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Induced Flood Damage

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.



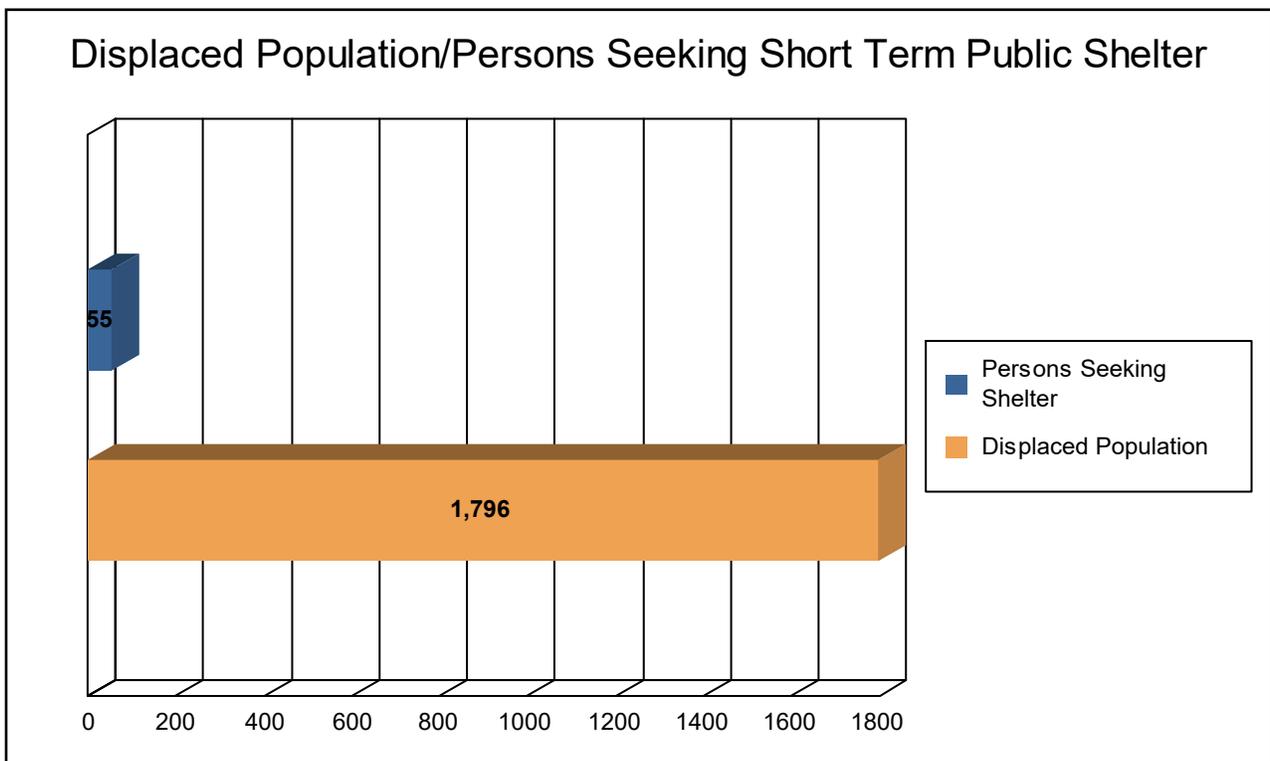
The model estimates that a total of 2,480 tons of debris will be generated. Of the total amount, Finishes comprises 86% of the total, Structure comprises 8% of the total, and Foundation comprises 6%. If the debris tonnage is converted into an estimated number of truckloads, it will require 100 truckloads (@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 599 households (or 1,796 of people) will be displaced due to the flood. Displacement includes households evacuated from within or very near to the inundated area. Of these, 55 people (out of a total population of 88,737) will seek temporary shelter in public shelters.



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Economic Loss

The total economic loss estimated for the flood is 126.75 million dollars, which represents 3.31 % 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 84.60 million dollars. 33% of the estimated losses were related to the business interruption of the region. The residential occupancies made up 79.12% of the total loss. Table 6 below provides a summary of the losses associated with the building damage.



