Hazus: Flood Global Risk Report

Region Name: Clinton

Flood Scenario: ClintonAll

Print Date: Monday, January 6, 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):

- Connecticut

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

The geographical size of the region is approximately 16 square miles and contains 272 census blocks. The region contains over 5 thousand households and has a total population of 13,260 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 5,844 buildings in the region with a total building replacement value (excluding contents) of 2,062 million dollars. Approximately 91.43% of the buildings (and 80.58% of the building value) are associated with residential housing.

Building Inventory

General Building Stock

Hazus estimates that there are 5,844 buildings in the region which have an aggregate total replacement value of 2,062 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	1,661,441	80.6%
Commercial	255,126	12.4%
Industrial	98,279	4.8%
Agricultural	8,589	0.4%
Religion	15,970	0.8%
Government	7,665	0.4%
Education	14,865	0.7%
Total	**2,061,935**	**100%**

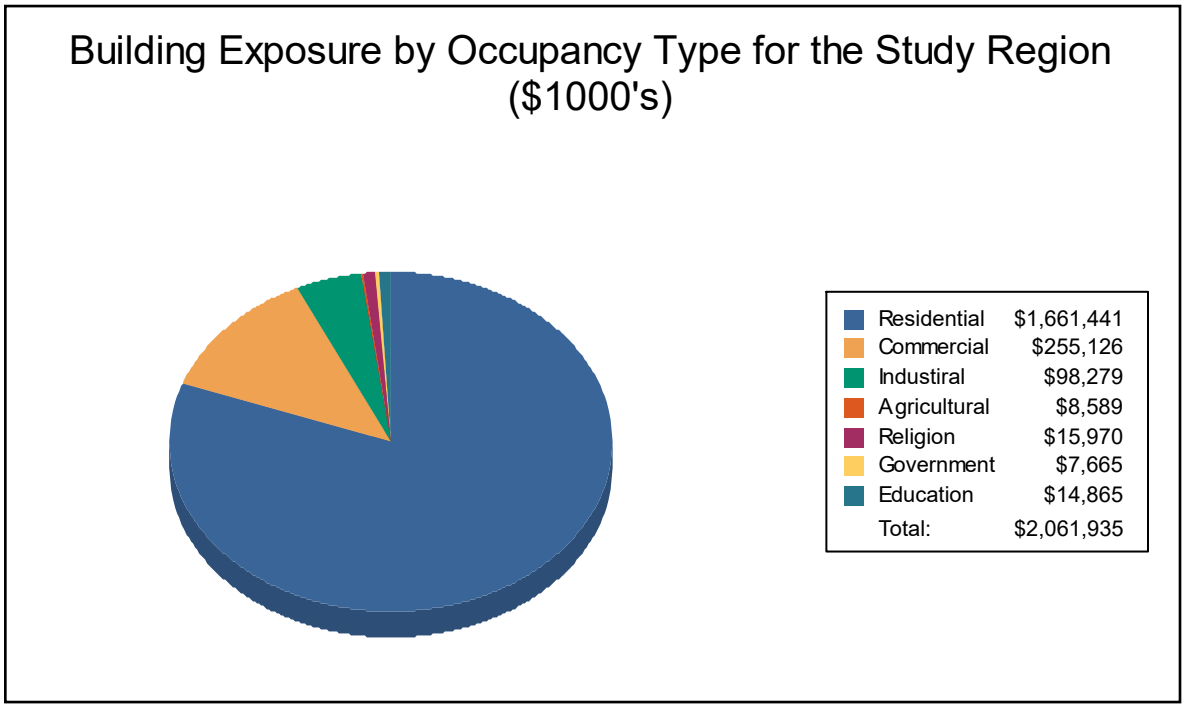
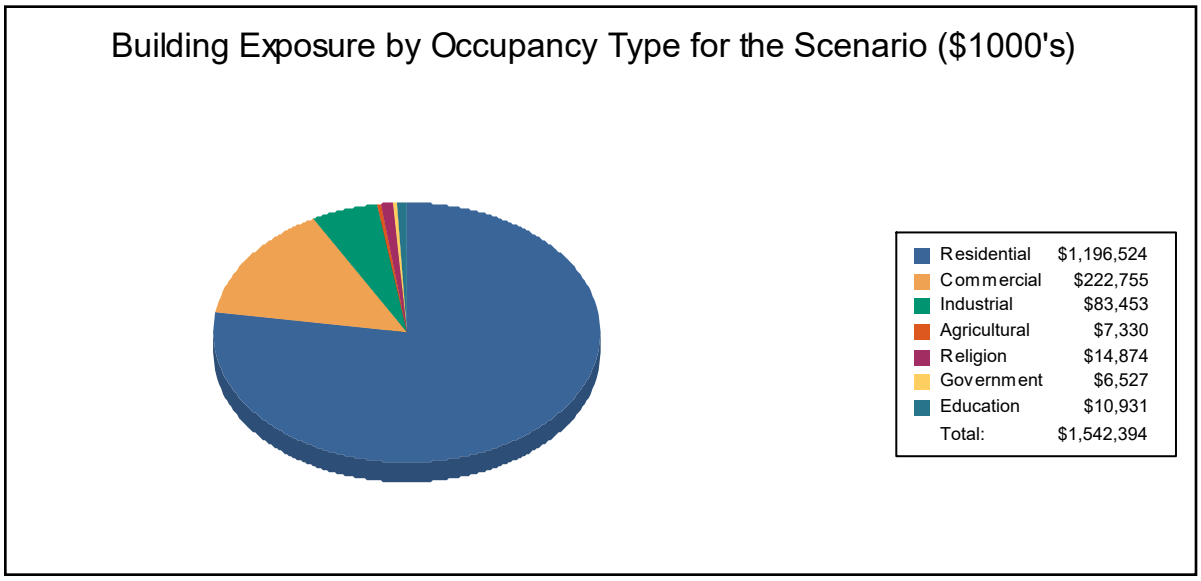


Table 2
Building Exposure by Occupancy Type for the Scenario

Occupancy	Exposure ($1000)	Percent of Total
Residential	1,196,524	77.6%
Commercial	222,755	14.4%
Industrial	83,453	5.4%
Agricultural	7,330	0.5%
Religion	14,874	1.0%
Government	6,527	0.4%
Education	10,931	0.7%
Total	**1,542,394**	**100%**



Essential Facility Inventory

For essential facilities, there are no hospitals in the region with a total bed capacity of no beds.
There are 5 schools, 2 fire stations, 1 police station and 1 emergency operation center.

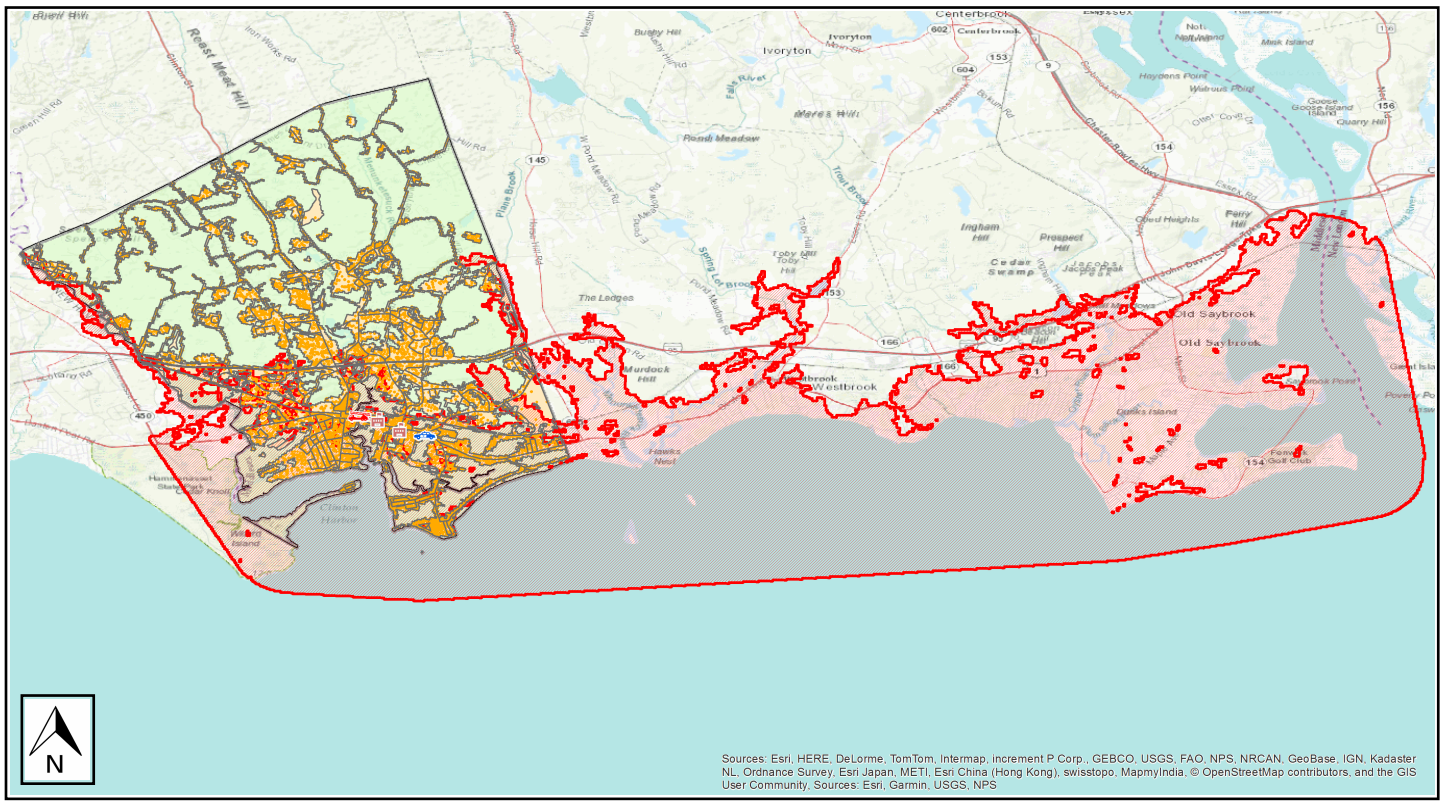
Flood Scenario Parameters

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

Study Region Name:	Clinton
Scenario Name:	ClintonAll
Return Period Analyzed:	10
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 308 buildings will be at least moderately damaged. This is over 29% of the total number of buildings in the scenario. There are an estimated 25 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

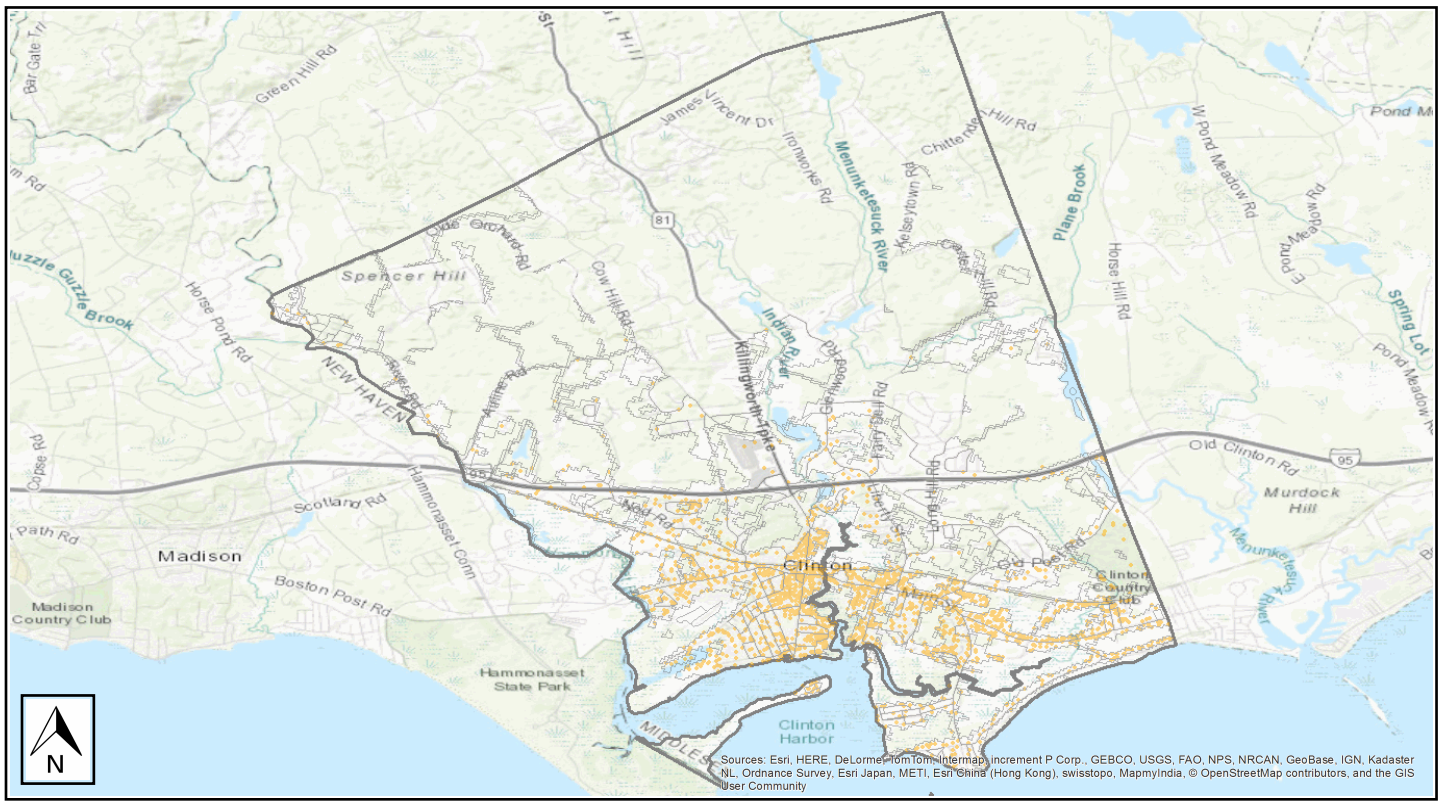


Table 3: Expected Building Damage by Occupancy

	1-10		11-20		21-30		31-40		41-50		>50	
Occupancy	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**
Agriculture	0	0	0	0	0	0	0	0	0	0	0	0
Commercial	0	0	0	0	1	100	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	104	25	225	55	48	12	8	2	1	0	25	6
Total	**104**		**225**		**49**		**8**		**1**		**25**	

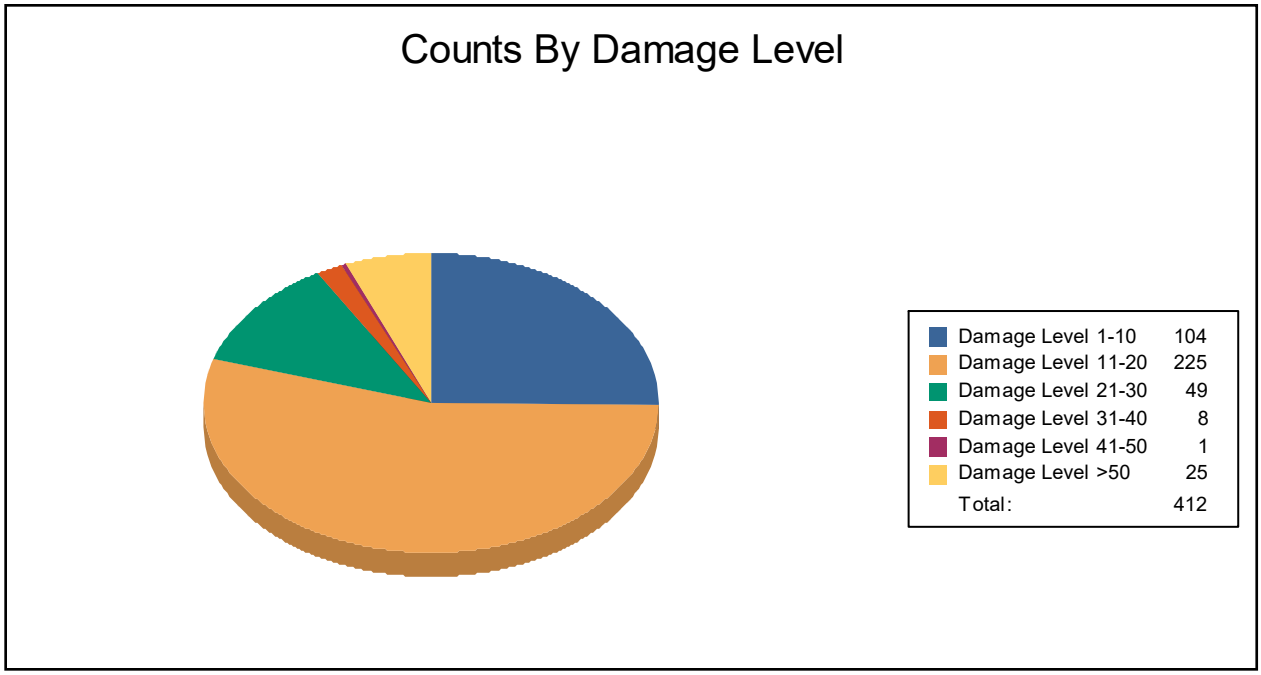


Table 4: Expected Building Damage by Building Type

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	1	25	0	0	1	25	0	0	0	0	2	50
Masonry	2	22	6	67	1	11	0	0	0	0	0	0
Steel	0	0	0	0	0	0	0	0	0	0	0	0
Wood	101	25	219	55	46	12	8	2	1	0	23	6

Essential Facility Damage

Before the flood analyzed in this scenario, the region had 0 hospital beds available for use. On the day of the scenario flood event, the model estimates that 0 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
Emergency Operation Centers	1	1	0	1
Fire Stations	2	1	0	1
Hospitals	0	0	0	0
Police Stations	1	1	0	1
Schools	5	1	0	1

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

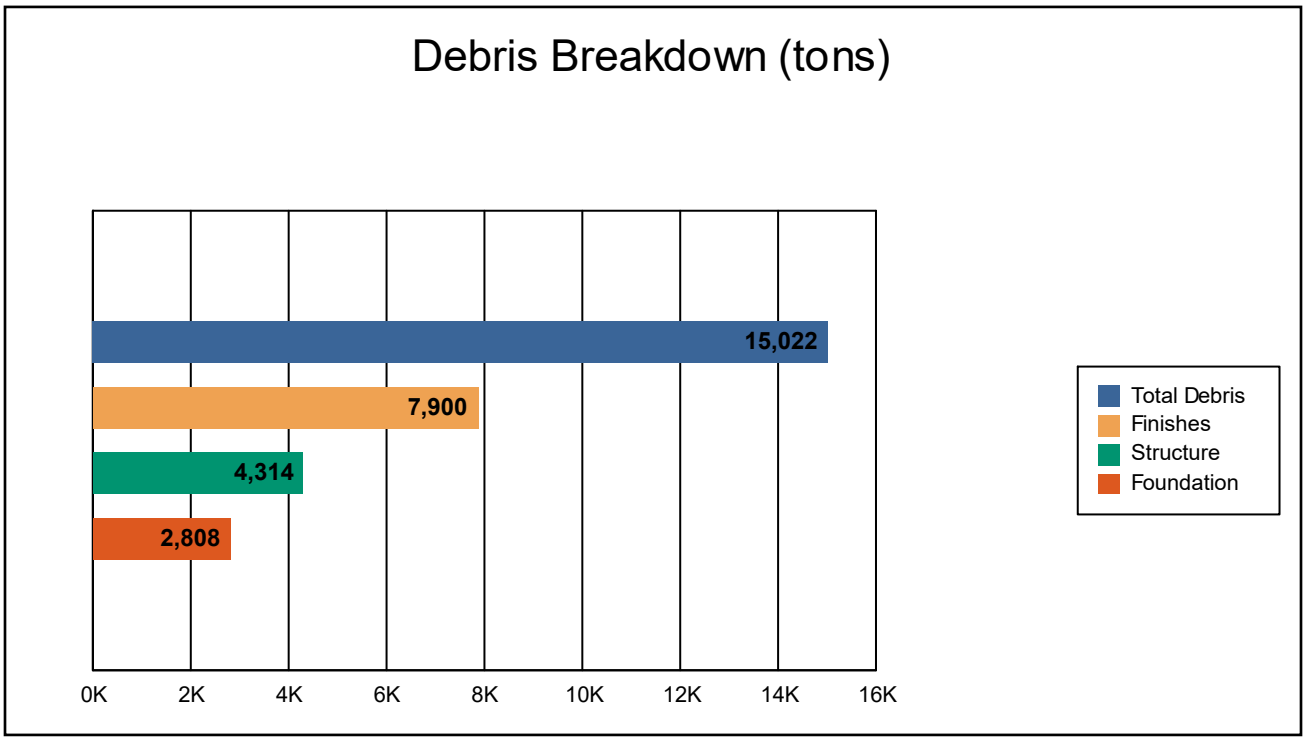
(1) None of your facilities were flooded. This can be checked by mapping the inventory data on the depth grid.

(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.

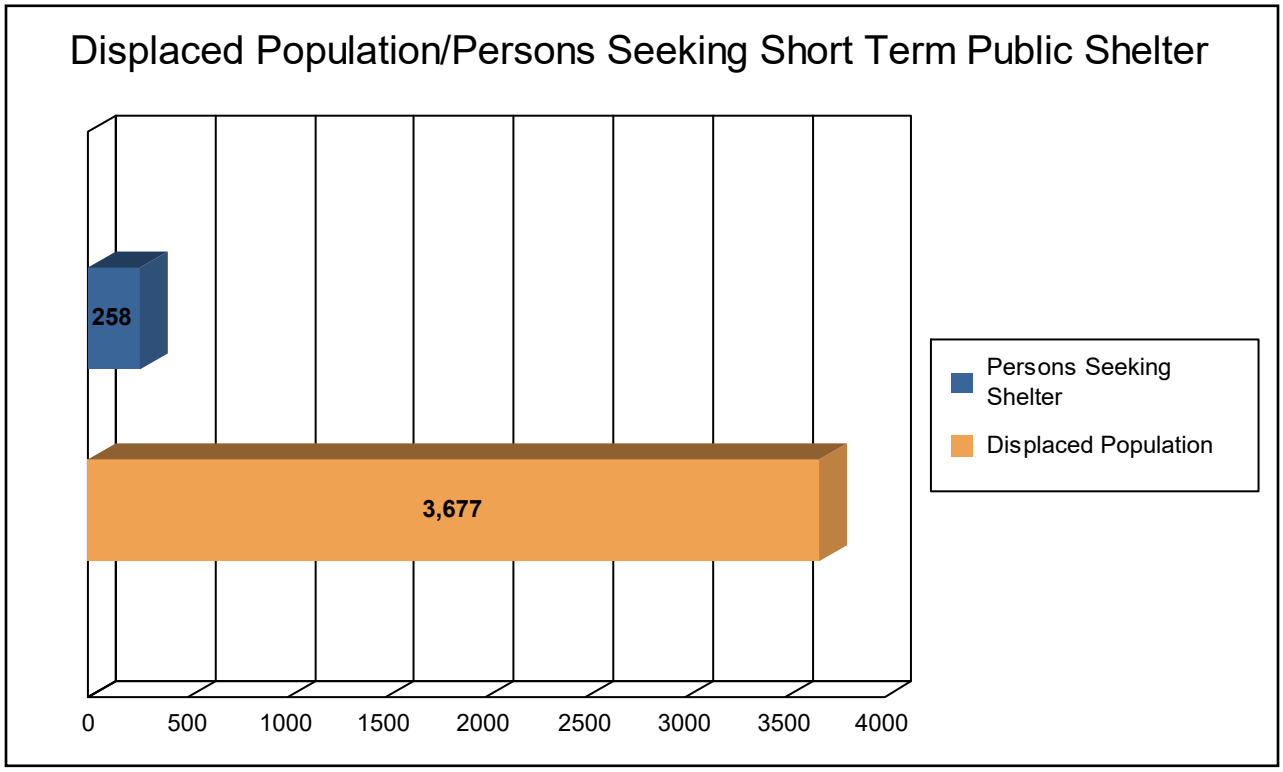


The model estimates that a total of 15,022 tons of debris will be generated. Of the total amount, Finishes comprises 53% of the total, Structure comprises 29% of the total, and Foundation comprises 19%. If the debris tonnage is converted into an estimated number of truckloads, it will require 601 truckloads (@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 1,226 households (or 3,677 of people) will be displaced due to the flood. Displacement includes households evacuated from within or very near to the inundated area. Of these, 258 people (out of a total population of 13,260) will seek temporary shelter in public shelters.



Economic Loss

The total economic loss estimated for the flood is 299.47 million dollars, which represents 19.42 % of the total replacement value of the scenario buildings.

Building-Related Losses

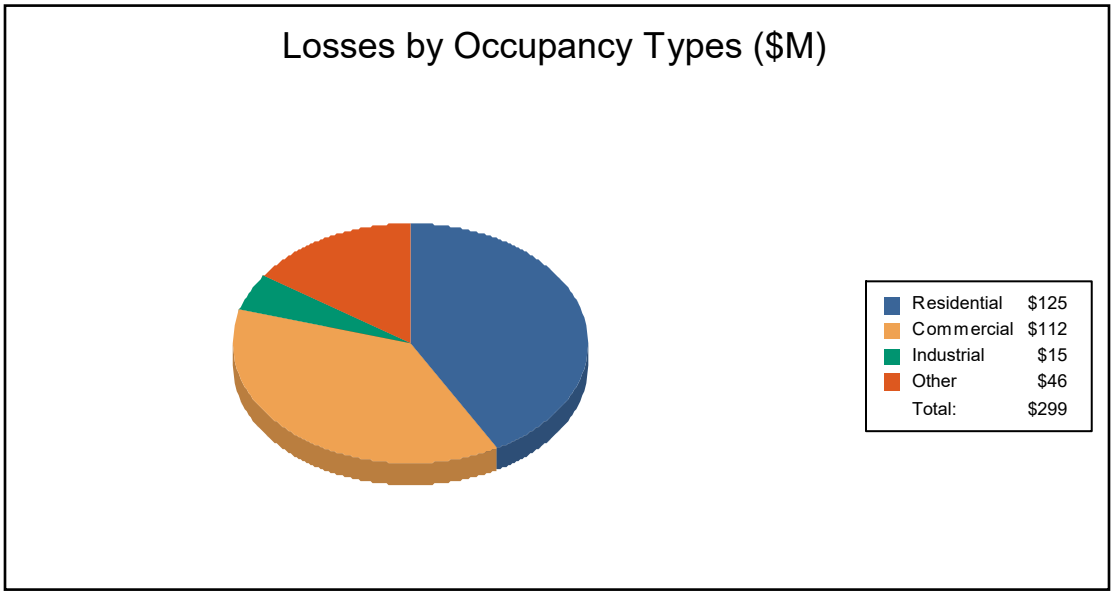
The building losses are broken into two categories: direct building losses and business interruption losses. The direct building losses are the estimated costs to repair or replace the damage caused to the building and its contents. The business interruption losses are the losses associated with inability 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 139.91 million dollars. 53% of the estimated losses were related to the business interruption of the region. The residential occupancies made up 41.88% 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	47.62	6.82	3.75	0.92	59.11
	Content	43.09	21.97	8.18	5.90	79.14
	Inventory	0.00	0.40	1.20	0.06	1.66
	Subtotal	**90.71**	**29.19**	**13.14**	**6.88**	**139.91**
Business Interruption						
	Income	0.42	31.68	0.53	2.71	35.34
	Relocation	23.74	10.01	0.65	1.68	36.09
	Rental Income	9.57	7.30	0.12	0.22	17.20
	Wage	0.98	34.02	0.94	34.99	70.93
	Subtotal	**34.71**	**83.01**	**2.24**	**39.61**	**159.56**
ALL	**Total**	**125.42**	**112.20**	**15.37**	**46.48**	**299.47**



Appendix A: County Listing for the Region

Connecticut

- Middlesex

Appendix B: Regional Population and Building Value Data

	Population	Building Value (thousands of dollars)		
		Residential	Non-Residential	Total
Connecticut				
Middlesex	13,260	1,661,441	400,494	2,061,935
Total	**13,260**	**1,661,441**	**400,494**	**2,061,935**
Total Study Region	**13,260**	**1,661,441**	**400,494**	**2,061,935**

Hazus: Flood Global Risk Report

Region Name: Clinton

Flood Scenario: ClintonAllRiverine

Print Date: Wednesday, January 8, 2020

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Note:
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There are an estimated 5,844 buildings in the region with a total building replacement value (excluding contents) of 2,062 million dollars. Approximately 91.43% of the buildings (and 80.58% of the building value) are associated with residential housing.

Building Inventory

General Building Stock

Hazus estimates that there are 5,844 buildings in the region which have an aggregate total replacement value of 2,062 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.

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Government	7,665	0.4%
Education	14,865	0.7%
Total	**2,061,935**	**100%**

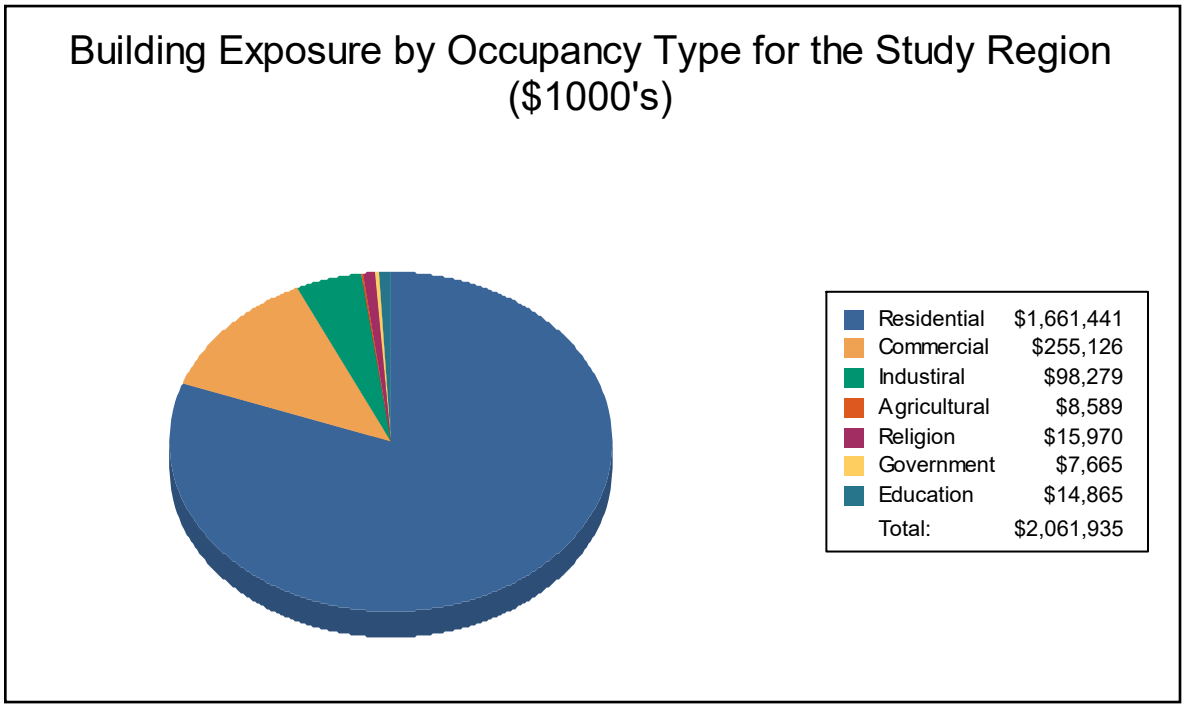
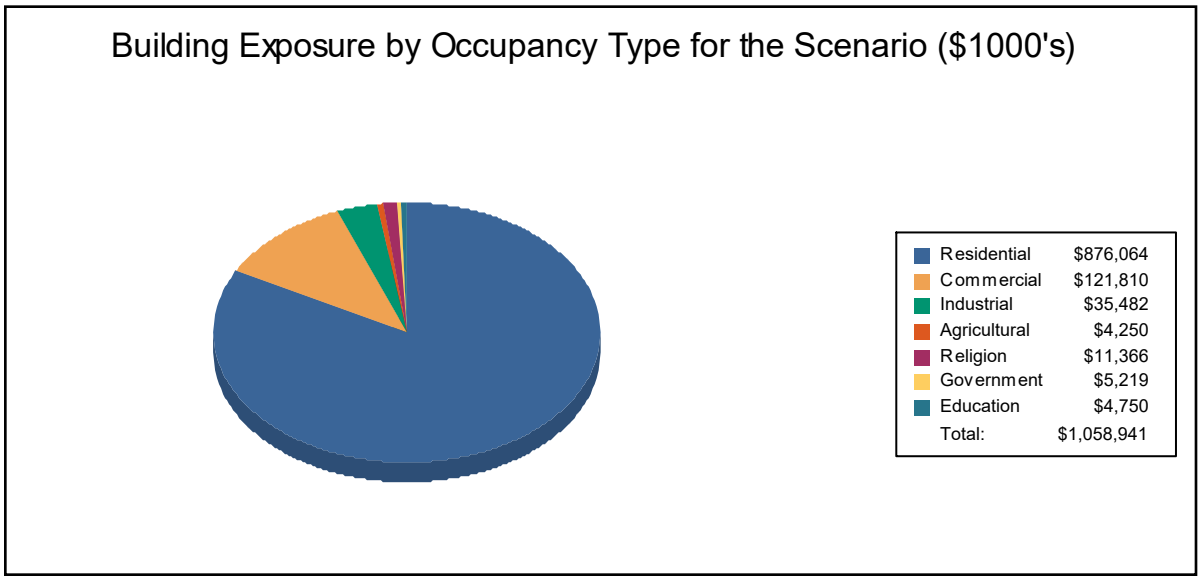


Table 2
Building Exposure by Occupancy Type for the Scenario

Occupancy	Exposure ($1000)	Percent of Total
Residential	876,064	82.7%
Commercial	121,810	11.5%
Industrial	35,482	3.4%
Agricultural	4,250	0.4%
Religion	11,366	1.1%
Government	5,219	0.5%
Education	4,750	0.4%
Total	**1,058,941**	**100%**



Essential Facility Inventory

For essential facilities, there are no hospitals in the region with a total bed capacity of no beds.
There are 5 schools, 2 fire stations, 1 police station and 1 emergency operation center.

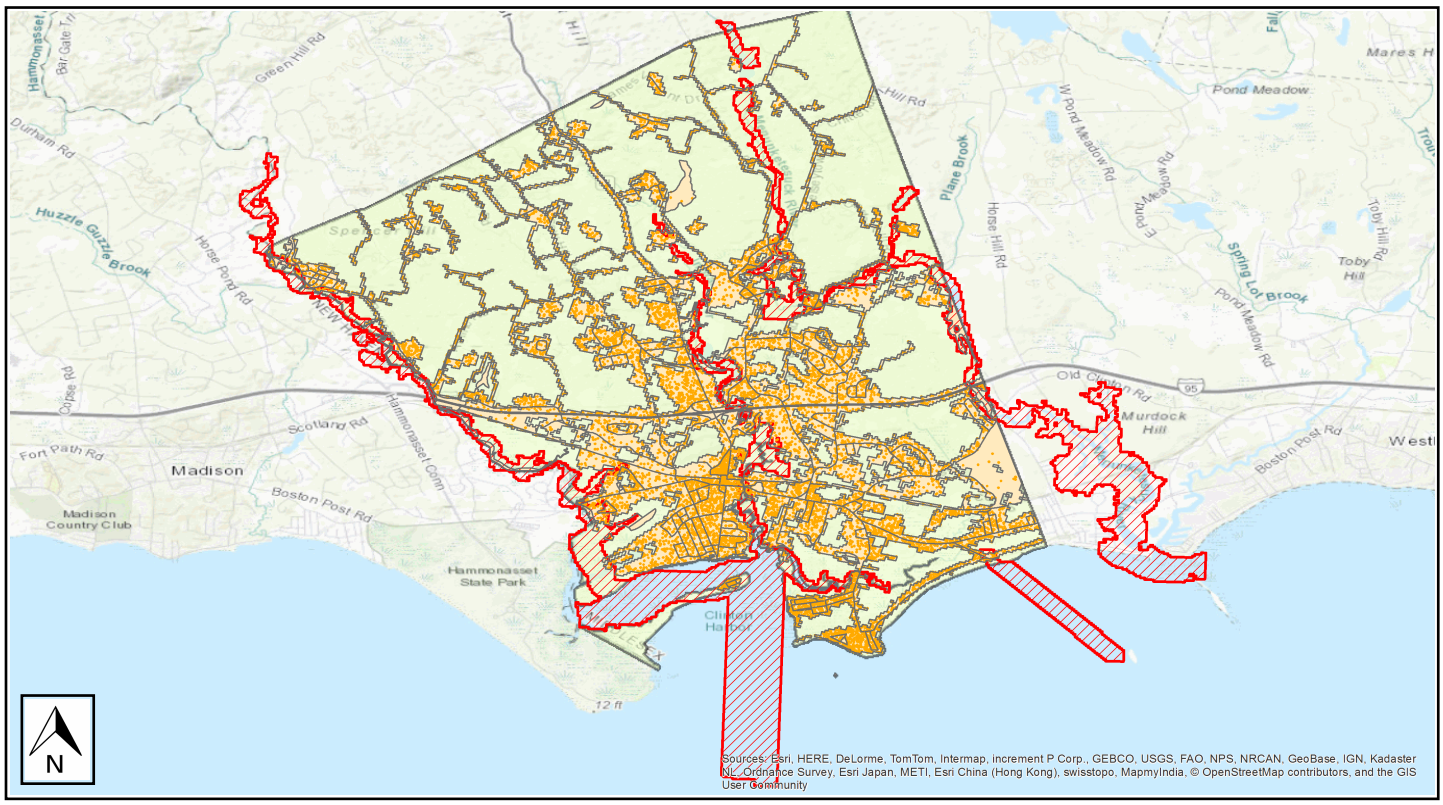
Flood Scenario Parameters

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

Study Region Name:	Clinton
Scenario Name:	ClintonAllRiverine
Return Period Analyzed:	10
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 2 buildings will be at least moderately damaged. This is over 50% of the total number of buildings in the scenario. There are an estimated 0 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

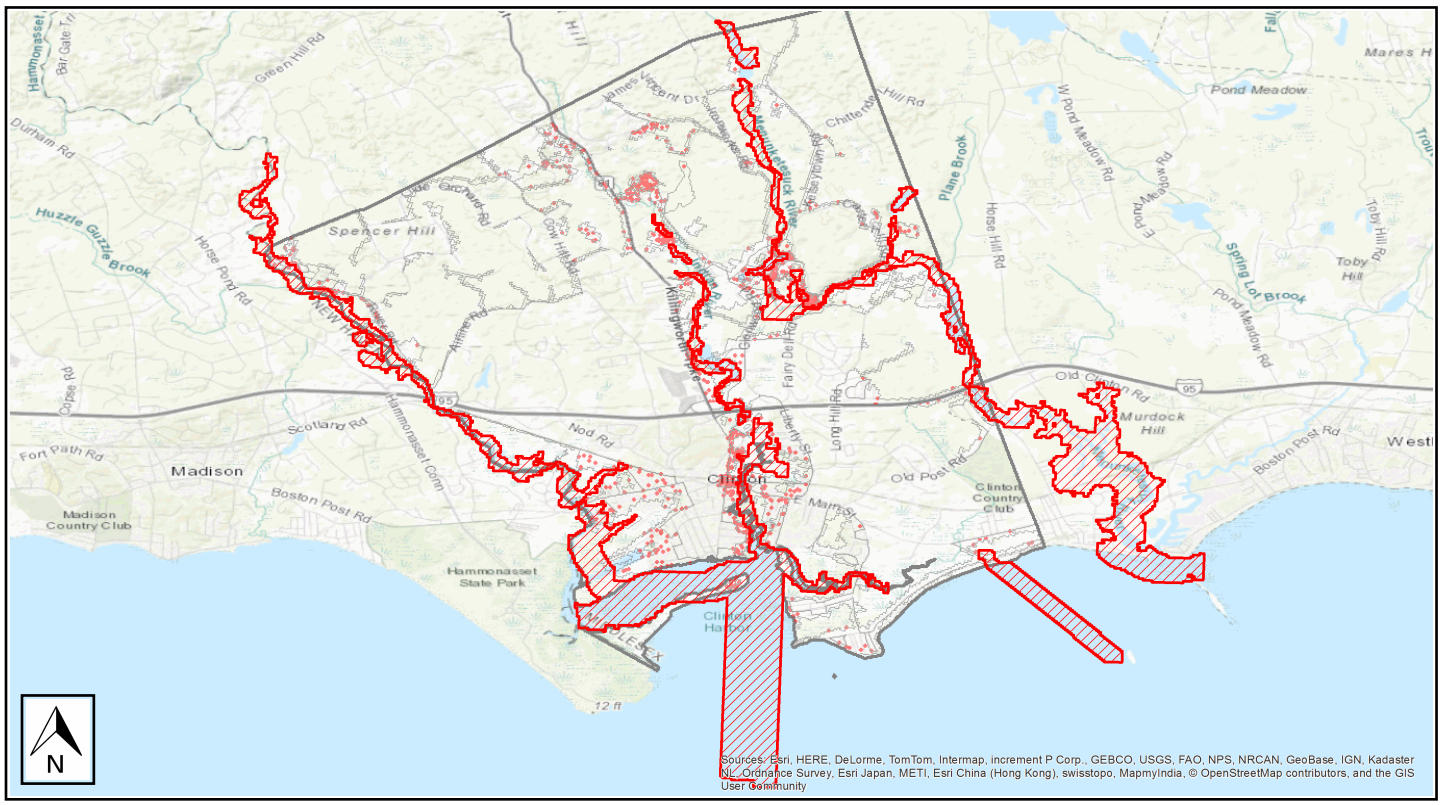


Table 3: Expected Building Damage by Occupancy

	1-10		11-20		21-30		31-40		41-50		>50	
Occupancy	**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	31	94	2	6	0	0	0	0	0	0	0	0
Total	**31**		**2**		**0**		**0**		**0**		**0**	

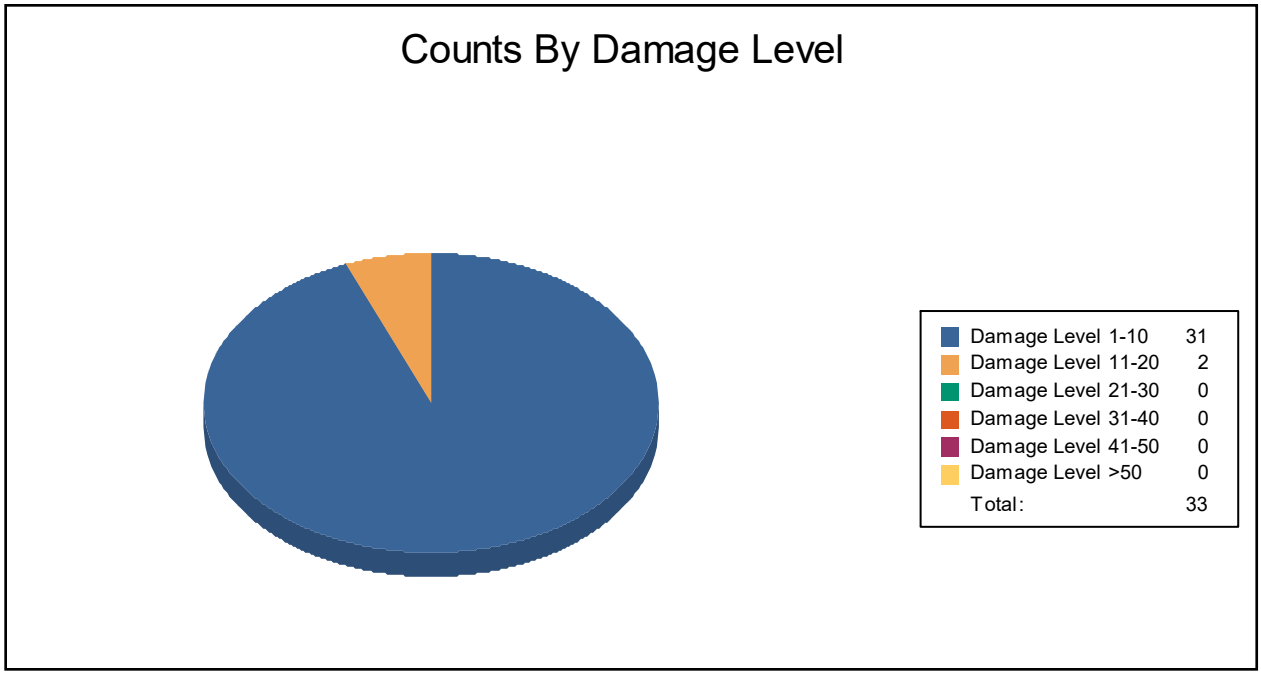


Table 4: Expected Building Damage by Building Type

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	0	0
Masonry	0	0	0	0	0	0	0	0	0	0	0	0
Steel	0	0	0	0	0	0	0	0	0	0	0	0
Wood	31	94	2	6	0	0	0	0	0	0	0	0

Essential Facility Damage

Before the flood analyzed in this scenario, the region had 0 hospital beds available for use. On the day of the scenario flood event, the model estimates that 0 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
Emergency Operation Centers	1	0	0	0
Fire Stations	2	0	0	0
Hospitals	0	0	0	0
Police Stations	1	0	0	0
Schools	5	0	0	0

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

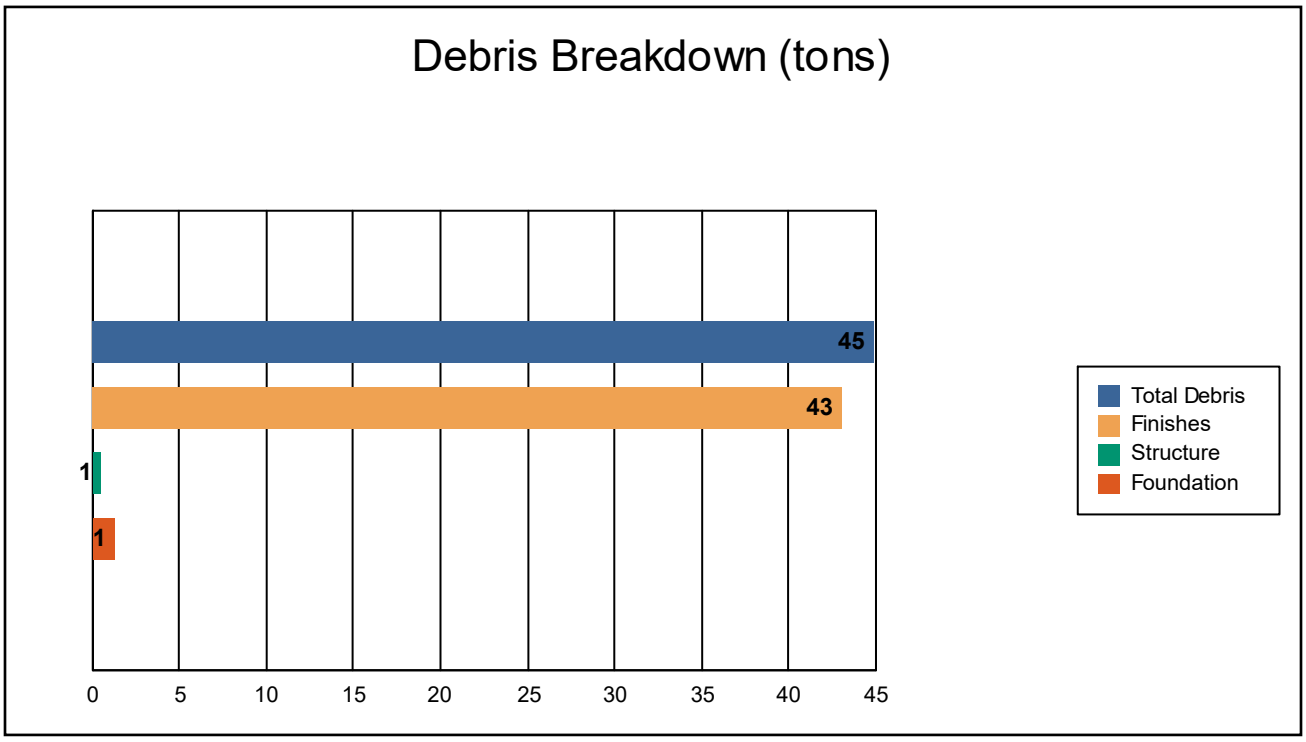
(1) None of your facilities were flooded. This can be checked by mapping the inventory data on the depth grid.

(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.

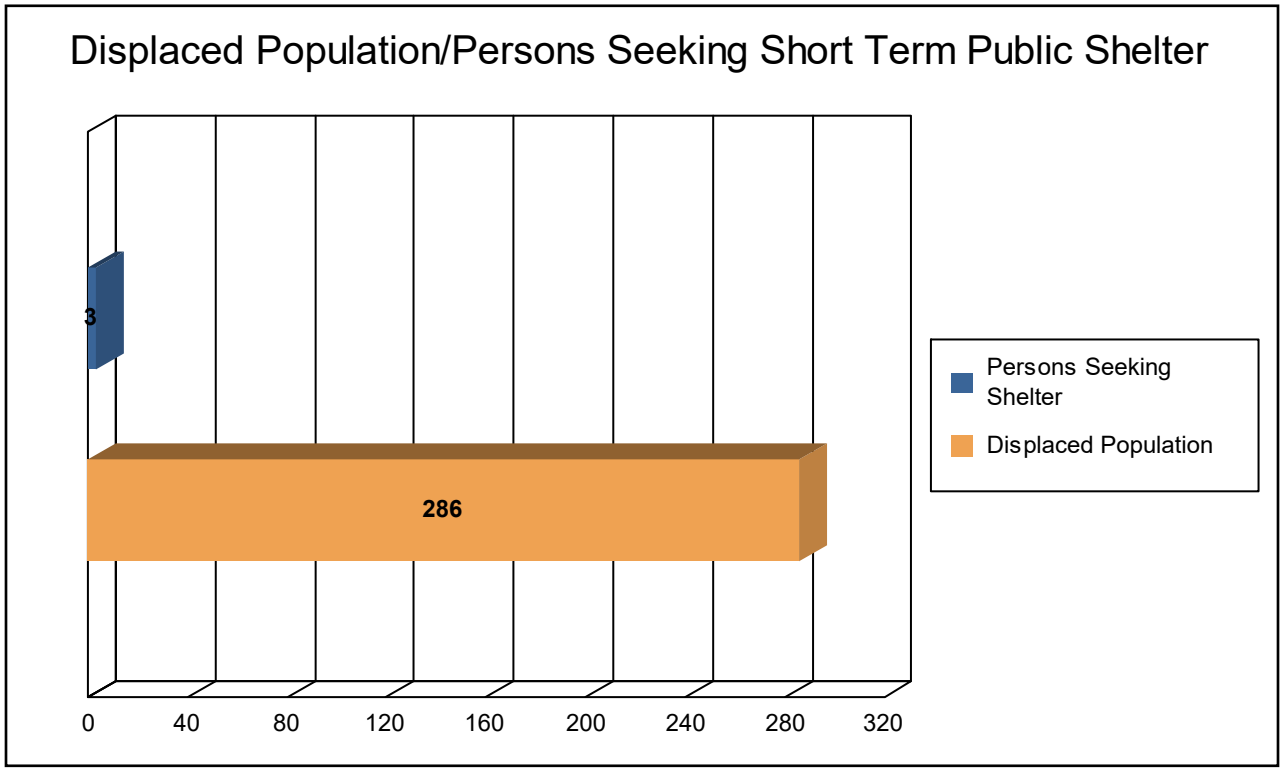


The model estimates that a total of 45 tons of debris will be generated. Of the total amount, Finishes comprises 96% of the total, Structure comprises 1% of the total, and Foundation comprises 3%. If the debris tonnage is converted into an estimated number of truckloads, it will require 2 truckloads (@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 95 households (or 286 of people) will be displaced due to the flood. Displacement includes households evacuated from within or very near to the inundated area. Of these, 3 people (out of a total population of 13,260) will seek temporary shelter in public shelters.



Economic Loss

The total economic loss estimated for the flood is 7.95 million dollars, which represents 0.75 % of the total replacement value of the scenario buildings.

Building-Related Losses

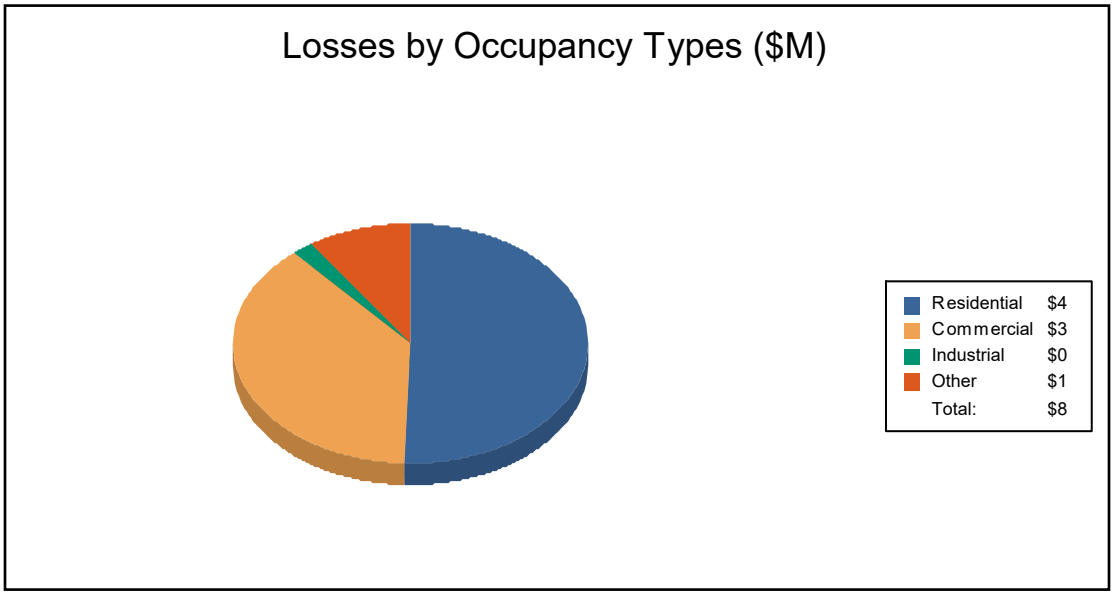
The building losses are broken into two categories: direct building losses and business interruption losses. The direct building losses are the estimated costs to repair or replace the damage caused to the building and its contents. The business interruption losses are the losses associated with inability 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 2.19 million dollars. 72% of the estimated losses were related to the business interruption of the region. The residential occupancies made up 50.57% 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	1.26	0.05	0.05	0.00	1.36
	Content	0.52	0.18	0.09	0.03	0.82
	Inventory	0.00	0.00	0.01	0.00	0.01
	Subtotal	**1.78**	**0.23**	**0.15**	**0.04**	**2.19**
Business Interruption						
	Income	0.01	1.27	0.01	0.09	1.37
	Relocation	1.66	0.24	0.00	0.03	1.93
	Rental Income	0.55	0.18	0.00	0.00	0.72
	Wage	0.02	1.12	0.01	0.59	1.74
	Subtotal	**2.24**	**2.79**	**0.02**	**0.71**	**5.76**
ALL	**Total**	**4.02**	**3.02**	**0.16**	**0.75**	**7.95**



Appendix A: County Listing for the Region

Connecticut

- Middlesex

Appendix B: Regional Population and Building Value Data

	Population	Building Value (thousands of dollars)		
		Residential	Non-Residential	Total
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Middlesex	13,260	1,661,441	400,494	2,061,935
Total	**13,260**	**1,661,441**	**400,494**	**2,061,935**
Total Study Region	**13,260**	**1,661,441**	**400,494**	**2,061,935**

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Flood Scenario: ClintonAll

Print Date: Monday, January 6, 2020

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

The geographical size of the region is approximately 16 square miles and contains 272 census blocks. The region contains over 5 thousand households and has a total population of 13,260 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 5,844 buildings in the region with a total building replacement value (excluding contents) of 2,062 million dollars. Approximately 91.43% of the buildings (and 80.58% of the building value) are associated with residential housing.

Building Inventory

General Building Stock

Hazus estimates that there are 5,844 buildings in the region which have an aggregate total replacement value of 2,062 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	1,661,441	80.6%
Commercial	255,126	12.4%
Industrial	98,279	4.8%
Agricultural	8,589	0.4%
Religion	15,970	0.8%
Government	7,665	0.4%
Education	14,865	0.7%
Total	**2,061,935**	**100%**

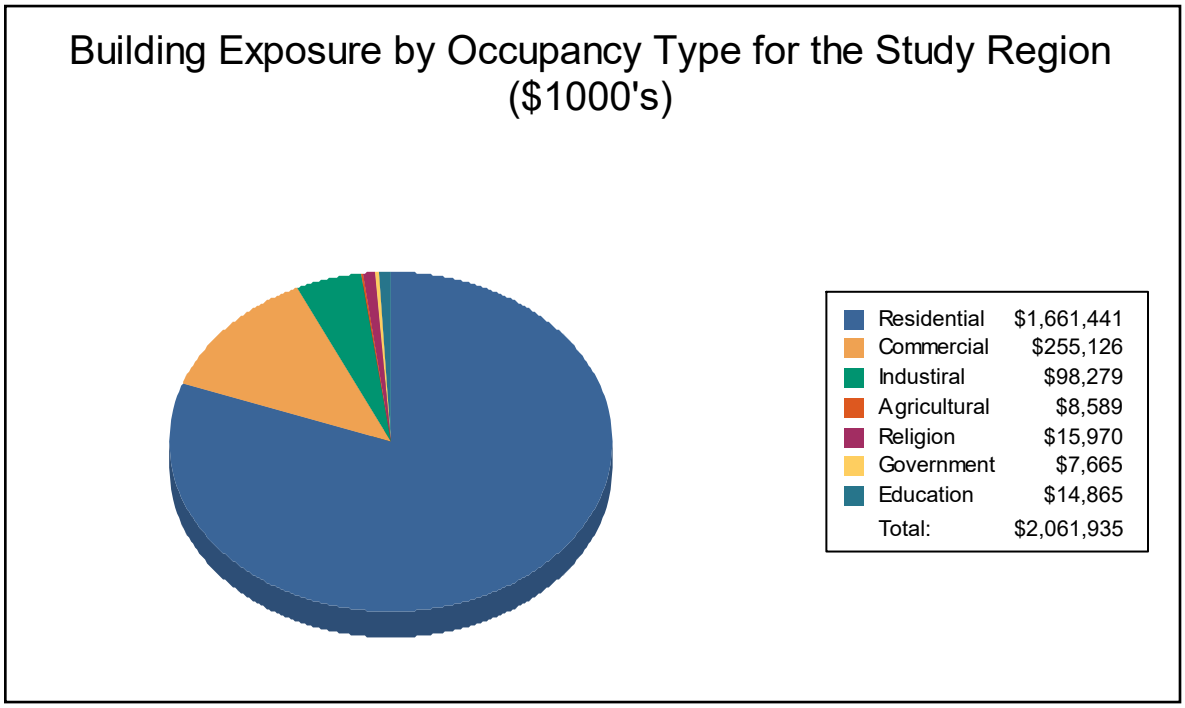
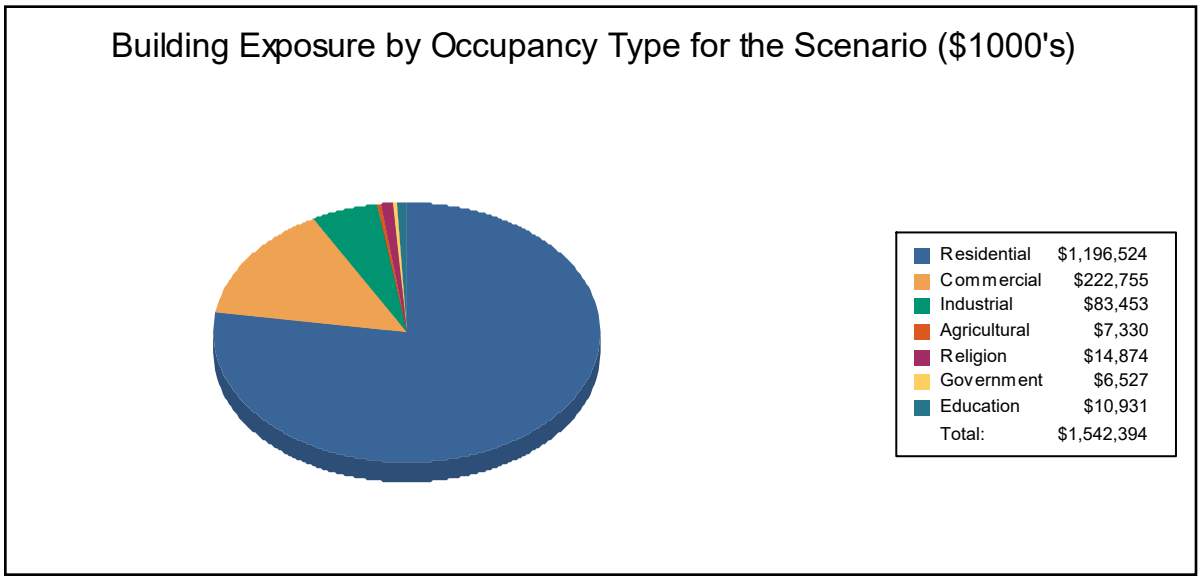


Table 2
Building Exposure by Occupancy Type for the Scenario

Occupancy	Exposure ($1000)	Percent of Total
Residential	1,196,524	77.6%
Commercial	222,755	14.4%
Industrial	83,453	5.4%
Agricultural	7,330	0.5%
Religion	14,874	1.0%
Government	6,527	0.4%
Education	10,931	0.7%
Total	**1,542,394**	**100%**



Essential Facility Inventory

For essential facilities, there are no hospitals in the region with a total bed capacity of no beds.
There are 5 schools, 2 fire stations, 1 police station and 1 emergency operation center.

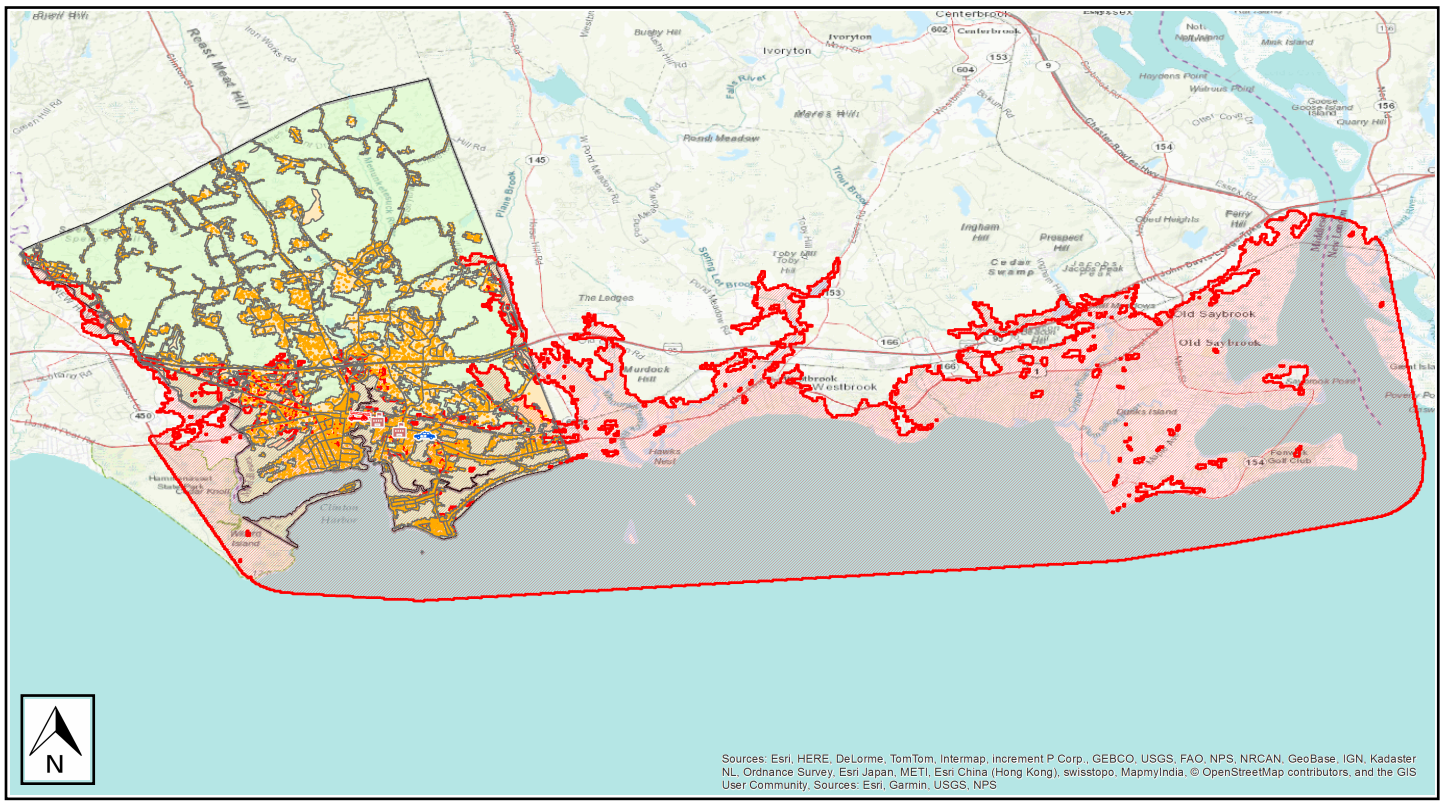
Flood Scenario Parameters

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

Study Region Name:	Clinton
Scenario Name:	ClintonAll
Return Period Analyzed:	25
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 308 buildings will be at least moderately damaged. This is over 29% of the total number of buildings in the scenario. There are an estimated 25 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

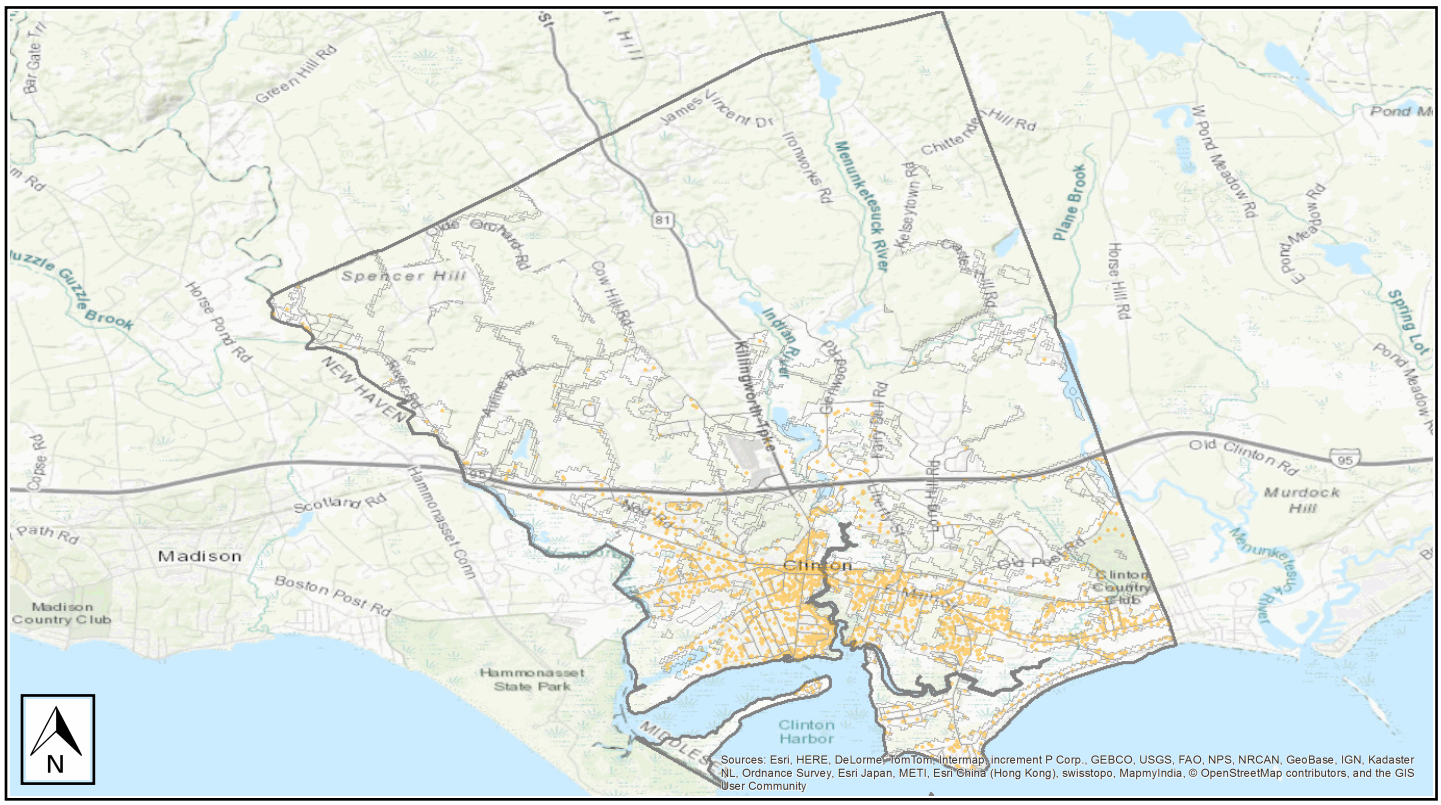


Table 3: Expected Building Damage by Occupancy

	1-10		11-20		21-30		31-40		41-50		>50	
Occupancy	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**
Agriculture	0	0	0	0	0	0	0	0	0	0	0	0
Commercial	0	0	0	0	1	100	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	104	25	225	55	48	12	8	2	1	0	25	6
Total	**104**		**225**		**49**		**8**		**1**		**25**	

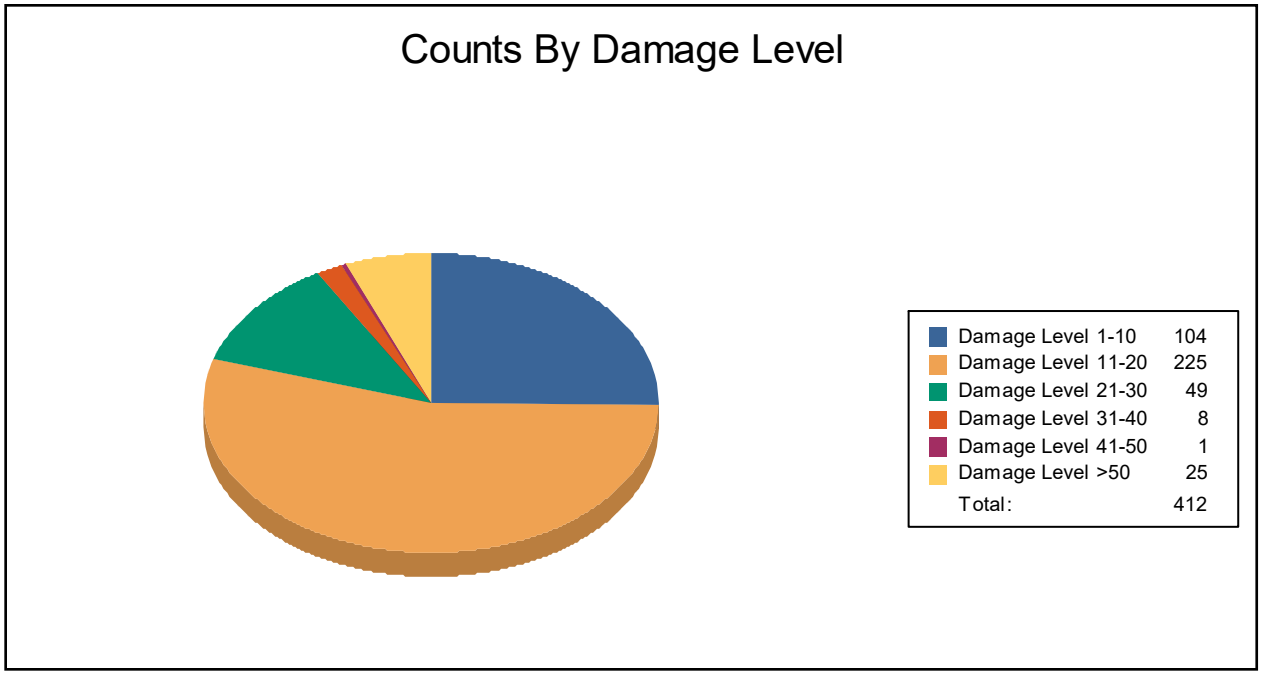


Table 4: Expected Building Damage by Building Type

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	1	25	0	0	1	25	0	0	0	0	2	50
Masonry	2	22	6	67	1	11	0	0	0	0	0	0
Steel	0	0	0	0	0	0	0	0	0	0	0	0
Wood	101	25	219	55	46	12	8	2	1	0	23	6

Essential Facility Damage

Before the flood analyzed in this scenario, the region had 0 hospital beds available for use. On the day of the scenario flood event, the model estimates that 0 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
Emergency Operation Centers	1	1	0	1
Fire Stations	2	1	0	1
Hospitals	0	0	0	0
Police Stations	1	1	0	1
Schools	5	1	0	1

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

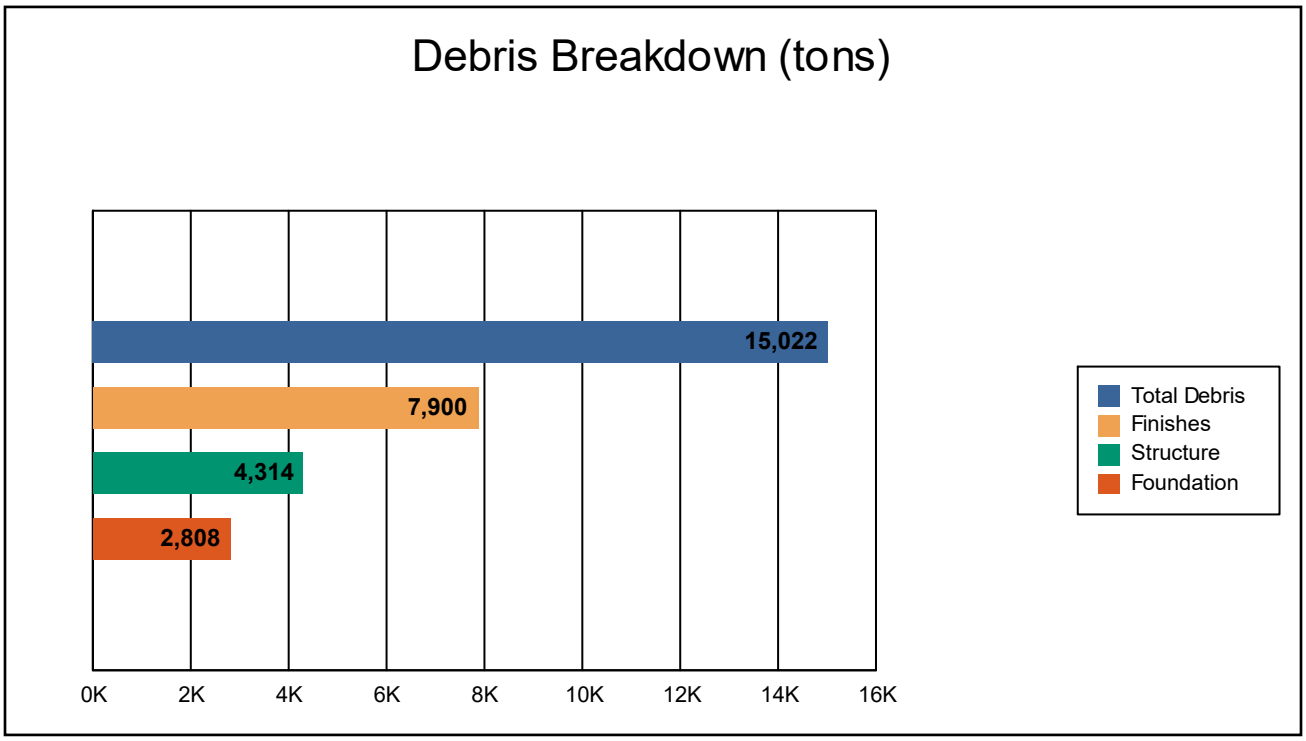
(1) None of your facilities were flooded. This can be checked by mapping the inventory data on the depth grid.

