Hazus: Flood Global Risk Report

Region Name: OldLyme

Flood Scenario: OldLymeAllCoastal

Print Date: Tuesday, January 7, 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 24 square miles and contains 367 census blocks. The region contains over 3 thousand households and has a total population of 7,603 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 5,155 buildings in the region with a total building replacement value (excluding contents) of 1,871 million dollars. Approximately 91.85% of the buildings (and 84.71% of the building value) are associated with residential housing.

Building Inventory

General Building Stock

Hazus estimates that there are 5,155 buildings in the region which have an aggregate total replacement value of 1,871 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	1,585,261	84.7%
Commercial	188,392	10.1%
Industrial	43,115	2.3%
Agricultural	7,152	0.4%
Religion	18,115	1.0%
Government	7,334	0.4%
Education	22,034	1.2%
Total	**1,871,403**	**100%**

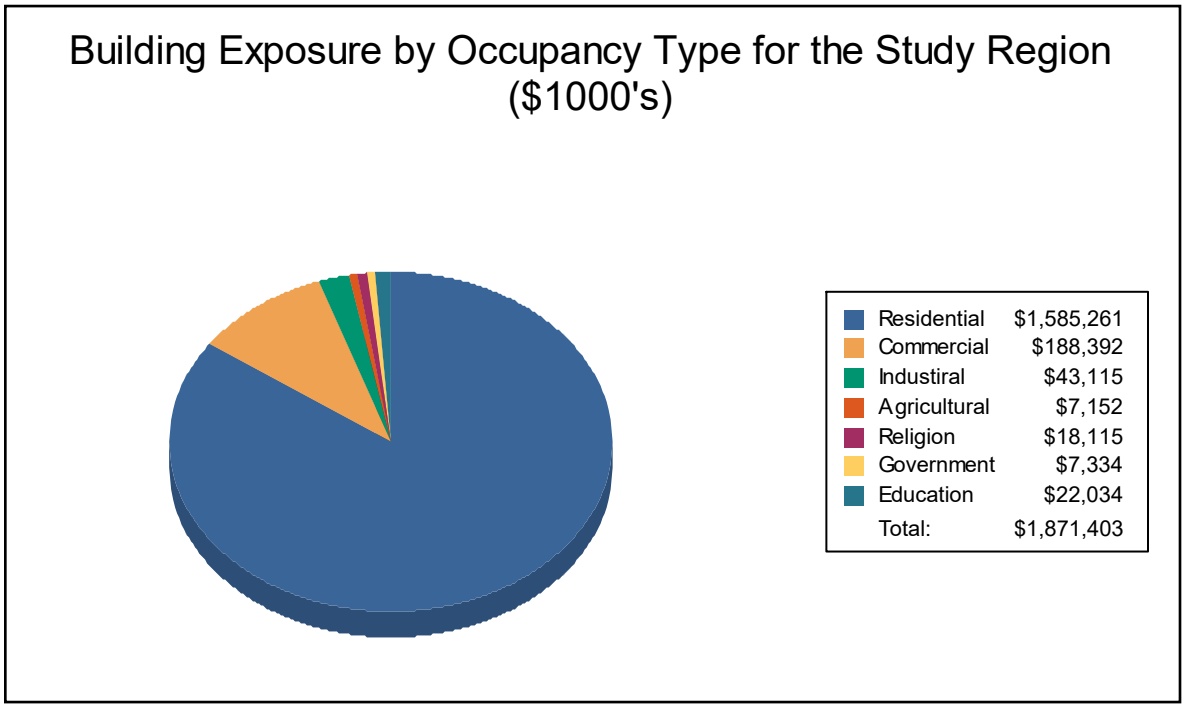
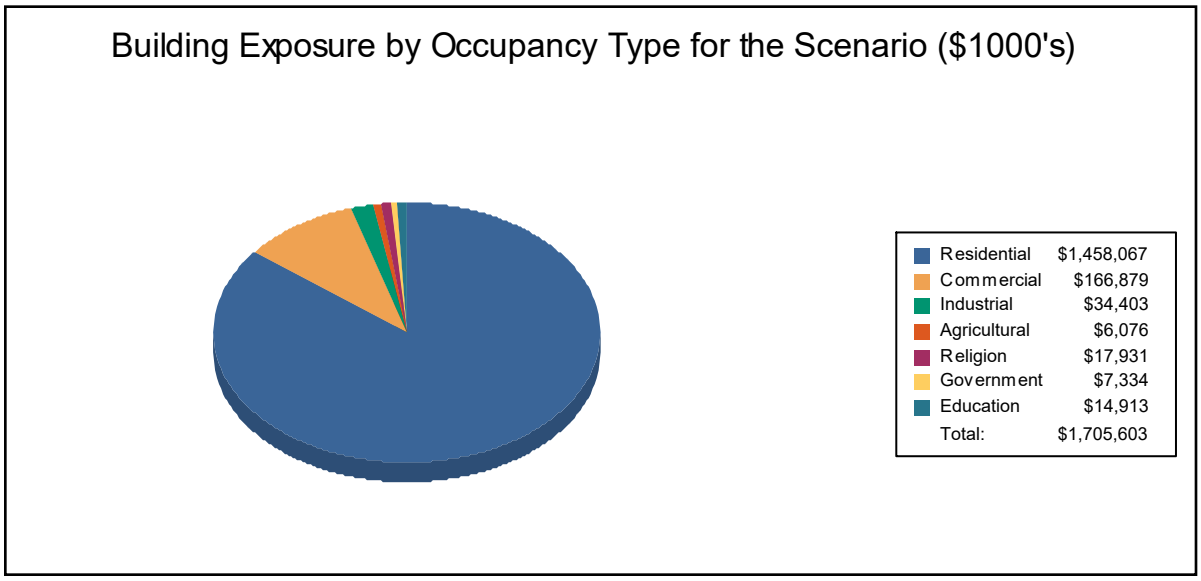


Table 2
Building Exposure by Occupancy Type for the Scenario

Occupancy	Exposure ($1000)	Percent of Total
Residential	1,458,067	85.5%
Commercial	166,879	9.8%
Industrial	34,403	2.0%
Agricultural	6,076	0.4%
Religion	17,931	1.1%
Government	7,334	0.4%
Education	14,913	0.9%
Total	**1,705,603**	**100%**



Essential Facility Inventory

For essential facilities, there are no hospitals in the region with a total bed capacity of no beds.
There are 6 schools, 3 fire stations, 1 police station and 1 emergency operation center.

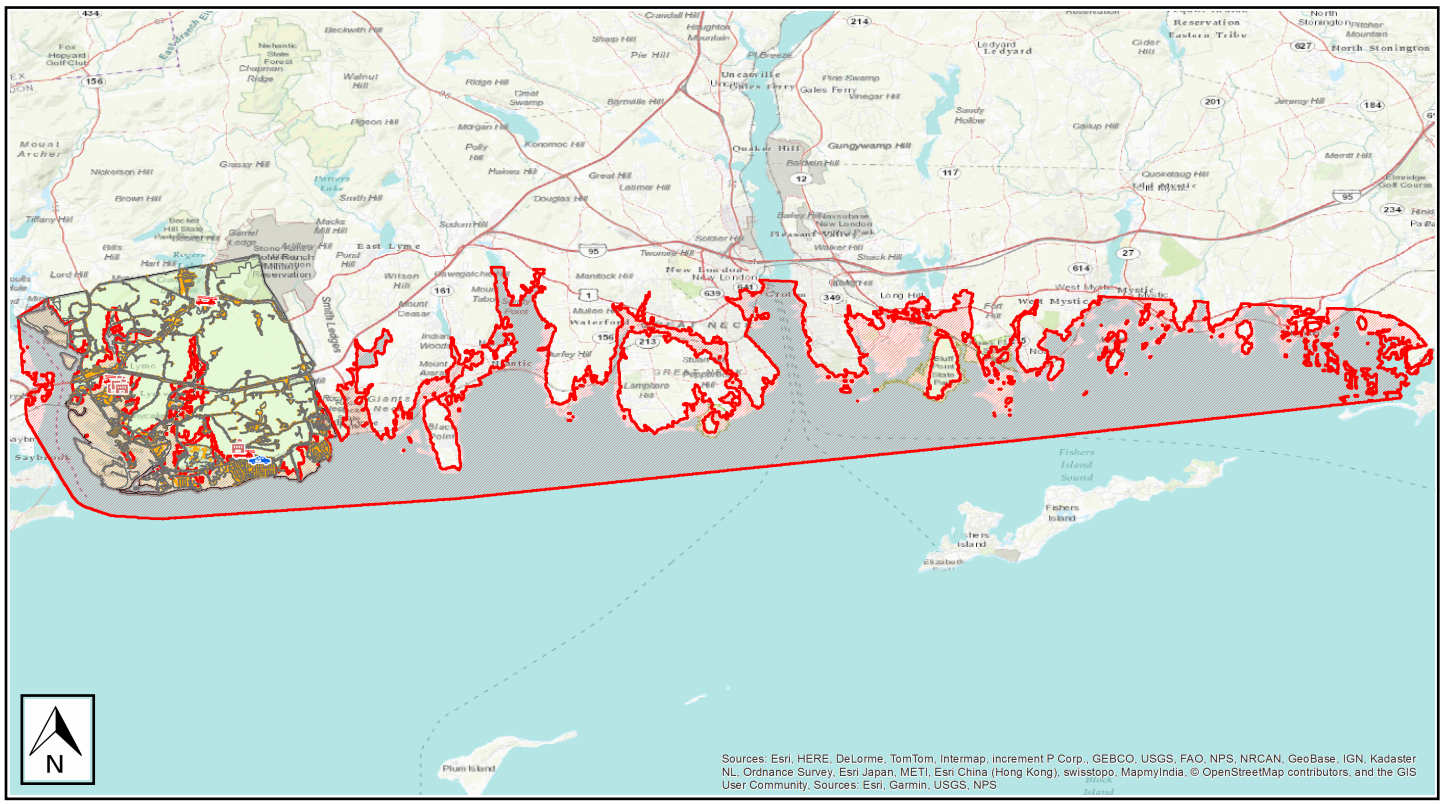
Flood Scenario Parameters

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

Study Region Name:	OldLyme
Scenario Name:	OldLymeAllCoastal
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 60 buildings will be at least moderately damaged. This is over 31% 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

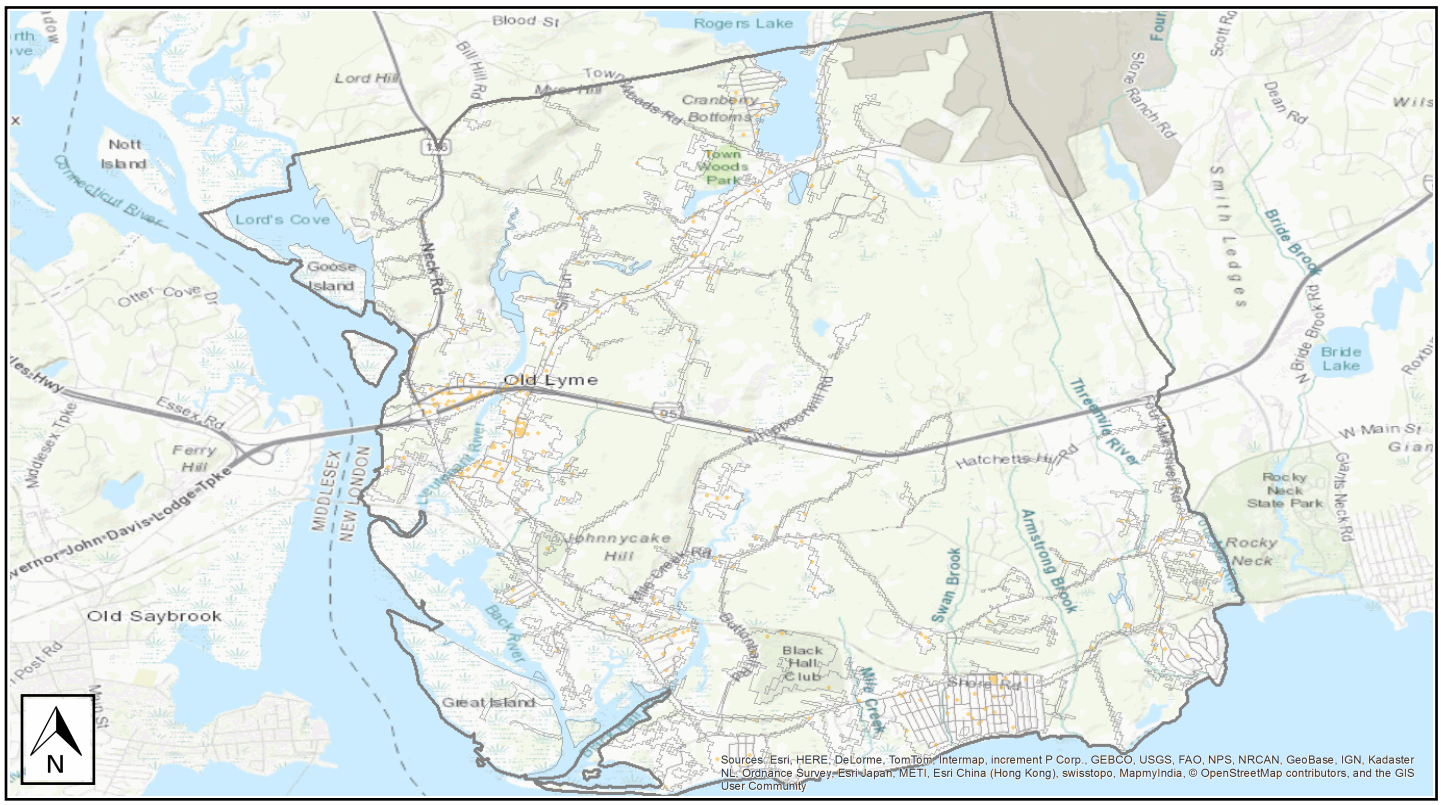


Table 3: Expected Building Damage by Occupancy

	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	2	3	57	92	3	5	0	0	0	0	0	0
Total	**2**		**57**		**3**		**0**		**0**		**0**	

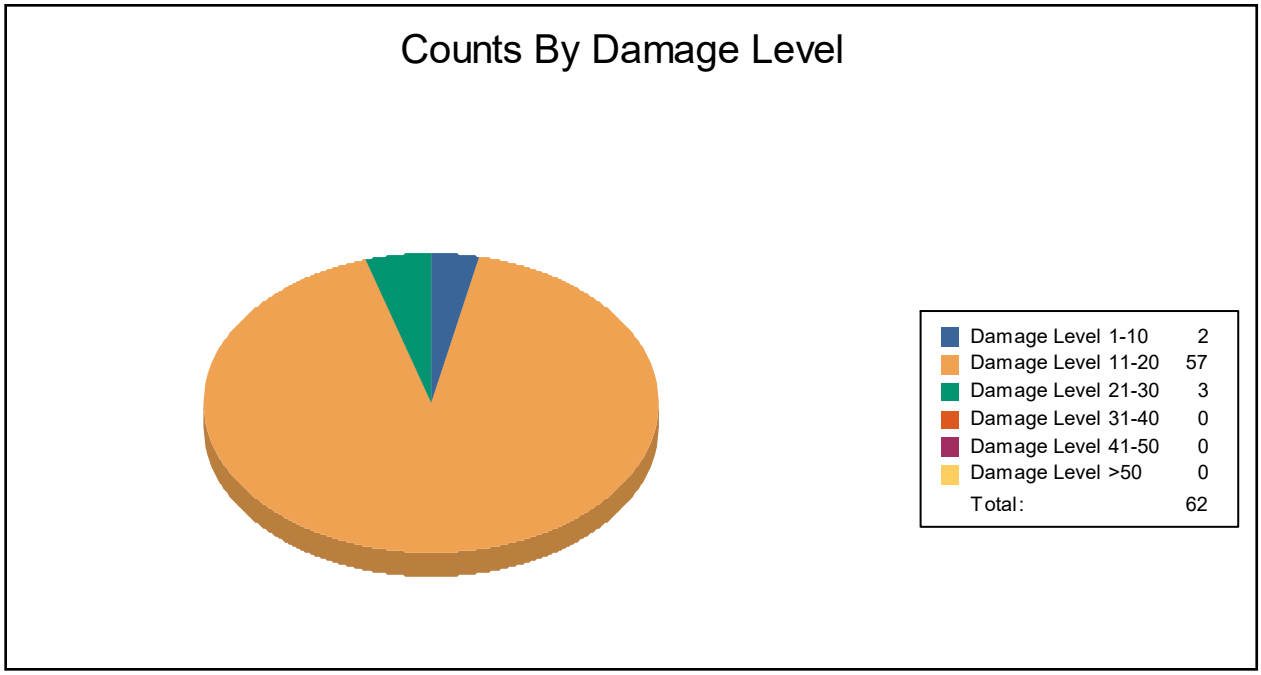


Table 4: Expected Building Damage by Building Type

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	2	3	57	92	3	5	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	1	0	0
Fire Stations	3	0	0	0
Hospitals	0	0	0	0
Police Stations	1	0	0	0
Schools	6	0	0	0

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

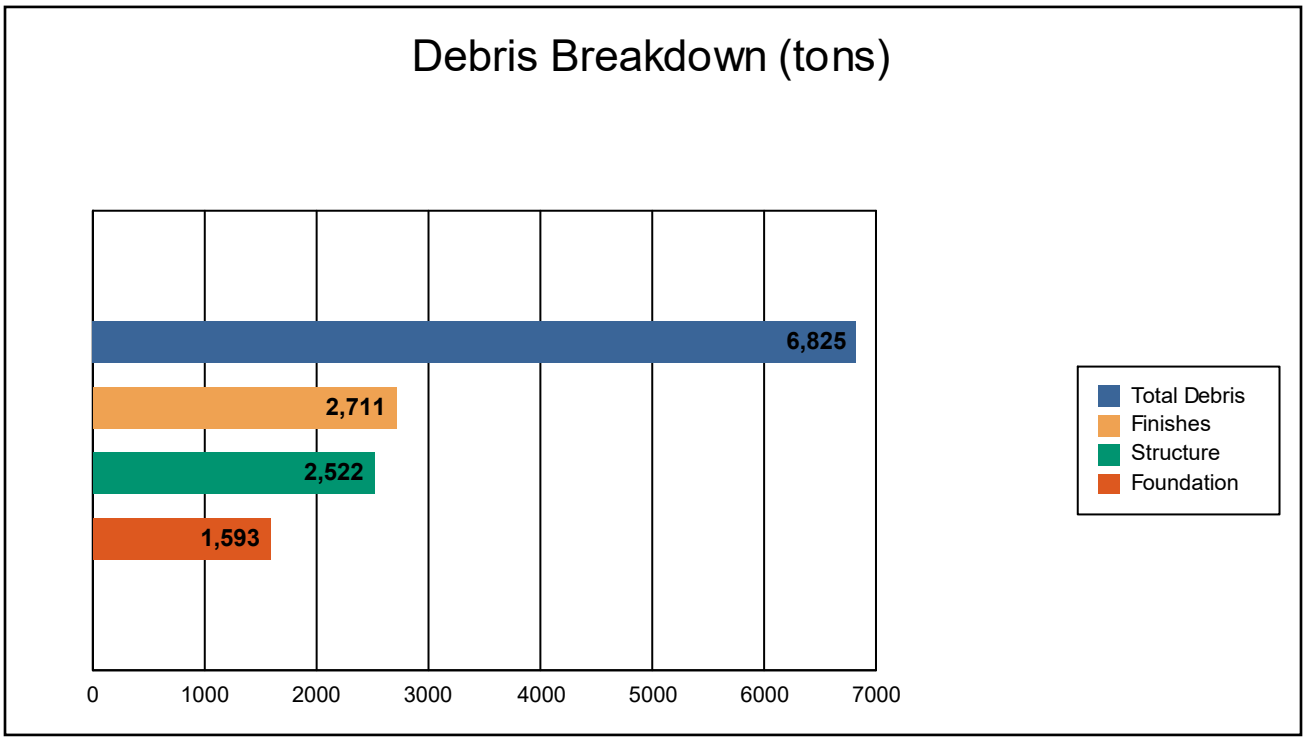
(1) None of your facilities were flooded. This can be checked by mapping the inventory data on the depth grid.

(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.

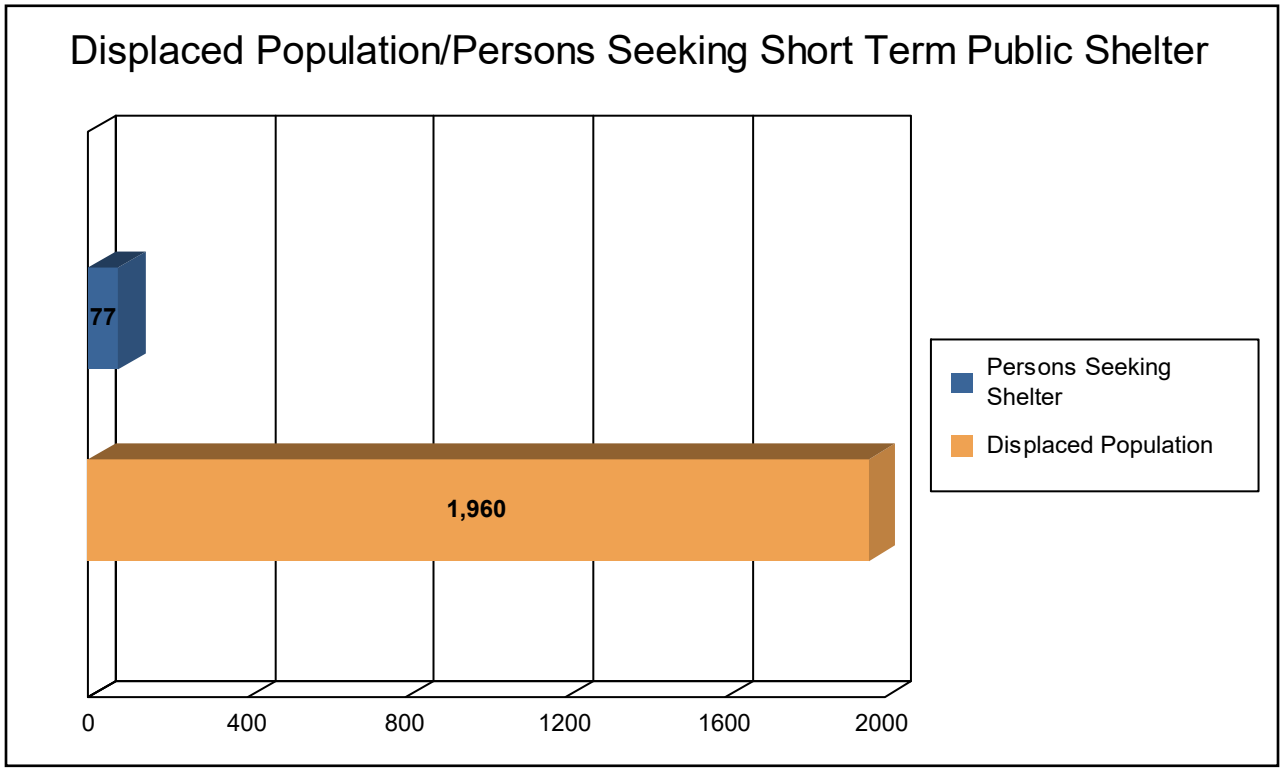


The model estimates that a total of 6,825 tons of debris will be generated. Of the total amount, Finishes comprises 40% of the total, Structure comprises 37% of the total, and Foundation comprises 23%. If the debris tonnage is converted into an estimated number of truckloads, it will require 274 truckloads (@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 653 households (or 1,960 of people) will be displaced due to the flood. Displacement includes households evacuated from within or very near to the inundated area. Of these, 77 people (out of a total population of 7,603) will seek temporary shelter in public shelters.



Economic Loss

The total economic loss estimated for the flood is 58.39 million dollars, which represents 3.42 % of the total replacement value of the scenario buildings.

Building-Related Losses

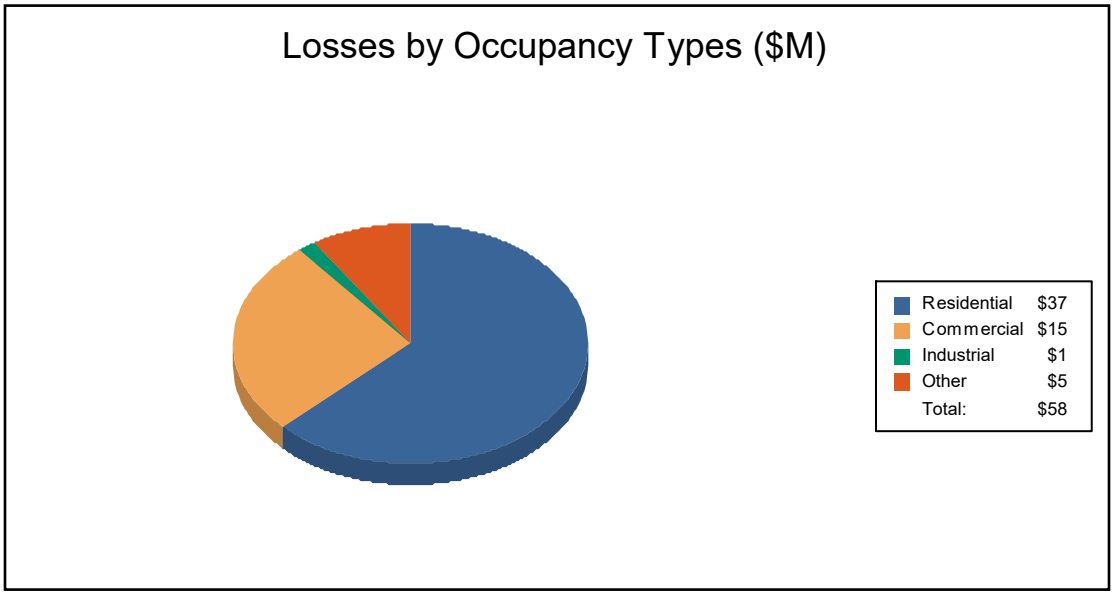
The building losses are broken into two categories: direct building losses and business interruption losses. The direct building losses are the estimated costs to repair or replace the damage caused to the building and its contents. The business interruption losses are the losses associated with inability 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 37.32 million dollars. 36% of the estimated losses were related to the business interruption of the region. The residential occupancies made up 62.90% 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	15.62	1.26	0.35	0.27	17.51
	Content	13.09	4.08	0.66	1.87	19.70
	Inventory	0.00	0.03	0.07	0.02	0.12
	Subtotal	**28.72**	**5.37**	**1.08**	**2.15**	**37.32**
Business Interruption						
	Income	0.01	4.79	0.01	0.56	5.37
	Relocation	6.10	0.70	0.01	0.23	7.04
	Rental Income	1.89	0.53	0.00	0.03	2.45
	Wage	0.02	3.86	0.02	2.31	6.22
	Subtotal	**8.02**	**9.89**	**0.04**	**3.13**	**21.07**
ALL	**Total**	**36.73**	**15.26**	**1.12**	**5.28**	**58.39**



Appendix A: County Listing for the Region

Connecticut

- New London

Appendix B: Regional Population and Building Value Data

	Population	Building Value (thousands of dollars)		
		Residential	Non-Residential	Total
Connecticut				
New London	7,603	1,585,261	286,142	1,871,403
Total	**7,603**	**1,585,261**	**286,142**	**1,871,403**
Total Study Region	**7,603**	**1,585,261**	**286,142**	**1,871,403**

Hazus-MH: Flood Global Risk Report

Region Name: OldLyme

Flood Scenario: OlyLymeRivering

Print Date: Friday, April 17, 2020

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Note:
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Building Inventory

General Building Stock

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Education	22,034	1.2%
Total	**1,871,403**	**100%**

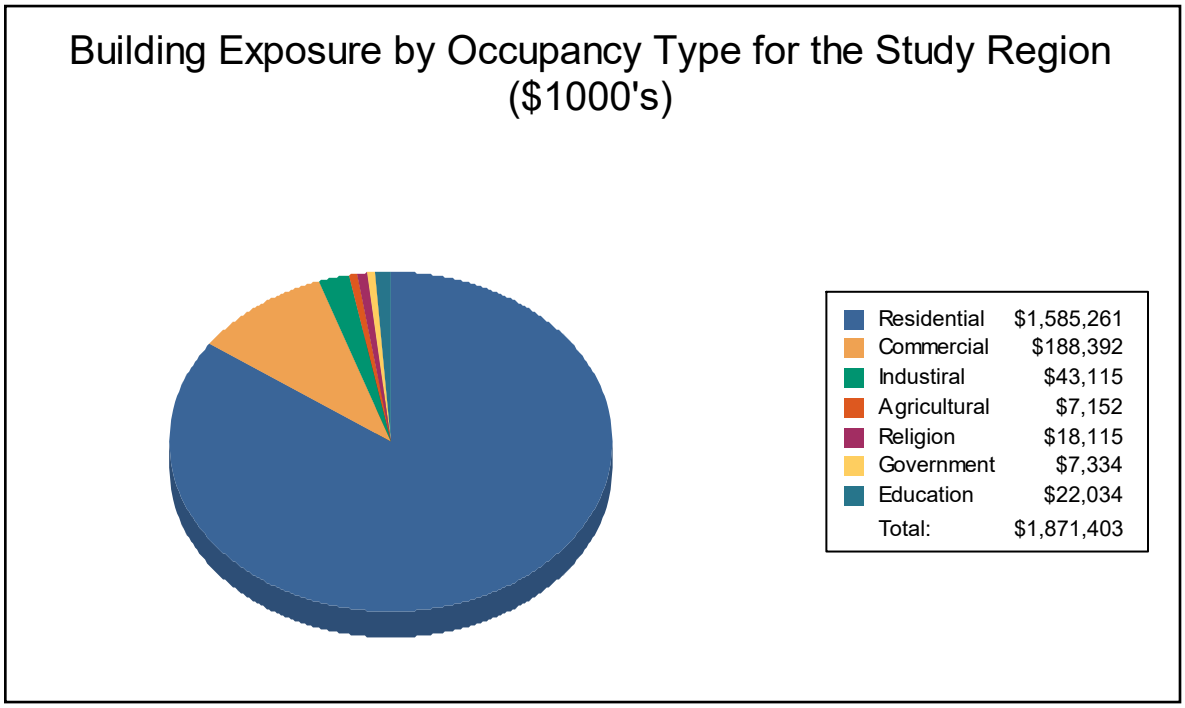
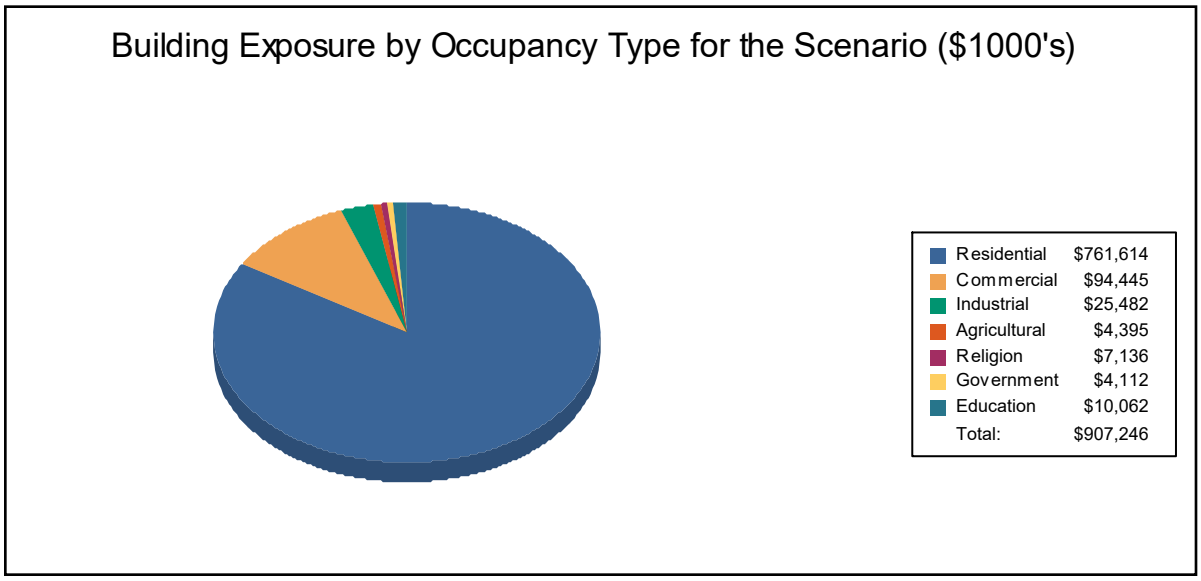


Table 2
Building Exposure by Occupancy Type for the Scenario

Occupancy	Exposure ($1000)	Percent of Total
Residential	761,614	83.9%
Commercial	94,445	10.4%
Industrial	25,482	2.8%
Agricultural	4,395	0.5%
Religion	7,136	0.8%
Government	4,112	0.5%
Education	10,062	1.1%
Total	**907,246**	**100%**



Essential Facility Inventory

For essential facilities, there are no hospitals in the region with a total bed capacity of no beds.
There are 6 schools, 3 fire stations, 1 police station and 1 emergency operation center.