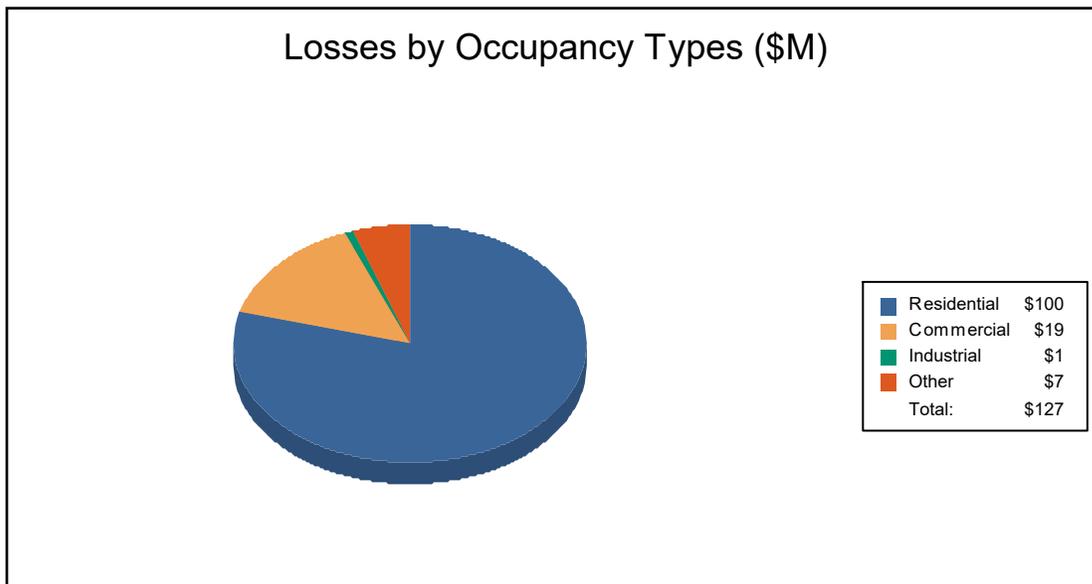
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Table 6: Building-Related Economic Loss Estimates
(Millions of dollars)

Category	Area	Residential	Commercial	Industrial	Others	Total
<u>Building Loss</u>						
	Building	48.66	0.96	0.33	0.14	50.09
	Content	29.83	2.97	0.52	1.12	34.43
	Inventory	0.00	0.04	0.05	0.00	0.09
	Subtotal	78.49	3.97	0.90	1.25	84.60
<u>Business Interruption</u>						
	Income	0.21	6.99	0.03	1.18	8.41
	Relocation	16.09	1.00	0.02	0.31	17.41
	Rental Income	5.01	0.77	0.00	0.03	5.81
	Wage	0.50	6.07	0.06	3.88	10.52
	Subtotal	21.81	14.82	0.12	5.40	42.15
ALL	Total	100.29	18.78	1.02	6.66	126.75





Appendix A: County Listing for the Region

- Maryland
- Calvert



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Appendix B: Regional Population and Building Value Data

	Population	Building Value (thousands of dollars)		
		Residential	Non-Residential	Total
Maryland				
Calvert	88,737	11,178,644	1,487,970	12,666,614
Total	88,737	11,178,644	1,487,970	12,666,614
Total Study Region	88,737	11,178,644	1,487,970	12,666,614



Direct Economic Losses for Buildings



July 20, 2023

All values are in thousands of dollars

	Capital Stock Losses			Building Loss Ratio %	Income Losses				Total Loss
	Building Loss	Contents Loss	Inventory Loss		Relocation Loss	Capital Related Loss	Wages Losses	Rental Income Loss	
Maryland									
Calvert	50,085	34,427	89	1.30	17,414	8,409	10,515	5,814	126,753
Total	50,085	34,427	89	1.30	17,414	8,409	10,515	5,814	126,753
Scenario Total	50,085	34,427	89	1.30	17,414	8,409	10,515	5,814	126,753