(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.

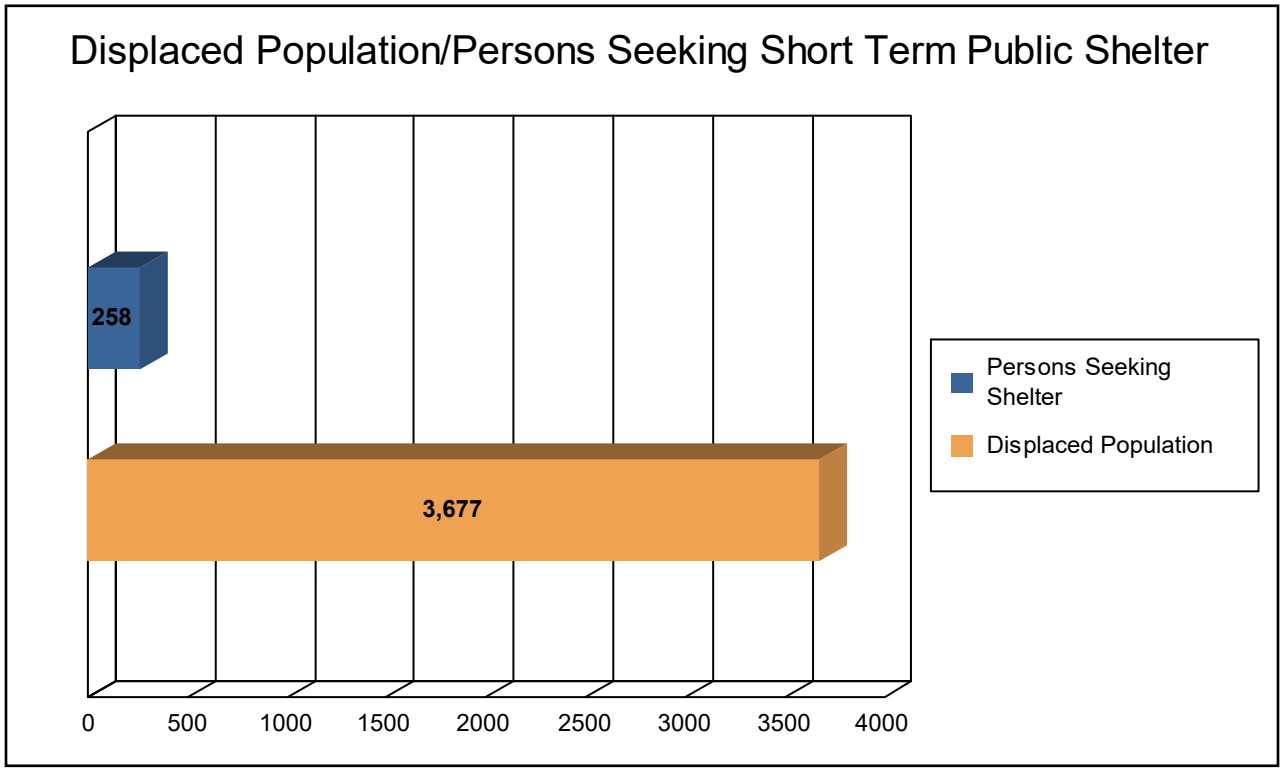


The model estimates that a total of 15,022 tons of debris will be generated. Of the total amount, Finishes comprises 53% of the total, Structure comprises 29% of the total, and Foundation comprises 19%. If the debris tonnage is converted into an estimated number of truckloads, it will require 601 truckloads (@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 1,226 households (or 3,677 of people) will be displaced due to the flood. Displacement includes households evacuated from within or very near to the inundated area. Of these, 258 people (out of a total population of 13,260) will seek temporary shelter in public shelters.



Economic Loss

The total economic loss estimated for the flood is 299.47 million dollars, which represents 19.42 % of the total replacement value of the scenario buildings.

Building-Related Losses

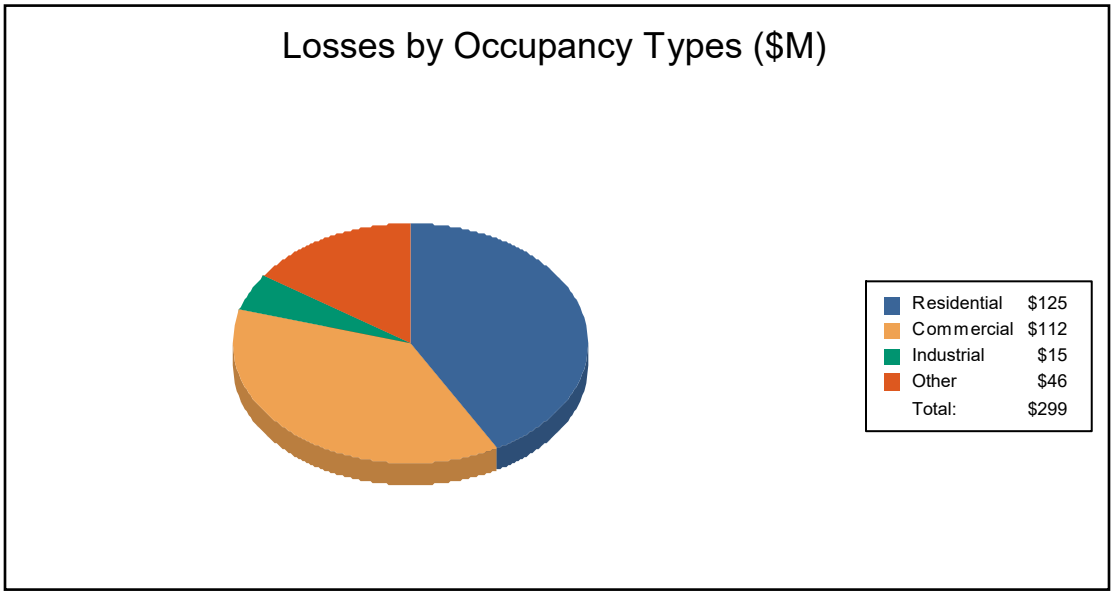
The building losses are broken into two categories: direct building losses and business interruption losses. The direct building losses are the estimated costs to repair or replace the damage caused to the building and its contents. The business interruption losses are the losses associated with inability 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 139.91 million dollars. 53% of the estimated losses were related to the business interruption of the region. The residential occupancies made up 41.88% 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	47.62	6.82	3.75	0.92	59.11
	Content	43.09	21.97	8.18	5.90	79.14
	Inventory	0.00	0.40	1.20	0.06	1.66
	Subtotal	**90.71**	**29.19**	**13.14**	**6.88**	**139.91**
Business Interruption						
	Income	0.42	31.68	0.53	2.71	35.34
	Relocation	23.74	10.01	0.65	1.68	36.09
	Rental Income	9.57	7.30	0.12	0.22	17.20
	Wage	0.98	34.02	0.94	34.99	70.93
	Subtotal	**34.71**	**83.01**	**2.24**	**39.61**	**159.56**
ALL	**Total**	**125.42**	**112.20**	**15.37**	**46.48**	**299.47**



Appendix A: County Listing for the Region

Connecticut

- Middlesex

Appendix B: Regional Population and Building Value Data

	Population	Building Value (thousands of dollars)		
		Residential	Non-Residential	Total
Connecticut				
Middlesex	13,260	1,661,441	400,494	2,061,935
Total	**13,260**	**1,661,441**	**400,494**	**2,061,935**
Total Study Region	**13,260**	**1,661,441**	**400,494**	**2,061,935**

Hazus: Flood Global Risk Report

Region Name: Clinton

Flood Scenario: ClintonAllRiverine

Print Date: Wednesday, January 8, 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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Table of Contents

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):

- Connecticut

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

The geographical size of the region is approximately 16 square miles and contains 272 census blocks. The region contains over 5 thousand households and has a total population of 13,260 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 5,844 buildings in the region with a total building replacement value (excluding contents) of 2,062 million dollars. Approximately 91.43% of the buildings (and 80.58% of the building value) are associated with residential housing.

Building Inventory

General Building Stock

Hazus estimates that there are 5,844 buildings in the region which have an aggregate total replacement value of 2,062 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.

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Agricultural	8,589	0.4%
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Government	7,665	0.4%
Education	14,865	0.7%
Total	**2,061,935**	**100%**

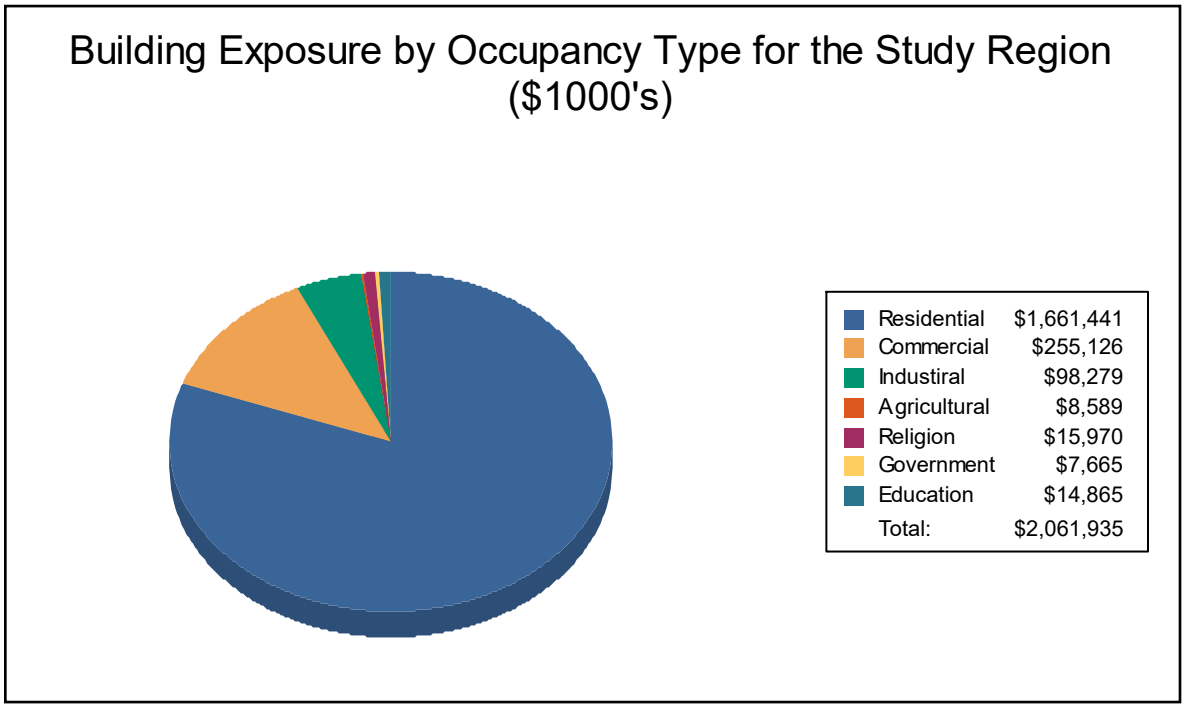
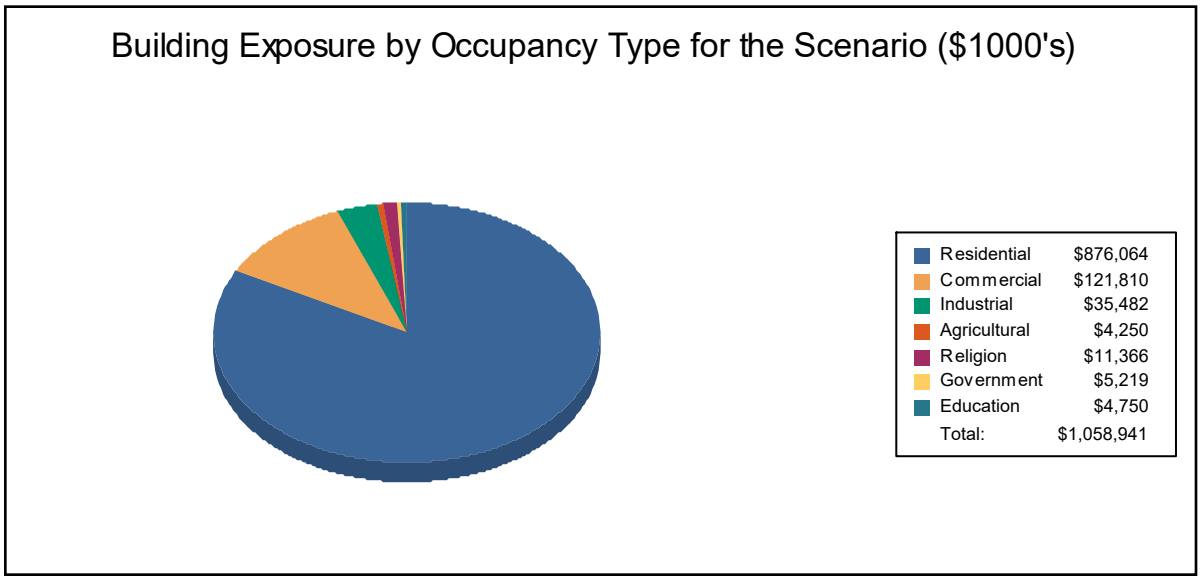


Table 2
Building Exposure by Occupancy Type for the Scenario

Occupancy	Exposure ($1000)	Percent of Total
Residential	876,064	82.7%
Commercial	121,810	11.5%
Industrial	35,482	3.4%
Agricultural	4,250	0.4%
Religion	11,366	1.1%
Government	5,219	0.5%
Education	4,750	0.4%
Total	**1,058,941**	**100%**



Essential Facility Inventory

For essential facilities, there are no hospitals in the region with a total bed capacity of no beds.
There are 5 schools, 2 fire stations, 1 police station and 1 emergency operation center.

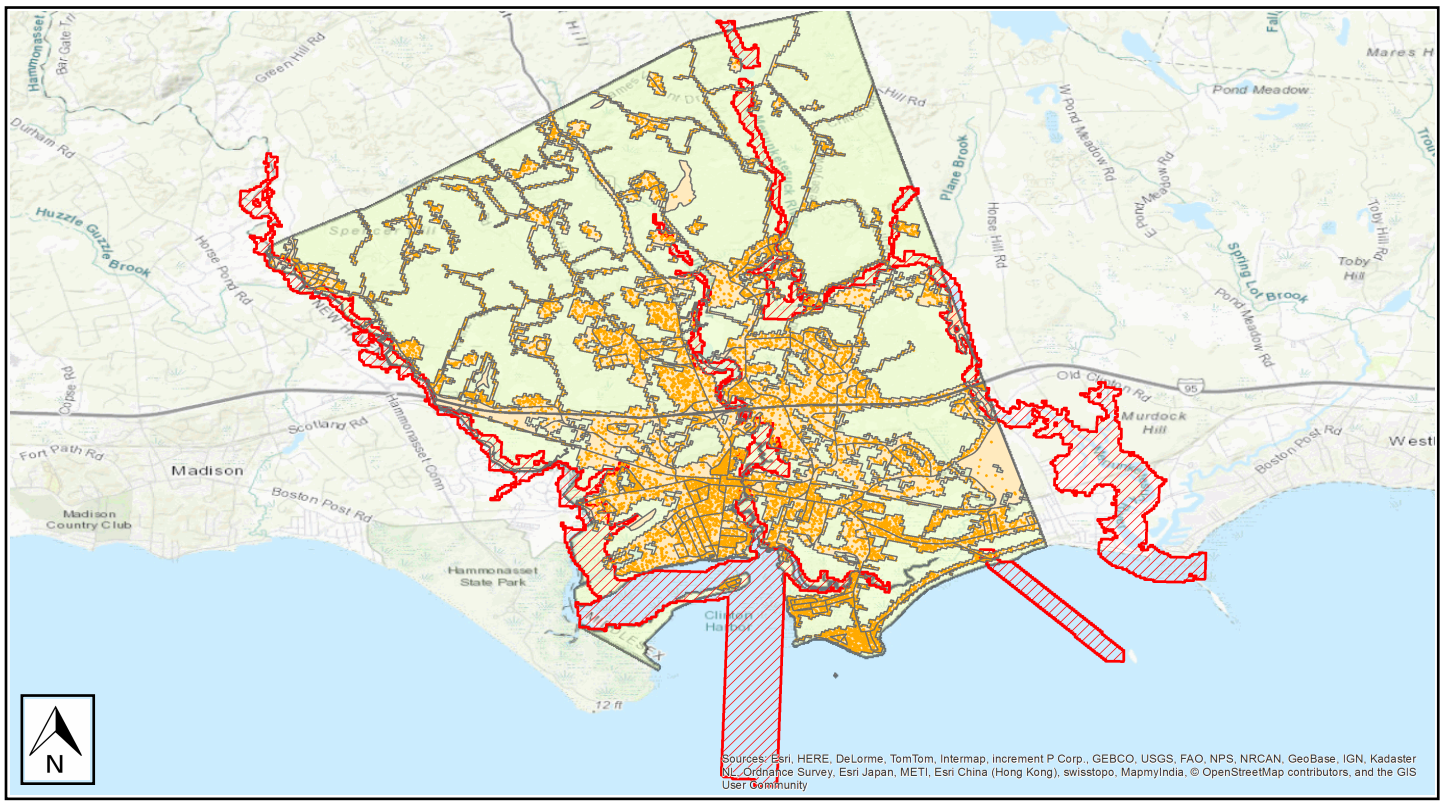
Flood Scenario Parameters

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

Study Region Name:	Clinton
Scenario Name:	ClintonAllRiverine
Return Period Analyzed:	25
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 4 buildings will be at least moderately damaged. This is over 53% of the total number of buildings in the scenario. There are an estimated 0 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

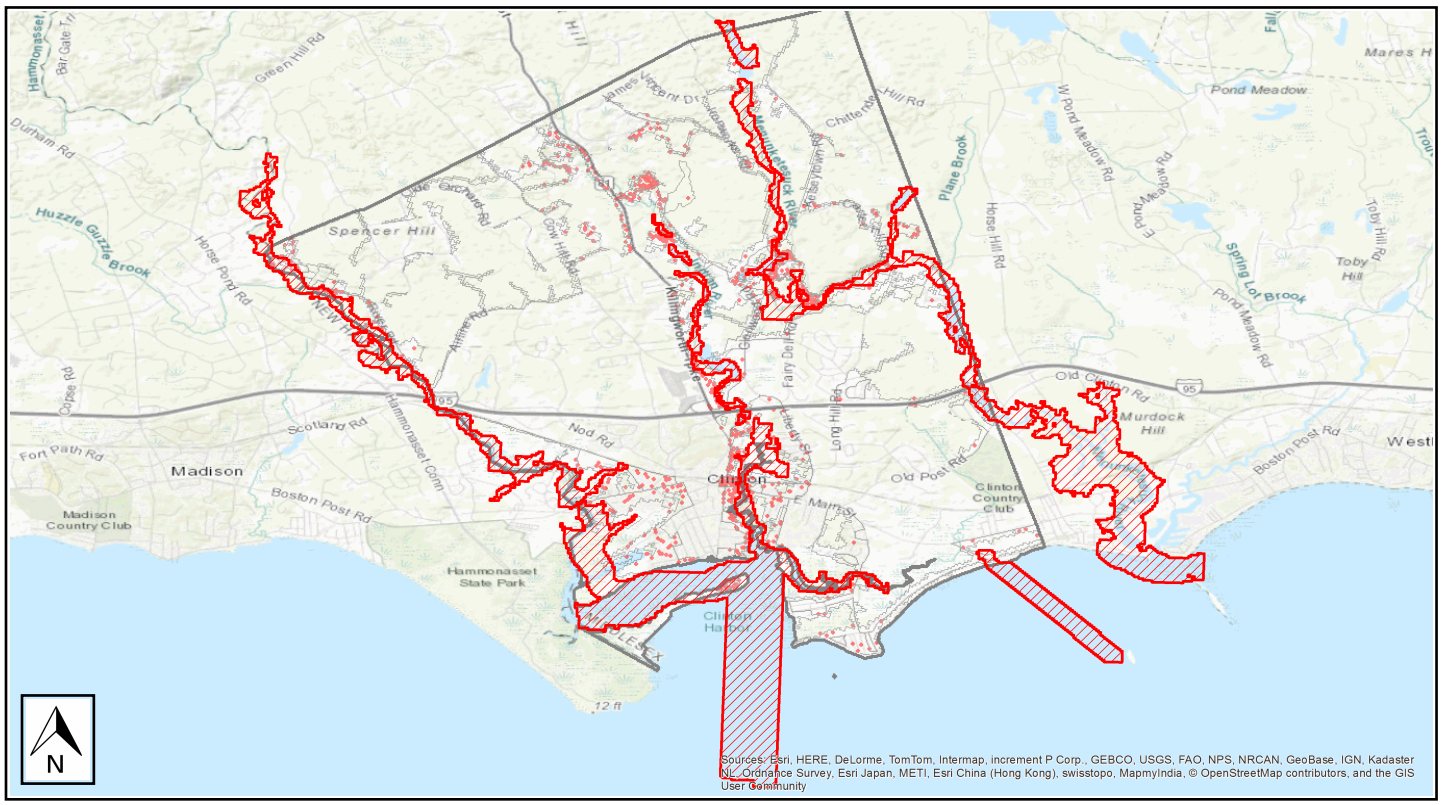


Table 3: Expected Building Damage by Occupancy

	1-10		11-20		21-30		31-40		41-50		>50	
Occupancy	**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	33	89	4	11	0	0	0	0	0	0	0	0
Total	**33**		**4**		**0**		**0**		**0**		**0**	

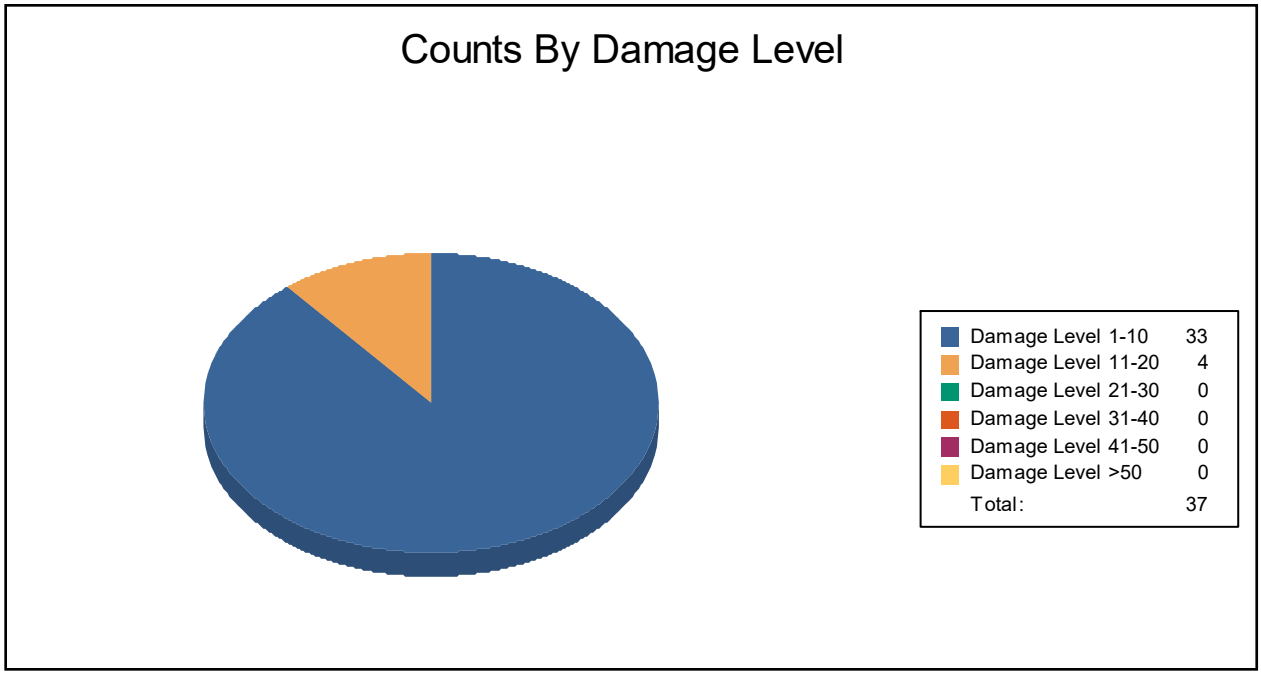


Table 4: Expected Building Damage by Building Type

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	0	0
Masonry	0	0	0	0	0	0	0	0	0	0	0	0
Steel	0	0	0	0	0	0	0	0	0	0	0	0
Wood	33	89	4	11	0	0	0	0	0	0	0	0

Essential Facility Damage

Before the flood analyzed in this scenario, the region had 0 hospital beds available for use. On the day of the scenario flood event, the model estimates that 0 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
Emergency Operation Centers	1	0	0	0
Fire Stations	2	0	0	0
Hospitals	0	0	0	0
Police Stations	1	0	0	0
Schools	5	0	0	0

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

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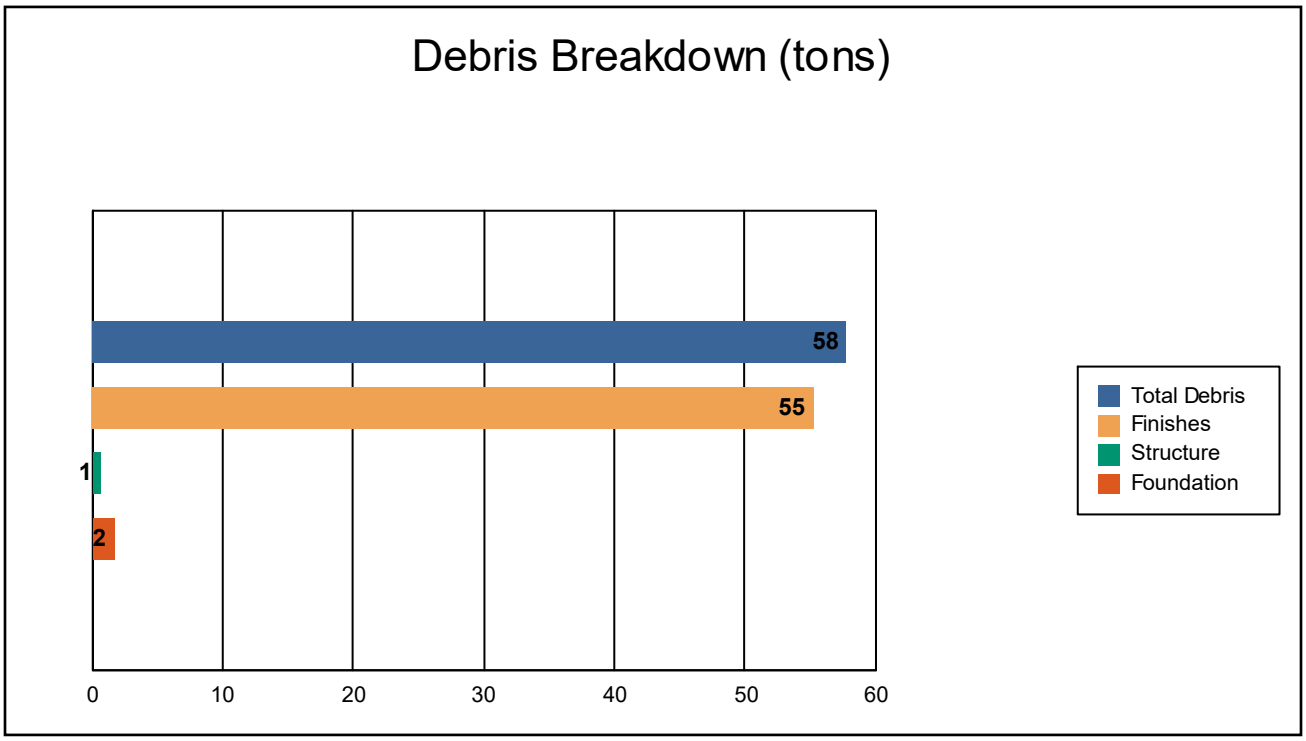
(2) The analysis was not run. This can be tested by checking the run box on the Analysis Menu and seeing if a message box asks you to replace the existing results.

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.

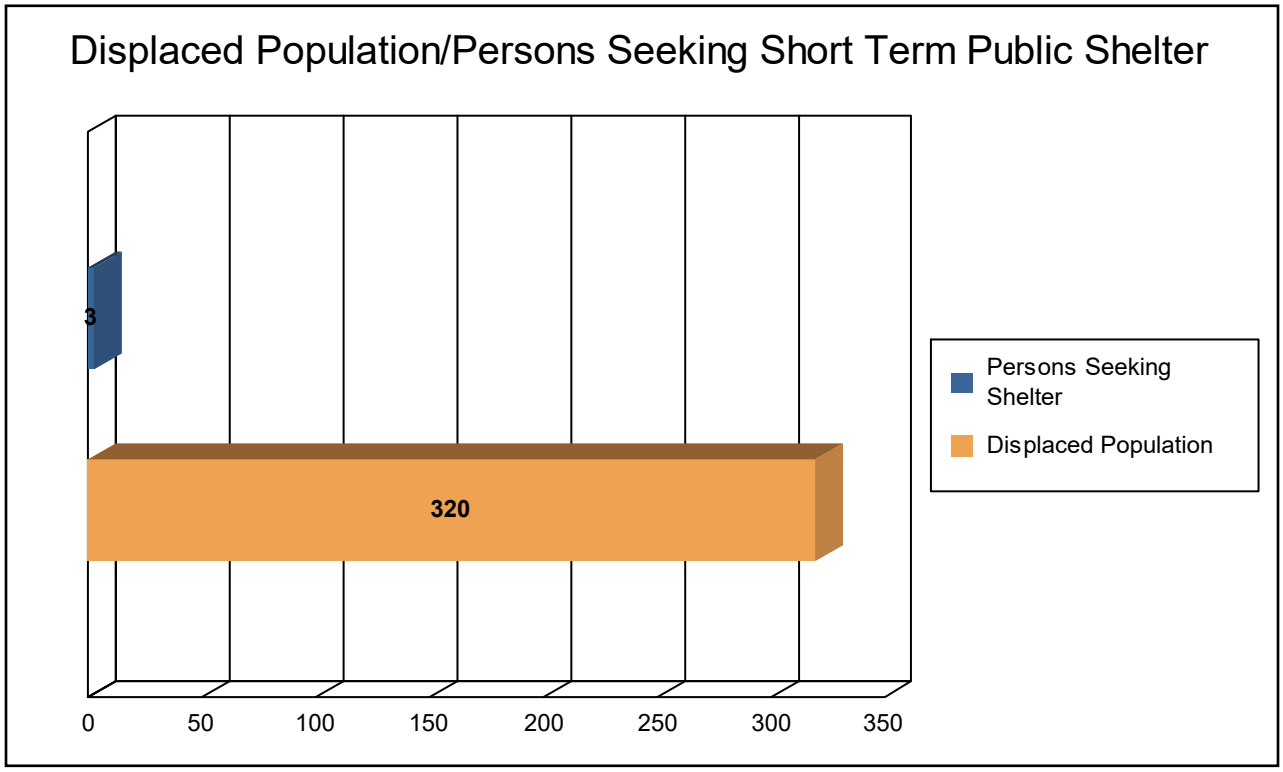


The model estimates that a total of 58 tons of debris will be generated. Of the total amount, Finishes comprises 96% of the total, Structure comprises 1% of the total, and Foundation comprises 3%. If the debris tonnage is converted into an estimated number of truckloads, it will require 3 truckloads (@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 107 households (or 320 of people) will be displaced due to the flood. Displacement includes households evacuated from within or very near to the inundated area. Of these, 3 people (out of a total population of 13,260) will seek temporary shelter in public shelters.



Economic Loss

The total economic loss estimated for the flood is 9.13 million dollars, which represents 0.86 % of the total replacement value of the scenario buildings.

Building-Related Losses

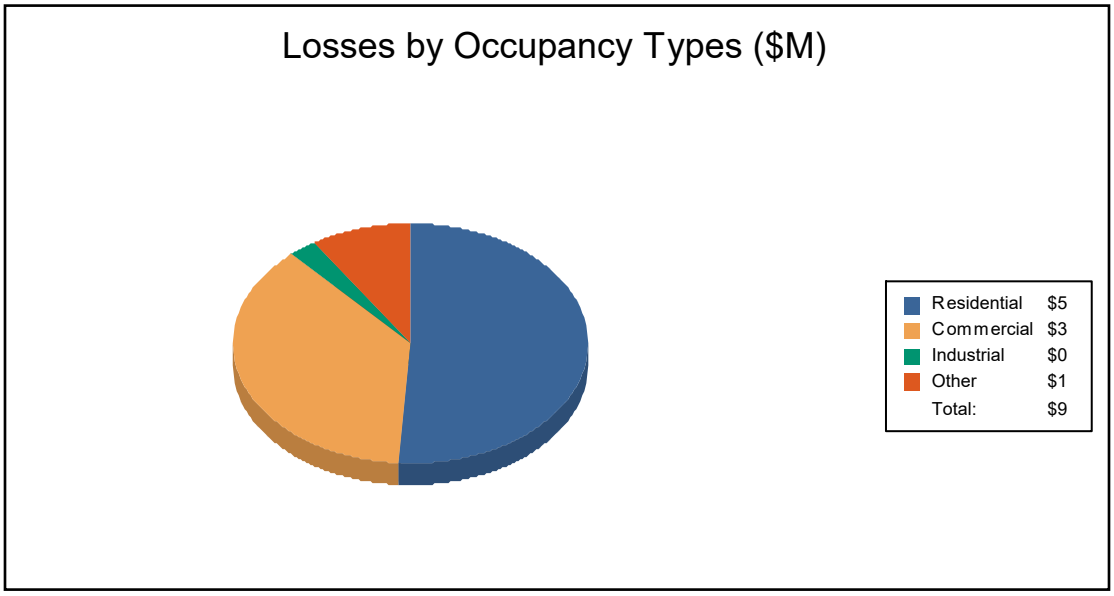
The building losses are broken into two categories: direct building losses and business interruption losses. The direct building losses are the estimated costs to repair or replace the damage caused to the building and its contents. The business interruption losses are the losses associated with inability 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 2.83 million dollars. 69% of the estimated losses were related to the business interruption of the region. The residential occupancies made up 51.14% 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	1.57	0.07	0.07	0.01	1.72
	Content	0.67	0.25	0.12	0.05	1.10
	Inventory	0.00	0.00	0.01	0.00	0.01
	Subtotal	**2.24**	**0.32**	**0.20**	**0.06**	**2.83**
Business Interruption						
	Income	0.01	1.37	0.01	0.09	1.49
	Relocation	1.79	0.27	0.01	0.03	2.09
	Rental Income	0.59	0.20	0.00	0.00	0.79
	Wage	0.03	1.24	0.01	0.65	1.93
	Subtotal	**2.43**	**3.08**	**0.03**	**0.77**	**6.30**
ALL	**Total**	**4.67**	**3.40**	**0.23**	**0.83**	**9.13**



Appendix A: County Listing for the Region

Connecticut

- Middlesex

Appendix B: Regional Population and Building Value Data

	Population	Building Value (thousands of dollars)		
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Middlesex	13,260	1,661,441	400,494	2,061,935
Total	**13,260**	**1,661,441**	**400,494**	**2,061,935**
Total Study Region	**13,260**	**1,661,441**	**400,494**	**2,061,935**

Hazus: Flood Global Risk Report

Region Name: Clinton

Flood Scenario: ClintonAll

Print Date: Monday, January 6, 2020

Disclaimer:
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Totals only reflect data for those census tracts/blocks included in the user's study region.

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Education	14,865	0.7%
Total	**2,061,935**	**100%**

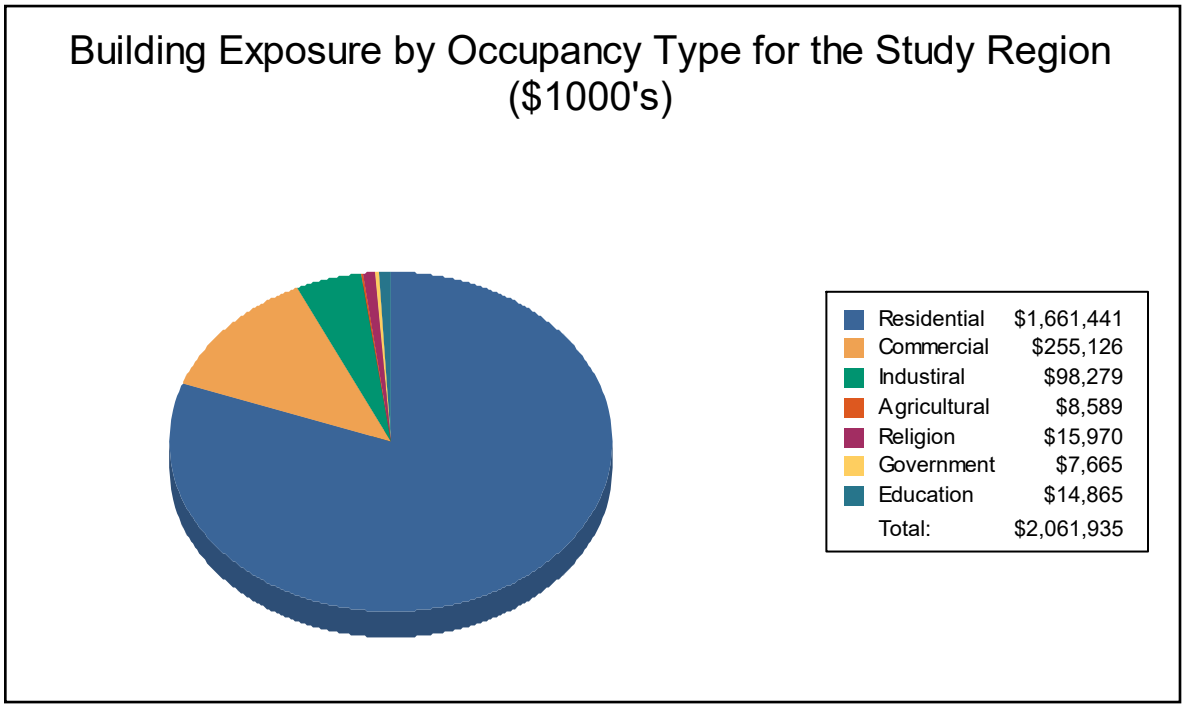
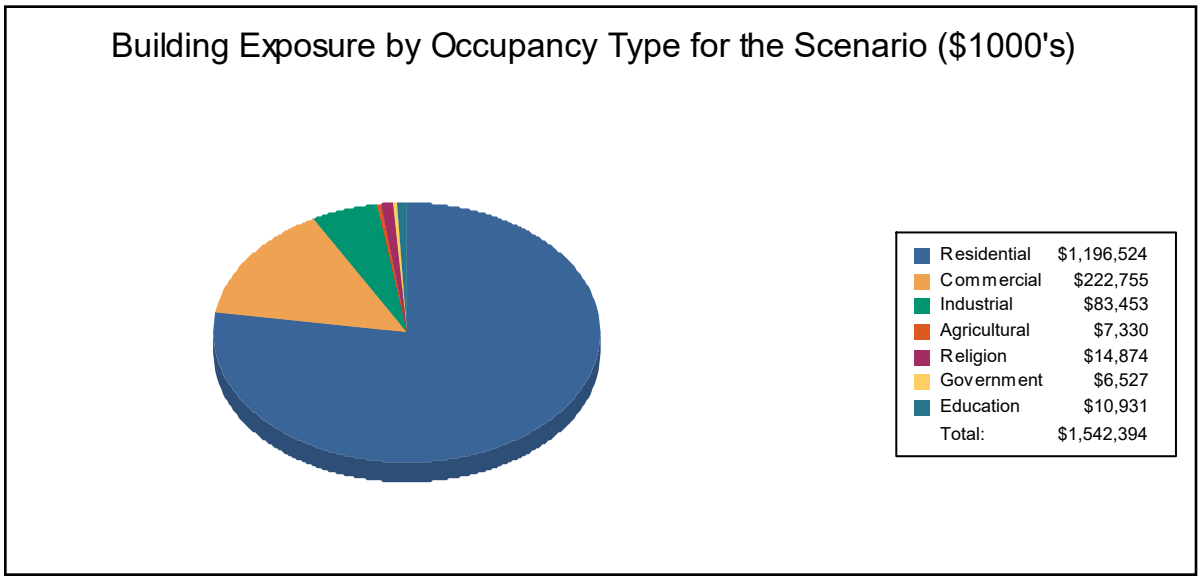


Table 2
Building Exposure by Occupancy Type for the Scenario

Occupancy	Exposure ($1000)	Percent of Total
Residential	1,196,524	77.6%
Commercial	222,755	14.4%
Industrial	83,453	5.4%
Agricultural	7,330	0.5%
Religion	14,874	1.0%
Government	6,527	0.4%
Education	10,931	0.7%
Total	**1,542,394**	**100%**



Essential Facility Inventory

For essential facilities, there are no hospitals in the region with a total bed capacity of no beds.
There are 5 schools, 2 fire stations, 1 police station and 1 emergency operation center.

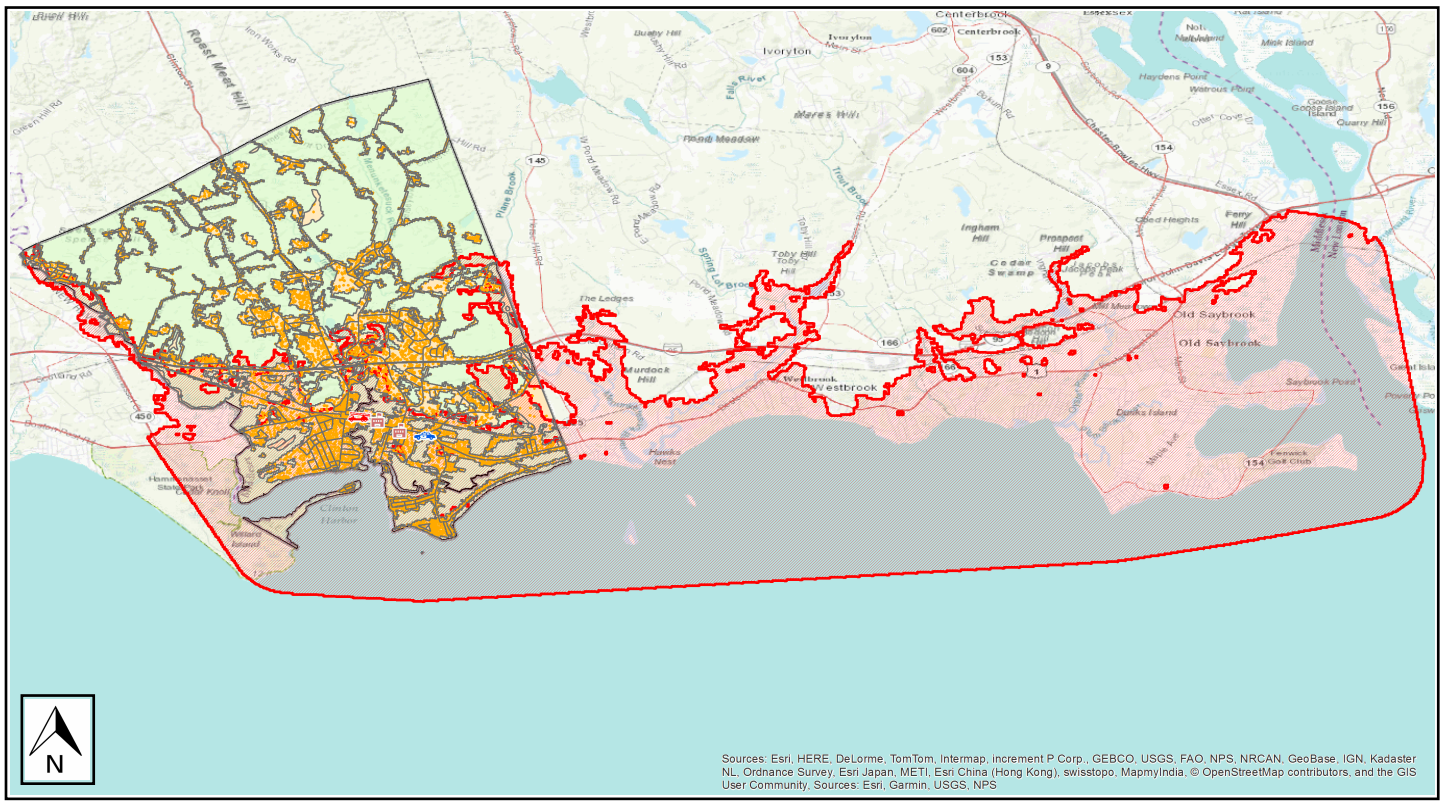
Flood Scenario Parameters

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

Study Region Name:	Clinton
Scenario Name:	ClintonAll
Return Period Analyzed:	50
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 476 buildings will be at least moderately damaged. This is over 41% of the total number of buildings in the scenario. There are an estimated 34 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

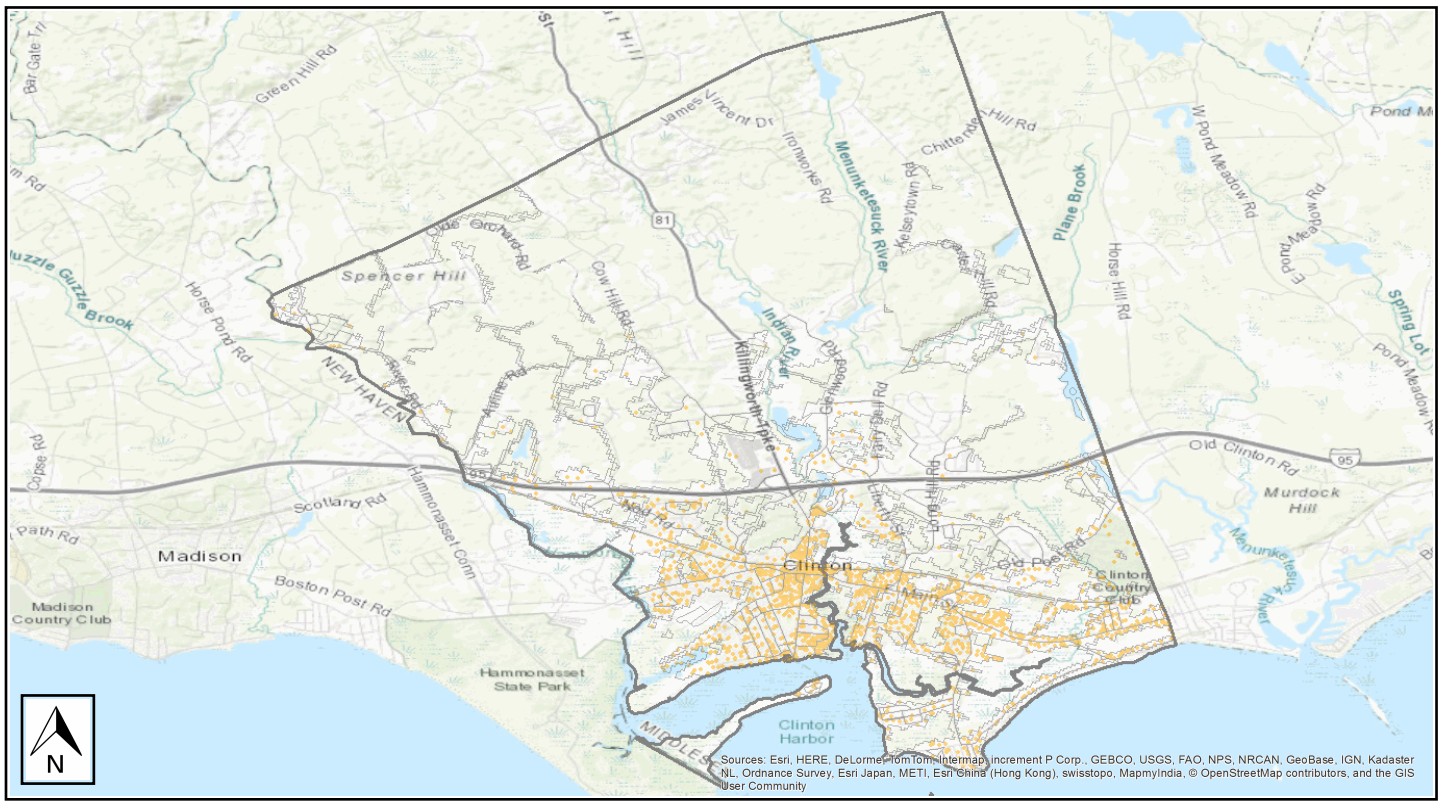


Table 3: Expected Building Damage by Occupancy

	1-10		11-20		21-30		31-40		41-50		>50	
Occupancy	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**
Agriculture	0	0	0	0	0	0	0	0	0	0	0	0
Commercial	0	0	2	67	0	0	1	33	0	0	0	0
Education	0	0	0	0	0	0	0	0	0	0	0	0
Government	1	100	0	0	0	0	0	0	0	0	0	0
Industrial	0	0	1	100	0	0	0	0	0	0	0	0
Religion	0	0	0	0	0	0	0	0	0	0	0	0
Residential	76	14	252	46	162	30	24	4	0	0	34	6
Total	**77**		**255**		**162**		**25**		**0**		**34**	

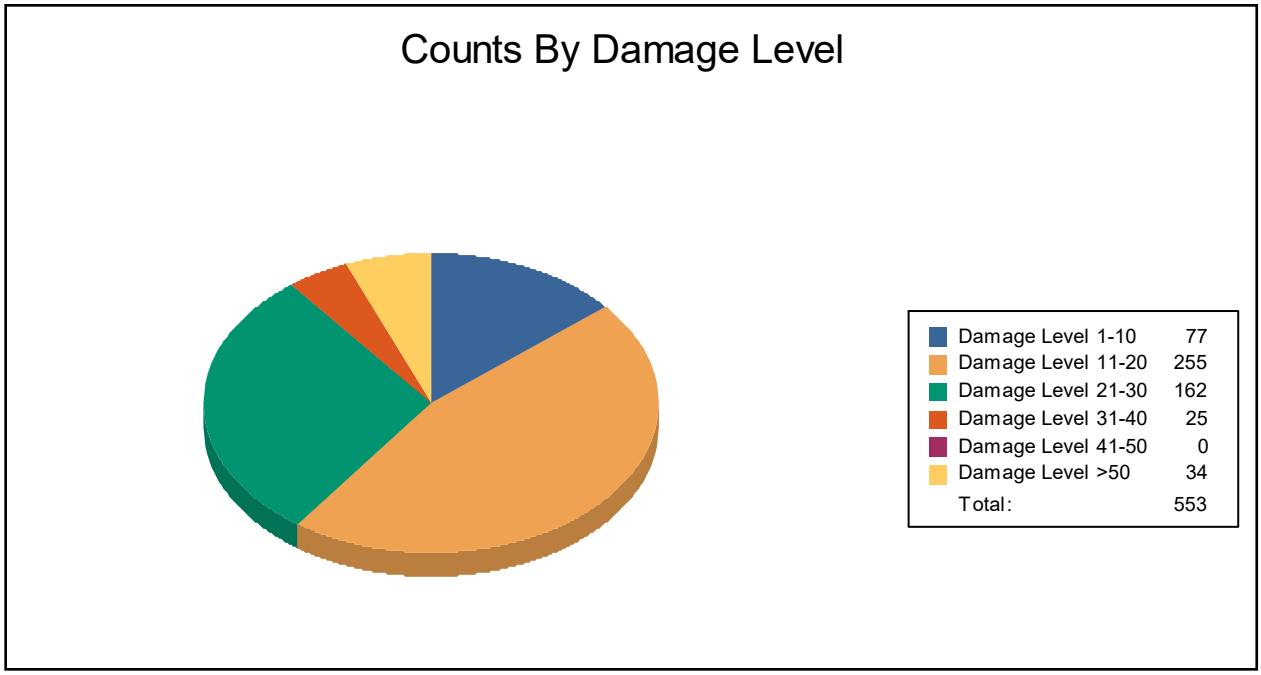


Table 4: Expected Building Damage by Building Type

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	8	100
Masonry	0	0	3	60	2	40	0	0	0	0	0	0
Steel	1	25	3	75	0	0	0	0	0	0	0	0
Wood	76	14	249	47	160	30	24	4	0	0	26	5

Essential Facility Damage

Before the flood analyzed in this scenario, the region had 0 hospital beds available for use. On the day of the scenario flood event, the model estimates that 0 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
Emergency Operation Centers	1	1	0	1
Fire Stations	2	1	0	1
Hospitals	0	0	0	0
Police Stations	1	1	0	1
Schools	5	2	0	2

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

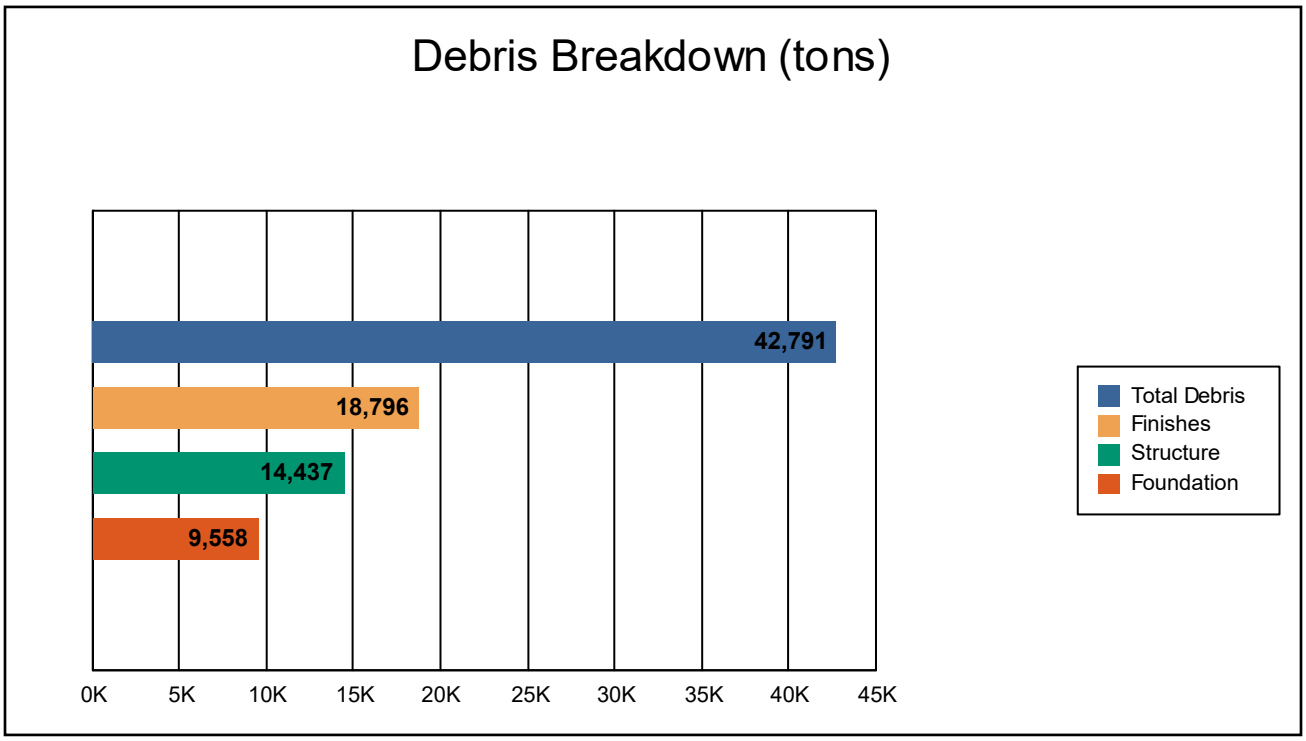
(1) None of your facilities were flooded. This can be checked by mapping the inventory data on the depth grid.

(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.

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.

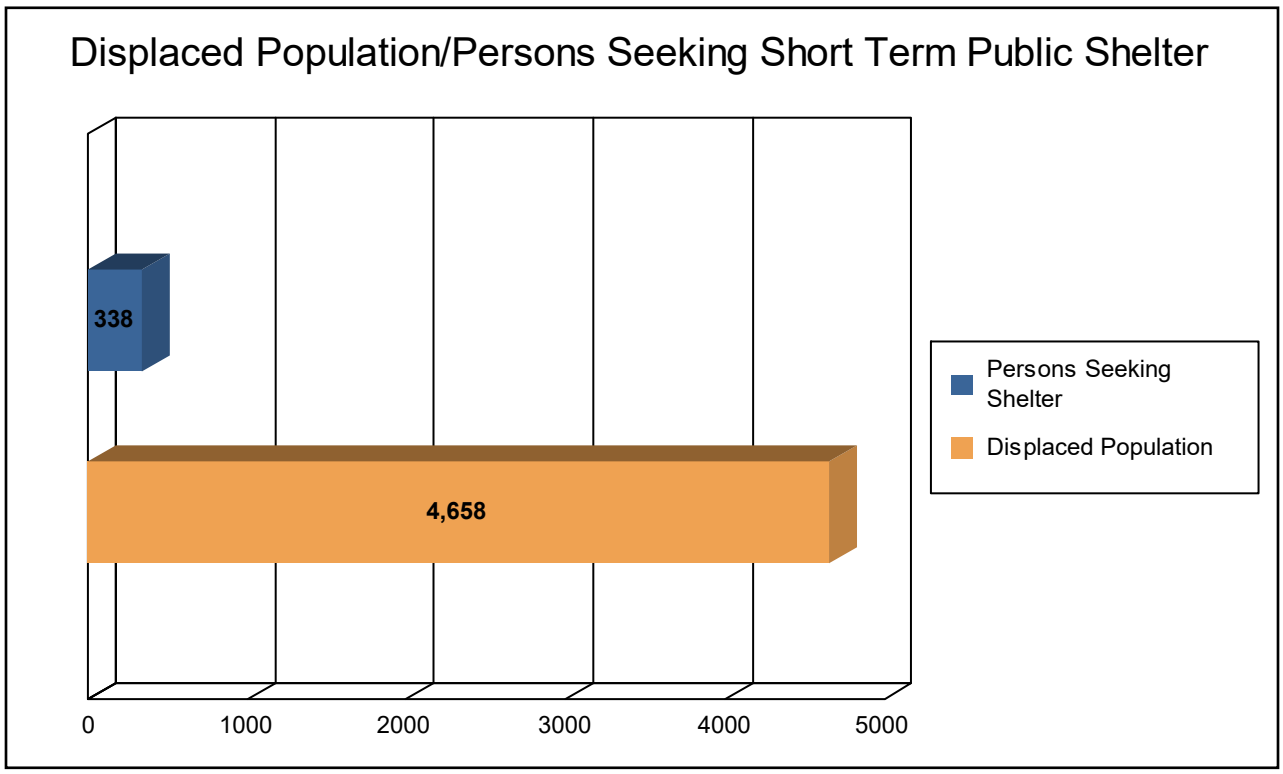


The model estimates that a total of 42,791 tons of debris will be generated. Of the total amount, Finishes comprises 44% of the total, Structure comprises 34% of the total, and Foundation comprises 22%. If the debris tonnage is converted into an estimated number of truckloads, it will require 1712 truckloads (@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 1,553 households (or 4,658 of people) will be displaced due to the flood. Displacement includes households evacuated from within or very near to the inundated area. Of these, 338 people (out of a total population of 13,260) will seek temporary shelter in public shelters.



Economic Loss

The total economic loss estimated for the flood is 453.33 million dollars, which represents 29.39 % of the total replacement value of the scenario buildings.

Building-Related Losses

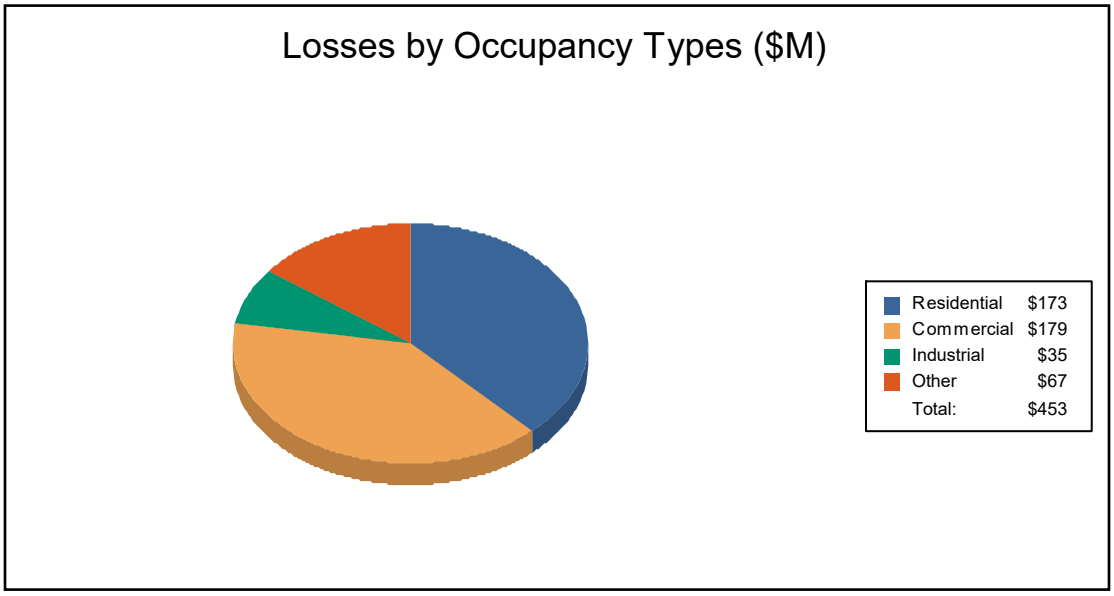
The building losses are broken into two categories: direct building losses and business interruption losses. The direct building losses are the estimated costs to repair or replace the damage caused to the building and its contents. The business interruption losses are the losses associated with inability 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 249.04 million dollars. 45% of the estimated losses were related to the business interruption of the region. The residential occupancies made up 38.09% 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	73.54	15.97	8.45	2.03	99.99
	Content	61.87	50.66	19.89	12.56	144.97
	Inventory	0.00	1.04	2.89	0.15	4.07
	Subtotal	**135.41**	**67.66**	**31.23**	**14.73**	**249.04**
Business Interruption						
	Income	0.53	42.08	0.79	3.53	46.93
	Relocation	25.21	13.29	0.94	2.23	41.68
	Rental Income	10.28	9.76	0.19	0.34	20.56
	Wage	1.24	46.52	1.39	45.97	95.12
	Subtotal	**37.26**	**111.65**	**3.31**	**52.07**	**204.29**
ALL	**Total**	**172.68**	**179.31**	**34.54**	**66.80**	**453.33**



Appendix A: County Listing for the Region

Connecticut

- Middlesex

Appendix B: Regional Population and Building Value Data

	Population	Building Value (thousands of dollars)		
		Residential	Non-Residential	Total
Connecticut				
Middlesex	13,260	1,661,441	400,494	2,061,935
Total	**13,260**	**1,661,441**	**400,494**	**2,061,935**
Total Study Region	**13,260**	**1,661,441**	**400,494**	**2,061,935**

Hazus: Flood Global Risk Report

Region Name: Clinton

Flood Scenario: ClintonAllRiverine

Print Date: Wednesday, January 8, 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):

- Connecticut

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

The geographical size of the region is approximately 16 square miles and contains 272 census blocks. The region contains over 5 thousand households and has a total population of 13,260 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 5,844 buildings in the region with a total building replacement value (excluding contents) of 2,062 million dollars. Approximately 91.43% of the buildings (and 80.58% of the building value) are associated with residential housing.

Building Inventory

General Building Stock

Hazus estimates that there are 5,844 buildings in the region which have an aggregate total replacement value of 2,062 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	1,661,441	80.6%
Commercial	255,126	12.4%
Industrial	98,279	4.8%
Agricultural	8,589	0.4%
Religion	15,970	0.8%
Government	7,665	0.4%
Education	14,865	0.7%
Total	**2,061,935**	**100%**

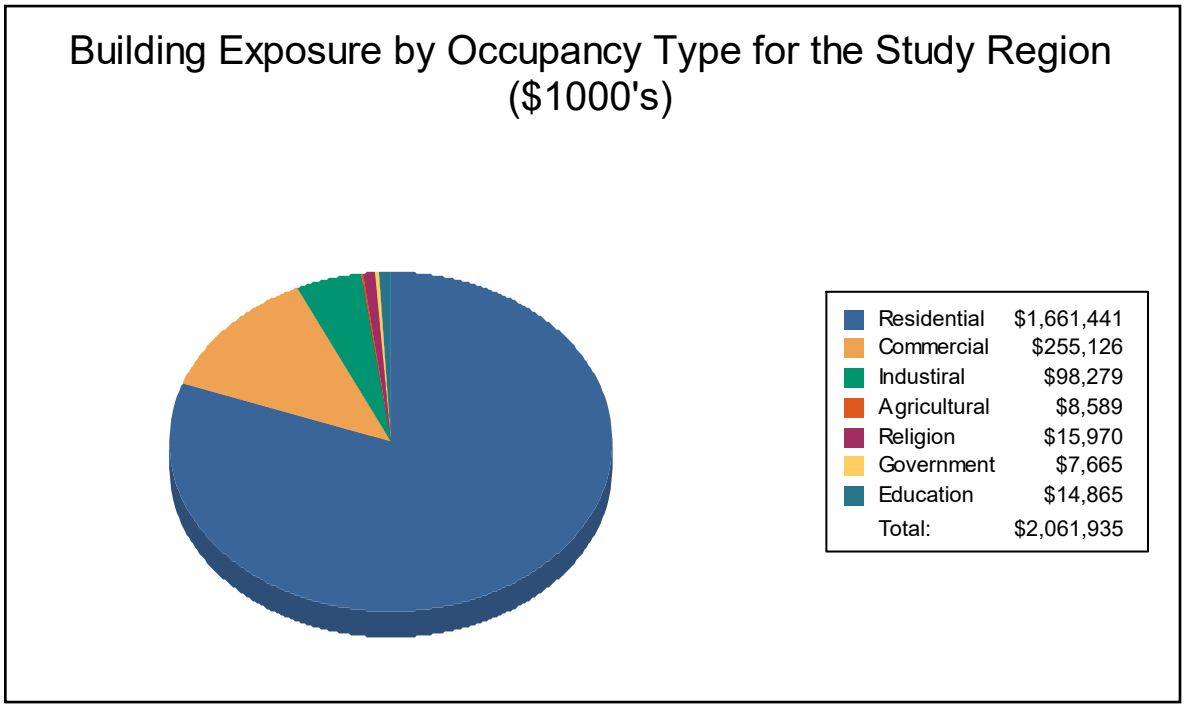
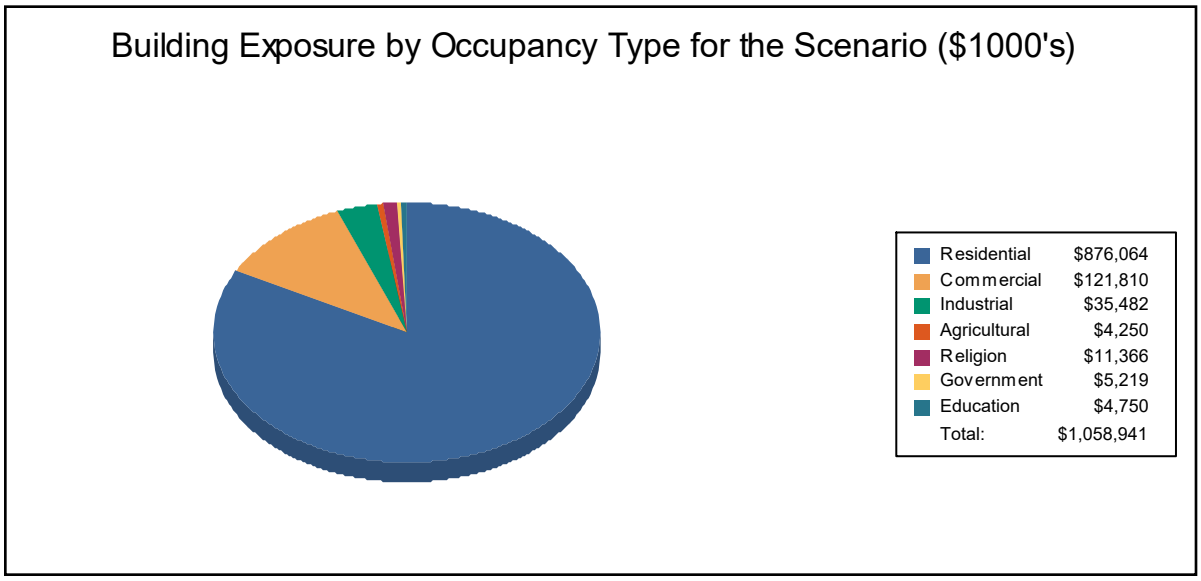


Table 2
Building Exposure by Occupancy Type for the Scenario

Occupancy	Exposure ($1000)	Percent of Total
Residential	876,064	82.7%
Commercial	121,810	11.5%
Industrial	35,482	3.4%
Agricultural	4,250	0.4%
Religion	11,366	1.1%
Government	5,219	0.5%
Education	4,750	0.4%
Total	**1,058,941**	**100%**



Essential Facility Inventory

For essential facilities, there are no hospitals in the region with a total bed capacity of no beds.
There are 5 schools, 2 fire stations, 1 police station and 1 emergency operation center.