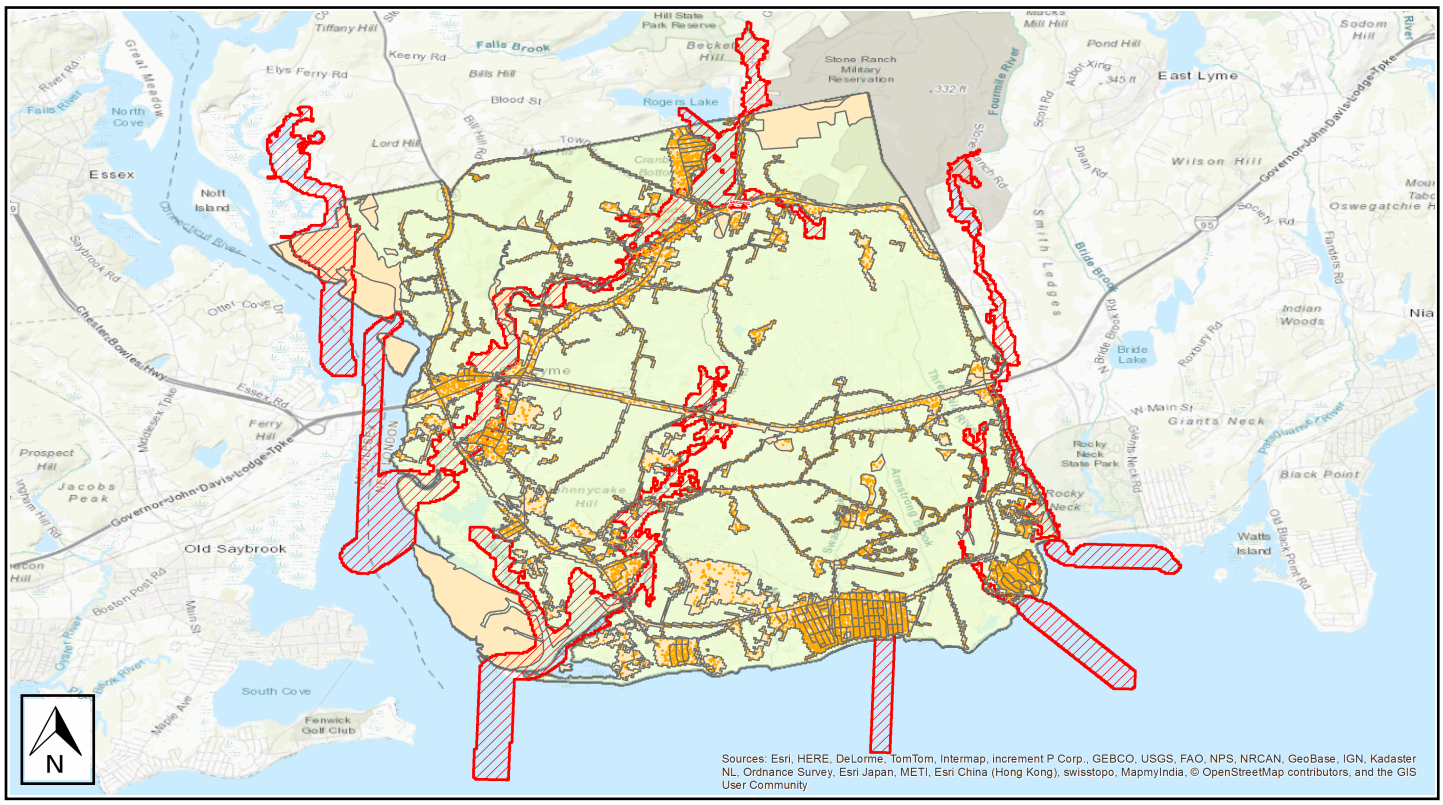
Flood Scenario Parameters

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

Study Region Name:	OldLyme
Scenario Name:	OlyLymeRivering
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 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

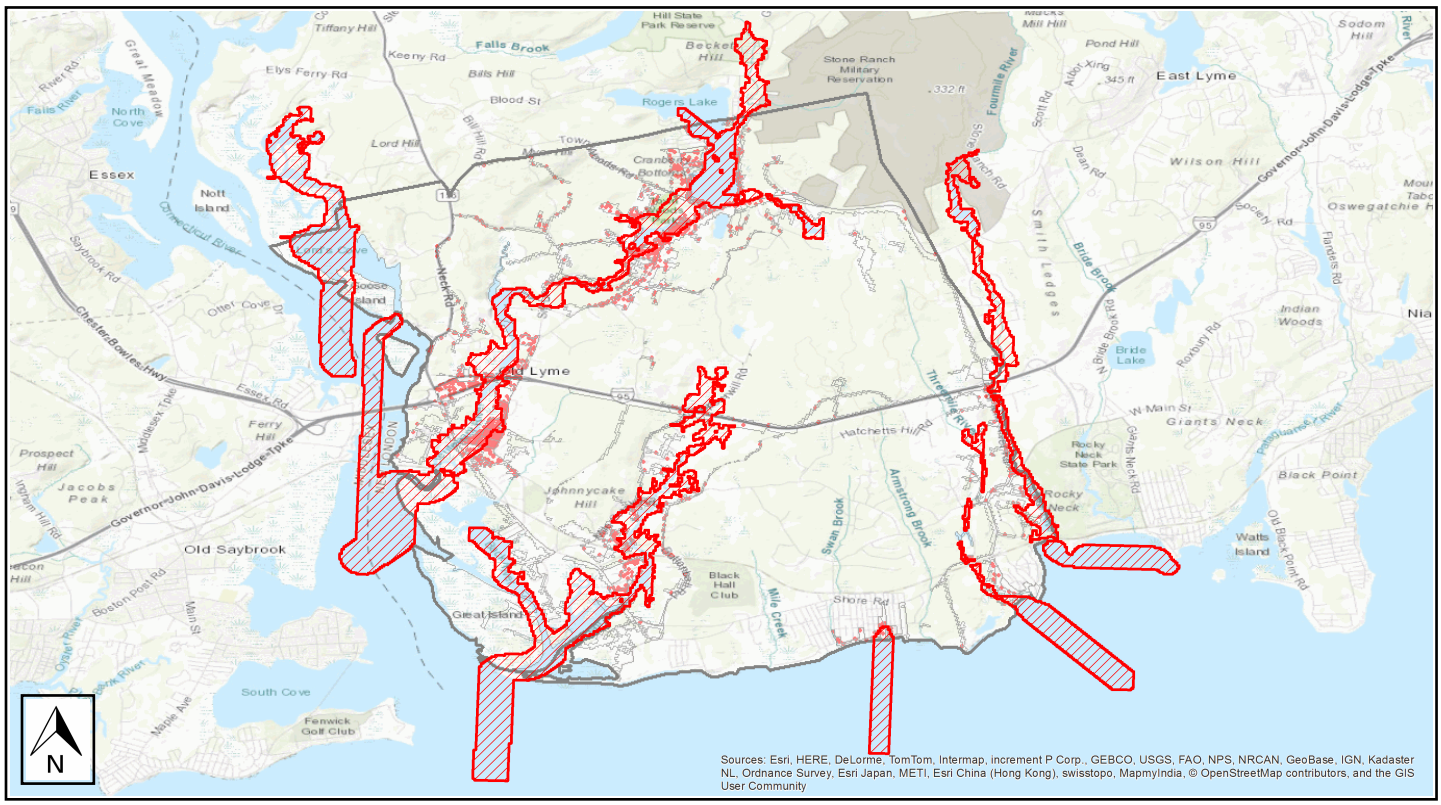


Table 3: Expected Building Damage by Occupancy

	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	87	98	2	2	0	0	0	0	0	0	0	0
Total	**87**		**2**		**0**		**0**		**0**		**0**	

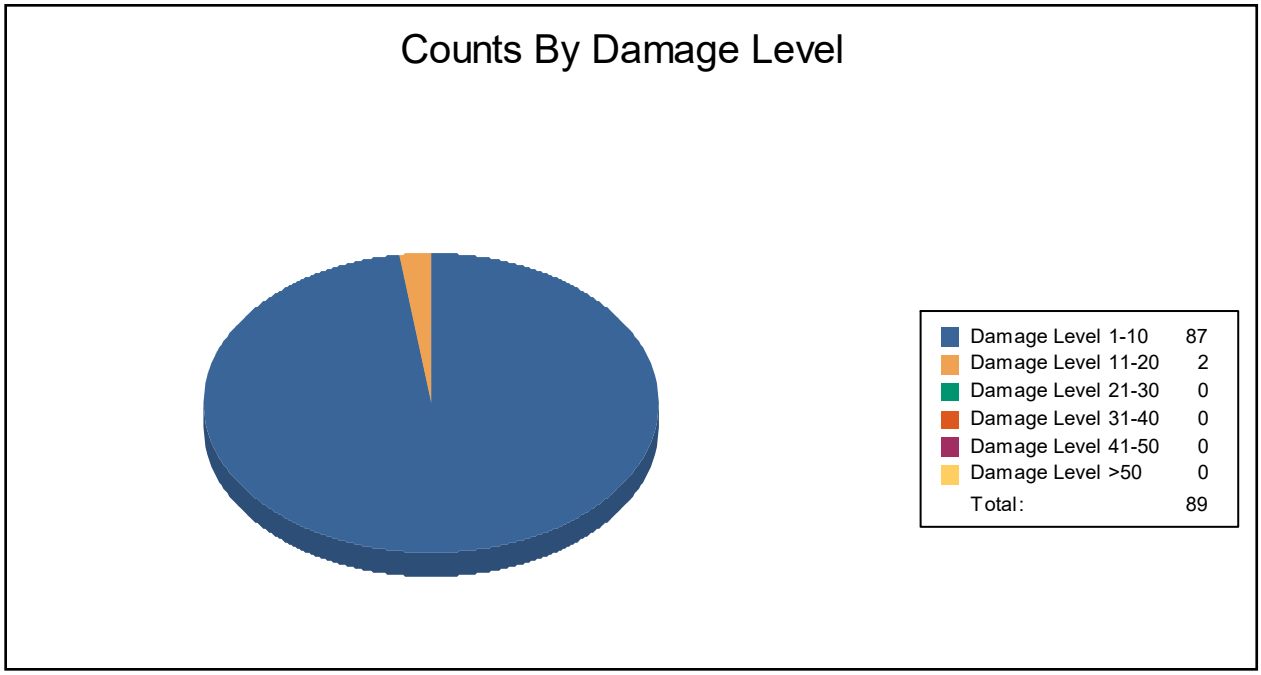


Table 4: Expected Building Damage by Building Type

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	1	100	0	0	0	0	0	0	0	0	0	0
Steel	0	0	0	0	0	0	0	0	0	0	0	0
Wood	86	98	2	2	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	3	0	0	0
Hospitals	0	0	0	0
Police Stations	1	0	0	0
Schools	6	0	0	0

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

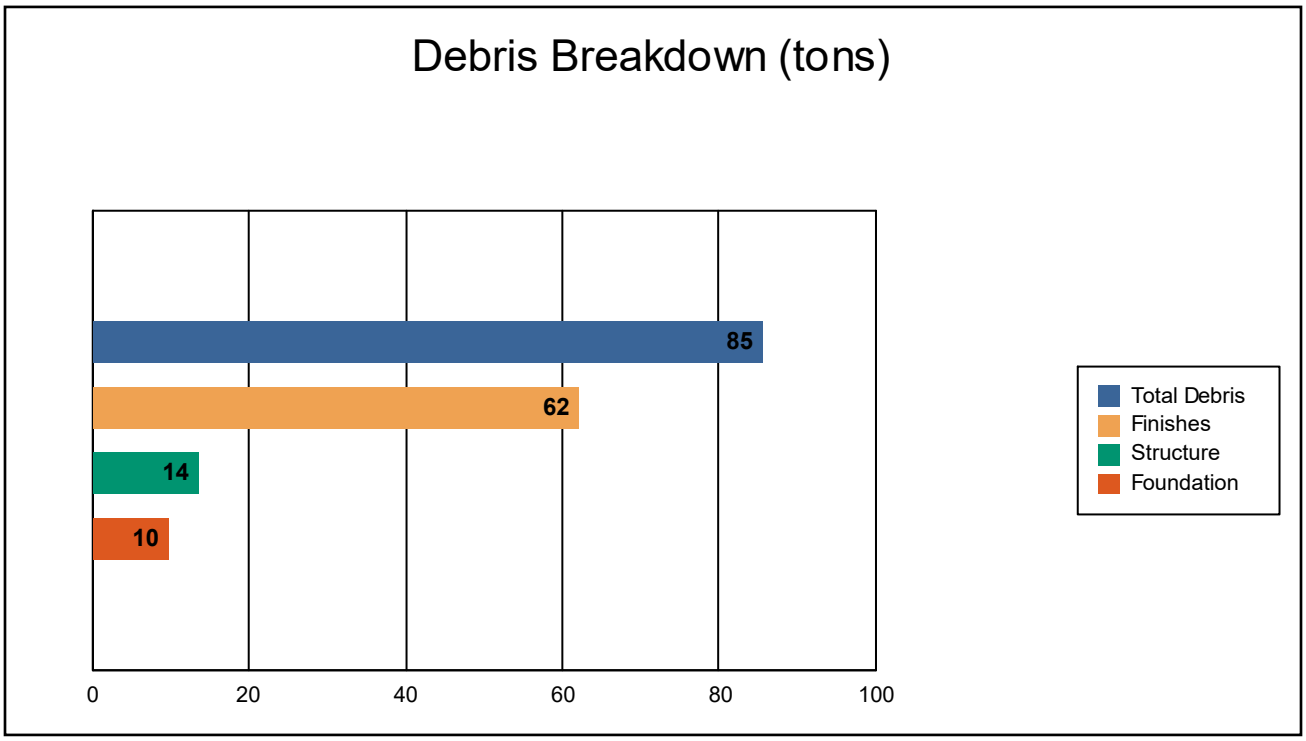
(1) None of your facilities were flooded. This can be checked by mapping the inventory data on the depth grid.

(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.

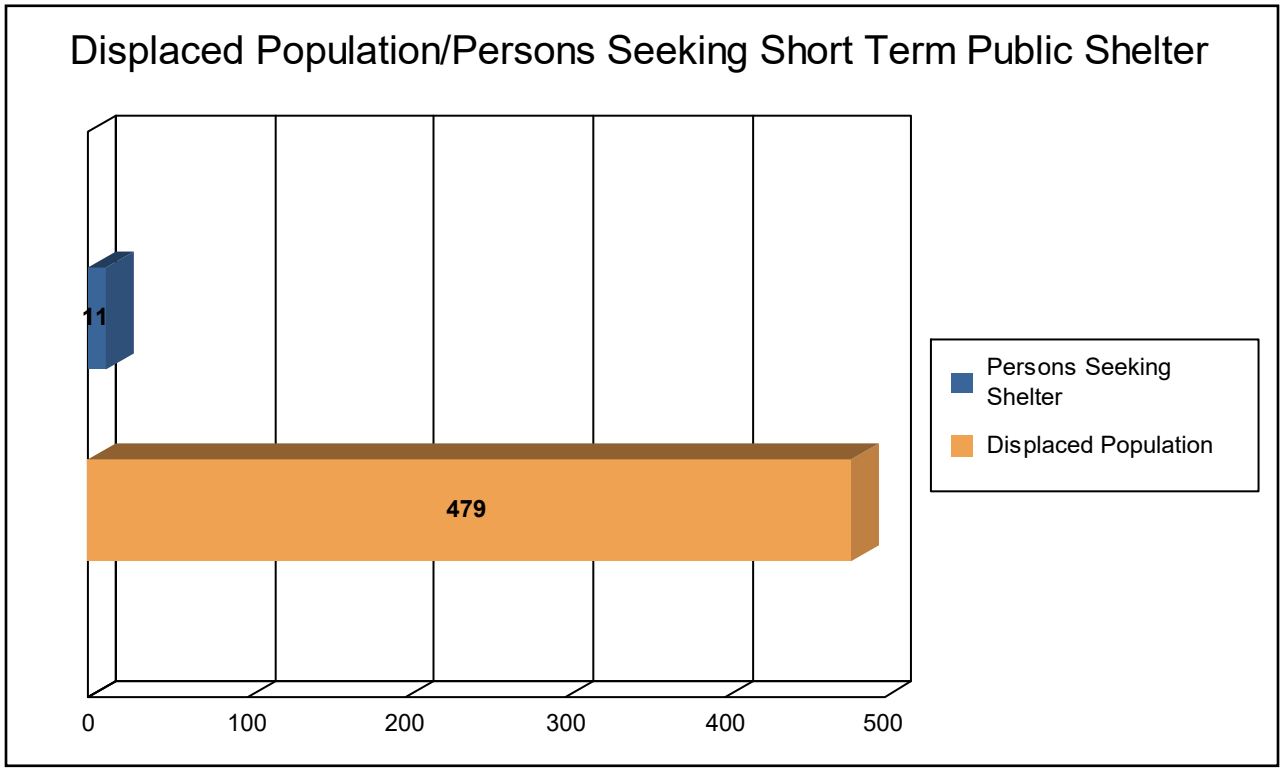


The model estimates that a total of 85 tons of debris will be generated. Of the total amount, Finishes comprises 73% of the total, Structure comprises 16% of the total, and Foundation comprises 11%. If the debris tonnage is converted into an estimated number of truckloads, it will require 4 truckloads (@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 160 households (or 479 of people) will be displaced due to the flood. Displacement includes households evacuated from within or very near to the inundated area. Of these, 11 people (out of a total population of 7,603) will seek temporary shelter in public shelters.



Economic Loss

The total economic loss estimated for the flood is 16.56 million dollars, which represents 1.83 % of the total replacement value of the scenario buildings.

Building-Related Losses

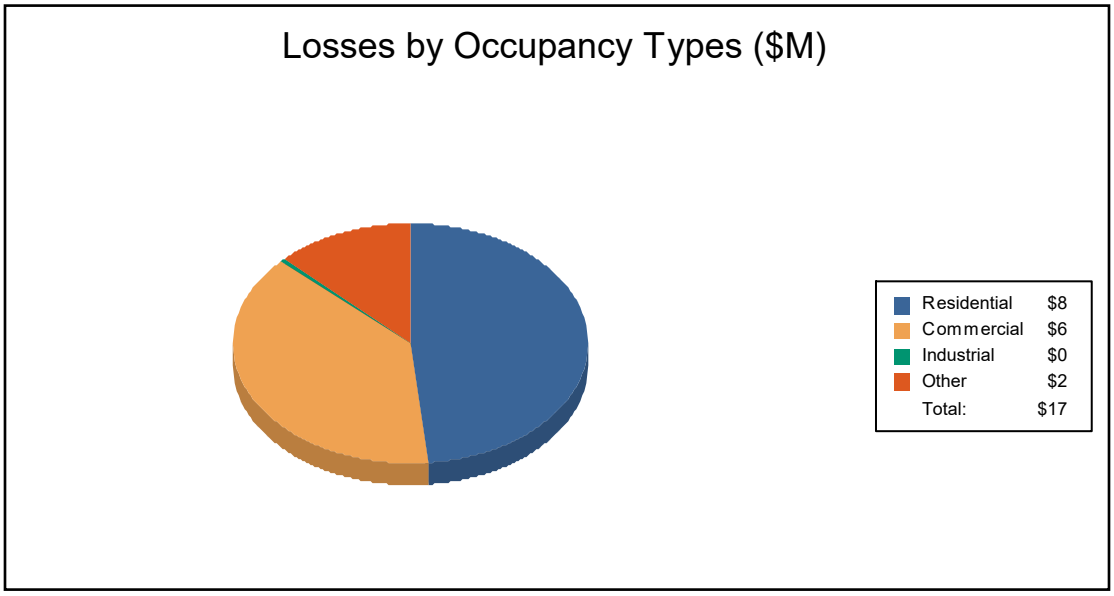
The building losses are broken into two categories: direct building losses and business interruption losses. The direct building losses are the estimated costs to repair or replace the damage caused to the building and its contents. The business interruption losses are the losses associated with inability 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 4.45 million dollars. 73% of the estimated losses were related to the business interruption of the region. The residential occupancies made up 48.38% 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	2.74	0.09	0.04	0.00	2.87
	Content	1.09	0.38	0.04	0.07	1.58
	Inventory	0.00	0.00	0.00	0.00	0.00
	Subtotal	**3.83**	**0.46**	**0.08**	**0.08**	**4.45**
Business Interruption						
	Income	0.02	2.79	0.01	0.40	3.22
	Relocation	3.12	0.46	0.01	0.21	3.79
	Rental Income	0.99	0.33	0.00	0.02	1.33
	Wage	0.05	2.34	0.01	1.38	3.78
	Subtotal	**4.18**	**5.91**	**0.02**	**2.00**	**12.12**
ALL	**Total**	**8.01**	**6.37**	**0.10**	**2.08**	**16.56**



Appendix A: County Listing for the Region

Connecticut

- New London

Appendix B: Regional Population and Building Value Data

	Population	Building Value (thousands of dollars)		
		Residential	Non-Residential	Total
Connecticut				
New London	7,603	1,585,261	286,142	1,871,403
Total	**7,603**	**1,585,261**	**286,142**	**1,871,403**
Total Study Region	**7,603**	**1,585,261**	**286,142**	**1,871,403**

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Flood Scenario: OldLymeAllCoastal

Print Date: Tuesday, January 7, 2020

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There are an estimated 5,155 buildings in the region with a total building replacement value (excluding contents) of 1,871 million dollars. Approximately 91.85% of the buildings (and 84.71% of the building value) are associated with residential housing.

Building Inventory

General Building Stock

Hazus estimates that there are 5,155 buildings in the region which have an aggregate total replacement value of 1,871 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	1,585,261	84.7%
Commercial	188,392	10.1%
Industrial	43,115	2.3%
Agricultural	7,152	0.4%
Religion	18,115	1.0%
Government	7,334	0.4%
Education	22,034	1.2%
Total	**1,871,403**	**100%**

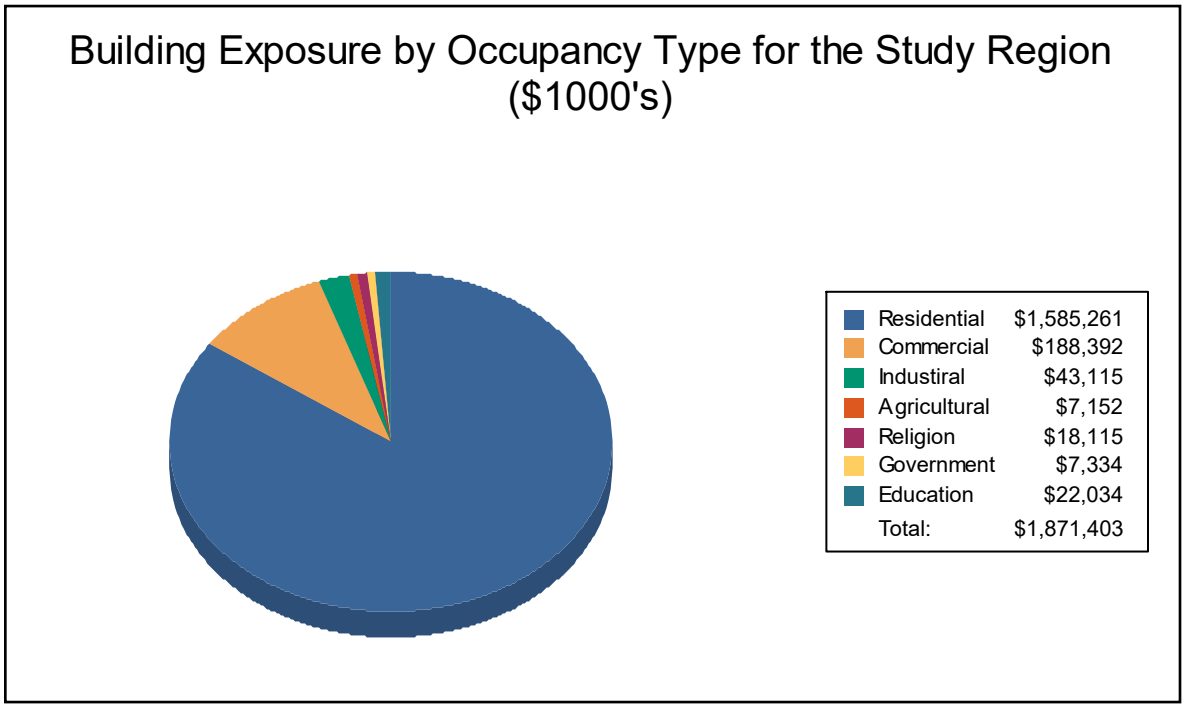
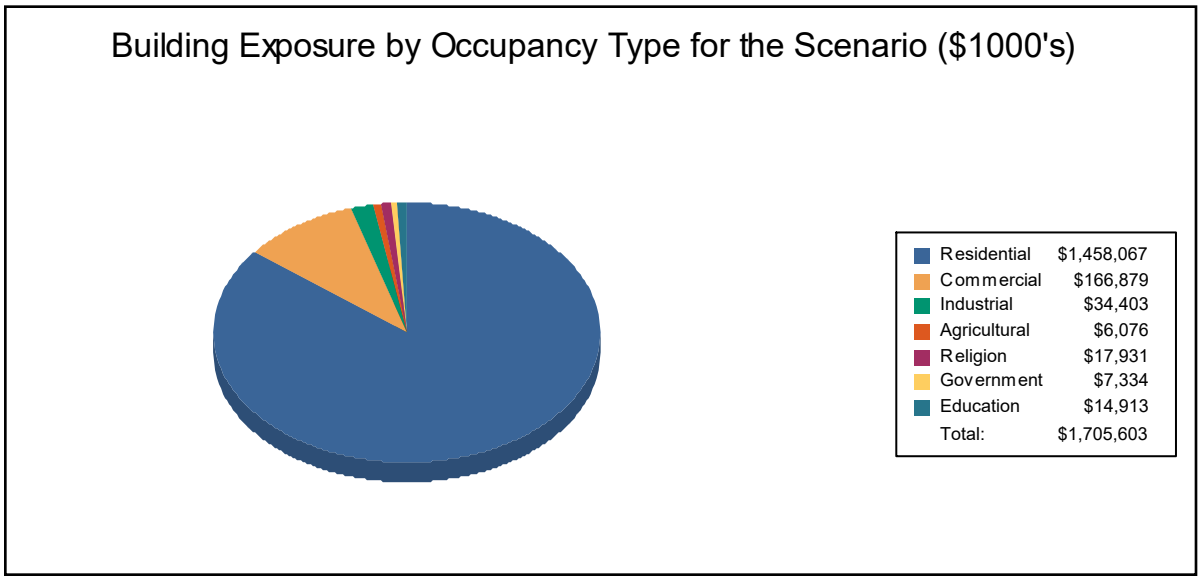


Table 2
Building Exposure by Occupancy Type for the Scenario

Occupancy	Exposure ($1000)	Percent of Total
Residential	1,458,067	85.5%
Commercial	166,879	9.8%
Industrial	34,403	2.0%
Agricultural	6,076	0.4%
Religion	17,931	1.1%
Government	7,334	0.4%
Education	14,913	0.9%
Total	**1,705,603**	**100%**



Essential Facility Inventory

For essential facilities, there are no hospitals in the region with a total bed capacity of no beds.
There are 6 schools, 3 fire stations, 1 police station and 1 emergency operation center.

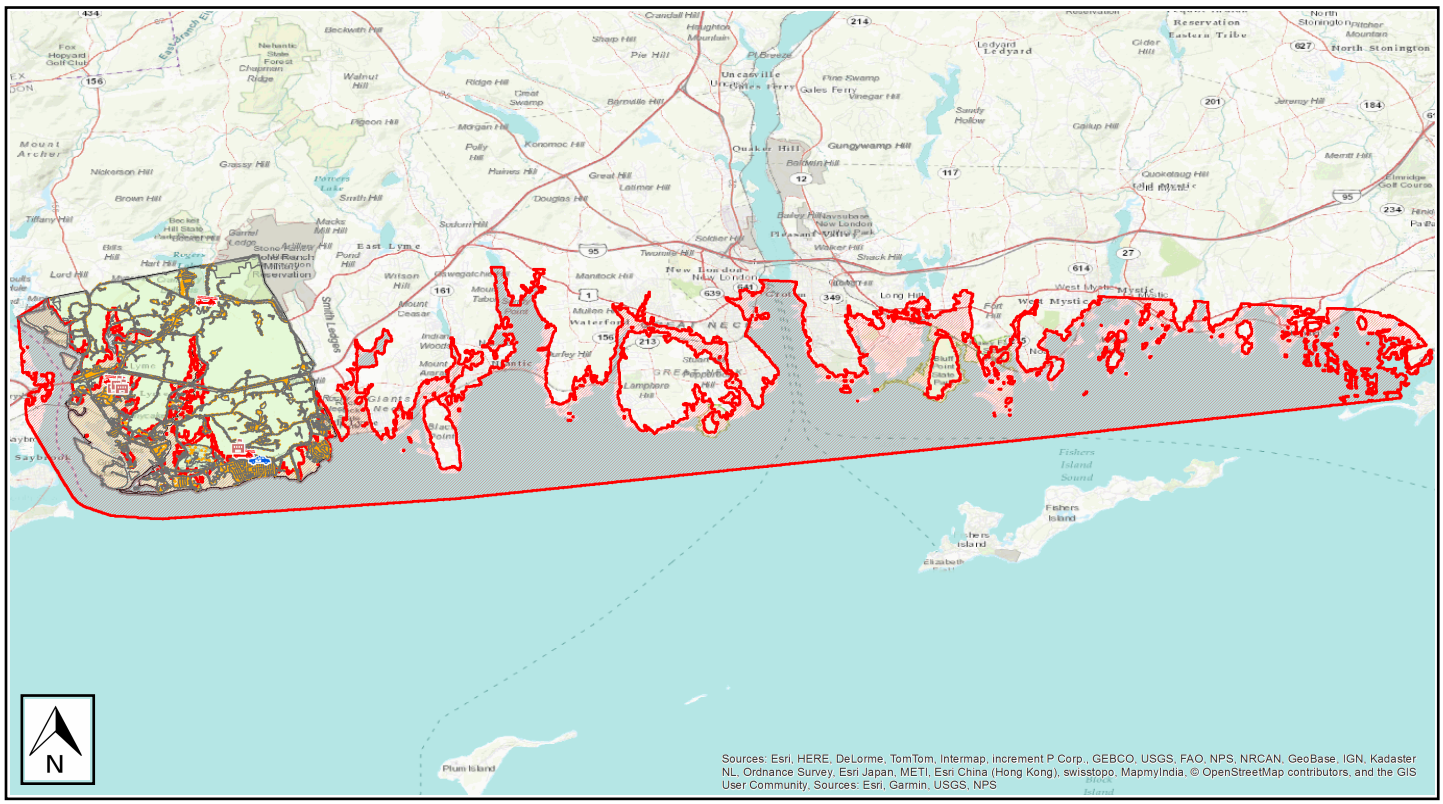
Flood Scenario Parameters

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

Study Region Name:	OldLyme
Scenario Name:	OldLymeAllCoastal
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 60 buildings will be at least moderately damaged. This is over 31% 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

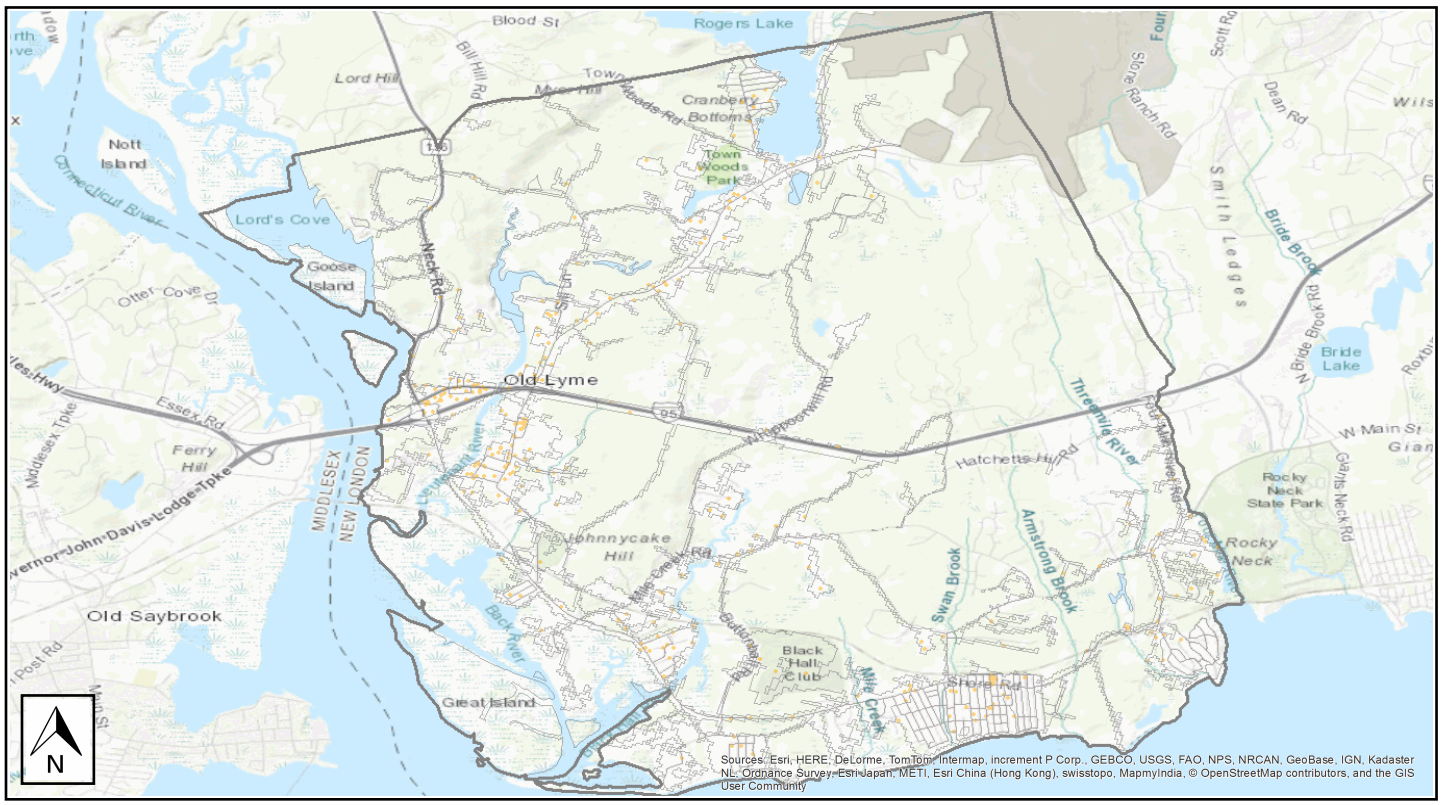


Table 3: Expected Building Damage by Occupancy

	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	2	3	57	92	3	5	0	0	0	0	0	0
Total	**2**		**57**		**3**		**0**		**0**		**0**	

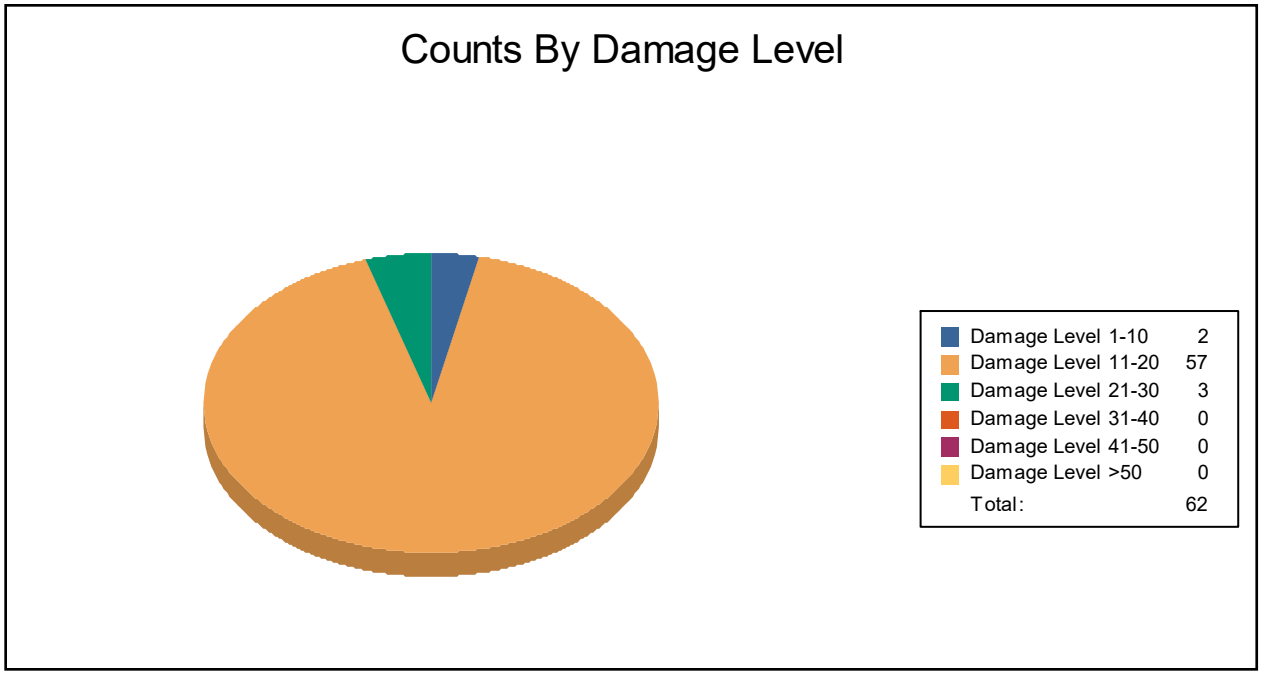


Table 4: Expected Building Damage by Building Type

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	2	3	57	92	3	5	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	1	0	0
Fire Stations	3	0	0	0
Hospitals	0	0	0	0
Police Stations	1	0	0	0
Schools	6	0	0	0

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

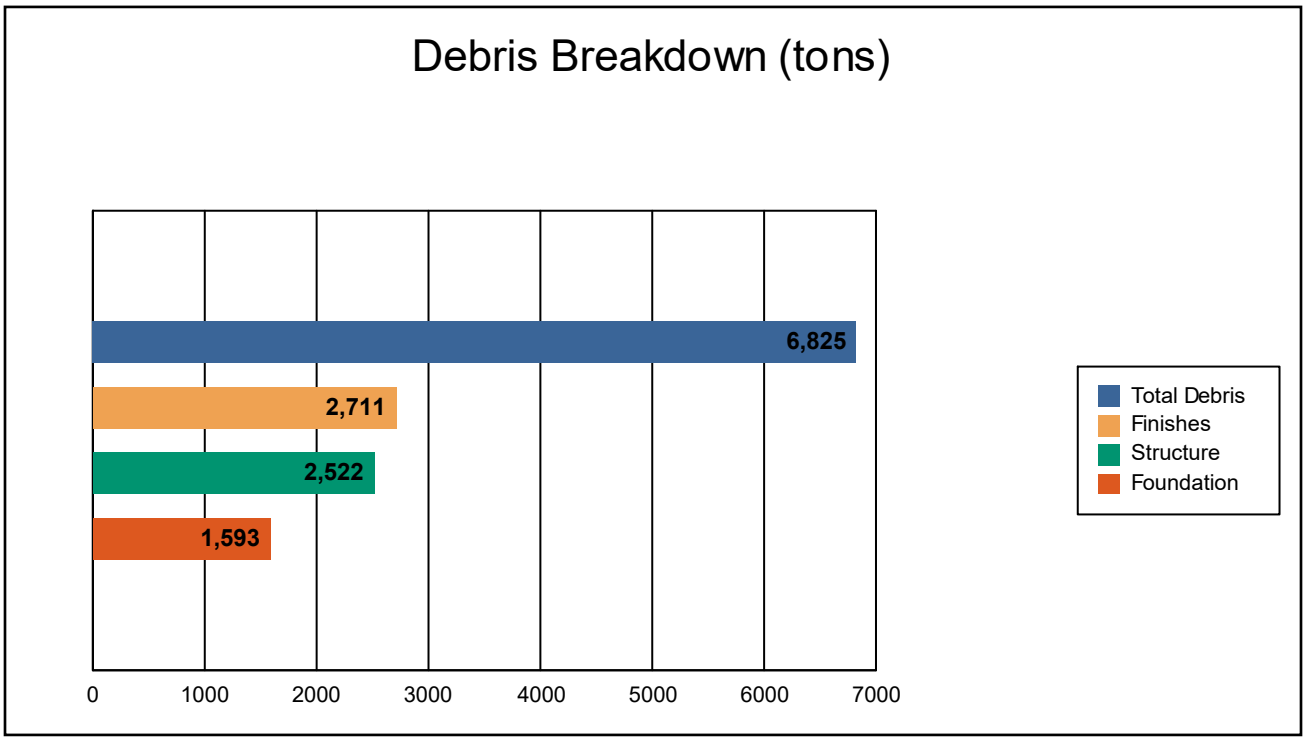
(1) None of your facilities were flooded. This can be checked by mapping the inventory data on the depth grid.