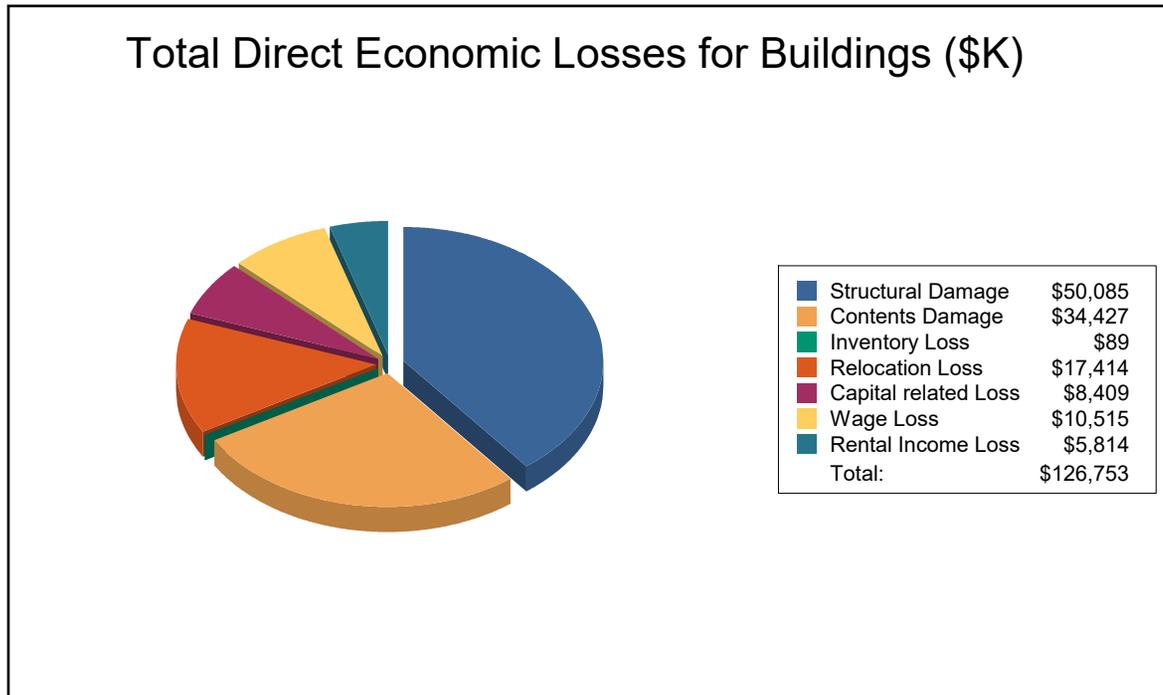


Direct Economic Losses for Buildings



July 20, 2023

All values are in thousands of dollars





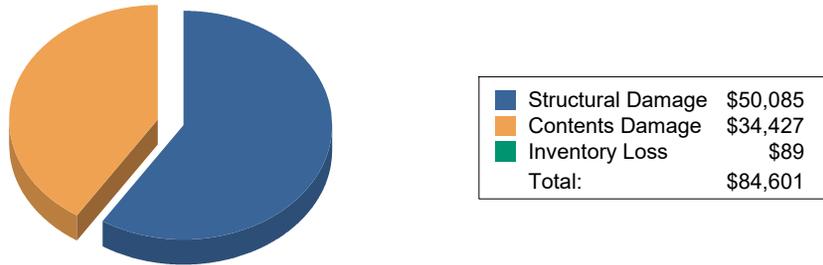
Direct Economic Losses for Buildings



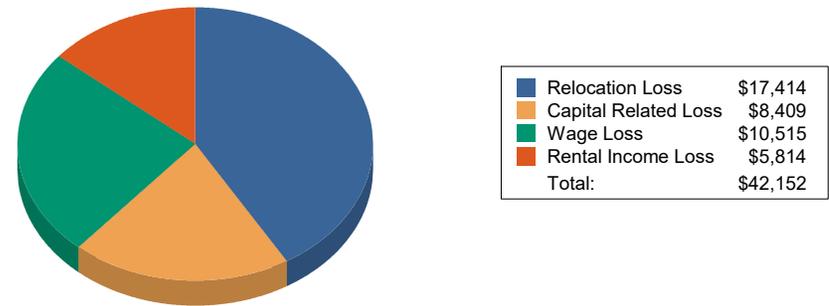
July 20, 2023

All values are in thousands of dollars

Loss by Capital Stock Categories (\$K)



Income Losses by Categories (\$K)



Totals only reflect data for those census tracts/blocks included in the user's study region and will reflect the entire county/state only if all of the census blocks for that county/state were selected at the time of study region creation.

Study Region: CalvertFl
Scenario: Flood1
Return Period: 100



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Direct Economic Losses For Vehicles (Day)

July 20, 2023

All values are in dollars.

	Car	Light Truck	Heavy Truck	Total Loss
Maryland				
Calvert	\$4,608,789	\$1,878,317	\$131,888	\$6,618,994
Total	\$4,608,789	\$1,878,317	\$131,888	\$6,618,994
Scenario Total	\$4,608,789	\$1,878,317	\$131,888	\$6,618,994

Totals only reflect data for those census tracts/blocks included in the user's study region and will reflect the entire county/state only if all of the census blocks for that county/state were selected at the time of study region creation.

Study Region: CalvertFI
Scenario: Flood1
Return Period: 100



Utility System Dollar Exposure



July 20, 2023

All values are in thousands of dollars.

	Potable Water	Waste Water	Oil Systems	Natural Gas	Electric Power	Communication	Total
Maryland							
Calvert							
Facilities	0	782,925	0	0	957,213	99	1,740,237
Pipelines	0	0	0	18,176	0	0	18,176
Total	0	782,925	0	18,176	957,213	99	1,758,412
Total	0	782,925	0	18,176	957,213	99	1,758,412
Study Region Total	0	782,925	0	18,176	957,213	99	1,758,412

Totals only reflect data for those census tracts/blocks included in the user's study region and will reflect the entire county/state only if all of the census blocks for that county/state were selected at the time of study region creation.

Study Region: CalvertFI
 Scenario: Flood1
 Return Period: 100



Vehicle Dollar Exposure (Day)

July 20, 2023

All values are in dollars.

	Cars	Light Trucks	Heavy Trucks	Total
Maryland				
Calvert	\$400,407,551	\$277,655,145	\$75,373,103	\$753,435,799
Total	\$400,407,551	\$277,655,145	\$75,373,103	\$753,435,799
Study Region Total	\$400,407,551	\$277,655,145	\$75,373,103	\$753,435,799

Totals only reflect data for those census tracts/blocks included in the user's study region and will reflect the entire county/state only if all of the census blocks for that county/state were selected at the time of study region creation.

Study Region: CalvertFI
Scenario: Flood1
Return Period: 100