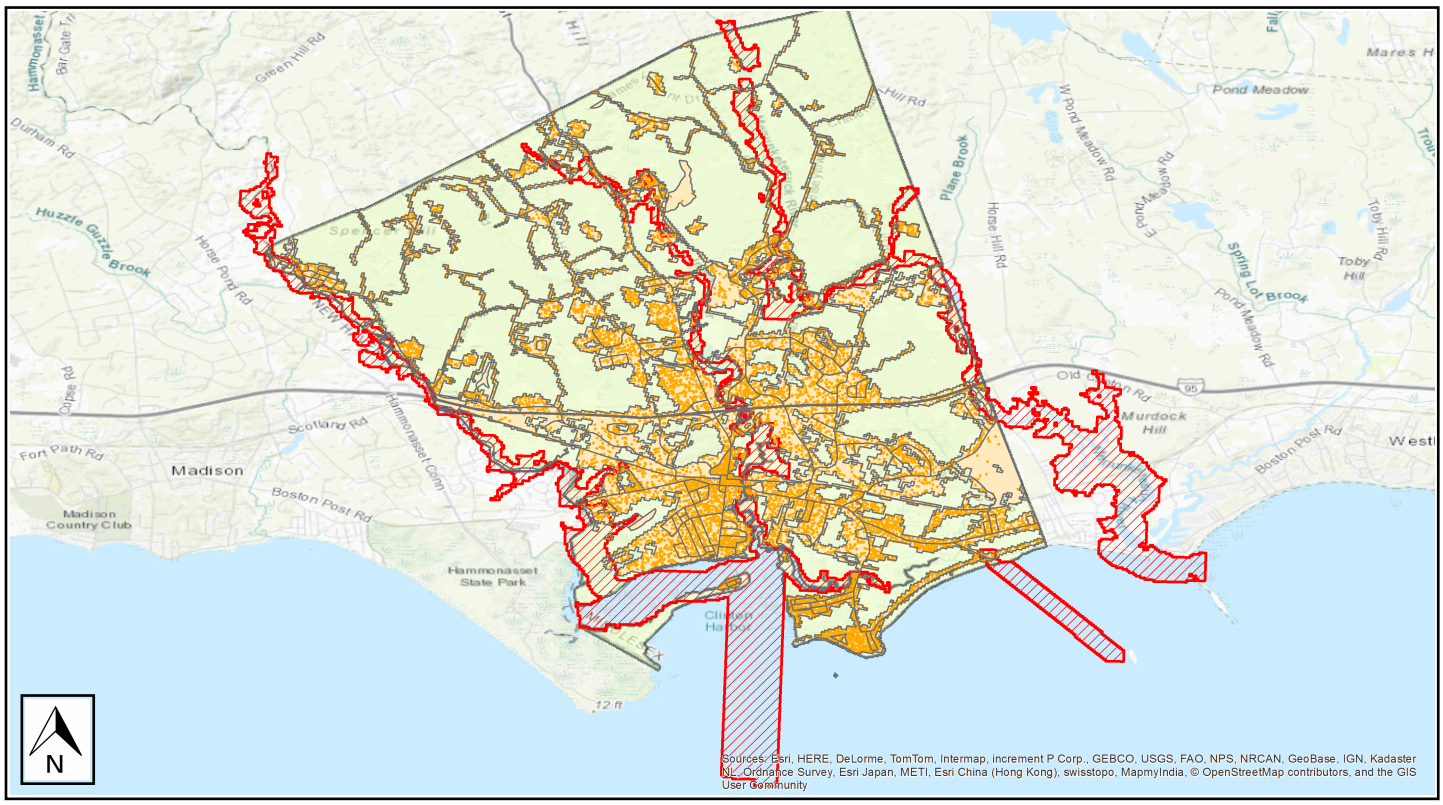
Flood Scenario Parameters

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

Study Region Name:	Clinton
Scenario Name:	ClintonAllRiverine
Return Period Analyzed:	50
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 22 buildings will be at least moderately damaged. This is over 64% of the total number of buildings in the scenario. There are an estimated 0 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

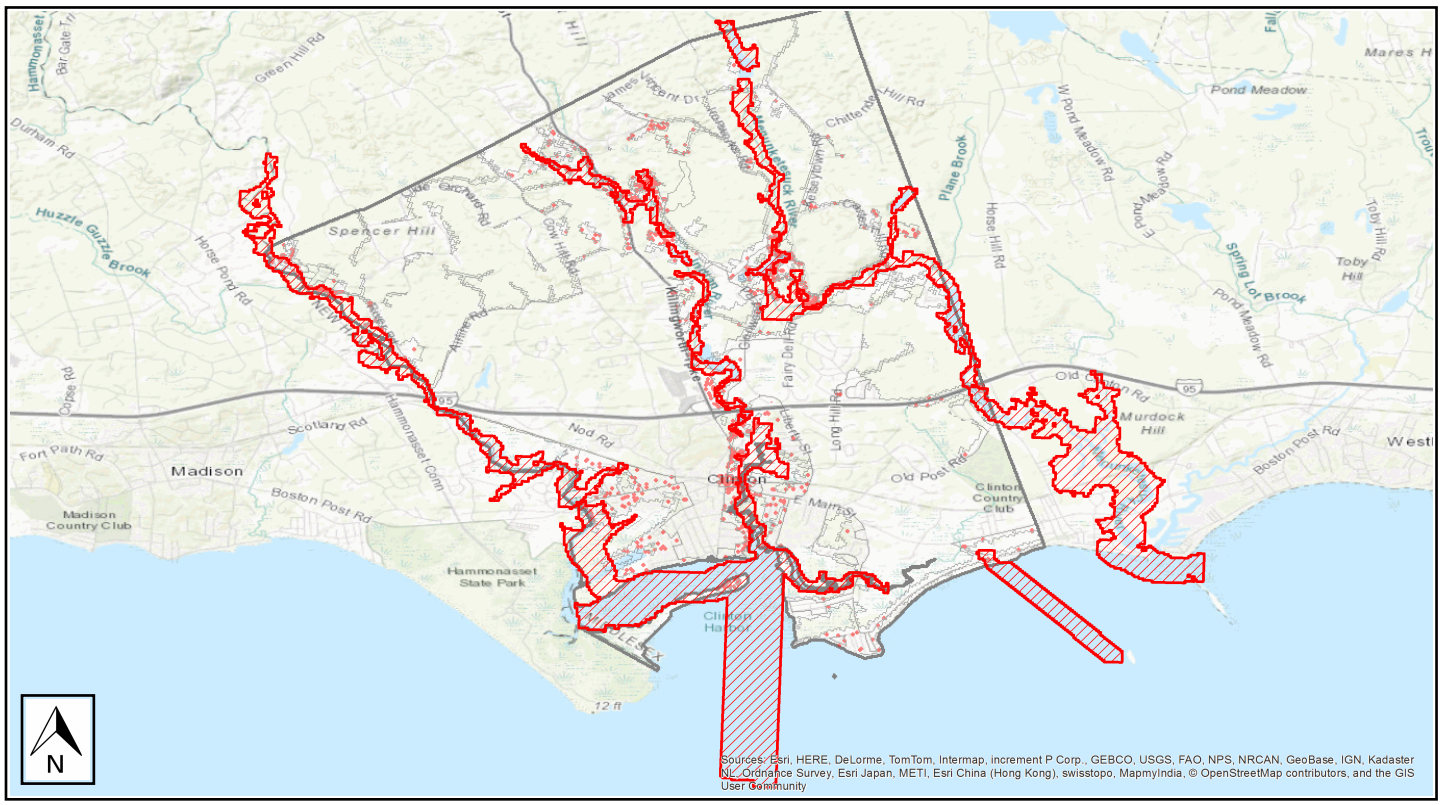


Table 3: Expected Building Damage by Occupancy

	1-10		11-20		21-30		31-40		41-50		>50	
Occupancy	**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	46	68	22	32	0	0	0	0	0	0	0	0
Total	**46**		**22**		**0**		**0**		**0**		**0**	

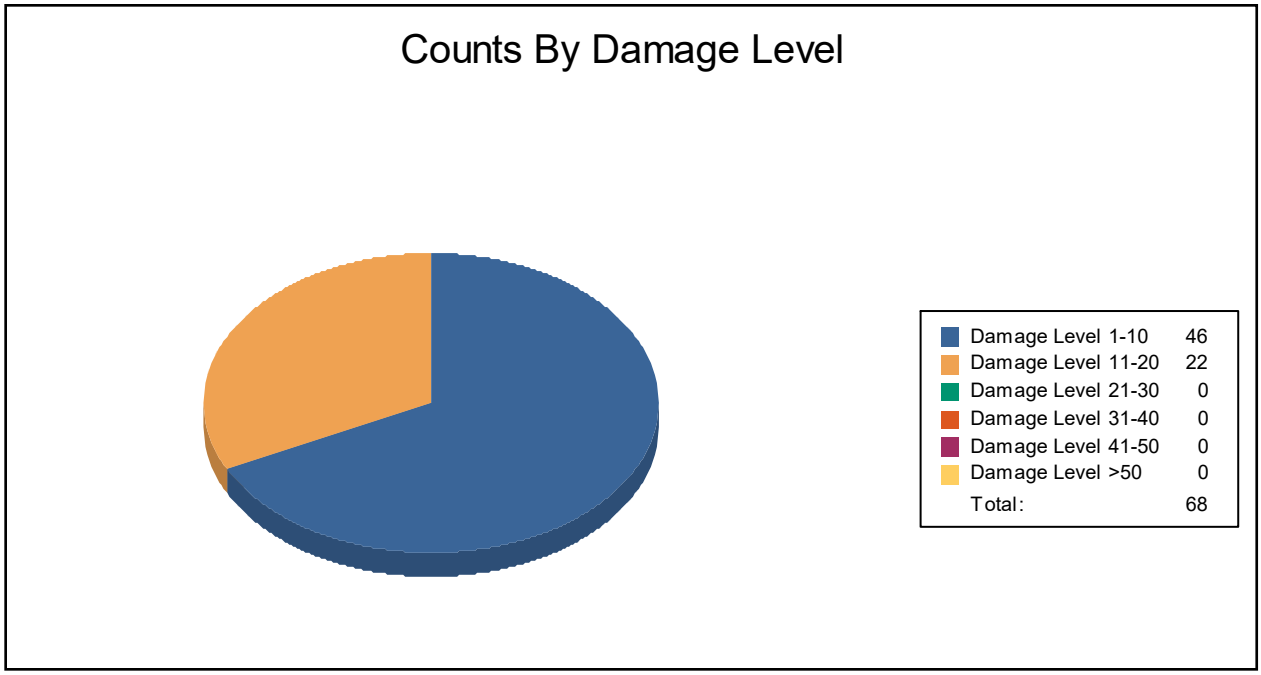


Table 4: Expected Building Damage by Building Type

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	0	0
Masonry	0	0	0	0	0	0	0	0	0	0	0	0
Steel	0	0	0	0	0	0	0	0	0	0	0	0
Wood	46	68	22	32	0	0	0	0	0	0	0	0

Essential Facility Damage

Before the flood analyzed in this scenario, the region had 0 hospital beds available for use. On the day of the scenario flood event, the model estimates that 0 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
Emergency Operation Centers	1	0	0	0
Fire Stations	2	0	0	0
Hospitals	0	0	0	0
Police Stations	1	0	0	0
Schools	5	0	0	0

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

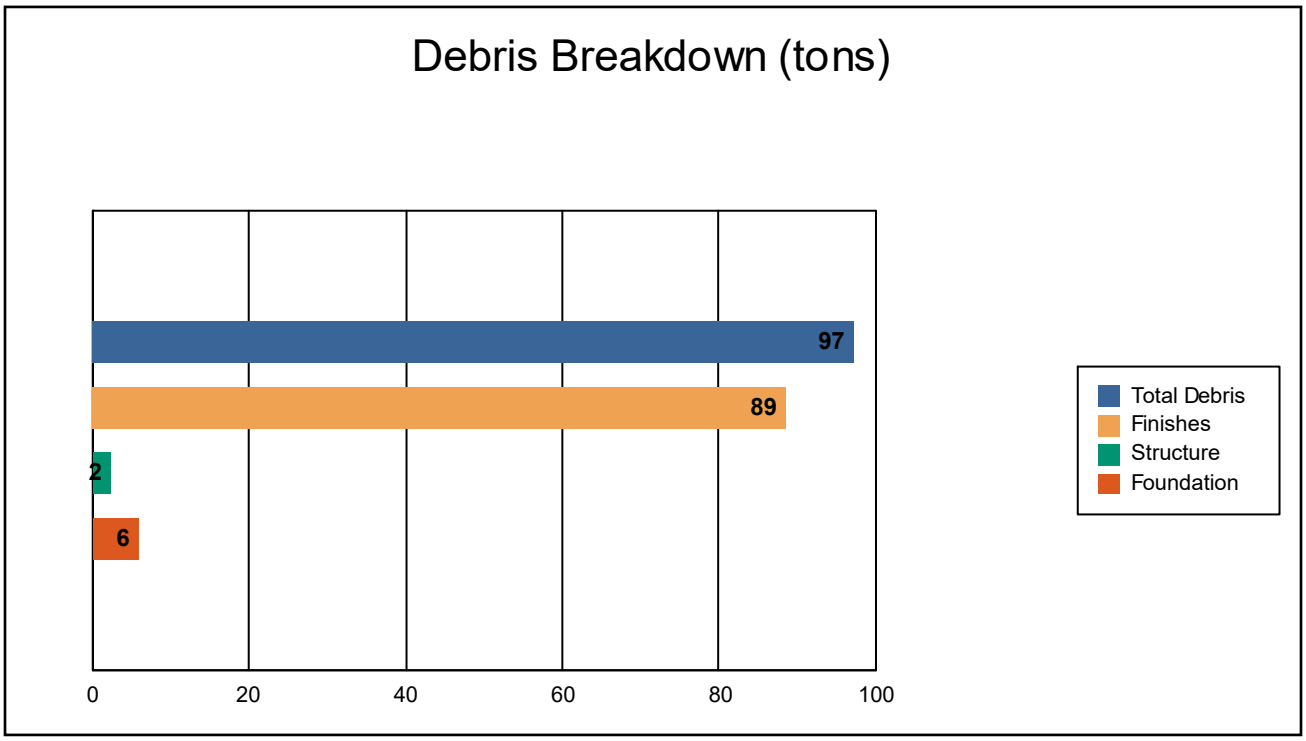
(1) None of your facilities were flooded. This can be checked by mapping the inventory data on the depth grid.

(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.

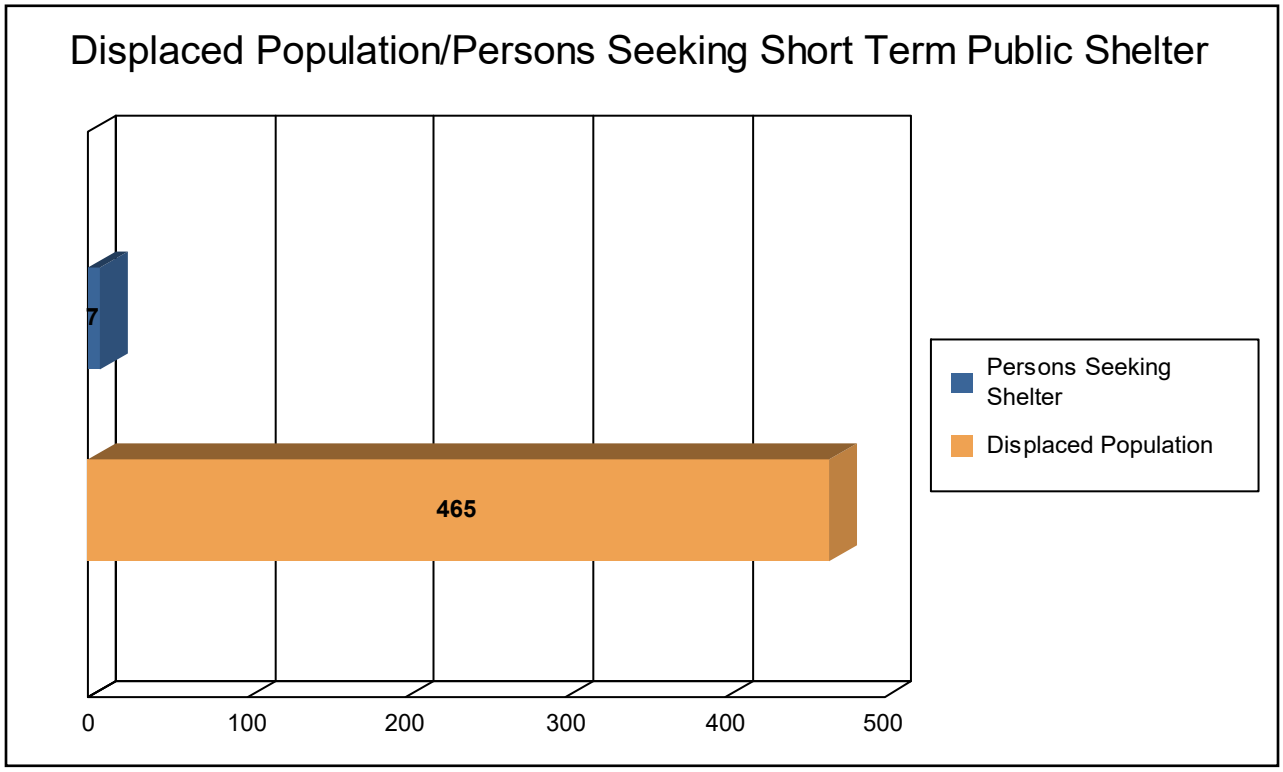


The model estimates that a total of 97 tons of debris will be generated. Of the total amount, Finishes comprises 91% of the total, Structure comprises 2% of the total, and Foundation comprises 6%. If the debris tonnage is converted into an estimated number of truckloads, it will require 4 truckloads (@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 155 households (or 465 of people) will be displaced due to the flood. Displacement includes households evacuated from within or very near to the inundated area. Of these, 7 people (out of a total population of 13,260) will seek temporary shelter in public shelters.



Economic Loss

The total economic loss estimated for the flood is 13.60 million dollars, which represents 1.28 % of the total replacement value of the scenario buildings.

Building-Related Losses

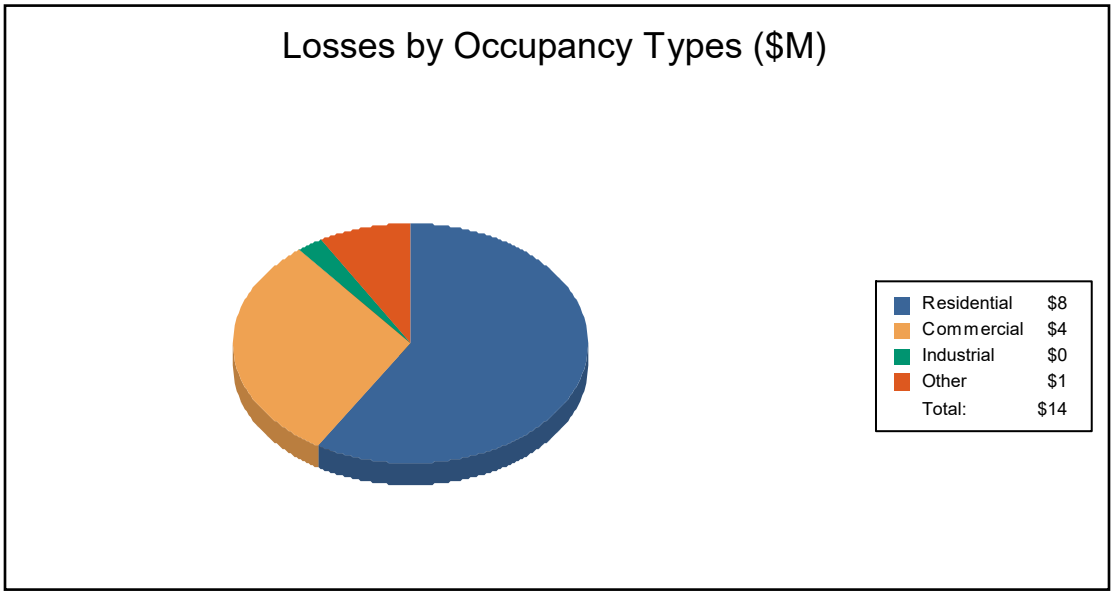
The building losses are broken into two categories: direct building losses and business interruption losses. The direct building losses are the estimated costs to repair or replace the damage caused to the building and its contents. The business interruption losses are the losses associated with inability 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 5.61 million dollars. 59% of the estimated losses were related to the business interruption of the region. The residential occupancies made up 58.58% 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	3.21	0.15	0.11	0.01	3.49
	Content	1.32	0.48	0.19	0.10	2.09
	Inventory	0.00	0.01	0.02	0.00	0.03
	Subtotal	**4.54**	**0.64**	**0.32**	**0.12**	**5.61**
Business Interruption						
	Income	0.02	1.58	0.01	0.12	1.72
	Relocation	2.56	0.29	0.01	0.05	2.90
	Rental Income	0.82	0.22	0.00	0.00	1.04
	Wage	0.04	1.44	0.02	0.84	2.33
	Subtotal	**3.43**	**3.52**	**0.03**	**1.00**	**7.99**
ALL	**Total**	**7.97**	**4.16**	**0.35**	**1.12**	**13.60**



Appendix A: County Listing for the Region

Connecticut

- Middlesex

Appendix B: Regional Population and Building Value Data

	Population	Building Value (thousands of dollars)		
		Residential	Non-Residential	Total
Connecticut				
Middlesex	13,260	1,661,441	400,494	2,061,935
Total	**13,260**	**1,661,441**	**400,494**	**2,061,935**
Total Study Region	**13,260**	**1,661,441**	**400,494**	**2,061,935**

Hazus: Flood Global Risk Report

Region Name: Clinton

Flood Scenario: ClintonAll

Print Date: Monday, January 6, 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.

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Note:
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Building Inventory

General Building Stock

Hazus estimates that there are 5,844 buildings in the region which have an aggregate total replacement value of 2,062 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.

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Industrial	98,279	4.8%
Agricultural	8,589	0.4%
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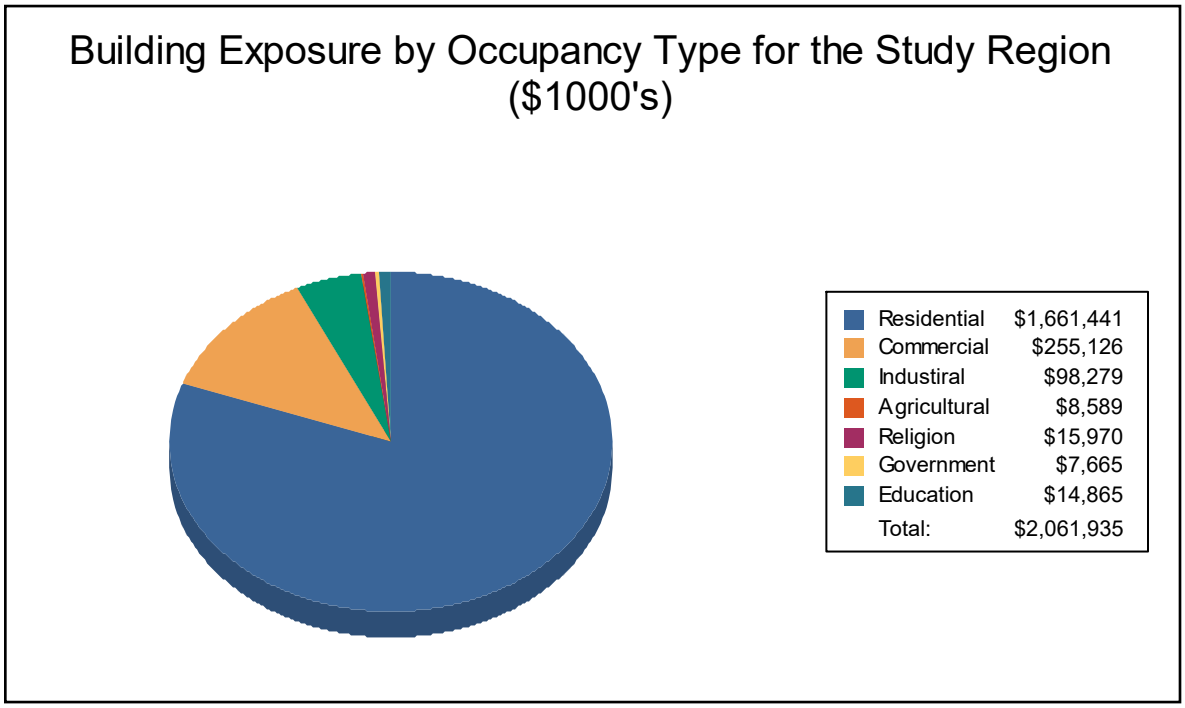
Education	14,865	0.7%
Total	**2,061,935**	**100%**



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Building Exposure by Occupancy Type for the Scenario

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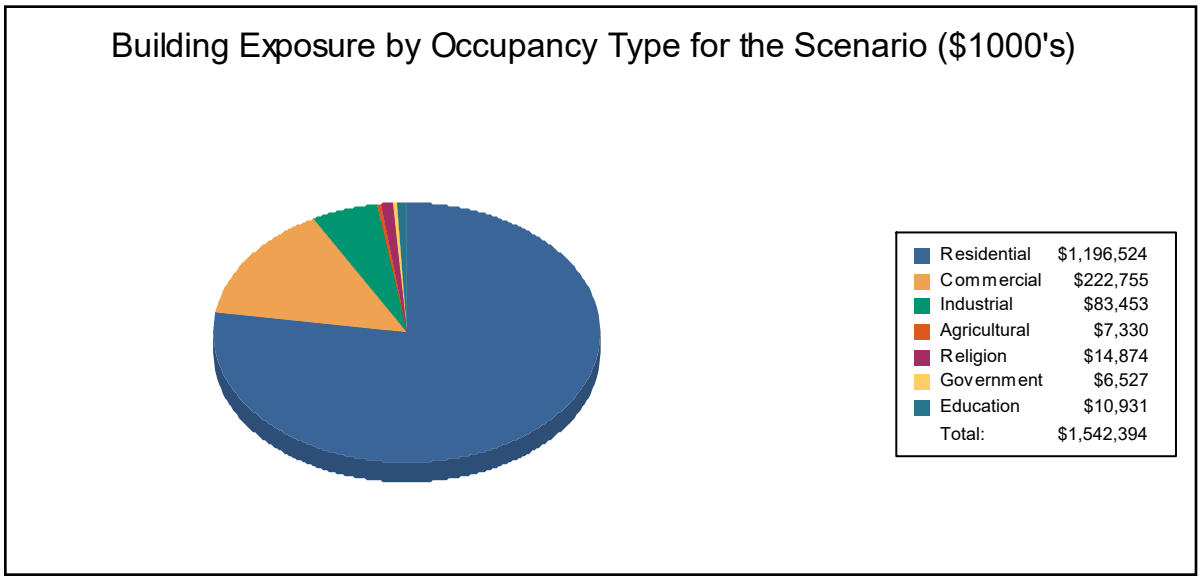
Education	10,931	0.7%
Total	**1,542,394**	**100%**



Essential Facility Inventory

For essential facilities, there are no hospitals in the region with a total bed capacity of no beds.
There are 5 schools, 2 fire stations, 1 police station and 1 emergency operation center.

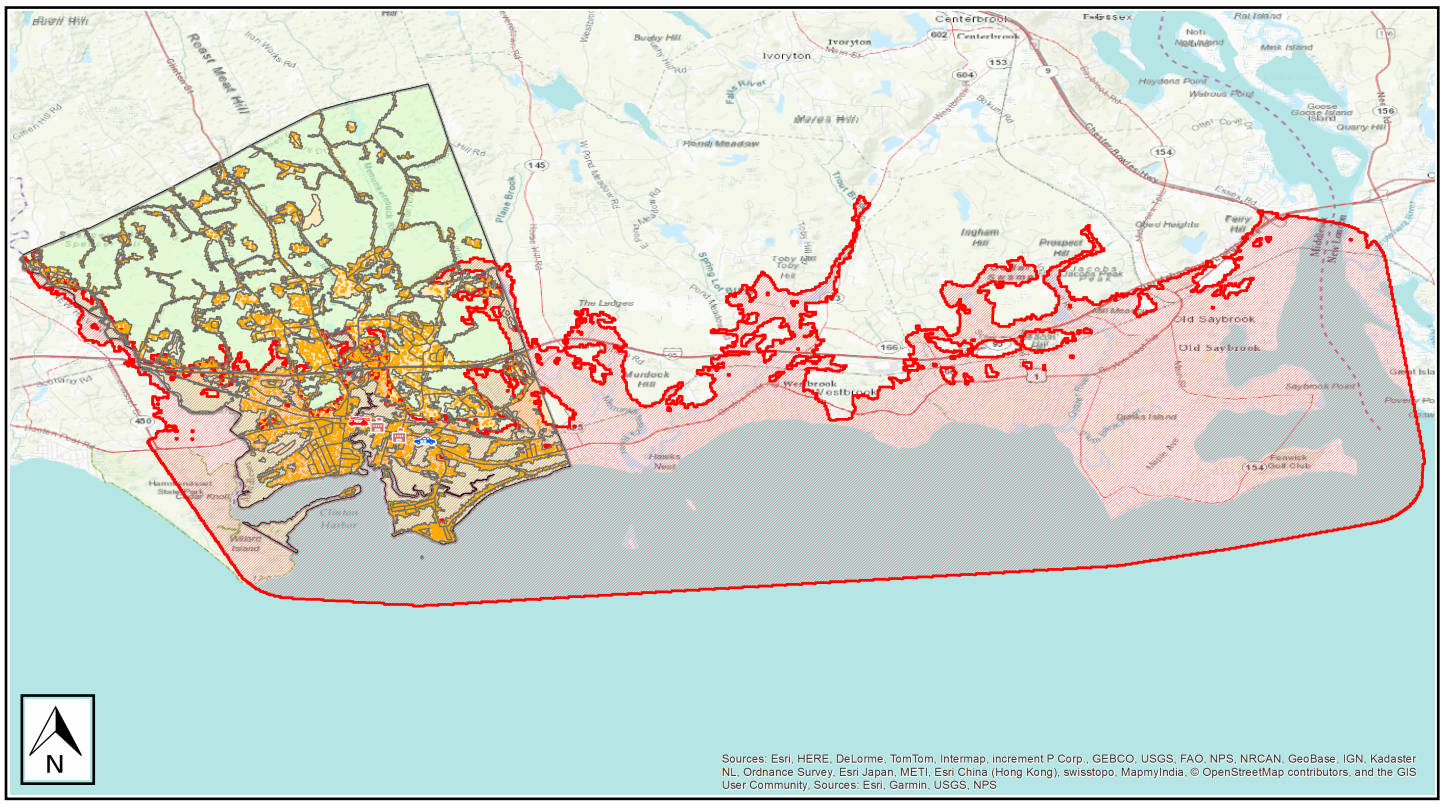
Flood Scenario Parameters

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

Study Region Name:	Clinton
Scenario Name:	ClintonAll
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 779 buildings will be at least moderately damaged. This is over 57% of the total number of buildings in the scenario. There are an estimated 63 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

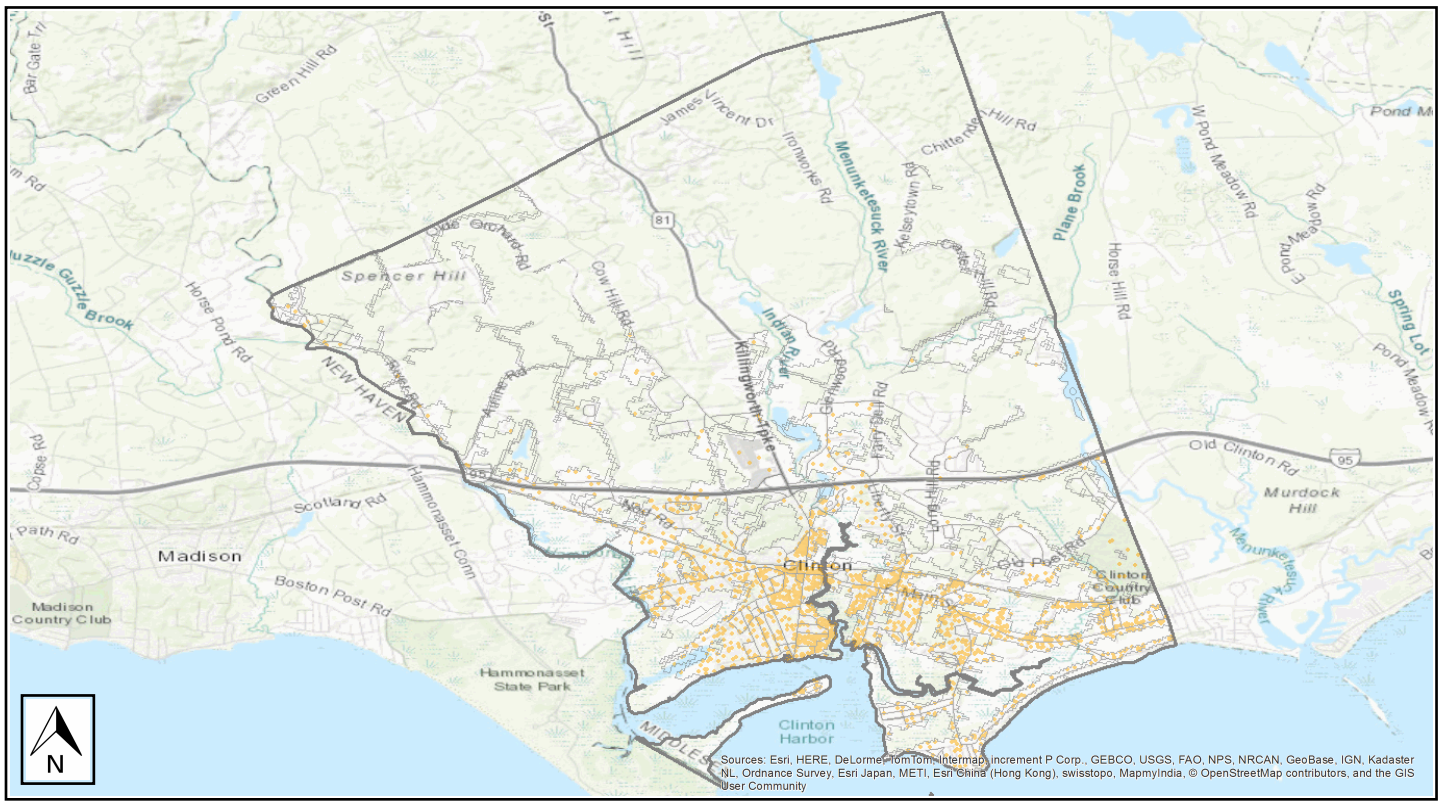


Table 3: Expected Building Damage by Occupancy

	1-10		11-20		21-30		31-40		41-50		>50	
Occupancy	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**
Agriculture	0	0	0	0	0	0	0	0	0	0	0	0
Commercial	0	0	3	100	0	0	0	0	0	0	0	0
Education	0	0	0	0	0	0	0	0	0	0	0	0
Government	0	0	1	100	0	0	0	0	0	0	0	0
Industrial	0	0	1	100	0	0	0	0	0	0	0	0
Religion	0	0	0	0	0	0	0	0	0	0	0	0
Residential	95	11	373	43	245	28	91	10	2	0	63	7
Total	**95**		**378**		**245**		**91**		**2**		**63**	

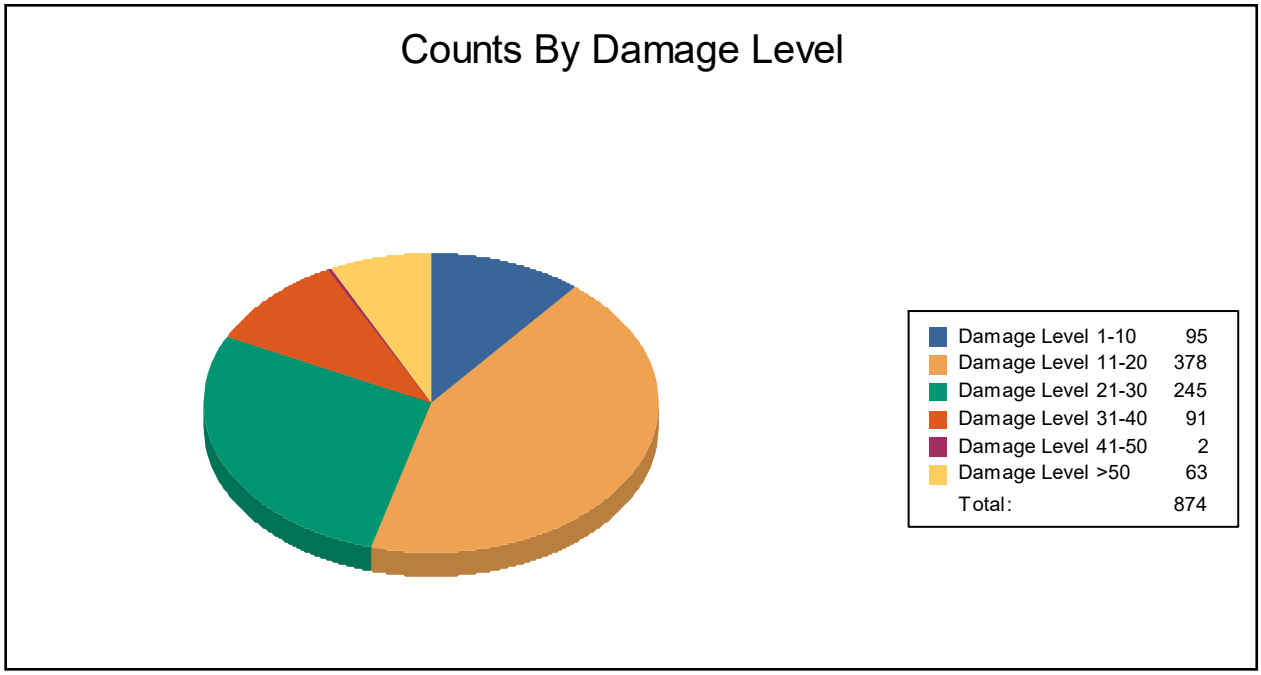


Table 4: Expected Building Damage by Building Type

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	2	10	0	0	4	19	0	0	0	0	15	71
Masonry	2	13	9	60	3	20	1	7	0	0	0	0
Steel	0	0	4	100	0	0	0	0	0	0	0	0
Wood	91	11	366	44	238	29	90	11	2	0	48	6

Essential Facility Damage

Before the flood analyzed in this scenario, the region had 0 hospital beds available for use. On the day of the scenario flood event, the model estimates that 0 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
Emergency Operation Centers	1	1	0	1
Fire Stations	2	1	0	1
Hospitals	0	0	0	0
Police Stations	1	1	0	1
Schools	5	2	0	2

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

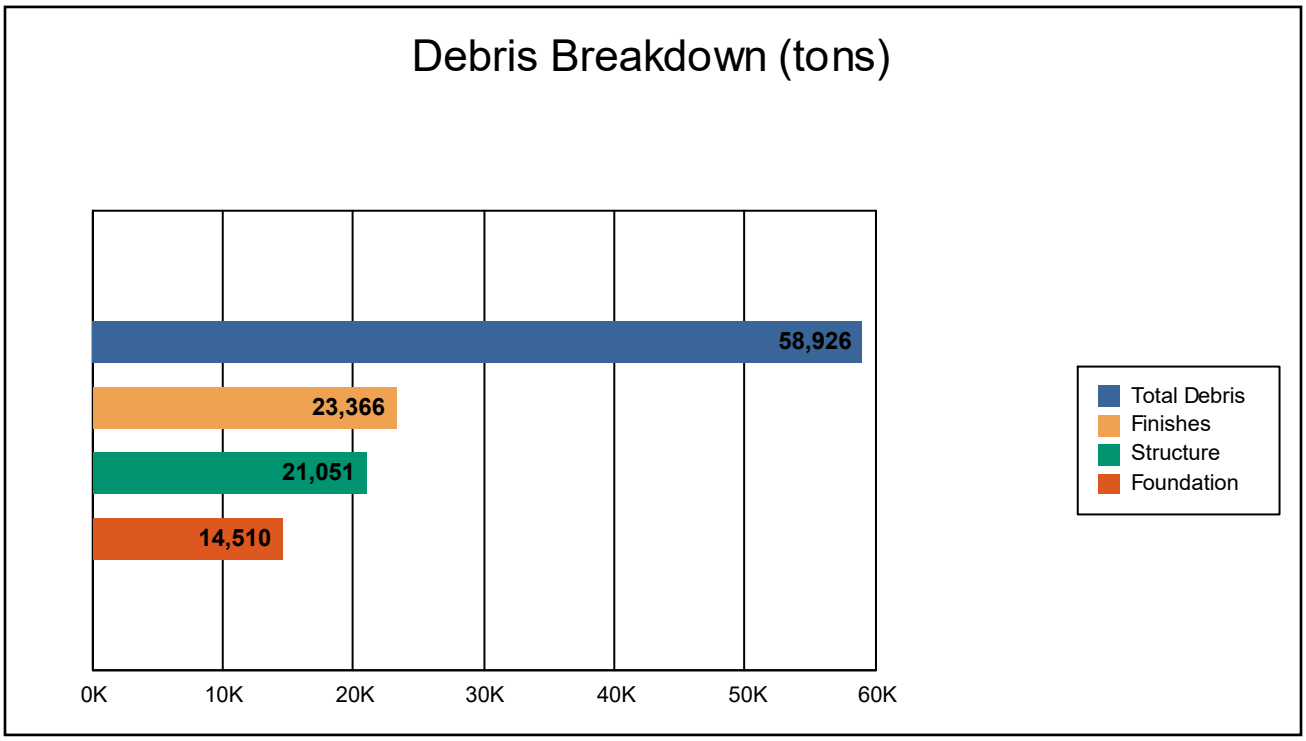
(1) None of your facilities were flooded. This can be checked by mapping the inventory data on the depth grid.

(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.

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.

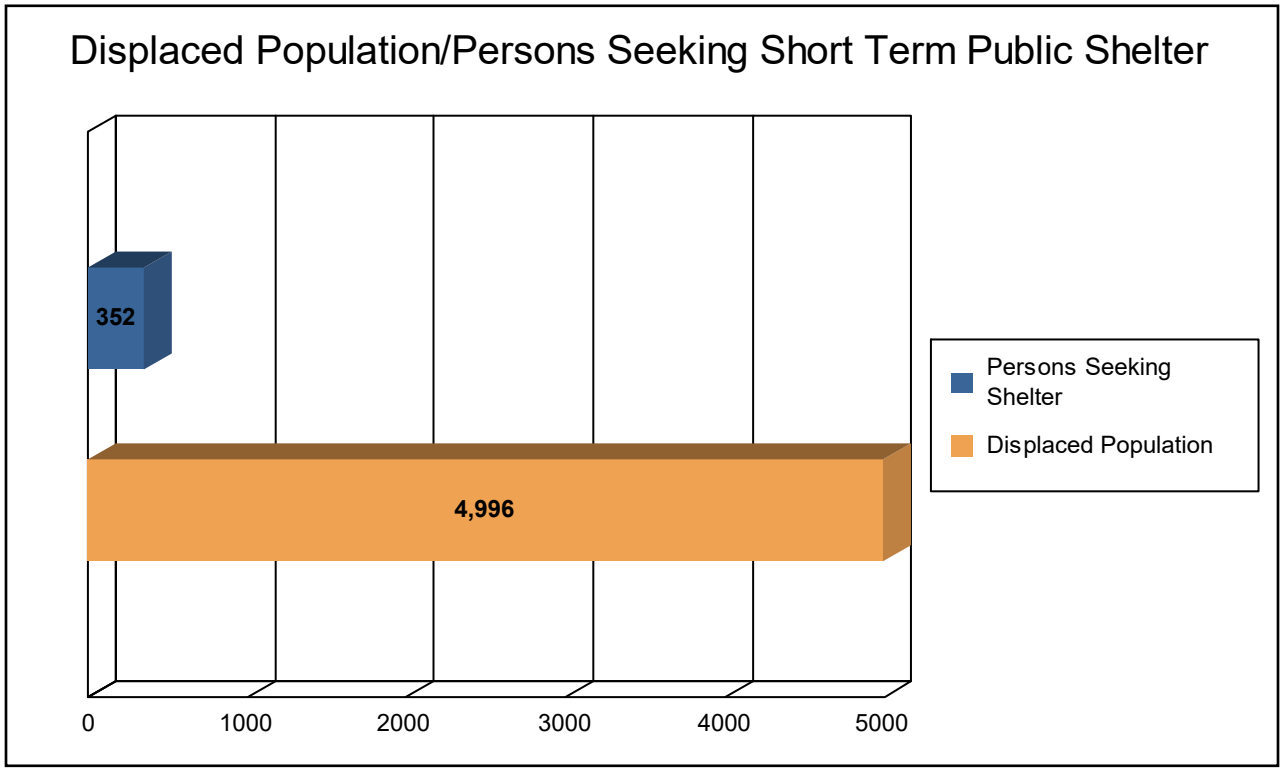


The model estimates that a total of 58,926 tons of debris will be generated. Of the total amount, Finishes comprises 40% of the total, Structure comprises 36% of the total, and Foundation comprises 25%. If the debris tonnage is converted into an estimated number of truckloads, it will require 2358 truckloads (@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 1,665 households (or 4,996 of people) will be displaced due to the flood. Displacement includes households evacuated from within or very near to the inundated area. Of these, 352 people (out of a total population of 13,260) will seek temporary shelter in public shelters.



Economic Loss

The total economic loss estimated for the flood is 575.88 million dollars, which represents 37.34 % of the total replacement value of the scenario buildings.

Building-Related Losses

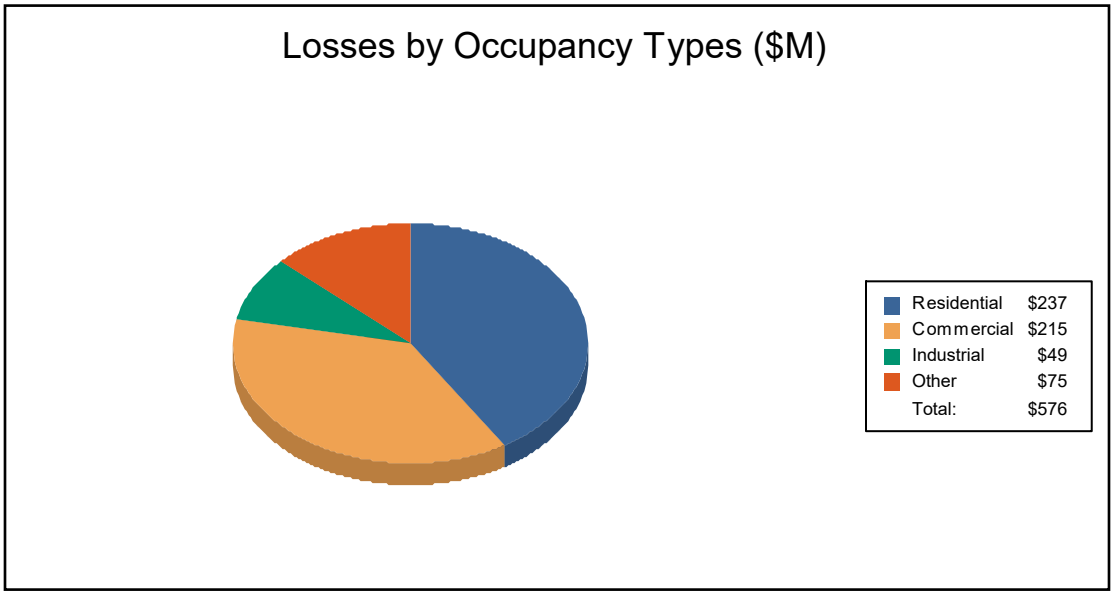
The building losses are broken into two categories: direct building losses and business interruption losses. The direct building losses are the estimated costs to repair or replace the damage caused to the building and its contents. The business interruption losses are the losses associated with inability 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 350.32 million dollars. 39% of the estimated losses were related to the business interruption of the region. The residential occupancies made up 41.14% 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	107.66	21.82	11.84	2.61	143.93
	Content	87.86	67.96	29.23	15.42	200.47
	Inventory	0.00	1.43	4.26	0.24	5.93
	Subtotal	**195.51**	**91.21**	**45.33**	**18.27**	**350.32**
Business Interruption						
	Income	0.60	46.71	0.92	3.71	51.94
	Relocation	27.95	14.55	1.08	2.34	45.92
	Rental Income	11.42	10.69	0.22	0.35	22.68
	Wage	1.42	51.57	1.61	50.41	105.01
	Subtotal	**41.40**	**123.52**	**3.83**	**56.81**	**225.56**
ALL	**Total**	**236.91**	**214.73**	**49.16**	**75.09**	**575.88**



Appendix A: County Listing for the Region

Connecticut

- Middlesex

Appendix B: Regional Population and Building Value Data

	Population	Building Value (thousands of dollars)		
		Residential	Non-Residential	Total
Connecticut				
Middlesex	13,260	1,661,441	400,494	2,061,935
Total	**13,260**	**1,661,441**	**400,494**	**2,061,935**
Total Study Region	**13,260**	**1,661,441**	**400,494**	**2,061,935**

Hazus: Flood Global Risk Report

Region Name: Clinton

Flood Scenario: ClintonAllRiverine

Print Date: Wednesday, January 8, 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):

- Connecticut

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

The geographical size of the region is approximately 16 square miles and contains 272 census blocks. The region contains over 5 thousand households and has a total population of 13,260 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 5,844 buildings in the region with a total building replacement value (excluding contents) of 2,062 million dollars. Approximately 91.43% of the buildings (and 80.58% of the building value) are associated with residential housing.

Building Inventory

General Building Stock

Hazus estimates that there are 5,844 buildings in the region which have an aggregate total replacement value of 2,062 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	1,661,441	80.6%
Commercial	255,126	12.4%
Industrial	98,279	4.8%
Agricultural	8,589	0.4%
Religion	15,970	0.8%
Government	7,665	0.4%
Education	14,865	0.7%
Total	**2,061,935**	**100%**

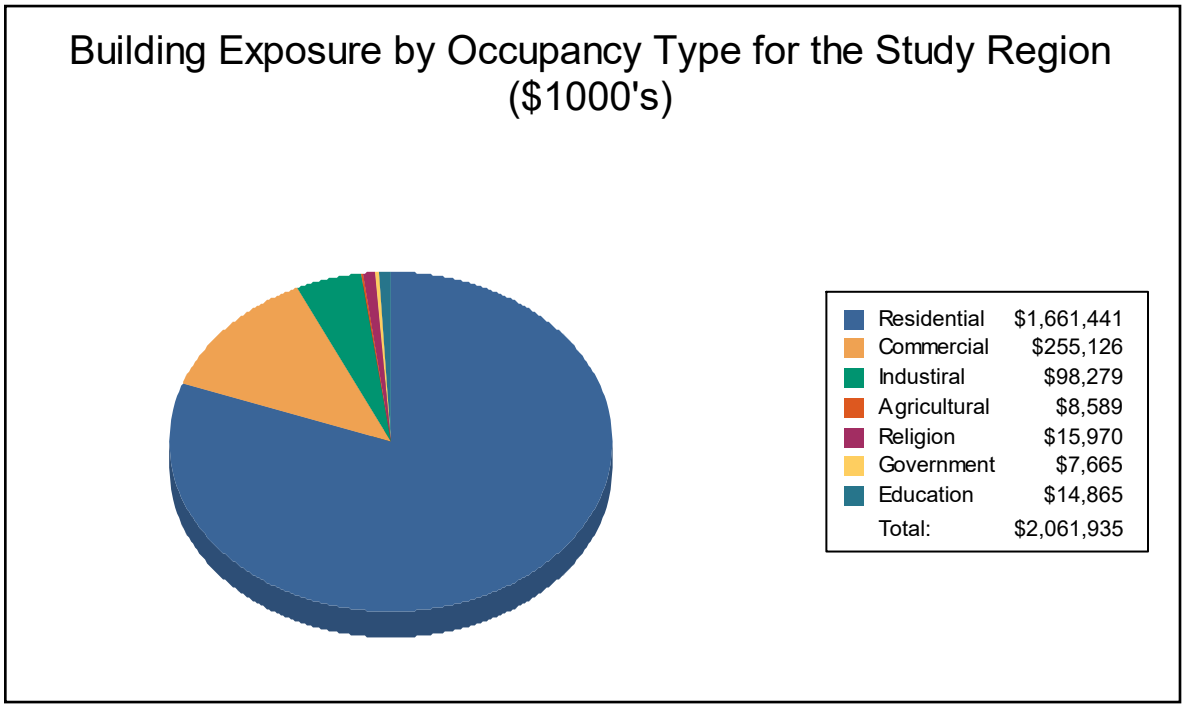
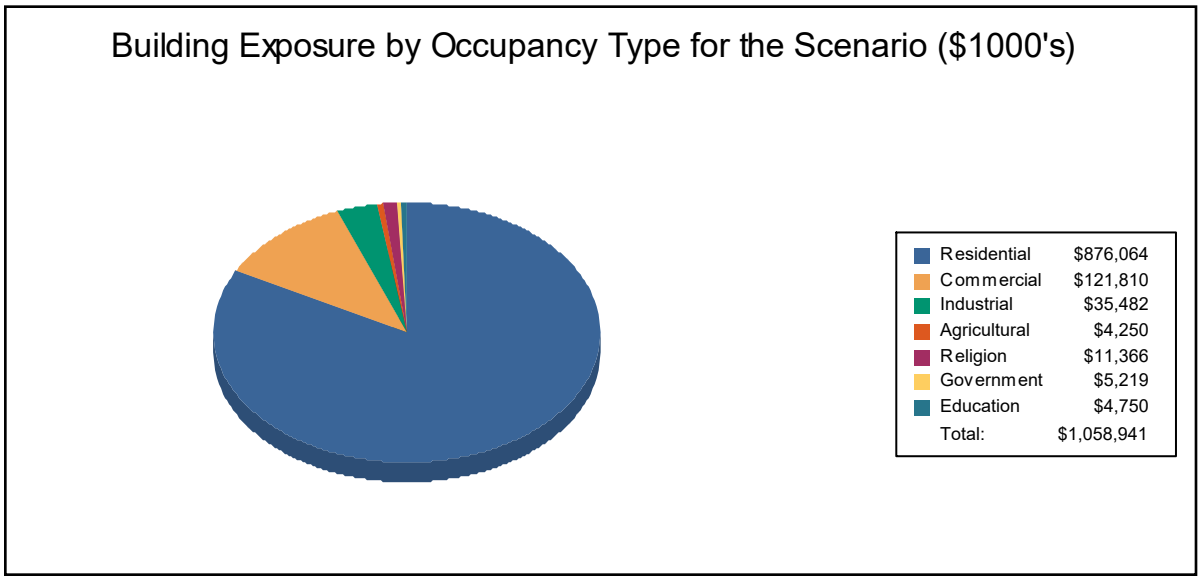


Table 2
Building Exposure by Occupancy Type for the Scenario

Occupancy	Exposure ($1000)	Percent of Total
Residential	876,064	82.7%
Commercial	121,810	11.5%
Industrial	35,482	3.4%
Agricultural	4,250	0.4%
Religion	11,366	1.1%
Government	5,219	0.5%
Education	4,750	0.4%
Total	**1,058,941**	**100%**



Essential Facility Inventory

For essential facilities, there are no hospitals in the region with a total bed capacity of no beds.
There are 5 schools, 2 fire stations, 1 police station and 1 emergency operation center.

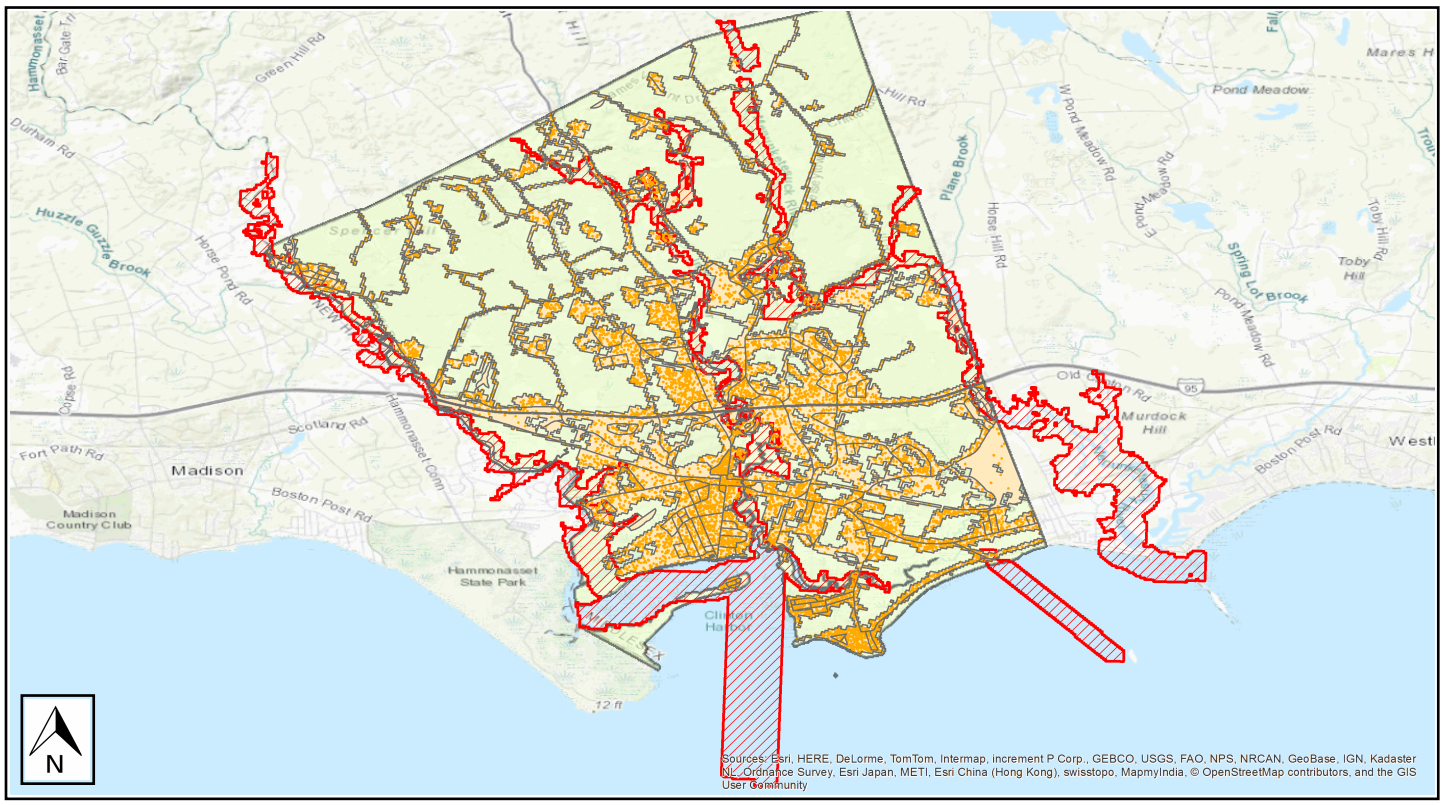
Flood Scenario Parameters

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

Study Region Name:	Clinton
Scenario Name:	ClintonAllRiverine
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 29 buildings will be at least moderately damaged. This is over 67% of the total number of buildings in the scenario. There are an estimated 0 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

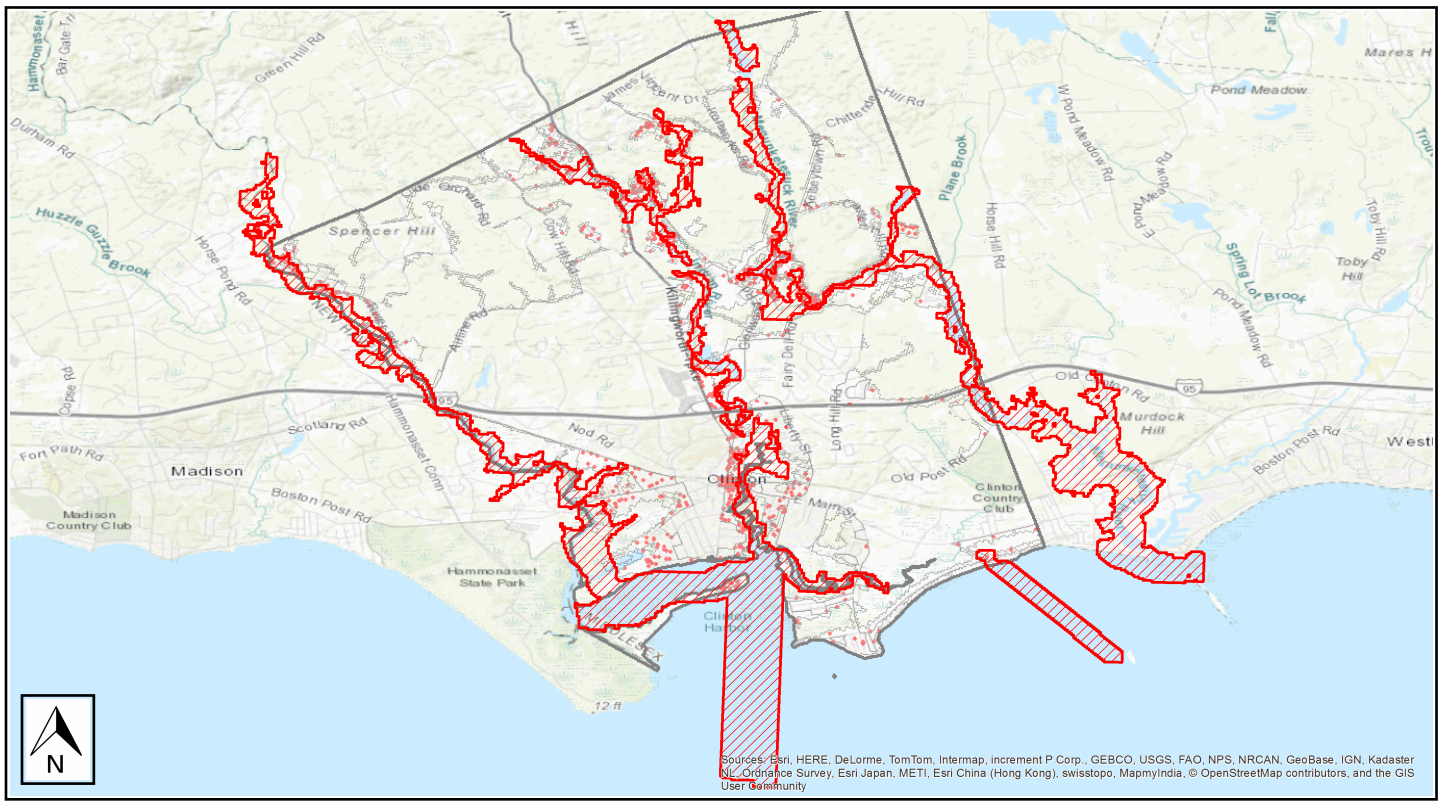


Table 3: Expected Building Damage by Occupancy

	1-10		11-20		21-30		31-40		41-50		>50	
Occupancy	**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	54	65	29	35	0	0	0	0	0	0	0	0
Total	**54**		**29**		**0**		**0**		**0**		**0**	

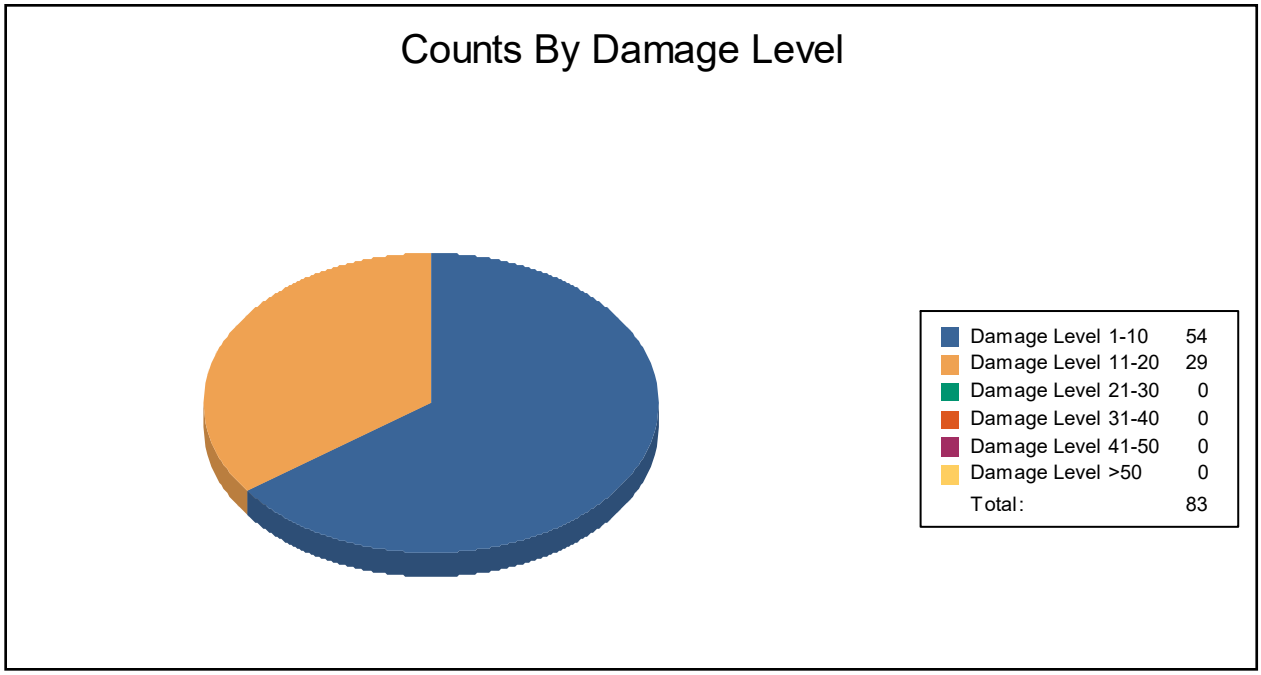


Table 4: Expected Building Damage by Building Type

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	0	0
Masonry	0	0	0	0	0	0	0	0	0	0	0	0
Steel	0	0	0	0	0	0	0	0	0	0	0	0
Wood	54	65	29	35	0	0	0	0	0	0	0	0

Essential Facility Damage

Before the flood analyzed in this scenario, the region had 0 hospital beds available for use. On the day of the scenario flood event, the model estimates that 0 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
Emergency Operation Centers	1	0	0	0
Fire Stations	2	0	0	0
Hospitals	0	0	0	0
Police Stations	1	0	0	0
Schools	5	0	0	0

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

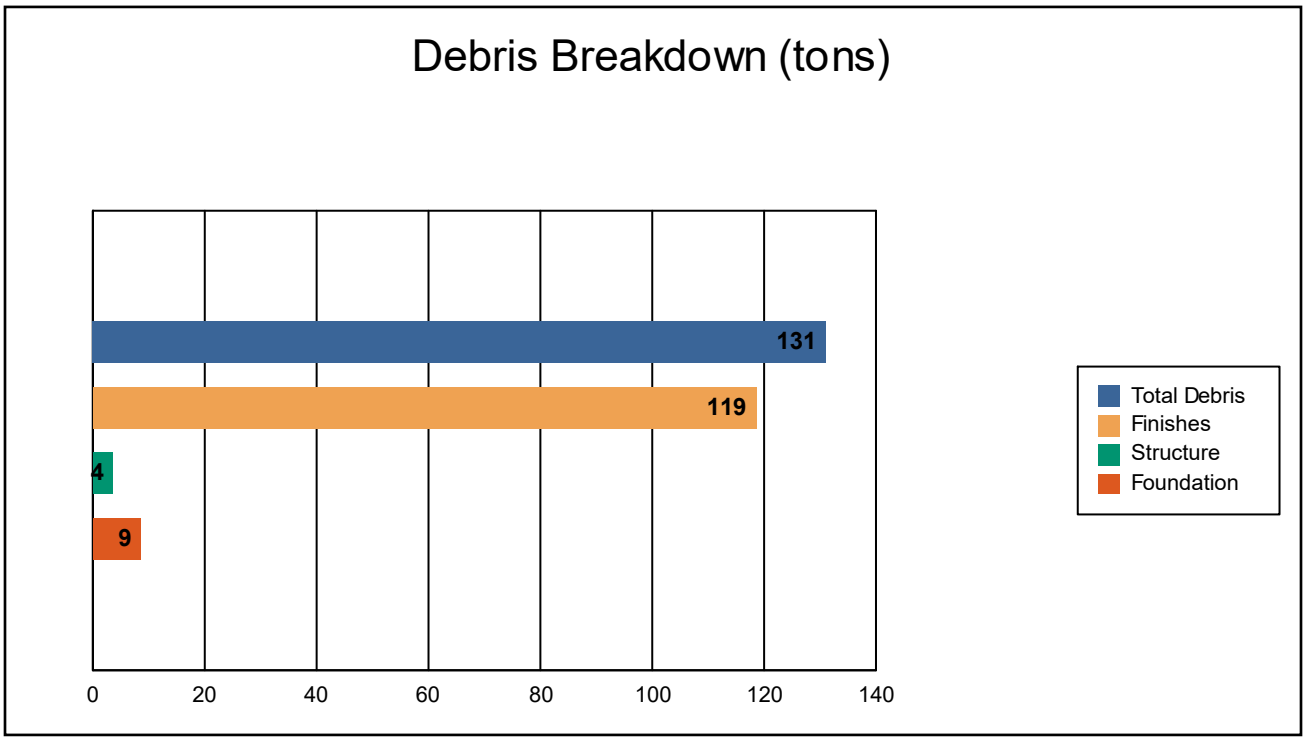
(1) None of your facilities were flooded. This can be checked by mapping the inventory data on the depth grid.

(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.