(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.

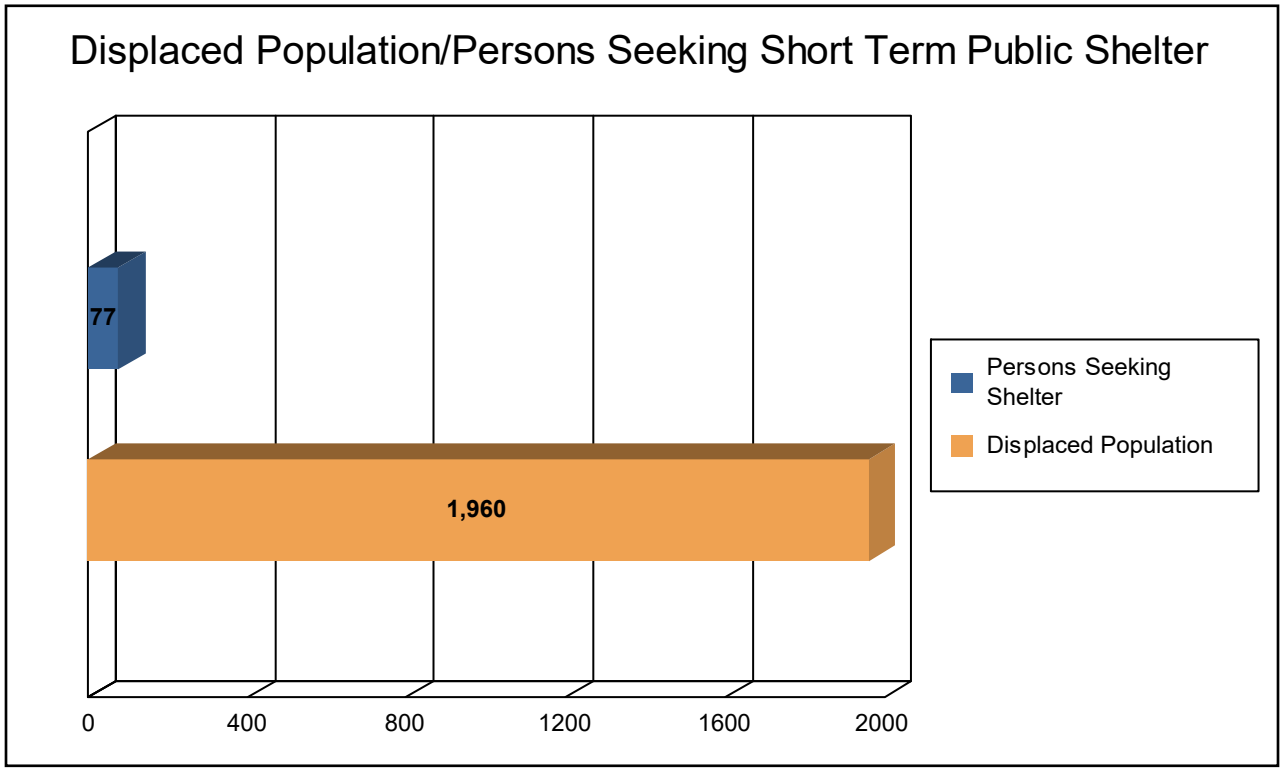


The model estimates that a total of 6,825 tons of debris will be generated. Of the total amount, Finishes comprises 40% of the total, Structure comprises 37% of the total, and Foundation comprises 23%. If the debris tonnage is converted into an estimated number of truckloads, it will require 274 truckloads (@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 653 households (or 1,960 of people) will be displaced due to the flood. Displacement includes households evacuated from within or very near to the inundated area. Of these, 77 people (out of a total population of 7,603) will seek temporary shelter in public shelters.



Economic Loss

The total economic loss estimated for the flood is 58.39 million dollars, which represents 3.42 % of the total replacement value of the scenario buildings.

Building-Related Losses

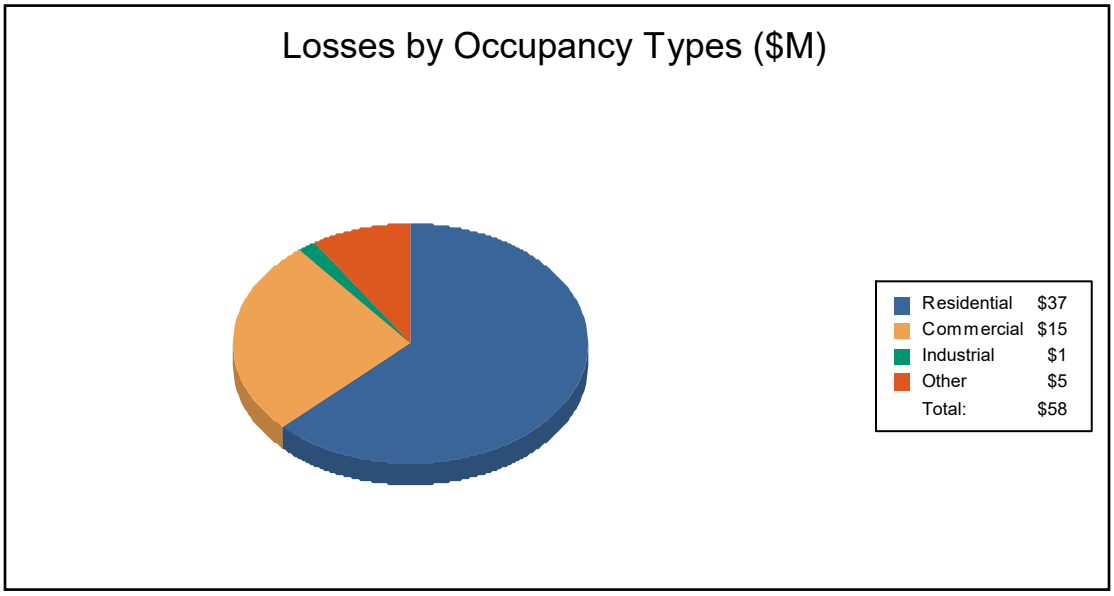
The building losses are broken into two categories: direct building losses and business interruption losses. The direct building losses are the estimated costs to repair or replace the damage caused to the building and its contents. The business interruption losses are the losses associated with inability 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 37.32 million dollars. 36% of the estimated losses were related to the business interruption of the region. The residential occupancies made up 62.90% 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	15.62	1.26	0.35	0.27	17.51
	Content	13.09	4.08	0.66	1.87	19.70
	Inventory	0.00	0.03	0.07	0.02	0.12
	Subtotal	**28.72**	**5.37**	**1.08**	**2.15**	**37.32**
Business Interruption						
	Income	0.01	4.79	0.01	0.56	5.37
	Relocation	6.10	0.70	0.01	0.23	7.04
	Rental Income	1.89	0.53	0.00	0.03	2.45
	Wage	0.02	3.86	0.02	2.31	6.22
	Subtotal	**8.02**	**9.89**	**0.04**	**3.13**	**21.07**
ALL	**Total**	**36.73**	**15.26**	**1.12**	**5.28**	**58.39**



Appendix A: County Listing for the Region

Connecticut

- New London

Appendix B: Regional Population and Building Value Data

	Population	Building Value (thousands of dollars)		
		Residential	Non-Residential	Total
Connecticut				
New London	7,603	1,585,261	286,142	1,871,403
Total	**7,603**	**1,585,261**	**286,142**	**1,871,403**
Total Study Region	**7,603**	**1,585,261**	**286,142**	**1,871,403**

Hazus-MH: Flood Global Risk Report

Region Name: OldLyme

Flood Scenario: OlyLymeRivering

Print Date: Friday, April 17, 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
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General Description of the Region

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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.

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Building Inventory

General Building Stock

Hazus estimates that there are 5,155 buildings in the region which have an aggregate total replacement value of 1,871 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	7,334	0.4%
Education	22,034	1.2%
Total	**1,871,403**	**100%**

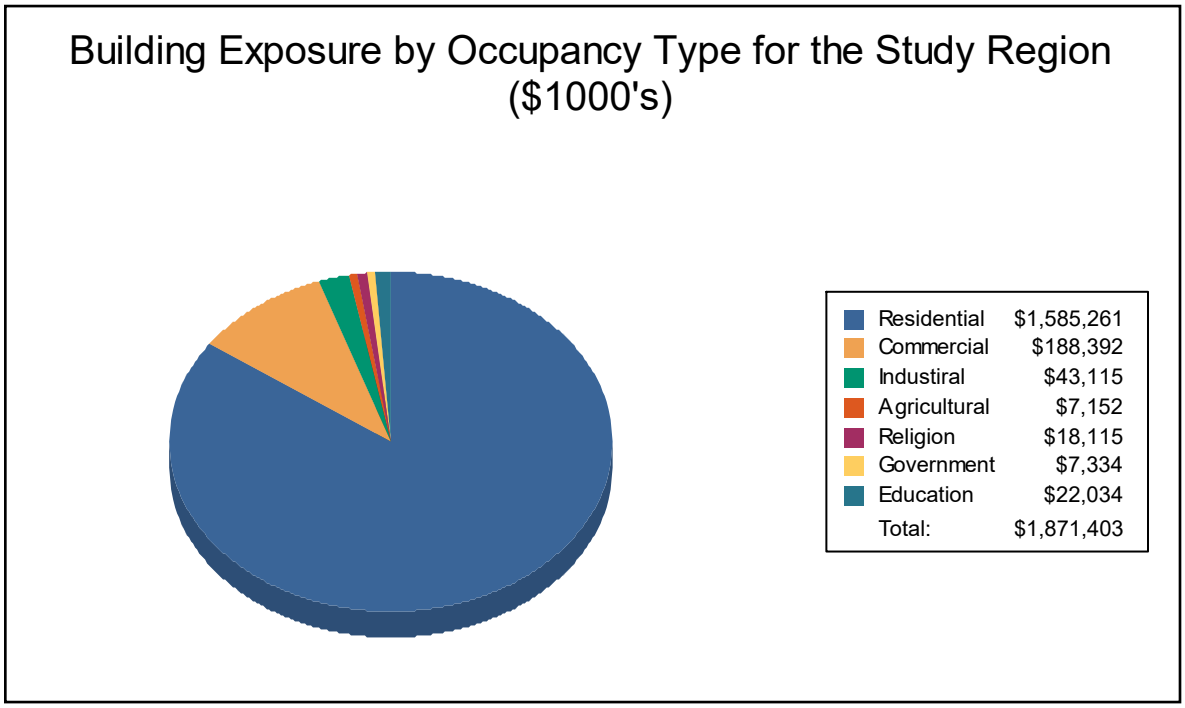
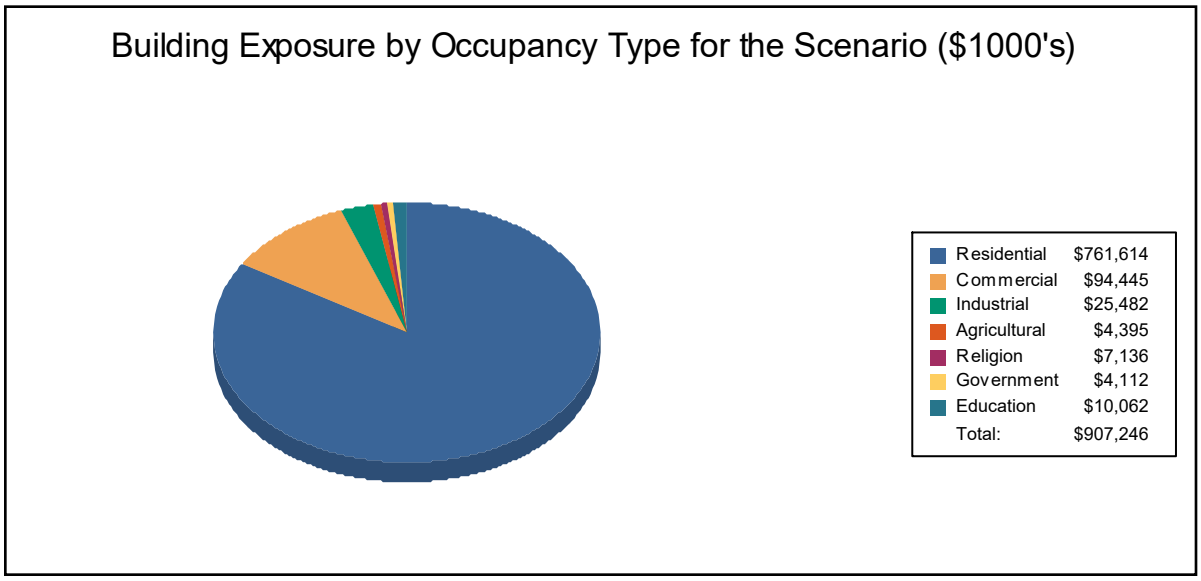


Table 2
Building Exposure by Occupancy Type for the Scenario

Occupancy	Exposure ($1000)	Percent of Total
Residential	761,614	83.9%
Commercial	94,445	10.4%
Industrial	25,482	2.8%
Agricultural	4,395	0.5%
Religion	7,136	0.8%
Government	4,112	0.5%
Education	10,062	1.1%
Total	**907,246**	**100%**



Essential Facility Inventory

For essential facilities, there are no hospitals in the region with a total bed capacity of no beds.
There are 6 schools, 3 fire stations, 1 police station and 1 emergency operation center.

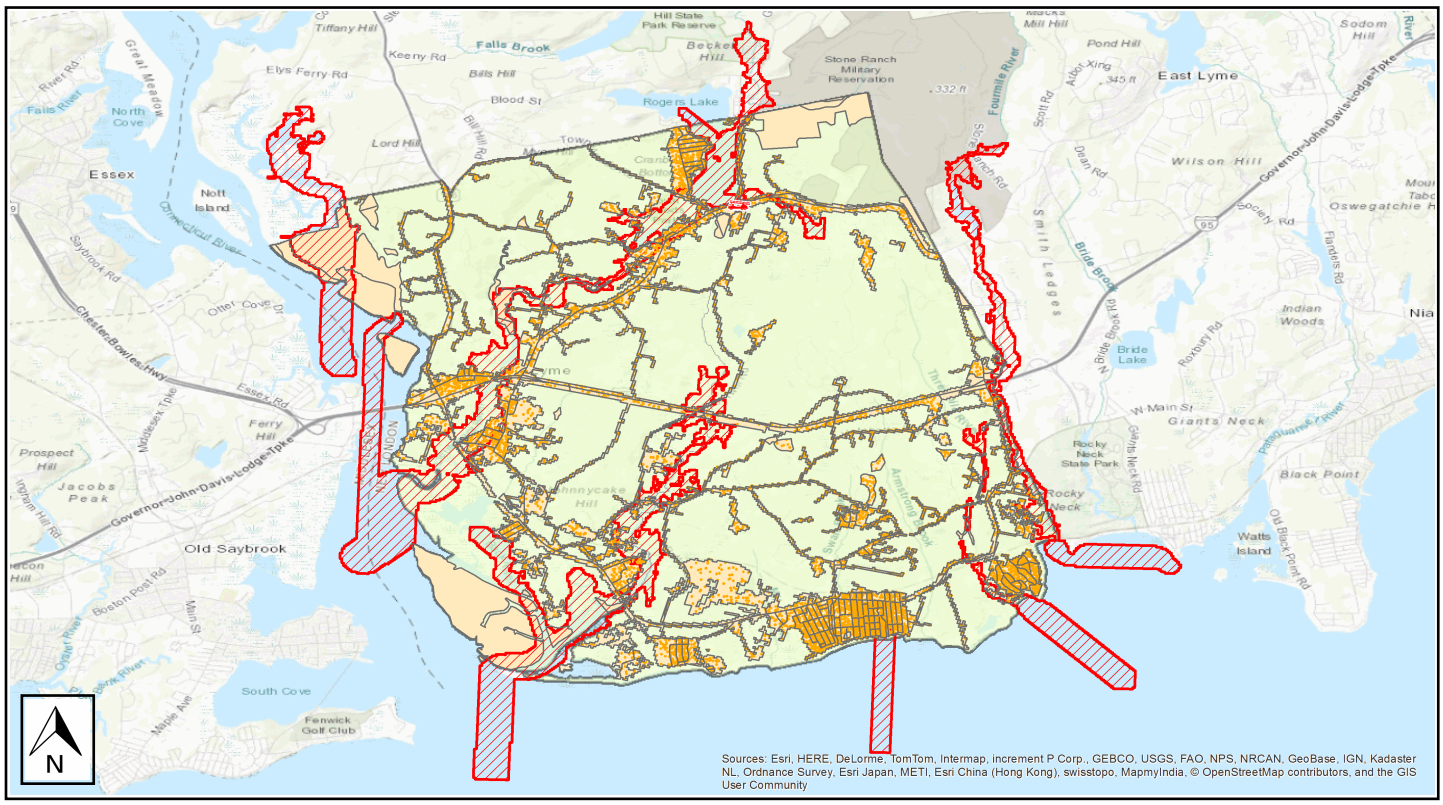
Flood Scenario Parameters

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

Study Region Name:	OldLyme
Scenario Name:	OlyLymeRivering
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 3 buildings will be at least moderately damaged. This is over 65% 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

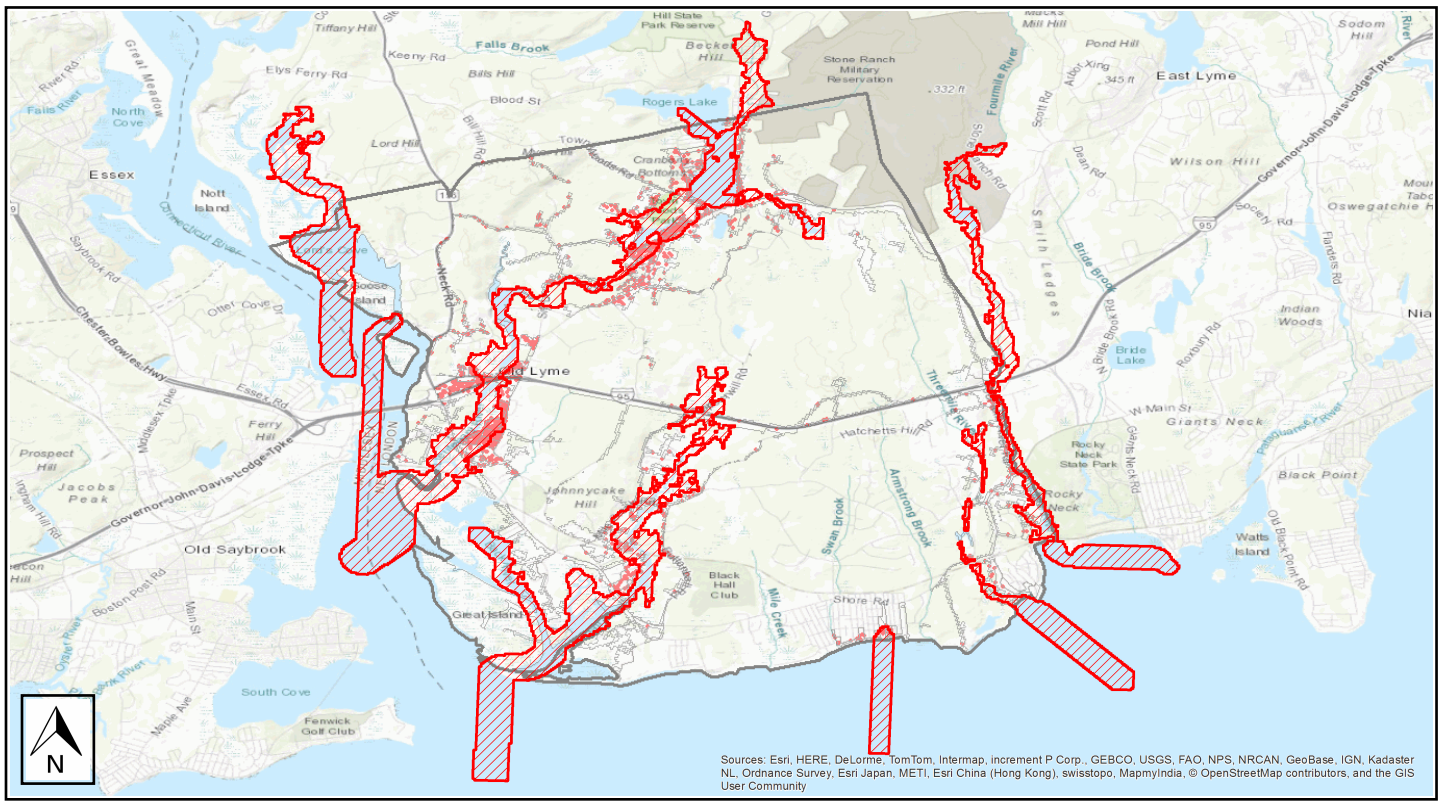


Table 3: Expected Building Damage by Occupancy

	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	115	97	3	3	0	0	0	0	0	0	0	0
Total	**115**		**3**		**0**		**0**		**0**		**0**	

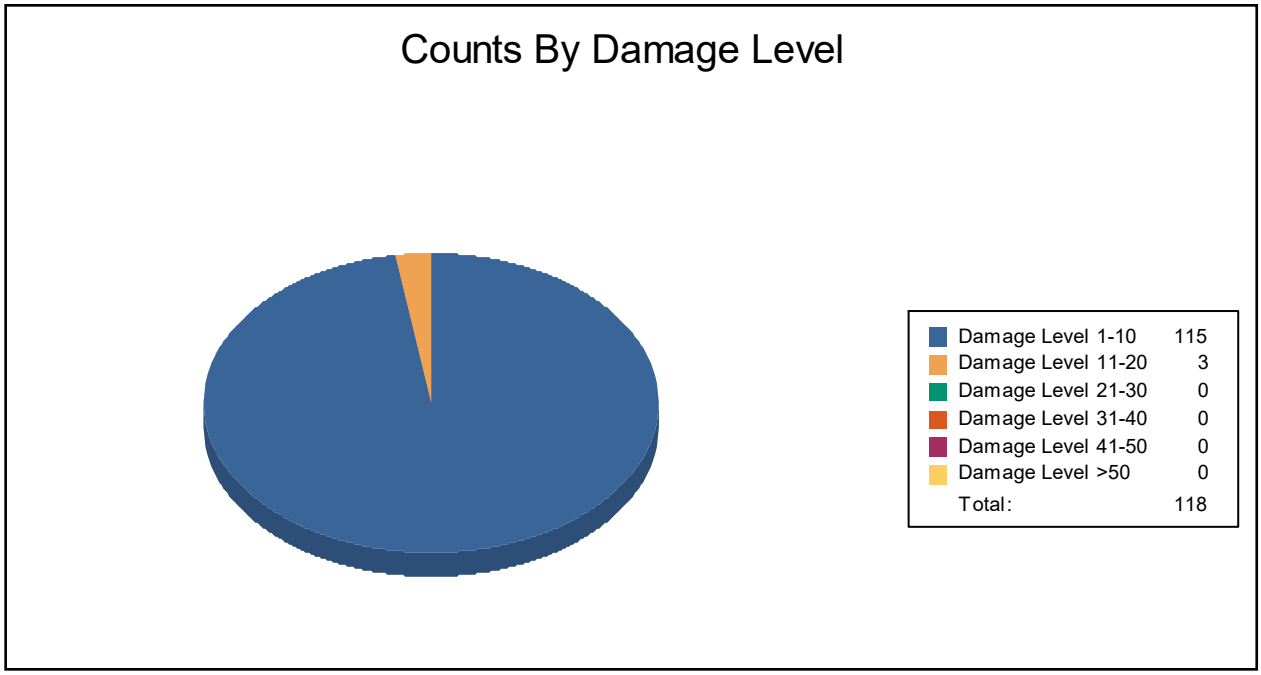


Table 4: Expected Building Damage by Building Type

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	1	100	0	0	0	0	0	0	0	0	0	0
Steel	0	0	0	0	0	0	0	0	0	0	0	0
Wood	114	97	3	3	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	3	0	0	0
Hospitals	0	0	0	0
Police Stations	1	0	0	0
Schools	6	0	0	0

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

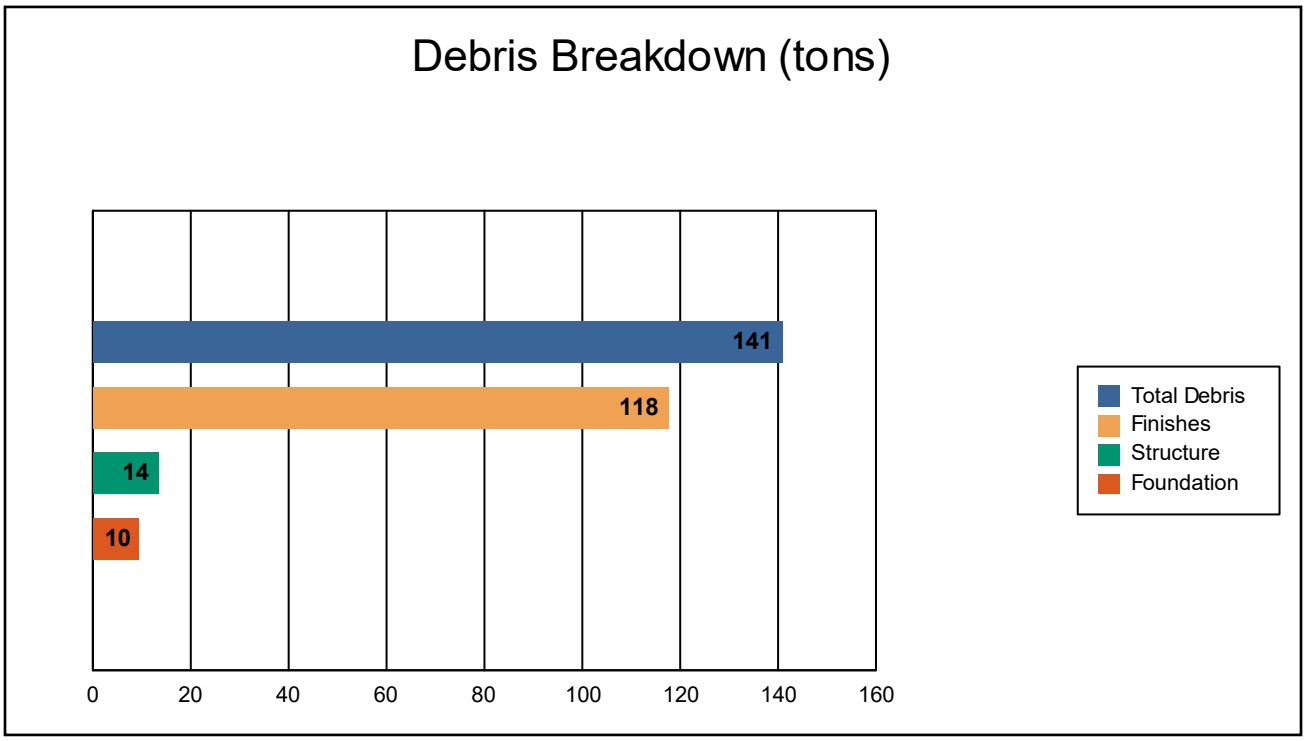
(1) None of your facilities were flooded. This can be checked by mapping the inventory data on the depth grid.

(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.

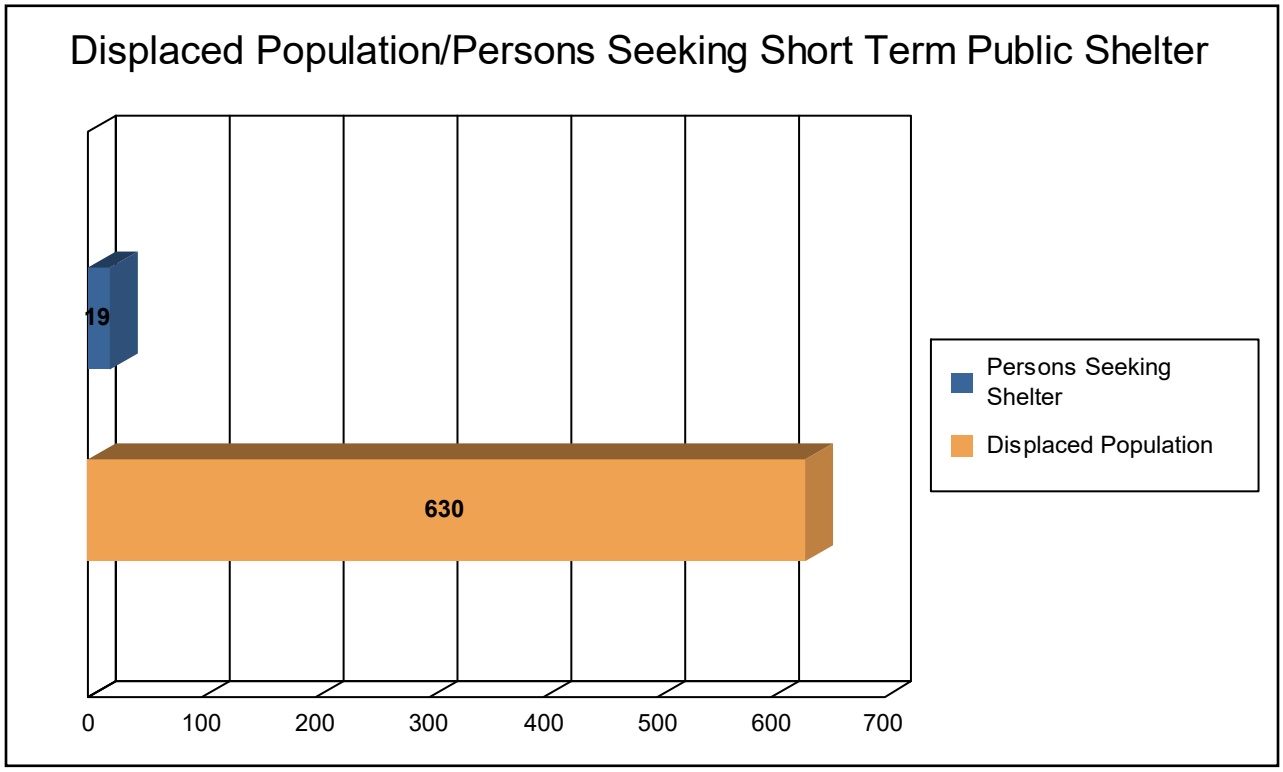


The model estimates that a total of 141 tons of debris will be generated. Of the total amount, Finishes comprises 83% of the total, Structure comprises 10% of the total, and Foundation comprises 7%. If the debris tonnage is converted into an estimated number of truckloads, it will require 6 truckloads (@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 210 households (or 630 of people) will be displaced due to the flood. Displacement includes households evacuated from within or very near to the inundated area. Of these, 19 people (out of a total population of 7,603) will seek temporary shelter in public shelters.



Economic Loss

The total economic loss estimated for the flood is 21.26 million dollars, which represents 2.34 % of the total replacement value of the scenario buildings.

Building-Related Losses

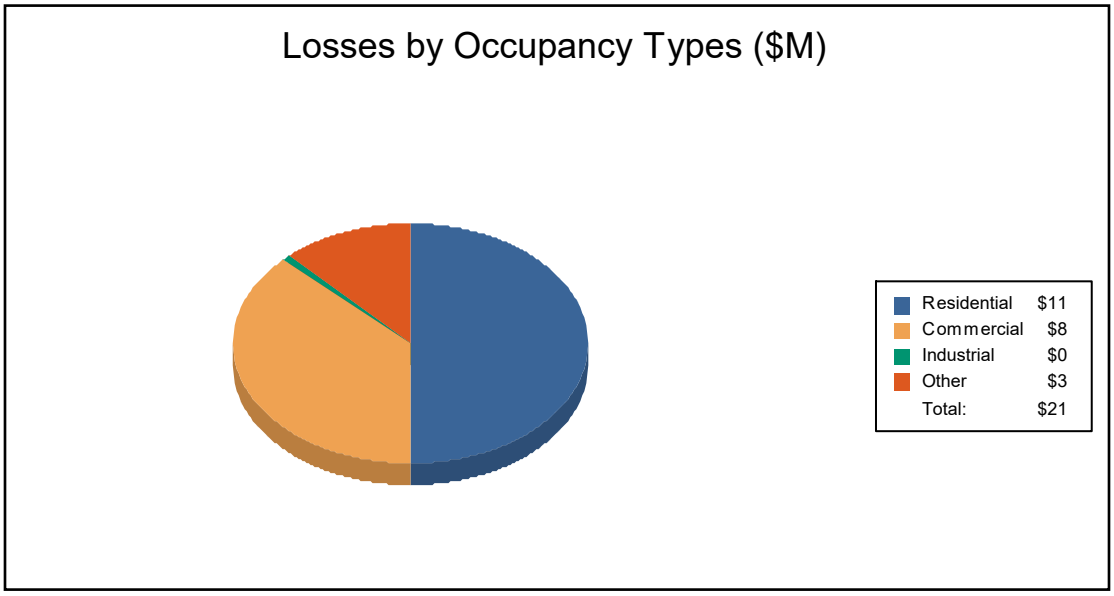
The building losses are broken into two categories: direct building losses and business interruption losses. The direct building losses are the estimated costs to repair or replace the damage caused to the building and its contents. The business interruption losses are the losses associated with inability 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 6.21 million dollars. 71% of the estimated losses were related to the business interruption of the region. The residential occupancies made up 49.88% 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	3.72	0.14	0.07	0.01	3.93
	Content	1.54	0.55	0.06	0.13	2.28
	Inventory	0.00	0.00	0.00	0.00	0.00
	Subtotal	**5.26**	**0.68**	**0.13**	**0.14**	**6.21**
Business Interruption						
	Income	0.02	3.41	0.01	0.49	3.94
	Relocation	4.01	0.59	0.02	0.25	4.87
	Rental Income	1.26	0.44	0.00	0.02	1.72
	Wage	0.06	2.83	0.03	1.62	4.53
	Subtotal	**5.35**	**7.27**	**0.05**	**2.38**	**15.05**
ALL	**Total**	**10.61**	**7.95**	**0.19**	**2.52**	**21.26**



Appendix A: County Listing for the Region

Connecticut

- New London

Appendix B: Regional Population and Building Value Data

	Population	Building Value (thousands of dollars)		
		Residential	Non-Residential	Total
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New London	7,603	1,585,261	286,142	1,871,403
Total	**7,603**	**1,585,261**	**286,142**	**1,871,403**
Total Study Region	**7,603**	**1,585,261**	**286,142**	**1,871,403**

Hazus: Flood Global Risk Report

Region Name: OldLyme

Flood Scenario: OldLymeAllCoastal

Print Date: Tuesday, January 7, 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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Education	22,034	1.2%
Total	**1,871,403**	**100%**

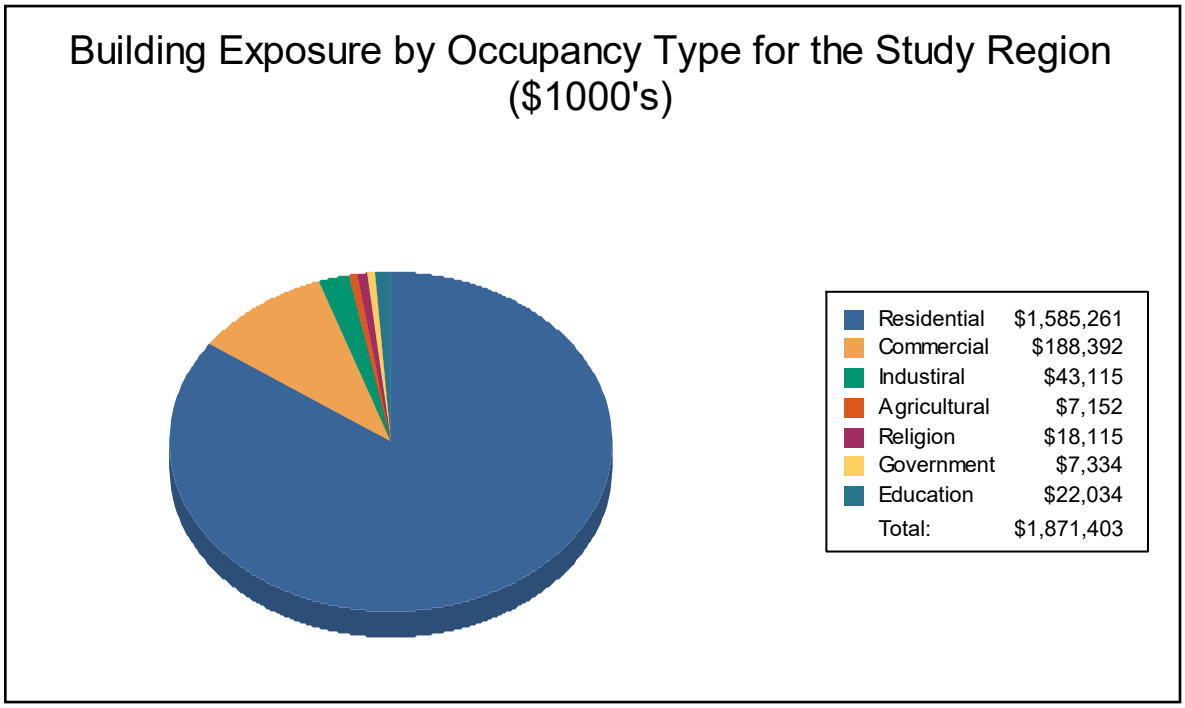
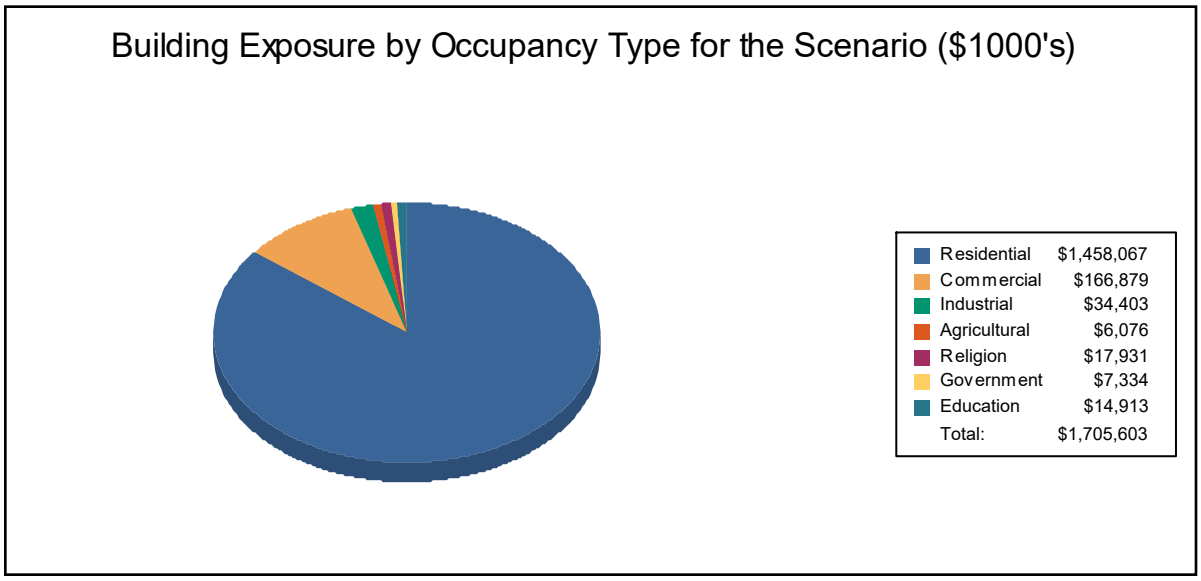


Table 2
Building Exposure by Occupancy Type for the Scenario

Occupancy	Exposure ($1000)	Percent of Total
Residential	1,458,067	85.5%
Commercial	166,879	9.8%
Industrial	34,403	2.0%
Agricultural	6,076	0.4%
Religion	17,931	1.1%
Government	7,334	0.4%
Education	14,913	0.9%
Total	**1,705,603**	**100%**



Essential Facility Inventory

For essential facilities, there are no hospitals in the region with a total bed capacity of no beds.
There are 6 schools, 3 fire stations, 1 police station and 1 emergency operation center.

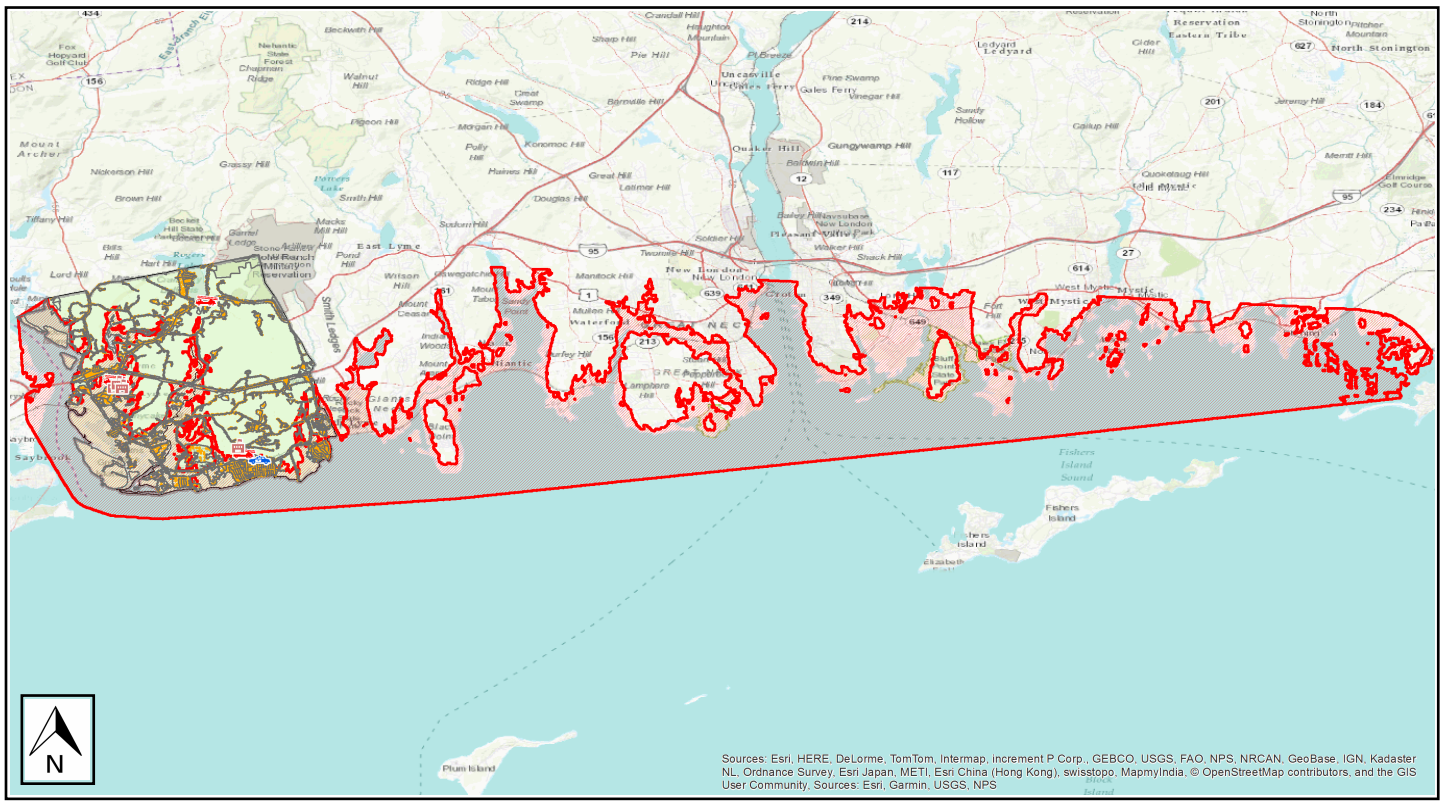
Flood Scenario Parameters

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

Study Region Name:	OldLyme
Scenario Name:	OldLymeAllCoastal
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 70 buildings will be at least moderately damaged. This is over 41% 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

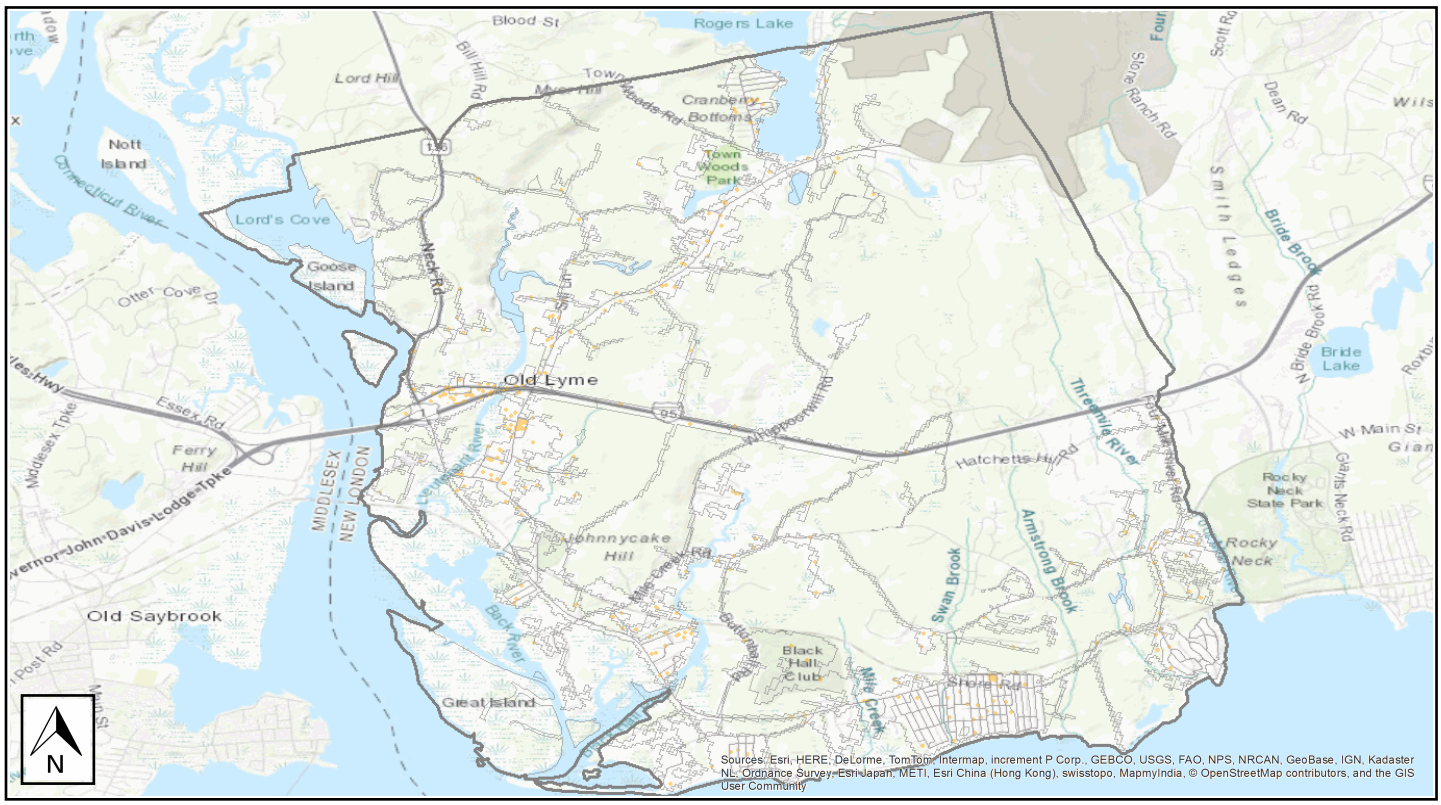


Table 3: Expected Building Damage by Occupancy

	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	1	1	15	21	31	44	24	34	0	0	0	0
Total	**1**		**15**		**31**		**24**		**0**		**0**	

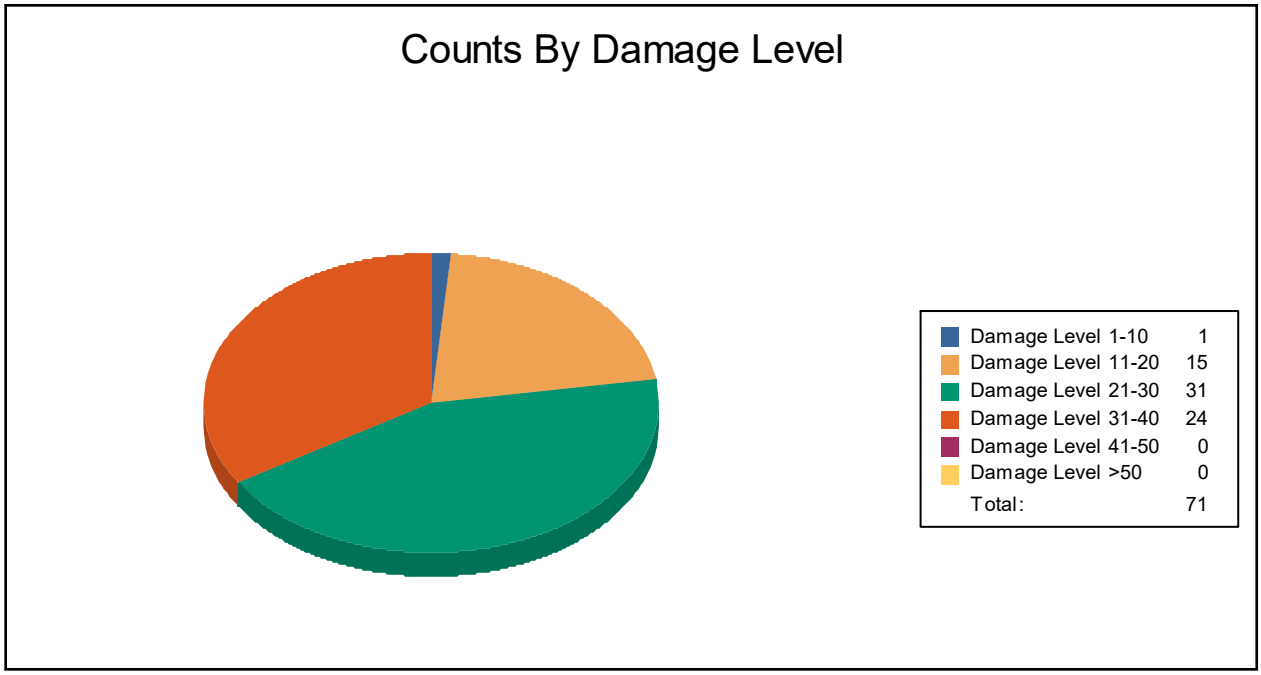


Table 4: Expected Building Damage by Building Type

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	1	1	15	21	31	44	24	34	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	1	0	1
Fire Stations	3	1	0	1
Hospitals	0	0	0	0
Police Stations	1	1	0	1
Schools	6	2	0	2

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

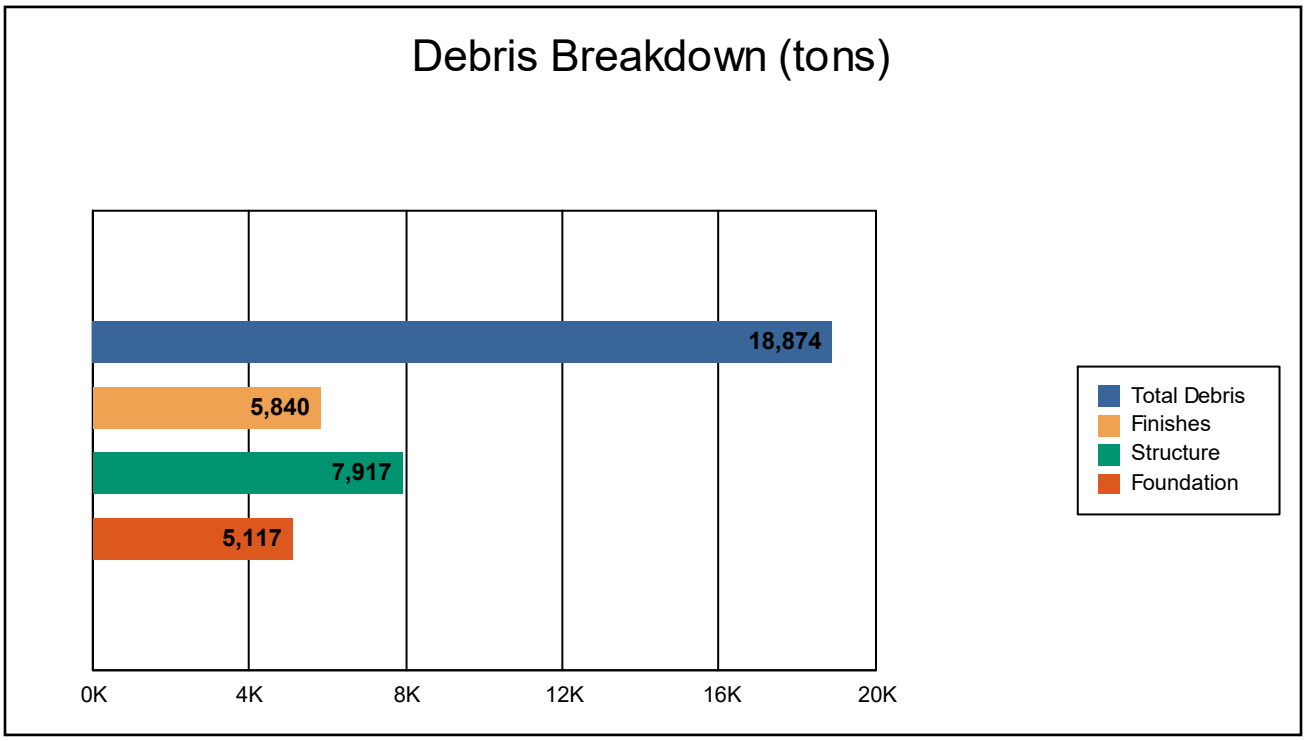
(1) None of your facilities were flooded. This can be checked by mapping the inventory data on the depth grid.

(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.

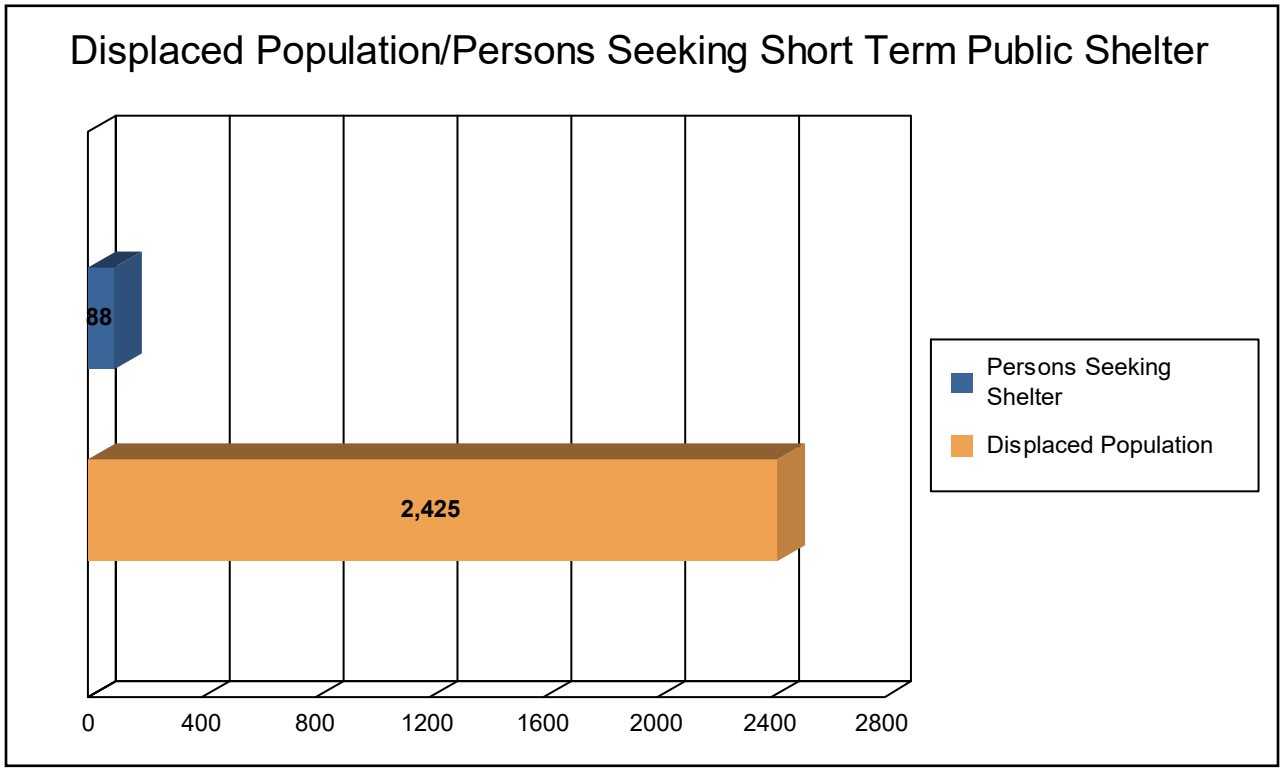


The model estimates that a total of 18,874 tons of debris will be generated. Of the total amount, Finishes comprises 31% of the total, Structure comprises 42% of the total, and Foundation comprises 27%. If the debris tonnage is converted into an estimated number of truckloads, it will require 755 truckloads (@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 808 households (or 2,425 of people) will be displaced due to the flood. Displacement includes households evacuated from within or very near to the inundated area. Of these, 88 people (out of a total population of 7,603) will seek temporary shelter in public shelters.



Economic Loss

The total economic loss estimated for the flood is 83.66 million dollars, which represents 4.90 % of the total replacement value of the scenario buildings.

Building-Related Losses

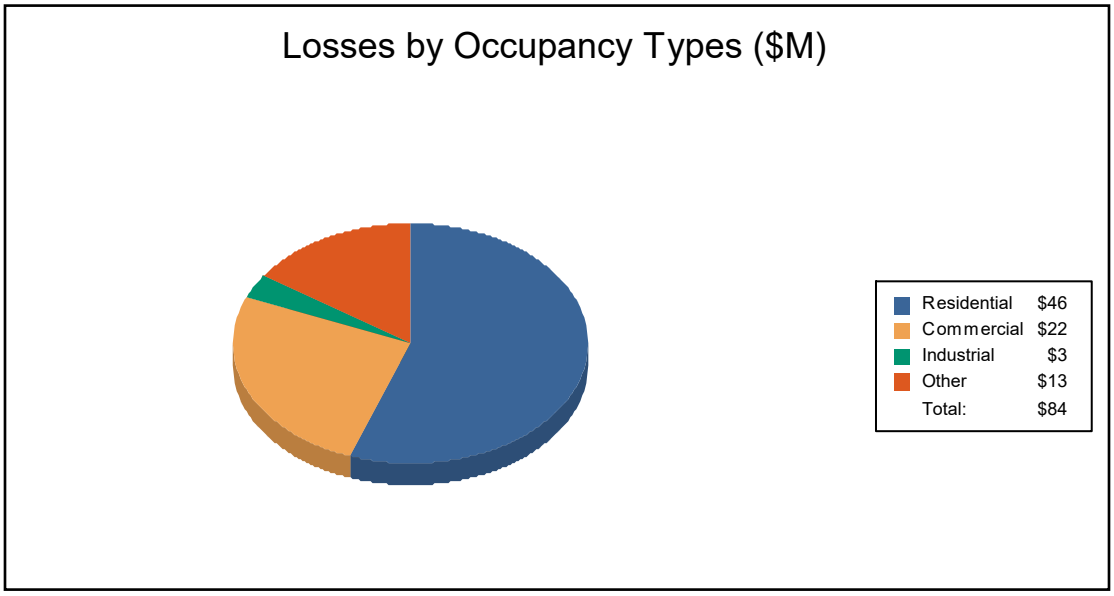
The building losses are broken into two categories: direct building losses and business interruption losses. The direct building losses are the estimated costs to repair or replace the damage caused to the building and its contents. The business interruption losses are the losses associated with inability 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 55.21 million dollars. 34% of the estimated losses were related to the business interruption of the region. The residential occupancies made up 55.43% 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	22.76	2.31	0.74	0.52	26.33
	Content	16.91	6.97	1.54	3.19	28.61
	Inventory	0.00	0.06	0.18	0.03	0.27
	Subtotal	**39.67**	**9.34**	**2.46**	**3.74**	**55.21**
Business Interruption						
	Income	0.00	5.99	0.02	0.87	6.87
	Relocation	5.14	0.86	0.02	0.38	6.40
	Rental Income	1.56	0.65	0.00	0.04	2.24
	Wage	0.00	4.93	0.05	7.96	12.93
	Subtotal	**6.70**	**12.43**	**0.09**	**9.24**	**28.45**
ALL	**Total**	**46.37**	**21.77**	**2.54**	**12.98**	**83.66**



Appendix A: County Listing for the Region

Connecticut

- New London

Appendix B: Regional Population and Building Value Data

	Population	Building Value (thousands of dollars)		
		Residential	Non-Residential	Total
Connecticut				
New London	7,603	1,585,261	286,142	1,871,403
Total	**7,603**	**1,585,261**	**286,142**	**1,871,403**
Total Study Region	**7,603**	**1,585,261**	**286,142**	**1,871,403**

Hazus-MH: Flood Global Risk Report

Region Name: OldLyme

Flood Scenario: OlyLymeRivering

Print Date: Friday, April 17, 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
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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 24 square miles and contains 367 census blocks. The region contains over 3 thousand households and has a total population of 7,603 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 5,155 buildings in the region with a total building replacement value (excluding contents) of 1,871 million dollars. Approximately 91.85% of the buildings (and 84.71% of the building value) are associated with residential housing.

Building Inventory

General Building Stock

Hazus estimates that there are 5,155 buildings in the region which have an aggregate total replacement value of 1,871 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	1,585,261	84.7%
Commercial	188,392	10.1%
Industrial	43,115	2.3%
Agricultural	7,152	0.4%
Religion	18,115	1.0%
Government	7,334	0.4%
Education	22,034	1.2%
Total	**1,871,403**	**100%**

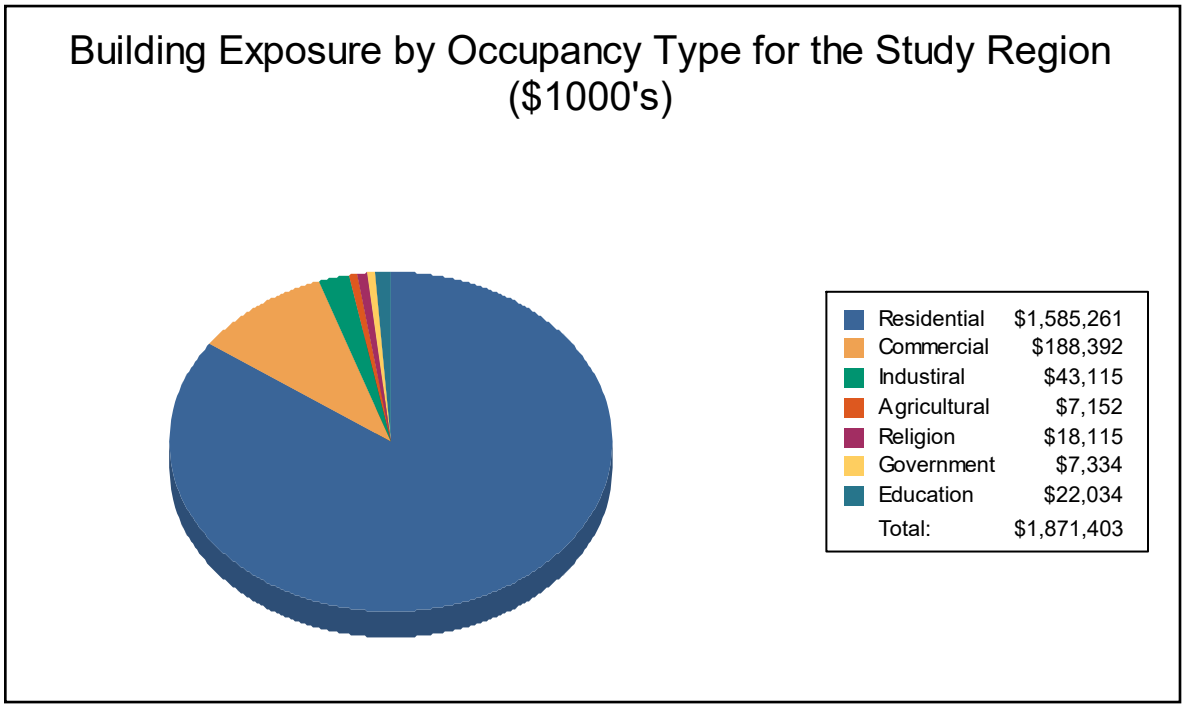
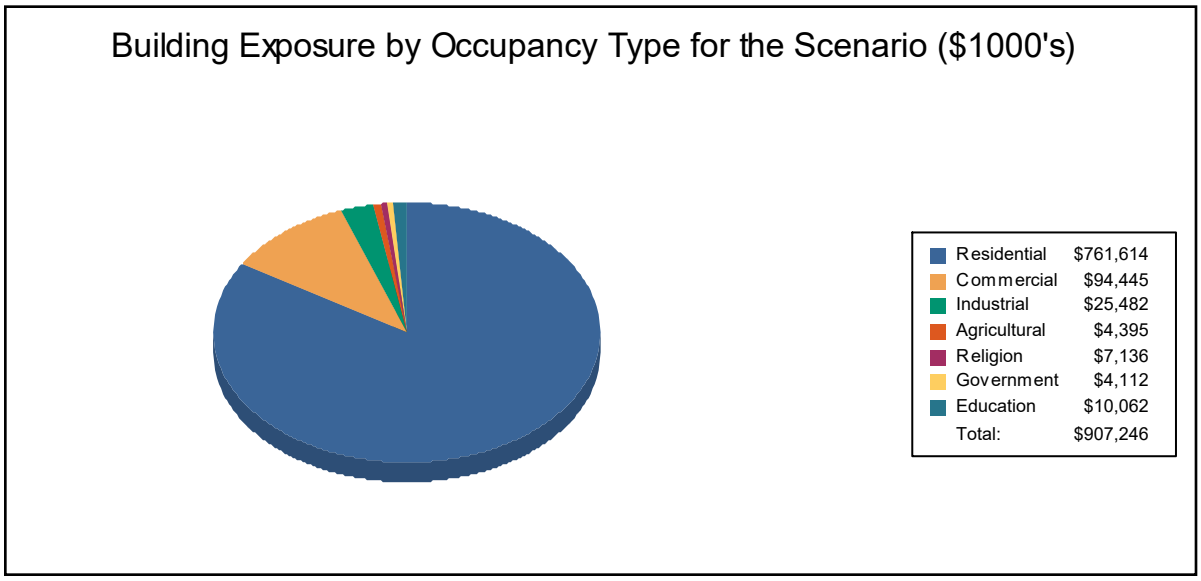


Table 2
Building Exposure by Occupancy Type for the Scenario

Occupancy	Exposure ($1000)	Percent of Total
Residential	761,614	83.9%
Commercial	94,445	10.4%
Industrial	25,482	2.8%
Agricultural	4,395	0.5%
Religion	7,136	0.8%
Government	4,112	0.5%
Education	10,062	1.1%
Total	**907,246**	**100%**



Essential Facility Inventory

For essential facilities, there are no hospitals in the region with a total bed capacity of no beds.
There are 6 schools, 3 fire stations, 1 police station and 1 emergency operation center.