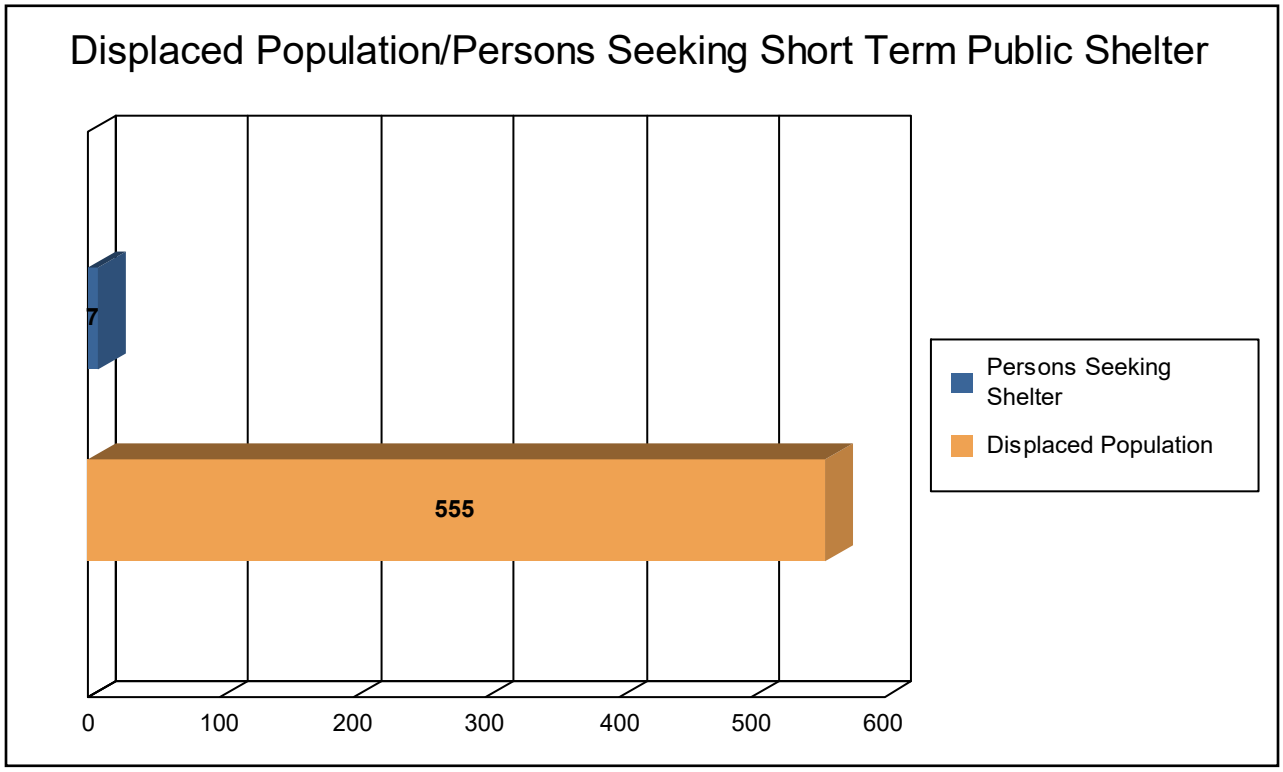


The model estimates that a total of 131 tons of debris will be generated. Of the total amount, Finishes comprises 91% of the total, Structure comprises 3% of the total, and Foundation comprises 7%. If the debris tonnage is converted into an estimated number of truckloads, it will require 6 truckloads (@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 185 households (or 555 of people) will be displaced due to the flood. Displacement includes households evacuated from within or very near to the inundated area. Of these, 7 people (out of a total population of 13,260) will seek temporary shelter in public shelters.



Economic Loss

The total economic loss estimated for the flood is 16.57 million dollars, which represents 1.57 % of the total replacement value of the scenario buildings.

Building-Related Losses

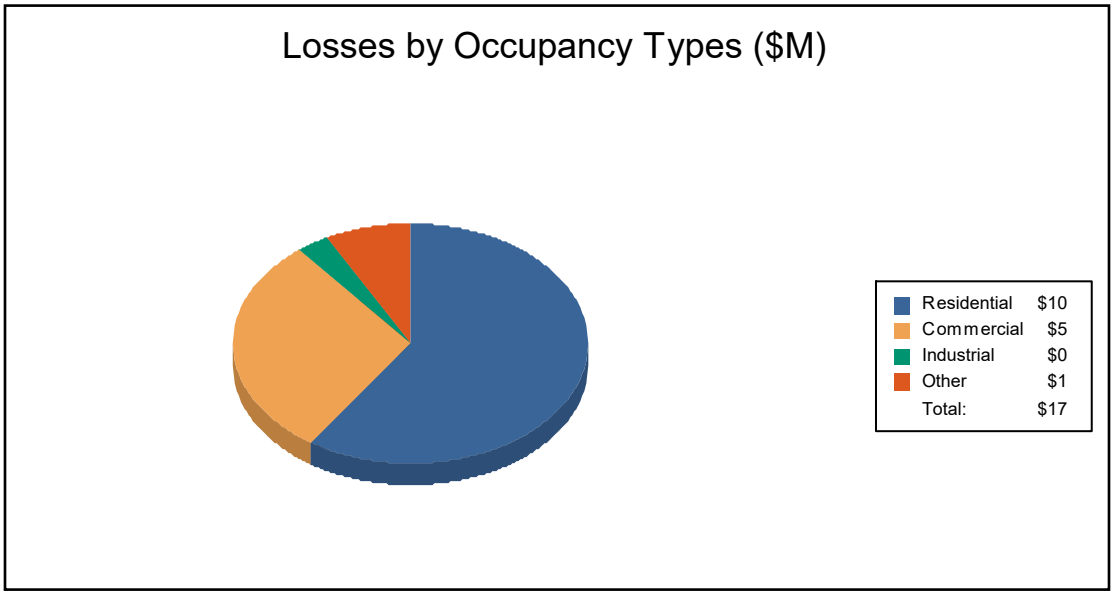
The building losses are broken into two categories: direct building losses and business interruption losses. The direct building losses are the estimated costs to repair or replace the damage caused to the building and its contents. The business interruption losses are the losses associated with inability 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 7.21 million dollars. 56% of the estimated losses were related to the business interruption of the region. The residential occupancies made up 59.55% 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	4.12	0.19	0.15	0.01	4.48
	Content	1.70	0.61	0.26	0.13	2.70
	Inventory	0.00	0.01	0.03	0.00	0.04
	Subtotal	**5.82**	**0.81**	**0.44**	**0.14**	**7.21**
Business Interruption						
	Income	0.03	1.79	0.01	0.14	1.96
	Relocation	3.00	0.37	0.01	0.05	3.43
	Rental Income	0.96	0.27	0.00	0.01	1.23
	Wage	0.06	1.69	0.02	0.97	2.74
	Subtotal	**4.05**	**4.11**	**0.05**	**1.16**	**9.36**
ALL	**Total**	**9.87**	**4.92**	**0.49**	**1.30**	**16.57**



Appendix A: County Listing for the Region

Connecticut

- Middlesex

Appendix B: Regional Population and Building Value Data

	Population	Building Value (thousands of dollars)		
		Residential	Non-Residential	Total
Connecticut				
Middlesex	13,260	1,661,441	400,494	2,061,935
Total	**13,260**	**1,661,441**	**400,494**	**2,061,935**
Total Study Region	**13,260**	**1,661,441**	**400,494**	**2,061,935**

Hazus: Flood Global Risk Report

Region Name: Clinton

Flood Scenario: ClintonAll

Print Date: Monday, January 6, 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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The flood loss estimates provided in this report were based on a region that included 1 county(ies) from the following state(s):

- Connecticut

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

The geographical size of the region is approximately 16 square miles and contains 272 census blocks. The region contains over 5 thousand households and has a total population of 13,260 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 5,844 buildings in the region with a total building replacement value (excluding contents) of 2,062 million dollars. Approximately 91.43% of the buildings (and 80.58% of the building value) are associated with residential housing.

Building Inventory

General Building Stock

Hazus estimates that there are 5,844 buildings in the region which have an aggregate total replacement value of 2,062 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.

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Building Exposure by Occupancy Type for the Study Region

Occupancy	Exposure ($1000)	Percent of Total
Residential	1,661,441	80.6%
Commercial	255,126	12.4%
Industrial	98,279	4.8%
Agricultural	8,589	0.4%
Religion	15,970	0.8%
Government	7,665	0.4%
Education	14,865	0.7%
Total	**2,061,935**	**100%**

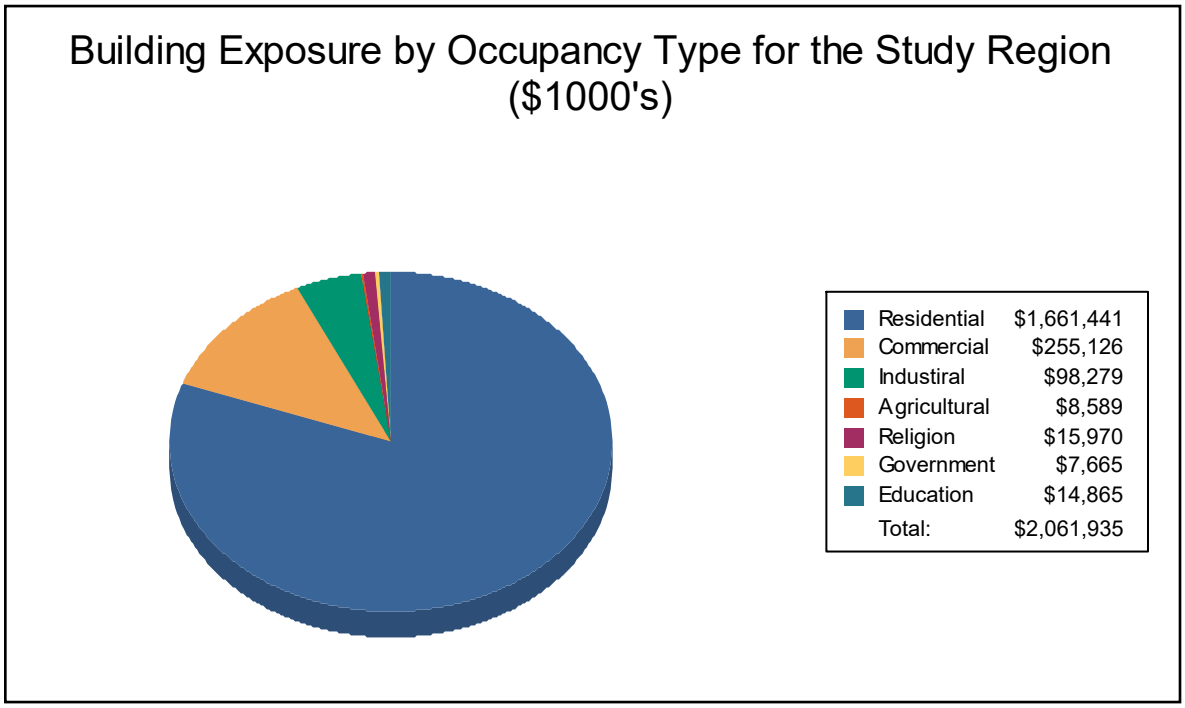
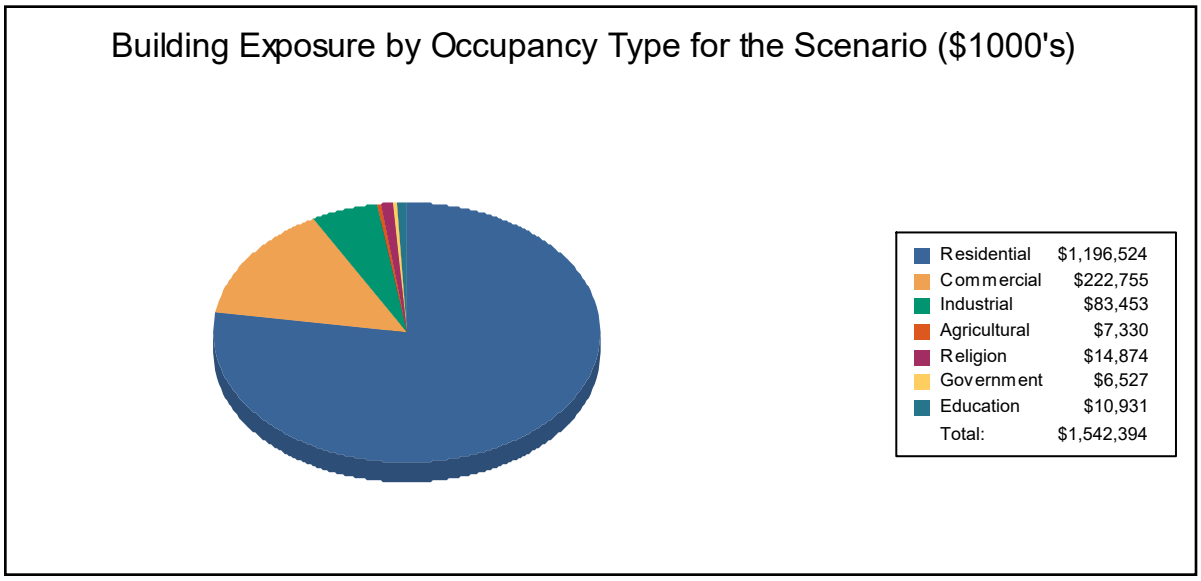


Table 2
Building Exposure by Occupancy Type for the Scenario

Occupancy	Exposure ($1000)	Percent of Total
Residential	1,196,524	77.6%
Commercial	222,755	14.4%
Industrial	83,453	5.4%
Agricultural	7,330	0.5%
Religion	14,874	1.0%
Government	6,527	0.4%
Education	10,931	0.7%
Total	**1,542,394**	**100%**



Essential Facility Inventory

For essential facilities, there are no hospitals in the region with a total bed capacity of no beds.
There are 5 schools, 2 fire stations, 1 police station and 1 emergency operation center.

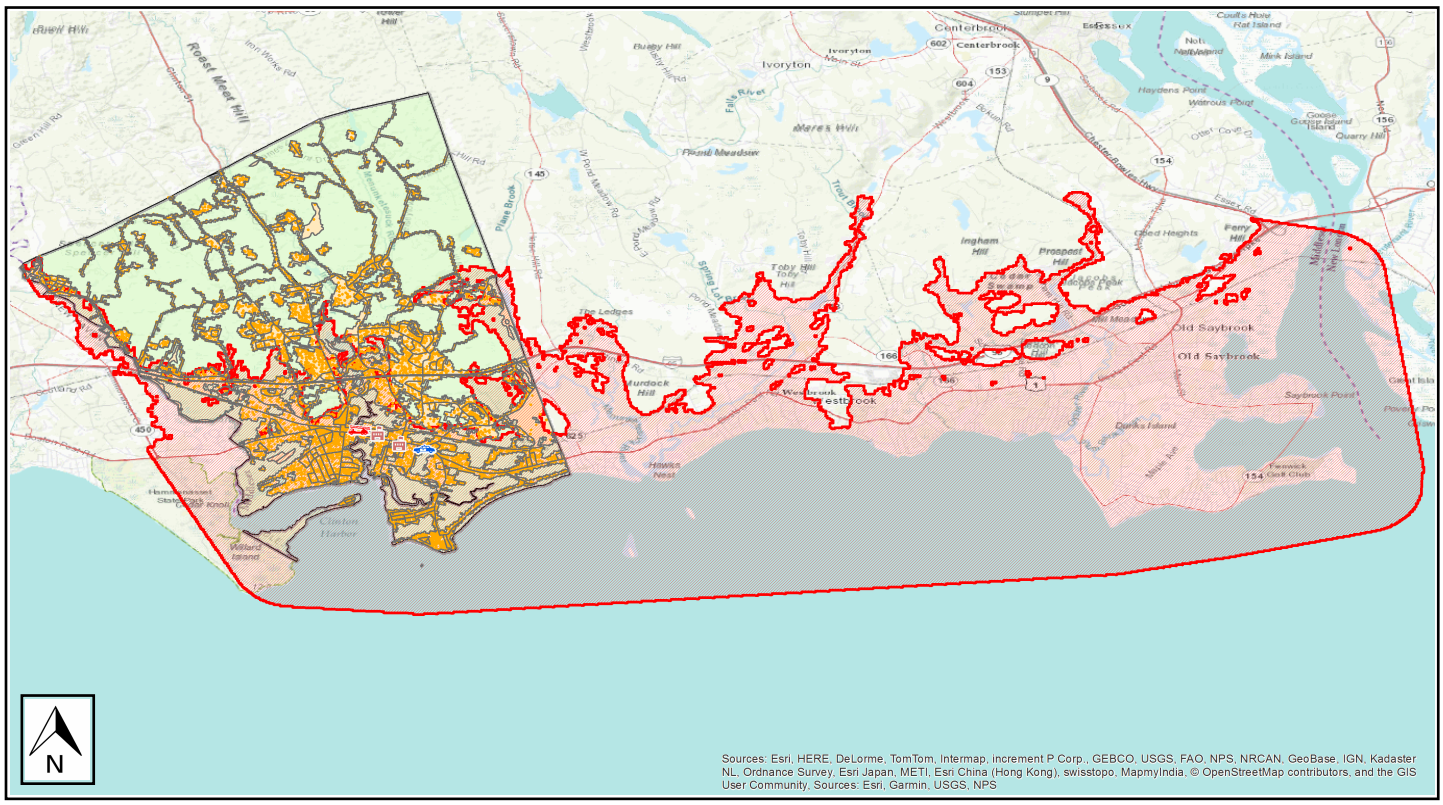
Flood Scenario Parameters

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

Study Region Name:	Clinton
Scenario Name:	ClintonAll
Return Period Analyzed:	500
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 993 buildings will be at least moderately damaged. This is over 55% of the total number of buildings in the scenario. There are an estimated 119 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

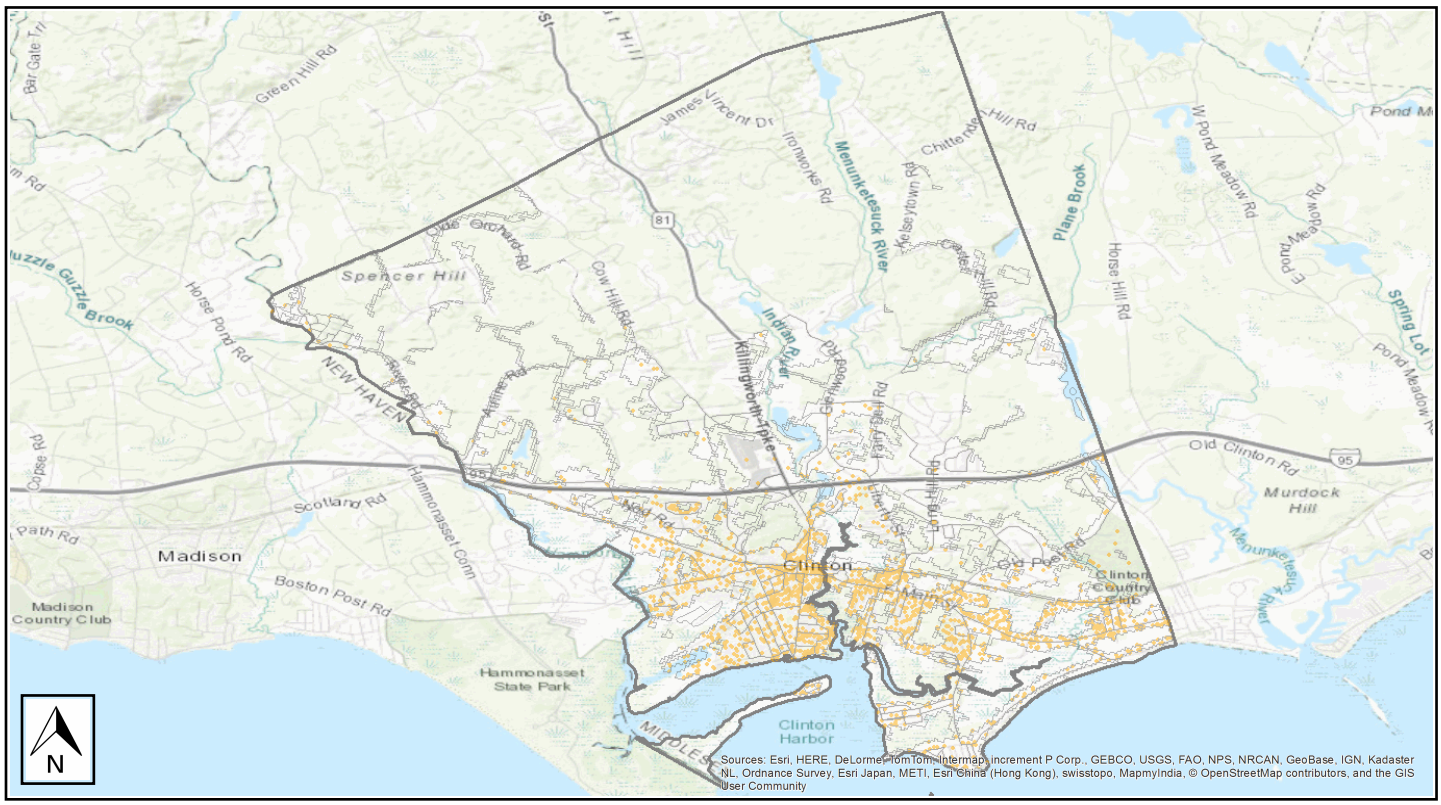


Table 3: Expected Building Damage by Occupancy

	1-10		11-20		21-30		31-40		41-50		>50	
Occupancy	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**
Agriculture	0	0	0	0	0	0	0	0	0	0	0	0
Commercial	0	0	5	100	0	0	0	0	0	0	0	0
Education	0	0	0	0	0	0	0	0	0	0	0	0
Government	0	0	1	100	0	0	0	0	0	0	0	0
Industrial	0	0	0	0	1	100	0	0	0	0	0	0
Religion	0	0	0	0	0	0	0	0	0	0	0	0
Residential	62	6	249	24	379	36	160	15	79	8	119	11
Total	**62**		**255**		**380**		**160**		**79**		**119**	

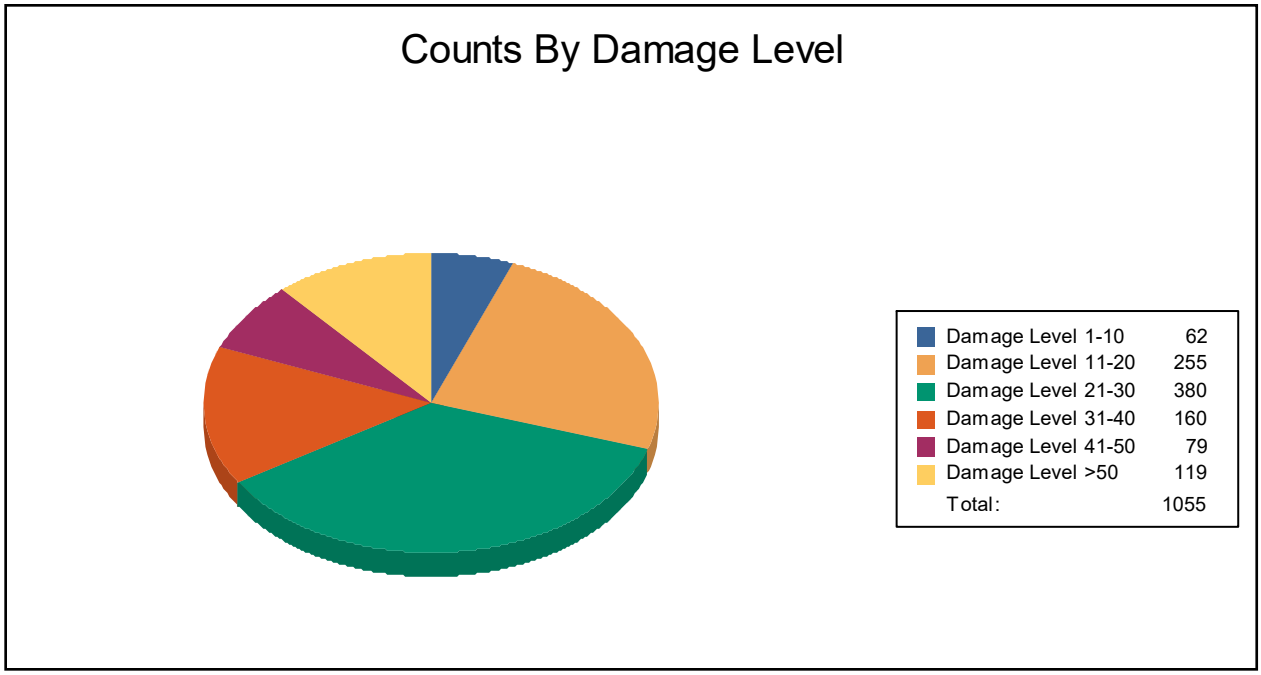


Table 4: Expected Building Damage by Building Type

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	30	100
Masonry	1	6	5	31	9	56	0	0	1	6	0	0
Steel	0	0	4	80	1	20	0	0	0	0	0	0
Wood	61	6	245	24	370	37	160	16	78	8	89	9

Essential Facility Damage

Before the flood analyzed in this scenario, the region had 0 hospital beds available for use. On the day of the scenario flood event, the model estimates that 0 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
Emergency Operation Centers	1	1	0	1
Fire Stations	2	1	0	1
Hospitals	0	0	0	0
Police Stations	1	1	0	1
Schools	5	2	0	2

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

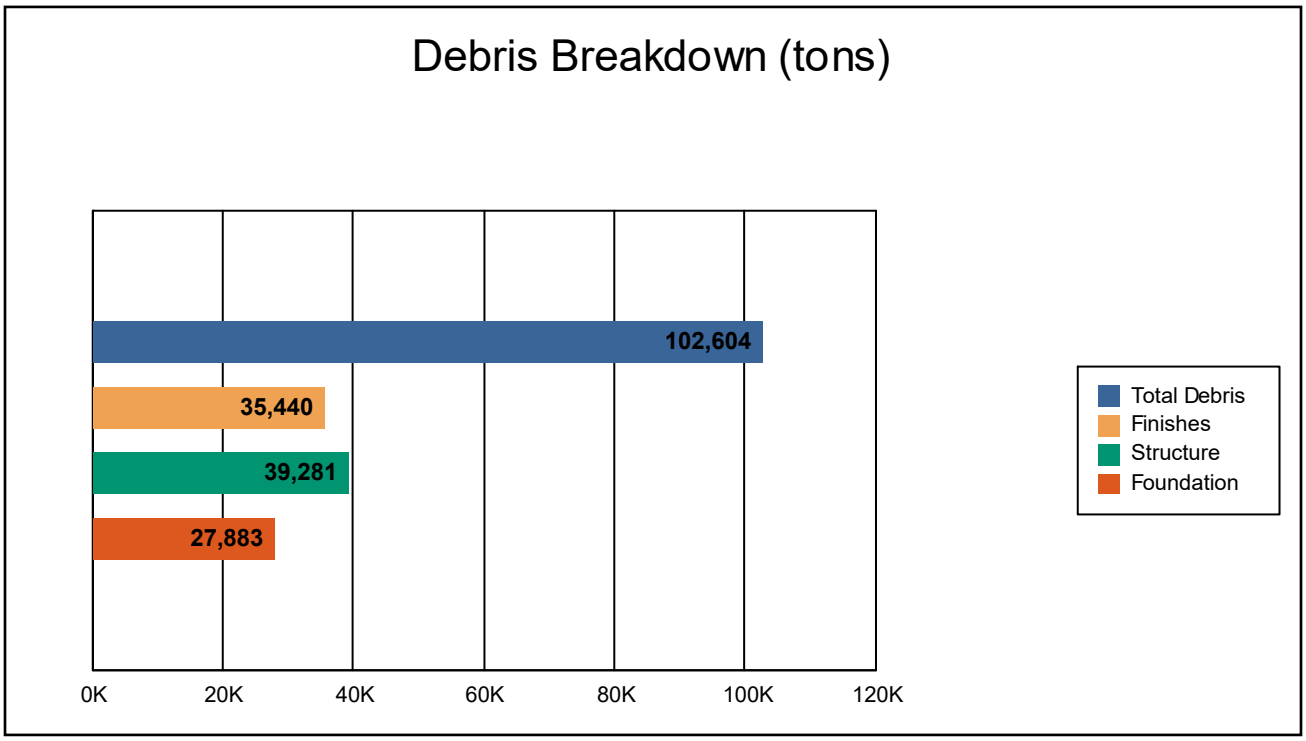
(1) None of your facilities were flooded. This can be checked by mapping the inventory data on the depth grid.

(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.

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.

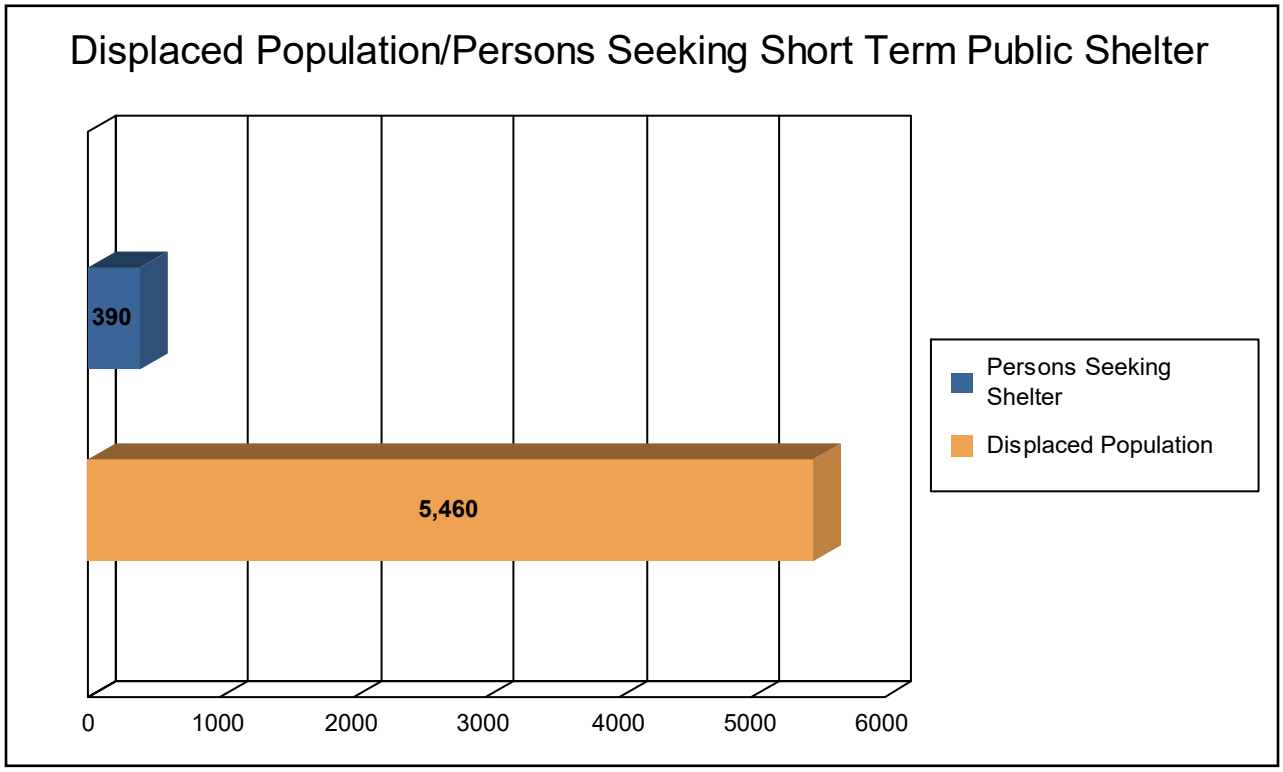


The model estimates that a total of 102,604 tons of debris will be generated. Of the total amount, Finishes comprises 35% of the total, Structure comprises 38% of the total, and Foundation comprises 27%. If the debris tonnage is converted into an estimated number of truckloads, it will require 4105 truckloads (@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 1,820 households (or 5,460 of people) will be displaced due to the flood. Displacement includes households evacuated from within or very near to the inundated area. Of these, 390 people (out of a total population of 13,260) will seek temporary shelter in public shelters.



Economic Loss

The total economic loss estimated for the flood is 719.77 million dollars, which represents 46.67 % of the total replacement value of the scenario buildings.

Building-Related Losses

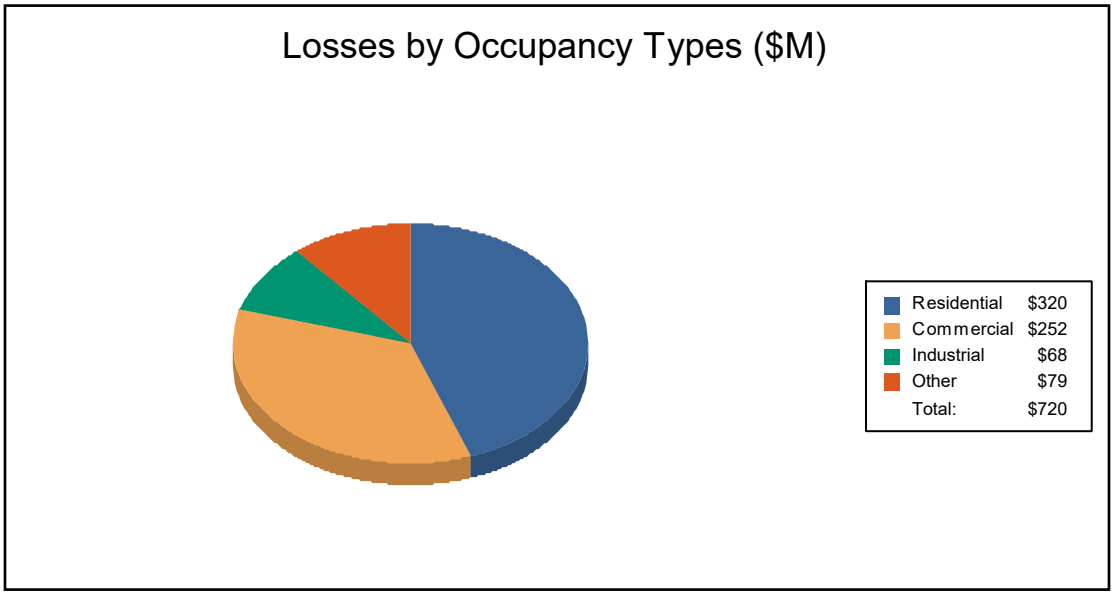
The building losses are broken into two categories: direct building losses and business interruption losses. The direct building losses are the estimated costs to repair or replace the damage caused to the building and its contents. The business interruption losses are the losses associated with inability 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 477.03 million dollars. 34% of the estimated losses were related to the business interruption of the region. The residential occupancies made up 44.53% 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	152.51	30.00	16.30	3.49	202.30
	Content	118.69	87.32	41.60	18.95	266.55
	Inventory	0.00	1.96	5.90	0.33	8.18
	Subtotal	**271.19**	**119.28**	**63.79**	**22.77**	**477.03**
Business Interruption						
	Income	0.69	49.56	0.98	4.18	55.41
	Relocation	33.27	15.58	1.10	2.60	52.54
	Rental Income	13.70	11.56	0.23	0.41	25.90
	Wage	1.63	56.25	1.69	49.33	108.90
	Subtotal	**49.29**	**132.95**	**4.00**	**56.51**	**242.74**
ALL	**Total**	**320.48**	**252.22**	**67.78**	**79.28**	**719.77**



Appendix A: County Listing for the Region

Connecticut

- Middlesex

Appendix B: Regional Population and Building Value Data

	Population	Building Value (thousands of dollars)		
		Residential	Non-Residential	Total
Connecticut				
Middlesex	13,260	1,661,441	400,494	2,061,935
Total	**13,260**	**1,661,441**	**400,494**	**2,061,935**
Total Study Region	**13,260**	**1,661,441**	**400,494**	**2,061,935**

Hazus: Flood Global Risk Report

Region Name: Clinton

Flood Scenario: ClintonAllRiverine

Print Date: Wednesday, January 8, 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.

FEMA

RiskMAP
Increasing Resilience Together

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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):

- Connecticut

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

The geographical size of the region is approximately 16 square miles and contains 272 census blocks. The region contains over 5 thousand households and has a total population of 13,260 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 5,844 buildings in the region with a total building replacement value (excluding contents) of 2,062 million dollars. Approximately 91.43% of the buildings (and 80.58% of the building value) are associated with residential housing.

Building Inventory

General Building Stock

Hazus estimates that there are 5,844 buildings in the region which have an aggregate total replacement value of 2,062 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	1,661,441	80.6%
Commercial	255,126	12.4%
Industrial	98,279	4.8%
Agricultural	8,589	0.4%
Religion	15,970	0.8%
Government	7,665	0.4%
Education	14,865	0.7%
Total	**2,061,935**	**100%**

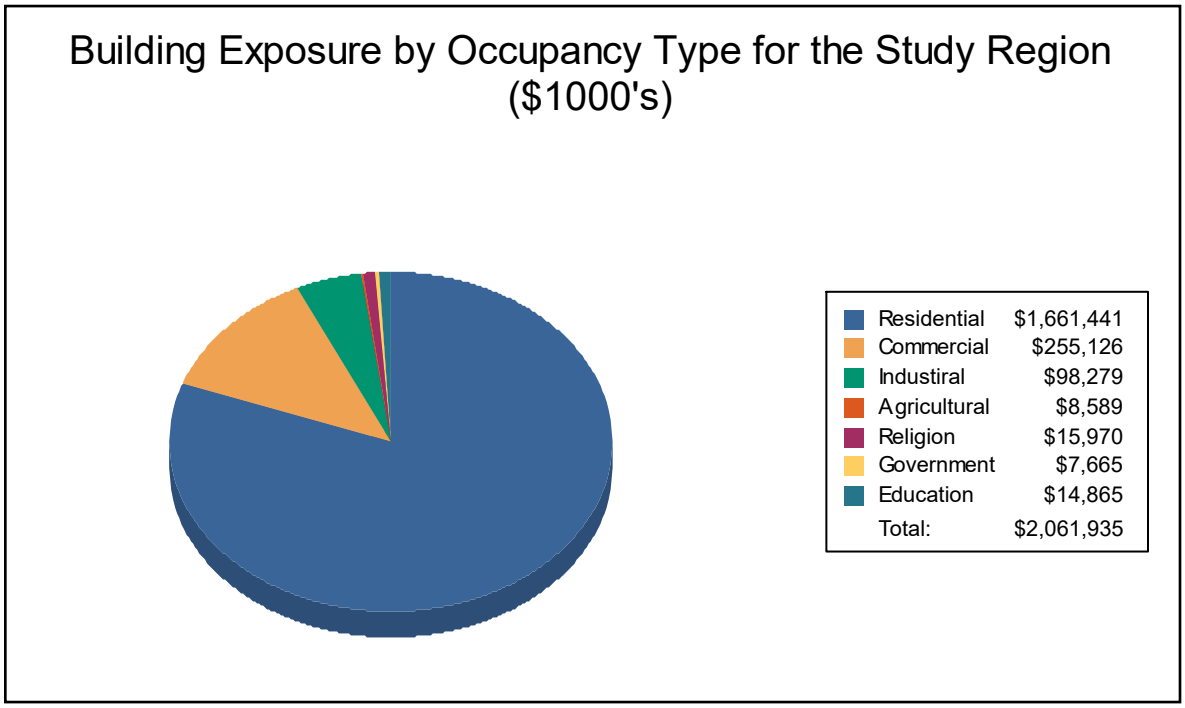
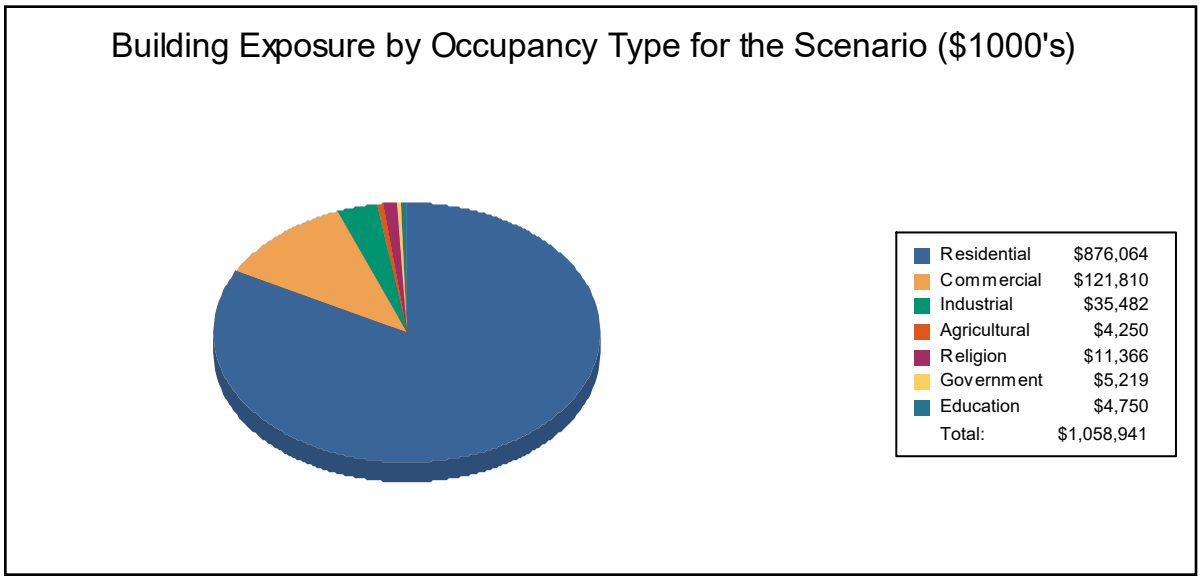


Table 2
Building Exposure by Occupancy Type for the Scenario

Occupancy	Exposure ($1000)	Percent of Total
Residential	876,064	82.7%
Commercial	121,810	11.5%
Industrial	35,482	3.4%
Agricultural	4,250	0.4%
Religion	11,366	1.1%
Government	5,219	0.5%
Education	4,750	0.4%
Total	**1,058,941**	**100%**



Essential Facility Inventory

For essential facilities, there are no hospitals in the region with a total bed capacity of no beds.
There are 5 schools, 2 fire stations, 1 police station and 1 emergency operation center.

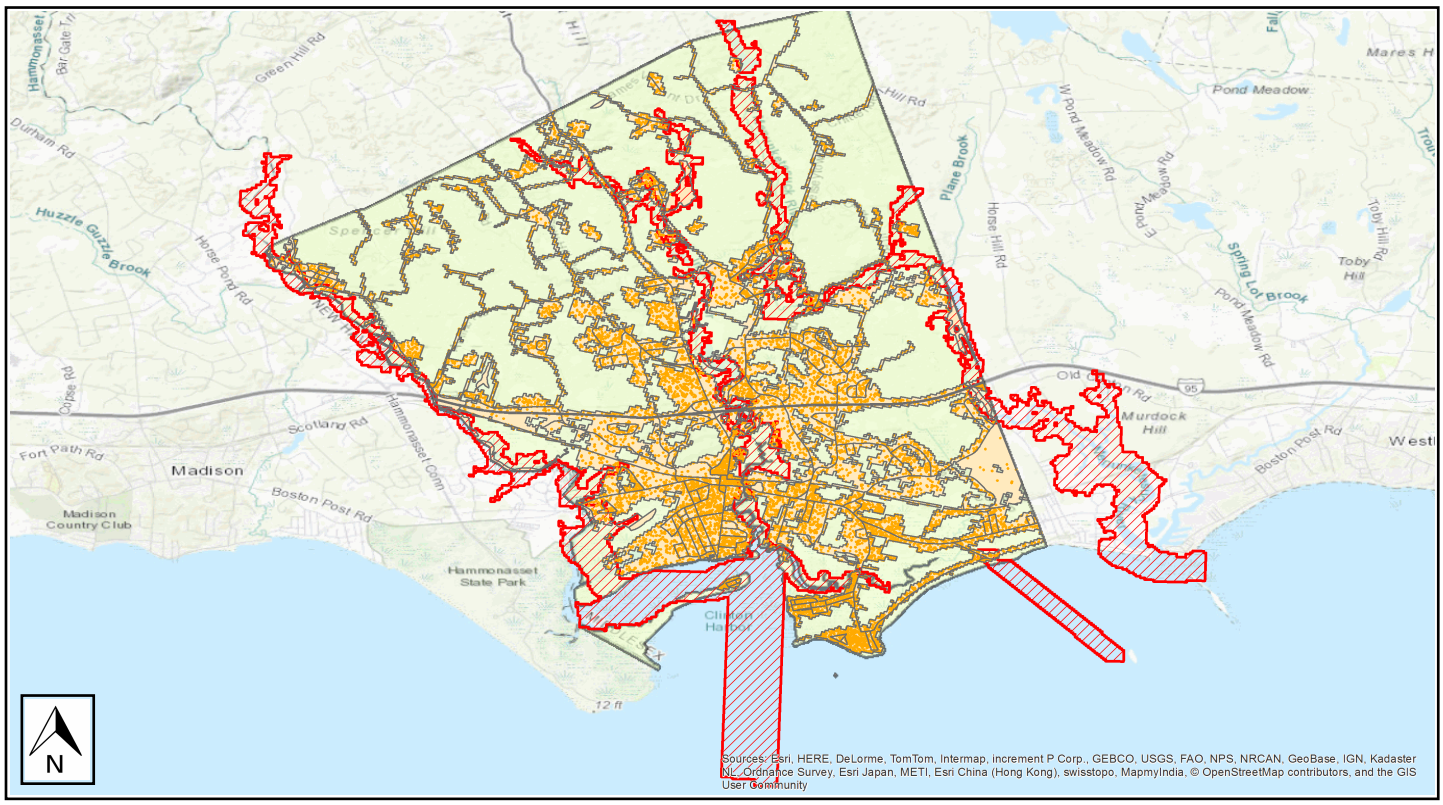
Flood Scenario Parameters

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

Study Region Name:	Clinton
Scenario Name:	ClintonAllRiverine
Return Period Analyzed:	500
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 51 buildings will be at least moderately damaged. This is over 71% of the total number of buildings in the scenario. There are an estimated 0 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

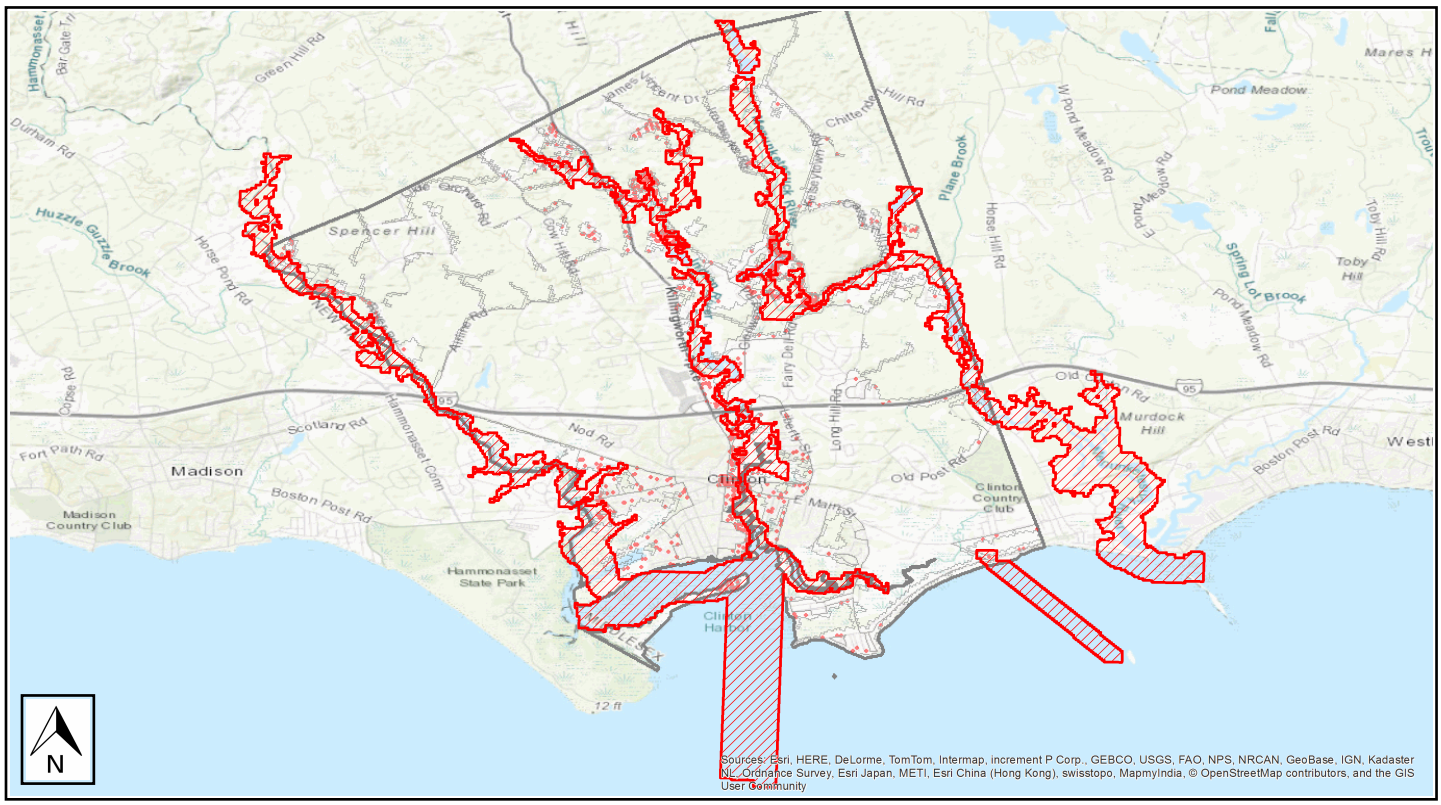


Table 3: Expected Building Damage by Occupancy

	1-10		11-20		21-30		31-40		41-50		>50	
Occupancy	**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	62	55	49	43	2	2	0	0	0	0	0	0
Total	**62**		**49**		**2**		**0**		**0**		**0**	

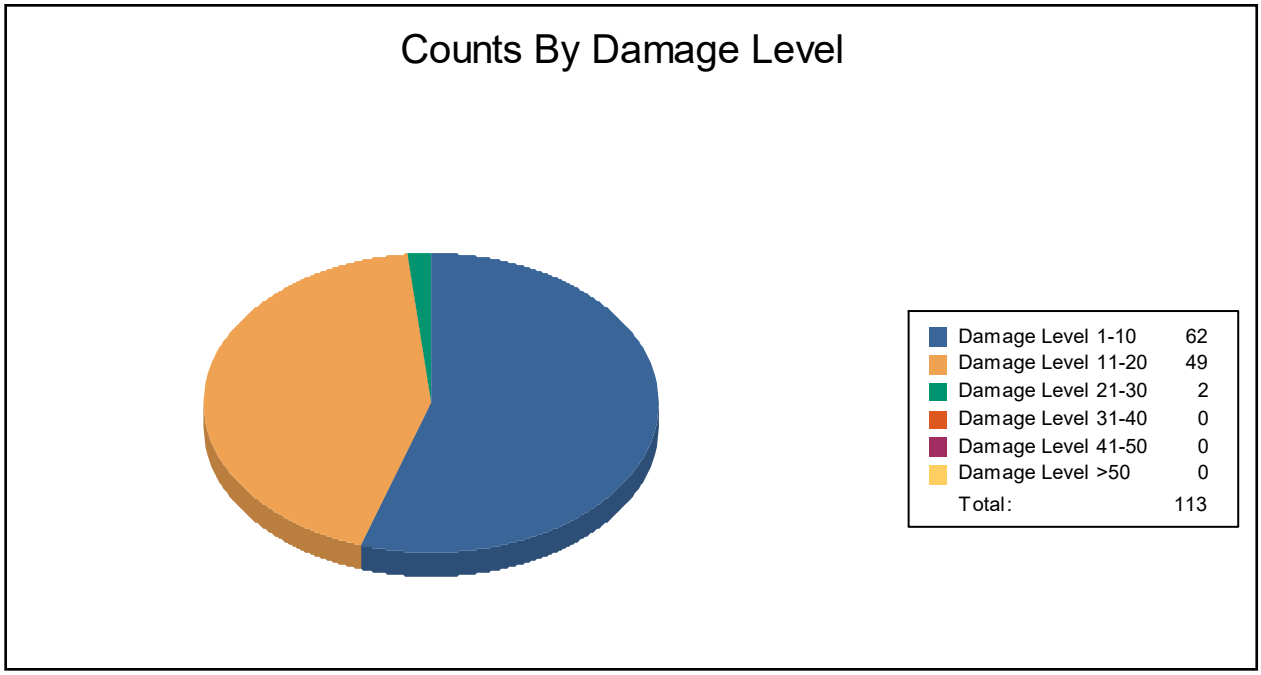


Table 4: Expected Building Damage by Building Type

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	0	0
Masonry	0	0	0	0	0	0	0	0	0	0	0	0
Steel	0	0	0	0	0	0	0	0	0	0	0	0
Wood	62	55	49	43	2	2	0	0	0	0	0	0

Essential Facility Damage

Before the flood analyzed in this scenario, the region had 0 hospital beds available for use. On the day of the scenario flood event, the model estimates that 0 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
Emergency Operation Centers	1	0	0	0
Fire Stations	2	0	0	0
Hospitals	0	0	0	0
Police Stations	1	0	0	0
Schools	5	0	0	0

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

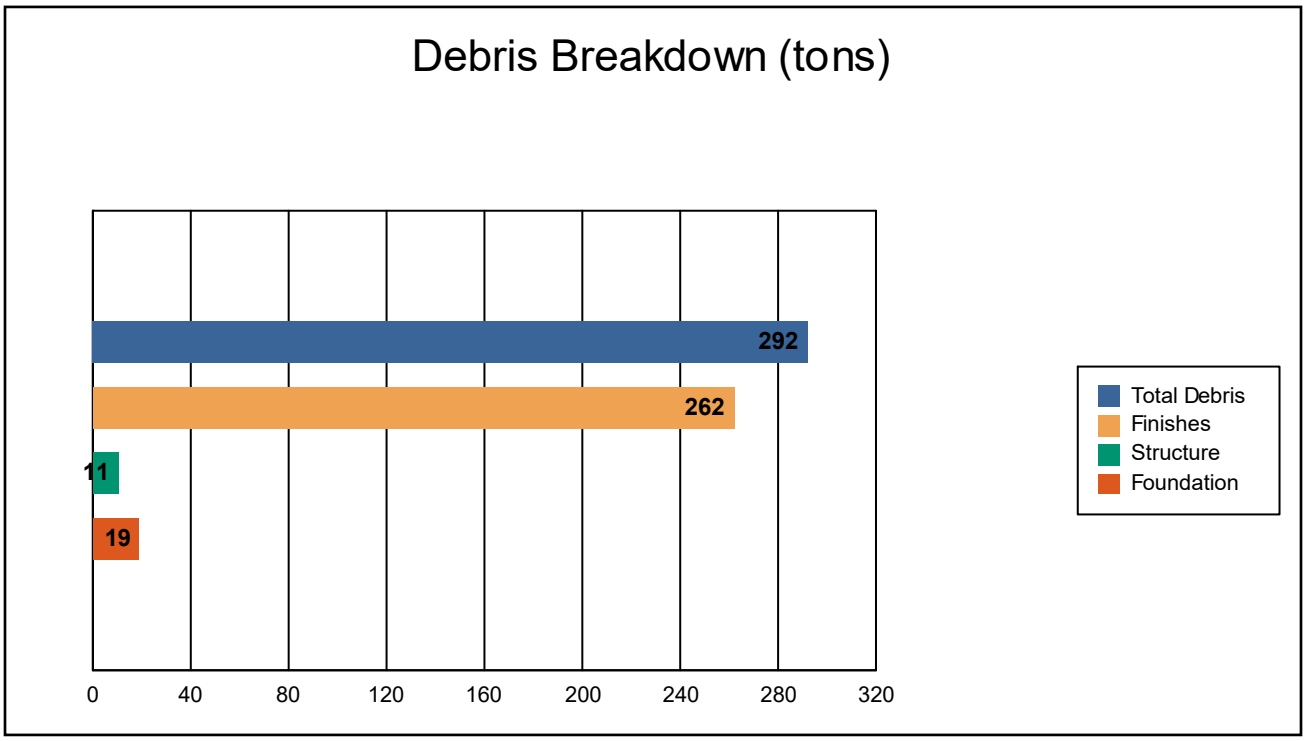
(1) None of your facilities were flooded. This can be checked by mapping the inventory data on the depth grid.

(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.

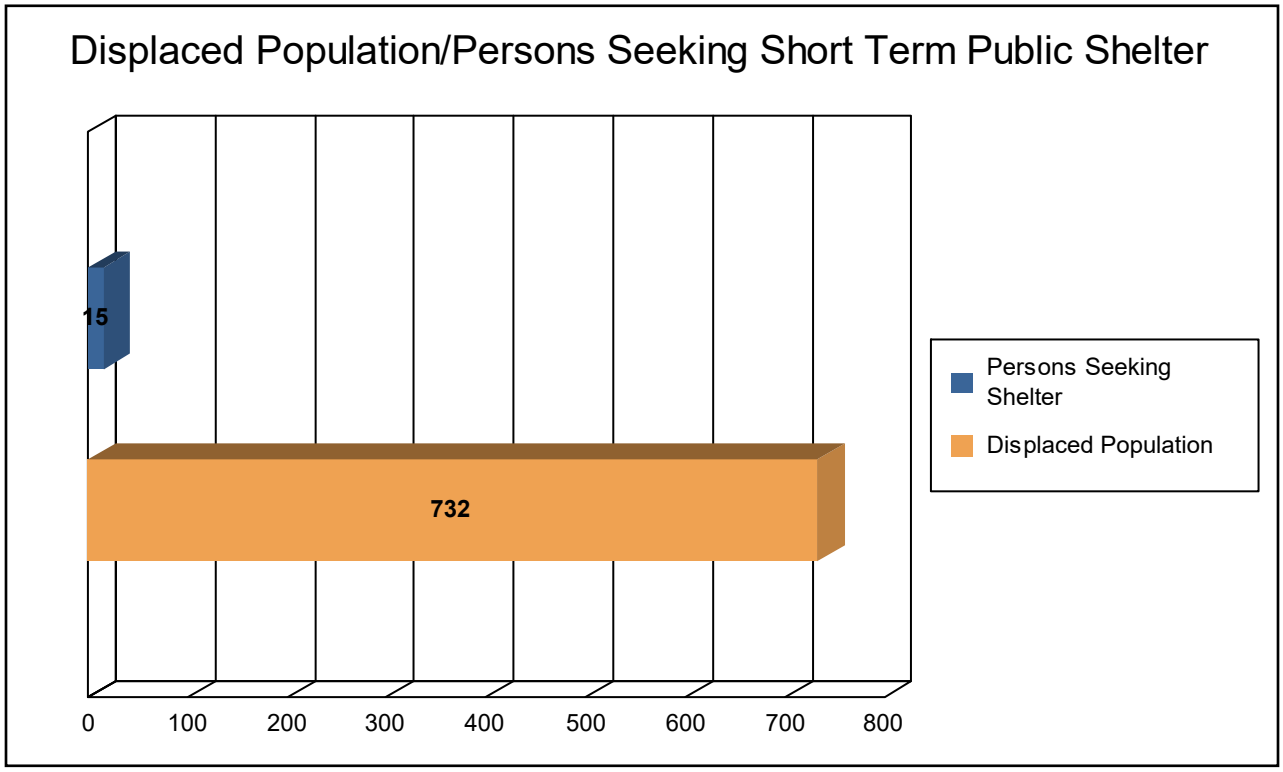


The model estimates that a total of 292 tons of debris will be generated. Of the total amount, Finishes comprises 90% of the total, Structure comprises 4% of the total, and Foundation comprises 7%. If the debris tonnage is converted into an estimated number of truckloads, it will require 12 truckloads (@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 244 households (or 732 of people) will be displaced due to the flood. Displacement includes households evacuated from within or very near to the inundated area. Of these, 15 people (out of a total population of 13,260) will seek temporary shelter in public shelters.



Economic Loss

The total economic loss estimated for the flood is 23.98 million dollars, which represents 2.26 % of the total replacement value of the scenario buildings.

Building-Related Losses

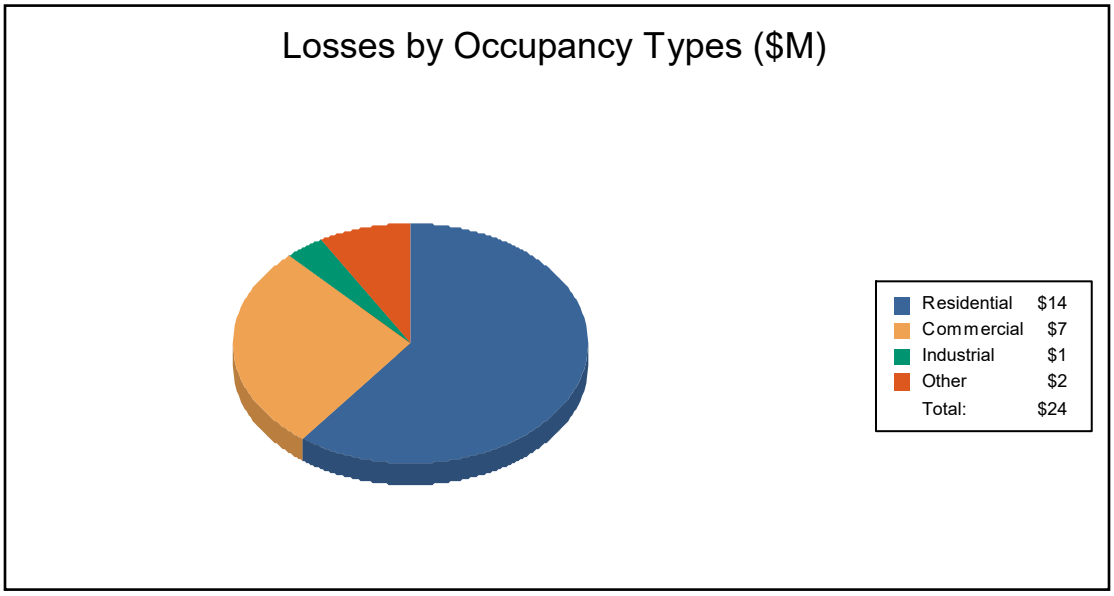
The building losses are broken into two categories: direct building losses and business interruption losses. The direct building losses are the estimated costs to repair or replace the damage caused to the building and its contents. The business interruption losses are the losses associated with inability 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 11.69 million dollars. 51% of the estimated losses were related to the business interruption of the region. The residential occupancies made up 60.23% 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	6.50	0.35	0.28	0.03	7.16
	Content	2.68	1.07	0.50	0.20	4.45
	Inventory	0.00	0.02	0.05	0.00	0.08
	Subtotal	**9.19**	**1.44**	**0.83**	**0.23**	**11.69**
Business Interruption						
	Income	0.04	2.22	0.02	0.19	2.46
	Relocation	3.88	0.46	0.02	0.08	4.44
	Rental Income	1.25	0.34	0.00	0.01	1.60
	Wage	0.09	2.19	0.03	1.49	3.79
	Subtotal	**5.26**	**5.21**	**0.07**	**1.76**	**12.29**
ALL	**Total**	**14.44**	**6.64**	**0.90**	**1.99**	**23.98**



Appendix A: County Listing for the Region

Connecticut

- Middlesex

Appendix B: Regional Population and Building Value Data

	Population	Building Value (thousands of dollars)		
		Residential	Non-Residential	Total
Connecticut				
Middlesex	13,260	1,661,441	400,494	2,061,935
Total	**13,260**	**1,661,441**	**400,494**	**2,061,935**
Total Study Region	**13,260**	**1,661,441**	**400,494**	**2,061,935**

Hazus: Hurricane Global Risk Report

Region Name: Clinton

Hurricane Scenario: Probabilistic 10-year Return Period

Print Date: Tuesday, October 1, 2019

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 Hurricane. These results can be improved by using enhanced inventory data.

Table of Contents

General Description of the Region

Hazus is a regional multi-hazard loss estimation model that was developed by the Federal Emergency Management Agency and the National Institute of Building Sciences. 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 hurricane loss estimates provided in this report are based on a region that includes 1 county(ies) from the following state(s):

- Connecticut

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

The geographical size of the region is 16.39 square miles and contains 4 census tracts. There are over 5 thousand households in the region and a total population of 13,260 people (2010 Census Bureau data). The distribution of population by State and County is provided in Appendix B.

There are an estimated 5 thousand buildings in the region with a total building replacement value (excluding contents) of 2,062 million dollars (2014 dollars). Approximately 91% of the buildings (and 81% of the building value) are associated with residential housing.

Building Inventory

General Building Stock

Hazus estimates that there are 5,844 buildings in the region which have an aggregate total replacement value of 2,062 million (2014 dollars). Table 1 presents the relative distribution of the value with respect to the general occupancies. Appendix B provides a general distribution of the building value by State and County.

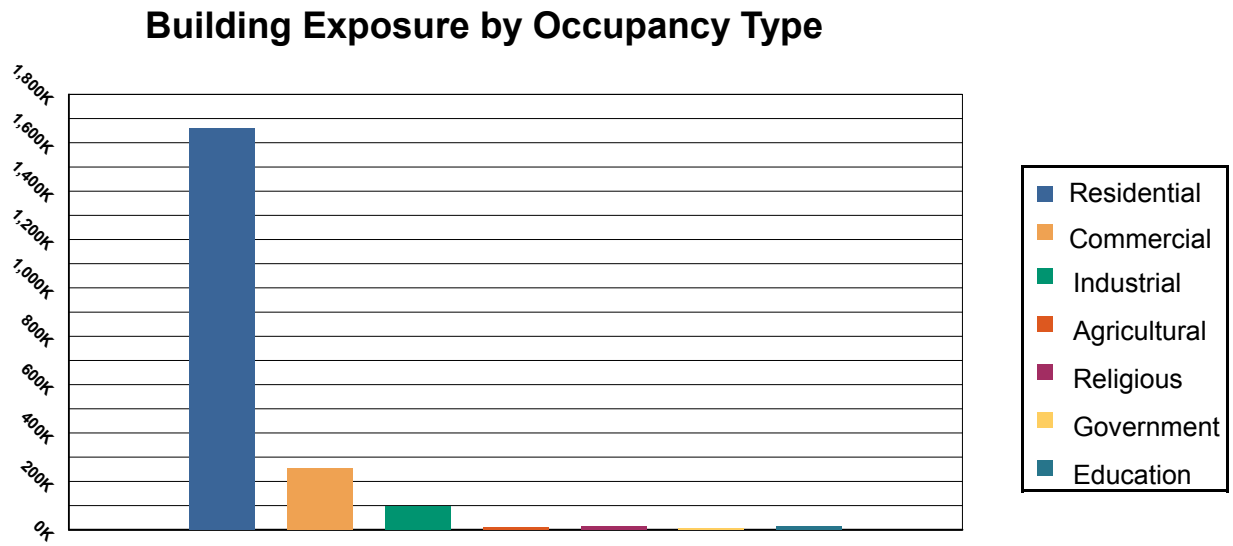


Table 1: Building Exposure by Occupancy Type

Occupancy	Exposure ($1000)	Percent of Tot
Residential	1,661,441	80.58 %
Commercial	255,126	12.37%
Industrial	98,279	4.77%
Agricultural	8,589	0.42%
Religious	15,970	0.77%
Government	7,665	0.37%
Education	14,865	0.72%
Total	**2,061,935**	**100.00%**

Essential Facility Inventory

For essential facilities, there are no hospitals in the region with a total bed capacity of no beds. There are 5 schools, 2 fire stations, 1 police stations and 1 emergency operation facilities.

Hurricane Scenario

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

Scenario Name:	Probabilistic
Type:	Probabilistic

Building Damage

General Building Stock Damage

Hazus estimates that about 0 buildings will be at least moderately damaged. This is over 0% of the total number of buildings in the region. There are an estimated 0 buildings that will be completely destroyed. The definition of the 'damage states' is provided in the Hazus Hurricane technical manual. Table 2 below summarizes the expected damage by general occupancy for the buildings in the region. Table 3 summarizes the expected damage by general building type.

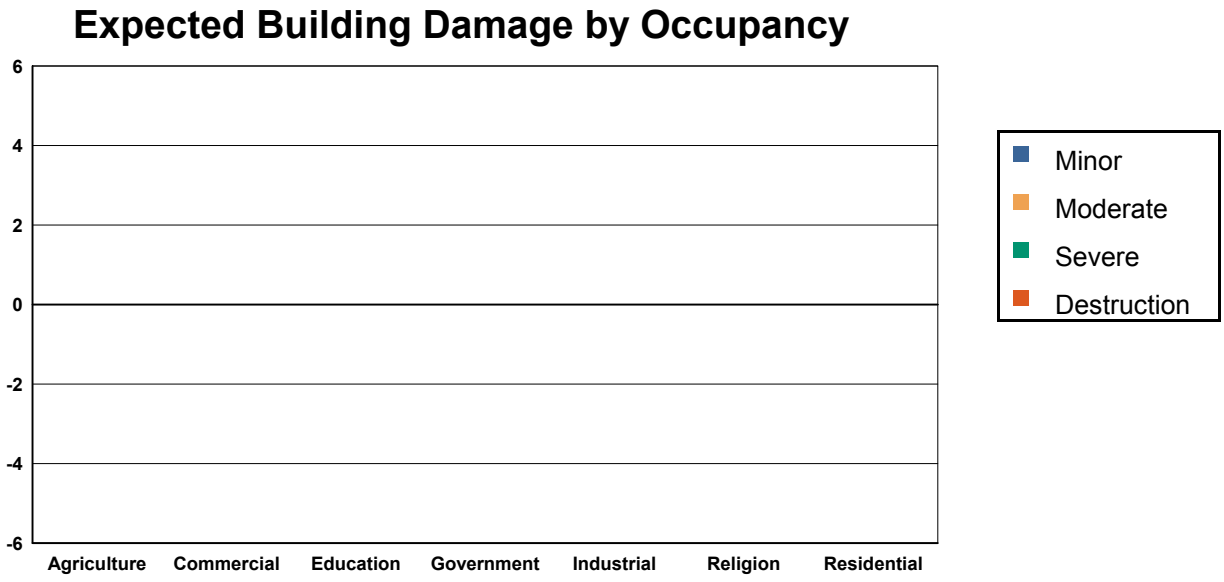


Table 2: Expected Building Damage by Occupancy : 10 - year Event

	None		Minor		Moderate		Severe		Destruction	
Occupancy	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**
Agriculture	29.00	100.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Commercial	305.00	100.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Education	10.00	100.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Government	11.00	100.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Industrial	128.00	100.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Religion	18.00	100.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Residential	5,343.00	100.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	**5,844.00**		**0.00**		**0.00**		**0.00**		**0.00**	

Table 3: Expected Building Damage by Building Type : 10 - year Event

Building Type	None		Minor		Moderate		Severe		Destruction	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Concrete	33	100.00	0	0.00	0	0.00	0	0.00	0	0.00
Masonry	308	100.00	0	0.00	0	0.00	0	0.00	0	0.00
MH	248	100.00	0	0.00	0	0.00	0	0.00	0	0.00
Steel	216	100.00	0	0.00	0	0.00	0	0.00	0	0.00
Wood	4,816	100.00	0	0.00	0	0.00	0	0.00	0	0.00

Essential Facility Damage

Before the hurricane, the region had no hospital beds available for use. On the day of the hurricane, the model estimates that 0 hospital beds (0%) are available for use by patients already in the hospital and those injured by the hurricane. After one week, none of the beds will be in service. By 30 days, none will be operational.