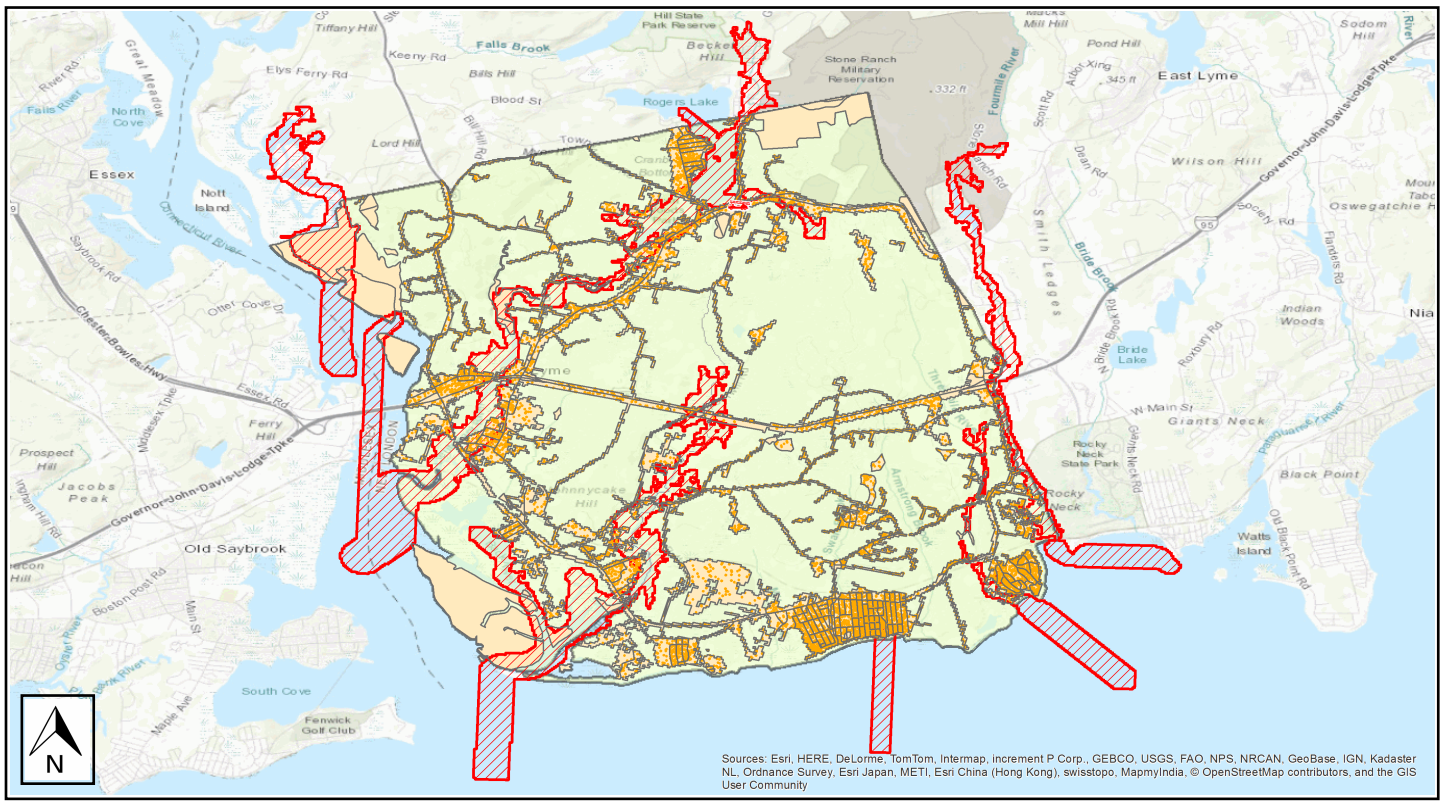
Flood Scenario Parameters

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

Study Region Name:	OldLyme
Scenario Name:	OlyLymeRivering
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 6 buildings will be at least moderately damaged. This is over 66% 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

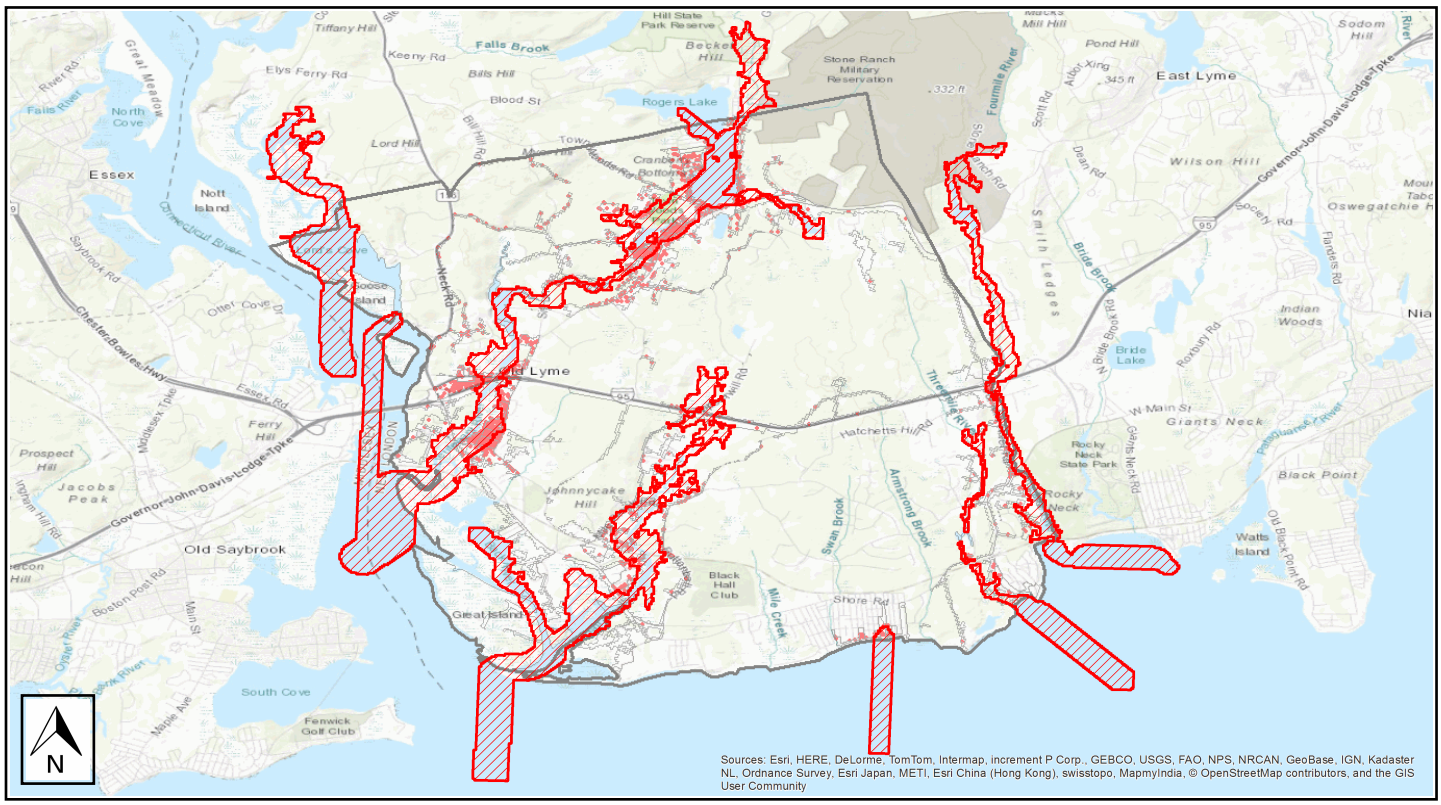


Table 3: Expected Building Damage by Occupancy

	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	131	96	6	4	0	0	0	0	0	0	0	0
Total	**131**		**6**		**0**		**0**		**0**		**0**	

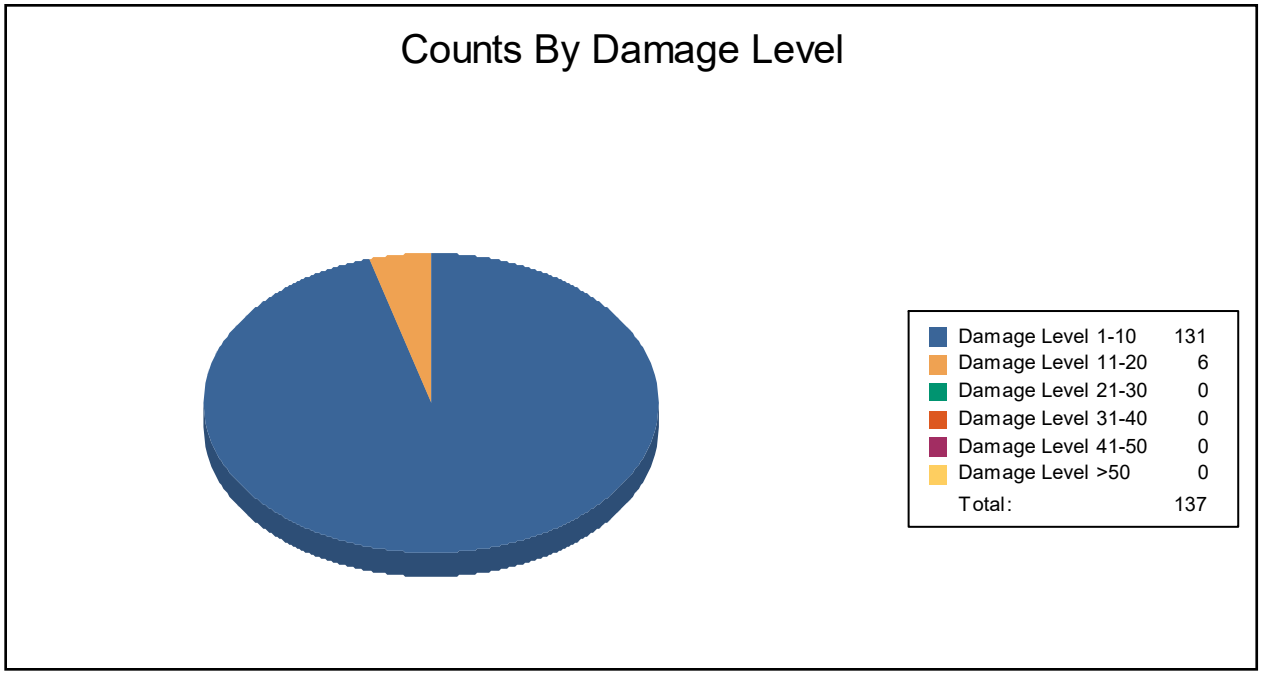


Table 4: Expected Building Damage by Building Type

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	1	100	0	0	0	0	0	0	0	0	0	0
Steel	0	0	0	0	0	0	0	0	0	0	0	0
Wood	130	96	6	4	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	3	0	0	0
Hospitals	0	0	0	0
Police Stations	1	0	0	0
Schools	6	0	0	0

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

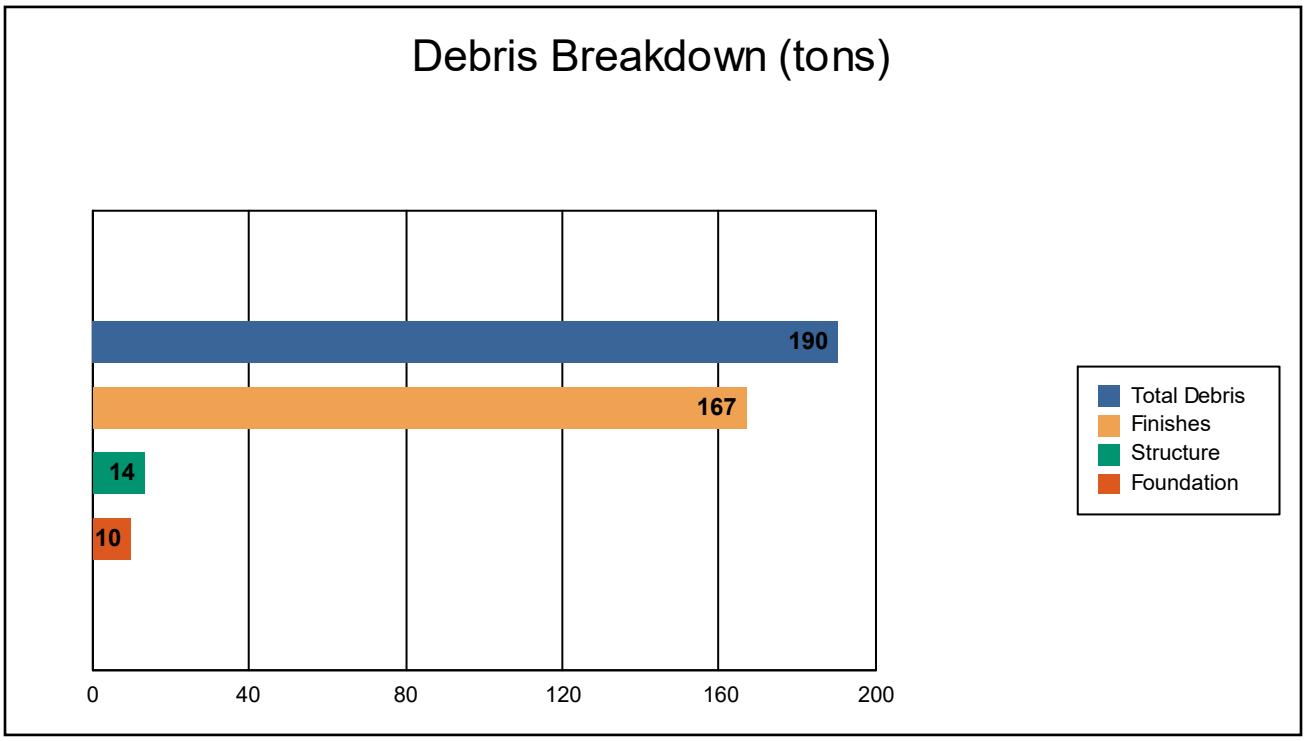
(1) None of your facilities were flooded. This can be checked by mapping the inventory data on the depth grid.

(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.

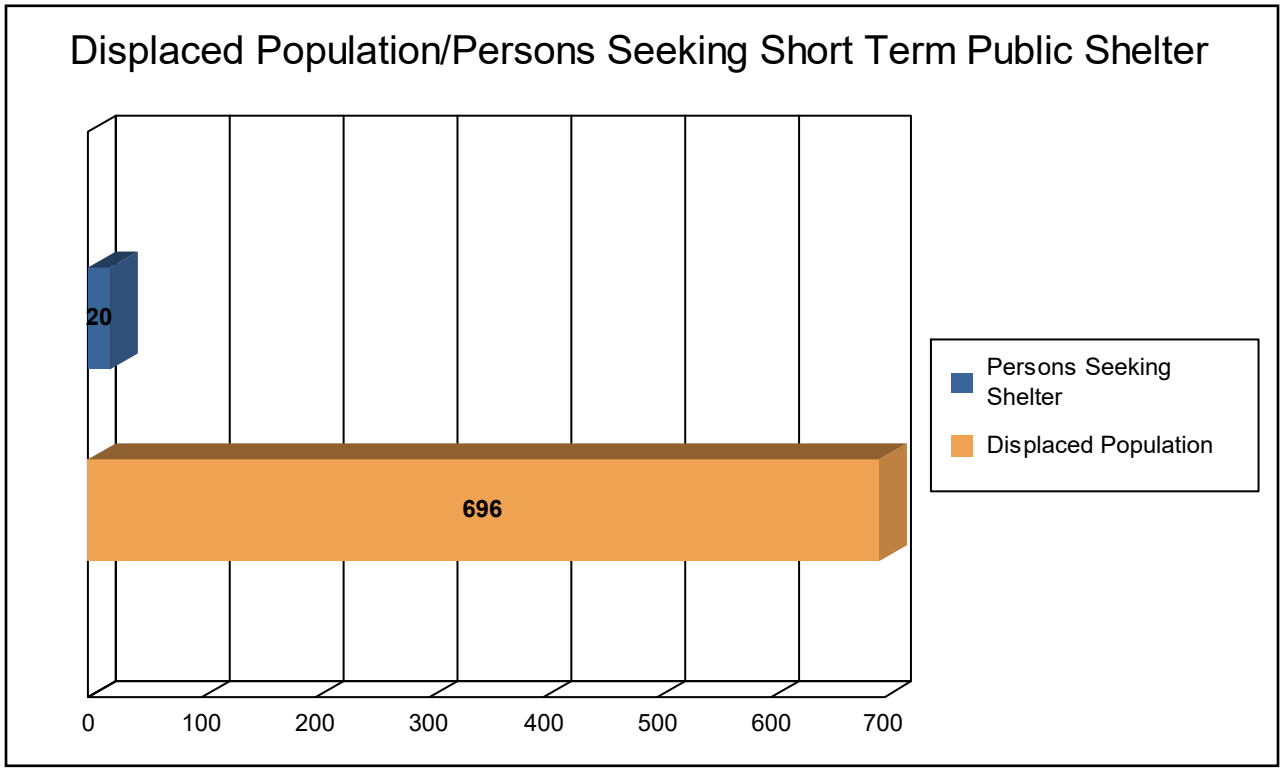


The model estimates that a total of 190 tons of debris will be generated. Of the total amount, Finishes comprises 88% of the total, Structure comprises 7% of the total, and Foundation comprises 5%. If the debris tonnage is converted into an estimated number of truckloads, it will require 8 truckloads (@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 232 households (or 696 of people) will be displaced due to the flood. Displacement includes households evacuated from within or very near to the inundated area. Of these, 20 people (out of a total population of 7,603) will seek temporary shelter in public shelters.



Economic Loss

The total economic loss estimated for the flood is 24.25 million dollars, which represents 2.67 % of the total replacement value of the scenario buildings.

Building-Related Losses

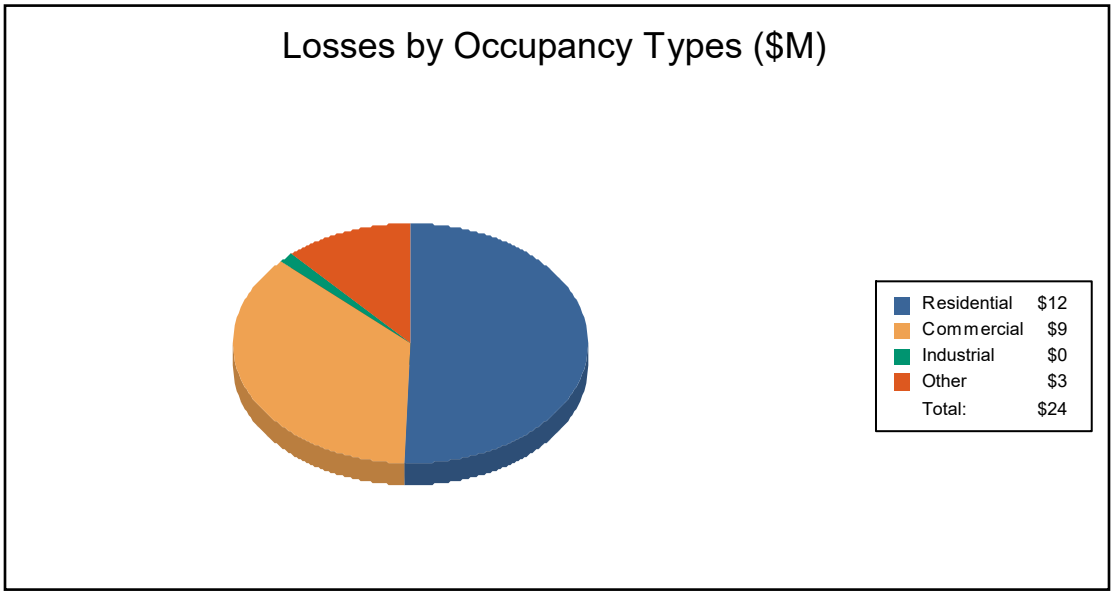
The building losses are broken into two categories: direct building losses and business interruption losses. The direct building losses are the estimated costs to repair or replace the damage caused to the building and its contents. The business interruption losses are the losses associated with inability 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 7.60 million dollars. 69% of the estimated losses were related to the business interruption of the region. The residential occupancies made up 50.45% 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	4.36	0.19	0.10	0.01	4.65
	Content	1.93	0.72	0.10	0.19	2.94
	Inventory	0.00	0.00	0.01	0.00	0.01
	Subtotal	**6.30**	**0.90**	**0.20**	**0.20**	**7.60**
Business Interruption						
	Income	0.02	3.72	0.02	0.55	4.31
	Relocation	4.46	0.67	0.02	0.27	5.43
	Rental Income	1.40	0.48	0.00	0.02	1.91
	Wage	0.06	3.10	0.04	1.81	5.01
	Subtotal	**5.94**	**7.98**	**0.07**	**2.66**	**16.66**
ALL	**Total**	**12.24**	**8.88**	**0.28**	**2.86**	**24.25**



Appendix A: County Listing for the Region

Connecticut

- New London

Appendix B: Regional Population and Building Value Data

	Population	Building Value (thousands of dollars)		
		Residential	Non-Residential	Total
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New London	7,603	1,585,261	286,142	1,871,403
Total	**7,603**	**1,585,261**	**286,142**	**1,871,403**
Total Study Region	**7,603**	**1,585,261**	**286,142**	**1,871,403**

Hazus: Flood Global Risk Report

Region Name: OldLyme

Flood Scenario: OldLymeAllCoastal

Print Date: Tuesday, January 7, 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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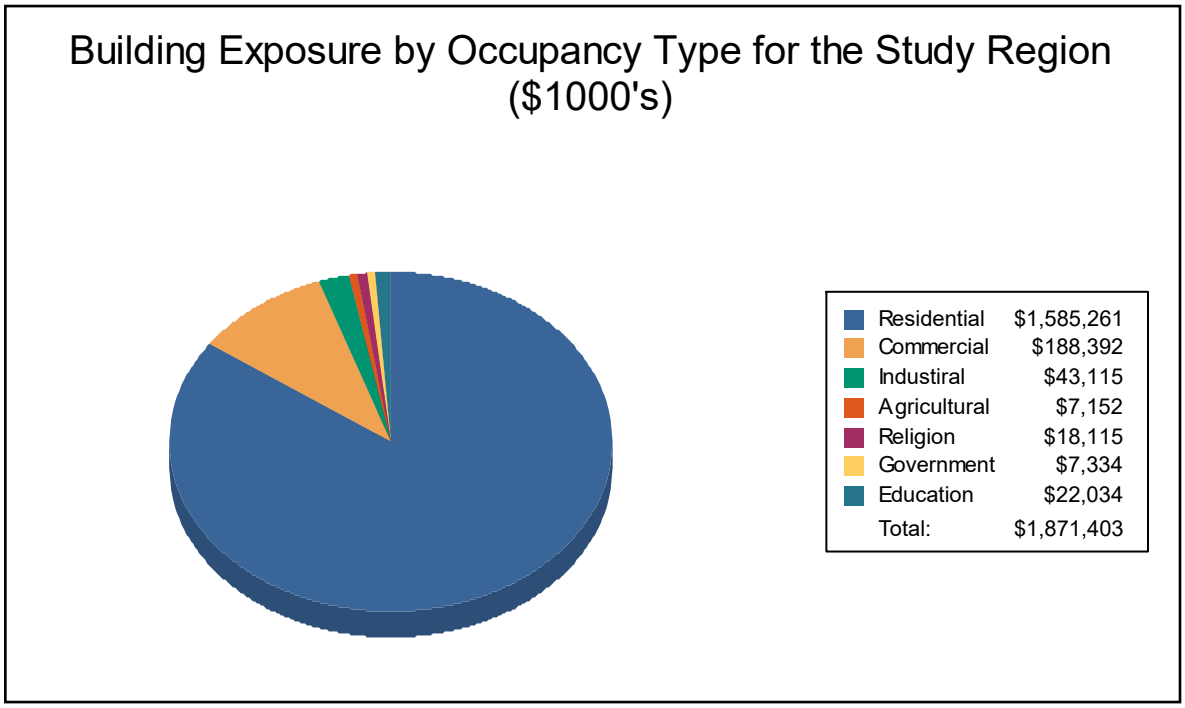

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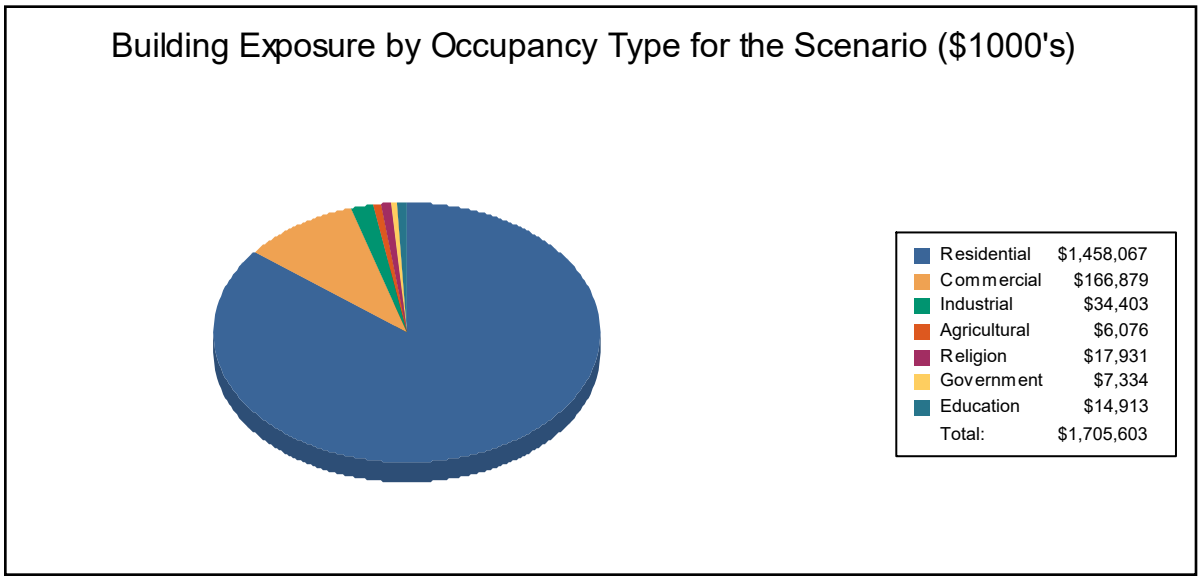
Education	14,913	0.9%
Total	**1,705,603**	**100%**



Essential Facility Inventory

For essential facilities, there are no hospitals in the region with a total bed capacity of no beds.
There are 6 schools, 3 fire stations, 1 police station and 1 emergency operation center.

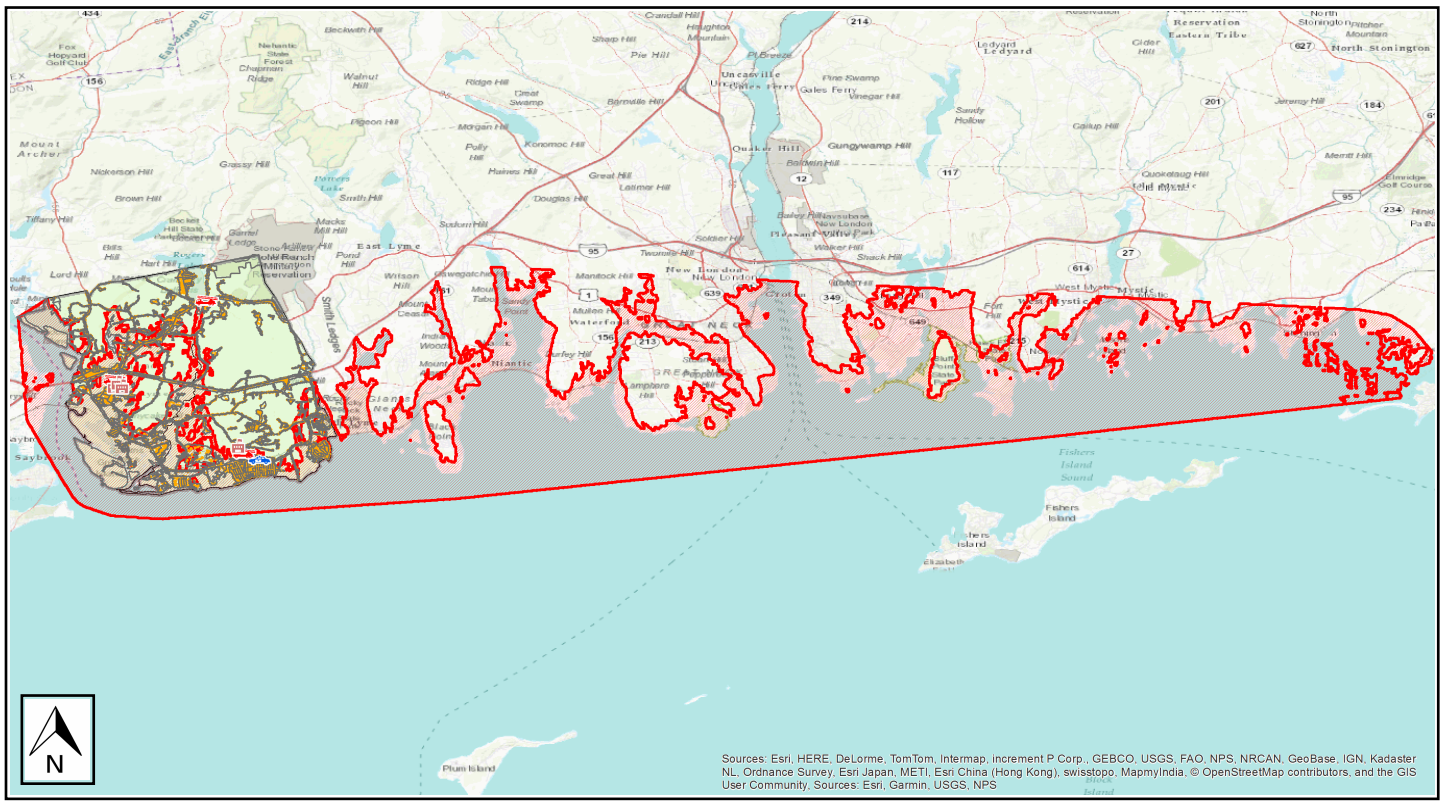
Flood Scenario Parameters

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

Study Region Name:	OldLyme
Scenario Name:	OldLymeAllCoastal
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 56 buildings will be at least moderately damaged. This is over 36% 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

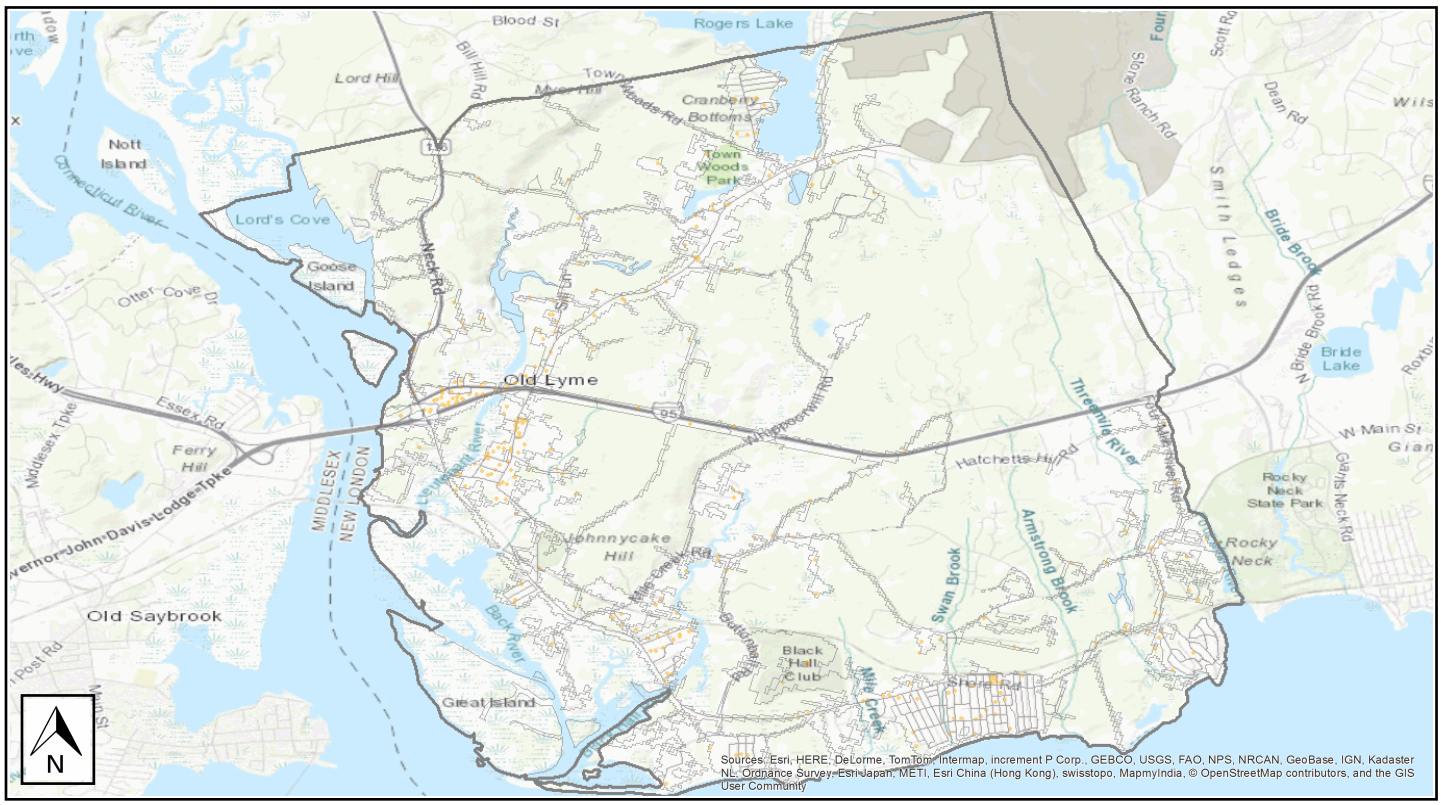


Table 3: Expected Building Damage by Occupancy

	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	1	2	12	21	24	42	17	30	3	5	0	0
Total	**1**		**12**		**24**		**17**		**3**		**0**	

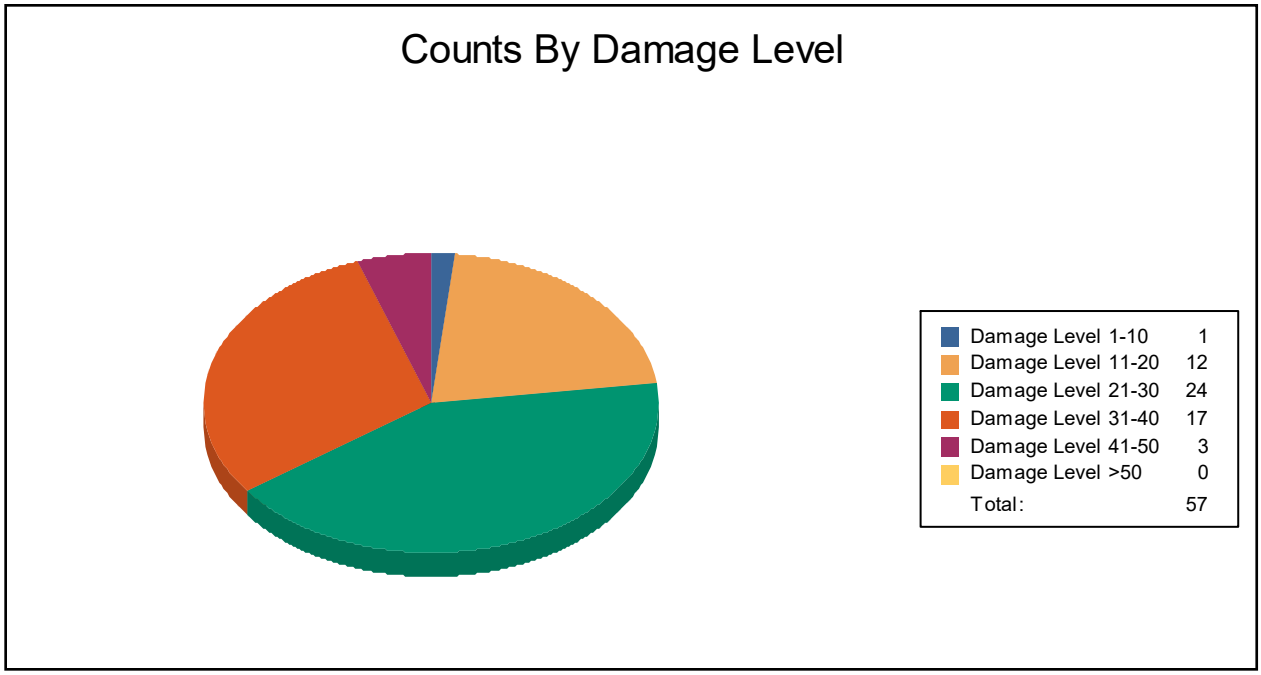


Table 4: Expected Building Damage by Building Type

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	1	2	12	21	24	42	17	30	3	5	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	1	0	1
Fire Stations	3	1	0	1
Hospitals	0	0	0	0
Police Stations	1	1	0	1
Schools	6	2	0	2

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

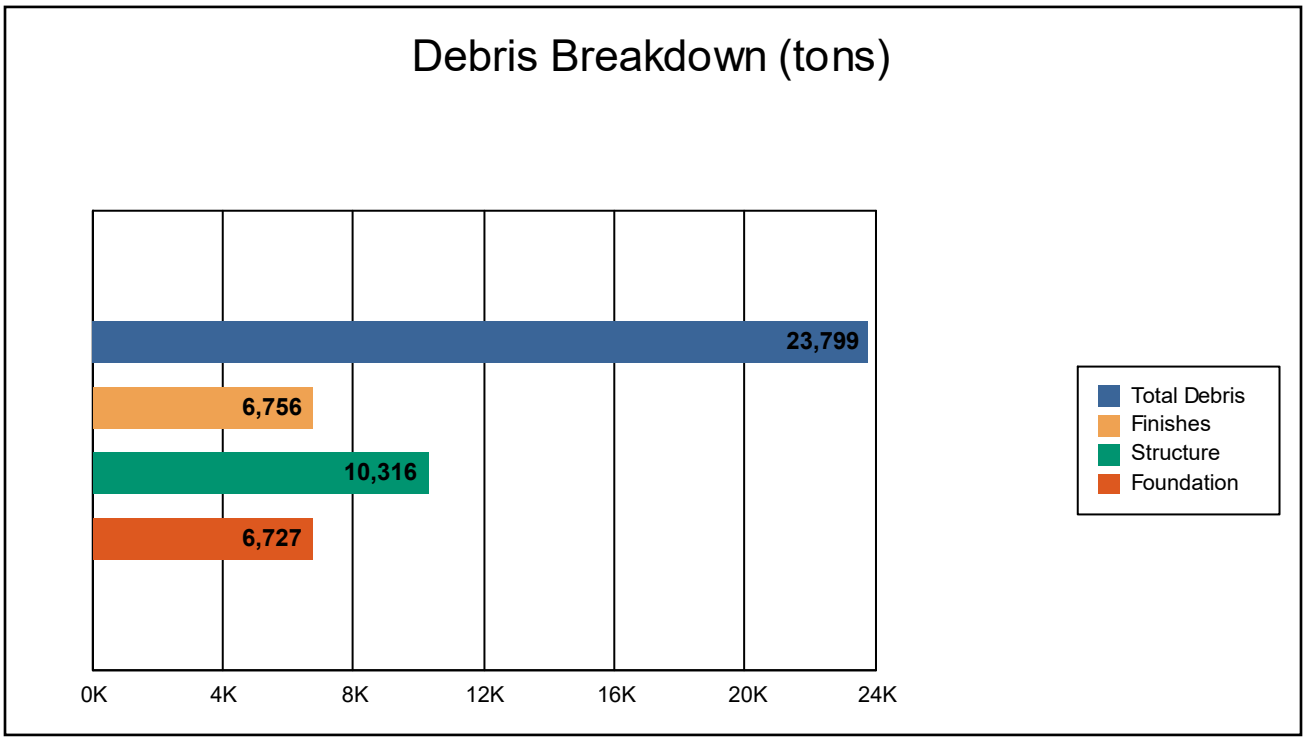
(1) None of your facilities were flooded. This can be checked by mapping the inventory data on the depth grid.

(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.

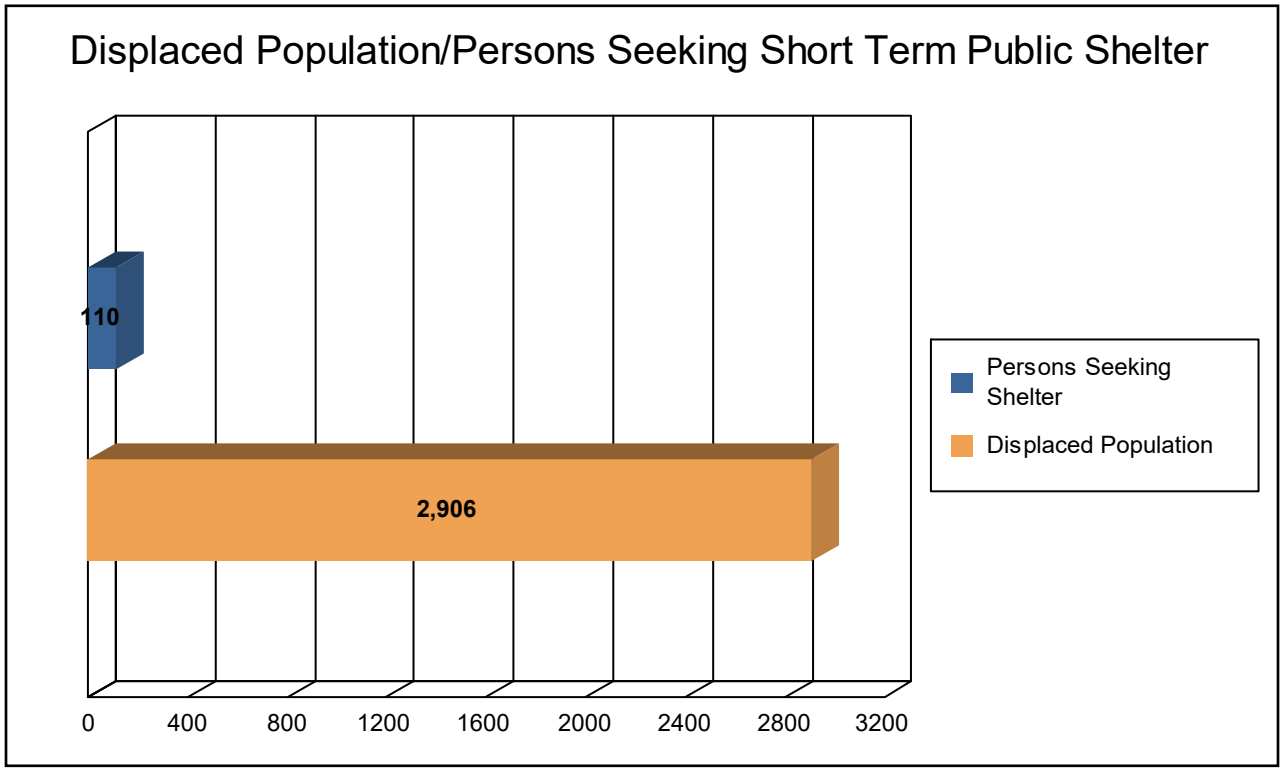


The model estimates that a total of 23,799 tons of debris will be generated. Of the total amount, Finishes comprises 28% of the total, Structure comprises 43% of the total, and Foundation comprises 28%. If the debris tonnage is converted into an estimated number of truckloads, it will require 952 truckloads (@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 969 households (or 2,906 of people) will be displaced due to the flood. Displacement includes households evacuated from within or very near to the inundated area. Of these, 110 people (out of a total population of 7,603) will seek temporary shelter in public shelters.



Economic Loss

The total economic loss estimated for the flood is 89.41 million dollars, which represents 5.24 % of the total replacement value of the scenario buildings.

Building-Related Losses

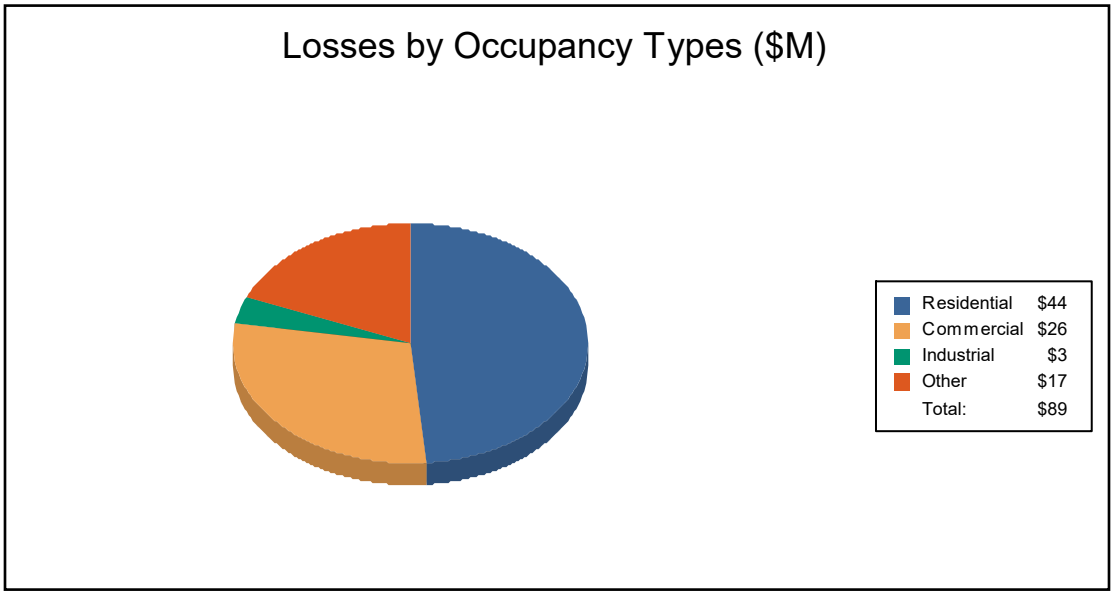
The building losses are broken into two categories: direct building losses and business interruption losses. The direct building losses are the estimated costs to repair or replace the damage caused to the building and its contents. The business interruption losses are the losses associated with inability 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 55.24 million dollars. 38% of the estimated losses were related to the business interruption of the region. The residential occupancies made up 48.70% 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	21.52	2.74	0.84	0.56	25.66
	Content	15.61	8.26	1.89	3.46	29.22
	Inventory	0.00	0.08	0.24	0.04	0.36
	Subtotal	**37.13**	**11.08**	**2.97**	**4.06**	**55.24**
Business Interruption						
	Income	0.00	6.95	0.04	0.96	7.95
	Relocation	4.93	1.17	0.03	0.44	6.56
	Rental Income	1.49	0.86	0.00	0.05	2.40
	Wage	0.00	6.00	0.07	11.19	17.26
	Subtotal	**6.41**	**14.98**	**0.13**	**12.64**	**34.16**
ALL	**Total**	**43.54**	**26.06**	**3.10**	**16.71**	**89.41**



Appendix A: County Listing for the Region

Connecticut

- New London

Appendix B: Regional Population and Building Value Data

	Population	Building Value (thousands of dollars)		
		Residential	Non-Residential	Total
Connecticut				
New London	7,603	1,585,261	286,142	1,871,403
Total	**7,603**	**1,585,261**	**286,142**	**1,871,403**
Total Study Region	**7,603**	**1,585,261**	**286,142**	**1,871,403**

Hazus-MH: Flood Global Risk Report

Region Name: OldLyme

Flood Scenario: OlyLymeRivering

Print Date: Friday, April 17, 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 24 square miles and contains 367 census blocks. The region contains over 3 thousand households and has a total population of 7,603 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 5,155 buildings in the region with a total building replacement value (excluding contents) of 1,871 million dollars. Approximately 91.85% of the buildings (and 84.71% of the building value) are associated with residential housing.

Building Inventory

General Building Stock

Hazus estimates that there are 5,155 buildings in the region which have an aggregate total replacement value of 1,871 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	1,585,261	84.7%
Commercial	188,392	10.1%
Industrial	43,115	2.3%
Agricultural	7,152	0.4%
Religion	18,115	1.0%
Government	7,334	0.4%
Education	22,034	1.2%
Total	**1,871,403**	**100%**

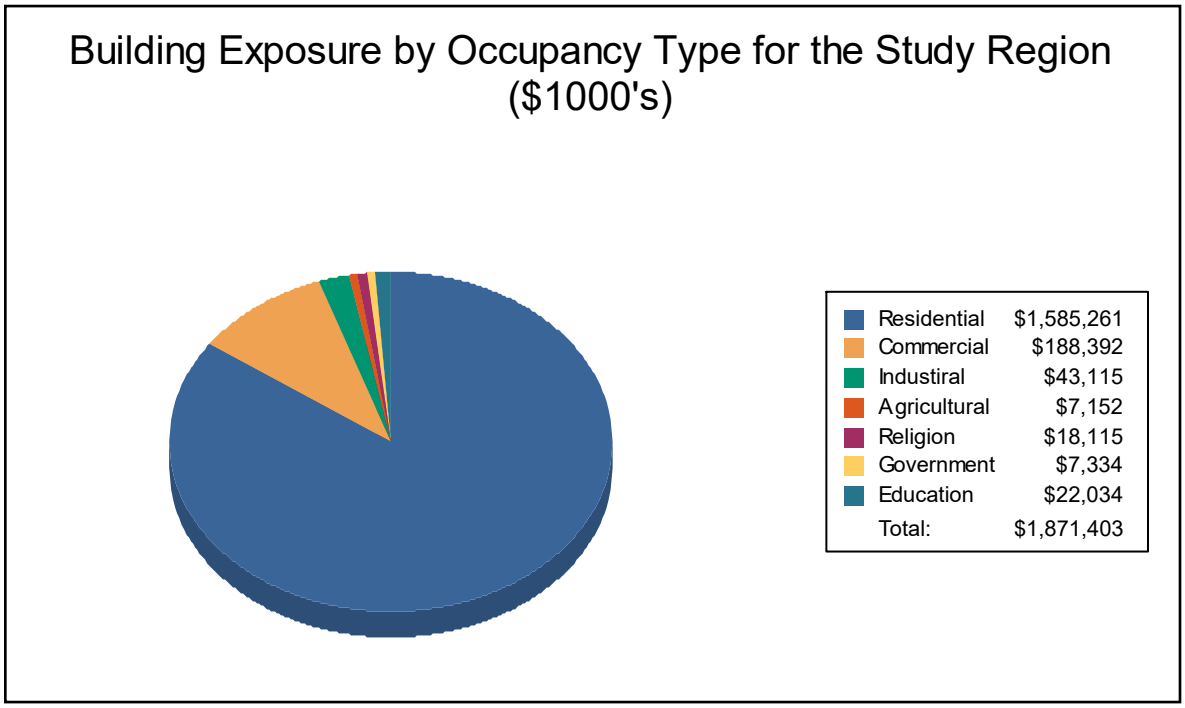
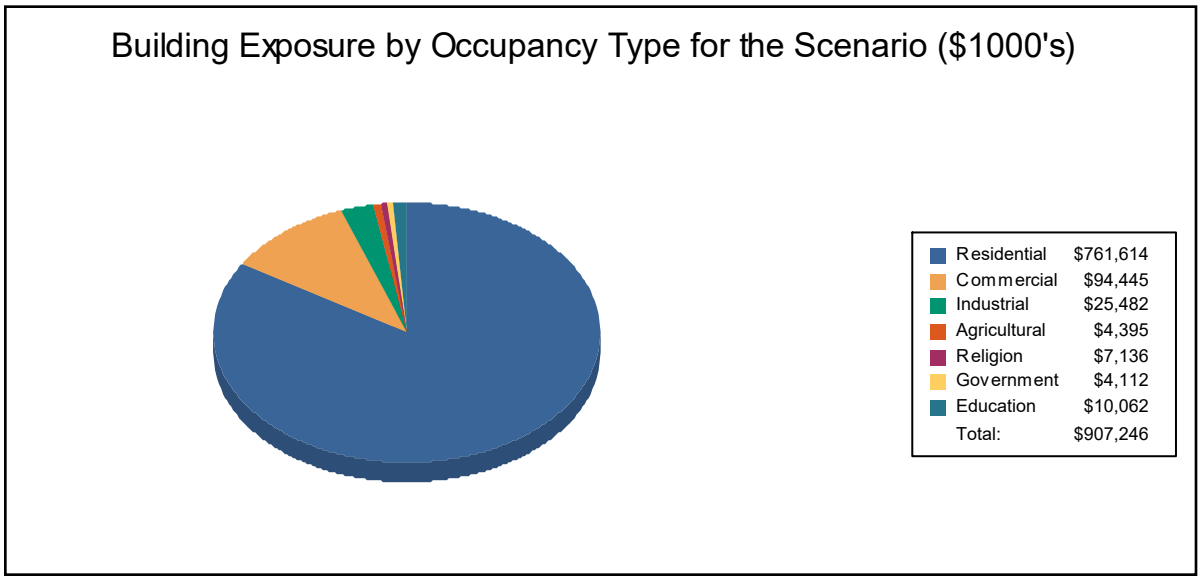


Table 2
Building Exposure by Occupancy Type for the Scenario

Occupancy	Exposure ($1000)	Percent of Total
Residential	761,614	83.9%
Commercial	94,445	10.4%
Industrial	25,482	2.8%
Agricultural	4,395	0.5%
Religion	7,136	0.8%
Government	4,112	0.5%
Education	10,062	1.1%
Total	**907,246**	**100%**



Essential Facility Inventory

For essential facilities, there are no hospitals in the region with a total bed capacity of no beds.
There are 6 schools, 3 fire stations, 1 police station and 1 emergency operation center.

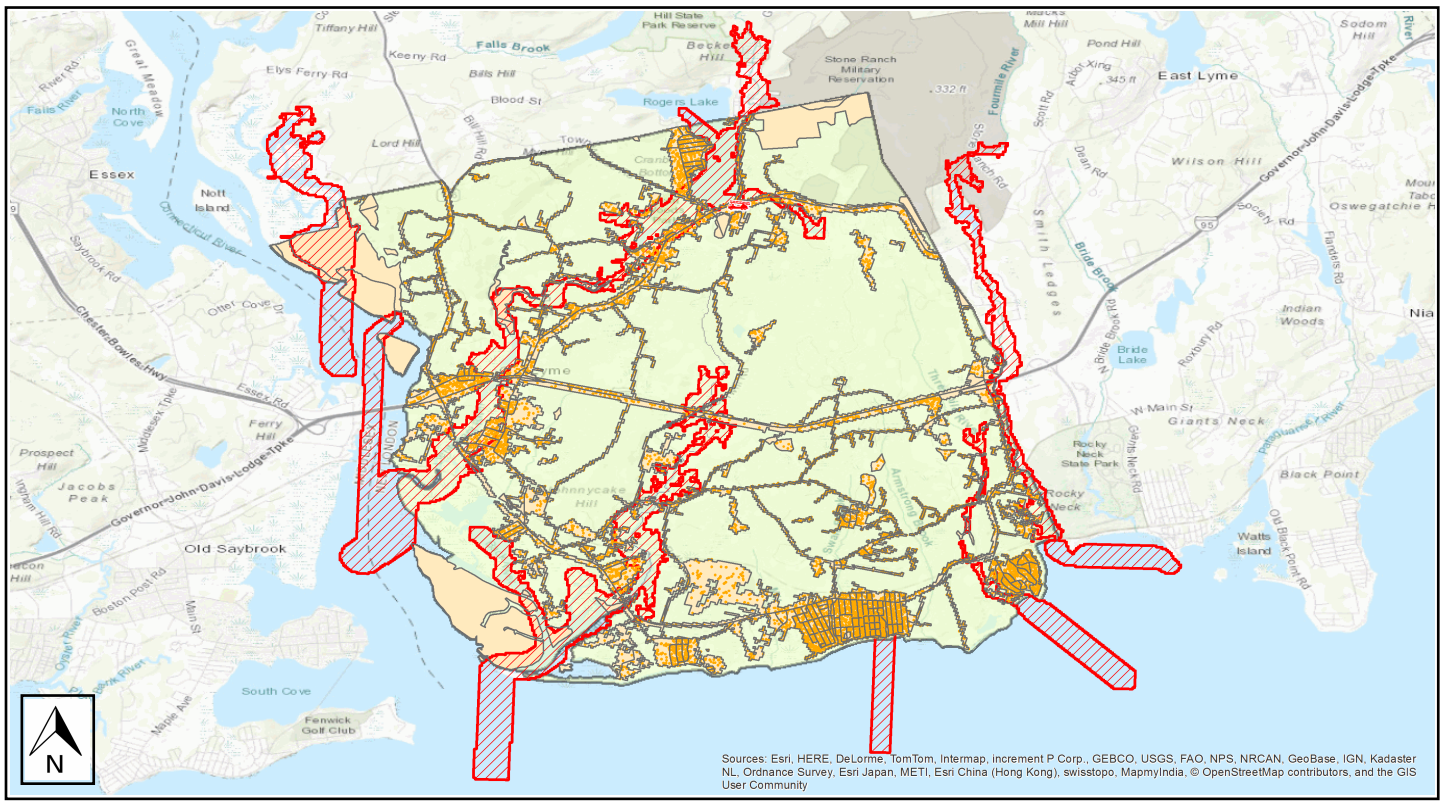
Flood Scenario Parameters

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

Study Region Name:	OldLyme
Scenario Name:	OlyLymeRivering
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 9 buildings will be at least moderately damaged. This is over 70% 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

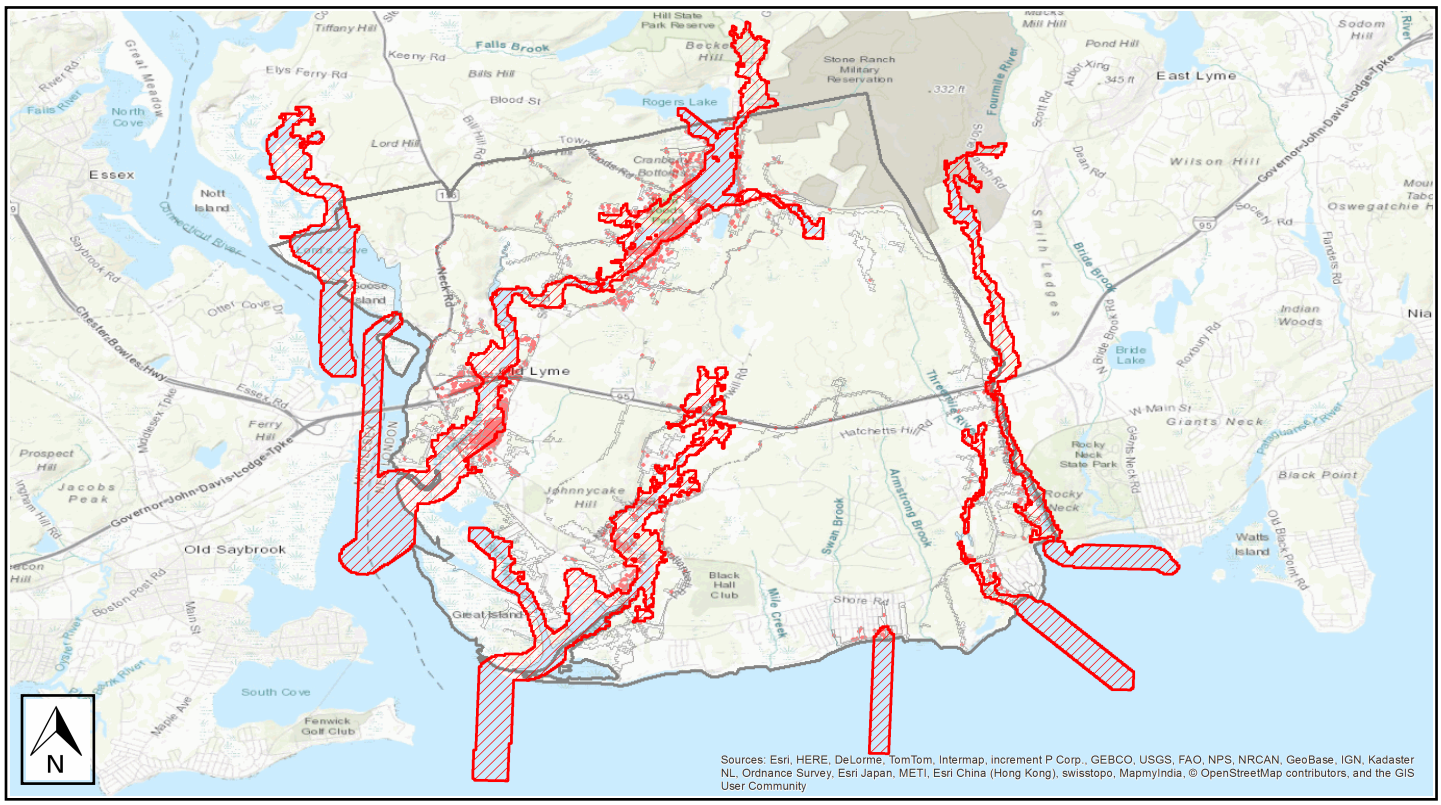


Table 3: Expected Building Damage by Occupancy

	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	146	94	9	6	0	0	0	0	0	0	0	0
Total	**146**		**9**		**0**		**0**		**0**		**0**	

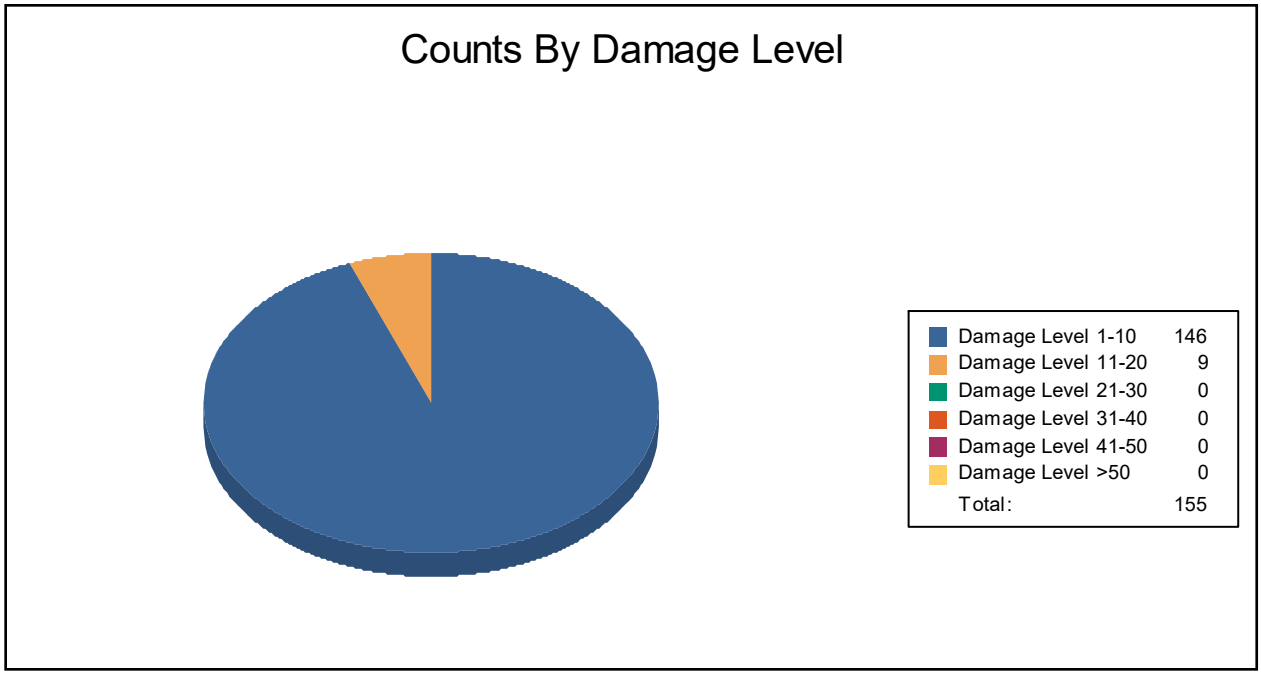


Table 4: Expected Building Damage by Building Type

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	2	100	0	0	0	0	0	0	0	0	0	0
Steel	0	0	0	0	0	0	0	0	0	0	0	0
Wood	144	94	9	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	3	0	0	0
Hospitals	0	0	0	0
Police Stations	1	0	0	0
Schools	6	0	0	0

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

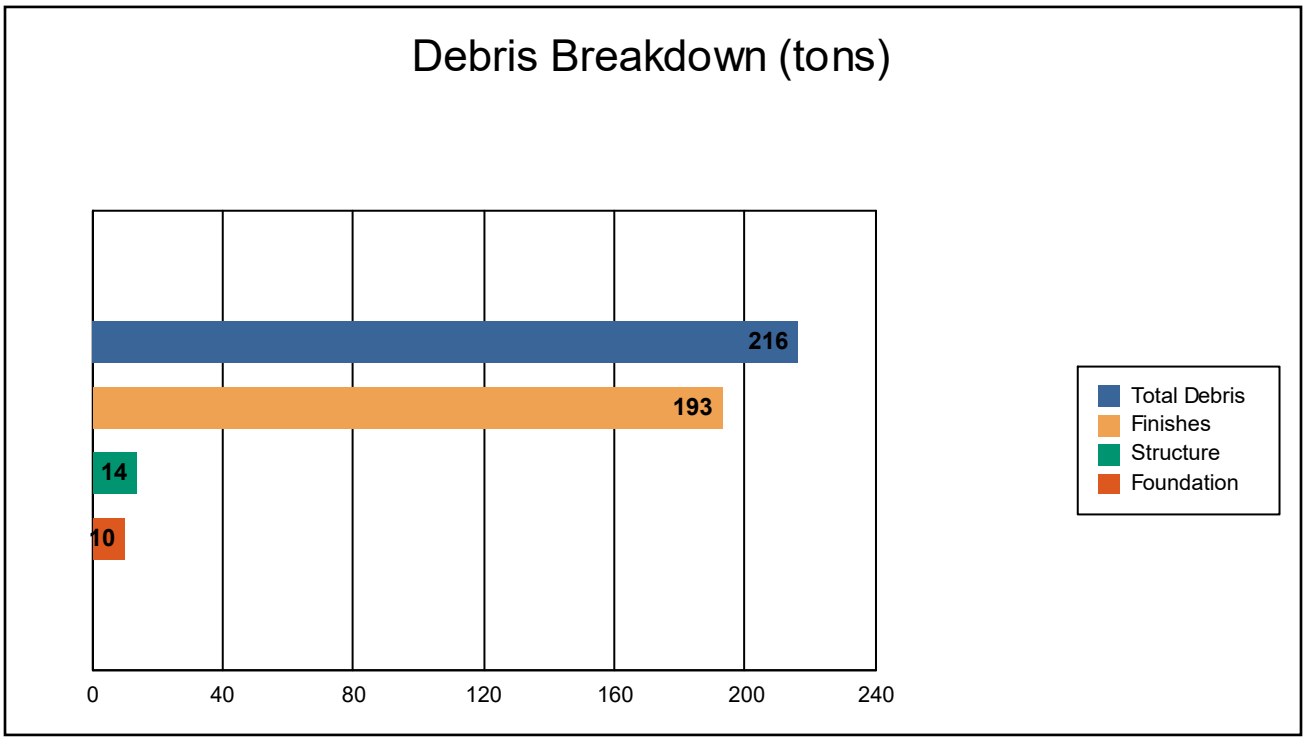
(1) None of your facilities were flooded. This can be checked by mapping the inventory data on the depth grid.

(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.

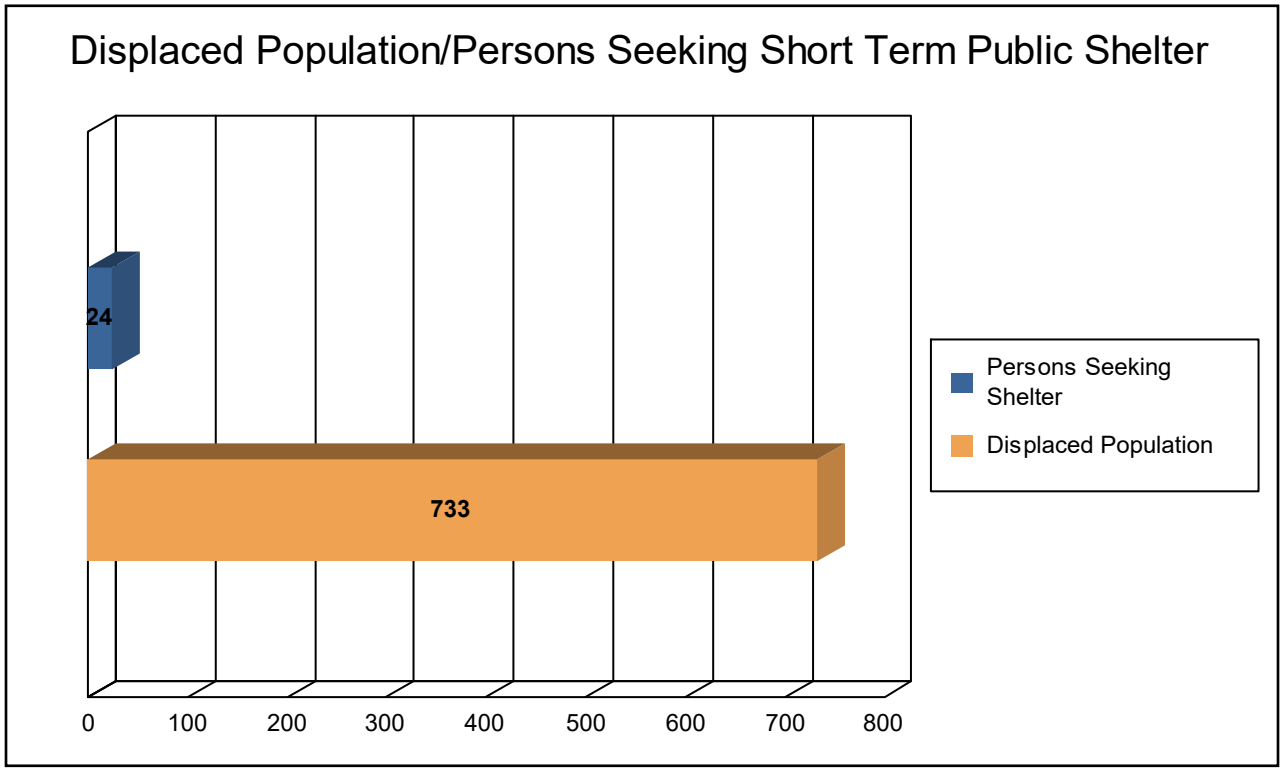


The model estimates that a total of 216 tons of debris will be generated. Of the total amount, Finishes comprises 89% of the total, Structure comprises 6% of the total, and Foundation comprises 4%. If the debris tonnage is converted into an estimated number of truckloads, it will require 9 truckloads (@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 733 of people) will be displaced due to the flood. Displacement includes households evacuated from within or very near to the inundated area. Of these, 24 people (out of a total population of 7,603) will seek temporary shelter in public shelters.