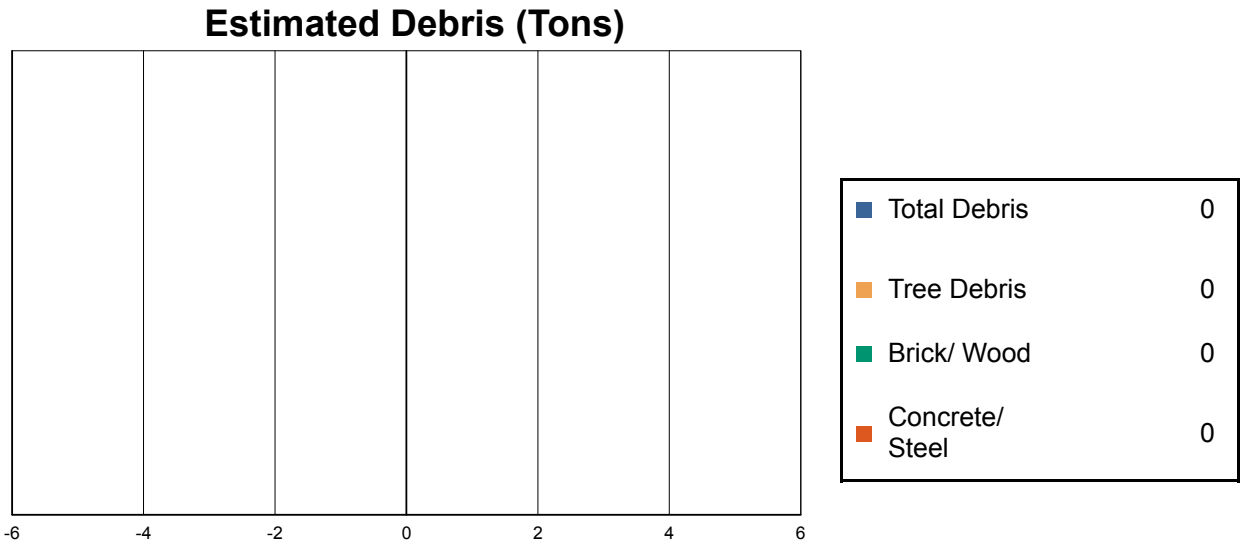
Thematic Map of Essential Facilities with greater than 50% moderate

Table 4: Expected Damage to Essential Facilities

		# Facilities		
Classification	**Total**	**Probability of at Least Moderate Damage > 50%**	**Probability of Complete Damage > 50%**	**Expected Loss of Use < 1 day**
EOCs	1	0	0	1
Fire Stations	2	0	0	2
Police Stations	1	0	0	1
Schools	5	0	0	5

Induced Hurricane Damage

Debris Generation

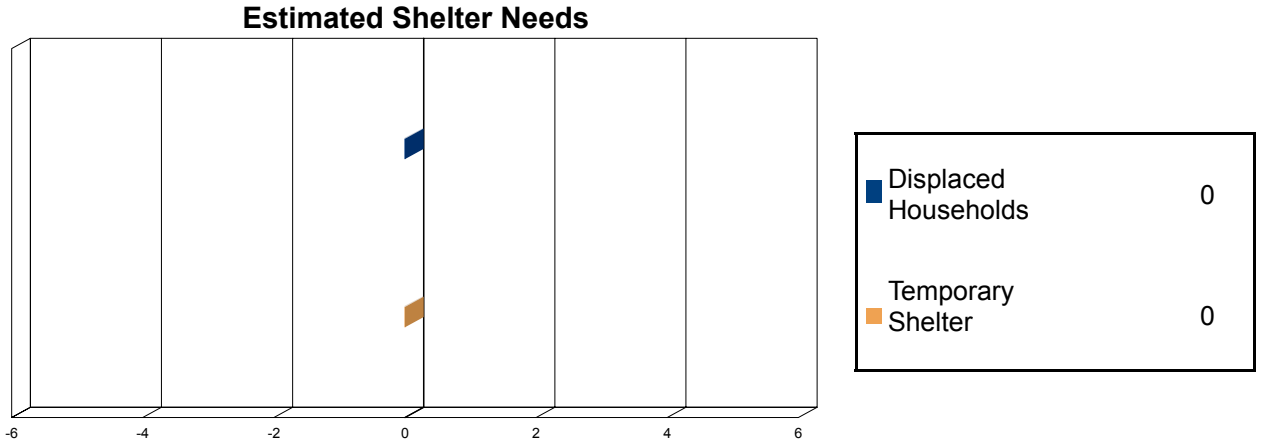


Hazus estimates the amount of debris that will be generated by the hurricane. The model breaks the debris into four general categories: a) Brick/Wood, b) Reinforced Concrete/Steel, c) Eligible Tree Debris, and d) Other Tree Debris. This distinction is made because of the different types of material handling equipment required to handle the debris.

The model estimates that a total of 0 tons of debris will be generated. Of the total amount, 0 tons (0%) is Other Tree Debris. Of the remaining 0 tons, Brick/Wood comprises 0% of the total, Reinforced Concrete/Steel comprises of 0% of the total, with the remainder being Eligible Tree Debris. If the building debris tonnage is converted to an estimated number of truckloads, it will require 0 truckloads (@25 tons/truck) to remove the building debris generated by the hurricane. The number of Eligible Tree Debris truckloads will depend on how the 0 tons of Eligible Tree Debris are collected and processed. The volume of tree debris generally ranges from about 4 cubic yards per ton for chipped or compacted tree debris to about 10 cubic yards per ton for bulkier, uncompacted debris.

Social Impact

Shelter Requirement



Hazus estimates the number of households that are expected to be displaced from their homes due to the hurricane and the number of displaced people that will require accommodations in temporary public shelters. The model estimates 0 households to be displaced due to the hurricane. Of these, 0 people (out of a total population of 13,260) will seek temporary shelter in public shelters.

Economic Loss

The total economic loss estimated for the hurricane is 0.0 million dollars, which represents 0.00 % of the total replacement value of the region's buildings.

Building-Related Losses

The building related losses are broken into two categories: direct property damage losses and business interruption losses. The direct property damage 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 hurricane. Business interruption losses also include the temporary living expenses for those people displaced from their homes because of the hurricane.

The total property damage losses were 0 million dollars. 0% of the estimated losses were related to the business interruption of the region. By far, the largest loss was sustained by the residential occupancies which made up over 0% of the total loss. Table 5 below provides a summary of the losses associated with the building damage.

Loss by Business Interruption Type (left) and Building Damage Type (right)

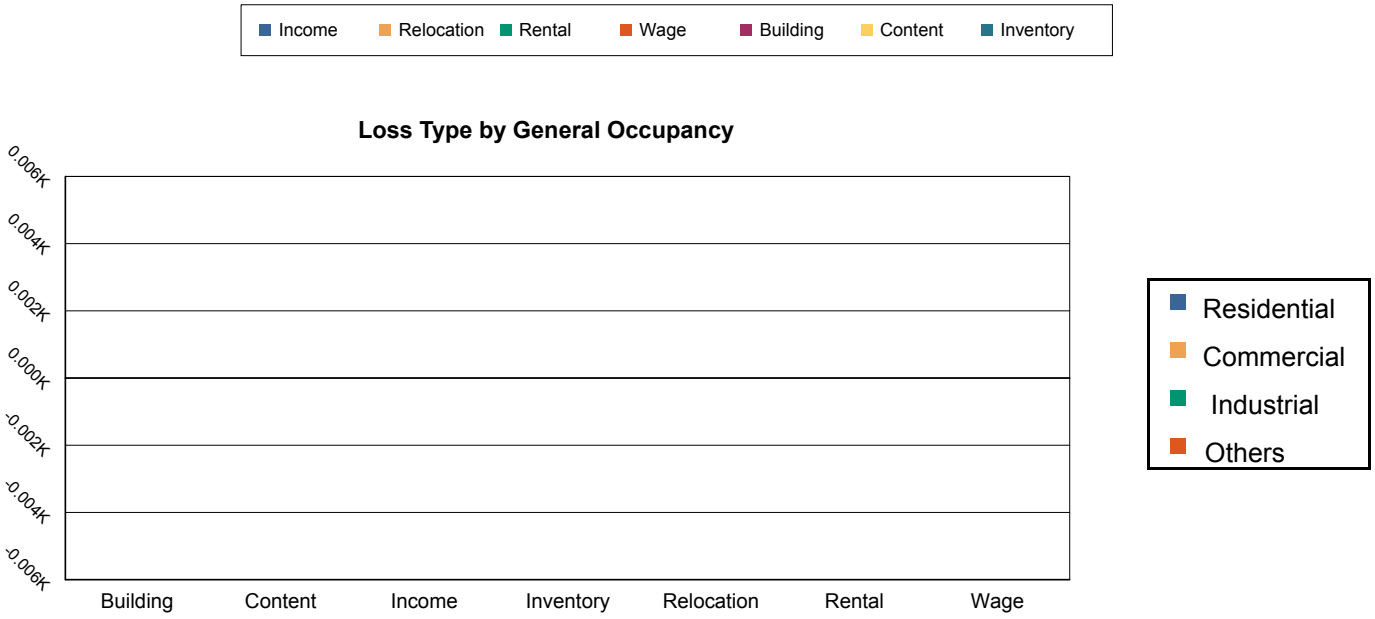


Table 5: Building-Related Economic Loss Estimates

(Thousands of dollars)

Category	Area	Residential	Commercial	Industrial	Others	Total
Property Damage						
	Building	0.00	0.00	0.00	0.00	0.00
	Content	0.00	0.00	0.00	0.00	0.00
	Inventory	0.00	0.00	0.00	0.00	0.00
	Subtotal	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**
Business Interruption Loss						
	Income	0.00	0.00	0.00	0.00	0.00
	Relocation	0.00	0.00	0.00	0.00	0.00
	Rental	0.00	0.00	0.00	0.00	0.00
	Wage	0.00	0.00	0.00	0.00	0.00
	Subtotal	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

Total

Total	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

Appendix A: County Listing for the Region

Connecticut
- Middlesex

Appendix B: Regional Population and Building Value Data

		Building Value (thousands of dollars)		
	Population	Residential	Non-Residential	Total
Connecticut				
Middlesex	13,260	1,661,441	400,494	2,061,935
Total	**13,260**	**1,661,441**	**400,494**	**2,061,935**
Study Region Total	**13,260**	**1,661,441**	**400,494**	**2,061,935**

Hazus: Hurricane Global Risk Report

Region Name: Clinton

Hurricane Scenario: Probabilistic 20-year Return Period

Print Date: Tuesday, October 1, 2019

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 Hurricane. These results can be improved by using enhanced inventory data.

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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 and the National Institute of Building Sciences. 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 hurricane loss estimates provided in this report are based on a region that includes 1 county(ies) from the following state(s):

- Connecticut

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

The geographical size of the region is 16.39 square miles and contains 4 census tracts. There are over 5 thousand households in the region and a total population of 13,260 people (2010 Census Bureau data). The distribution of population by State and County is provided in Appendix B.

There are an estimated 5 thousand buildings in the region with a total building replacement value (excluding contents) of 2,062 million dollars (2014 dollars). Approximately 91% of the buildings (and 81% of the building value) are associated with residential housing.

Building Inventory

General Building Stock

Hazus estimates that there are 5,844 buildings in the region which have an aggregate total replacement value of 2,062 million (2014 dollars). Table 1 presents the relative distribution of the value with respect to the general occupancies. Appendix B provides a general distribution of the building value by State and County.

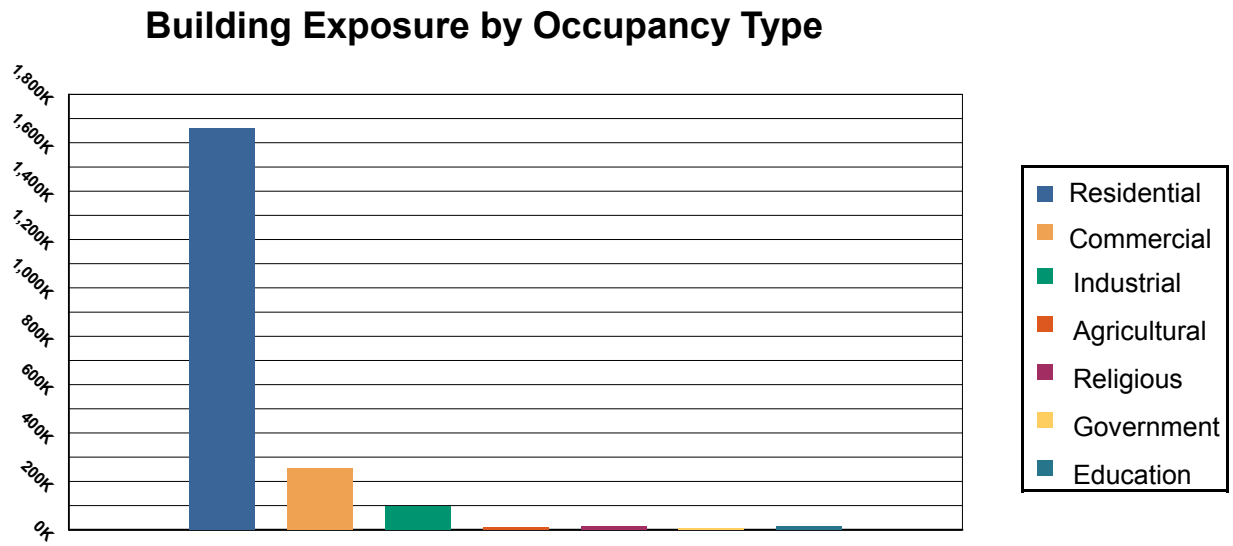


Table 1: Building Exposure by Occupancy Type

Occupancy	Exposure ($1000)	Percent of Tot
Residential	1,661,441	80.58 %
Commercial	255,126	12.37%
Industrial	98,279	4.77%
Agricultural	8,589	0.42%
Religious	15,970	0.77%
Government	7,665	0.37%
Education	14,865	0.72%
Total	**2,061,935**	**100.00%**

Essential Facility Inventory

For essential facilities, there are no hospitals in the region with a total bed capacity of no beds. There are 5 schools, 2 fire stations, 1 police stations and 1 emergency operation facilities.

Hurricane Scenario

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

Scenario Name:	Probabilistic
Type:	Probabilistic

Building Damage

General Building Stock Damage

Hazus estimates that about 0 buildings will be at least moderately damaged. This is over 0% of the total number of buildings in the region. There are an estimated 0 buildings that will be completely destroyed. The definition of the 'damage states' is provided in the Hazus Hurricane technical manual. Table 2 below summarizes the expected damage by general occupancy for the buildings in the region. Table 3 summarizes the expected damage by general building type.

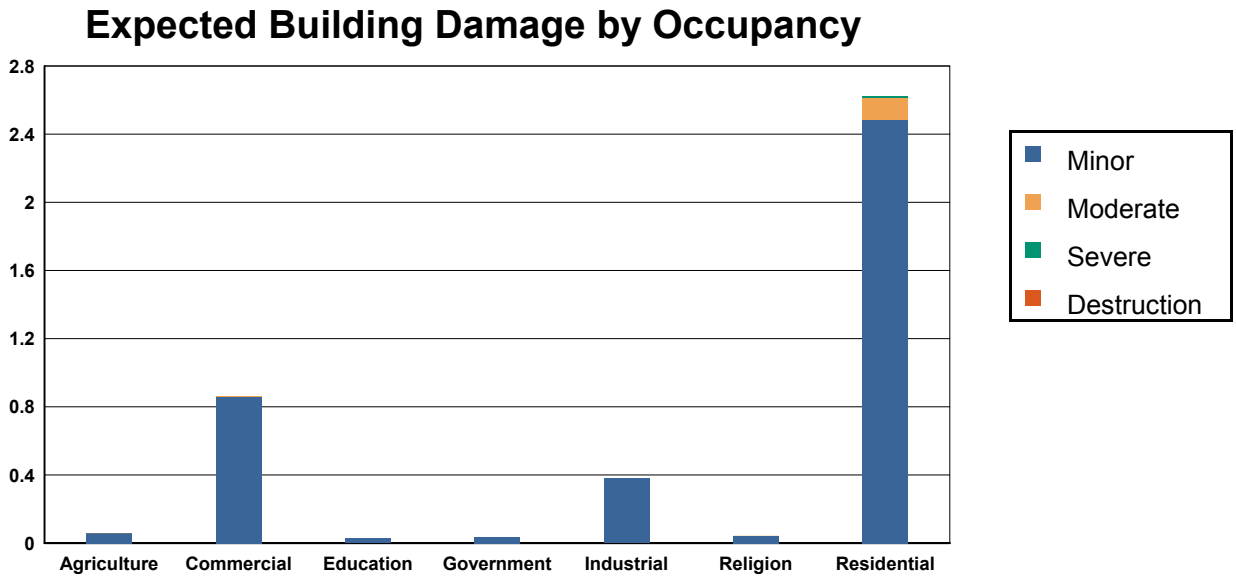


Table 2: Expected Building Damage by Occupancy : 20 - year Event

	None		Minor		Moderate		Severe		Destruction	
Occupancy	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**
Agriculture	28.94	99.80	0.06	0.20	0.00	0.00	0.00	0.00	0.00	0.00
Commercial	304.14	99.72	0.86	0.28	0.00	0.00	0.00	0.00	0.00	0.00
Education	9.97	99.71	0.03	0.29	0.00	0.00	0.00	0.00	0.00	0.00
Government	10.96	99.68	0.04	0.32	0.00	0.00	0.00	0.00	0.00	0.00
Industrial	127.62	99.70	0.38	0.30	0.00	0.00	0.00	0.00	0.00	0.00
Religion	17.96	99.76	0.04	0.23	0.00	0.00	0.00	0.00	0.00	0.00
Residential	5,340.38	99.95	2.48	0.05	0.13	0.00	0.01	0.00	0.00	0.00
Total	**5,839.97**		**3.89**		**0.14**		**0.01**		**0.00**	

Table 3: Expected Building Damage by Building Type : 20 - year Event

Building Type	None		Minor		Moderate		Severe		Destruction	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Concrete	33	99.64	0	0.36	0	0.00	0	0.00	0	0.00
Masonry	307	99.62	1	0.37	0	0.01	0	0.00	0	0.00
MH	248	100.00	0	0.00	0	0.00	0	0.00	0	0.00
Steel	215	99.68	1	0.32	0	0.00	0	0.00	0	0.00
Wood	4,815	99.98	1	0.02	0	0.00	0	0.00	0	0.00

Essential Facility Damage

Before the hurricane, the region had no hospital beds available for use. On the day of the hurricane, the model estimates that 0 hospital beds (0%) are available for use by patients already in the hospital and those injured by the hurricane. After one week, none of the beds will be in service. By 30 days, none will be operational.

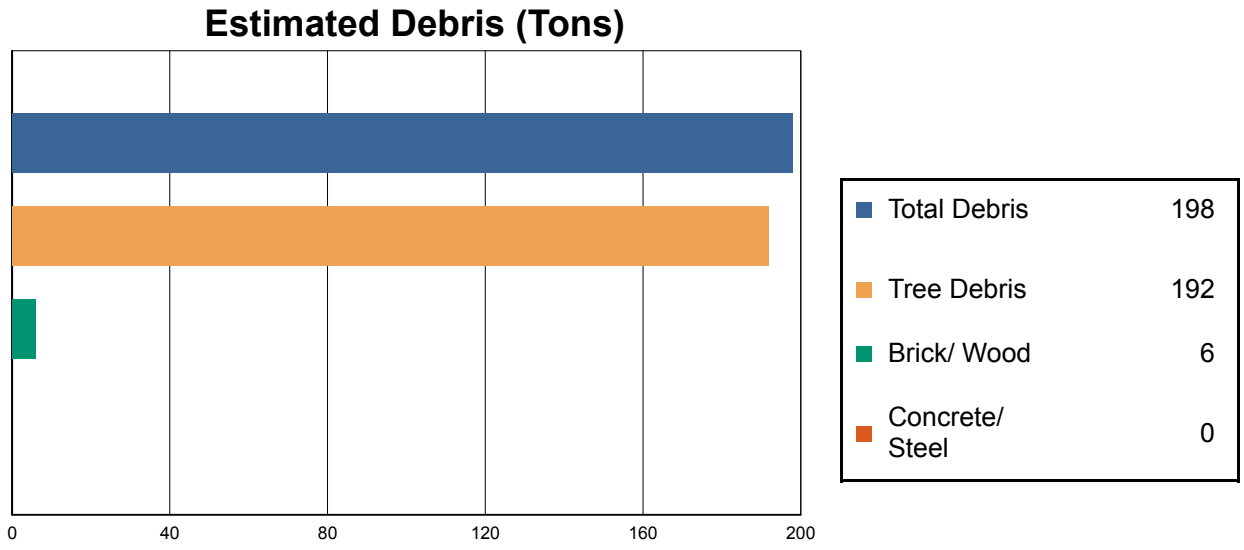
Thematic Map of Essential Facilities with greater than 50% moderate

Table 4: Expected Damage to Essential Facilities

		# Facilities		
Classification	**Total**	**Probability of at Least Moderate Damage > 50%**	**Probability of Complete Damage > 50%**	**Expected Loss of Use < 1 day**
EOCs	1	0	0	1
Fire Stations	2	0	0	2
Police Stations	1	0	0	1
Schools	5	0	0	5

Induced Hurricane Damage

Debris Generation

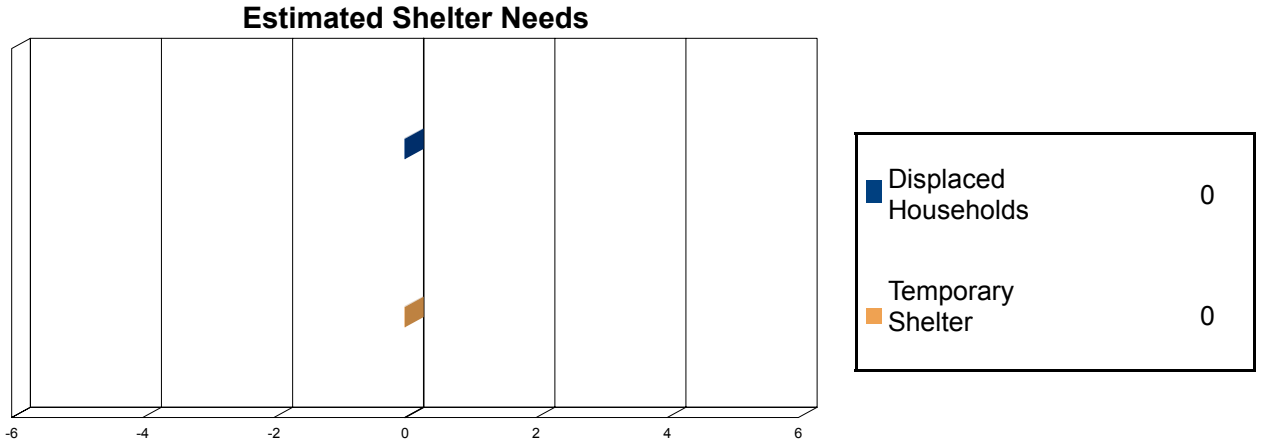


Hazus estimates the amount of debris that will be generated by the hurricane. The model breaks the debris into four general categories: a) Brick/Wood, b) Reinforced Concrete/Steel, c) Eligible Tree Debris, and d) Other Tree Debris. This distinction is made because of the different types of material handling equipment required to handle the debris.

The model estimates that a total of 198 tons of debris will be generated. Of the total amount, 95 tons (48%) is Other Tree Debris. Of the remaining 103 tons, Brick/Wood comprises 6% of the total, Reinforced Concrete/Steel comprises of 0% of the total, with the remainder being Eligible Tree Debris. If the building debris tonnage is converted to an estimated number of truckloads, it will require 0 truckloads (@25 tons/truck) to remove the building debris generated by the hurricane. The number of Eligible Tree Debris truckloads will depend on how the 97 tons of Eligible Tree Debris are collected and processed. The volume of tree debris generally ranges from about 4 cubic yards per ton for chipped or compacted tree debris to about 10 cubic yards per ton for bulkier, uncompacted debris.

Social Impact

Shelter Requirement



Hazus estimates the number of households that are expected to be displaced from their homes due to the hurricane and the number of displaced people that will require accommodations in temporary public shelters. The model estimates 0 households to be displaced due to the hurricane. Of these, 0 people (out of a total population of 13,260) will seek temporary shelter in public shelters.

Economic Loss

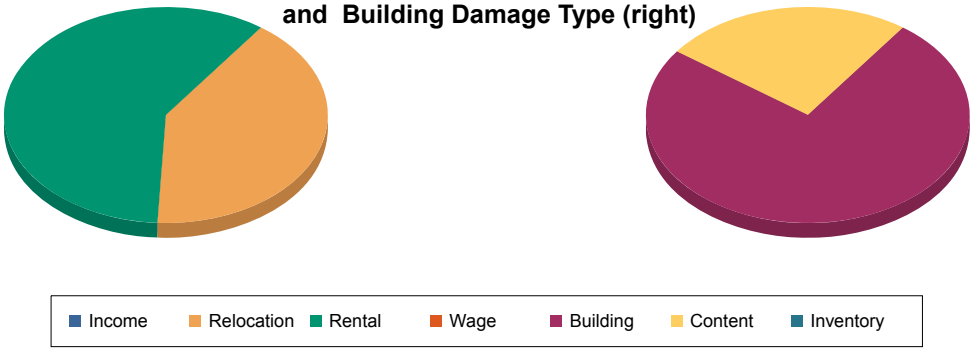
The total economic loss estimated for the hurricane is 0.6 million dollars, which represents 0.03 % of the total replacement value of the region's buildings.

Building-Related Losses

The building related losses are broken into two categories: direct property damage losses and business interruption losses. The direct property damage 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 hurricane. Business interruption losses also include the temporary living expenses for those people displaced from their homes because of the hurricane.

The total property damage losses were 1 million dollars. 0% of the estimated losses were related to the business interruption of the region. By far, the largest loss was sustained by the residential occupancies which made up over 98% of the total loss. Table 5 below provides a summary of the losses associated with the building damage.

Loss by Business Interruption Type (left) and Building Damage Type (right)



Loss Type by General Occupancy

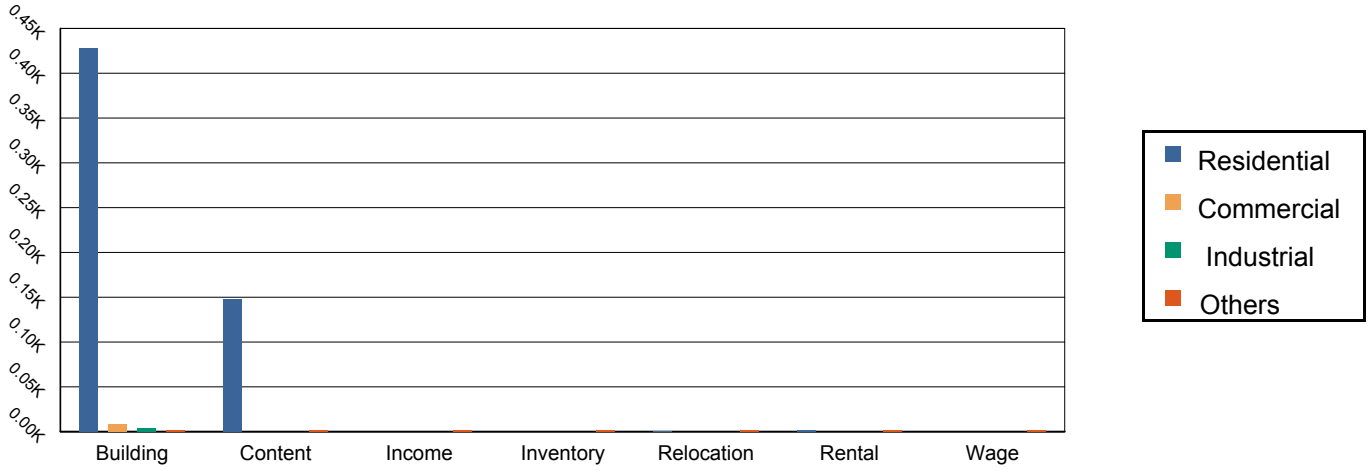


Table 5: Building-Related Economic Loss Estimates

(Thousands of dollars)

Category	Area	Residential	Commercial	Industrial	Others	Total
Property Damage						
	Building	428.10	8.04	3.41	1.54	441.09
	Content	148.01	0.00	0.00	0.00	148.01
	Inventory	0.00	0.00	0.00	0.00	0.00
	Subtotal	**576.11**	**8.04**	**3.41**	**1.54**	**589.09**
Business Interruption Loss						
	Income	0.00	0.00	0.00	0.00	0.00
	Relocation	1.11	0.01	0.00	0.00	1.12
	Rental	1.61	0.00	0.00	0.00	1.61
	Wage	0.00	0.00	0.00	0.00	0.00
	Subtotal	**2.72**	**0.01**	**0.00**	**0.00**	**2.73**

Total

Total	**578.82**	**8.05**	**3.41**	**1.54**	**591.82**

Appendix A: County Listing for the Region

Connecticut
- Middlesex

Appendix B: Regional Population and Building Value Data

		Building Value (thousands of dollars)		
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Connecticut				
Middlesex	13,260	1,661,441	400,494	2,061,935
Total	**13,260**	**1,661,441**	**400,494**	**2,061,935**
Study Region Total	**13,260**	**1,661,441**	**400,494**	**2,061,935**

Hazus: Hurricane Global Risk Report

Region Name: Clinton

Hurricane Scenario: Probabilistic 50-year Return Period

Print Date: Tuesday, October 1, 2019

Disclaimer:
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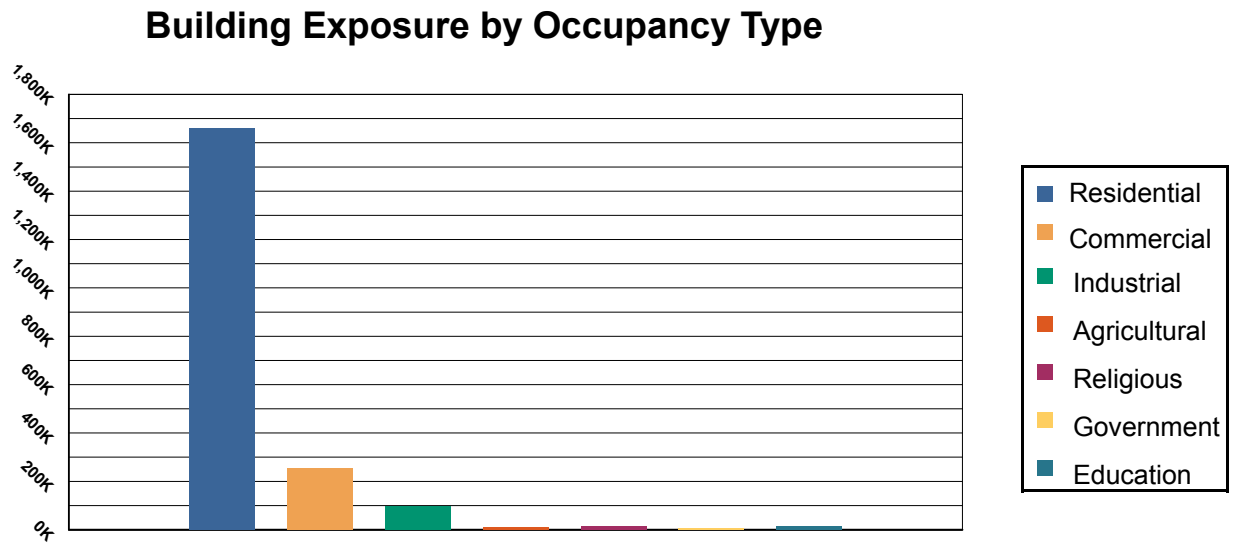

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Government	7,665	0.37%
Education	14,865	0.72%
Total	**2,061,935**	**100.00%**

Essential Facility Inventory

For essential facilities, there are no hospitals in the region with a total bed capacity of no beds. There are 5 schools, 2 fire stations, 1 police stations and 1 emergency operation facilities.

Hurricane Scenario

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

Scenario Name:	Probabilistic
Type:	Probabilistic

Building Damage

General Building Stock Damage

Hazus estimates that about 6 buildings will be at least moderately damaged. This is over 0% of the total number of buildings in the region. There are an estimated 0 buildings that will be completely destroyed. The definition of the 'damage states' is provided in the Hazus Hurricane technical manual. Table 2 below summarizes the expected damage by general occupancy for the buildings in the region. Table 3 summarizes the expected damage by general building type.

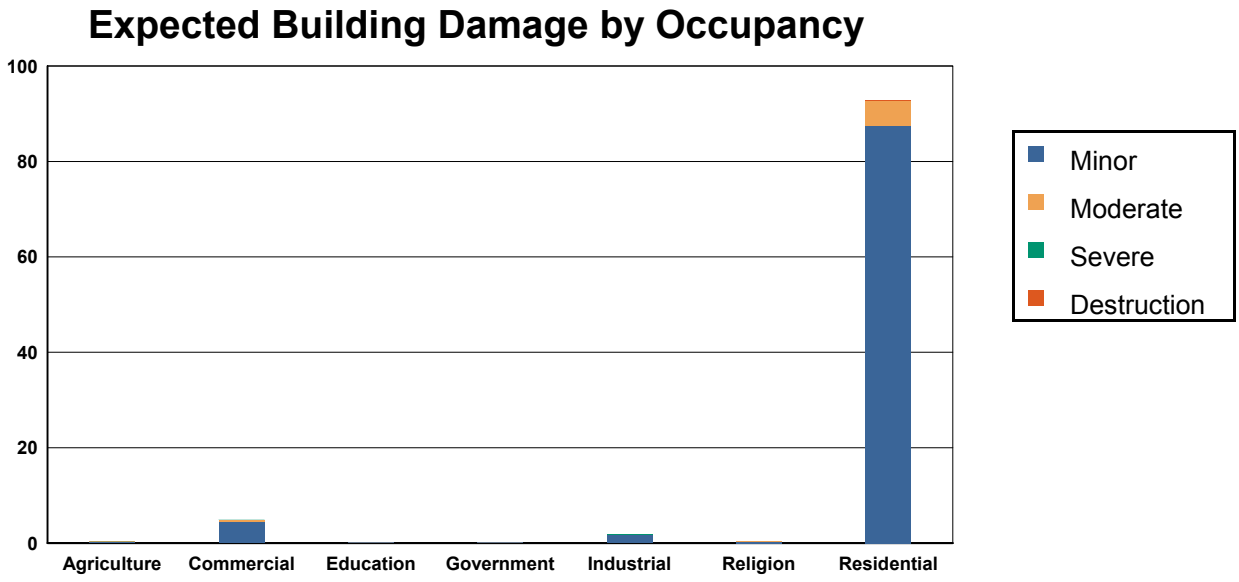


Table 2: Expected Building Damage by Occupancy : 50 - year Event

	None		Minor		Moderate		Severe		Destruction	
Occupancy	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**
Agriculture	28.55	98.46	0.40	1.37	0.04	0.13	0.01	0.04	0.00	0.00
Commercial	300.08	98.39	4.56	1.50	0.34	0.11	0.01	0.00	0.00	0.00
Education	9.85	98.48	0.15	1.47	0.00	0.04	0.00	0.00	0.00	0.00
Government	10.81	98.29	0.18	1.67	0.01	0.05	0.00	0.00	0.00	0.00
Industrial	126.10	98.51	1.83	1.43	0.07	0.05	0.01	0.01	0.00	0.00
Religion	17.73	98.50	0.26	1.45	0.01	0.05	0.00	0.00	0.00	0.00
Residential	5,250.16	98.26	87.45	1.64	5.20	0.10	0.15	0.00	0.03	0.00
Total	**5,743.28**		**94.83**		**5.67**		**0.18**		**0.03**	

Table 3: Expected Building Damage by Building Type : 50 - year Event

Building Type	None		Minor		Moderate		Severe		Destruction	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Concrete	32	98.07	1	1.88	0	0.05	0	0.00	0	0.00
Masonry	299	96.98	8	2.50	2	0.50	0	0.02	0	0.00
MH	248	99.91	0	0.07	0	0.02	0	0.00	0	0.00
Steel	213	98.42	3	1.49	0	0.09	0	0.00	0	0.00
Wood	4,737	98.36	76	1.58	3	0.05	0	0.00	0	0.00

Essential Facility Damage

Before the hurricane, the region had no hospital beds available for use. On the day of the hurricane, the model estimates that 0 hospital beds (0%) are available for use by patients already in the hospital and those injured by the hurricane. After one week, none of the beds will be in service. By 30 days, none will be operational.

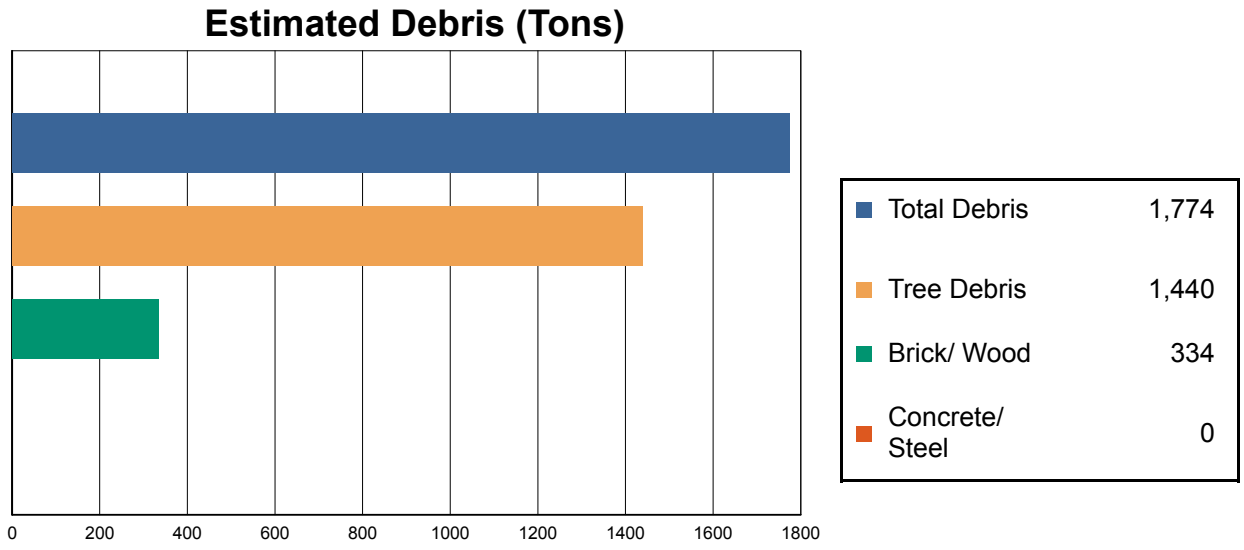
Thematic Map of Essential Facilities with greater than 50% moderate

Table 4: Expected Damage to Essential Facilities

		# Facilities		
Classification	**Total**	**Probability of at Least Moderate Damage > 50%**	**Probability of Complete Damage > 50%**	**Expected Loss of Use < 1 day**
EOCs	1	0	0	1
Fire Stations	2	0	0	2
Police Stations	1	0	0	1
Schools	5	0	0	5

Induced Hurricane Damage

Debris Generation

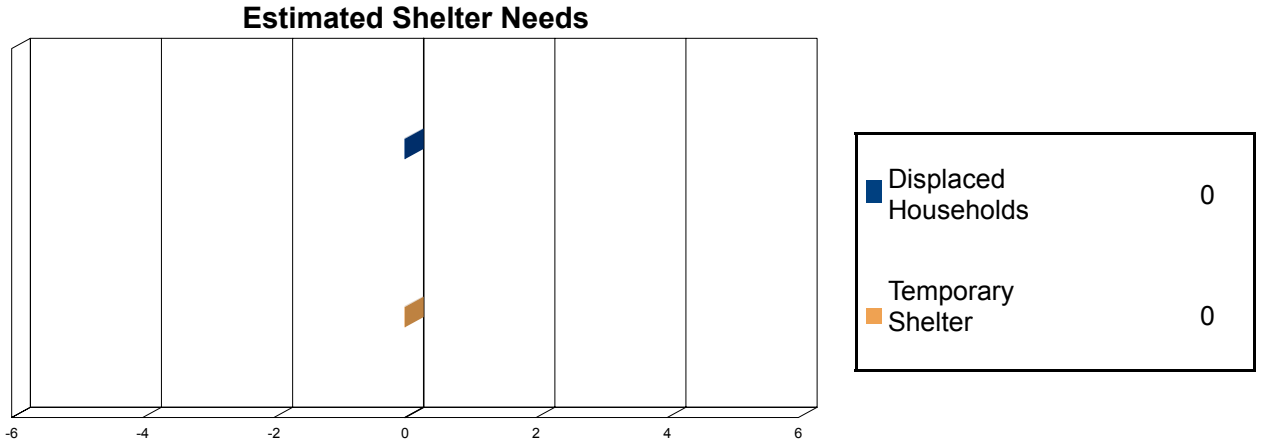


Hazus estimates the amount of debris that will be generated by the hurricane. The model breaks the debris into four general categories: a) Brick/Wood, b) Reinforced Concrete/Steel, c) Eligible Tree Debris, and d) Other Tree Debris. This distinction is made because of the different types of material handling equipment required to handle the debris.

The model estimates that a total of 1,774 tons of debris will be generated. Of the total amount, 729 tons (41%) is Other Tree Debris. Of the remaining 1,045 tons, Brick/Wood comprises 32% of the total, Reinforced Concrete/Steel comprises of 0% of the total, with the remainder being Eligible Tree Debris. If the building debris tonnage is converted to an estimated number of truckloads, it will require 13 truckloads (@25 tons/truck) to remove the building debris generated by the hurricane. The number of Eligible Tree Debris truckloads will depend on how the 711 tons of Eligible Tree Debris are collected and processed. The volume of tree debris generally ranges from about 4 cubic yards per ton for chipped or compacted tree debris to about 10 cubic yards per ton for bulkier, uncompacted debris.

Social Impact

Shelter Requirement



Hazus estimates the number of households that are expected to be displaced from their homes due to the hurricane and the number of displaced people that will require accommodations in temporary public shelters. The model estimates 0 households to be displaced due to the hurricane. Of these, 0 people (out of a total population of 13,260) will seek temporary shelter in public shelters.

Economic Loss

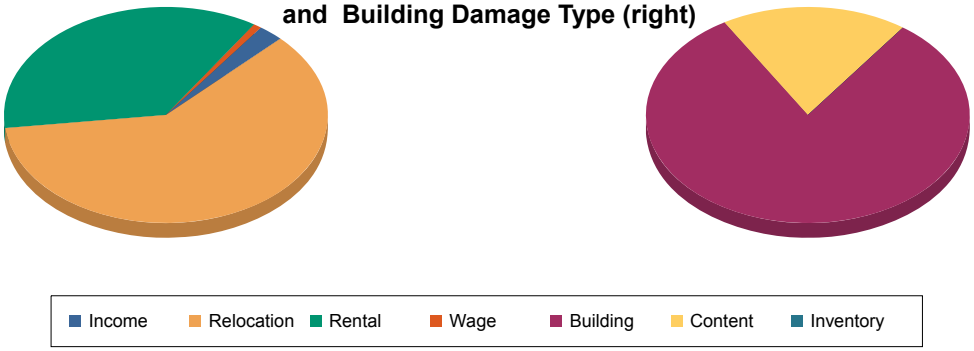
The total economic loss estimated for the hurricane is 6.5 million dollars, which represents 0.31 % of the total replacement value of the region's buildings.

Building-Related Losses

The building related losses are broken into two categories: direct property damage losses and business interruption losses. The direct property damage 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 hurricane. Business interruption losses also include the temporary living expenses for those people displaced from their homes because of the hurricane.

The total property damage losses were 6 million dollars. 3% of the estimated losses were related to the business interruption of the region. By far, the largest loss was sustained by the residential occupancies which made up over 97% of the total loss. Table 5 below provides a summary of the losses associated with the building damage.

Loss by Business Interruption Type (left) and Building Damage Type (right)



Loss Type by General Occupancy

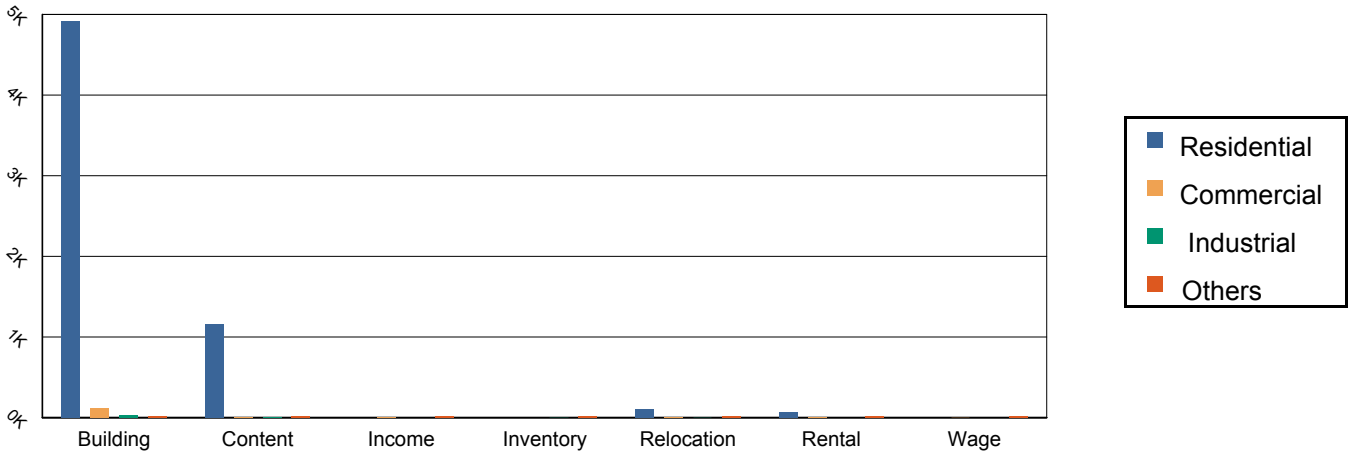


Table 5: Building-Related Economic Loss Estimates

(Thousands of dollars)

Category	Area	Residential	Commercial	Industrial	Others	Total
Property Damage						
	Building	4,915.39	123.66	34.52	21.04	5,094.61
	Content	1,160.51	7.85	4.39	1.41	1,174.17
	Inventory	0.00	0.14	0.69	0.09	0.92
	Subtotal	**6,075.91**	**131.65**	**39.61**	**22.54**	**6,269.70**
Business Interruption Loss						
	Income	0.00	4.35	0.01	0.00	4.36
	Relocation	105.83	4.35	0.26	0.22	110.65
	Rental	63.71	1.94	0.00	0.00	65.65
	Wage	0.00	1.55	0.02	0.00	1.56
	Subtotal	**169.54**	**12.18**	**0.29**	**0.22**	**182.22**

Total

Total	**6,245.44**	**143.82**	**39.89**	**22.76**	**6,451.92**

Appendix A: County Listing for the Region

Connecticut
- Middlesex

Appendix B: Regional Population and Building Value Data

		Building Value (thousands of dollars)		
	Population	Residential	Non-Residential	Total
Connecticut				
Middlesex	13,260	1,661,441	400,494	2,061,935
Total	**13,260**	**1,661,441**	**400,494**	**2,061,935**
Study Region Total	**13,260**	**1,661,441**	**400,494**	**2,061,935**

Hazus: Hurricane Global Risk Report

Region Name: Clinton

Hurricane Scenario: Probabilistic 100-year Return Period

Print Date: Tuesday, October 1, 2019

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 Hurricane. These results can be improved by using enhanced inventory data.

Table of Contents

General Description of the Region

Hazus is a regional multi-hazard loss estimation model that was developed by the Federal Emergency Management Agency and the National Institute of Building Sciences. 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 hurricane loss estimates provided in this report are based on a region that includes 1 county(ies) from the following state(s):

- Connecticut

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

The geographical size of the region is 16.39 square miles and contains 4 census tracts. There are over 5 thousand households in the region and a total population of 13,260 people (2010 Census Bureau data). The distribution of population by State and County is provided in Appendix B.

There are an estimated 5 thousand buildings in the region with a total building replacement value (excluding contents) of 2,062 million dollars (2014 dollars). Approximately 91% of the buildings (and 81% of the building value) are associated with residential housing.

Building Inventory

General Building Stock

Hazus estimates that there are 5,844 buildings in the region which have an aggregate total replacement value of 2,062 million (2014 dollars). Table 1 presents the relative distribution of the value with respect to the general occupancies. Appendix B provides a general distribution of the building value by State and County.

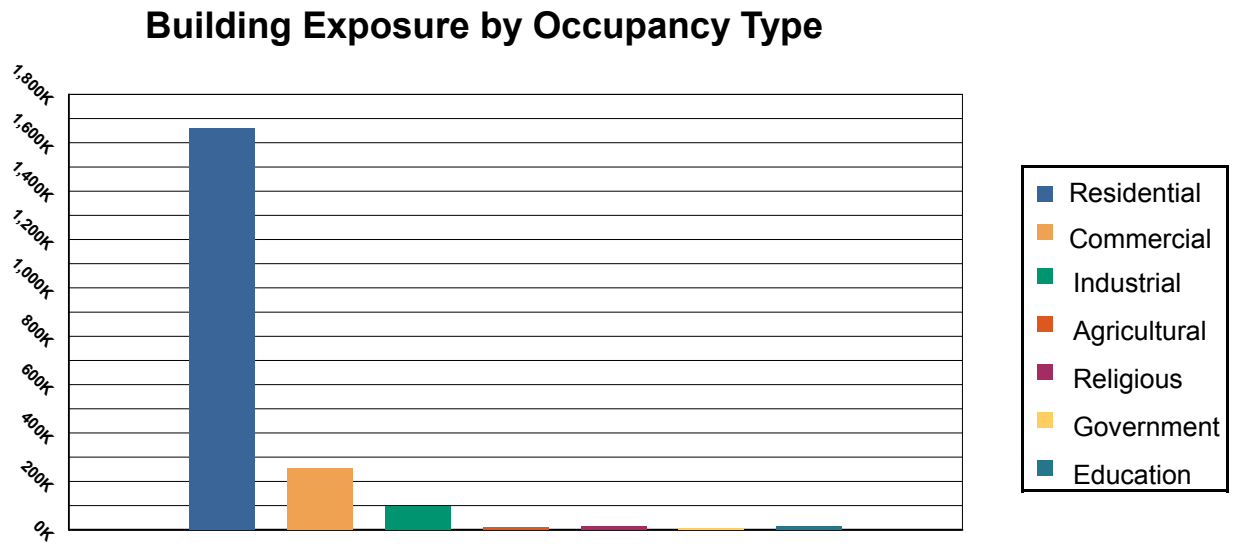


Table 1: Building Exposure by Occupancy Type

Occupancy	Exposure ($1000)	Percent of Tot
Residential	1,661,441	80.58 %
Commercial	255,126	12.37%
Industrial	98,279	4.77%
Agricultural	8,589	0.42%
Religious	15,970	0.77%
Government	7,665	0.37%
Education	14,865	0.72%
Total	**2,061,935**	**100.00%**

Essential Facility Inventory

For essential facilities, there are no hospitals in the region with a total bed capacity of no beds. There are 5 schools, 2 fire stations, 1 police stations and 1 emergency operation facilities.

Hurricane Scenario

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

Scenario Name:	Probabilistic
Type:	Probabilistic

Building Damage

General Building Stock Damage

Hazus estimates that about 42 buildings will be at least moderately damaged. This is over 1% of the total number of buildings in the region. There are an estimated 1 buildings that will be completely destroyed. The definition of the 'damage states' is provided in the Hazus Hurricane technical manual. Table 2 below summarizes the expected damage by general occupancy for the buildings in the region. Table 3 summarizes the expected damage by general building type.

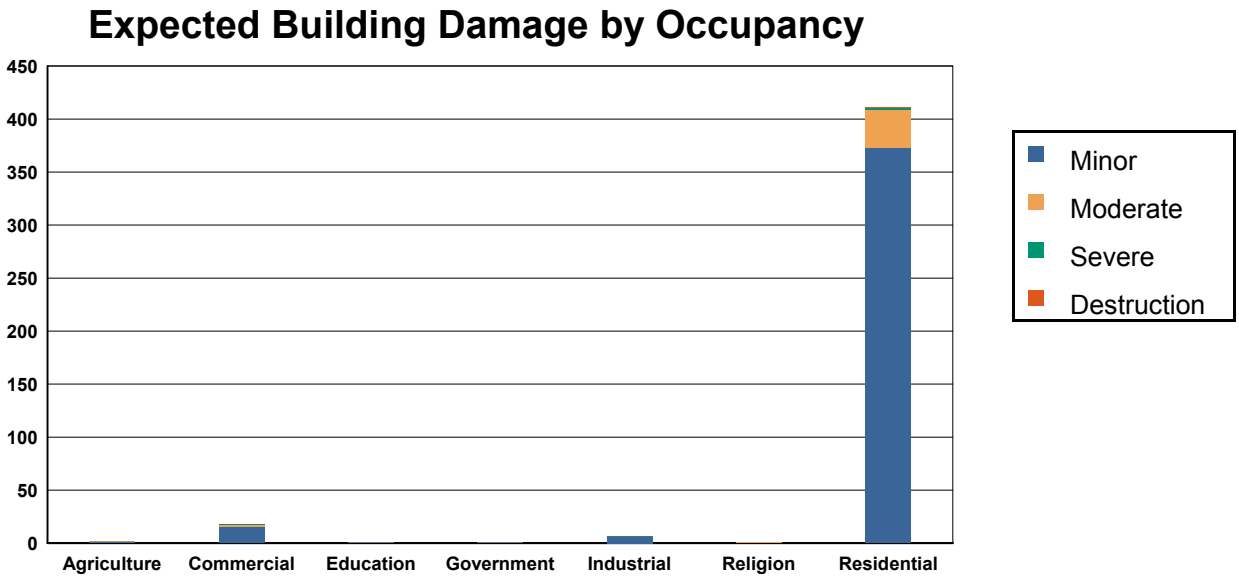


Table 2: Expected Building Damage by Occupancy : 100 - year Event

	None		Minor		Moderate		Severe		Destruction	
Occupancy	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**
Agriculture	27.09	93.40	1.53	5.26	0.27	0.94	0.11	0.39	0.01	0.02
Commercial	286.97	94.09	15.44	5.06	2.39	0.78	0.21	0.07	0.00	0.00
Education	9.45	94.49	0.49	4.94	0.05	0.55	0.00	0.02	0.00	0.00
Government	10.33	93.92	0.60	5.41	0.07	0.65	0.00	0.02	0.00	0.00
Industrial	121.31	94.77	5.83	4.55	0.73	0.57	0.12	0.09	0.00	0.00
Religion	16.92	93.99	0.99	5.48	0.09	0.50	0.00	0.03	0.00	0.00
Residential	4,932.00	92.31	373.08	6.98	35.91	0.67	1.05	0.02	0.96	0.02
Total	**5,404.07**		**397.95**		**39.52**		**1.50**		**0.97**	

Table 3: Expected Building Damage by Building Type : 100 - year Event

Building Type	None		Minor		Moderate		Severe		Destruction	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Concrete	31	93.38	2	5.84	0	0.76	0	0.02	0	0.00
Masonry	279	90.44	22	7.13	7	2.32	0	0.10	0	0.01
MH	245	98.96	2	0.77	1	0.20	0	0.00	0	0.07
Steel	204	94.57	10	4.60	2	0.75	0	0.08	0	0.00
Wood	4,449	92.38	342	7.10	23	0.48	1	0.02	1	0.02

Essential Facility Damage

Before the hurricane, the region had no hospital beds available for use. On the day of the hurricane, the model estimates that 0 hospital beds (0%) are available for use by patients already in the hospital and those injured by the hurricane. After one week, none of the beds will be in service. By 30 days, none will be operational.

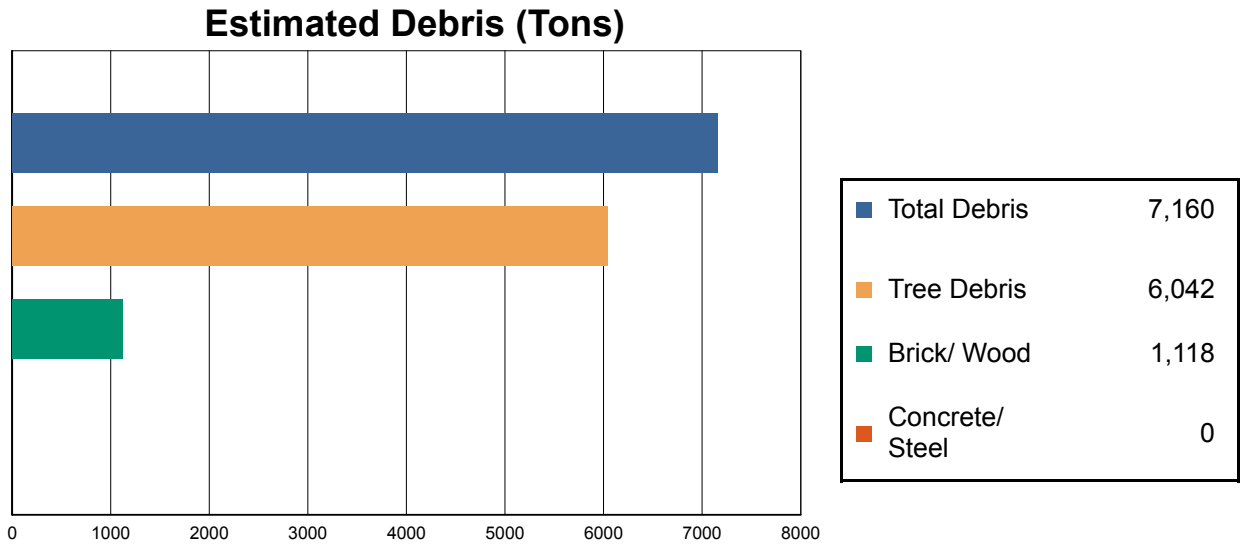
Thematic Map of Essential Facilities with greater than 50% moderate

Table 4: Expected Damage to Essential Facilities

		# Facilities		
Classification	**Total**	**Probability of at Least Moderate Damage > 50%**	**Probability of Complete Damage > 50%**	**Expected Loss of Use < 1 day**
EOCs	1	0	0	1
Fire Stations	2	0	0	2
Police Stations	1	0	0	1
Schools	5	0	0	5

Induced Hurricane Damage

Debris Generation

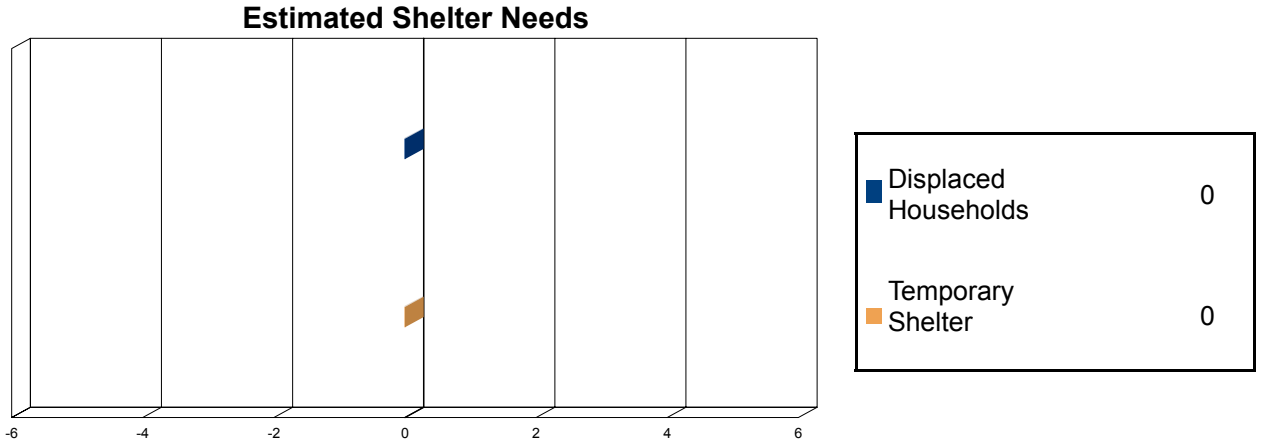


Hazus estimates the amount of debris that will be generated by the hurricane. The model breaks the debris into four general categories: a) Brick/Wood, b) Reinforced Concrete/Steel, c) Eligible Tree Debris, and d) Other Tree Debris. This distinction is made because of the different types of material handling equipment required to handle the debris.

The model estimates that a total of 7,160 tons of debris will be generated. Of the total amount, 3,721 tons (52%) is Other Tree Debris. Of the remaining 3,439 tons, Brick/Wood comprises 33% of the total, Reinforced Concrete/Steel comprises of 0% of the total, with the remainder being Eligible Tree Debris. If the building debris tonnage is converted to an estimated number of truckloads, it will require 45 truckloads (@25 tons/truck) to remove the building debris generated by the hurricane. The number of Eligible Tree Debris truckloads will depend on how the 2,321 tons of Eligible Tree Debris are collected and processed. The volume of tree debris generally ranges from about 4 cubic yards per ton for chipped or compacted tree debris to about 10 cubic yards per ton for bulkier, uncompacted debris.

Social Impact

Shelter Requirement



Hazus estimates the number of households that are expected to be displaced from their homes due to the hurricane and the number of displaced people that will require accommodations in temporary public shelters. The model estimates 0 households to be displaced due to the hurricane. Of these, 0 people (out of a total population of 13,260) will seek temporary shelter in public shelters.

Economic Loss

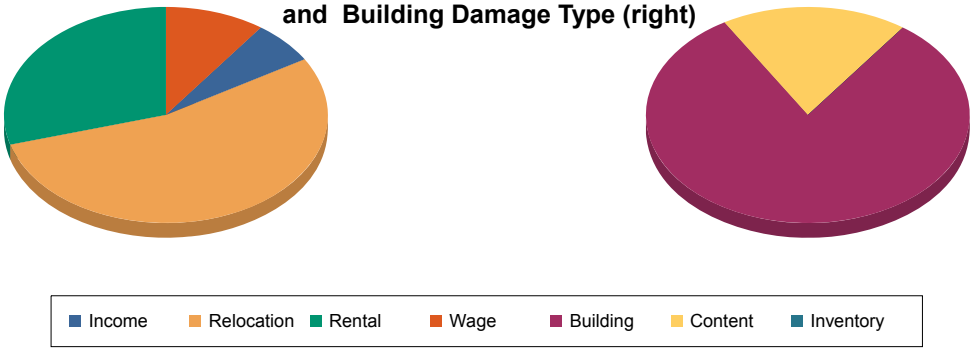
The total economic loss estimated for the hurricane is 17.3 million dollars, which represents 0.84 % of the total replacement value of the region's buildings.

Building-Related Losses

The building related losses are broken into two categories: direct property damage losses and business interruption losses. The direct property damage 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 hurricane. Business interruption losses also include the temporary living expenses for those people displaced from their homes because of the hurricane.

The total property damage losses were 17 million dollars. 5% of the estimated losses were related to the business interruption of the region. By far, the largest loss was sustained by the residential occupancies which made up over 94% of the total loss. Table 5 below provides a summary of the losses associated with the building damage.

Loss by Business Interruption Type (left) and Building Damage Type (right)



Loss Type by General Occupancy

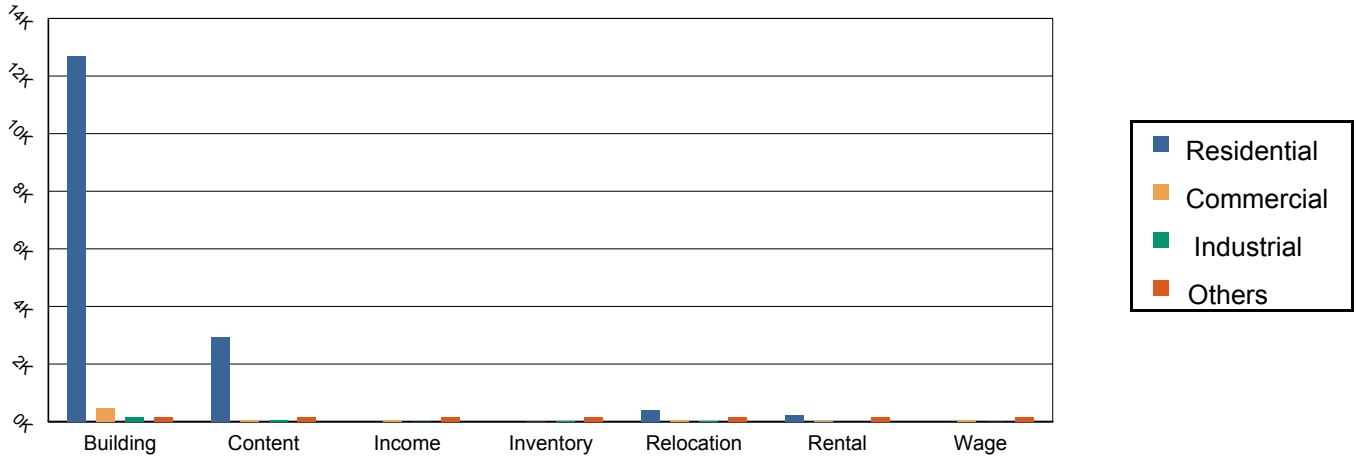


Table 5: Building-Related Economic Loss Estimates

(Thousands of dollars)

Category	Area	Residential	Commercial	Industrial	Others	Total
Property Damage						
	Building	12,680.66	457.12	150.30	87.35	13,375.43
	Content	2,924.67	70.68	47.99	17.04	3,060.39
	Inventory	0.00	1.60	7.04	0.93	9.57
	Subtotal	**15,605.33**	**529.40**	**205.34**	**105.33**	**16,445.40**
Business Interruption Loss						
	Income	0.00	45.40	0.70	6.91	53.02
	Relocation	389.48	51.22	5.16	9.83	455.68
	Rental	215.31	28.59	0.55	0.84	245.28
	Wage	0.00	46.60	1.19	36.72	84.51
	Subtotal	**604.79**	**171.80**	**7.60**	**54.29**	**838.49**

Total

Total	**16,210.12**	**701.20**	**212.94**	**159.62**	**17,283.88**

Appendix A: County Listing for the Region

Connecticut
- Middlesex

Appendix B: Regional Population and Building Value Data

		Building Value (thousands of dollars)		
	Population	Residential	Non-Residential	Total
Connecticut				
Middlesex	13,260	1,661,441	400,494	2,061,935
Total	**13,260**	**1,661,441**	**400,494**	**2,061,935**
Study Region Total	**13,260**	**1,661,441**	**400,494**	**2,061,935**

Hazus: Hurricane Global Risk Report

Region Name: Clinton

Hurricane Scenario: Probabilistic 200-year Return Period

Print Date: Tuesday, October 1, 2019

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.

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The hurricane loss estimates provided in this report are based on a region that includes 1 county(ies) from the following state(s):

- Connecticut

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

The geographical size of the region is 16.39 square miles and contains 4 census tracts. There are over 5 thousand households in the region and a total population of 13,260 people (2010 Census Bureau data). The distribution of population by State and County is provided in Appendix B.

There are an estimated 5 thousand buildings in the region with a total building replacement value (excluding contents) of 2,062 million dollars (2014 dollars). Approximately 91% of the buildings (and 81% of the building value) are associated with residential housing.

Building Inventory

General Building Stock

Hazus estimates that there are 5,844 buildings in the region which have an aggregate total replacement value of 2,062 million (2014 dollars). Table 1 presents the relative distribution of the value with respect to the general occupancies. Appendix B provides a general distribution of the building value by State and County.

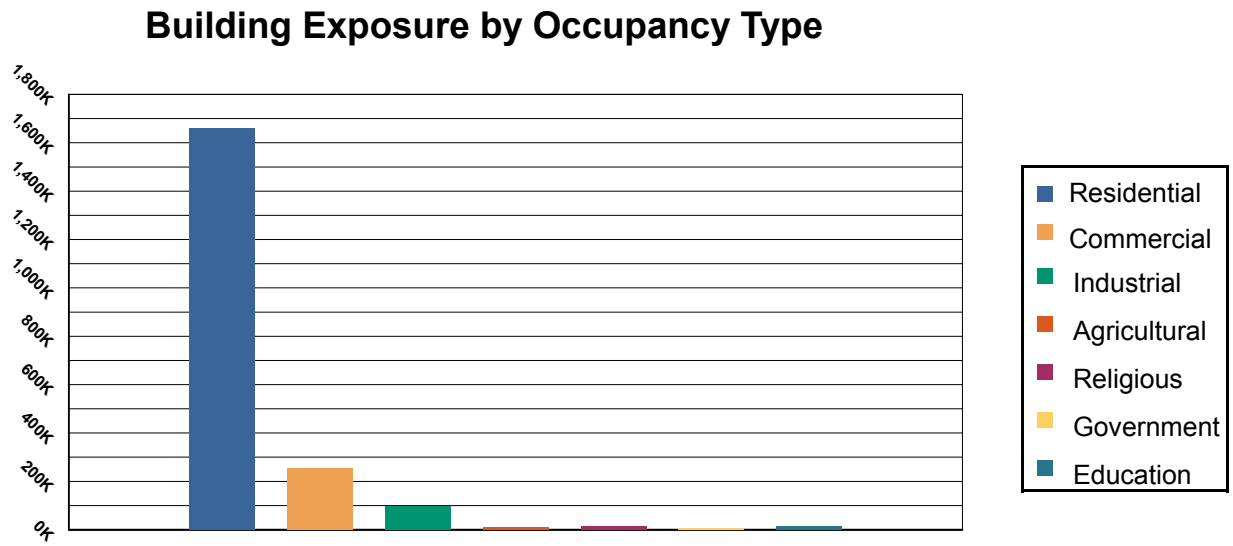


Table 1: Building Exposure by Occupancy Type

Occupancy	Exposure ($1000)	Percent of Tot
Residential	1,661,441	80.58 %
Commercial	255,126	12.37%
Industrial	98,279	4.77%
Agricultural	8,589	0.42%
Religious	15,970	0.77%
Government	7,665	0.37%
Education	14,865	0.72%
Total	**2,061,935**	**100.00%**

Essential Facility Inventory

For essential facilities, there are no hospitals in the region with a total bed capacity of no beds. There are 5 schools, 2 fire stations, 1 police stations and 1 emergency operation facilities.

Hurricane Scenario

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

Scenario Name:	Probabilistic
Type:	Probabilistic

Building Damage

General Building Stock Damage

Hazus estimates that about 174 buildings will be at least moderately damaged. This is over 3% of the total number of buildings in the region. There are an estimated 9 buildings that will be completely destroyed. The definition of the 'damage states' is provided in the Hazus Hurricane technical manual. Table 2 below summarizes the expected damage by general occupancy for the buildings in the region. Table 3 summarizes the expected damage by general building type.

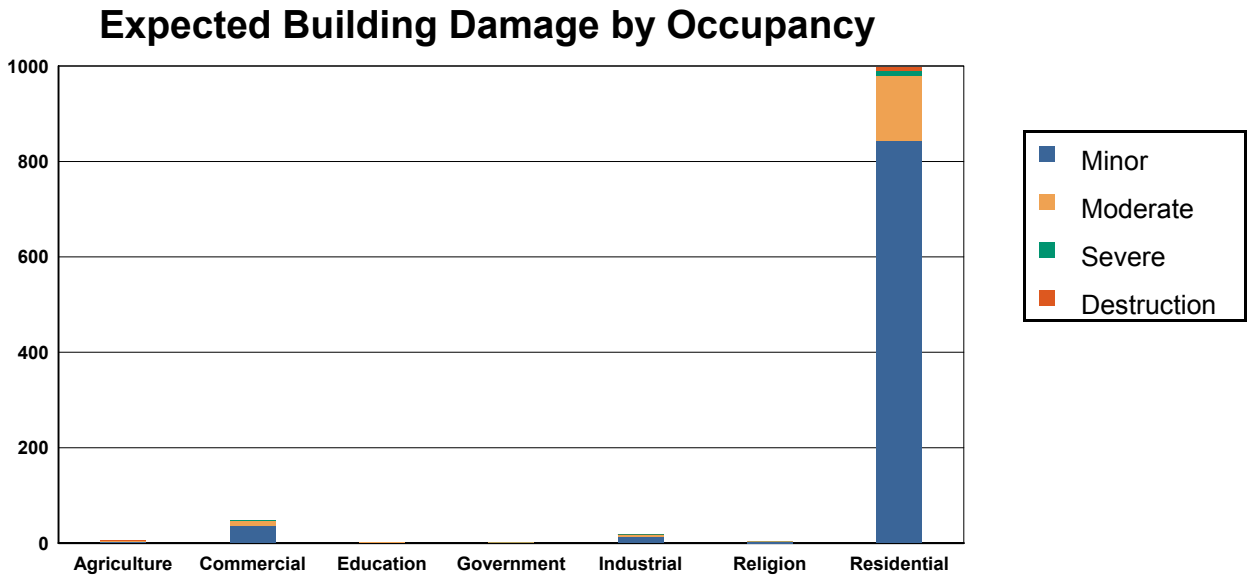


Table 2: Expected Building Damage by Occupancy : 200 - year Event

	None		Minor		Moderate		Severe		Destruction	
Occupancy	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**
Agriculture	24.04	82.89	3.58	12.34	0.91	3.14	0.43	1.48	0.04	0.15
Commercial	256.69	84.16	36.44	11.95	10.47	3.43	1.39	0.46	0.00	0.00
Education	8.52	85.24	1.15	11.49	0.29	2.95	0.03	0.33	0.00	0.00
Government	9.18	83.49	1.37	12.44	0.41	3.72	0.04	0.35	0.00	0.00
Industrial	110.19	86.09	13.43	10.49	3.63	2.84	0.71	0.56	0.04	0.03
Religion	15.00	83.34	2.43	13.49	0.52	2.89	0.05	0.27	0.00	0.00
Residential	4,345.78	81.34	842.27	15.76	137.79	2.58	8.63	0.16	8.52	0.16
Total	**4,769.40**		**900.67**		**154.03**		**11.29**		**8.61**	

Table 3: Expected Building Damage by Building Type : 200 - year Event

Building Type	None		Minor		Moderate		Severe		Destruction	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Concrete	27	81.99	4	13.15	1	4.49	0	0.37	0	0.00
Masonry	242	78.71	44	14.19	20	6.57	1	0.47	0	0.06
MH	236	95.33	7	2.94	3	1.26	0	0.03	1	0.44
Steel	184	85.35	23	10.57	8	3.50	1	0.57	0	0.00
Wood	3,912	81.23	785	16.31	103	2.15	8	0.16	7	0.15

Essential Facility Damage

Before the hurricane, the region had no hospital beds available for use. On the day of the hurricane, the model estimates that 0 hospital beds (0%) are available for use by patients already in the hospital and those injured by the hurricane. After one week, none of the beds will be in service. By 30 days, none will be operational.