Economic Loss

The total economic loss estimated for the flood is 27.25 million dollars, which represents 3.00 % of the total replacement value of the scenario buildings.

Building-Related Losses

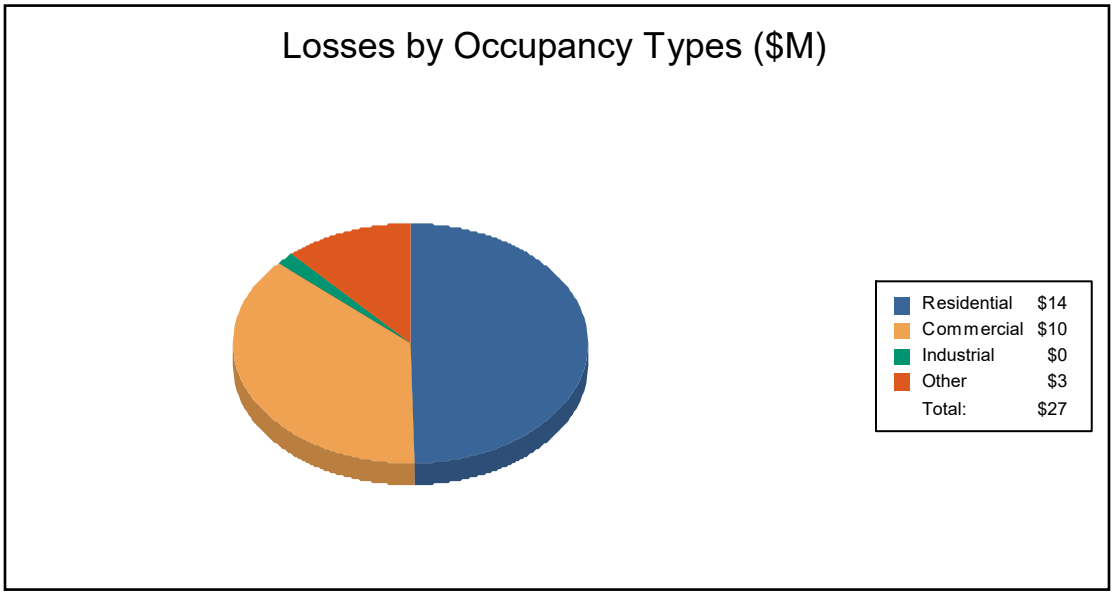
The building losses are broken into two categories: direct building losses and business interruption losses. The direct building losses are the estimated costs to repair or replace the damage caused to the building and its contents. The business interruption losses are the losses associated with inability 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 9.51 million dollars. 65% of the estimated losses were related to the business interruption of the region. The residential occupancies made up 49.83% 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	5.06	0.31	0.16	0.03	5.55
	Content	2.28	1.15	0.18	0.32	3.93
	Inventory	0.00	0.00	0.02	0.00	0.03
	Subtotal	**7.34**	**1.46**	**0.36**	**0.35**	**9.51**
Business Interruption						
	Income	0.02	3.96	0.02	0.59	4.59
	Relocation	4.68	0.74	0.03	0.30	5.75
	Rental Income	1.47	0.54	0.00	0.03	2.04
	Wage	0.06	3.36	0.04	1.90	5.36
	Subtotal	**6.24**	**8.60**	**0.08**	**2.82**	**17.74**
ALL	**Total**	**13.58**	**10.05**	**0.45**	**3.17**	**27.25**



Appendix A: County Listing for the Region

Connecticut

- New London

Appendix B: Regional Population and Building Value Data

	Population	Building Value (thousands of dollars)		
		Residential	Non-Residential	Total
Connecticut				
New London	7,603	1,585,261	286,142	1,871,403
Total	**7,603**	**1,585,261**	**286,142**	**1,871,403**
Total Study Region	**7,603**	**1,585,261**	**286,142**	**1,871,403**

Hazus: Flood Global Risk Report

Region Name: OldLyme

Flood Scenario: OldLymeAllCoastal

Print Date: Tuesday, January 7, 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

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Agricultural	7,152	0.4%
Religion	18,115	1.0%
Government	7,334	0.4%
Education	22,034	1.2%
Total	**1,871,403**	**100%**

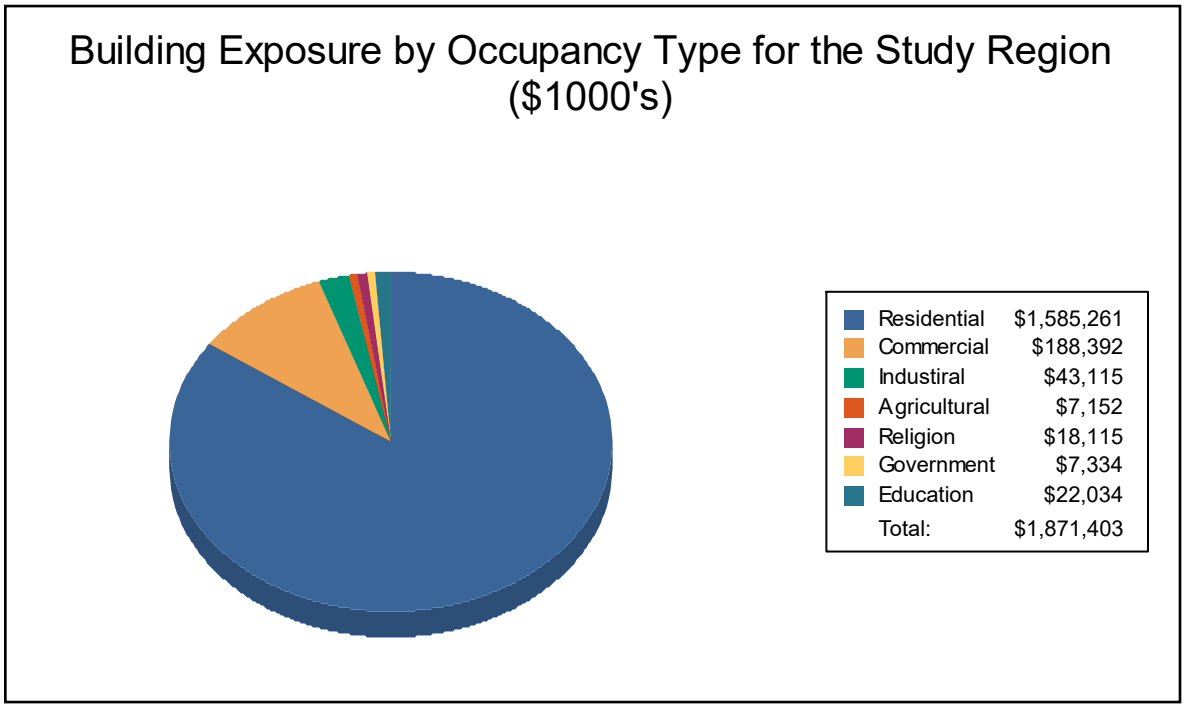
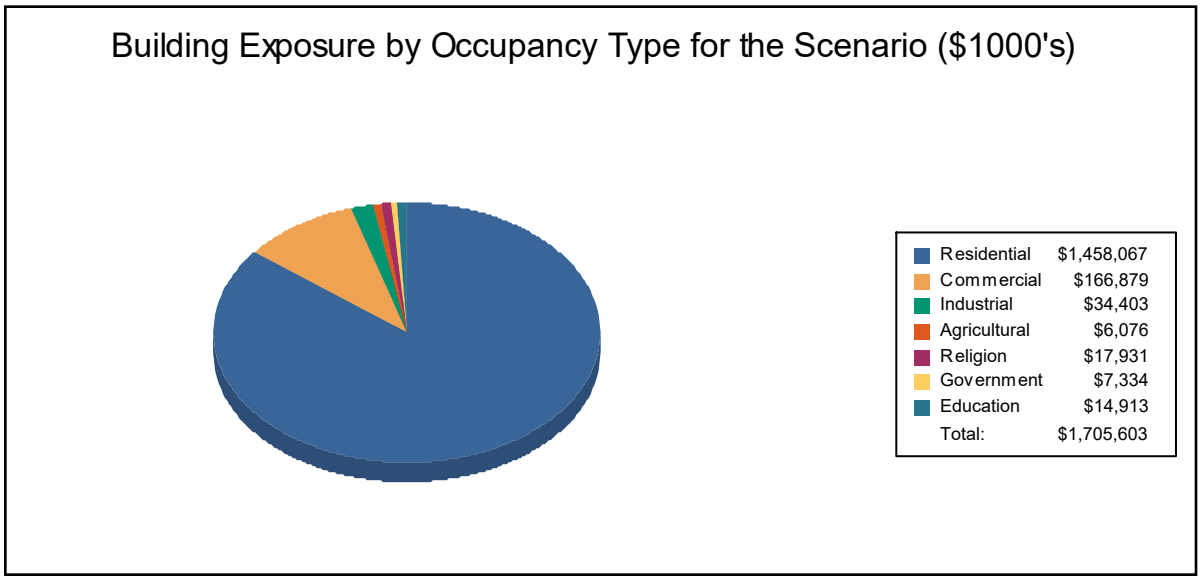


Table 2
Building Exposure by Occupancy Type for the Scenario

Occupancy	Exposure ($1000)	Percent of Total
Residential	1,458,067	85.5%
Commercial	166,879	9.8%
Industrial	34,403	2.0%
Agricultural	6,076	0.4%
Religion	17,931	1.1%
Government	7,334	0.4%
Education	14,913	0.9%
Total	**1,705,603**	**100%**



Essential Facility Inventory

For essential facilities, there are no hospitals in the region with a total bed capacity of no beds.
There are 6 schools, 3 fire stations, 1 police station and 1 emergency operation center.

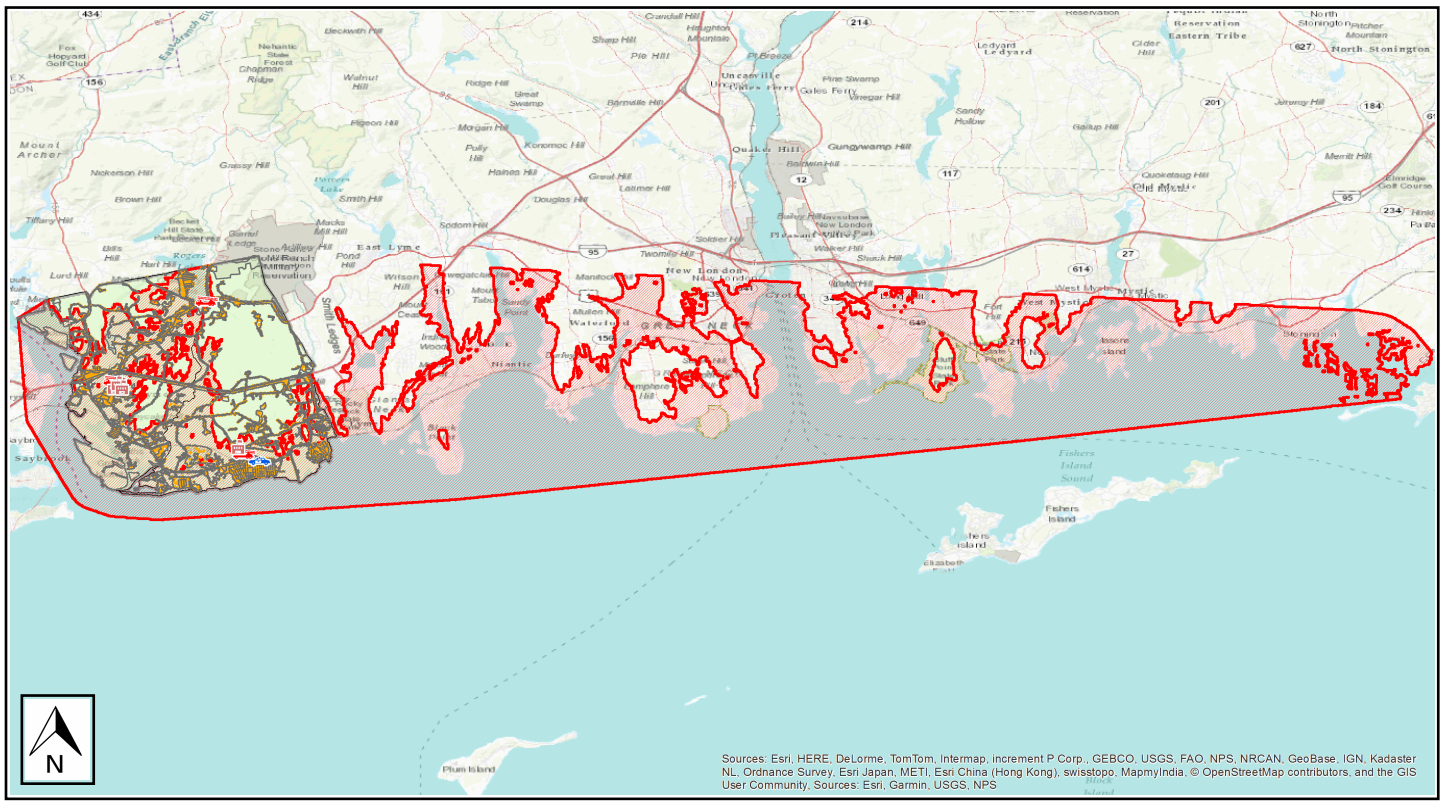
Flood Scenario Parameters

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

Study Region Name:	OldLyme
Scenario Name:	OldLymeAllCoastal
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 123 buildings will be at least moderately damaged. This is over 42% of the total number of buildings in the scenario. There are an estimated 20 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

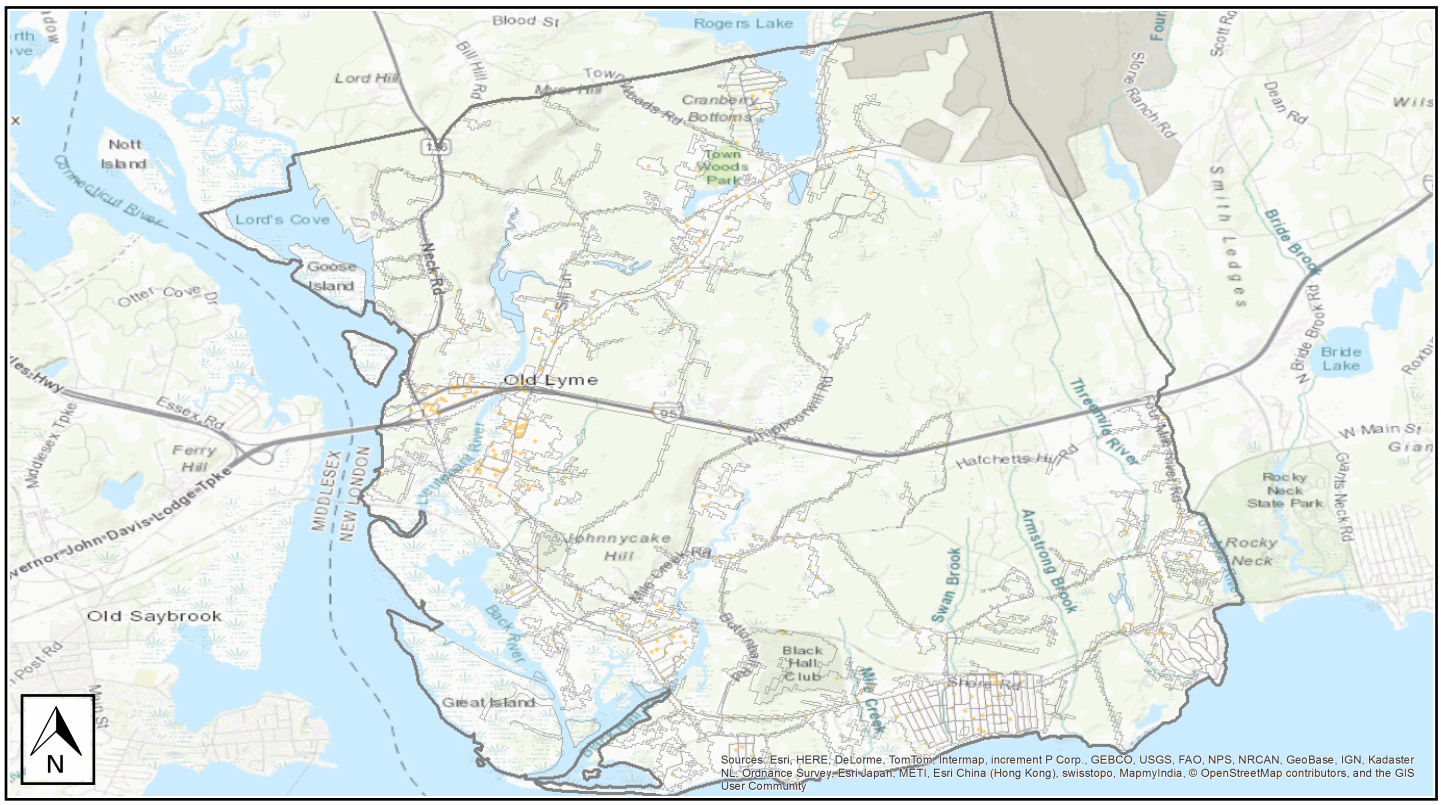


Table 3: Expected Building Damage by Occupancy

	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	0	0	26	21	40	33	34	28	3	2	20	16
Total	**0**		**26**		**40**		**34**		**3**		**20**	

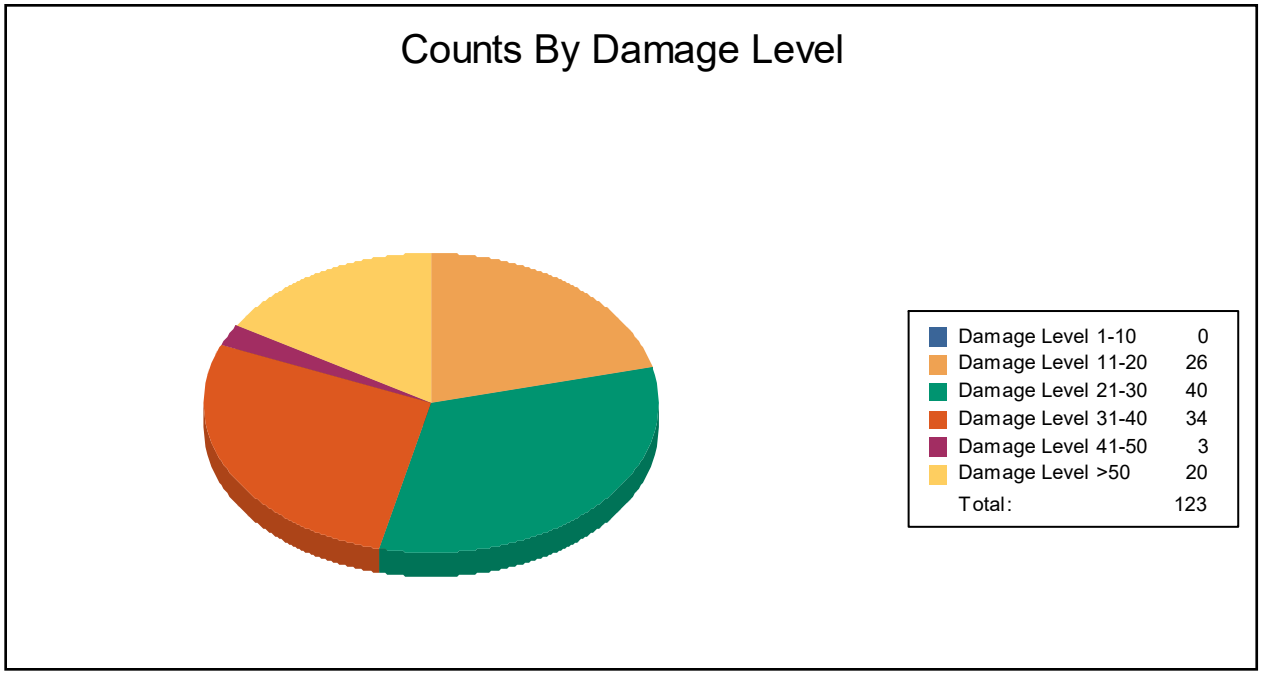


Table 4: Expected Building Damage by Building Type

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	0	0	26	21	40	33	34	28	3	2	20	16

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	3	3	0	3
Hospitals	0	0	0	0
Police Stations	1	1	0	1
Schools	6	4	0	4

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

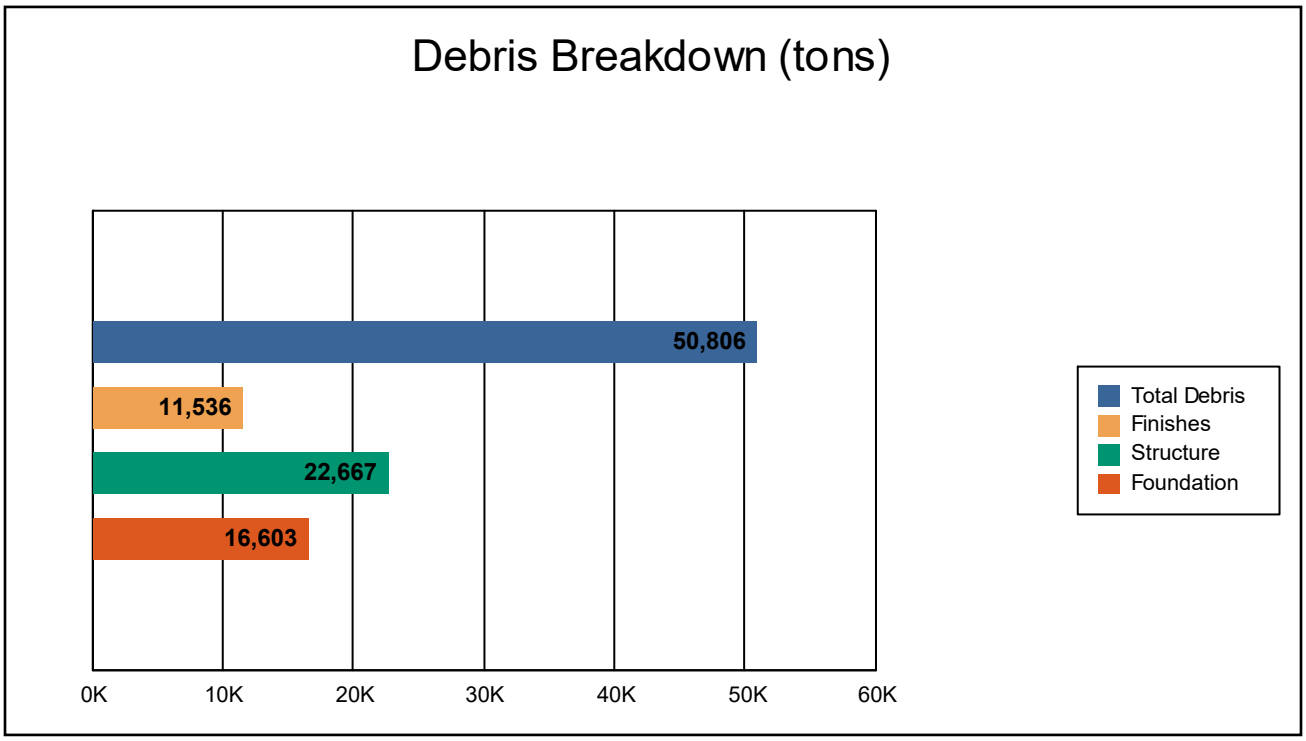
(1) None of your facilities were flooded. This can be checked by mapping the inventory data on the depth grid.

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

Induced Flood Damage

Debris Generation

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

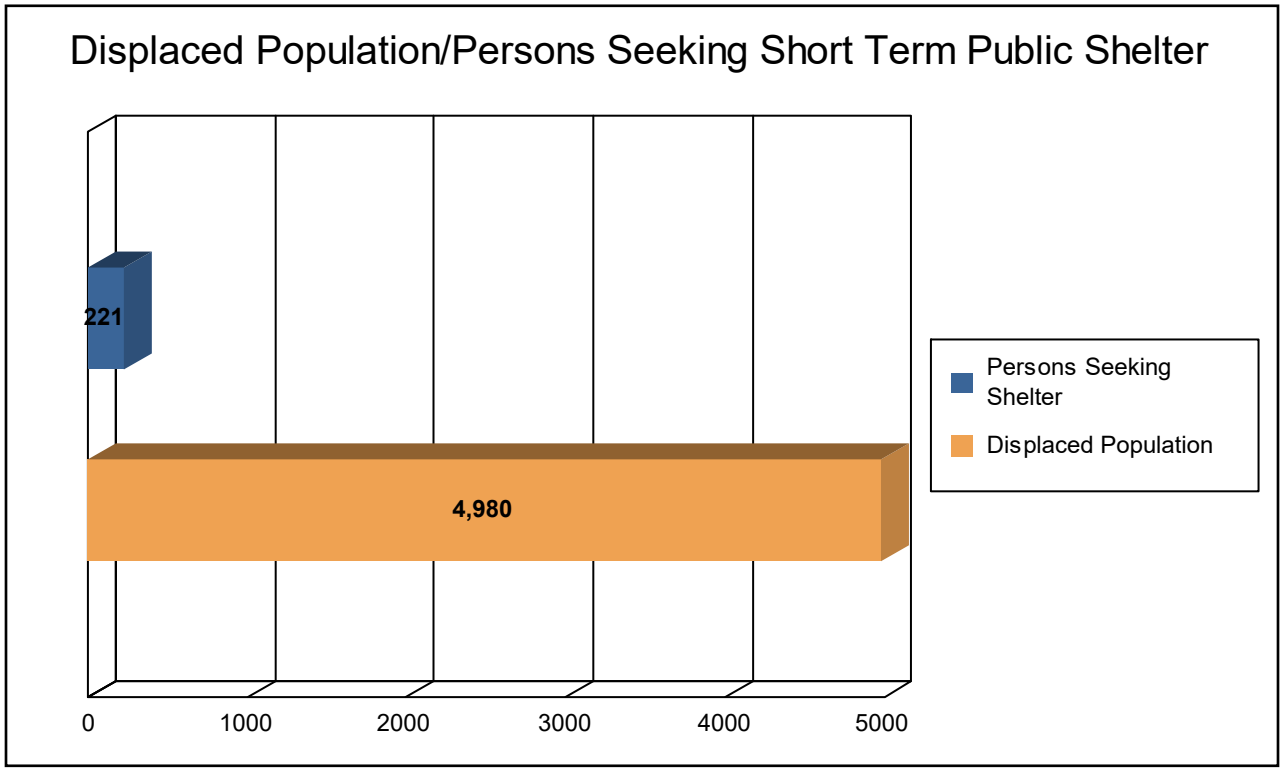


The model estimates that a total of 50,806 tons of debris will be generated. Of the total amount, Finishes comprises 23% of the total, Structure comprises 45% of the total, and Foundation comprises 33%. If the debris tonnage is converted into an estimated number of truckloads, it will require 2033 truckloads (@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 1,660 households (or 4,980 of people) will be displaced due to the flood. Displacement includes households evacuated from within or very near to the inundated area. Of these, 221 people (out of a total population of 7,603) will seek temporary shelter in public shelters.



Economic Loss

The total economic loss estimated for the flood is 162.19 million dollars, which represents 9.51 % of the total replacement value of the scenario buildings.

Building-Related Losses

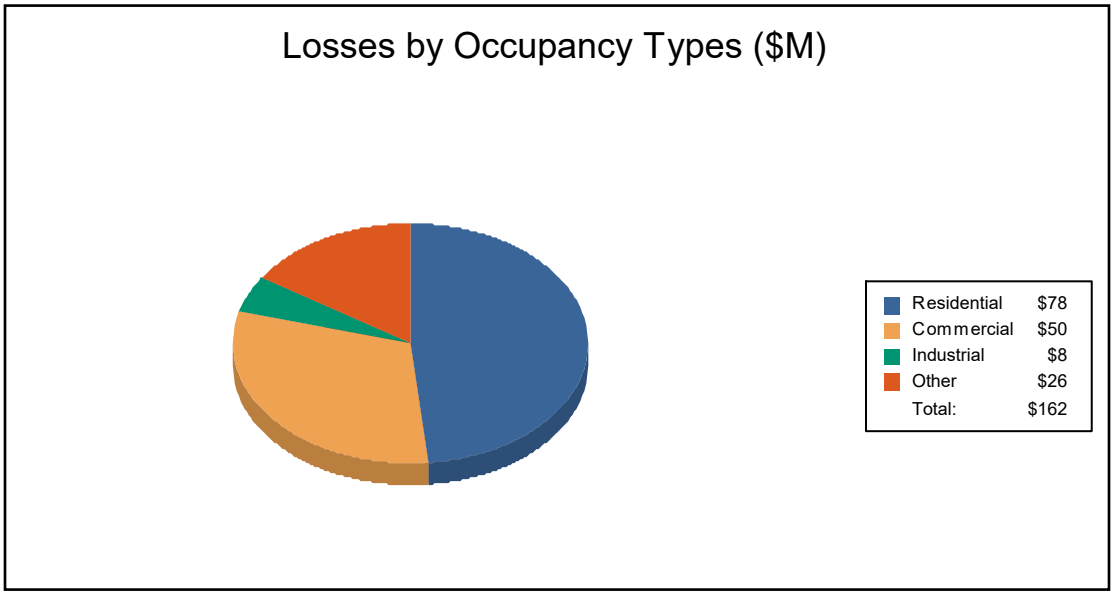
The building losses are broken into two categories: direct building losses and business interruption losses. The direct building losses are the estimated costs to repair or replace the damage caused to the building and its contents. The business interruption losses are the losses associated with inability 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 109.83 million dollars. 32% of the estimated losses were related to the business interruption of the region. The residential occupancies made up 48.36% 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	42.16	7.39	2.42	1.39	53.36
	Content	26.68	18.13	4.82	5.93	55.56
	Inventory	0.00	0.24	0.61	0.06	0.91
	Subtotal	**68.84**	**25.76**	**7.85**	**7.38**	**109.83**
Business Interruption						
	Income	0.02	11.03	0.07	1.25	12.38
	Relocation	7.28	1.84	0.05	0.44	9.60
	Rental Income	2.24	1.36	0.01	0.04	3.65
	Wage	0.05	10.14	0.11	16.44	26.74
	Subtotal	**9.59**	**24.37**	**0.24**	**18.16**	**52.36**
ALL	**Total**	**78.43**	**50.13**	**8.09**	**25.54**	**162.19**



Appendix A: County Listing for the Region

Connecticut

- New London

Appendix B: Regional Population and Building Value Data

	Population	Building Value (thousands of dollars)		
		Residential	Non-Residential	Total
Connecticut				
New London	7,603	1,585,261	286,142	1,871,403
Total	**7,603**	**1,585,261**	**286,142**	**1,871,403**
Total Study Region	**7,603**	**1,585,261**	**286,142**	**1,871,403**

Hazus-MH: Flood Global Risk Report

Region Name: OldLyme

Flood Scenario: OlyLymeRivering

Print Date: Friday, April 17, 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
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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 24 square miles and contains 367 census blocks. The region contains over 3 thousand households and has a total population of 7,603 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 5,155 buildings in the region with a total building replacement value (excluding contents) of 1,871 million dollars. Approximately 91.85% of the buildings (and 84.71% of the building value) are associated with residential housing.

Building Inventory

General Building Stock

Hazus estimates that there are 5,155 buildings in the region which have an aggregate total replacement value of 1,871 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	1,585,261	84.7%
Commercial	188,392	10.1%
Industrial	43,115	2.3%
Agricultural	7,152	0.4%
Religion	18,115	1.0%
Government	7,334	0.4%
Education	22,034	1.2%
Total	**1,871,403**	**100%**

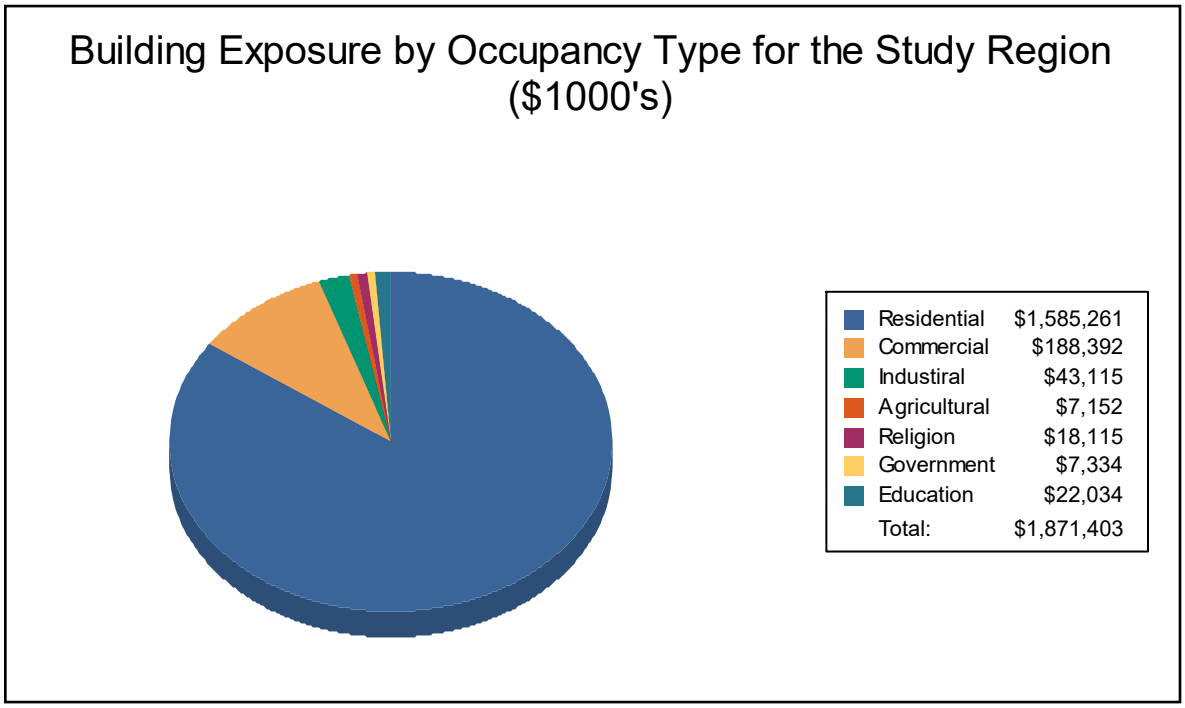
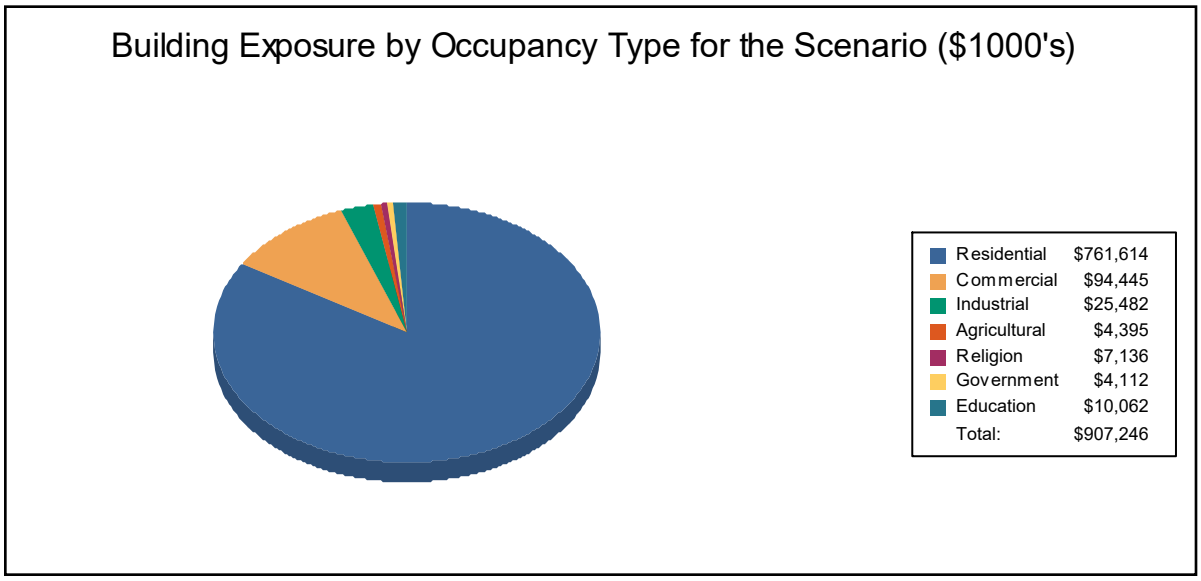


Table 2
Building Exposure by Occupancy Type for the Scenario

Occupancy	Exposure ($1000)	Percent of Total
Residential	761,614	83.9%
Commercial	94,445	10.4%
Industrial	25,482	2.8%
Agricultural	4,395	0.5%
Religion	7,136	0.8%
Government	4,112	0.5%
Education	10,062	1.1%
Total	**907,246**	**100%**



Essential Facility Inventory

For essential facilities, there are no hospitals in the region with a total bed capacity of no beds.
There are 6 schools, 3 fire stations, 1 police station and 1 emergency operation center.