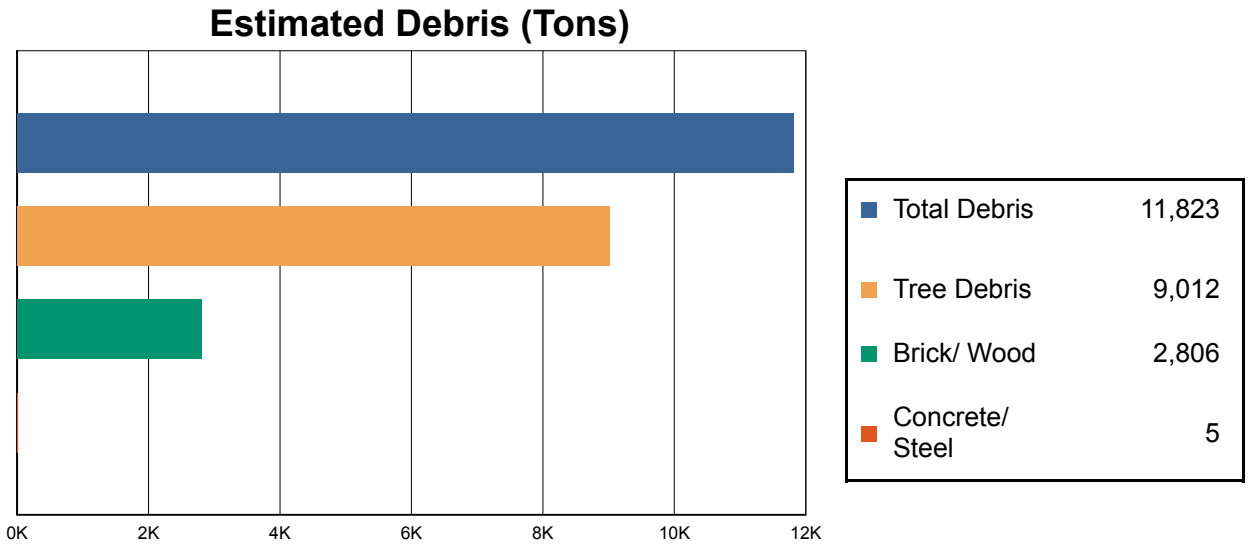
Thematic Map of Essential Facilities with greater than 50% moderate

Table 4: Expected Damage to Essential Facilities

		# Facilities		
Classification	**Total**	**Probability of at Least Moderate Damage > 50%**	**Probability of Complete Damage > 50%**	**Expected Loss of Use < 1 day**
EOCs	1	0	0	1
Fire Stations	2	0	0	2
Police Stations	1	0	0	1
Schools	5	0	0	3

Induced Hurricane Damage

Debris Generation

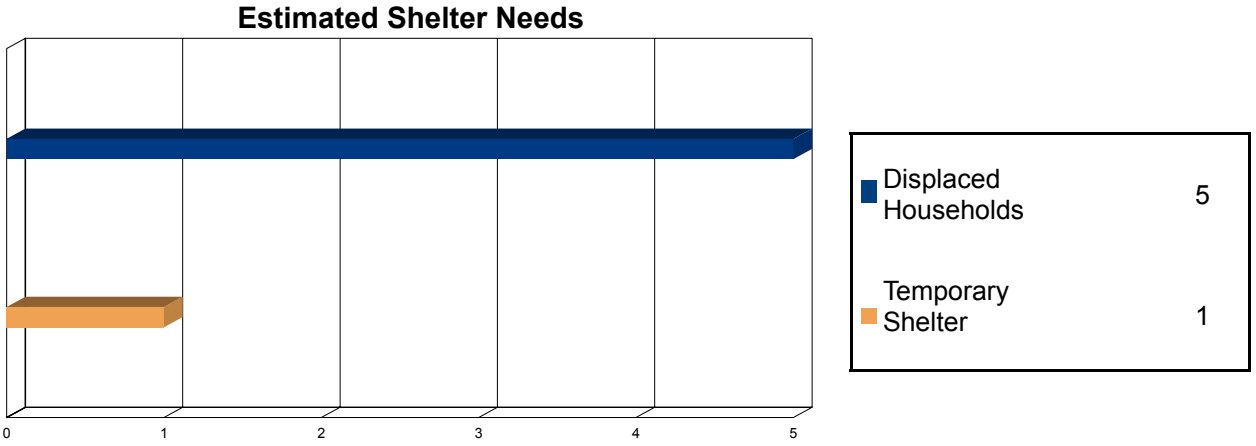


Hazus estimates the amount of debris that will be generated by the hurricane. The model breaks the debris into four general categories: a) Brick/Wood, b) Reinforced Concrete/Steel, c) Eligible Tree Debris, and d) Other Tree Debris. This distinction is made because of the different types of material handling equipment required to handle the debris.

The model estimates that a total of 11,823 tons of debris will be generated. Of the total amount, 5,330 tons (45%) is Other Tree Debris. Of the remaining 6,493 tons, Brick/Wood comprises 43% of the total, Reinforced Concrete/Steel comprises of 0% of the total, with the remainder being Eligible Tree Debris. If the building debris tonnage is converted to an estimated number of truckloads, it will require 112 truckloads (@25 tons/truck) to remove the building debris generated by the hurricane. The number of Eligible Tree Debris truckloads will depend on how the 3,682 tons of Eligible Tree Debris are collected and processed. The volume of tree debris generally ranges from about 4 cubic yards per ton for chipped or compacted tree debris to about 10 cubic yards per ton for bulkier, uncompacted debris.

Social Impact

Shelter Requirement



Hazus estimates the number of households that are expected to be displaced from their homes due to the hurricane and the number of displaced people that will require accommodations in temporary public shelters. The model estimates 5 households to be displaced due to the hurricane. Of these, 1 people (out of a total population of 13,260) will seek temporary shelter in public shelters.

Economic Loss

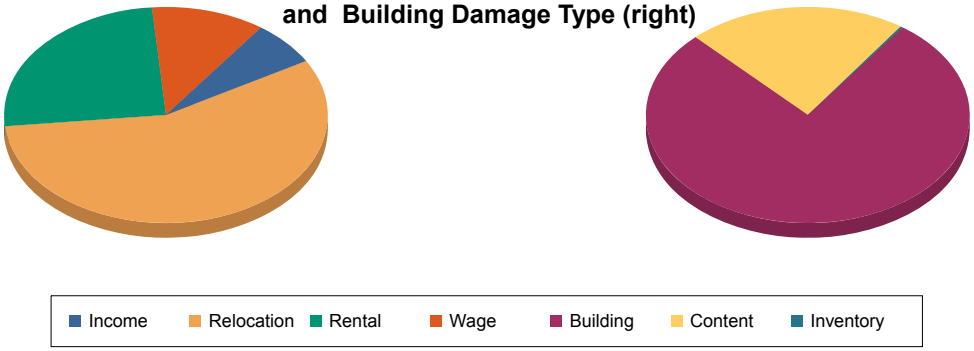
The total economic loss estimated for the hurricane is 41.8 million dollars, which represents 2.03 % of the total replacement value of the region's buildings.

Building-Related Losses

The building related losses are broken into two categories: direct property damage losses and business interruption losses. The direct property damage 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 hurricane. Business interruption losses also include the temporary living expenses for those people displaced from their homes because of the hurricane.

The total property damage losses were 42 million dollars. 7% of the estimated losses were related to the business interruption of the region. By far, the largest loss was sustained by the residential occupancies which made up over 90% of the total loss. Table 5 below provides a summary of the losses associated with the building damage.

Loss by Business Interruption Type (left) and Building Damage Type (right)



Loss Type by General Occupancy

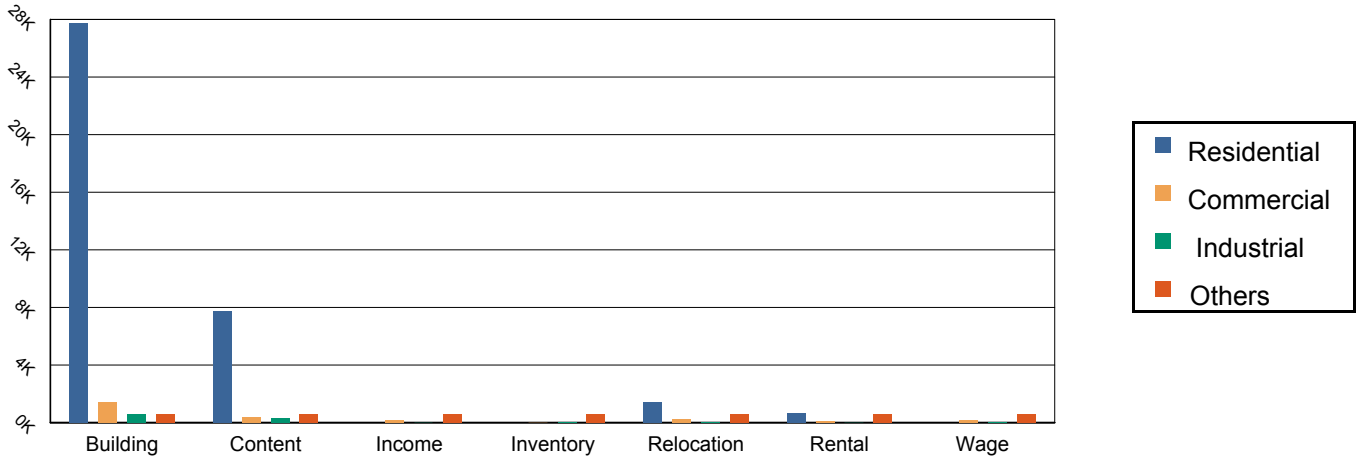


Table 5: Building-Related Economic Loss Estimates

(Thousands of dollars)

Category	Area	Residential	Commercial	Industrial	Others	Total
Property Damage						
	Building	27,769.19	1,420.85	568.13	296.83	30,055.00
	Content	7,772.99	393.29	303.64	96.61	8,566.53
	Inventory	0.00	8.79	42.01	3.98	54.78
	Subtotal	**35,542.18**	**1,822.93**	**913.77**	**397.42**	**38,676.30**
Business Interruption Loss						
	Income	0.00	181.75	6.86	21.69	210.30
	Relocation	1,436.67	248.14	40.34	48.49	1,773.64
	Rental	634.67	140.95	5.56	4.01	785.18
	Wage	0.00	193.70	11.33	155.81	360.84
	Subtotal	**2,071.34**	**764.54**	**64.08**	**229.99**	**3,129.96**

Total

Total	**37,613.52**	**2,587.47**	**977.85**	**627.41**	**41,806.26**

Appendix A: County Listing for the Region

Connecticut
- Middlesex

Appendix B: Regional Population and Building Value Data

		Building Value (thousands of dollars)		
	Population	Residential	Non-Residential	Total
Connecticut				
Middlesex	13,260	1,661,441	400,494	2,061,935
Total	**13,260**	**1,661,441**	**400,494**	**2,061,935**
Study Region Total	**13,260**	**1,661,441**	**400,494**	**2,061,935**

Hazus: Hurricane Global Risk Report

Region Name: Clinton

Hurricane Scenario: Probabilistic 500-year Return Period

Print Date: Tuesday, October 1, 2019

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 Hurricane. These results can be improved by using enhanced inventory data.

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General Description of the Region

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The hurricane loss estimates provided in this report are based on a region that includes 1 county(ies) from the following state(s):

- Connecticut

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

The geographical size of the region is 16.39 square miles and contains 4 census tracts. There are over 5 thousand households in the region and a total population of 13,260 people (2010 Census Bureau data). The distribution of population by State and County is provided in Appendix B.

There are an estimated 5 thousand buildings in the region with a total building replacement value (excluding contents) of 2,062 million dollars (2014 dollars). Approximately 91% of the buildings (and 81% of the building value) are associated with residential housing.

Building Inventory

General Building Stock

Hazus estimates that there are 5,844 buildings in the region which have an aggregate total replacement value of 2,062 million (2014 dollars). Table 1 presents the relative distribution of the value with respect to the general occupancies. Appendix B provides a general distribution of the building value by State and County.

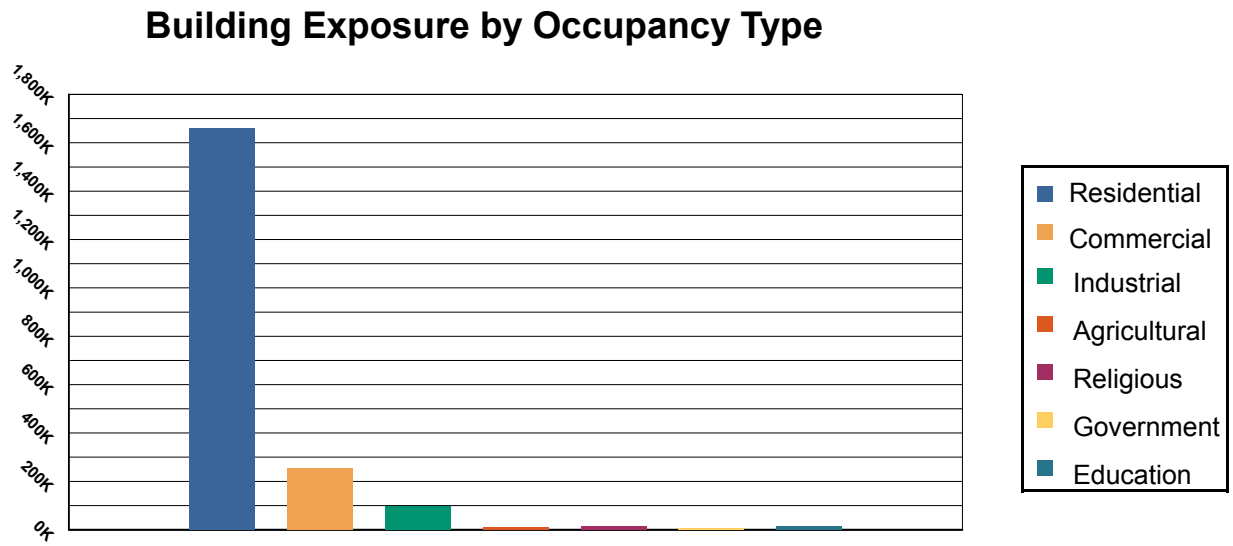


Table 1: Building Exposure by Occupancy Type

Occupancy	Exposure ($1000)	Percent of Tot
Residential	1,661,441	80.58 %
Commercial	255,126	12.37%
Industrial	98,279	4.77%
Agricultural	8,589	0.42%
Religious	15,970	0.77%
Government	7,665	0.37%
Education	14,865	0.72%
Total	**2,061,935**	**100.00%**

Essential Facility Inventory

For essential facilities, there are no hospitals in the region with a total bed capacity of no beds. There are 5 schools, 2 fire stations, 1 police stations and 1 emergency operation facilities.

Hurricane Scenario

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

Scenario Name:	Probabilistic
Type:	Probabilistic

Building Damage

General Building Stock Damage

Hazus estimates that about 532 buildings will be at least moderately damaged. This is over 9% of the total number of buildings in the region. There are an estimated 41 buildings that will be completely destroyed. The definition of the 'damage states' is provided in the Hazus Hurricane technical manual. Table 2 below summarizes the expected damage by general occupancy for the buildings in the region. Table 3 summarizes the expected damage by general building type.

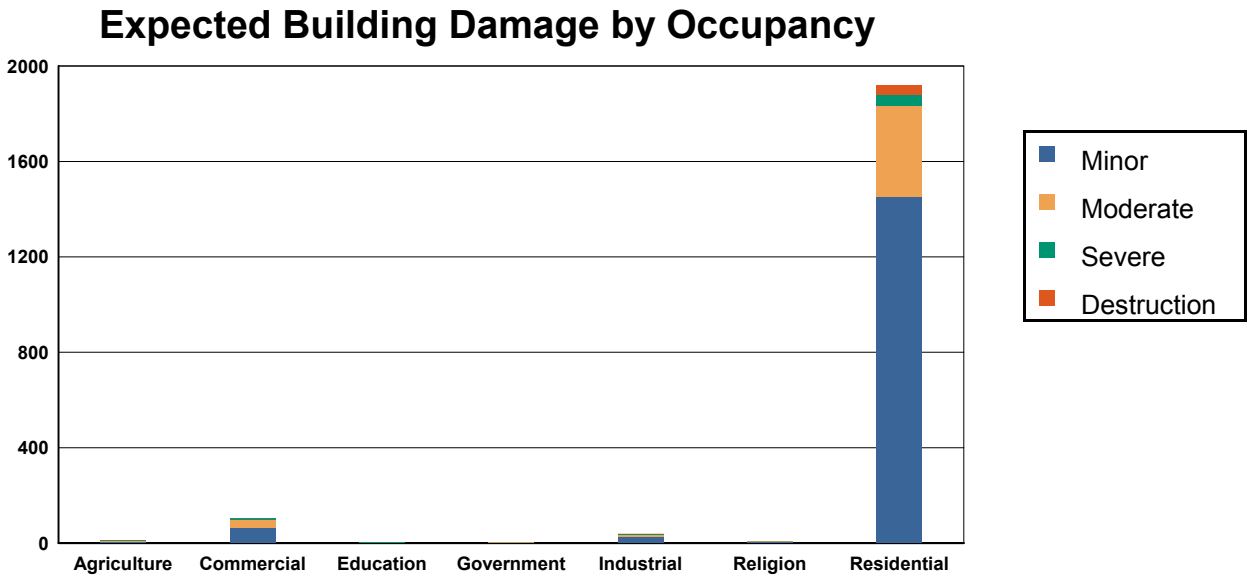


Table 2: Expected Building Damage by Occupancy : 500 - year Event

	None		Minor		Moderate		Severe		Destruction	
Occupancy	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**
Agriculture	18.61	64.17	6.58	22.70	2.42	8.34	1.20	4.14	0.19	0.65
Commercial	201.30	66.00	64.29	21.08	32.11	10.53	7.25	2.38	0.05	0.02
Education	6.79	67.87	2.06	20.62	0.96	9.59	0.19	1.92	0.00	0.00
Government	7.19	65.38	2.24	20.40	1.27	11.52	0.30	2.69	0.00	0.00
Industrial	88.85	69.41	24.30	18.98	11.67	9.12	3.01	2.35	0.17	0.13
Religion	11.71	65.04	4.30	23.91	1.69	9.38	0.30	1.67	0.00	0.00
Residential	3,422.41	64.05	1,451.42	27.16	381.86	7.15	46.55	0.87	40.76	0.76
Total	**3,756.85**		**1,555.20**		**431.97**		**58.80**		**41.17**	

Table 3: Expected Building Damage by Building Type : 500 - year Event

Building Type	None		Minor		Moderate		Severe		Destruction	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Concrete	21	63.06	7	20.83	4	13.53	1	2.59	0	0.00
Masonry	188	61.11	69	22.25	45	14.49	6	1.85	1	0.30
MH	211	85.01	19	7.56	13	5.15	1	0.31	5	1.97
Steel	147	67.95	40	18.40	23	10.78	6	2.85	0	0.02
Wood	3,066	63.67	1,366	28.36	308	6.39	41	0.86	35	0.72

Essential Facility Damage

Before the hurricane, the region had no hospital beds available for use. On the day of the hurricane, the model estimates that 0 hospital beds (0%) are available for use by patients already in the hospital and those injured by the hurricane. After one week, none of the beds will be in service. By 30 days, none will be operational.

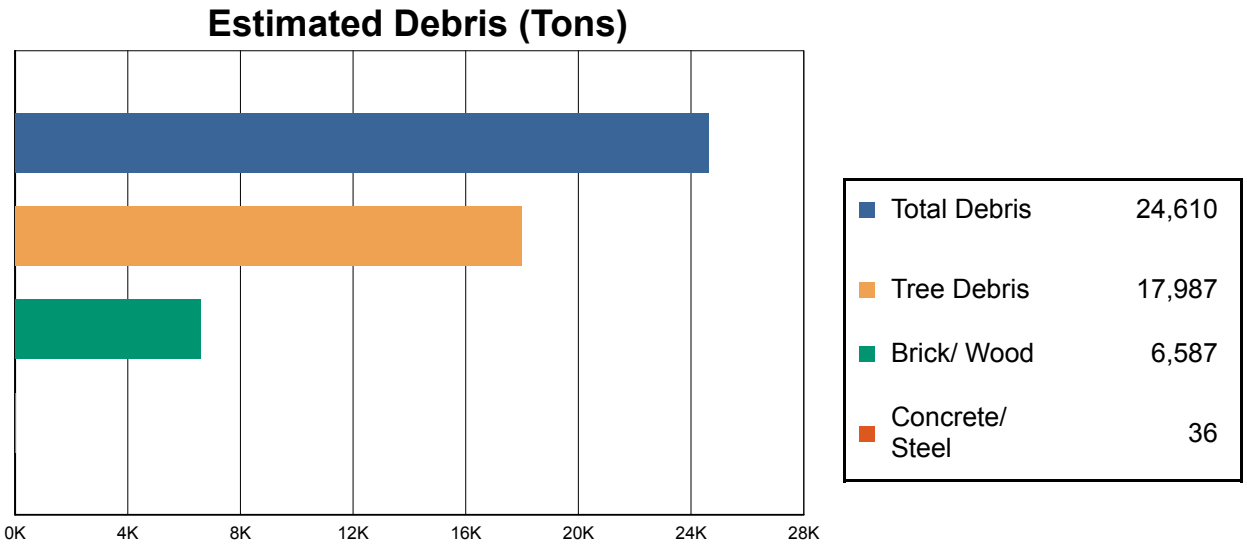
Thematic Map of Essential Facilities with greater than 50% moderate

Table 4: Expected Damage to Essential Facilities

		# Facilities		
Classification	**Total**	**Probability of at Least Moderate Damage > 50%**	**Probability of Complete Damage > 50%**	**Expected Loss of Use < 1 day**
EOCs	1	0	0	1
Fire Stations	2	0	0	2
Police Stations	1	0	0	1
Schools	5	0	0	0

Induced Hurricane Damage

Debris Generation

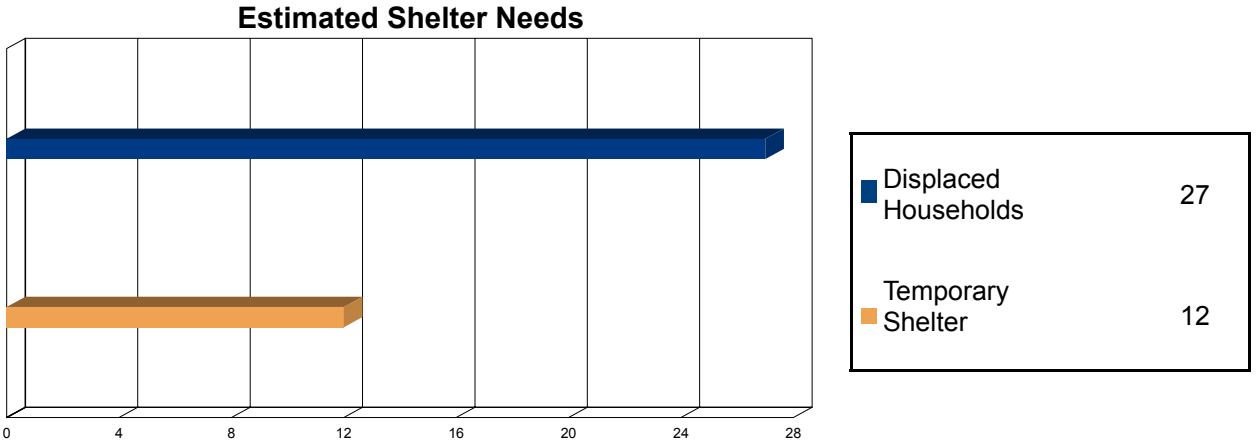


Hazus estimates the amount of debris that will be generated by the hurricane. The model breaks the debris into four general categories: a) Brick/Wood, b) Reinforced Concrete/Steel, c) Eligible Tree Debris, and d) Other Tree Debris. This distinction is made because of the different types of material handling equipment required to handle the debris.

The model estimates that a total of 24,610 tons of debris will be generated. Of the total amount, 11,152 tons (45%) is Other Tree Debris. Of the remaining 13,458 tons, Brick/Wood comprises 49% of the total, Reinforced Concrete/Steel comprises of 0% of the total, with the remainder being Eligible Tree Debris. If the building debris tonnage is converted to an estimated number of truckloads, it will require 265 truckloads (@25 tons/truck) to remove the building debris generated by the hurricane. The number of Eligible Tree Debris truckloads will depend on how the 6,835 tons of Eligible Tree Debris are collected and processed. The volume of tree debris generally ranges from about 4 cubic yards per ton for chipped or compacted tree debris to about 10 cubic yards per ton for bulkier, uncompacted debris.

Social Impact

Shelter Requirement



Hazus estimates the number of households that are expected to be displaced from their homes due to the hurricane and the number of displaced people that will require accommodations in temporary public shelters. The model estimates 27 households to be displaced due to the hurricane. Of these, 12 people (out of a total population of 13,260) will seek temporary shelter in public shelters.

Economic Loss

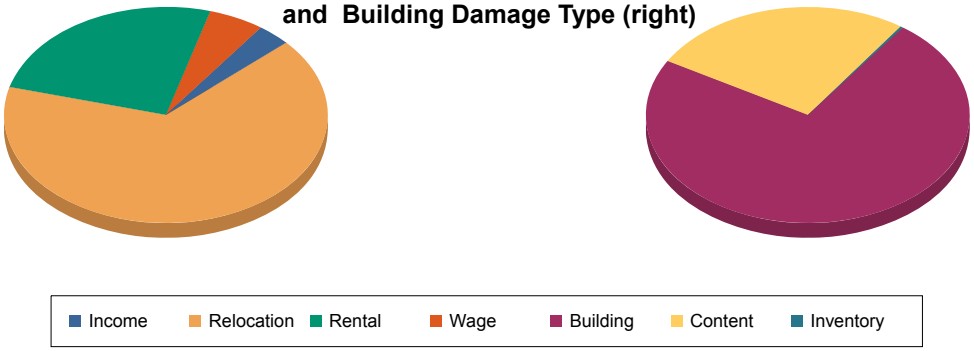
The total economic loss estimated for the hurricane is 107.9 million dollars, which represents 5.23 % of the total replacement value of the region's buildings.

Building-Related Losses

The building related losses are broken into two categories: direct property damage losses and business interruption losses. The direct property damage 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 hurricane. Business interruption losses also include the temporary living expenses for those people displaced from their homes because of the hurricane.

The total property damage losses were 108 million dollars. 9% of the estimated losses were related to the business interruption of the region. By far, the largest loss was sustained by the residential occupancies which made up over 88% of the total loss. Table 5 below provides a summary of the losses associated with the building damage.

Loss by Business Interruption Type (left) and Building Damage Type (right)



Loss Type by General Occupancy

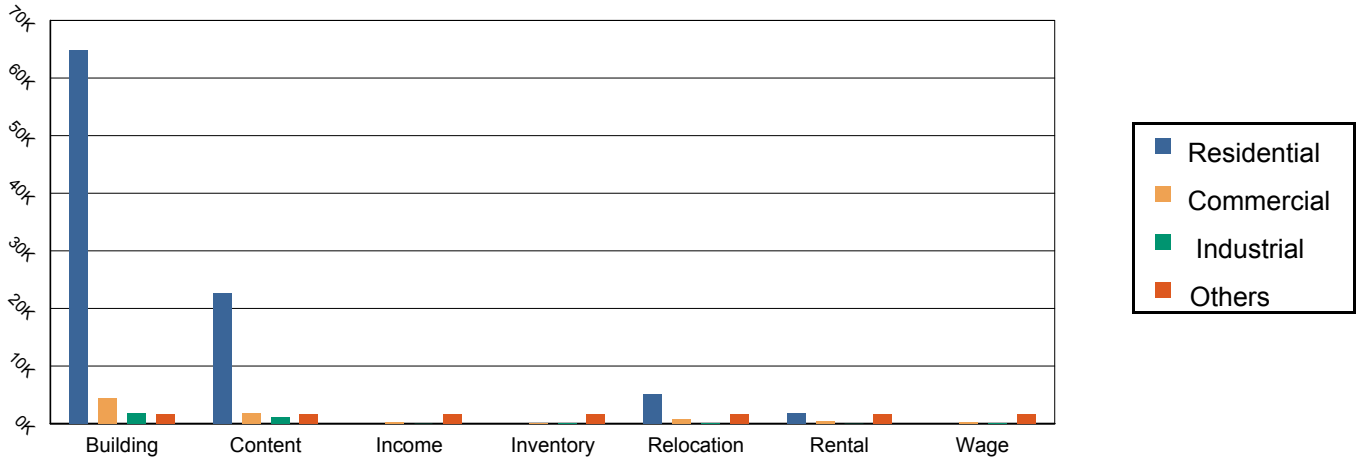


Table 5: Building-Related Economic Loss Estimates

(Thousands of dollars)

Category	Area	Residential	Commercial	Industrial	Others	Total
Property Damage						
	Building	64,793.85	4,487.36	1,851.54	892.51	72,025.25
	Content	22,712.03	1,807.41	1,204.48	381.20	26,105.12
	Inventory	0.00	41.66	158.14	13.59	213.38
	Subtotal	**87,505.88**	**6,336.43**	**3,214.15**	**1,287.29**	**98,343.75**
Business Interruption Loss						
	Income	0.21	256.95	16.71	31.59	305.45
	Relocation	5,160.10	828.33	144.78	155.18	6,288.39
	Rental	1,908.71	460.35	18.45	13.78	2,401.29
	Wage	0.48	303.70	27.00	199.63	530.81
	Subtotal	**7,069.50**	**1,849.32**	**206.94**	**400.18**	**9,525.94**

Total

Total	**94,575.38**	**8,185.75**	**3,421.09**	**1,687.47**	**107,869.69**

Appendix A: County Listing for the Region

Connecticut
- Middlesex

Appendix B: Regional Population and Building Value Data

		Building Value (thousands of dollars)		
	Population	Residential	Non-Residential	Total
Connecticut				
Middlesex	13,260	1,661,441	400,494	2,061,935
Total	**13,260**	**1,661,441**	**400,494**	**2,061,935**
Study Region Total	**13,260**	**1,661,441**	**400,494**	**2,061,935**

Hazus: Hurricane Global Risk Report

Region Name: Clinton

Hurricane Scenario: Probabilistic 1000-year Return Period

Print Date: Tuesday, October 1, 2019

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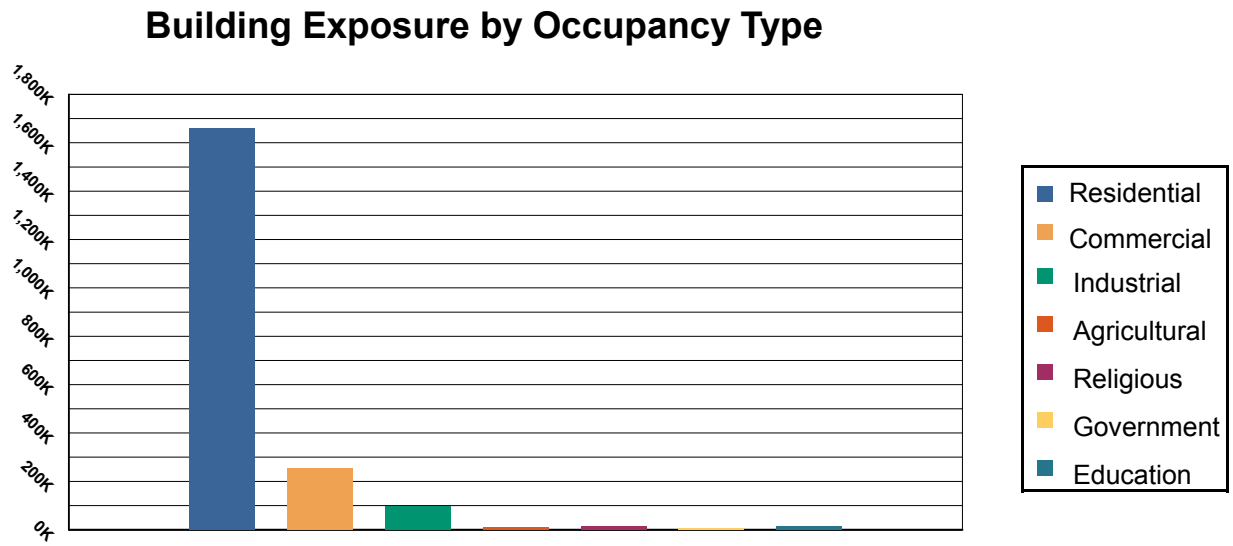
There are an estimated 5 thousand buildings in the region with a total building replacement value (excluding contents) of 2,062 million dollars (2014 dollars). Approximately 91% of the buildings (and 81% of the building value) are associated with residential housing.

Building Inventory

General Building Stock

Hazus estimates that there are 5,844 buildings in the region which have an aggregate total replacement value of 2,062 million (2014 dollars). Table 1 presents the relative distribution of the value with respect to the general occupancies. Appendix B provides a general distribution of the building value by State and County.



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Religious	15,970	0.77%
Government	7,665	0.37%
Education	14,865	0.72%
Total	**2,061,935**	**100.00%**

Essential Facility Inventory

For essential facilities, there are no hospitals in the region with a total bed capacity of no beds. There are 5 schools, 2 fire stations, 1 police stations and 1 emergency operation facilities.

Hurricane Scenario

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

Scenario Name:	Probabilistic
Type:	Probabilistic

Building Damage

General Building Stock Damage

Hazus estimates that about 957 buildings will be at least moderately damaged. This is over 16% of the total number of buildings in the region. There are an estimated 100 buildings that will be completely destroyed. The definition of the 'damage states' is provided in the Hazus Hurricane technical manual. Table 2 below summarizes the expected damage by general occupancy for the buildings in the region. Table 3 summarizes the expected damage by general building type.

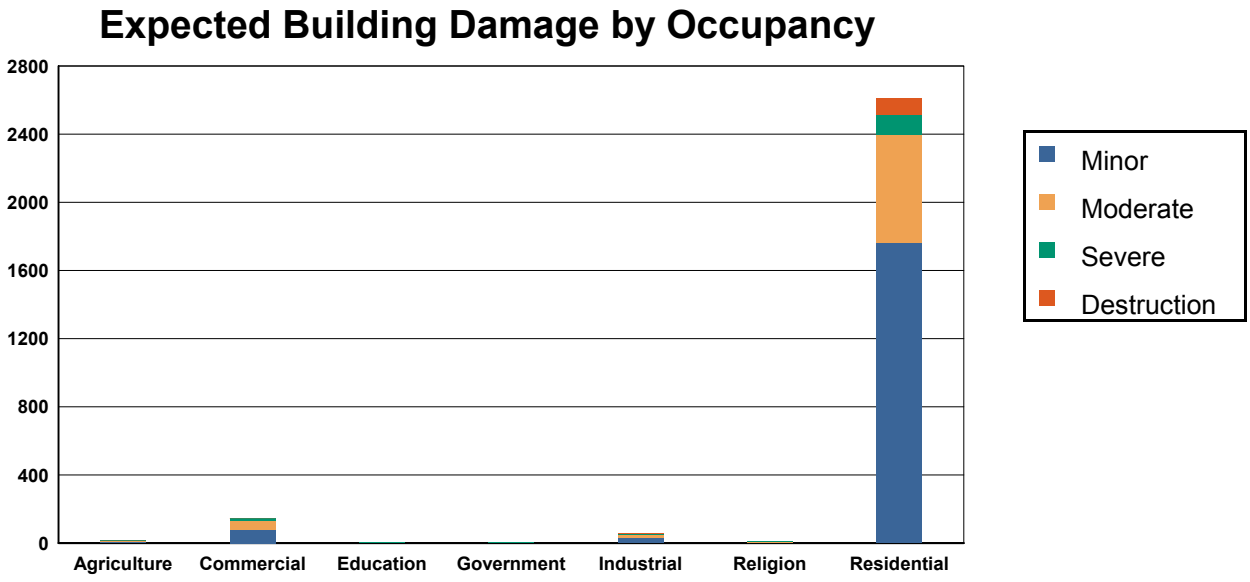


Table 2: Expected Building Damage by Occupancy : 1000 - year Event

	None		Minor		Moderate		Severe		Destruction	
Occupancy	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**
Agriculture	14.53	50.12	8.27	28.51	3.84	13.23	1.97	6.81	0.39	1.33
Commercial	157.29	51.57	77.41	25.38	53.02	17.38	17.13	5.62	0.15	0.05
Education	5.34	53.44	2.50	25.01	1.65	16.54	0.50	5.01	0.00	0.00
Government	5.57	50.65	2.63	23.88	2.05	18.63	0.75	6.85	0.00	0.00
Industrial	70.77	55.29	29.75	23.24	20.18	15.77	6.94	5.42	0.36	0.28
Religion	9.08	50.45	5.24	29.10	2.88	16.01	0.80	4.43	0.00	0.00
Residential	2,733.05	51.15	1,765.66	33.05	628.96	11.77	116.33	2.18	98.99	1.85
Total	**2,995.64**		**1,891.45**		**712.59**		**144.43**		**99.89**	

Table 3: Expected Building Damage by Building Type : 1000 - year Event

Building Type	None		Minor		Moderate		Severe		Destruction	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Concrete	16	48.04	8	23.34	7	21.78	2	6.84	0	0.00
Masonry	147	47.85	80	25.83	66	21.42	13	4.18	2	0.72
MH	185	74.41	27	10.83	24	9.57	2	0.92	11	4.26
Steel	116	53.55	47	21.81	39	17.92	14	6.66	0	0.05
Wood	2,437	50.60	1,669	34.66	521	10.83	103	2.14	85	1.77

Essential Facility Damage

Before the hurricane, the region had no hospital beds available for use. On the day of the hurricane, the model estimates that 0 hospital beds (0%) are available for use by patients already in the hospital and those injured by the hurricane. After one week, none of the beds will be in service. By 30 days, none will be operational.

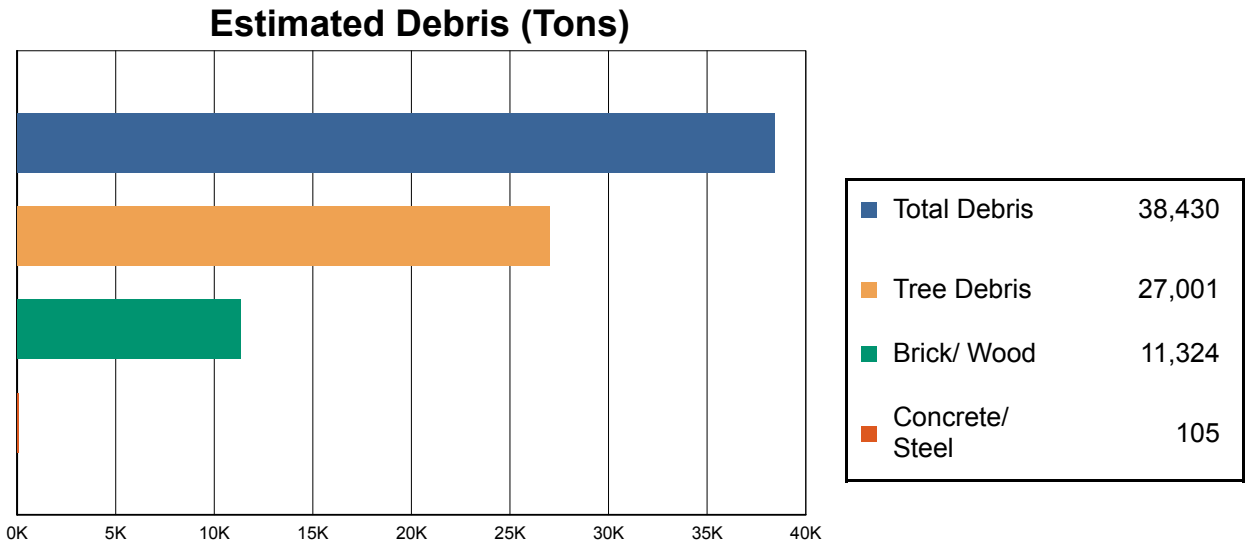
Thematic Map of Essential Facilities with greater than 50% moderate

Table 4: Expected Damage to Essential Facilities

		# Facilities		
Classification	**Total**	**Probability of at Least Moderate Damage > 50%**	**Probability of Complete Damage > 50%**	**Expected Loss of Use < 1 day**
EOCs	1	0	0	1
Fire Stations	2	0	0	2
Police Stations	1	0	0	1
Schools	5	0	0	0

Induced Hurricane Damage

Debris Generation

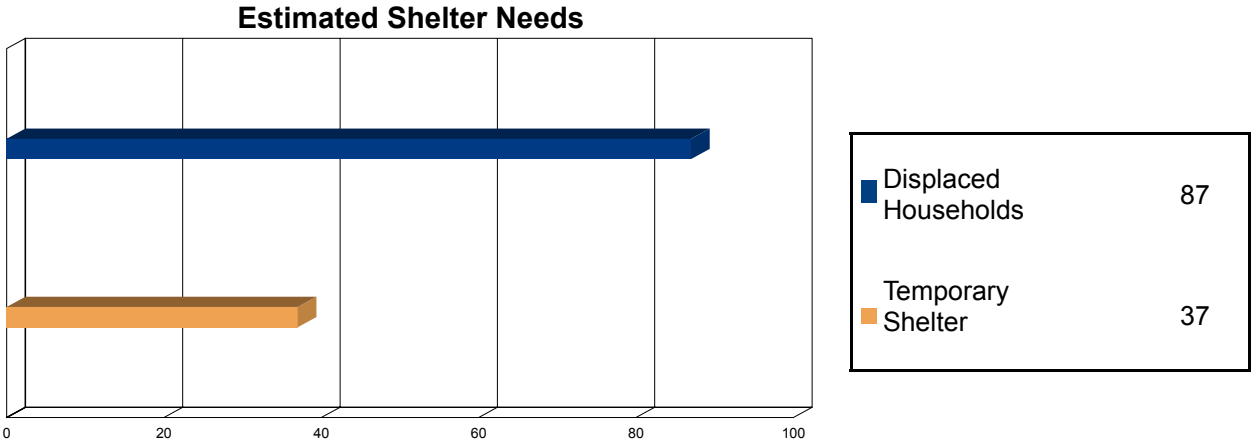


Hazus estimates the amount of debris that will be generated by the hurricane. The model breaks the debris into four general categories: a) Brick/Wood, b) Reinforced Concrete/Steel, c) Eligible Tree Debris, and d) Other Tree Debris. This distinction is made because of the different types of material handling equipment required to handle the debris.

The model estimates that a total of 38,430 tons of debris will be generated. Of the total amount, 16,931 tons (44%) is Other Tree Debris. Of the remaining 21,499 tons, Brick/Wood comprises 53% of the total, Reinforced Concrete/Steel comprises of 0% of the total, with the remainder being Eligible Tree Debris. If the building debris tonnage is converted to an estimated number of truckloads, it will require 457 truckloads (@25 tons/truck) to remove the building debris generated by the hurricane. The number of Eligible Tree Debris truckloads will depend on how the 10,070 tons of Eligible Tree Debris are collected and processed. The volume of tree debris generally ranges from about 4 cubic yards per ton for chipped or compacted tree debris to about 10 cubic yards per ton for bulkier, uncompacted debris.

Social Impact

Shelter Requirement



Hazus estimates the number of households that are expected to be displaced from their homes due to the hurricane and the number of displaced people that will require accommodations in temporary public shelters. The model estimates 87 households to be displaced due to the hurricane. Of these, 37 people (out of a total population of 13,260) will seek temporary shelter in public shelters.

Economic Loss

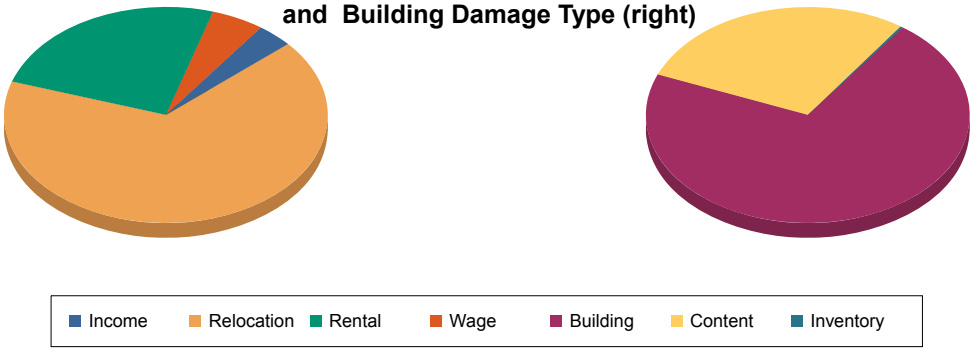
The total economic loss estimated for the hurricane is 196.6 million dollars, which represents 9.53 % of the total replacement value of the region's buildings.

Building-Related Losses

The building related losses are broken into two categories: direct property damage losses and business interruption losses. The direct property damage 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 hurricane. Business interruption losses also include the temporary living expenses for those people displaced from their homes because of the hurricane.

The total property damage losses were 197 million dollars. 10% of the estimated losses were related to the business interruption of the region. By far, the largest loss was sustained by the residential occupancies which made up over 87% of the total loss. Table 5 below provides a summary of the losses associated with the building damage.

Loss by Business Interruption Type (left) and Building Damage Type (right)



Loss Type by General Occupancy

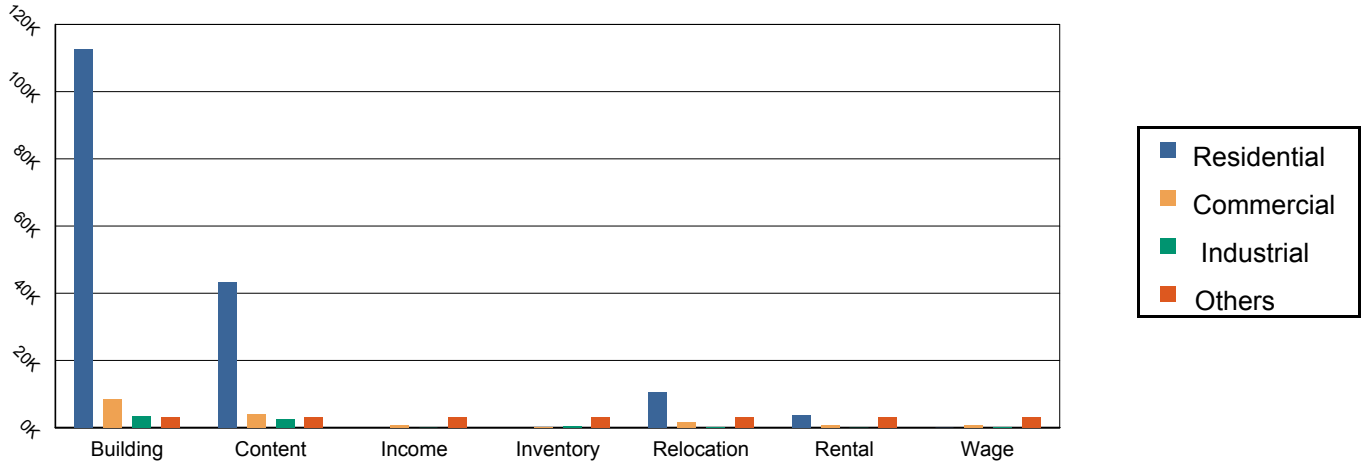


Table 5: Building-Related Economic Loss Estimates

(Thousands of dollars)

Category	Area	Residential	Commercial	Industrial	Others	Total
Property Damage						
	Building	112,643.09	8,536.74	3,603.97	1,669.56	126,453.37
	Content	43,403.46	3,956.46	2,530.76	794.11	50,684.79
	Inventory	0.00	89.48	326.79	24.16	440.43
	Subtotal	**156,046.56**	**12,582.67**	**6,461.53**	**2,487.82**	**177,578.58**
Business Interruption Loss						
	Income	3.25	617.99	33.44	39.88	694.56
	Relocation	10,510.51	1,559.06	274.57	290.28	12,634.42
	Rental	3,708.69	885.25	35.95	27.77	4,657.66
	Wage	7.61	695.45	54.58	266.51	1,024.16
	Subtotal	**14,230.06**	**3,757.75**	**398.54**	**624.44**	**19,010.79**

Total

Total	**170,276.62**	**16,340.42**	**6,860.07**	**3,112.26**	**196,589.37**

Appendix A: County Listing for the Region

Connecticut
- Middlesex

Appendix B: Regional Population and Building Value Data

		Building Value (thousands of dollars)		
	Population	Residential	Non-Residential	Total
Connecticut				
Middlesex	13,260	1,661,441	400,494	2,061,935
Total	**13,260**	**1,661,441**	**400,494**	**2,061,935**
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Hazus: Hurricane Global Risk Report

Region Name: Clinton

Hurricane Scenario: UN-NAMED-1938-4

Print Date: Tuesday, October 15, 2019

Disclaimer:
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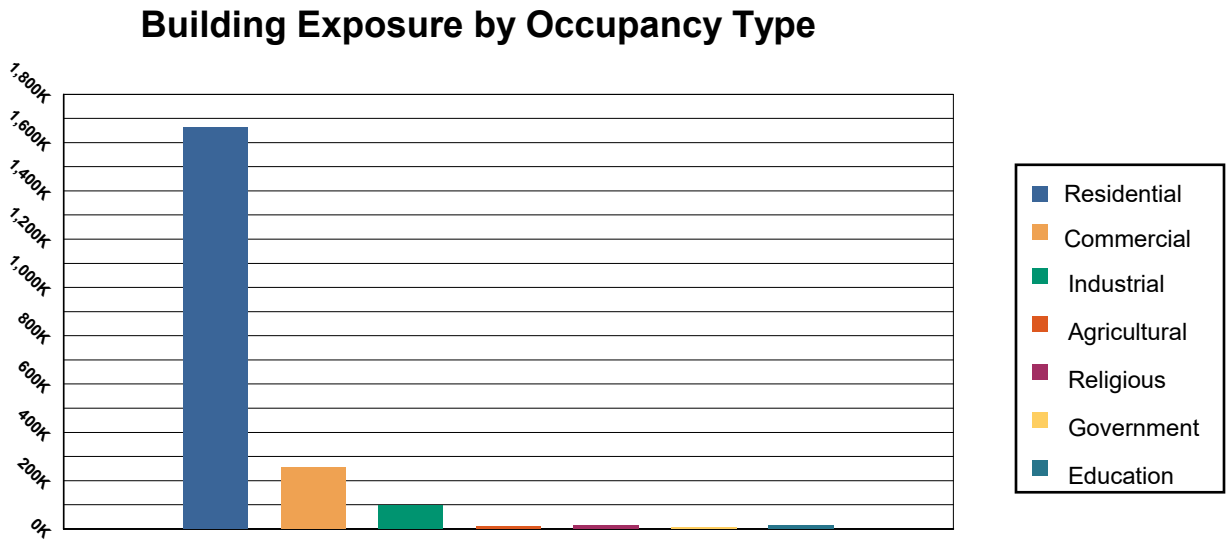

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Government	7,665	0.37%
Education	14,865	0.72%
Total	**2,061,935**	**100.00%**

Essential Facility Inventory

For essential facilities, there are no hospitals in the region with a total bed capacity of no beds. There are 5 schools, 2 fire stations, 1 police stations and 1 emergency operation facilities.

Hurricane Scenario

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

Scenario Name:	UN-NAMED-1938-4
Type:	Historic
Max Peak Gust in Study Region:	114 mph

Building Damage

General Building Stock Damage

Hazus estimates that about 597 buildings will be at least moderately damaged. This is over 10% of the total number of buildings in the region. There are an estimated 48 buildings that will be completely destroyed. The definition of the 'damage states' is provided in the Hazus Hurricane technical manual. Table 2 below summarizes the expected damage by general occupancy for the buildings in the region. Table 3 summarizes the expected damage by general building type.

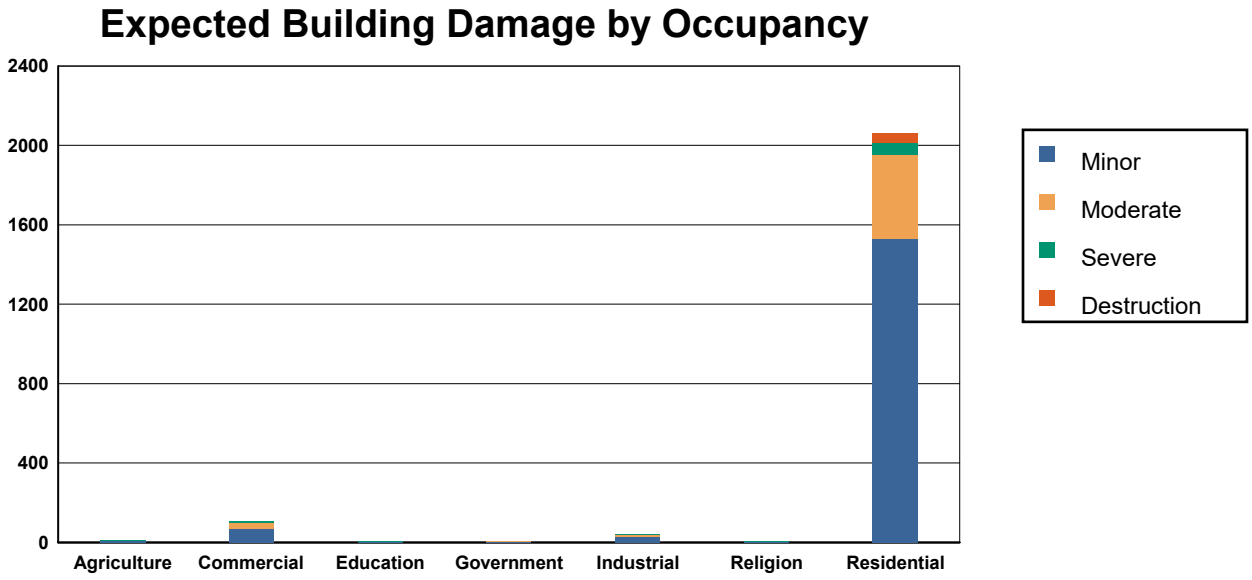


Table 2: Expected Building Damage by Occupancy

	None		Minor		Moderate		Severe		Destruction	
Occupancy	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**
Agriculture	18.02	62.15	6.89	23.74	2.60	8.96	1.29	4.44	0.20	0.70
Commercial	195.55	64.12	66.98	21.96	34.60	11.34	7.81	2.56	0.06	0.02
Education	6.50	65.01	2.18	21.85	1.09	10.86	0.23	2.28	0.00	0.00
Government	6.91	62.82	2.39	21.69	1.39	12.65	0.31	2.83	0.00	0.00
Industrial	85.46	66.76	25.78	20.14	13.13	10.26	3.44	2.69	0.19	0.15
Religion	11.36	63.14	4.46	24.77	1.83	10.18	0.34	1.91	0.00	0.00
Residential	3,284.91	61.48	1,529.93	28.63	425.59	7.97	55.28	1.03	47.29	0.89
Total	**3,608.72**		**1,638.61**		**480.23**		**68.71**		**47.74**	

Table 3: Expected Building Damage by Building Type

Building Type	None		Minor		Moderate		Severe		Destruction	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Concrete	20	61.18	7	21.40	5	14.54	1	2.88	0	0.00
Masonry	181	58.72	72	23.25	48	15.61	6	2.07	1	0.35
MH	206	83.13	21	8.36	15	5.92	1	0.37	5	2.21
Steel	142	65.72	42	19.29	26	11.83	7	3.13	0	0.02
Wood	2,941	61.07	1,439	29.89	345	7.17	49	1.03	41	0.84

Essential Facility Damage

Before the hurricane, the region had no hospital beds available for use. On the day of the hurricane, the model estimates that 0 hospital beds (0%) are available for use by patients already in the hospital and those injured by the hurricane. After one week, none of the beds will be in service. By 30 days, none will be operational.

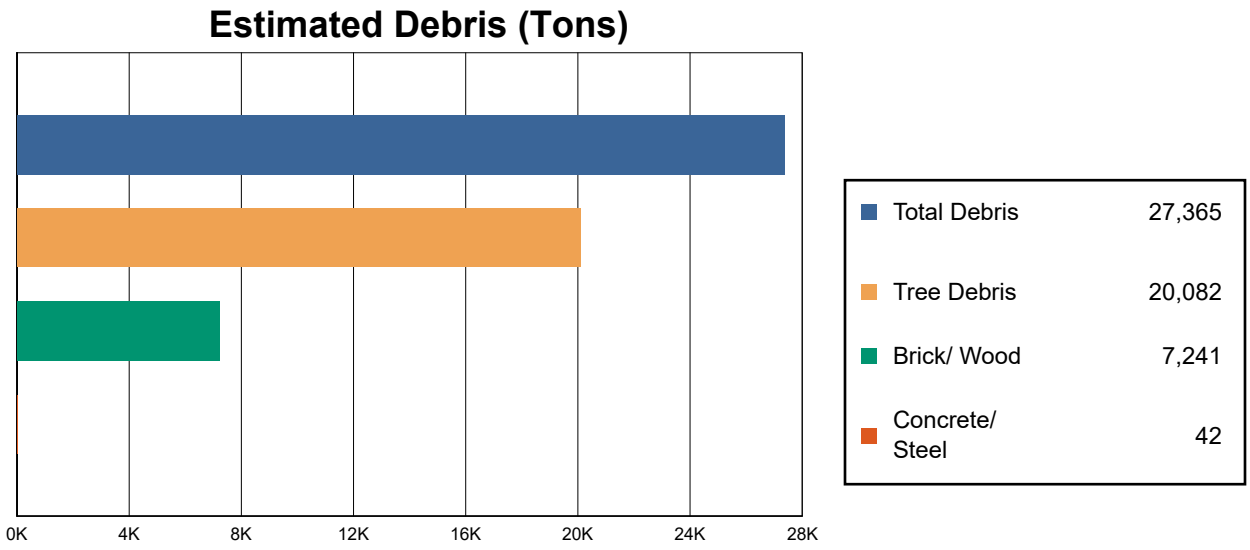
Thematic Map of Essential Facilities with greater than 50% moderate

Table 4: Expected Damage to Essential Facilities

		# Facilities		
Classification	Total	Probability of at Least Moderate Damage > 50%	Probability of Complete Damage > 50%	Expected Loss of Use < 1 day
EOCs	1	0	0	1
Fire Stations	2	0	0	2
Police Stations	1	0	0	1
Schools	5	0	0	0

Induced Hurricane Damage

Debris Generation

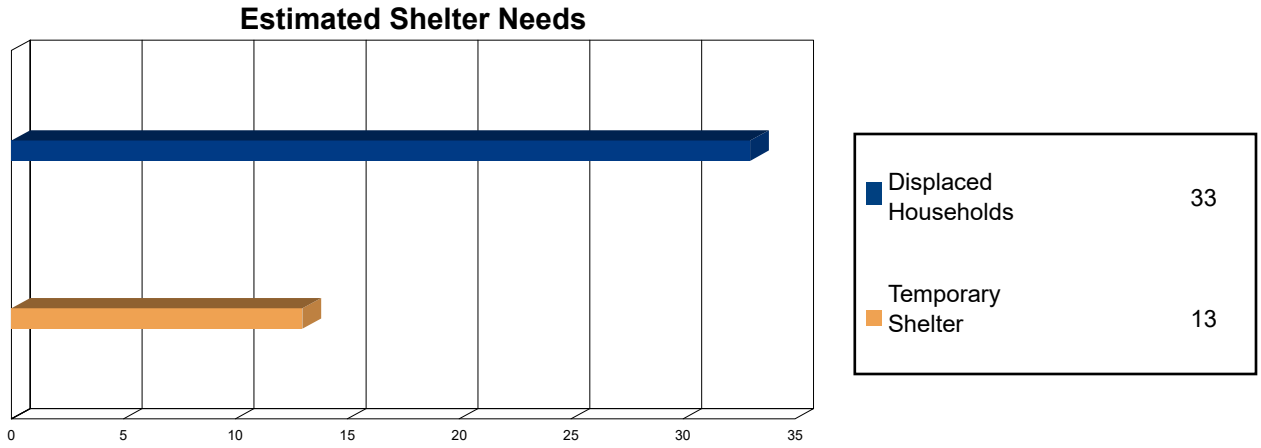


Hazus estimates the amount of debris that will be generated by the hurricane. The model breaks the debris into four general categories: a) Brick/Wood, b) Reinforced Concrete/Steel, c) Eligible Tree Debris, and d) Other Tree Debris. This distinction is made because of the different types of material handling equipment required to handle the debris.

The model estimates that a total of 27,365 tons of debris will be generated. Of the total amount, 12,578 tons (46%) is Other Tree Debris. Of the remaining 14,787 tons, Brick/Wood comprises 49% of the total, Reinforced Concrete/Steel comprises of 0% of the total, with the remainder being Eligible Tree Debris. If the building debris tonnage is converted to an estimated number of truckloads, it will require 291 truckloads (@25 tons/truck) to remove the building debris generated by the hurricane. The number of Eligible Tree Debris truckloads will depend on how the 7,504 tons of Eligible Tree Debris are collected and processed. The volume of tree debris generally ranges from about 4 cubic yards per ton for chipped or compacted tree debris to about 10 cubic yards per ton for bulkier, uncompacted debris.

Social Impact

Shelter Requirement



Hazus estimates the number of households that are expected to be displaced from their homes due to the hurricane and the number of displaced people that will require accommodations in temporary public shelters. The model estimates 33 households to be displaced due to the hurricane. Of these, 13 people (out of a total population of 13,260) will seek temporary shelter in public shelters.

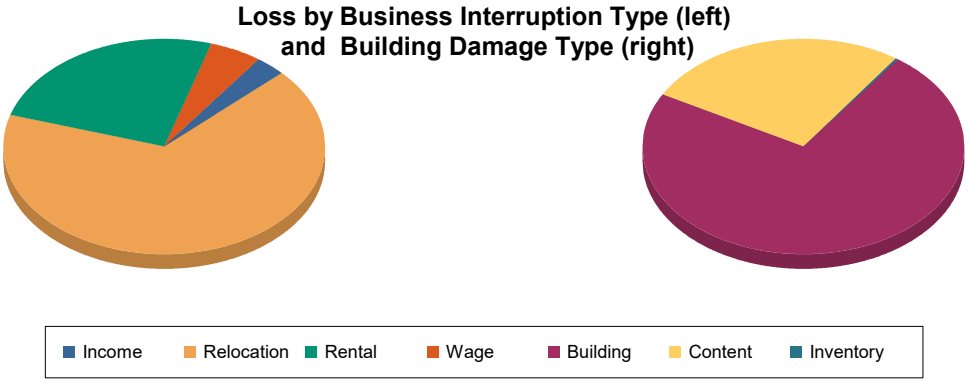
Economic Loss

The total economic loss estimated for the hurricane is 120.1 million dollars, which represents 5.82 % of the total replacement value of the region's buildings.

Building-Related Losses

The building related losses are broken into two categories: direct property damage losses and business interruption losses. The direct property damage 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 hurricane. Business interruption losses also include the temporary living expenses for those people displaced from their homes because of the hurricane.

The total property damage losses were 120 million dollars. 9% of the estimated losses were related to the business interruption of the region. By far, the largest loss was sustained by the residential occupancies which made up over 88% of the total loss. Table 5 below provides a summary of the losses associated with the building damage.



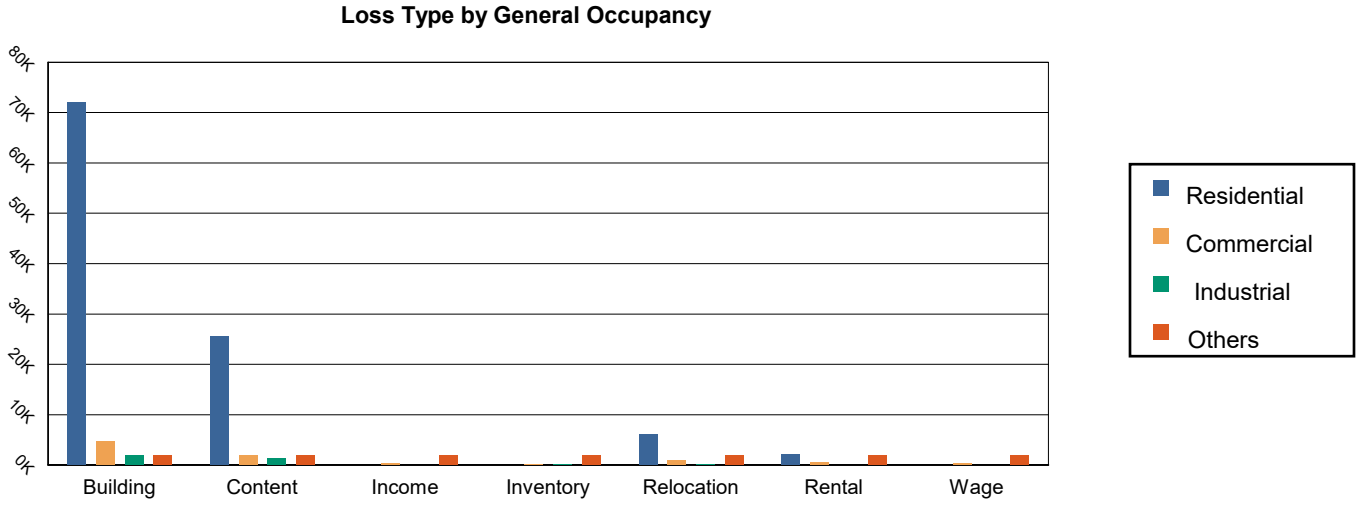


Table 5: Building-Related Economic Loss Estimates

(Thousands of dollars)

Category	Area	Residential	Commercial	Industrial	Others	Total
Property Damage						
	Building	71,997.01	4,762.62	2,008.70	977.90	79,746.24
	Content	25,611.54	1,937.19	1,320.78	421.67	29,291.18
	Inventory	0.00	44.45	173.49	13.79	231.73
	Subtotal	**97,608.55**	**6,744.27**	**3,502.97**	**1,413.35**	**109,269.15**
Business Interruption Loss						
	Income	0.36	277.01	19.02	33.24	329.62
	Relocation	5,966.76	891.47	157.75	170.18	7,186.16
	Rental	2,180.42	497.57	20.33	15.37	2,713.68
	Wage	0.84	324.81	30.74	210.78	567.16
	Subtotal	**8,148.38**	**1,990.85**	**227.83**	**429.57**	**10,796.63**

Total

Total	**105,756.93**	**8,735.11**	**3,730.80**	**1,842.92**	**120,065.77**

Appendix A: County Listing for the Region

Connecticut
- Middlesex

Appendix B: Regional Population and Building Value Data

		Building Value (thousands of dollars)		
	Population	Residential	Non-Residential	Total
Connecticut				
Middlesex	13,260	1,661,441	400,494	2,061,935
Total	**13,260**	**1,661,441**	**400,494**	**2,061,935**
Study Region Total	**13,260**	**1,661,441**	**400,494**	**2,061,935**

Hazus: Earthquake Global Risk Report

Region Name: Clinton

Earthquake Scenario: EastHaddam

Print Date: October 16, 2019

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 earthquake. These results can be improved by using enhanced inventory, geotechnical, and observed ground motion data.

Table of Contents

General Description of the Region

Hazus-MH is a regional earthquake loss estimation model that was developed by the Federal Emergency Management Agency (FEMA) and the National Institute of Building Sciences. 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 earthquake loss estimates provided in this report was based on a region that includes 1 county(ies) from the following state(s):

Connecticut

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

The geographical size of the region is 16.38 square miles and contains 4 census tracts. There are over 5 thousand households in the region which has a total population of 13,260 people (2010 Census Bureau data). The distribution of population by Total Region and County is provided in Appendix B.

There are an estimated 5 thousand buildings in the region with a total building replacement value (excluding contents) of 2,061 (millions of dollars). Approximately 91.00 % of the buildings (and 81.00% of the building value) are associated with residential housing.

The replacement value of the transportation and utility lifeline systems is estimated to be 342 and 14 (millions of dollars) , respectively.

Building and Lifeline Inventory

Building Inventory

Hazus estimates that there are 5 thousand buildings in the region which have an aggregate total replacement value of 2,061 (millions of dollars) . Appendix B provides a general distribution of the building value by Total Region and County.

In terms of building construction types found in the region, wood frame construction makes up 83% of the building inventory. The remaining percentage is distributed between the other general building types.

Critical Facility Inventory

Hazus breaks critical facilities into two (2) groups: essential facilities and high potential loss facilities (HPL). Essential facilities include hospitals, medical clinics, schools, fire stations, police stations and emergency operations facilities. High potential loss facilities include dams, levees, military installations, nuclear power plants and hazardous material sites.

For essential facilities, there are 0 hospitals in the region with a total bed capacity of beds. There are 5 schools, 2 fire stations, 1 police stations and 1 emergency operation facilities. With respect to high potential loss facilities (HPL), there are no dams identified within the inventory. The inventory also includes 3 hazardous material sites, no military installations and no nuclear power plants.

Transportation and Utility Lifeline Inventory

Within Hazus, the lifeline inventory is divided between transportation and utility lifeline systems. There are seven (7) transportation systems that include highways, railways, light rail, bus, ports, ferry and airports. There are six (6) utility systems that include potable water, wastewater, natural gas, crude & refined oil, electric power and communications. The lifeline inventory data are provided in Tables 1 and 2.

The total value of the lifeline inventory is over 356.00 (millions of dollars). This inventory includes over 24.23 miles of highways, 19 bridges, 444.28 miles of pipes.

Table 1: Transportation System Lifeline Inventory

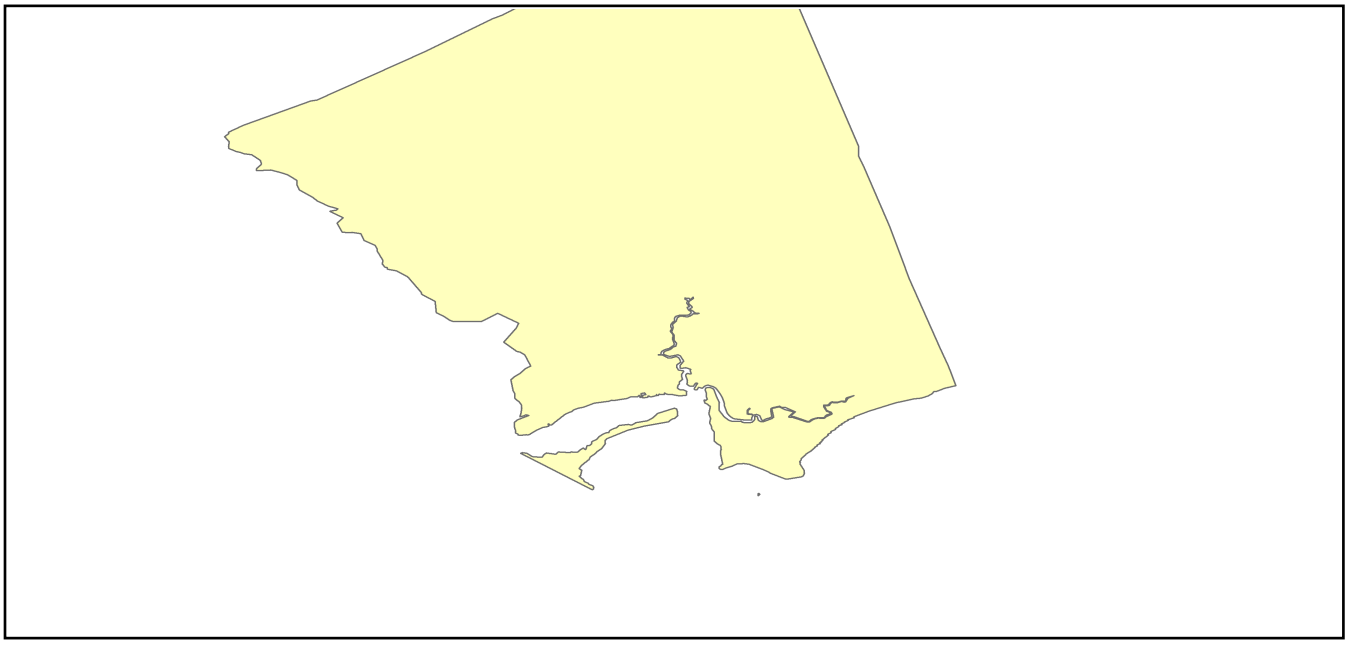
System	Component	# Locations/ # Segments	Replacement value (millions of dollars)
Highway	Bridges	19	116.7909
	Segments	11	200.7307
	Tunnels	0	0.0000
		Subtotal	**317.5216**
Railways	Bridges	1	0.0621
	Facilities	0	0.0000
	Segments	3	11.9909
	Tunnels	0	0.0000
		Subtotal	**12.0530**
Light Rail	Bridges	0	0.0000
	Facilities	1	2.6630
	Segments	2	9.2680
	Tunnels	0	0.0000
		Subtotal	**11.9310**
Bus	Facilities	1	1.2535
		Subtotal	**1.2535**
Ferry	Facilities	0	0.0000
		Subtotal	**0.0000**
Port	Facilities	0	0.0000
		Subtotal	**0.0000**
Airport	Facilities	0	0.0000
	Runways	0	0.0000
		Subtotal	**0.0000**
		Total	**342.80**

Table 2: Utility System Lifeline Inventory

System	Component	# Locations / Segments	Replacement value (millions of dollars)
Potable Water	Distribution Lines	NA	7.1591
	Facilities	0	0.0000
	Pipelines	0	0.0000
		Subtotal	**7.1591**
Waste Water	Distribution Lines	NA	4.2954
	Facilities	0	0.0000
	Pipelines	0	0.0000
		Subtotal	**4.2954**
Natural Gas	Distribution Lines	NA	2.8636
	Facilities	0	0.0000
	Pipelines	0	0.0000
		Subtotal	**2.8636**
Oil Systems	Facilities	0	0.0000
	Pipelines	0	0.0000
		Subtotal	**0.0000**
Electrical Power	Facilities	0	0.0000
		Subtotal	**0.0000**
Communication	Facilities	0	0.0000
		Subtotal	**0.0000**
		Total	**14.30**

Earthquake Scenario

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



Scenario Name	EastHaddam
Type of Earthquake	Arbitrary
Fault Name	NA
Historical Epicenter ID #	NA
Probabilistic Return Period	NA
Longitude of Epicenter	-72.40
Latitude of Epicenter	41.50
Earthquake Magnitude	6.40
Depth (km)	10.00
Rupture Length (Km)	NA
Rupture Orientation (degrees)	NA
Attenuation Function	Central & East US (CEUS 2008)

Direct Earthquake Damage

Building Damage

Hazus estimates that about 1,525 buildings will be at least moderately damaged. This is over 26.00 % of the buildings in the region. There are an estimated 242 buildings that will be damaged beyond repair. The definition of the 'damage states' is provided in Volume 1: Chapter 5 of the Hazus technical manual. Table 3 below summarizes the expected damage by general occupancy for the buildings in the region. Table 4 below summarizes the expected damage by general building type.

Damage Categories by General Occupancy Type

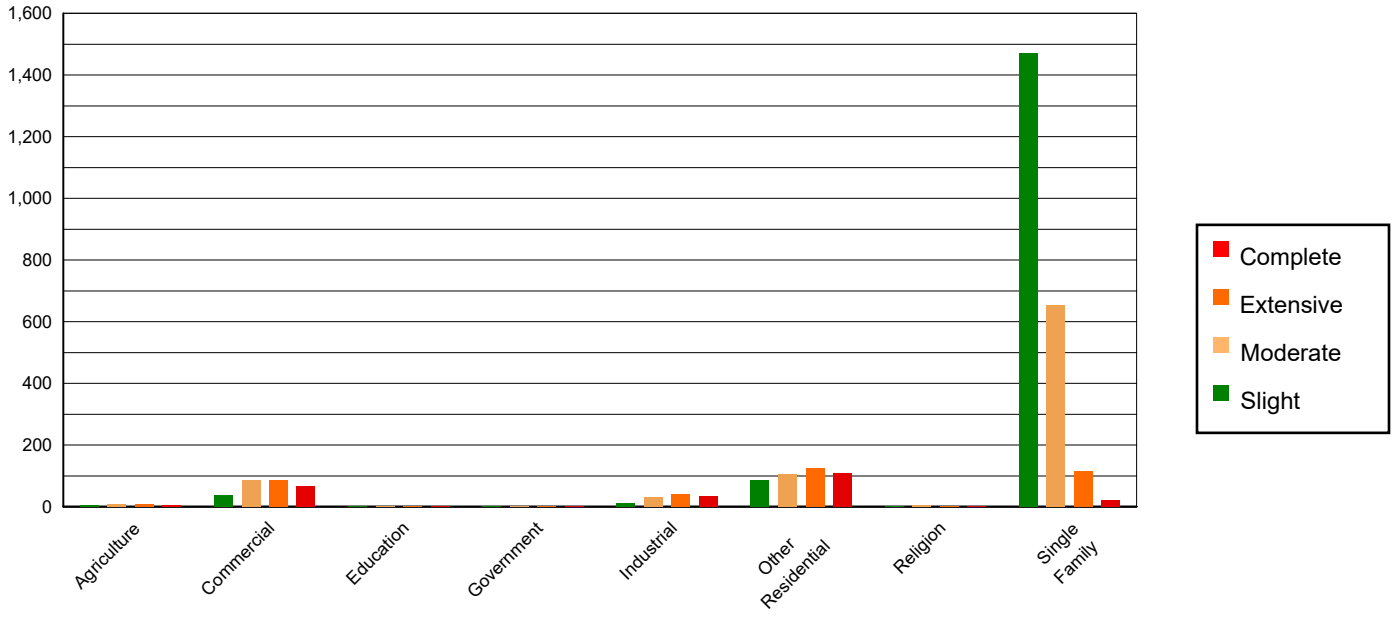


Table 3: Expected Building Damage by Occupancy

	None		Slight		Moderate		Extensive		Complete	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Agriculture	2.31	0.09	4.07	0.25	9.55	1.06	7.51	1.95	5.57	2.29
Commercial	28.42	1.05	37.48	2.32	87.00	9.68	86.46	22.49	65.64	27.05
Education	0.93	0.03	1.16	0.07	2.76	0.31	2.94	0.77	2.21	0.91
Government	0.83	0.03	1.04	0.06	2.79	0.31	3.45	0.90	2.90	1.19
Industrial	8.77	0.32	11.70	0.72	32.43	3.61	40.41	10.51	34.69	14.30
Other Residential	111.92	4.14	86.58	5.36	106.73	11.88	124.23	32.31	107.54	44.33
Religion	5.49	0.20	3.73	0.23	3.89	0.43	3.02	0.79	1.87	0.77
Single Family	2543.84	94.13	1470.25	90.98	653.29	72.71	116.44	30.29	22.18	9.14
Total	**2,703**		**1,616**		**898**		**384**		**243**	

Table 4: Expected Building Damage by Building Type (All Design Levels)

	None		Slight		Moderate		Extensive		Complete	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Wood	2591.86	95.91	1490.79	92.25	655.09	72.92	103.11	26.82	12.91	5.32
Steel	8.66	0.32	13.30	0.82	54.51	6.07	84.30	21.93	77.64	32.00
Concrete	1.40	0.05	2.17	0.13	9.60	1.07	15.03	3.91	12.83	5.29
Precast	0.70	0.03	0.80	0.05	3.30	0.37	5.52	1.44	5.44	2.24
RM	6.87	0.25	4.89	0.30	15.26	1.70	19.90	5.18	12.00	4.95
URM	78.12	2.89	76.72	4.75	98.04	10.91	58.87	15.31	29.34	12.09
MH	14.90	0.55	27.32	1.69	62.62	6.97	97.73	25.42	92.44	38.10
Total	**2,703**		**1,616**		**898**		**384**		**243**	

*Note:

RM Reinforced Masonry
URM Unreinforced Masonry
MH Manufactured Housing

Essential Facility Damage

Before the earthquake, the region had hospital beds available for use. On the day of the earthquake, the model estimates that only hospital beds (%) are available for use by patients already in the hospital and those injured by the earthquake. After one week, % of the beds will be back in service. By 30 days, % will be operational.

Table 5: Expected Damage to Essential Facilities

Classification	Total	# Facilities		
		At Least Moderate Damage > 50%	Complete Damage > 50%	With Functionality > 50% on day 1
Hospitals	0	0	0	0
Schools	5	5	0	0
EOCs	1	1	0	0
PoliceStations	1	1	0	0
FireStations	2	2	0	0

Transportation Lifeline Damage

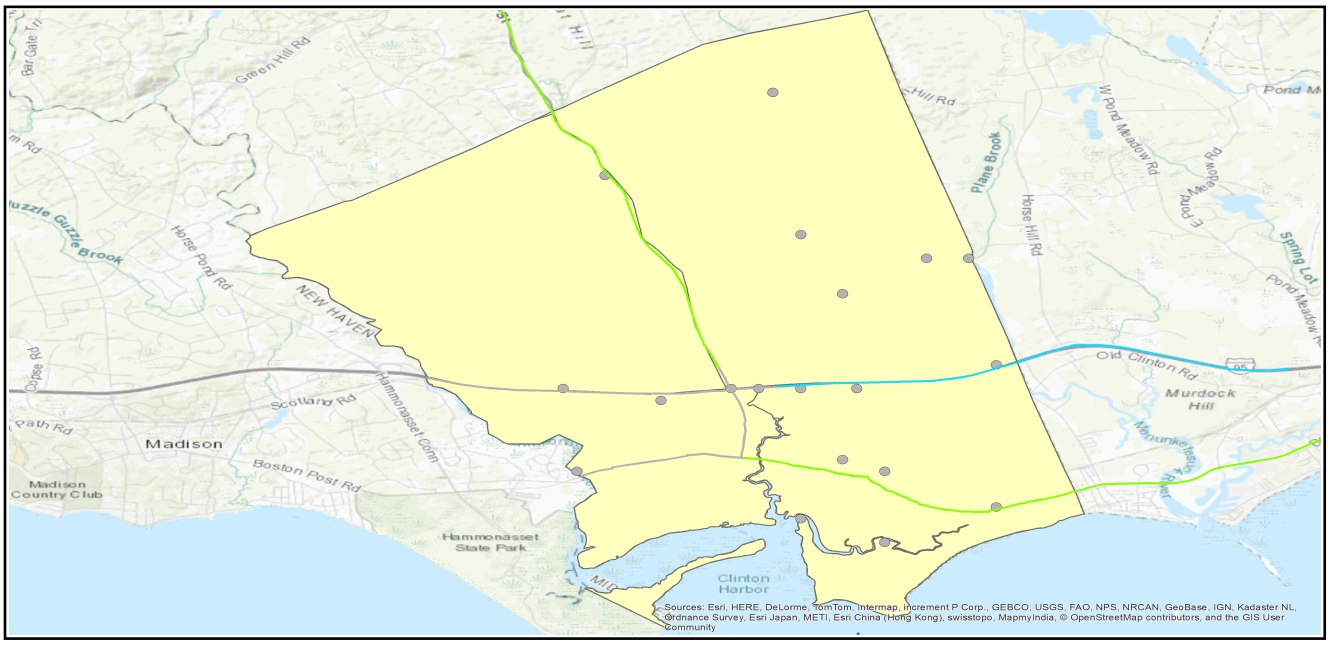


Table 6: Expected Damage to the Transportation Systems

System	Component		Number of Locations			
		Locations/ Segments	With at Least Mod. Damage	With Complete Damage	With Functionality > 50 % After Day 1	With Functionality > 50 % After Day 7
Highway	Segments	11	0	0	11	11
	Bridges	19	5	0	14	14
	Tunnels	0	0	0	0	0
Railways	Segments	3	0	0	1	1
	Bridges	1	0	0	1	1
	Tunnels	0	0	0	0	0
	Facilities	0	0	0	0	0
Light Rail	Segments	2	0	0	2	2
	Bridges	0	0	0	0	0
	Tunnels	0	0	0	0	0
	Facilities	1	0	0	1	1
Bus	Facilities	1	0	0	1	1
Ferry	Facilities	0	0	0	0	0
Port	Facilities	0	0	0	0	0
Airport	Facilities	0	0	0	0	0
	Runways	0	0	0	0	0

Table 6 provides damage estimates for the transportation system.

Note: Roadway segments, railroad tracks and light rail tracks are assumed to be damaged by ground failure only. If ground failure maps are not provided, damage estimates to these components will not be computed.

Tables 7-9 provide information on the damage to the utility lifeline systems. Table 7 provides damage to the utility system facilities. Table 8 provides estimates on the number of leaks and breaks by the pipelines of the utility systems. For electric power and potable water, Hazus performs a simplified system performance analysis. Table 9 provides a summary of the system performance information.

Table 7 : Expected Utility System Facility Damage

System	# of Locations				
	Total #	With at Least Moderate Damage	With Complete Damage	with Functionality > 50 %	
				After Day 1	After Day 7
Potable Water	0	0	0	0	0
Waste Water	0	0	0	0	0
Natural Gas	0	0	0	0	0
Oil Systems	0	0	0	0	0
Electrical Power	0	0	0	0	0
Communication	0	0	0	0	0

Table 8 : Expected Utility System Pipeline Damage (Site Specific)

System	Total Pipelines Length (miles)	Number of Leaks	Number of Breaks
Potable Water	222	0	0
Waste Water	133	0	0
Natural Gas	89	0	0
Oil	0	0	0

Table 9: Expected Potable Water and Electric Power System Performance

	Total # of Households	Number of Households without Service				
		At Day 1	At Day 3	At Day 7	At Day 30	At Day 90
Potable Water						
Electric Power						

Induced Earthquake Damage

Fire Following Earthquake

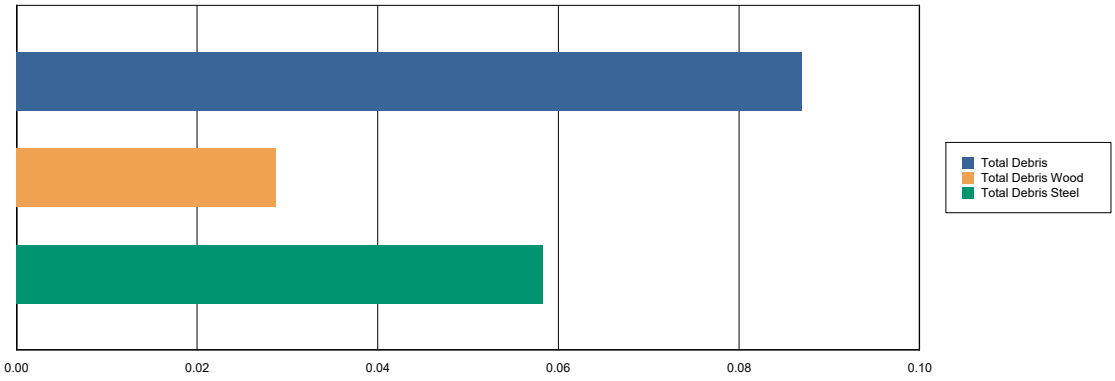
Fires often occur after an earthquake. Because of the number of fires and the lack of water to fight the fires, they can often burn out of control. Hazus uses a Monte Carlo simulation model to estimate the number of ignitions and the amount of burnt area. For this scenario, the model estimates that there will be 0 ignitions that will burn about 0.00 sq. mi 0.00 % of the region's total area.) The model also estimates that the fires will displace about 0 people and burn about 0 (millions of dollars) of building value.

Debris Generation

Hazus estimates the amount of debris that will be generated by the earthquake. The model breaks the debris into two general categories: a) Brick/Wood and b) Reinforced Concrete/Steel. 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 87,000 tons of debris will be generated. Of the total amount, Brick/Wood comprises 33.00% of the total, with the remainder being Reinforced Concrete/Steel. If the debris tonnage is converted to an estimated number of truckloads, it will require 3,480 truckloads (@25 tons/truck) to remove the debris generated by the earthquake.

Earthquake Debris (millions of tons)



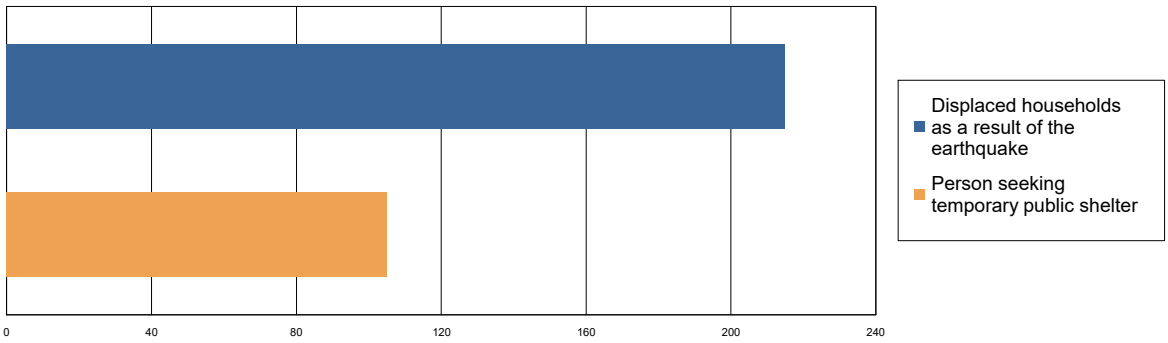
Brick/ Wood	Reinforced Concrete/Steel	Total Debris	Truck Load
0.03	0.06	0.09	3,480 (@25 tons/truck)

Social Impact

Shelter Requirement

Hazus estimates the number of households that are expected to be displaced from their homes due to the earthquake and the number of displaced people that will require accommodations in temporary public shelters. The model estimates 215 households to be displaced due to the earthquake. Of these, 105 people (out of a total population of 13,260) will seek temporary shelter in public shelters.

Displaced Households/ Persons Seeking Short Term Public Shelter



Displaced households as a result of the earthquake	Persons seeking temporary public shelter
215	105

Casualties

Hazus estimates the number of people that will be injured and killed by the earthquake. The casualties are broken down into four (4) severity levels that describe the extent of the injuries. The levels are described as follows;

- Severity Level 1: Injuries will require medical attention but hospitalization is not needed.
- Severity Level 2: Injuries will require hospitalization but are not considered life-threatening
- Severity Level 3: Injuries will require hospitalization and can become life threatening if not promptly treated.
- Severity Level 4: Victims are killed by the earthquake.

The casualty estimates are provided for three (3) times of day: 2:00 AM, 2:00 PM and 5:00 PM. These times represent the periods of the day that different sectors of the community are at their peak occupancy loads. The 2:00 AM estimate considers that the residential occupancy load is maximum, the 2:00 PM estimate considers that the educational, commercial and industrial sector loads are maximum and 5:00 PM represents peak commute time.

Table 10 provides a summary of the casualties estimated for this earthquake

Table 10: Casualty Estimates

		Level 1	Level 2	Level 3	Level 4
2 AM	Commercial	2.40	0.68	0.10	0.20
	Commuting	0.01	0.01	0.02	0.00
	Educational	0.00	0.00	0.00	0.00
	Hotels	0.00	0.00	0.00	0.00
	Industrial	4.25	1.25	0.19	0.38
	Other-Residential	23.48	6.14	0.74	1.41
	Single Family	15.39	2.85	0.32	0.62
	Total	**46**	**11**	**1**	**3**
2 PM	Commercial	133.54	37.97	5.71	11.14
	Commuting	0.08	0.11	0.19	0.04
	Educational	48.91	14.45	2.35	4.58
	Hotels	0.00	0.00	0.00	0.00
	Industrial	31.41	9.22	1.44	2.80
	Other-Residential	4.04	1.07	0.14	0.25
	Single Family	2.71	0.52	0.06	0.11
	Total	**221**	**63**	**10**	**19**
5 PM	Commercial	95.50	27.14	4.12	7.91
	Commuting	1.95	2.56	4.37	0.84
	Educational	3.39	1.01	0.16	0.32
	Hotels	0.00	0.00	0.00	0.00
	Industrial	19.63	5.76	0.90	1.75
	Other-Residential	8.81	2.31	0.29	0.53
	Single Family	6.07	1.16	0.14	0.26
	Total	**135**	**40**	**10**	**12**

Economic Loss

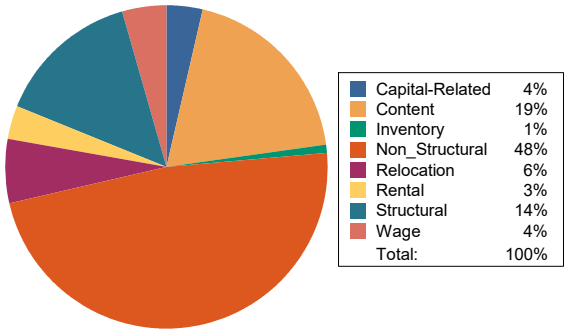
The total economic loss estimated for the earthquake is 372.78 (millions of dollars), which includes building and lifeline related losses based on the region's available inventory. The following three sections provide more detailed information about these losses.

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 earthquake. Business interruption losses also include the temporary living expenses for those people displaced from their homes because of the earthquake.

The total building-related losses were 347.52 (millions of dollars); 18 % of the estimated losses were related to the business interruption of the region. By far, the largest loss was sustained by the residential occupancies which made up over 40 % of the total loss. Table 11 below provides a summary of the losses associated with the building damage.

Earthquake Losses by Loss Type ($ millions)



Earthquake Losses by Occupancy Type ($ millions)

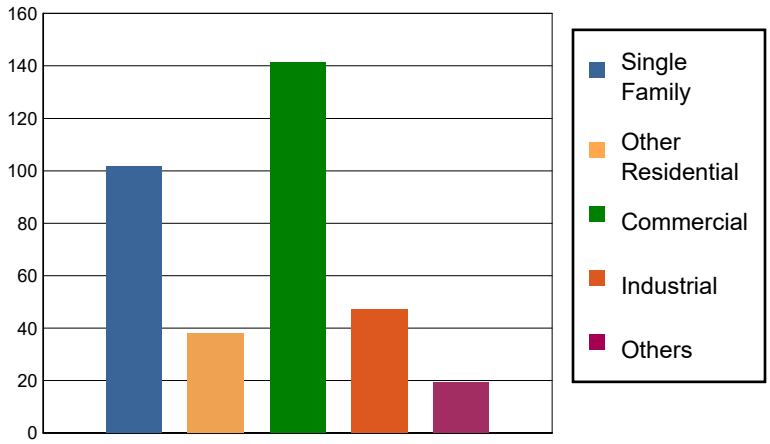


Table 11: Building-Related Economic Loss Estimates

(Millions of dollars)

Category	Area	Single Family	Other Residential	Commercial	Industrial	Others	Total
Income Losses							
	Wage	0.0000	0.4359	13.4362	0.8329	0.7113	15.4163
	Capital-Related	0.0000	0.1861	11.3637	0.5060	0.1345	12.1903
	Rental	1.6318	2.2417	7.1786	0.2611	0.2560	11.5692
	Relocation	5.8328	2.0998	10.5056	1.4431	1.9482	21.8295
	Subtotal	**7.4646**	**4.9635**	**42.4841**	**3.0431**	**3.0500**	**61.0053**
Capital Stock Losses							
	Structural	12.7619	5.4927	21.3905	6.7866	3.7576	50.1893
	Non_Structural	60.0124	22.5297	53.3646	22.1843	8.6437	166.7347
	Content	21.5026	4.8679	23.3071	13.1105	3.8521	66.6402
	Inventory	0.0000	0.0000	0.7619	2.1057	0.0873	2.9549
	Subtotal	**94.2769**	**32.8903**	**98.8241**	**44.1871**	**16.3407**	**286.5191**
	Total	**101.74**	**37.85**	**141.31**	**47.23**	**19.39**	**347.52**

Transportation and Utility Lifeline Losses

For the transportation and utility lifeline systems, Hazus computes the direct repair cost for each component only. There are no losses computed by Hazus for business interruption due to lifeline outages. Tables 12 & 13 provide a detailed breakdown in the expected lifeline losses.

Table 12: Transportation System Economic Losses
(Millions of dollars)

System	Component	Inventory Value	Economic Loss	Loss Ratio (%)
Highway	Segments	200.7307	0.0000	0.00
	Bridges	116.7909	24.2861	20.79
	Tunnels	0.0000	0.0000	0.00
	Subtotal	**317.5216**	**24.2861**	
Railways	Segments	11.9909	0.0000	0.00
	Bridges	0.0621	0.0019	3.06
	Tunnels	0.0000	0.0000	0.00
	Facilities	0.0000	0.0000	0.00
	Subtotal	**12.0530**	**0.0019**	
Light Rail	Segments	9.2680	0.0000	0.00
	Bridges	0.0000	0.0000	0.00
	Tunnels	0.0000	0.0000	0.00
	Facilities	2.6630	0.6558	24.63
	Subtotal	**11.9310**	**0.6558**	
Bus	Facilities	1.2535	0.3103	24.75
	Subtotal	**1.2535**	**0.3103**	
Ferry	Facilities	0.0000	0.0000	0.00
	Subtotal	**0.0000**	**0.0000**	
Port	Facilities	0.0000	0.0000	0.00
	Subtotal	**0.0000**	**0.0000**	
Airport	Facilities	0.0000	0.0000	0.00
	Runways	0.0000	0.0000	0.00
	Subtotal	**0.0000**	**0.0000**	
	Total	**342.76**	**25.25**	

Table 13: Utility System Economic Losses

(Millions of dollars)

System	Component	Inventory Value	Economic Loss	Loss Ratio (%)
Potable Water	Pipelines	0.0000	0.0000	0.00
	Facilities	0.0000	0.0000	0.00
	Distribution Lines	7.1591	0.0000	0.00
	Subtotal	**7.1591**	**0.0000**	
Waste Water	Pipelines	0.0000	0.0000	0.00
	Facilities	0.0000	0.0000	0.00
	Distribution Lines	4.2954	0.0000	0.00
	Subtotal	**4.2954**	**0.0000**	
Natural Gas	Pipelines	0.0000	0.0000	0.00
	Facilities	0.0000	0.0000	0.00
	Distribution Lines	2.8636	0.0000	0.00
	Subtotal	**2.8636**	**0.0000**	
Oil Systems	Pipelines	0.0000	0.0000	0.00
	Facilities	0.0000	0.0000	0.00
	Subtotal	**0.0000**	**0.0000**	
Electrical Power	Facilities	0.0000	0.0000	0.00
	Subtotal	**0.0000**	**0.0000**	
Communication	Facilities	0.0000	0.0000	0.00
	Subtotal	**0.0000**	**0.0000**	
	Total	**14.32**	**0.00**	

Appendix A: County Listing for the Region

Middlesex,CT

Appendix B: Regional Population and Building Value Data

State	County Name	Population	Building Value (millions of dollars)		
			Residential	Non-Residential	Total
Connecticut					
	Middlesex	13,260	1,661	400	2,061
Total Region		**13,260**	**1,661**	**400**	**2,061**

Hazus: Earthquake Global Risk Report

Region Name: Clinton

Earthquake Scenario: Haddam

Print Date: October 16, 2019

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 earthquake. These results can be improved by using enhanced inventory, geotechnical, and observed ground motion data.

Table of Contents

General Description of the Region

Hazus-MH is a regional earthquake loss estimation model that was developed by the Federal Emergency Management Agency (FEMA) and the National Institute of Building Sciences. 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 earthquake loss estimates provided in this report was based on a region that includes 1 county(ies) from the following state(s):

Connecticut

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

The geographical size of the region is 16.38 square miles and contains 4 census tracts. There are over 5 thousand households in the region which has a total population of 13,260 people (2010 Census Bureau data). The distribution of population by Total Region and County is provided in Appendix B.

There are an estimated 5 thousand buildings in the region with a total building replacement value (excluding contents) of 2,061 (millions of dollars). Approximately 91.00 % of the buildings (and 81.00% of the building value) are associated with residential housing.

The replacement value of the transportation and utility lifeline systems is estimated to be 342 and 14 (millions of dollars) , respectively.

Building and Lifeline Inventory

Building Inventory

Hazus estimates that there are 5 thousand buildings in the region which have an aggregate total replacement value of 2,061 (millions of dollars) . Appendix B provides a general distribution of the building value by Total Region and County.

In terms of building construction types found in the region, wood frame construction makes up 83% of the building inventory. The remaining percentage is distributed between the other general building types.

Critical Facility Inventory

Hazus breaks critical facilities into two (2) groups: essential facilities and high potential loss facilities (HPL). Essential facilities include hospitals, medical clinics, schools, fire stations, police stations and emergency operations facilities. High potential loss facilities include dams, levees, military installations, nuclear power plants and hazardous material sites.

For essential facilities, there are 0 hospitals in the region with a total bed capacity of beds. There are 5 schools, 2 fire stations, 1 police stations and 1 emergency operation facilities. With respect to high potential loss facilities (HPL), there are no dams identified within the inventory. The inventory also includes 3 hazardous material sites, no military installations and no nuclear power plants.

Transportation and Utility Lifeline Inventory

Within Hazus, the lifeline inventory is divided between transportation and utility lifeline systems. There are seven (7) transportation systems that include highways, railways, light rail, bus, ports, ferry and airports. There are six (6) utility systems that include potable water, wastewater, natural gas, crude & refined oil, electric power and communications. The lifeline inventory data are provided in Tables 1 and 2.

The total value of the lifeline inventory is over 356.00 (millions of dollars). This inventory includes over 24.23 miles of highways, 19 bridges, 444.28 miles of pipes.

Table 1: Transportation System Lifeline Inventory

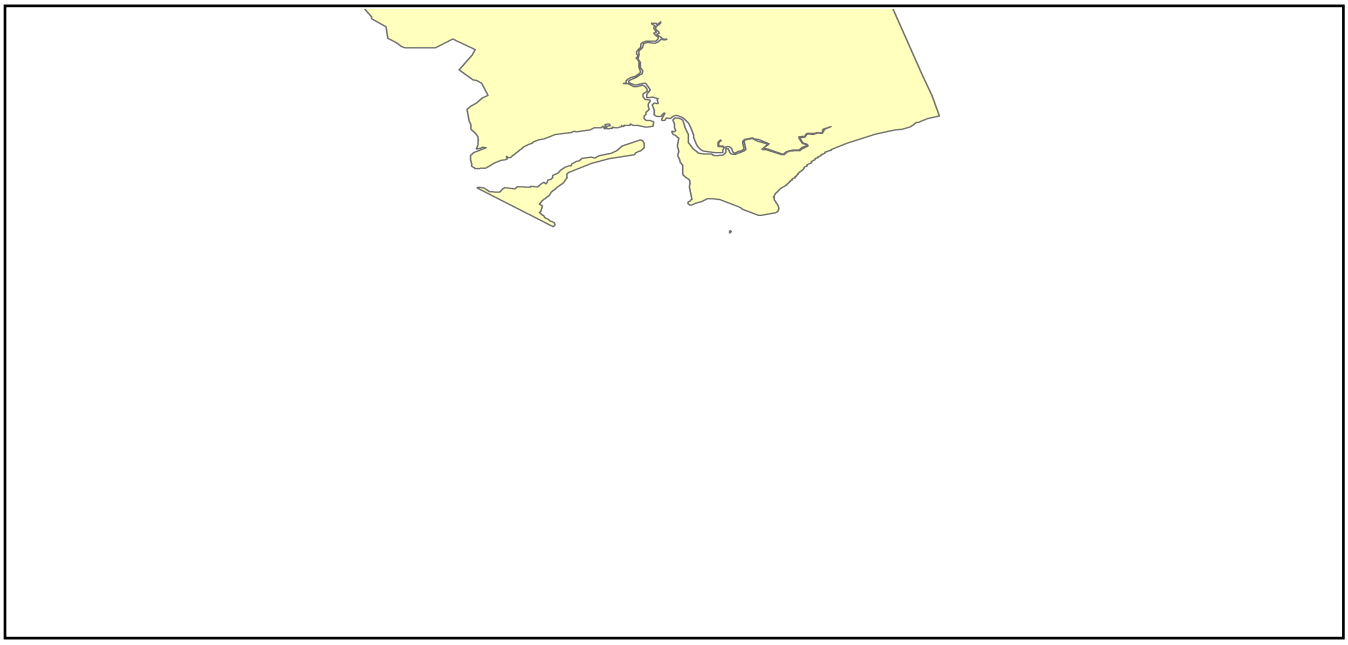
System	Component	# Locations/ # Segments	Replacement value (millions of dollars)
Highway	Bridges	19	116.7909
	Segments	11	200.7307
	Tunnels	0	0.0000
		Subtotal	**317.5216**
Railways	Bridges	1	0.0621
	Facilities	0	0.0000
	Segments	3	11.9909
	Tunnels	0	0.0000
		Subtotal	**12.0530**
Light Rail	Bridges	0	0.0000
	Facilities	1	2.6630
	Segments	2	9.2680
	Tunnels	0	0.0000
		Subtotal	**11.9310**
Bus	Facilities	1	1.2535
		Subtotal	**1.2535**
Ferry	Facilities	0	0.0000
		Subtotal	**0.0000**
Port	Facilities	0	0.0000
		Subtotal	**0.0000**
Airport	Facilities	0	0.0000
	Runways	0	0.0000
		Subtotal	**0.0000**
		Total	**342.80**

Table 2: Utility System Lifeline Inventory

System	Component	# Locations / Segments	Replacement value (millions of dollars)
Potable Water	Distribution Lines	NA	7.1591
	Facilities	0	0.0000
	Pipelines	0	0.0000
		Subtotal	**7.1591**
Waste Water	Distribution Lines	NA	4.2954
	Facilities	0	0.0000
	Pipelines	0	0.0000
		Subtotal	**4.2954**
Natural Gas	Distribution Lines	NA	2.8636
	Facilities	0	0.0000
	Pipelines	0	0.0000
		Subtotal	**2.8636**
Oil Systems	Facilities	0	0.0000
	Pipelines	0	0.0000
		Subtotal	**0.0000**
Electrical Power	Facilities	0	0.0000
		Subtotal	**0.0000**
Communication	Facilities	0	0.0000
		Subtotal	**0.0000**
		Total	**14.30**

Earthquake Scenario

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



Scenario Name	Haddam
Type of Earthquake	Arbitrary
Fault Name	NA
Historical Epicenter ID #	NA
Probabilistic Return Period	NA
Longitude of Epicenter	-72.50
Latitude of Epicenter	41.50
Earthquake Magnitude	5.70
Depth (km)	10.00
Rupture Length (Km)	NA
Rupture Orientation (degrees)	NA
Attenuation Function	Central & East US (CEUS 2008)

Direct Earthquake Damage

Building Damage

Hazus estimates that about 781 buildings will be at least moderately damaged. This is over 13.00 % of the buildings in the region. There are an estimated 46 buildings that will be damaged beyond repair. The definition of the 'damage states' is provided in Volume 1: Chapter 5 of the Hazus technical manual. Table 3 below summarizes the expected damage by general occupancy for the buildings in the region. Table 4 below summarizes the expected damage by general building type.

Damage Categories by General Occupancy Type

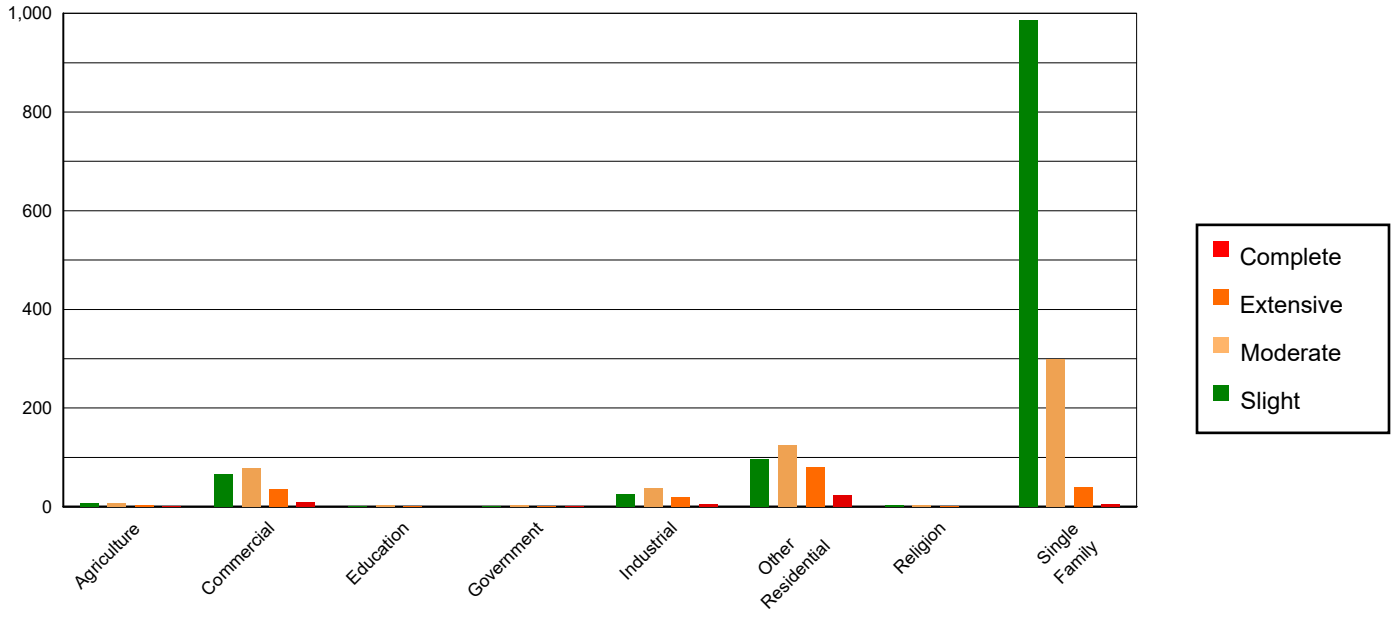


Table 3: Expected Building Damage by Occupancy

	None		Slight		Moderate		Extensive		Complete	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Agriculture	10.69	0.28	7.28	0.61	7.21	1.30	2.96	1.63	0.86	1.86
Commercial	114.26	2.95	66.56	5.59	78.82	14.23	35.63	19.61	9.73	21.09
Education	3.67	0.09	2.11	0.18	2.68	0.48	1.20	0.66	0.34	0.73
Government	3.75	0.10	2.17	0.18	3.09	0.56	1.55	0.85	0.45	0.97
Industrial	40.85	1.05	25.21	2.12	36.90	6.66	19.29	10.62	5.75	12.46
Other Residential	212.66	5.49	96.78	8.13	123.68	22.32	80.55	44.33	23.34	50.58
Religion	10.08	0.26	3.57	0.30	2.94	0.53	1.16	0.64	0.25	0.55
Single Family	3476.34	89.77	986.17	82.88	298.70	53.92	39.37	21.67	5.43	11.76
Total	**3,872**		**1,190**		**554**		**182**		**46**	

Table 4: Expected Building Damage by Building Type (All Design Levels)

	None		Slight		Moderate		Extensive		Complete	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Wood	3538.35	91.38	1000.03	84.05	286.45	51.71	27.22	14.98	1.72	3.72
Steel	64.19	1.66	43.13	3.63	75.78	13.68	42.04	23.14	13.26	28.73
Concrete	11.35	0.29	7.32	0.61	13.59	2.45	6.91	3.80	1.87	4.05
Precast	5.49	0.14	2.40	0.20	4.36	0.79	3.02	1.66	0.50	1.09
RM	31.03	0.80	8.83	0.74	12.48	2.25	6.19	3.41	0.40	0.86
URM	164.04	4.24	78.05	6.56	66.40	11.99	25.51	14.04	7.09	15.36
MH	57.83	1.49	50.08	4.21	94.95	17.14	70.83	38.98	21.32	46.19
Total	**3,872**		**1,190**		**554**		**182**		**46**	

*Note:

RM Reinforced Masonry
URM Unreinforced Masonry
MH Manufactured Housing

Essential Facility Damage

Before the earthquake, the region had hospital beds available for use. On the day of the earthquake, the model estimates that only hospital beds (%) are available for use by patients already in the hospital and those injured by the earthquake. After one week, % of the beds will be back in service. By 30 days, % will be operational.

Table 5: Expected Damage to Essential Facilities

Classification	Total	# Facilities		
		At Least Moderate Damage > 50%	Complete Damage > 50%	With Functionality > 50% on day 1
Hospitals	0	0	0	0
Schools	5	0	0	0
EOCs	1	0	0	0
PoliceStations	1	0	0	0
FireStations	2	0	0	0

Transportation Lifeline Damage

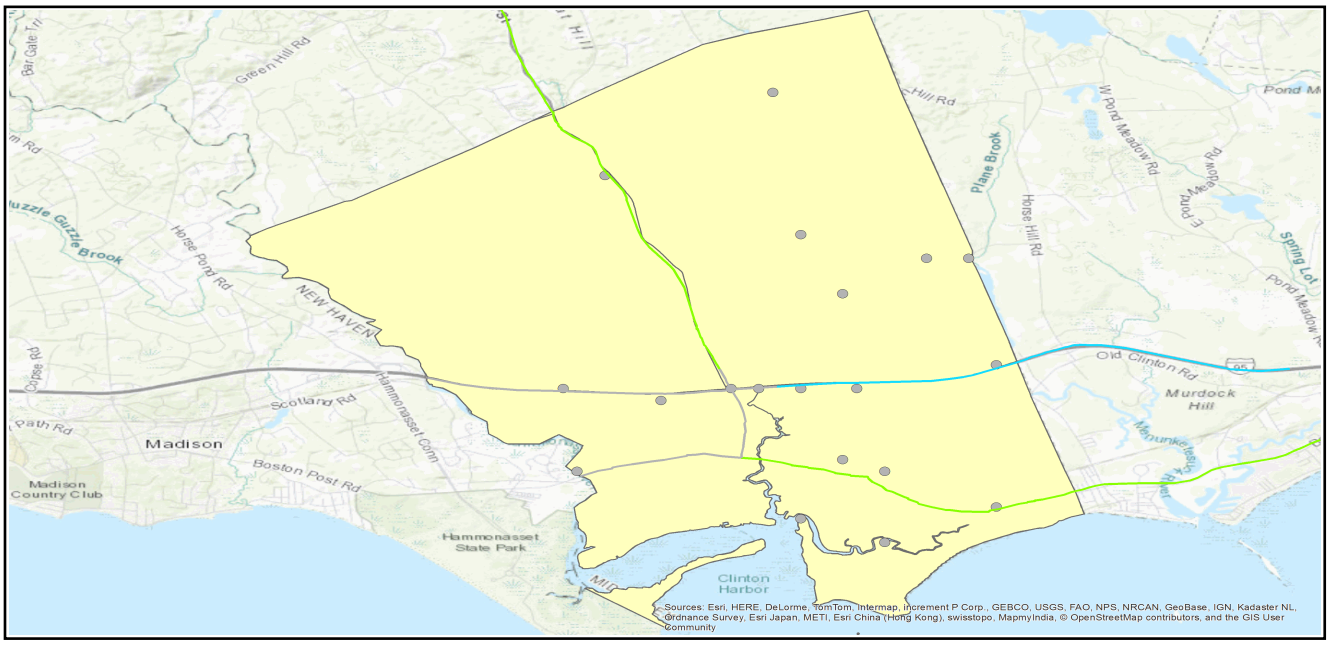


Table 6: Expected Damage to the Transportation Systems

System	Component		Number of Locations			
		Locations/ Segments	With at Least Mod. Damage	With Complete Damage	With Functionality > 50 % After Day 1	With Functionality > 50 % After Day 7
Highway	Segments	11	0	0	11	11
	Bridges	19	0	0	19	19
	Tunnels	0	0	0	0	0
Railways	Segments	3	0	0	1	1
	Bridges	1	0	0	1	1
	Tunnels	0	0	0	0	0
	Facilities	0	0	0	0	0
Light Rail	Segments	2	0	0	2	2
	Bridges	0	0	0	0	0
	Tunnels	0	0	0	0	0
	Facilities	1	0	0	1	1
Bus	Facilities	1	0	0	1	1
Ferry	Facilities	0	0	0	0	0
Port	Facilities	0	0	0	0	0
Airport	Facilities	0	0	0	0	0
	Runways	0	0	0	0	0

Table 6 provides damage estimates for the transportation system.

Note: Roadway segments, railroad tracks and light rail tracks are assumed to be damaged by ground failure only. If ground failure maps are not provided, damage estimates to these components will not be computed.

Tables 7-9 provide information on the damage to the utility lifeline systems. Table 7 provides damage to the utility system facilities. Table 8 provides estimates on the number of leaks and breaks by the pipelines of the utility systems. For electric power and potable water, Hazus performs a simplified system performance analysis. Table 9 provides a summary of the system performance information.

Table 7 : Expected Utility System Facility Damage

System	# of Locations				
	Total #	With at Least Moderate Damage	With Complete Damage	with Functionality > 50 %	
				After Day 1	After Day 7
Potable Water	0	0	0	0	0
Waste Water	0	0	0	0	0
Natural Gas	0	0	0	0	0
Oil Systems	0	0	0	0	0
Electrical Power	0	0	0	0	0
Communication	0	0	0	0	0

Table 8 : Expected Utility System Pipeline Damage (Site Specific)

System	Total Pipelines Length (miles)	Number of Leaks	Number of Breaks
Potable Water	222	0	0
Waste Water	133	0	0
Natural Gas	89	0	0
Oil	0	0	0

Table 9: Expected Potable Water and Electric Power System Performance

	Total # of Households	Number of Households without Service				
		At Day 1	At Day 3	At Day 7	At Day 30	At Day 90
Potable Water						
Electric Power						

Induced Earthquake Damage

Fire Following Earthquake

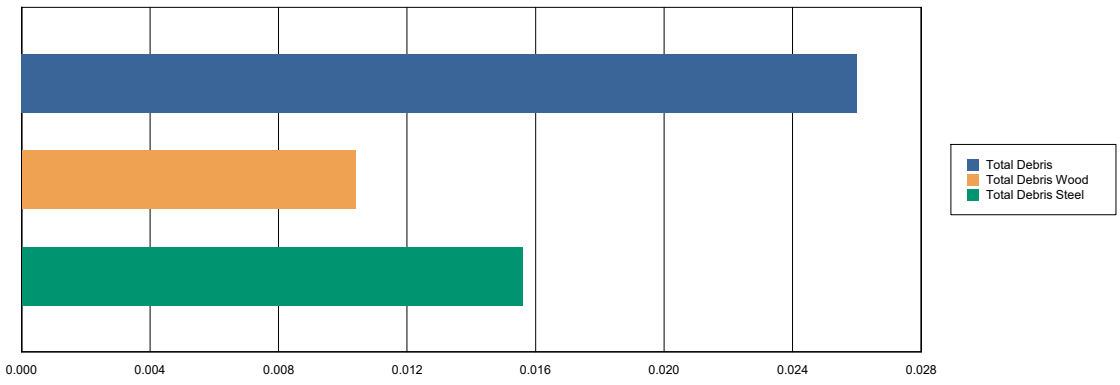
Fires often occur after an earthquake. Because of the number of fires and the lack of water to fight the fires, they can often burn out of control. Hazus uses a Monte Carlo simulation model to estimate the number of ignitions and the amount of burnt area. For this scenario, the model estimates that there will be 0 ignitions that will burn about 0.00 sq. mi 0.00 % of the region's total area.) The model also estimates that the fires will displace about 0 people and burn about 0 (millions of dollars) of building value.

Debris Generation

Hazus estimates the amount of debris that will be generated by the earthquake. The model breaks the debris into two general categories: a) Brick/Wood and b) Reinforced Concrete/Steel. 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 26,000 tons of debris will be generated. Of the total amount, Brick/Wood comprises 40.00% of the total, with the remainder being Reinforced Concrete/Steel. If the debris tonnage is converted to an estimated number of truckloads, it will require 1,040 truckloads (@25 tons/truck) to remove the debris generated by the earthquake.

Earthquake Debris (millions of tons)



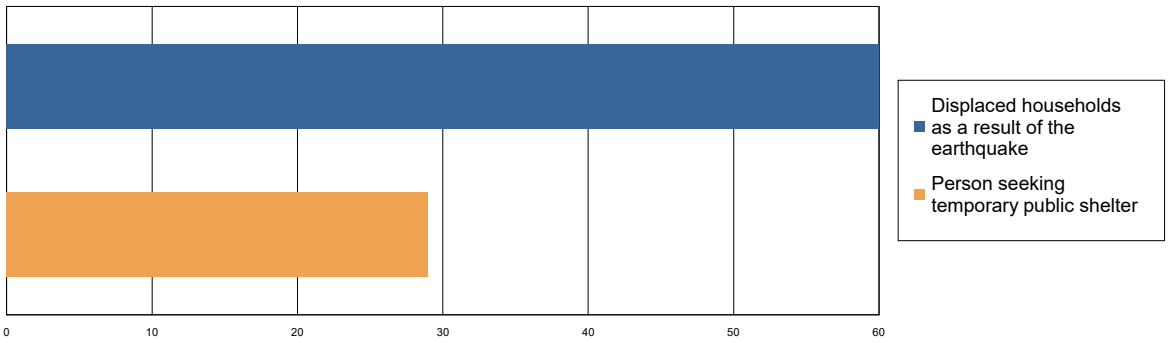
Brick/ Wood	Reinforced Concrete/Steel	Total Debris	Truck Load
0.01	0.02	0.03	1,040 (@25 tons/truck)

Social Impact

Shelter Requirement

Hazus estimates the number of households that are expected to be displaced from their homes due to the earthquake and the number of displaced people that will require accommodations in temporary public shelters. The model estimates 60 households to be displaced due to the earthquake. Of these, 29 people (out of a total population of 13,260) will seek temporary shelter in public shelters.

Displaced Households/ Persons Seeking Short Term Public Shelter



Displaced households as a result of the earthquake	Persons seeking temporary public shelter
60	29

Casualties

Hazus estimates the number of people that will be injured and killed by the earthquake. The casualties are broken down into four (4) severity levels that describe the extent of the injuries. The levels are described as follows;

- Severity Level 1: Injuries will require medical attention but hospitalization is not needed.
- Severity Level 2: Injuries will require hospitalization but are not considered life-threatening
- Severity Level 3: Injuries will require hospitalization and can become life threatening if not promptly treated.
- Severity Level 4: Victims are killed by the earthquake.

The casualty estimates are provided for three (3) times of day: 2:00 AM, 2:00 PM and 5:00 PM. These times represent the periods of the day that different sectors of the community are at their peak occupancy loads. The 2:00 AM estimate considers that the residential occupancy load is maximum, the 2:00 PM estimate considers that the educational, commercial and industrial sector loads are maximum and 5:00 PM represents peak commute time.

Table 10 provides a summary of the casualties estimated for this earthquake

Table 10: Casualty Estimates

		Level 1	Level 2	Level 3	Level 4
2 AM	Commercial	0.55	0.13	0.02	0.03
	Commuting	0.00	0.00	0.00	0.00
	Educational	0.00	0.00	0.00	0.00
	Hotels	0.00	0.00	0.00	0.00
	Industrial	1.06	0.26	0.03	0.07
	Other-Residential	6.50	1.32	0.12	0.22
	Single Family	5.82	0.85	0.08	0.16
	Total	**14**	**3**	**0**	**0**
2 PM	Commercial	30.53	7.01	0.90	1.75
	Commuting	0.02	0.02	0.04	0.01
	Educational	11.31	2.73	0.39	0.76
	Hotels	0.00	0.00	0.00	0.00
	Industrial	7.85	1.90	0.26	0.50
	Other-Residential	1.09	0.22	0.02	0.04
	Single Family	1.00	0.15	0.02	0.03
	Total	**52**	**12**	**2**	**3**
5 PM	Commercial	21.89	5.05	0.66	1.26
	Commuting	0.38	0.47	0.83	0.16
	Educational	0.80	0.19	0.03	0.05
	Hotels	0.00	0.00	0.00	0.00
	Industrial	4.91	1.19	0.16	0.31
	Other-Residential	2.42	0.49	0.05	0.08
	Single Family	2.27	0.35	0.04	0.06
	Total	**33**	**8**	**2**	**2**

Economic Loss

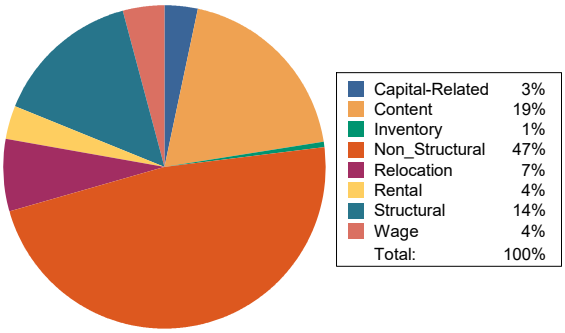
The total economic loss estimated for the earthquake is 127.63 (millions of dollars), which includes building and lifeline related losses based on the region's available inventory. The following three sections provide more detailed information about these losses.

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 earthquake. Business interruption losses also include the temporary living expenses for those people displaced from their homes because of the earthquake.

The total building-related losses were 120.01 (millions of dollars); 18 % of the estimated losses were related to the business interruption of the region. By far, the largest loss was sustained by the residential occupancies which made up over 51 % of the total loss. Table 11 below provides a summary of the losses associated with the building damage.

Earthquake Losses by Loss Type ($ millions)



Earthquake Losses by Occupancy Type ($ millions)

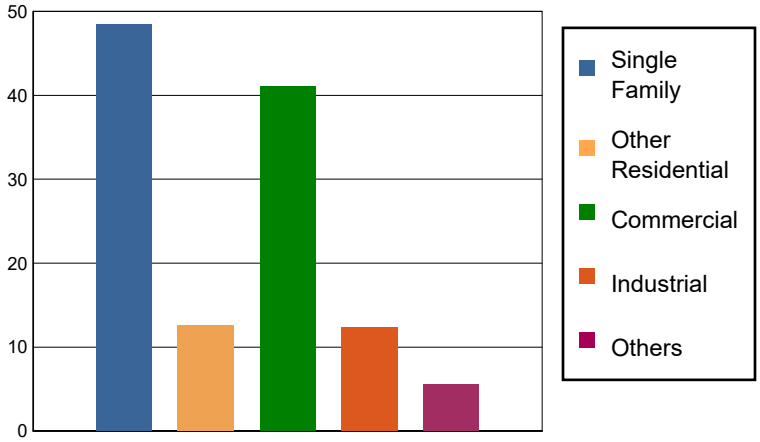


Table 11: Building-Related Economic Loss Estimates

(Millions of dollars)

Category	Area	Single Family	Other Residential	Commercial	Industrial	Others	Total
Income Losses							
	Wage	0.0000	0.1252	4.5266	0.2729	0.2334	5.1581
	Capital-Related	0.0000	0.0534	3.7080	0.1678	0.0433	3.9725
	Rental	0.6702	0.7435	2.6660	0.0977	0.0868	4.2642
	Relocation	2.3587	0.9084	4.0084	0.6208	0.6881	8.5844
	Subtotal	**3.0289**	**1.8305**	**14.9090**	**1.1592**	**1.0516**	**21.9792**
Capital Stock Losses							
	Structural	5.5166	1.9239	6.6373	2.1331	1.1503	17.3612
	Non_Structural	28.6398	7.2342	13.3543	5.3427	2.2674	56.8384
	Content	11.2487	1.6364	6.0011	3.1799	1.0446	23.1107
	Inventory	0.0000	0.0000	0.1981	0.5026	0.0232	0.7239
	Subtotal	**45.4051**	**10.7945**	**26.1908**	**11.1583**	**4.4855**	**98.0342**
	Total	**48.43**	**12.63**	**41.10**	**12.32**	**5.54**	**120.01**

Transportation and Utility Lifeline Losses

For the transportation and utility lifeline systems, Hazus computes the direct repair cost for each component only. There are no losses computed by Hazus for business interruption due to lifeline outages. Tables 12 & 13 provide a detailed breakdown in the expected lifeline losses.

Table 12: Transportation System Economic Losses
(Millions of dollars)

System	Component	Inventory Value	Economic Loss	Loss Ratio (%)
Highway	Segments	200.7307	0.0000	0.00
	Bridges	116.7909	6.9779	5.97
	Tunnels	0.0000	0.0000	0.00
	Subtotal	**317.5216**	**6.9779**	
Railways	Segments	11.9909	0.0000	0.00
	Bridges	0.0621	0.0002	0.32
	Tunnels	0.0000	0.0000	0.00
	Facilities	0.0000	0.0000	0.00
	Subtotal	**12.0530**	**0.0002**	
Light Rail	Segments	9.2680	0.0000	0.00
	Bridges	0.0000	0.0000	0.00
	Tunnels	0.0000	0.0000	0.00
	Facilities	2.6630	0.4246	15.94
	Subtotal	**11.9310**	**0.4246**	
Bus	Facilities	1.2535	0.2098	16.74
	Subtotal	**1.2535**	**0.2098**	
Ferry	Facilities	0.0000	0.0000	0.00
	Subtotal	**0.0000**	**0.0000**	
Port	Facilities	0.0000	0.0000	0.00
	Subtotal	**0.0000**	**0.0000**	
Airport	Facilities	0.0000	0.0000	0.00
	Runways	0.0000	0.0000	0.00
	Subtotal	**0.0000**	**0.0000**	
	Total	**342.76**	**7.61**	

Table 13: Utility System Economic Losses

(Millions of dollars)

System	Component	Inventory Value	Economic Loss	Loss Ratio (%)
Potable Water	Pipelines	0.0000	0.0000	0.00
	Facilities	0.0000	0.0000	0.00
	Distribution Lines	7.1591	0.0000	0.00
	Subtotal	**7.1591**	**0.0000**	
Waste Water	Pipelines	0.0000	0.0000	0.00
	Facilities	0.0000	0.0000	0.00
	Distribution Lines	4.2954	0.0000	0.00
	Subtotal	**4.2954**	**0.0000**	
Natural Gas	Pipelines	0.0000	0.0000	0.00
	Facilities	0.0000	0.0000	0.00
	Distribution Lines	2.8636	0.0000	0.00
	Subtotal	**2.8636**	**0.0000**	
Oil Systems	Pipelines	0.0000	0.0000	0.00
	Facilities	0.0000	0.0000	0.00
	Subtotal	**0.0000**	**0.0000**	
Electrical Power	Facilities	0.0000	0.0000	0.00
	Subtotal	**0.0000**	**0.0000**	
Communication	Facilities	0.0000	0.0000	0.00
	Subtotal	**0.0000**	**0.0000**	
	Total	**14.32**	**0.00**	

Appendix A: County Listing for the Region

Middlesex,CT

Appendix B: Regional Population and Building Value Data

State	County Name	Population	Building Value (millions of dollars)		
			Residential	Non-Residential	Total
Connecticut					
	Middlesex	13,260	1,661	400	2,061
Total Region		**13,260**	**1,661**	**400**	**2,061**

Hazus: Earthquake Global Risk Report

Region Name: Clinton

Earthquake Scenario: Portland

Print Date: October 16, 2019

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 earthquake. These results can be improved by using enhanced inventory, geotechnical, and observed ground motion data.

Table of Contents

General Description of the Region

Hazus-MH is a regional earthquake loss estimation model that was developed by the Federal Emergency Management Agency (FEMA) and the National Institute of Building Sciences. 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 earthquake loss estimates provided in this report was based on a region that includes 1 county(ies) from the following state(s):

Connecticut

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

The geographical size of the region is 16.38 square miles and contains 4 census tracts. There are over 5 thousand households in the region which has a total population of 13,260 people (2010 Census Bureau data). The distribution of population by Total Region and County is provided in Appendix B.

There are an estimated 5 thousand buildings in the region with a total building replacement value (excluding contents) of 2,061 (millions of dollars). Approximately 91.00 % of the buildings (and 81.00% of the building value) are associated with residential housing.

The replacement value of the transportation and utility lifeline systems is estimated to be 342 and 14 (millions of dollars) , respectively.

Building and Lifeline Inventory

Building Inventory

Hazus estimates that there are 5 thousand buildings in the region which have an aggregate total replacement value of 2,061 (millions of dollars) . Appendix B provides a general distribution of the building value by Total Region and County.

In terms of building construction types found in the region, wood frame construction makes up 83% of the building inventory. The remaining percentage is distributed between the other general building types.

Critical Facility Inventory

Hazus breaks critical facilities into two (2) groups: essential facilities and high potential loss facilities (HPL). Essential facilities include hospitals, medical clinics, schools, fire stations, police stations and emergency operations facilities. High potential loss facilities include dams, levees, military installations, nuclear power plants and hazardous material sites.

For essential facilities, there are 0 hospitals in the region with a total bed capacity of beds. There are 5 schools, 2 fire stations, 1 police stations and 1 emergency operation facilities. With respect to high potential loss facilities (HPL), there are no dams identified within the inventory. The inventory also includes 3 hazardous material sites, no military installations and no nuclear power plants.

Transportation and Utility Lifeline Inventory

Within Hazus, the lifeline inventory is divided between transportation and utility lifeline systems. There are seven (7) transportation systems that include highways, railways, light rail, bus, ports, ferry and airports. There are six (6) utility systems that include potable water, wastewater, natural gas, crude & refined oil, electric power and communications. The lifeline inventory data are provided in Tables 1 and 2.

The total value of the lifeline inventory is over 356.00 (millions of dollars). This inventory includes over 24.23 miles of highways, 19 bridges, 444.28 miles of pipes.

Table 1: Transportation System Lifeline Inventory

System	Component	# Locations/ # Segments	Replacement value (millions of dollars)
Highway	Bridges	19	116.7909
	Segments	11	200.7307
	Tunnels	0	0.0000
		Subtotal	**317.5216**
Railways	Bridges	1	0.0621
	Facilities	0	0.0000
	Segments	3	11.9909
	Tunnels	0	0.0000
		Subtotal	**12.0530**
Light Rail	Bridges	0	0.0000
	Facilities	1	2.6630
	Segments	2	9.2680
	Tunnels	0	0.0000
		Subtotal	**11.9310**
Bus	Facilities	1	1.2535
		Subtotal	**1.2535**
Ferry	Facilities	0	0.0000
		Subtotal	**0.0000**
Port	Facilities	0	0.0000
		Subtotal	**0.0000**
Airport	Facilities	0	0.0000
	Runways	0	0.0000
		Subtotal	**0.0000**
		Total	**342.80**

Table 2: Utility System Lifeline Inventory

System	Component	# Locations / Segments	Replacement value (millions of dollars)
Potable Water	Distribution Lines	NA	7.1591
	Facilities	0	0.0000
	Pipelines	0	0.0000
		Subtotal	**7.1591**
Waste Water	Distribution Lines	NA	4.2954
	Facilities	0	0.0000
	Pipelines	0	0.0000
		Subtotal	**4.2954**
Natural Gas	Distribution Lines	NA	2.8636
	Facilities	0	0.0000
	Pipelines	0	0.0000
		Subtotal	**2.8636**
Oil Systems	Facilities	0	0.0000
	Pipelines	0	0.0000
		Subtotal	**0.0000**
Electrical Power	Facilities	0	0.0000
		Subtotal	**0.0000**
Communication	Facilities	0	0.0000
		Subtotal	**0.0000**
		Total	**14.30**

Earthquake Scenario

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

Scenario Name	Portland
Type of Earthquake	Arbitrary
Fault Name	NA
Historical Epicenter ID #	NA
Probabilistic Return Period	NA
Longitude of Epicenter	-72.60
Latitude of Epicenter	41.60
Earthquake Magnitude	5.70
Depth (km)	10.00
Rupture Length (Km)	NA
Rupture Orientation (degrees)	NA
Attenuation Function	Central & East US (CEUS 2008)

Direct Earthquake Damage

Building Damage

Hazus estimates that about 293 buildings will be at least moderately damaged. This is over 5.00 % of the buildings in the region. There are an estimated 4 buildings that will be damaged beyond repair. The definition of the 'damage states' is provided in Volume 1: Chapter 5 of the Hazus technical manual. Table 3 below summarizes the expected damage by general occupancy for the buildings in the region. Table 4 below summarizes the expected damage by general building type.

Damage Categories by General Occupancy Type

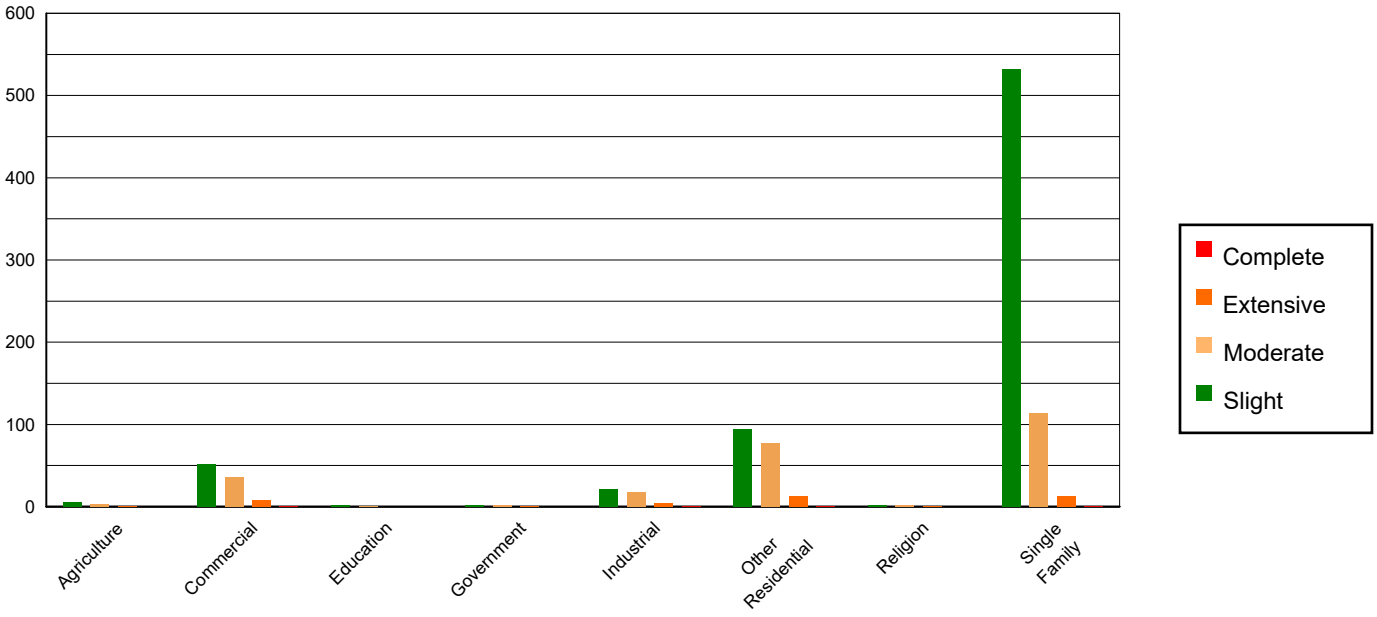


Table 3: Expected Building Damage by Occupancy

	None		Slight		Moderate		Extensive		Complete	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Agriculture	20.26	0.42	5.16	0.73	2.85	1.14	0.66	1.71	0.07	1.72
Commercial	209.06	4.32	51.53	7.25	35.36	14.08	7.98	20.76	1.07	25.62
Education	6.85	0.14	1.67	0.24	1.19	0.47	0.24	0.63	0.04	0.95
Government	7.38	0.15	1.84	0.26	1.43	0.57	0.31	0.80	0.04	1.07
Industrial	84.32	1.74	21.87	3.08	17.32	6.90	3.94	10.25	0.55	13.15
Other Residential	351.78	7.27	94.21	13.26	77.38	30.82	12.62	32.84	1.01	24.08
Religion	13.67	0.28	2.49	0.35	1.46	0.58	0.34	0.87	0.05	1.13
Single Family	4146.44	85.67	531.77	74.84	114.09	45.44	12.35	32.13	1.35	32.27
Total	**4,840**		**711**		**251**		**38**		**4**	

Table 4: Expected Building Damage by Building Type (All Design Levels)

	None		Slight		Moderate		Extensive		Complete	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Wood	4218.75	87.17	529.73	74.55	98.48	39.22	6.56	17.08	0.25	6.10
Steel	151.33	3.13	41.30	5.81	36.46	14.52	8.15	21.20	1.16	27.83
Concrete	26.98	0.56	6.90	0.97	6.04	2.41	1.00	2.60	0.10	2.50
Precast	10.60	0.22	2.12	0.30	2.27	0.90	0.77	2.01	0.03	0.61
RM	46.40	0.96	5.95	0.84	5.21	2.07	1.36	3.53	0.02	0.38
URM	229.94	4.75	59.96	8.44	38.59	15.37	10.64	27.68	1.95	46.58
MH	155.75	3.22	64.60	9.09	64.02	25.50	9.96	25.91	0.67	16.00
Total	**4,840**		**711**		**251**		**38**		**4**	

*Note:

RM Reinforced Masonry
URM Unreinforced Masonry
MH Manufactured Housing

Essential Facility Damage

Before the earthquake, the region had hospital beds available for use. On the day of the earthquake, the model estimates that only hospital beds (%) are available for use by patients already in the hospital and those injured by the earthquake. After one week, % of the beds will be back in service. By 30 days, % will be operational.

Table 5: Expected Damage to Essential Facilities

Classification	Total	# Facilities		
		At Least Moderate Damage > 50%	Complete Damage > 50%	With Functionality > 50% on day 1
Hospitals	0	0	0	0
Schools	5	0	0	5
EOCs	1	0	0	1
PoliceStations	1	0	0	1
FireStations	2	0	0	2

Transportation Lifeline Damage

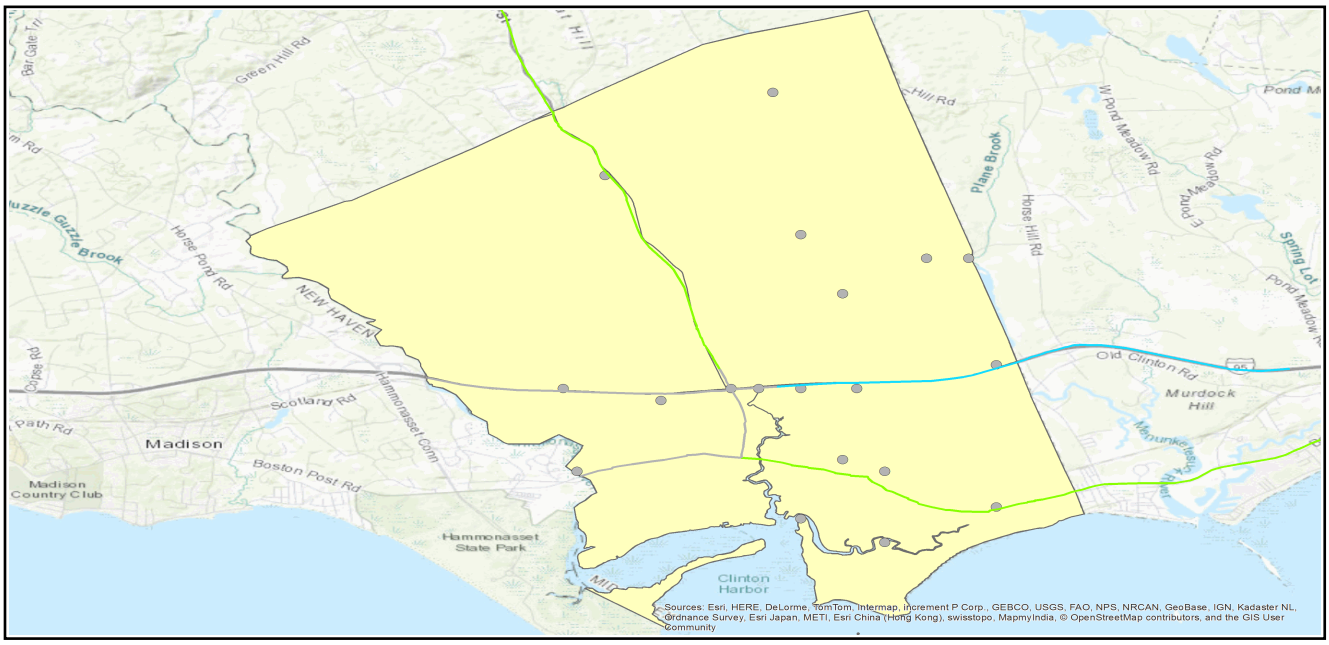


Table 6: Expected Damage to the Transportation Systems

System	Component		Number of Locations			
		Locations/ Segments	With at Least Mod. Damage	With Complete Damage	With Functionality > 50 % After Day 1	With Functionality > 50 % After Day 7
Highway	Segments	11	0	0	11	11
	Bridges	19	0	0	19	19
	Tunnels	0	0	0	0	0
Railways	Segments	3	0	0	1	1
	Bridges	1	0	0	1	1
	Tunnels	0	0	0	0	0
	Facilities	0	0	0	0	0
Light Rail	Segments	2	0	0	2	2
	Bridges	0	0	0	0	0
	Tunnels	0	0	0	0	0
	Facilities	1	0	0	1	1
Bus	Facilities	1	0	0	1	1
Ferry	Facilities	0	0	0	0	0
Port	Facilities	0	0	0	0	0
Airport	Facilities	0	0	0	0	0
	Runways	0	0	0	0	0

Table 6 provides damage estimates for the transportation system.

Note: Roadway segments, railroad tracks and light rail tracks are assumed to be damaged by ground failure only. If ground failure maps are not provided, damage estimates to these components will not be computed.

Tables 7-9 provide information on the damage to the utility lifeline systems. Table 7 provides damage to the utility system facilities. Table 8 provides estimates on the number of leaks and breaks by the pipelines of the utility systems. For electric power and potable water, Hazus performs a simplified system performance analysis. Table 9 provides a summary of the system performance information.

Table 7 : Expected Utility System Facility Damage

System	# of Locations				
	Total #	With at Least Moderate Damage	With Complete Damage	with Functionality > 50 %	
				After Day 1	After Day 7
Potable Water	0	0	0	0	0
Waste Water	0	0	0	0	0
Natural Gas	0	0	0	0	0
Oil Systems	0	0	0	0	0
Electrical Power	0	0	0	0	0
Communication	0	0	0	0	0

Table 8 : Expected Utility System Pipeline Damage (Site Specific)

System	Total Pipelines Length (miles)	Number of Leaks	Number of Breaks
Potable Water	222	0	0
Waste Water	133	0	0
Natural Gas	89	0	0
Oil	0	0	0

Table 9: Expected Potable Water and Electric Power System Performance

	Total # of Households	Number of Households without Service				
		At Day 1	At Day 3	At Day 7	At Day 30	At Day 90
Potable Water						
Electric Power						

Induced Earthquake Damage

Fire Following Earthquake

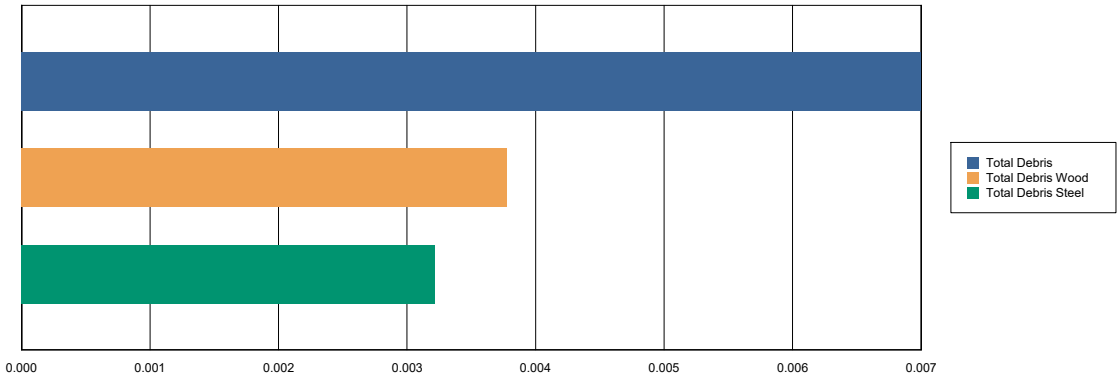
Fires often occur after an earthquake. Because of the number of fires and the lack of water to fight the fires, they can often burn out of control. Hazus uses a Monte Carlo simulation model to estimate the number of ignitions and the amount of burnt area. For this scenario, the model estimates that there will be 0 ignitions that will burn about 0.00 sq. mi 0.00 % of the region's total area.) The model also estimates that the fires will displace about 0 people and burn about 0 (millions of dollars) of building value.

Debris Generation

Hazus estimates the amount of debris that will be generated by the earthquake. The model breaks the debris into two general categories: a) Brick/Wood and b) Reinforced Concrete/Steel. 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 7,000 tons of debris will be generated. Of the total amount, Brick/Wood comprises 54.00% of the total, with the remainder being Reinforced Concrete/Steel. If the debris tonnage is converted to an estimated number of truckloads, it will require 280 truckloads (@25 tons/truck) to remove the debris generated by the earthquake.

Earthquake Debris (millions of tons)



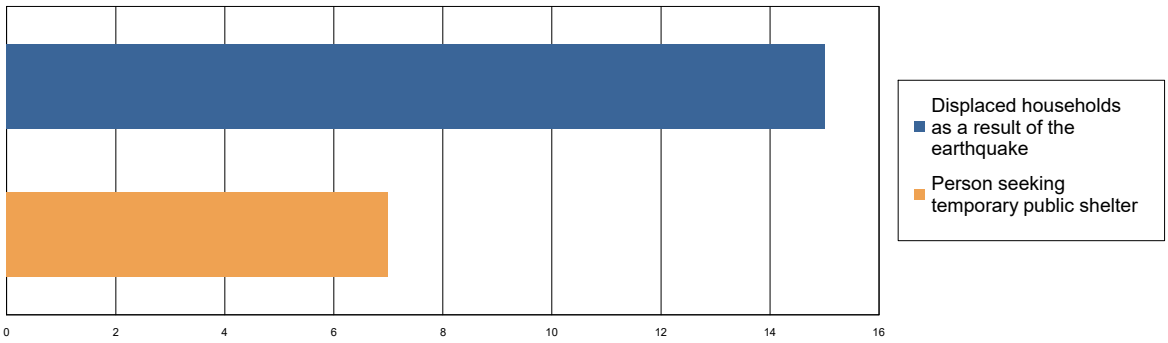
Brick/ Wood	Reinforced Concrete/Steel	Total Debris	Truck Load
0.00	0.00	0.01	280 (@25 tons/truck)

Social Impact

Shelter Requirement

Hazus estimates the number of households that are expected to be displaced from their homes due to the earthquake and the number of displaced people that will require accommodations in temporary public shelters. The model estimates 15 households to be displaced due to the earthquake. Of these, 7 people (out of a total population of 13,260) will seek temporary shelter in public shelters.

Displaced Households/ Persons Seeking Short Term Public Shelter



Displaced households as a result of the earthquake	Persons seeking temporary public shelter
15	7

Casualties

Hazus estimates the number of people that will be injured and killed by the earthquake. The casualties are broken down into four (4) severity levels that describe the extent of the injuries. The levels are described as follows;

- Severity Level 1: Injuries will require medical attention but hospitalization is not needed.
- Severity Level 2: Injuries will require hospitalization but are not considered life-threatening
- Severity Level 3: Injuries will require hospitalization and can become life threatening if not promptly treated.
- Severity Level 4: Victims are killed by the earthquake.

The casualty estimates are provided for three (3) times of day: 2:00 AM, 2:00 PM and 5:00 PM. These times represent the periods of the day that different sectors of the community are at their peak occupancy loads. The 2:00 AM estimate considers that the residential occupancy load is maximum, the 2:00 PM estimate considers that the educational, commercial and industrial sector loads are maximum and 5:00 PM represents peak commute time.

Table 10 provides a summary of the casualties estimated for this earthquake

Table 10: Casualty Estimates

		Level 1	Level 2	Level 3	Level 4
2 AM	Commercial	0.12	0.02	0.00	0.00
	Commuting	0.00	0.00	0.00	0.00
	Educational	0.00	0.00	0.00	0.00
	Hotels	0.00	0.00	0.00	0.00
	Industrial	0.19	0.03	0.00	0.01
	Other-Residential	1.39	0.21	0.02	0.03
	Single Family	2.14	0.26	0.02	0.04
	Total	**4**	**1**	**0**	**0**
2 PM	Commercial	6.44	1.13	0.12	0.23
	Commuting	0.00	0.00	0.01	0.00
	Educational	2.28	0.42	0.05	0.09
	Hotels	0.00	0.00	0.00	0.00
	Industrial	1.40	0.25	0.03	0.05
	Other-Residential	0.24	0.04	0.00	0.01
	Single Family	0.37	0.05	0.00	0.01
	Total	**11**	**2**	**0**	**0**
5 PM	Commercial	4.59	0.81	0.09	0.17
	Commuting	0.06	0.08	0.14	0.03
	Educational	0.16	0.03	0.00	0.01
	Hotels	0.00	0.00	0.00	0.00
	Industrial	0.87	0.16	0.02	0.03
	Other-Residential	0.53	0.08	0.01	0.01
	Single Family	0.83	0.10	0.01	0.02
	Total	**7**	**1**	**0**	**0**

Economic Loss

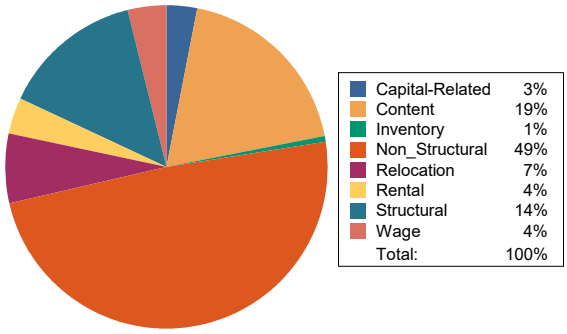
The total economic loss estimated for the earthquake is 40.05 (millions of dollars), which includes building and lifeline related losses based on the region's available inventory. The following three sections provide more detailed information about these losses.

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 earthquake. Business interruption losses also include the temporary living expenses for those people displaced from their homes because of the earthquake.

The total building-related losses were 37.80 (millions of dollars); 18 % of the estimated losses were related to the business interruption of the region. By far, the largest loss was sustained by the residential occupancies which made up over 57 % of the total loss. Table 11 below provides a summary of the losses associated with the building damage.

Earthquake Losses by Loss Type ($ millions)



Earthquake Losses by Occupancy Type ($ millions)

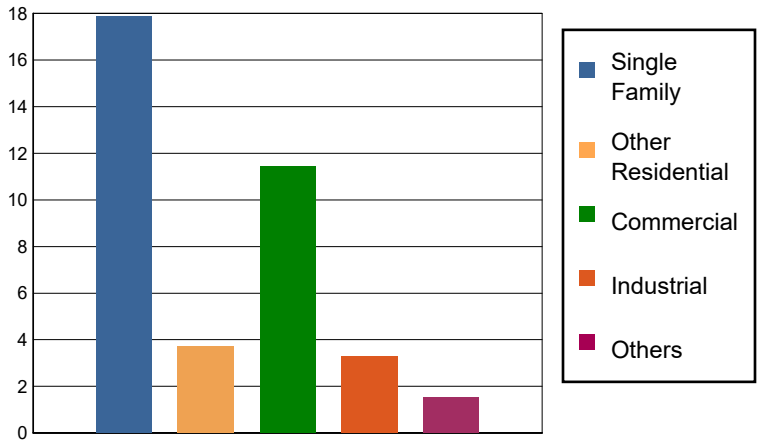


Table 11: Building-Related Economic Loss Estimates

(Millions of dollars)

Category	Area	Single Family	Other Residential	Commercial	Industrial	Others	Total
Income Losses							
	Wage	0.0000	0.0320	1.3082	0.0706	0.0698	1.4806
	Capital-Related	0.0000	0.0136	1.0686	0.0434	0.0120	1.1376
	Rental	0.2474	0.2394	0.8136	0.0287	0.0246	1.3537
	Relocation	0.8434	0.2819	1.1995	0.1935	0.1992	2.7175
	Subtotal	**1.0908**	**0.5669**	**4.3899**	**0.3362**	**0.3056**	**6.6894**
Capital Stock Losses							
	Structural	2.1860	0.5414	1.7368	0.5421	0.3039	5.3102
	Non_Structural	10.7853	2.0957	3.5352	1.3943	0.6203	18.4308
	Content	3.8177	0.4950	1.7011	0.8540	0.3081	7.1759
	Inventory	0.0000	0.0000	0.0544	0.1357	0.0063	0.1964
	Subtotal	**16.7890**	**3.1321**	**7.0275**	**2.9261**	**1.2386**	**31.1133**
	Total	**17.88**	**3.70**	**11.42**	**3.26**	**1.54**	**37.80**

Transportation and Utility Lifeline Losses

For the transportation and utility lifeline systems, Hazus computes the direct repair cost for each component only. There are no losses computed by Hazus for business interruption due to lifeline outages. Tables 12 & 13 provide a detailed breakdown in the expected lifeline losses.

Table 12: Transportation System Economic Losses
(Millions of dollars)

System	Component	Inventory Value	Economic Loss	Loss Ratio (%)
Highway	Segments	200.7307	0.0000	0.00
	Bridges	116.7909	1.9146	1.64
	Tunnels	0.0000	0.0000	0.00
	Subtotal	**317.5216**	**1.9146**	
Railways	Segments	11.9909	0.0000	0.00
	Bridges	0.0621	0.0000	0.00
	Tunnels	0.0000	0.0000	0.00
	Facilities	0.0000	0.0000	0.00
	Subtotal	**12.0530**	**0.0000**	
Light Rail	Segments	9.2680	0.0000	0.00
	Bridges	0.0000	0.0000	0.00
	Tunnels	0.0000	0.0000	0.00
	Facilities	2.6630	0.2180	8.19
	Subtotal	**11.9310**	**0.2180**	
Bus	Facilities	1.2535	0.1104	8.81
	Subtotal	**1.2535**	**0.1104**	
Ferry	Facilities	0.0000	0.0000	0.00
	Subtotal	**0.0000**	**0.0000**	
Port	Facilities	0.0000	0.0000	0.00
	Subtotal	**0.0000**	**0.0000**	
Airport	Facilities	0.0000	0.0000	0.00
	Runways	0.0000	0.0000	0.00
	Subtotal	**0.0000**	**0.0000**	
	Total	**342.76**	**2.24**	

Table 13: Utility System Economic Losses

(Millions of dollars)

System	Component	Inventory Value	Economic Loss	Loss Ratio (%)
Potable Water	Pipelines	0.0000	0.0000	0.00
	Facilities	0.0000	0.0000	0.00
	Distribution Lines	7.1591	0.0000	0.00
	Subtotal	**7.1591**	**0.0000**	
Waste Water	Pipelines	0.0000	0.0000	0.00
	Facilities	0.0000	0.0000	0.00
	Distribution Lines	4.2954	0.0000	0.00
	Subtotal	**4.2954**	**0.0000**	
Natural Gas	Pipelines	0.0000	0.0000	0.00
	Facilities	0.0000	0.0000	0.00
	Distribution Lines	2.8636	0.0000	0.00
	Subtotal	**2.8636**	**0.0000**	
Oil Systems	Pipelines	0.0000	0.0000	0.00
	Facilities	0.0000	0.0000	0.00
	Subtotal	**0.0000**	**0.0000**	
Electrical Power	Facilities	0.0000	0.0000	0.00
	Subtotal	**0.0000**	**0.0000**	
Communication	Facilities	0.0000	0.0000	0.00
	Subtotal	**0.0000**	**0.0000**	
	Total	**14.32**	**0.00**	

Appendix A: County Listing for the Region

Middlesex,CT

Appendix B: Regional Population and Building Value Data

State	County Name	Population	Building Value (millions of dollars)		
			Residential	Non-Residential	Total
Connecticut					
	Middlesex	13,260	1,661	400	2,061
Total Region		**13,260**	**1,661**	**400**	**2,061**

Hazus: Earthquake Global Risk Report

Region Name: Clinton

Earthquake Scenario: Stamford

Print Date: October 16, 2019

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 earthquake. These results can be improved by using enhanced inventory, geotechnical, and observed ground motion data.

Table of Contents

General Description of the Region

Hazus-MH is a regional earthquake loss estimation model that was developed by the Federal Emergency Management Agency (FEMA) and the National Institute of Building Sciences. 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 earthquake loss estimates provided in this report was based on a region that includes 1 county(ies) from the following state(s):

Connecticut

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

The geographical size of the region is 16.38 square miles and contains 4 census tracts. There are over 5 thousand households in the region which has a total population of 13,260 people (2010 Census Bureau data). The distribution of population by Total Region and County is provided in Appendix B.

There are an estimated 5 thousand buildings in the region with a total building replacement value (excluding contents) of 2,061 (millions of dollars). Approximately 91.00 % of the buildings (and 81.00% of the building value) are associated with residential housing.

The replacement value of the transportation and utility lifeline systems is estimated to be 342 and 14 (millions of dollars) , respectively.

Building and Lifeline Inventory

Building Inventory

Hazus estimates that there are 5 thousand buildings in the region which have an aggregate total replacement value of 2,061 (millions of dollars) . Appendix B provides a general distribution of the building value by Total Region and County.

In terms of building construction types found in the region, wood frame construction makes up 83% of the building inventory. The remaining percentage is distributed between the other general building types.

Critical Facility Inventory

Hazus breaks critical facilities into two (2) groups: essential facilities and high potential loss facilities (HPL). Essential facilities include hospitals, medical clinics, schools, fire stations, police stations and emergency operations facilities. High potential loss facilities include dams, levees, military installations, nuclear power plants and hazardous material sites.

For essential facilities, there are 0 hospitals in the region with a total bed capacity of beds. There are 5 schools, 2 fire stations, 1 police stations and 1 emergency operation facilities. With respect to high potential loss facilities (HPL), there are no dams identified within the inventory. The inventory also includes 3 hazardous material sites, no military installations and no nuclear power plants.

Transportation and Utility Lifeline Inventory

Within Hazus, the lifeline inventory is divided between transportation and utility lifeline systems. There are seven (7) transportation systems that include highways, railways, light rail, bus, ports, ferry and airports. There are six (6) utility systems that include potable water, wastewater, natural gas, crude & refined oil, electric power and communications. The lifeline inventory data are provided in Tables 1 and 2.

The total value of the lifeline inventory is over 356.00 (millions of dollars). This inventory includes over 24.23 miles of highways, 19 bridges, 444.28 miles of pipes.

Table 1: Transportation System Lifeline Inventory

System	Component	# Locations/ # Segments	Replacement value (millions of dollars)
Highway	Bridges	19	116.7909
	Segments	11	200.7307
	Tunnels	0	0.0000
		Subtotal	**317.5216**
Railways	Bridges	1	0.0621
	Facilities	0	0.0000
	Segments	3	11.9909
	Tunnels	0	0.0000
		Subtotal	**12.0530**
Light Rail	Bridges	0	0.0000
	Facilities	1	2.6630
	Segments	2	9.2680
	Tunnels	0	0.0000
		Subtotal	**11.9310**
Bus	Facilities	1	1.2535
		Subtotal	**1.2535**
Ferry	Facilities	0	0.0000
		Subtotal	**0.0000**
Port	Facilities	0	0.0000
		Subtotal	**0.0000**
Airport	Facilities	0	0.0000
	Runways	0	0.0000
		Subtotal	**0.0000**
		Total	**342.80**

Table 2: Utility System Lifeline Inventory

System	Component	# Locations / Segments	Replacement value (millions of dollars)
Potable Water	Distribution Lines	NA	7.1591
	Facilities	0	0.0000
	Pipelines	0	0.0000
		Subtotal	**7.1591**
Waste Water	Distribution Lines	NA	4.2954
	Facilities	0	0.0000
	Pipelines	0	0.0000
		Subtotal	**4.2954**
Natural Gas	Distribution Lines	NA	2.8636
	Facilities	0	0.0000
	Pipelines	0	0.0000
		Subtotal	**2.8636**
Oil Systems	Facilities	0	0.0000
	Pipelines	0	0.0000
		Subtotal	**0.0000**
Electrical Power	Facilities	0	0.0000
		Subtotal	**0.0000**
Communication	Facilities	0	0.0000
		Subtotal	**0.0000**
		Total	**14.30**

Earthquake Scenario

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

Scenario Name	Stamford
Type of Earthquake	Arbitrary
Fault Name	NA
Historical Epicenter ID #	NA
Probabilistic Return Period	NA
Longitude of Epicenter	-73.56
Latitude of Epicenter	41.11
Earthquake Magnitude	5.70
Depth (km)	10.00
Rupture Length (Km)	NA
Rupture Orientation (degrees)	NA
Attenuation Function	Central & East US (CEUS 2008)

Direct Earthquake Damage

Building Damage

Hazus estimates that about 34 buildings will be at least moderately damaged. This is over 1.00 % of the buildings in the region. There are an estimated 0 buildings that will be damaged beyond repair. The definition of the 'damage states' is provided in Volume 1: Chapter 5 of the Hazus technical manual. Table 3 below summarizes the expected damage by general occupancy for the buildings in the region. Table 4 below summarizes the expected damage by general building type.

Damage Categories by General Occupancy Type

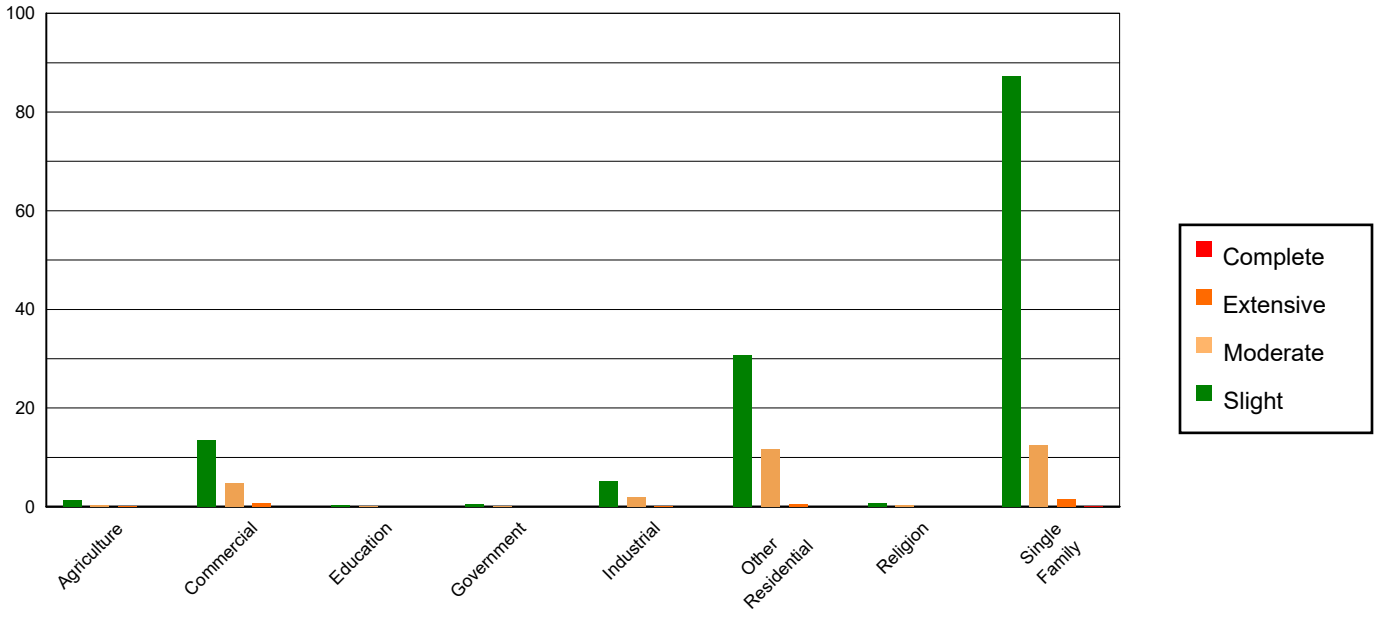


Table 3: Expected Building Damage by Occupancy

	None		Slight		Moderate		Extensive		Complete	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Agriculture	27.38	0.48	1.22	0.87	0.36	1.13	0.05	1.58	0.00	1.14
Commercial	286.19	5.05	13.42	9.62	4.72	14.97	0.63	21.14	0.04	21.22
Education	9.43	0.17	0.41	0.29	0.14	0.44	0.02	0.58	0.00	0.72
Government	10.37	0.18	0.45	0.33	0.16	0.50	0.02	0.64	0.00	0.61
Industrial	120.61	2.13	5.28	3.79	1.87	5.93	0.23	7.58	0.01	6.62
Other Residential	494.12	8.71	30.69	22.00	11.59	36.77	0.57	19.18	0.03	14.18
Religion	16.95	0.30	0.73	0.52	0.28	0.88	0.04	1.40	0.00	1.82
Single Family	4704.75	82.98	87.30	62.59	12.41	39.38	1.43	47.90	0.10	53.68
Total	**5,670**		**139**		**32**		**3**		**0**	

Table 4: Expected Building Damage by Building Type (All Design Levels)

	None		Slight		Moderate		Extensive		Complete	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Wood	4767.03	84.08	79.23	56.80	7.03	22.29	0.48	15.99	0.00	0.00
Steel	226.05	3.99	9.03	6.47	3.04	9.63	0.29	9.68	0.01	3.49
Concrete	39.12	0.69	1.45	1.04	0.44	1.39	0.02	0.73	0.00	0.00
Precast	14.39	0.25	0.79	0.57	0.51	1.61	0.09	3.09	0.00	0.60
RM	55.97	0.99	1.86	1.33	0.96	3.05	0.13	4.48	0.00	0.00
URM	305.10	5.38	23.77	17.04	10.30	32.67	1.73	57.98	0.18	95.90
MH	262.13	4.62	23.37	16.75	9.26	29.37	0.24	8.05	0.00	0.00
Total	**5,670**		**139**		**32**		**3**		**0**	

*Note:

RM Reinforced Masonry
URM Unreinforced Masonry
MH Manufactured Housing

Essential Facility Damage

Before the earthquake, the region had hospital beds available for use. On the day of the earthquake, the model estimates that only hospital beds (%) are available for use by patients already in the hospital and those injured by the earthquake. After one week, % of the beds will be back in service. By 30 days, % will be operational.

Table 5: Expected Damage to Essential Facilities

Classification	Total	# Facilities		
		At Least Moderate Damage > 50%	Complete Damage > 50%	With Functionality > 50% on day 1
Hospitals	0	0	0	0
Schools	5	0	0	5
EOCs	1	0	0	1
PoliceStations	1	0	0	1
FireStations	2	0	0	2

Transportation Lifeline Damage

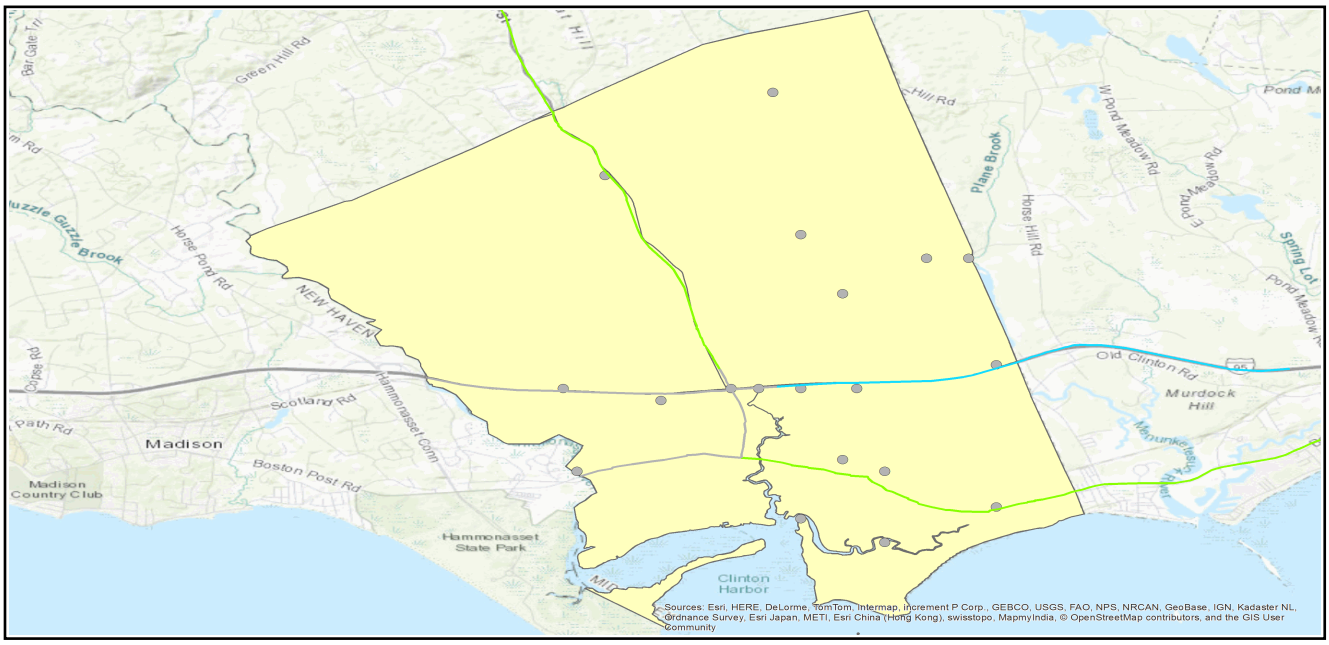


Table 6: Expected Damage to the Transportation Systems

System	Component		Number of Locations			
		Locations/ Segments	With at Least Mod. Damage	With Complete Damage	With Functionality > 50 % After Day 1	With Functionality > 50 % After Day 7
Highway	Segments	11	0	0	11	11
	Bridges	19	0	0	19	19
	Tunnels	0	0	0	0	0
Railways	Segments	3	0	0	1	1
	Bridges	1	0	0	1	1
	Tunnels	0	0	0	0	0
	Facilities	0	0	0	0	0
Light Rail	Segments	2	0	0	2	2
	Bridges	0	0	0	0	0
	Tunnels	0	0	0	0	0
	Facilities	1	0	0	1	1
Bus	Facilities	1	0	0	1	1
Ferry	Facilities	0	0	0	0	0
Port	Facilities	0	0	0	0	0
Airport	Facilities	0	0	0	0	0
	Runways	0	0	0	0	0

Table 6 provides damage estimates for the transportation system.

Note: Roadway segments, railroad tracks and light rail tracks are assumed to be damaged by ground failure only. If ground failure maps are not provided, damage estimates to these components will not be computed.

Tables 7-9 provide information on the damage to the utility lifeline systems. Table 7 provides damage to the utility system facilities. Table 8 provides estimates on the number of leaks and breaks by the pipelines of the utility systems. For electric power and potable water, Hazus performs a simplified system performance analysis. Table 9 provides a summary of the system performance information.

Table 7 : Expected Utility System Facility Damage

System	# of Locations				
	Total #	With at Least Moderate Damage	With Complete Damage	with Functionality > 50 %	
				After Day 1	After Day 7
Potable Water	0	0	0	0	0
Waste Water	0	0	0	0	0
Natural Gas	0	0	0	0	0
Oil Systems	0	0	0	0	0
Electrical Power	0	0	0	0	0
Communication	0	0	0	0	0

Table 8 : Expected Utility System Pipeline Damage (Site Specific)

System	Total Pipelines Length (miles)	Number of Leaks	Number of Breaks
Potable Water	222	0	0
Waste Water	133	0	0
Natural Gas	89	0	0
Oil	0	0	0

Table 9: Expected Potable Water and Electric Power System Performance

	Total # of Households	Number of Households without Service				
		At Day 1	At Day 3	At Day 7	At Day 30	At Day 90
Potable Water						
Electric Power						

Induced Earthquake Damage

Fire Following Earthquake

Fires often occur after an earthquake. Because of the number of fires and the lack of water to fight the fires, they can often burn out of control. Hazus uses a Monte Carlo simulation model to estimate the number of ignitions and the amount of burnt area. For this scenario, the model estimates that there will be 0 ignitions that will burn about 0.00 sq. mi 0.00 % of the region's total area.) The model also estimates that the fires will displace about 0 people and burn about 0 (millions of dollars) of building value.

Debris Generation

Hazus estimates the amount of debris that will be generated by the earthquake. The model breaks the debris into two general categories: a) Brick/Wood and b) Reinforced Concrete/Steel. 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 0 tons of debris will be generated. Of the total amount, Brick/Wood comprises 72.00% of the total, with the remainder being Reinforced Concrete/Steel. If the debris tonnage is converted to an estimated number of truckloads, it will require 0 truckloads (@25 tons/truck) to remove the debris generated by the earthquake.

Earthquake Debris (millions of tons)

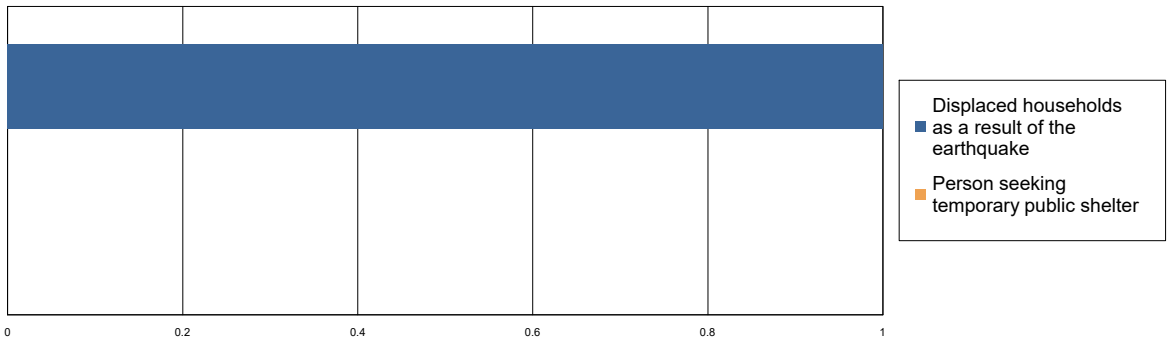
Brick/ Wood	Reinforced Concrete/Steel	Total Debris	Truck Load
0.00	0.00	0.00	0 (@25 tons/truck)

Social Impact

Shelter Requirement

Hazus estimates the number of households that are expected to be displaced from their homes due to the earthquake and the number of displaced people that will require accommodations in temporary public shelters. The model estimates 1 households to be displaced due to the earthquake. Of these, 0 people (out of a total population of 13,260) will seek temporary shelter in public shelters.

Displaced Households/ Persons Seeking Short Term Public Shelter



Displaced households as a result of the earthquake	Persons seeking temporary public shelter
1	0

Casualties

Hazus estimates the number of people that will be injured and killed by the earthquake. The casualties are broken down into four (4) severity levels that describe the extent of the injuries. The levels are described as follows;

- Severity Level 1: Injuries will require medical attention but hospitalization is not needed.
- Severity Level 2: Injuries will require hospitalization but are not considered life-threatening
- Severity Level 3: Injuries will require hospitalization and can become life threatening if not promptly treated.
- Severity Level 4: Victims are killed by the earthquake.

The casualty estimates are provided for three (3) times of day: 2:00 AM, 2:00 PM and 5:00 PM. These times represent the periods of the day that different sectors of the community are at their peak occupancy loads. The 2:00 AM estimate considers that the residential occupancy load is maximum, the 2:00 PM estimate considers that the educational, commercial and industrial sector loads are maximum and 5:00 PM represents peak commute time.

Table 10 provides a summary of the casualties estimated for this earthquake

Table 10: Casualty Estimates

		Level 1	Level 2	Level 3	Level 4
2 AM	Commercial	0.01	0.00	0.00	0.00
	Commuting	0.00	0.00	0.00	0.00
	Educational	0.00	0.00	0.00	0.00
	Hotels	0.00	0.00	0.00	0.00
	Industrial	0.01	0.00	0.00	0.00
	Other-Residential	0.18	0.02	0.00	0.00
	Single Family	0.27	0.03	0.00	0.00
	Total	**0**	**0**	**0**	**0**
2 PM	Commercial	0.64	0.08	0.01	0.01
	Commuting	0.00	0.00	0.00	0.00
	Educational	0.21	0.03	0.00	0.00
	Hotels	0.00	0.00	0.00	0.00
	Industrial	0.11	0.01	0.00	0.00
	Other-Residential	0.03	0.00	0.00	0.00
	Single Family	0.05	0.00	0.00	0.00
	Total	**1**	**0**	**0**	**0**
5 PM	Commercial	0.46	0.06	0.00	0.01
	Commuting	0.00	0.00	0.00	0.00
	Educational	0.01	0.00	0.00	0.00
	Hotels	0.00	0.00	0.00	0.00
	Industrial	0.07	0.01	0.00	0.00
	Other-Residential	0.07	0.01	0.00	0.00
	Single Family	0.10	0.01	0.00	0.00
	Total	**1**	**0**	**0**	**0**

Economic Loss

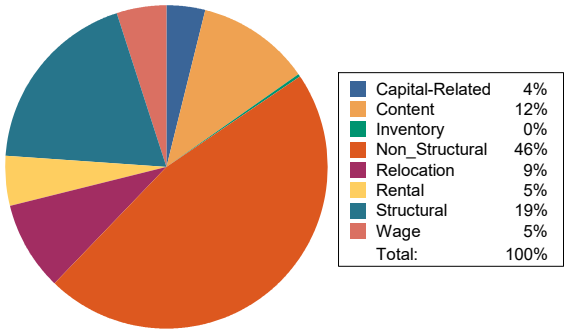
The total economic loss estimated for the earthquake is 3.50 (millions of dollars), which includes building and lifeline related losses based on the region's available inventory. The following three sections provide more detailed information about these losses.

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 earthquake. Business interruption losses also include the temporary living expenses for those people displaced from their homes because of the earthquake.

The total building-related losses were 3.37 (millions of dollars); 23 % of the estimated losses were related to the business interruption of the region. By far, the largest loss was sustained by the residential occupancies which made up over 56 % of the total loss. Table 11 below provides a summary of the losses associated with the building damage.

Earthquake Losses by Loss Type ($ millions)



Earthquake Losses by Occupancy Type ($ millions)

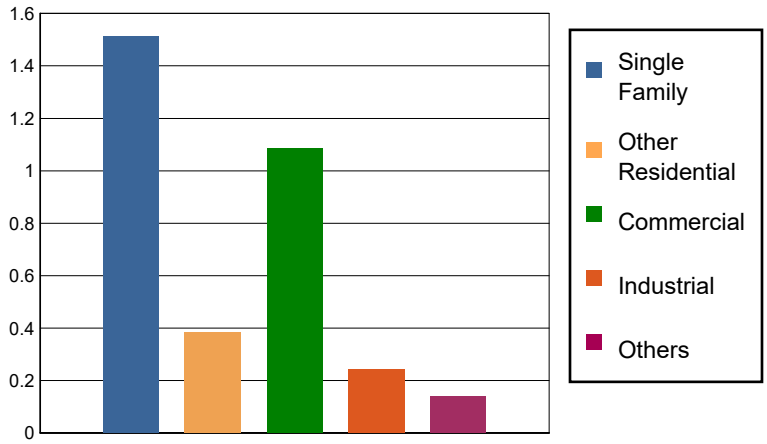


Table 11: Building-Related Economic Loss Estimates

(Millions of dollars)

Category	Area	Single Family	Other Residential	Commercial	Industrial	Others	Total
Income Losses							
	Wage	0.0000	0.0035	0.1507	0.0062	0.0096	0.1700
	Capital-Related	0.0000	0.0015	0.1197	0.0038	0.0016	0.1266
	Rental	0.0284	0.0356	0.0990	0.0029	0.0026	0.1685
	Relocation	0.0915	0.0380	0.1296	0.0187	0.0223	0.3001
	Subtotal	**0.1199**	**0.0786**	**0.4990**	**0.0316**	**0.0361**	**0.7652**
Capital Stock Losses							
	Structural	0.2804	0.0793	0.1886	0.0536	0.0355	0.6374
	Non_Structural	0.9298	0.1986	0.2886	0.0961	0.0503	1.5634
	Content	0.1811	0.0279	0.1067	0.0543	0.0185	0.3885
	Inventory	0.0000	0.0000	0.0033	0.0087	0.0003	0.0123
	Subtotal	**1.3913**	**0.3058**	**0.5872**	**0.2127**	**0.1046**	**2.6016**
	Total	**1.51**	**0.38**	**1.09**	**0.24**	**0.14**	**3.37**

Transportation and Utility Lifeline Losses

For the transportation and utility lifeline systems, Hazus computes the direct repair cost for each component only. There are no losses computed by Hazus for business interruption due to lifeline outages. Tables 12 & 13 provide a detailed breakdown in the expected lifeline losses.

Table 12: Transportation System Economic Losses
(Millions of dollars)

System	Component	Inventory Value	Economic Loss	Loss Ratio (%)
Highway	Segments	200.7307	0.0000	0.00
	Bridges	116.7909	0.0871	0.07
	Tunnels	0.0000	0.0000	0.00
	Subtotal	**317.5216**	**0.0871**	
Railways	Segments	11.9909	0.0000	0.00
	Bridges	0.0621	0.0000	0.00
	Tunnels	0.0000	0.0000	0.00
	Facilities	0.0000	0.0000	0.00
	Subtotal	**12.0530**	**0.0000**	
Light Rail	Segments	9.2680	0.0000	0.00
	Bridges	0.0000	0.0000	0.00
	Tunnels	0.0000	0.0000	0.00
	Facilities	2.6630	0.0303	1.14
	Subtotal	**11.9310**	**0.0303**	
Bus	Facilities	1.2535	0.0146	1.16
	Subtotal	**1.2535**	**0.0146**	
Ferry	Facilities	0.0000	0.0000	0.00
	Subtotal	**0.0000**	**0.0000**	
Port	Facilities	0.0000	0.0000	0.00
	Subtotal	**0.0000**	**0.0000**	
Airport	Facilities	0.0000	0.0000	0.00
	Runways	0.0000	0.0000	0.00
	Subtotal	**0.0000**	**0.0000**	
	Total	**342.76**	**0.13**	

Table 13: Utility System Economic Losses

(Millions of dollars)

System	Component	Inventory Value	Economic Loss	Loss Ratio (%)
Potable Water	Pipelines	0.0000	0.0000	0.00
	Facilities	0.0000	0.0000	0.00
	Distribution Lines	7.1591	0.0000	0.00
	Subtotal	**7.1591**	**0.0000**	
Waste Water	Pipelines	0.0000	0.0000	0.00
	Facilities	0.0000	0.0000	0.00
	Distribution Lines	4.2954	0.0000	0.00
	Subtotal	**4.2954**	**0.0000**	
Natural Gas	Pipelines	0.0000	0.0000	0.00
	Facilities	0.0000	0.0000	0.00
	Distribution Lines	2.8636	0.0000	0.00
	Subtotal	**2.8636**	**0.0000**	
Oil Systems	Pipelines	0.0000	0.0000	0.00
	Facilities	0.0000	0.0000	0.00
	Subtotal	**0.0000**	**0.0000**	
Electrical Power	Facilities	0.0000	0.0000	0.00
	Subtotal	**0.0000**	**0.0000**	
Communication	Facilities	0.0000	0.0000	0.00
	Subtotal	**0.0000**	**0.0000**	
	Total	**14.32**	**0.00**	

Appendix A: County Listing for the Region

Middlesex,CT

Appendix B: Regional Population and Building Value Data

State	County Name	Population	Building Value (millions of dollars)		
			Residential	Non-Residential	Total
Connecticut					
	Middlesex	13,260	1,661	400	2,061
Total Region		**13,260**	**1,661**	**400**	**2,061**

Hazus: Earthquake Global Risk Report

Region Name: Clinton

Earthquake Scenario: Annualized

Print Date: October 16, 2019

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 earthquake. These results can be improved by using enhanced inventory, geotechnical, and observed ground motion data.

Table of Contents

General Description of the Region

Hazus-MH is a regional earthquake loss estimation model that was developed by the Federal Emergency Management Agency (FEMA) and the National Institute of Building Sciences. 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 earthquake loss estimates provided in this report was based on a region that includes 1 county(ies) from the following state(s):

Connecticut

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

The geographical size of the region is 16.38 square miles and contains 4 census tracts. There are over 5 thousand households in the region which has a total population of 13,260 people (2010 Census Bureau data). The distribution of population by Total Region and County is provided in Appendix B.

There are an estimated 5 thousand buildings in the region with a total building replacement value (excluding contents) of 2,061 (millions of dollars). Approximately 91.00 % of the buildings (and 81.00% of the building value) are associated with residential housing.

The replacement value of the transportation and utility lifeline systems is estimated to be 342 and 14 (millions of dollars) , respectively.

Building and Lifeline Inventory

Building Inventory

Hazus estimates that there are 5 thousand buildings in the region which have an aggregate total replacement value of 2,061 (millions of dollars) . Appendix B provides a general distribution of the building value by Total Region and County.

In terms of building construction types found in the region, wood frame construction makes up 83% of the building inventory. The remaining percentage is distributed between the other general building types.

Critical Facility Inventory

Hazus breaks critical facilities into two (2) groups: essential facilities and high potential loss facilities (HPL). Essential facilities include hospitals, medical clinics, schools, fire stations, police stations and emergency operations facilities. High potential loss facilities include dams, levees, military installations, nuclear power plants and hazardous material sites.

For essential facilities, there are 0 hospitals in the region with a total bed capacity of beds. There are 5 schools, 2 fire stations, 1 police stations and 1 emergency operation facilities. With respect to high potential loss facilities (HPL), there are no dams identified within the inventory. The inventory also includes 3 hazardous material sites, no military installations and no nuclear power plants.

Transportation and Utility Lifeline Inventory

Within Hazus, the lifeline inventory is divided between transportation and utility lifeline systems. There are seven (7) transportation systems that include highways, railways, light rail, bus, ports, ferry and airports. There are six (6) utility systems that include potable water, wastewater, natural gas, crude & refined oil, electric power and communications. The lifeline inventory data are provided in Tables 1 and 2.

The total value of the lifeline inventory is over 356.00 (millions of dollars). This inventory includes over 24.23 miles of highways, 19 bridges, 444.28 miles of pipes.

Table 1: Transportation System Lifeline Inventory

System	Component	# Locations/ # Segments	Replacement value (millions of dollars)
Highway	Bridges	19	116.7909
	Segments	11	200.7307
	Tunnels	0	0.0000
		Subtotal	**317.5216**
Railways	Bridges	1	0.0621
	Facilities	0	0.0000
	Segments	3	11.9909
	Tunnels	0	0.0000
		Subtotal	**12.0530**
Light Rail	Bridges	0	0.0000
	Facilities	1	2.6630
	Segments	2	9.2680
	Tunnels	0	0.0000
		Subtotal	**11.9310**
Bus	Facilities	1	1.2535
		Subtotal	**1.2535**
Ferry	Facilities	0	0.0000
		Subtotal	**0.0000**
Port	Facilities	0	0.0000
		Subtotal	**0.0000**
Airport	Facilities	0	0.0000
	Runways	0	0.0000
		Subtotal	**0.0000**
		Total	**342.80**

Table 2: Utility System Lifeline Inventory

System	Component	# Locations / Segments	Replacement value (millions of dollars)
Potable Water	Distribution Lines	NA	7.1591
	Facilities	0	0.0000
	Pipelines	0	0.0000
		Subtotal	**7.1591**
Waste Water	Distribution Lines	NA	4.2954
	Facilities	0	0.0000
	Pipelines	0	0.0000
		Subtotal	**4.2954**
Natural Gas	Distribution Lines	NA	2.8636
	Facilities	0	0.0000
	Pipelines	0	0.0000
		Subtotal	**2.8636**
Oil Systems	Facilities	0	0.0000
	Pipelines	0	0.0000
		Subtotal	**0.0000**
Electrical Power	Facilities	0	0.0000
		Subtotal	**0.0000**
Communication	Facilities	0	0.0000
		Subtotal	**0.0000**
		Total	**14.30**

Earthquake Scenario

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

Scenario Name	Annualized
Type of Earthquake	Probabilistic
Fault Name	NA
Historical Epicenter ID #	NA
Probabilistic Return Period	Annualized
Longitude of Epicenter	NA
Latitude of Epicenter	NA
Earthquake Magnitude	NA
Depth (km)	NA
Rupture Length (Km)	NA
Rupture Orientation (degrees)	NA
Attenuation Function	NA

Direct Earthquake Damage

Building Damage

Hazus estimates that about 14 buildings will be at least moderately damaged. This is over 0.00 % of the buildings in the region. There are an estimated 0 buildings that will be damaged beyond repair. The definition of the 'damage states' is provided in Volume 1: Chapter 5 of the Hazus technical manual. Table 3 below summarizes the expected damage by general occupancy for the buildings in the region. Table 4 below summarizes the expected damage by general building type.

Damage Categories by General Occupancy Type

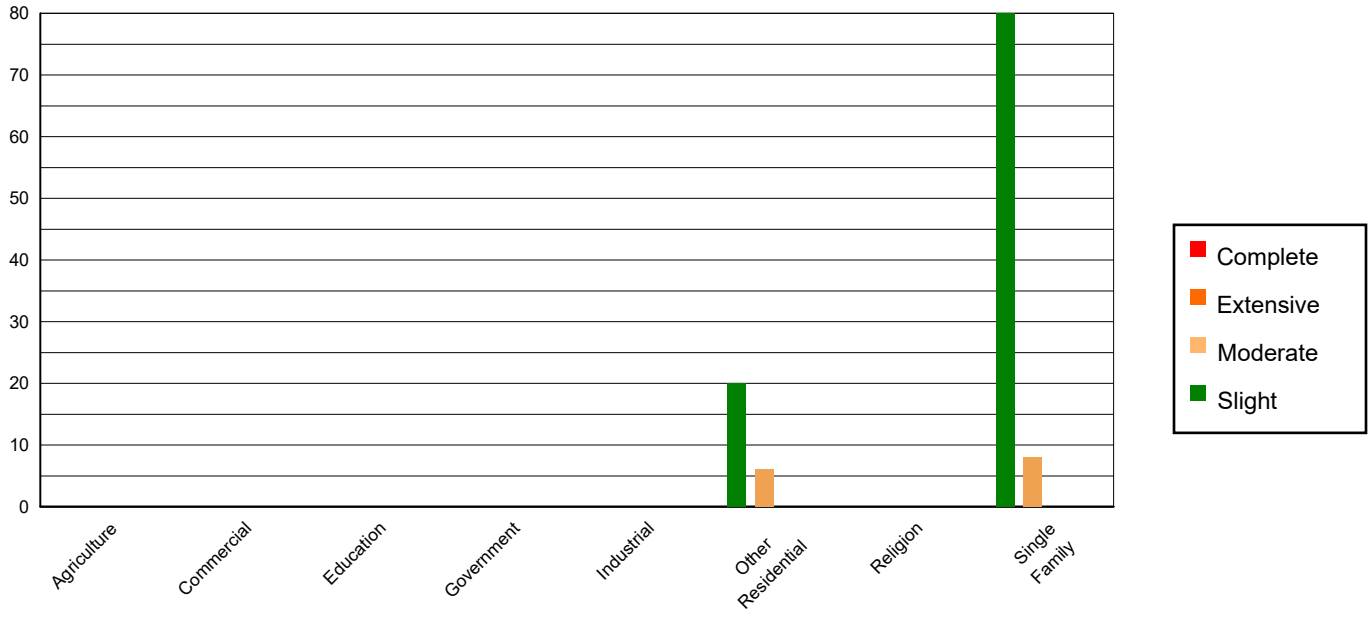


Table 3: Expected Building Damage by Occupancy

	None		Slight		Moderate		Extensive		Complete	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Agriculture	10.00	0.19	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Commercial	111.00	2.09	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Education	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Government	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Industrial	36.00	0.68	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Other Residential	445.00	8.39	20.00	20.00	6.00	42.86	0.00	0.00	0.00	0.00
Religion	6.00	0.11	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Single Family	4698.00	88.54	80.00	80.00	8.00	57.14	0.00	0.00	0.00	0.00
Total	**5,306**		**100**		**14**		**0**		**0**	

Table 4: Expected Building Damage by Building Type (All Design Levels)

	None		Slight		Moderate		Extensive		Complete	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Wood	4720.00	88.96	71.00	71.00	5.00	35.71	0.00	0.00	0.00	0.00
Steel	72.00	1.36	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Concrete	2.00	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Precast	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
RM	9.00	0.17	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
URM	244.00	4.60	9.00	9.00	3.00	21.43	0.00	0.00	0.00	0.00
MH	259.00	4.88	20.00	20.00	6.00	42.86	0.00	0.00	0.00	0.00
Total	**5,306**		**100**		**14**		**0**		**0**	

*Note:

RM Reinforced Masonry
URM Unreinforced Masonry
MH Manufactured Housing

Essential Facility Damage

Before the earthquake, the region had hospital beds available for use. On the day of the earthquake, the model estimates that only hospital beds (%) are available for use by patients already in the hospital and those injured by the earthquake. After one week, % of the beds will be back in service. By 30 days, % will be operational.

Table 5: Expected Damage to Essential Facilities

Classification	Total	# Facilities		
		At Least Moderate Damage > 50%	Complete Damage > 50%	With Functionality > 50% on day 1
Hospitals	0	0	0	0
Schools	5	0	0	5
EOCs	1	0	0	1
PoliceStations	1	0	0	1
FireStations	2	0	0	2

Transportation Lifeline Damage

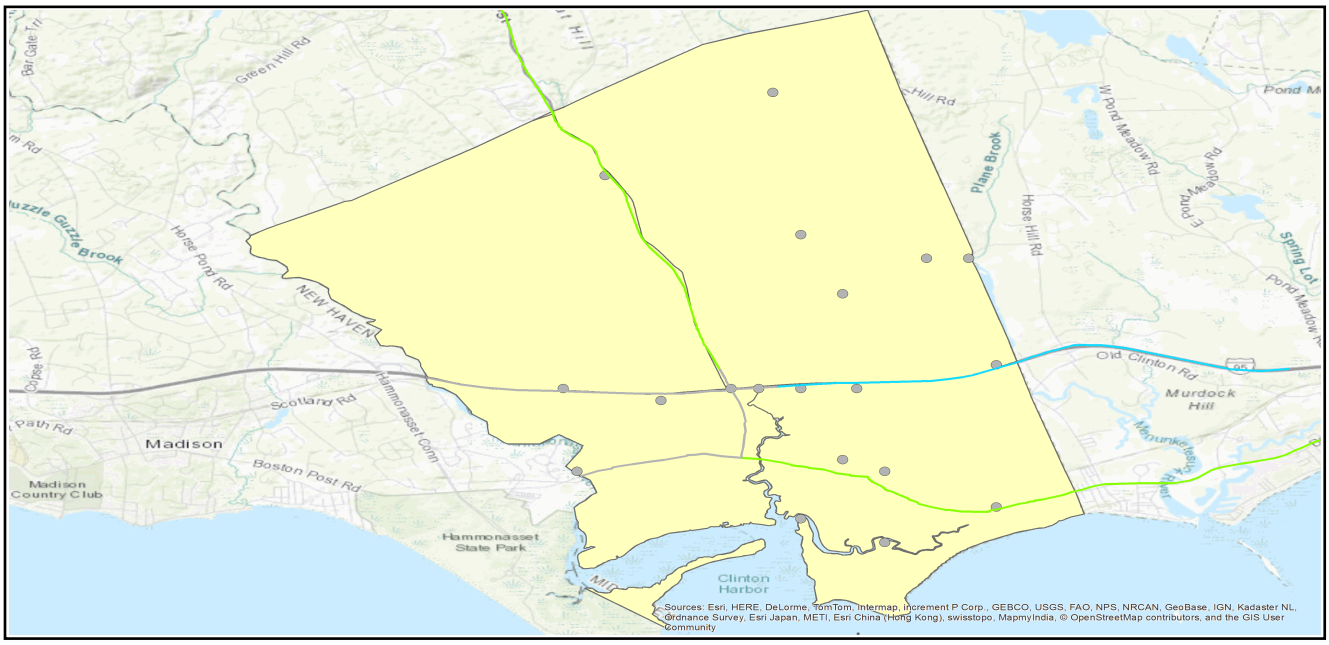


Table 6: Expected Damage to the Transportation Systems

System	Component		Number of Locations			
		Locations/ Segments	With at Least Mod. Damage	With Complete Damage	With Functionality > 50 % After Day 1	With Functionality > 50 % After Day 7
Highway	Segments	11	0	0	11	11
	Bridges	19	0	0	19	19
	Tunnels	0	0	0	0	0
Railways	Segments	3	0	0	1	1
	Bridges	1	0	0	1	1
	Tunnels	0	0	0	0	0
	Facilities	0	0	0	0	0
Light Rail	Segments	2	0	0	2	2
	Bridges	0	0	0	0	0
	Tunnels	0	0	0	0	0
	Facilities	1	0	0	1	1
Bus	Facilities	1	0	0	1	1
Ferry	Facilities	0	0	0	0	0
Port	Facilities	0	0	0	0	0
Airport	Facilities	0	0	0	0	0
	Runways	0	0	0	0	0

Table 6 provides damage estimates for the transportation system.

Note: Roadway segments, railroad tracks and light rail tracks are assumed to be damaged by ground failure only. If ground failure maps are not provided, damage estimates to these components will not be computed.

Tables 7-9 provide information on the damage to the utility lifeline systems. Table 7 provides damage to the utility system facilities. Table 8 provides estimates on the number of leaks and breaks by the pipelines of the utility systems. For electric power and potable water, Hazus performs a simplified system performance analysis. Table 9 provides a summary of the system performance information.

Table 7 : Expected Utility System Facility Damage

System	# of Locations				
	Total #	With at Least Moderate Damage	With Complete Damage	with Functionality > 50 %	
				After Day 1	After Day 7
Potable Water	0	0	0	0	0
Waste Water	0	0	0	0	0
Natural Gas	0	0	0	0	0
Oil Systems	0	0	0	0	0
Electrical Power	0	0	0	0	0
Communication	0	0	0	0	0

Table 8 : Expected Utility System Pipeline Damage (Site Specific)

System	Total Pipelines Length (miles)	Number of Leaks	Number of Breaks
Potable Water	222	0	0
Waste Water	133	0	0
Natural Gas	89	0	0
Oil	0	0	0

Table 9: Expected Potable Water and Electric Power System Performance

	Total # of Households	Number of Households without Service				
		At Day 1	At Day 3	At Day 7	At Day 30	At Day 90
Potable Water						
Electric Power						

Induced Earthquake Damage

Fire Following Earthquake

Fires often occur after an earthquake. Because of the number of fires and the lack of water to fight the fires, they can often burn out of control. Hazus uses a Monte Carlo simulation model to estimate the number of ignitions and the amount of burnt area. For this scenario, the model estimates that there will be 0 ignitions that will burn about 0.00 sq. mi 0.00 % of the region's total area.) The model also estimates that the fires will displace about 0 people and burn about 0 (millions of dollars) of building value.

Debris Generation

Hazus estimates the amount of debris that will be generated by the earthquake. The model breaks the debris into two general categories: a) Brick/Wood and b) Reinforced Concrete/Steel. 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 0 tons of debris will be generated. Of the total amount, Brick/Wood comprises 72.00% of the total, with the remainder being Reinforced Concrete/Steel. If the debris tonnage is converted to an estimated number of truckloads, it will require 0 truckloads (@25 tons/truck) to remove the debris generated by the earthquake.

Earthquake Debris (millions of tons)

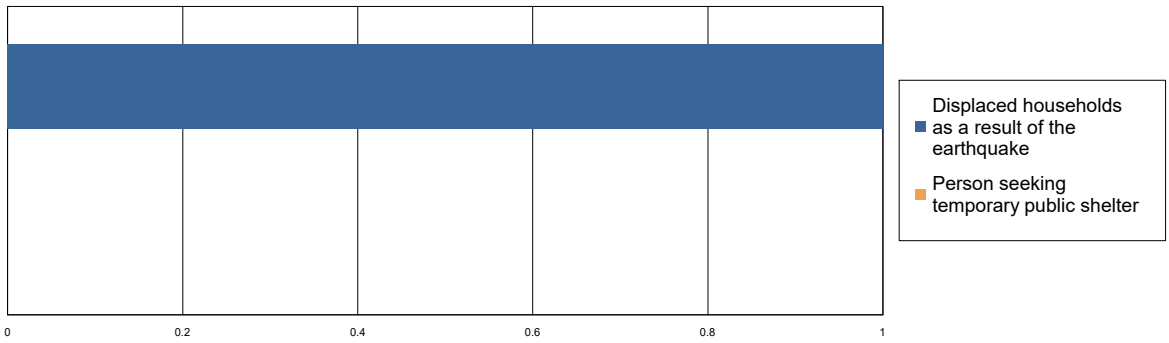
Brick/ Wood	Reinforced Concrete/Steel	Total Debris	Truck Load
0.00	0.00	0.00	0 (@25 tons/truck)

Social Impact

Shelter Requirement

Hazus estimates the number of households that are expected to be displaced from their homes due to the earthquake and the number of displaced people that will require accommodations in temporary public shelters. The model estimates 1 households to be displaced due to the earthquake. Of these, 0 people (out of a total population of 13,260) will seek temporary shelter in public shelters.

Displaced Households/ Persons Seeking Short Term Public Shelter



Displaced households as a result of the earthquake	Persons seeking temporary public shelter
1	0

Casualties

Hazus estimates the number of people that will be injured and killed by the earthquake. The casualties are broken down into four (4) severity levels that describe the extent of the injuries. The levels are described as follows;

- Severity Level 1: Injuries will require medical attention but hospitalization is not needed.
- Severity Level 2: Injuries will require hospitalization but are not considered life-threatening
- Severity Level 3: Injuries will require hospitalization and can become life threatening if not promptly treated.
- Severity Level 4: Victims are killed by the earthquake.

The casualty estimates are provided for three (3) times of day: 2:00 AM, 2:00 PM and 5:00 PM. These times represent the periods of the day that different sectors of the community are at their peak occupancy loads. The 2:00 AM estimate considers that the residential occupancy load is maximum, the 2:00 PM estimate considers that the educational, commercial and industrial sector loads are maximum and 5:00 PM represents peak commute time.

Table 10 provides a summary of the casualties estimated for this earthquake

Table 10: Casualty Estimates

		Level 1	Level 2	Level 3	Level 4
2 AM	Commercial	0.00	0.00	0.00	0.00
	Commuting	0.00	0.00	0.00	0.00
	Educational	0.00	0.00	0.00	0.00
	Hotels	0.00	0.00	0.00	0.00
	Industrial	0.00	0.00	0.00	0.00
	Other-Residential	0.00	0.00	0.00	0.00
	Single Family	0.00	0.00	0.00	0.00
	Total	**0**	**0**	**0**	**0**
2 PM	Commercial	0.00	0.00	0.00	0.00
	Commuting	0.00	0.00	0.00	0.00
	Educational	0.00	0.00	0.00	0.00
	Hotels	0.00	0.00	0.00	0.00
	Industrial	0.00	0.00	0.00	0.00
	Other-Residential	0.00	0.00	0.00	0.00
	Single Family	0.00	0.00	0.00	0.00
	Total	**0**	**0**	**0**	**0**
5 PM	Commercial	0.00	0.00	0.00	0.00
	Commuting	0.00	0.00	0.00	0.00
	Educational	0.00	0.00	0.00	0.00
	Hotels	0.00	0.00	0.00	0.00
	Industrial	0.00	0.00	0.00	0.00
	Other-Residential	0.00	0.00	0.00	0.00
	Single Family	0.00	0.00	0.00	0.00
	Total	**0**	**0**	**0**	**0**

Economic Loss

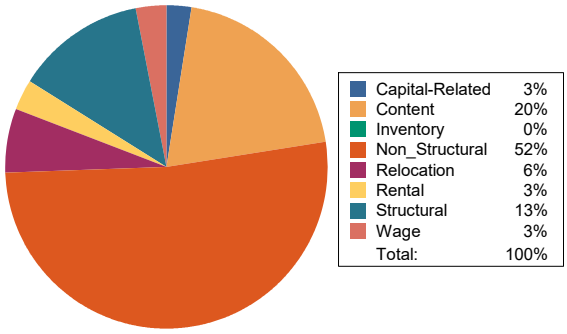
The total economic loss estimated for the earthquake is 0.16 (millions of dollars), which includes building and lifeline related losses based on the region's available inventory. The following three sections provide more detailed information about these losses.

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 earthquake. Business interruption losses also include the temporary living expenses for those people displaced from their homes because of the earthquake.

The total building-related losses were 0.02 (millions of dollars); 15 % of the estimated losses were related to the business interruption of the region. By far, the largest loss was sustained by the residential occupancies which made up over 63 % of the total loss. Table 11 below provides a summary of the losses associated with the building damage.

Earthquake Losses by Loss Type ($ millions)



Earthquake Losses by Occupancy Type ($ millions)

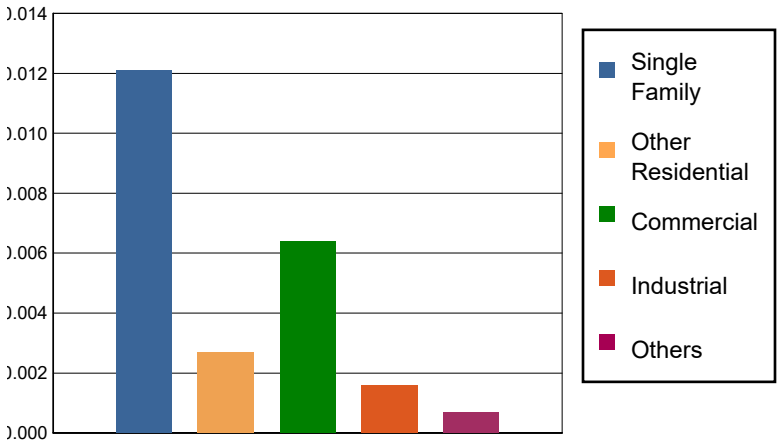


Table 11: Building-Related Economic Loss Estimates

(Millions of dollars)

Category	Area	Single Family	Other Residential	Commercial	Industrial	Others	Total
Income Losses							
	Wage	0.0000	0.0000	0.0007	0.0000	0.0000	0.0007
	Capital-Related	0.0000	0.0000	0.0006	0.0000	0.0000	0.0006
	Rental	0.0001	0.0002	0.0004	0.0000	0.0000	0.0007
	Relocation	0.0005	0.0002	0.0006	0.0001	0.0001	0.0015
	Subtotal	**0.0006**	**0.0004**	**0.0023**	**0.0001**	**0.0001**	**0.0035**
Capital Stock Losses							
	Structural	0.0015	0.0004	0.0009	0.0002	0.0001	0.0031
	Non_Structural	0.0074	0.0016	0.0021	0.0008	0.0003	0.0122
	Content	0.0026	0.0003	0.0011	0.0005	0.0002	0.0047
	Inventory	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	Subtotal	**0.0115**	**0.0023**	**0.0041**	**0.0015**	**0.0006**	**0.0200**
	Total	**0.01**	**0.00**	**0.01**	**0.00**	**0.00**	**0.02**

Transportation and Utility Lifeline Losses

For the transportation and utility lifeline systems, Hazus computes the direct repair cost for each component only. There are no losses computed by Hazus for business interruption due to lifeline outages. Tables 12 & 13 provide a detailed breakdown in the expected lifeline losses.

Table 12: Transportation System Economic Losses
(Millions of dollars)

System	Component	Inventory Value	Economic Loss	Loss Ratio (%)
Highway	Segments	200.7307	0.0000	0.00
	Bridges	116.7909	0.0871	0.07
	Tunnels	0.0000	0.0000	0.00
	Subtotal	**317.5216**	**0.0871**	
Railways	Segments	11.9909	0.0000	0.00
	Bridges	0.0621	0.0000	0.00
	Tunnels	0.0000	0.0000	0.00
	Facilities	0.0000	0.0000	0.00
	Subtotal	**12.0530**	**0.0000**	
Light Rail	Segments	9.2680	0.0000	0.00
	Bridges	0.0000	0.0000	0.00
	Tunnels	0.0000	0.0000	0.00
	Facilities	2.6630	0.0303	1.14
	Subtotal	**11.9310**	**0.0303**	
Bus	Facilities	1.2535	0.0146	1.16
	Subtotal	**1.2535**	**0.0146**	
Ferry	Facilities	0.0000	0.0000	0.00
	Subtotal	**0.0000**	**0.0000**	
Port	Facilities	0.0000	0.0000	0.00
	Subtotal	**0.0000**	**0.0000**	
Airport	Facilities	0.0000	0.0000	0.00
	Runways	0.0000	0.0000	0.00
	Subtotal	**0.0000**	**0.0000**	
	Total	**342.76**	**0.13**	

Table 13: Utility System Economic Losses

(Millions of dollars)

System	Component	Inventory Value	Economic Loss	Loss Ratio (%)
Potable Water	Pipelines	0.0000	0.0000	0.00
	Facilities	0.0000	0.0000	0.00
	Distribution Lines	7.1591	0.0000	0.00
	Subtotal	**7.1591**	**0.0000**	
Waste Water	Pipelines	0.0000	0.0000	0.00
	Facilities	0.0000	0.0000	0.00
	Distribution Lines	4.2954	0.0000	0.00
	Subtotal	**4.2954**	**0.0000**	
Natural Gas	Pipelines	0.0000	0.0000	0.00
	Facilities	0.0000	0.0000	0.00
	Distribution Lines	2.8636	0.0000	0.00
	Subtotal	**2.8636**	**0.0000**	
Oil Systems	Pipelines	0.0000	0.0000	0.00
	Facilities	0.0000	0.0000	0.00
	Subtotal	**0.0000**	**0.0000**	
Electrical Power	Facilities	0.0000	0.0000	0.00
	Subtotal	**0.0000**	**0.0000**	
Communication	Facilities	0.0000	0.0000	0.00
	Subtotal	**0.0000**	**0.0000**	
	Total	**14.32**	**0.00**	

Appendix A: County Listing for the Region

Middlesex,CT

Appendix B: Regional Population and Building Value Data

State	County Name	Population	Building Value (millions of dollars)		
			Residential	Non-Residential	Total
Connecticut					
	Middlesex	13,260	1,661	400	2,061
Total Region		**13,260**	**1,661**	**400**	**2,061**