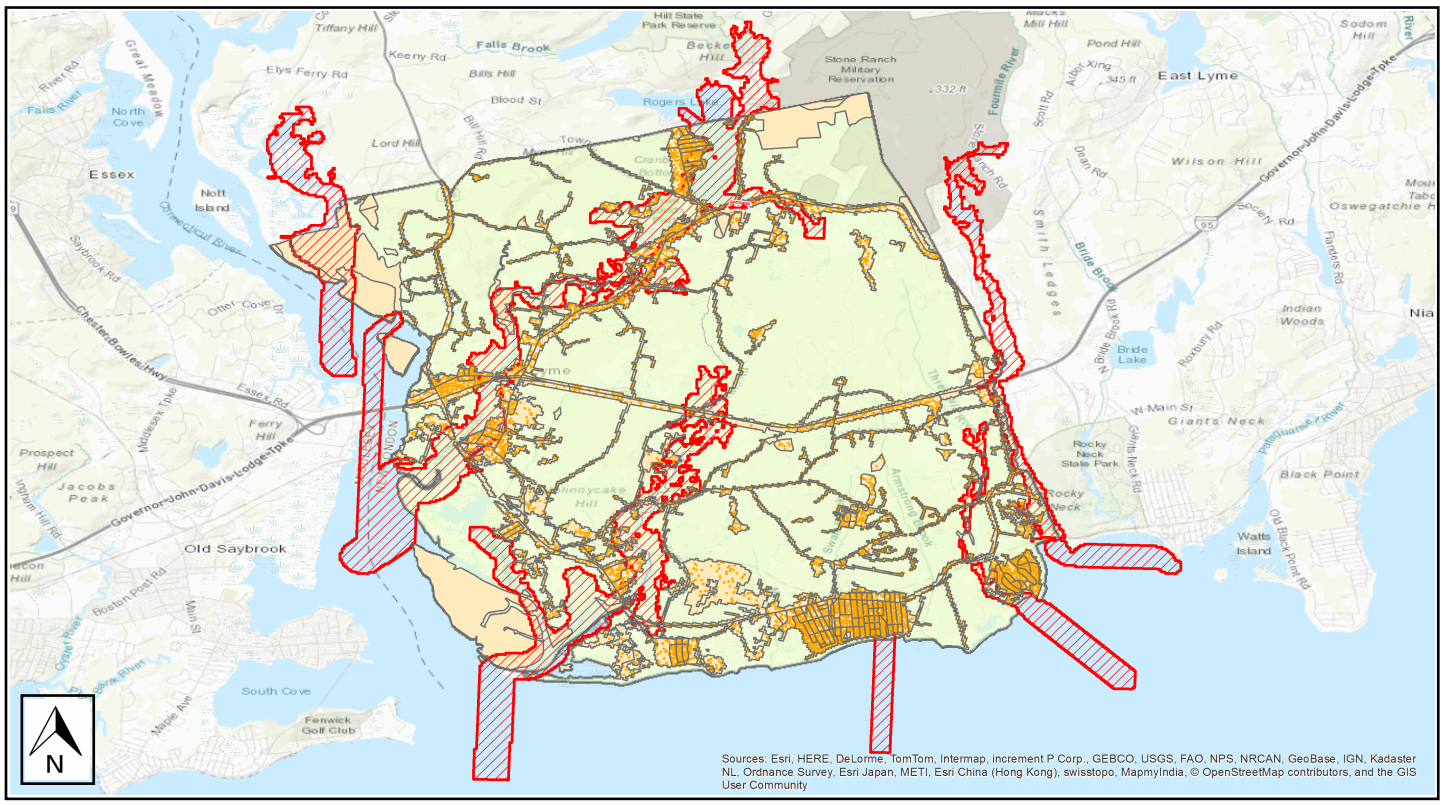
Flood Scenario Parameters

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

Study Region Name:	OldLyme
Scenario Name:	OlyLymeRivering
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 58 buildings will be at least moderately damaged. This is over 80% 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

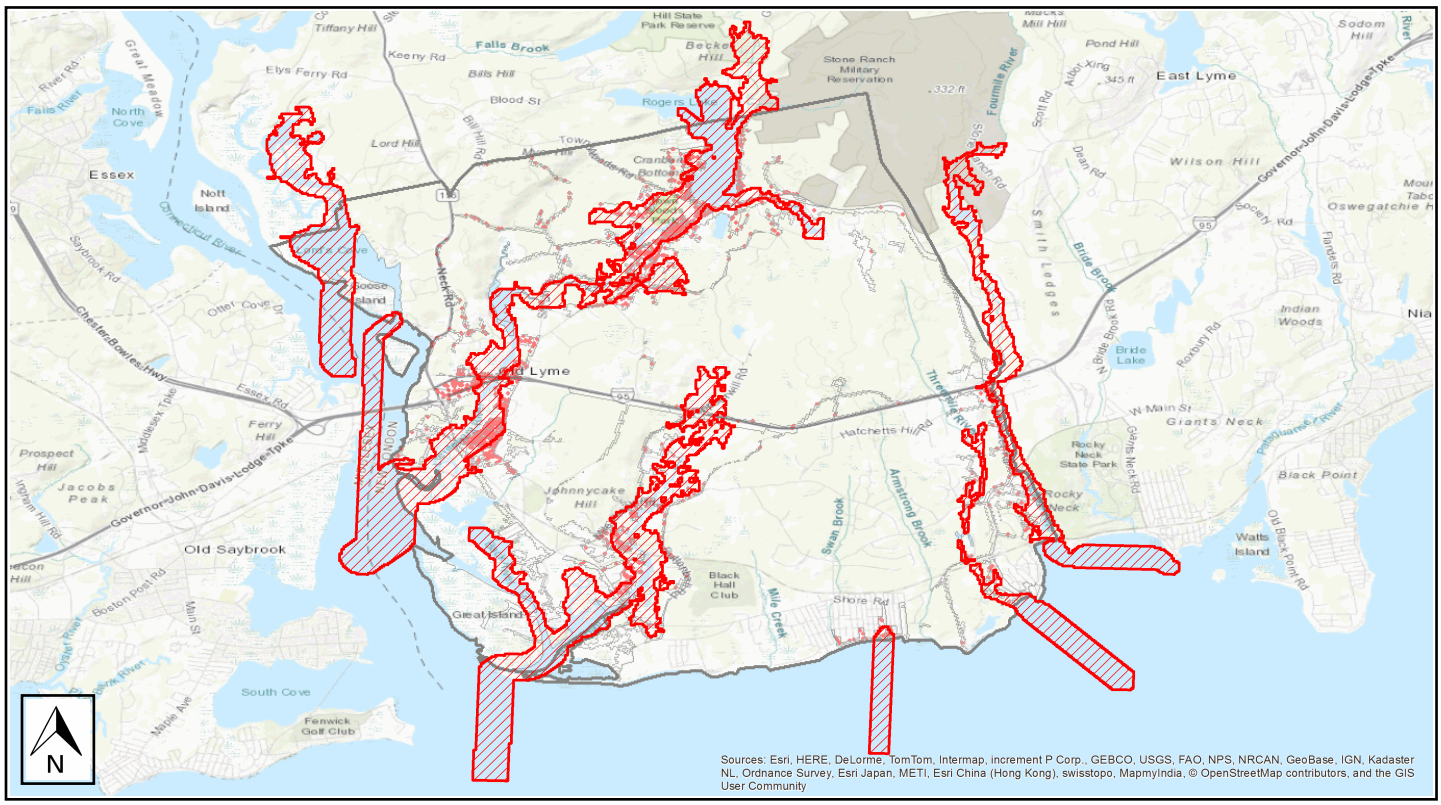


Table 3: Expected Building Damage by Occupancy

	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	221	79	58	21	0	0	0	0	0	0	0	0
Total	**221**		**58**		**0**		**0**		**0**		**0**	

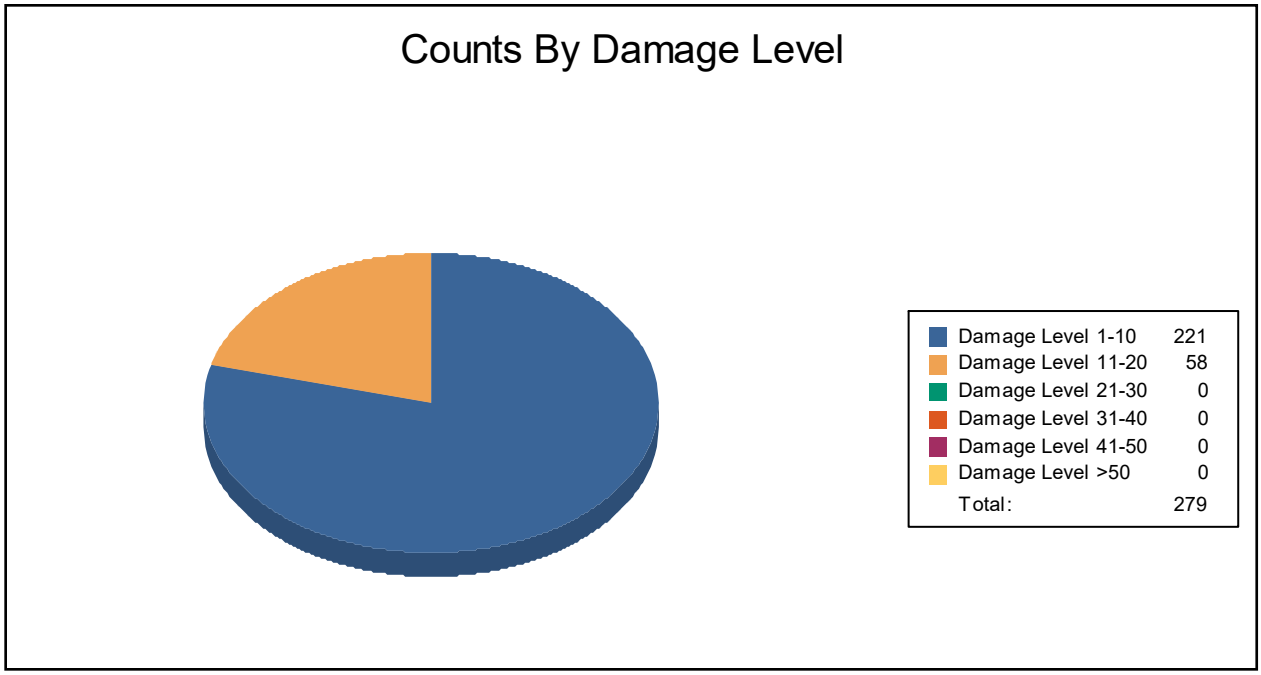


Table 4: Expected Building Damage by Building Type

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	5	100	0	0	0	0	0	0	0	0	0	0
Steel	0	0	0	0	0	0	0	0	0	0	0	0
Wood	216	79	58	21	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	3	1	0	1
Hospitals	0	0	0	0
Police Stations	1	0	0	0
Schools	6	0	0	0

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

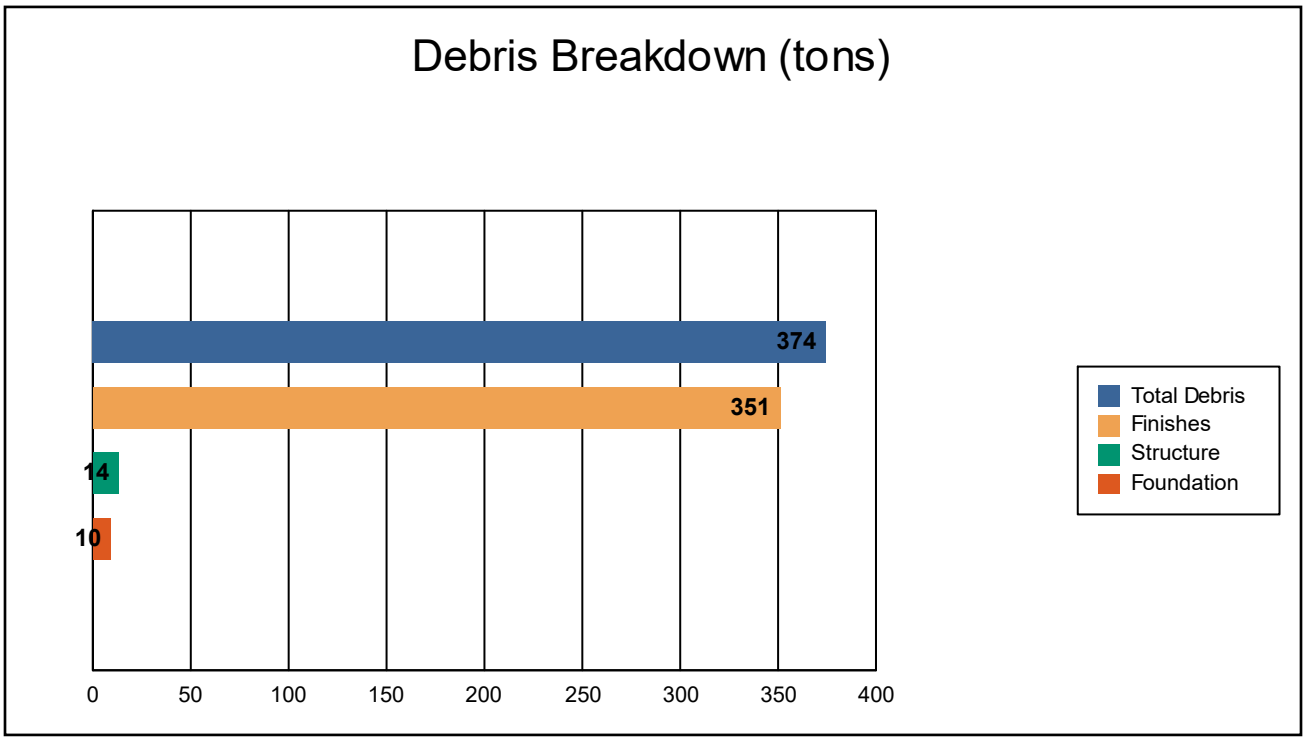
(1) None of your facilities were flooded. This can be checked by mapping the inventory data on the depth grid.

(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.

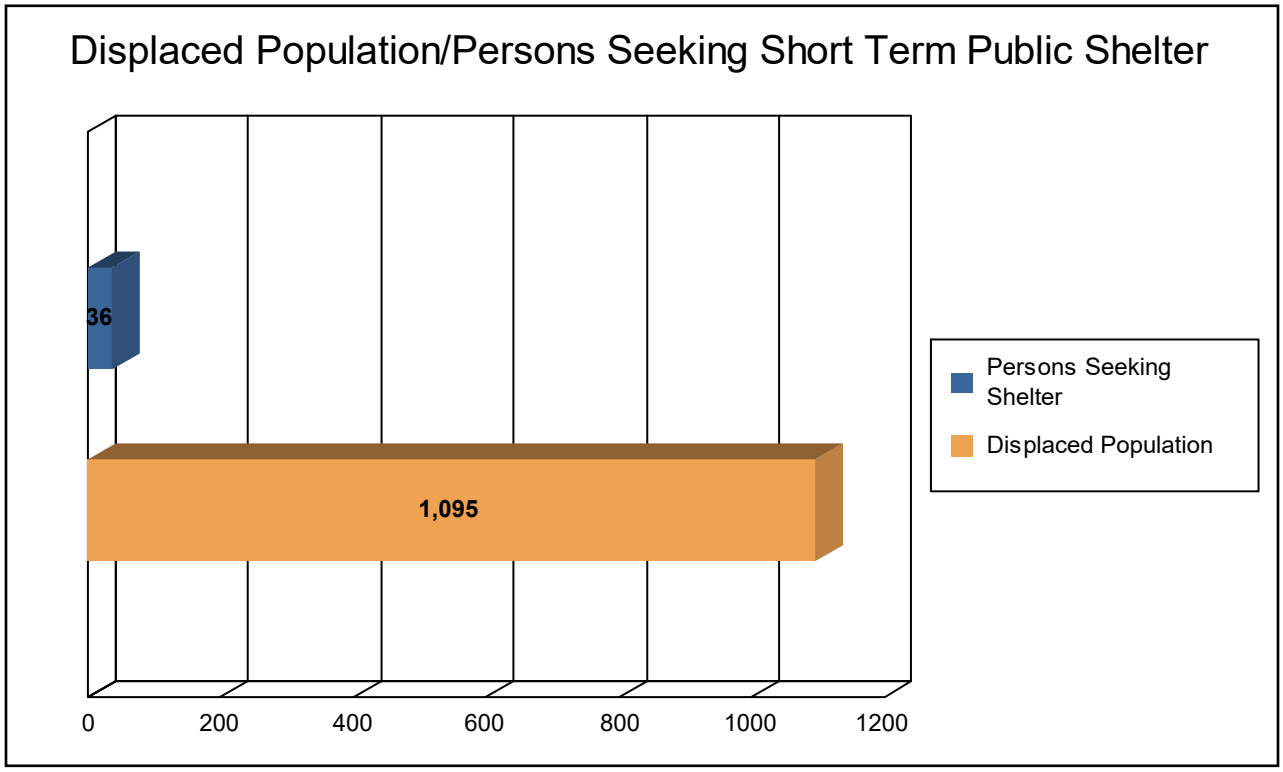


The model estimates that a total of 374 tons of debris will be generated. Of the total amount, Finishes comprises 94% of the total, Structure comprises 4% of the total, and Foundation comprises 3%. If the debris tonnage is converted into an estimated number of truckloads, it will require 15 truckloads (@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 365 households (or 1,095 of people) will be displaced due to the flood. Displacement includes households evacuated from within or very near to the inundated area. Of these, 36 people (out of a total population of 7,603) will seek temporary shelter in public shelters.



Economic Loss

The total economic loss estimated for the flood is 46.48 million dollars, which represents 5.12 % of the total replacement value of the scenario buildings.

Building-Related Losses

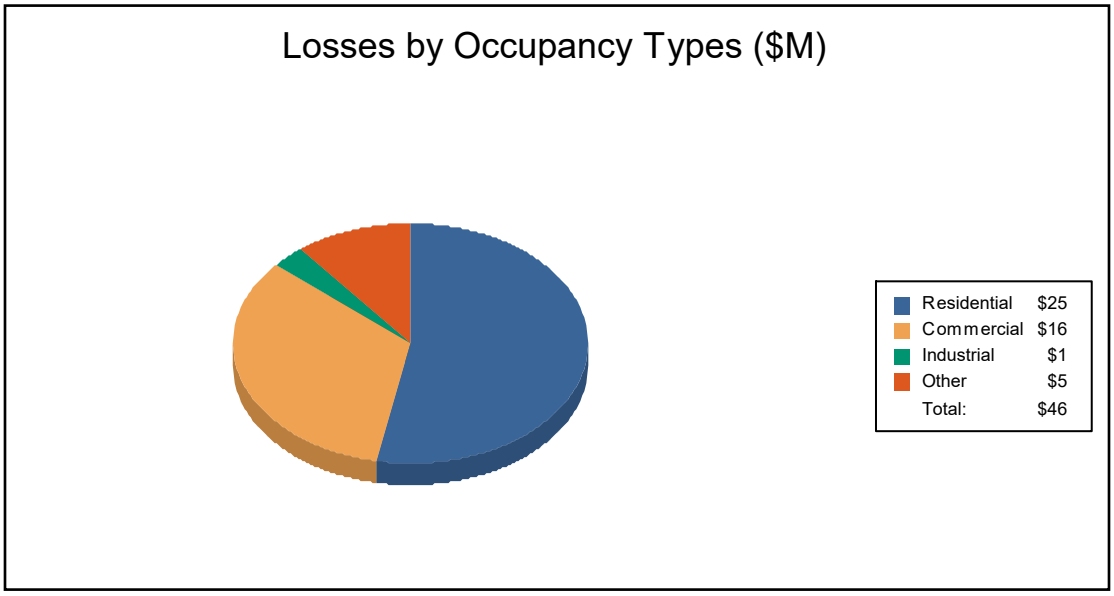
The building losses are broken into two categories: direct building losses and business interruption losses. The direct building losses are the estimated costs to repair or replace the damage caused to the building and its contents. The business interruption losses are the losses associated with inability 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 21.67 million dollars. 53% of the estimated losses were related to the business interruption of the region. The residential occupancies made up 53.09% 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	10.63	0.89	0.50	0.16	12.19
	Content	4.69	2.94	0.64	1.10	9.37
	Inventory	0.00	0.02	0.08	0.00	0.11
	Subtotal	**15.32**	**3.86**	**1.22**	**1.26**	**21.67**
Business Interruption						
	Income	0.02	5.29	0.03	0.75	6.09
	Relocation	7.05	1.04	0.04	0.38	8.51
	Rental Income	2.21	0.77	0.00	0.04	3.02
	Wage	0.06	4.58	0.07	2.48	7.19
	Subtotal	**9.35**	**11.68**	**0.15**	**3.64**	**24.81**
ALL	**Total**	**24.67**	**15.53**	**1.37**	**4.90**	**46.48**



Appendix A: County Listing for the Region

Connecticut

- New London

Appendix B: Regional Population and Building Value Data

	Population	Building Value (thousands of dollars)		
		Residential	Non-Residential	Total
Connecticut				
New London	7,603	1,585,261	286,142	1,871,403
Total	**7,603**	**1,585,261**	**286,142**	**1,871,403**
Total Study Region	**7,603**	**1,585,261**	**286,142**	**1,871,403**

Hazus: Hurricane Global Risk Report

Region Name: OldLyme

Hurricane Scenario: UN-NAMED-1938-4

Print Date: Friday, October 11, 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 24.27 square miles and contains 2 census tracts. There are over 3 thousand households in the region and a total population of 7,603 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 1,871 million dollars (2014 dollars). Approximately 92% of the buildings (and 85% of the building value) are associated with residential housing.

Building Inventory

General Building Stock

Hazus estimates that there are 5,155 buildings in the region which have an aggregate total replacement value of 1,871 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.

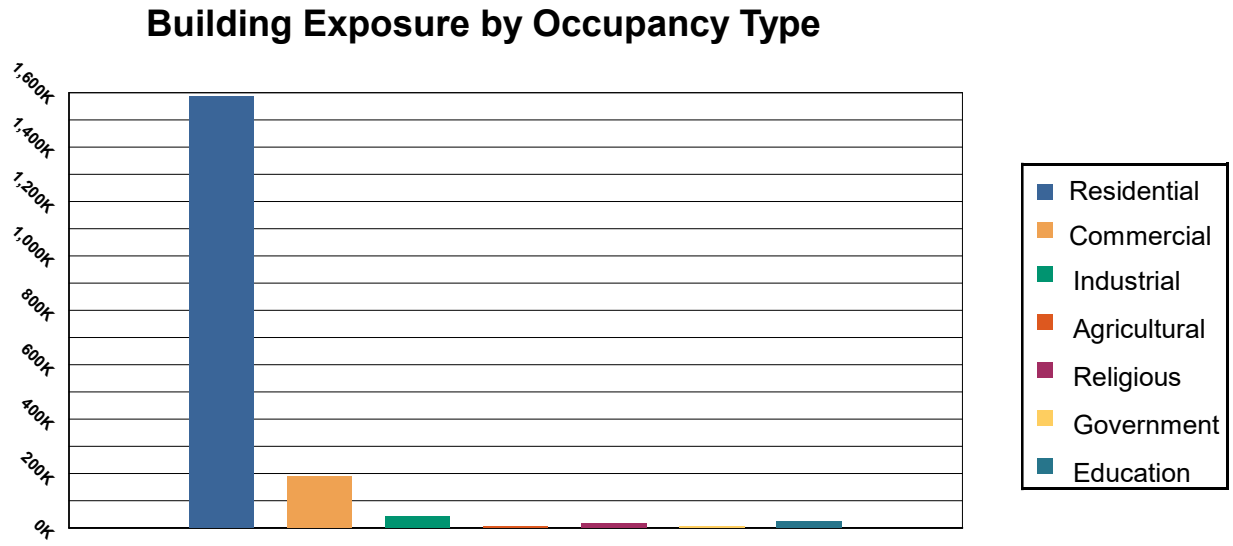


Table 1: Building Exposure by Occupancy Type

Occupancy	Exposure ($1000)	Percent of Tot
Residential	1,585,261	84.71 %
Commercial	188,392	10.07%
Industrial	43,115	2.30%
Agricultural	7,152	0.38%
Religious	18,115	0.97%
Government	7,334	0.39%
Education	22,034	1.18%
Total	**1,871,403**	**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 6 schools, 3 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:	119 mph

Building Damage

General Building Stock Damage

Hazus estimates that about 774 buildings will be at least moderately damaged. This is over 15% of the total number of buildings in the region. There are an estimated 75 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.

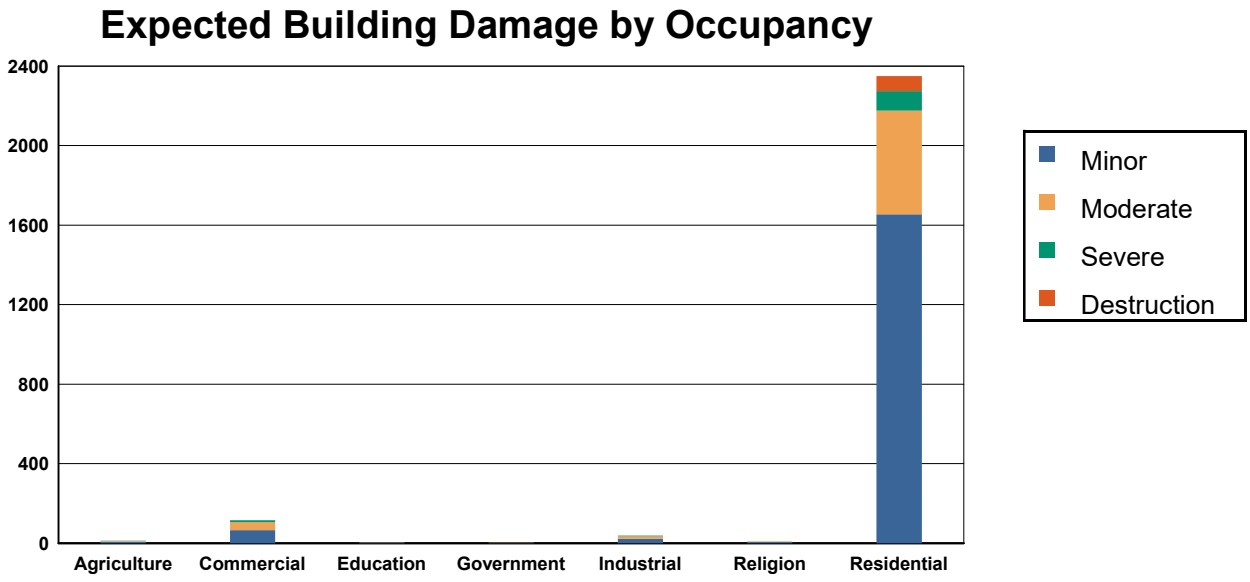


Table 2: Expected Building Damage by Occupancy

	None		Minor		Moderate		Severe		Destruction	
Occupancy	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**
Agriculture	13.07	50.28	7.44	28.60	3.42	13.14	1.74	6.68	0.34	1.30
Commercial	149.12	56.27	65.86	24.85	39.66	14.97	10.26	3.87	0.09	0.04
Education	6.86	62.35	2.64	23.96	1.31	11.86	0.20	1.82	0.00	0.00
Government	3.41	56.80	1.47	24.48	0.93	15.44	0.20	3.28	0.00	0.00
Industrial	52.02	57.80	21.30	23.67	13.15	14.61	3.40	3.77	0.13	0.14
Religion	12.82	58.26	6.09	27.69	2.64	11.99	0.45	2.06	0.00	0.00
Residential	2,385.36	50.38	1,653.65	34.92	522.10	11.03	98.95	2.09	74.94	1.58
Total	**2,622.66**		**1,758.45**		**583.20**		**115.19**		**75.50**	

Table 3: Expected Building Damage by Building Type

Building Type	None		Minor		Moderate		Severe		Destruction	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Concrete	8	62.08	3	22.57	2	13.17	0	2.18	0	0.00
Masonry	123	53.30	66	28.57	33	14.41	7	2.94	2	0.79
MH	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Steel	104	58.30	38	21.60	27	15.32	8	4.74	0	0.04
Wood	2,267	50.36	1,586	35.23	486	10.79	91	2.02	71	1.59

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.

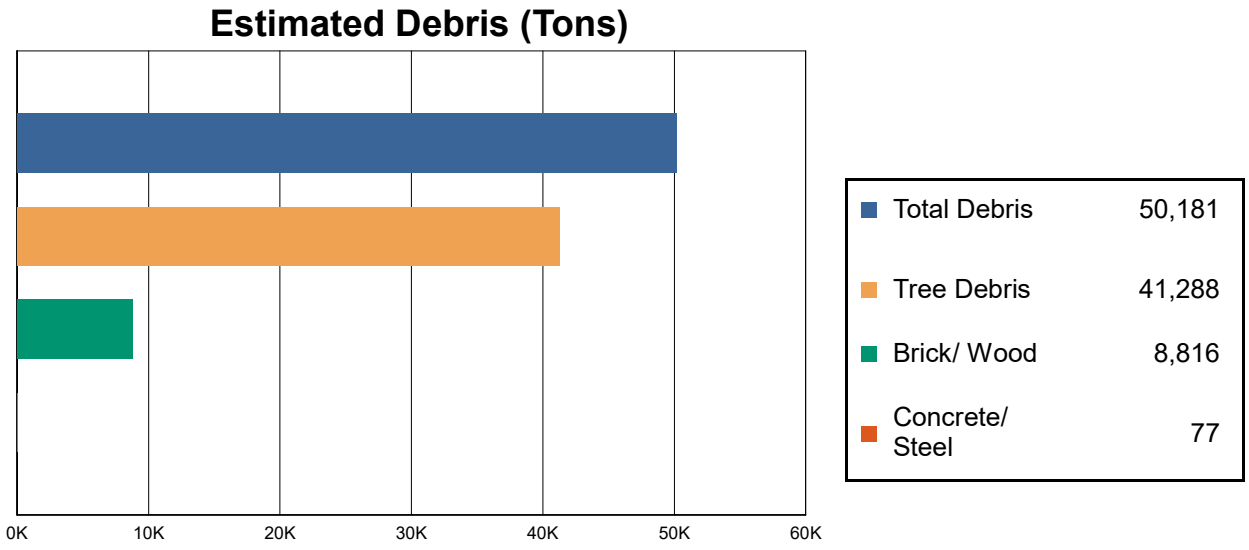
Thematic Map of Essential Facilities with greater than 50% moderate

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	3	0	0	3
Police Stations	1	0	0	1
Schools	6	0	0	0

Induced Hurricane Damage

Debris Generation

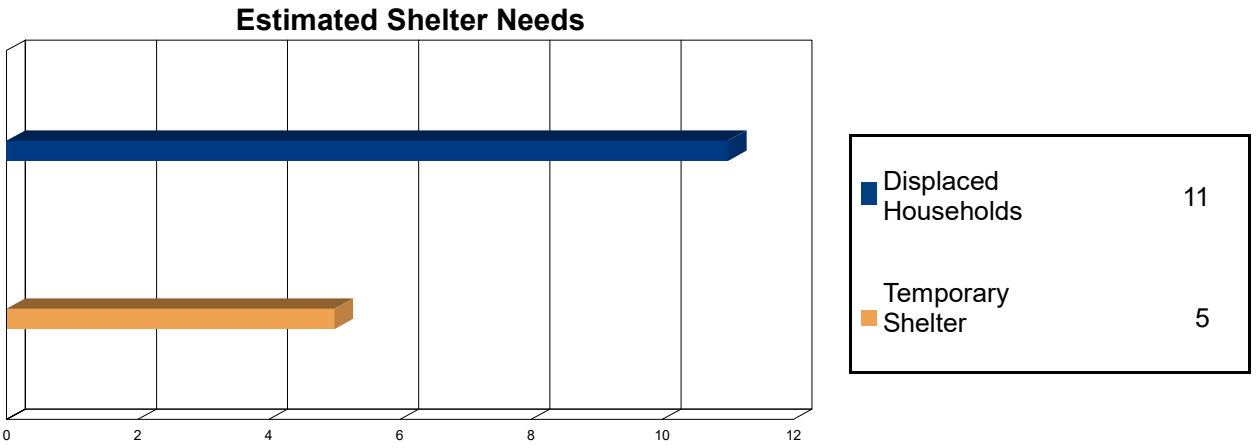


Hazus estimates the amount of debris that will be generated by the hurricane. The model breaks the debris into four general categories: a) Brick/Wood, b) Reinforced Concrete/Steel, c) Eligible Tree Debris, and d) Other Tree Debris. This distinction is made because of the different types of material handling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

The model estimates that a total of 50,181 tons of debris will be generated. Of the total amount, 31,835 tons (63%) is Other Tree Debris. Of the remaining 18,346 tons, Brick/Wood comprises 48% 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 356 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 9,453 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 11 households to be displaced due to the hurricane. Of these, 5 people (out of a total population of 7,603) will seek temporary shelter in public shelters.

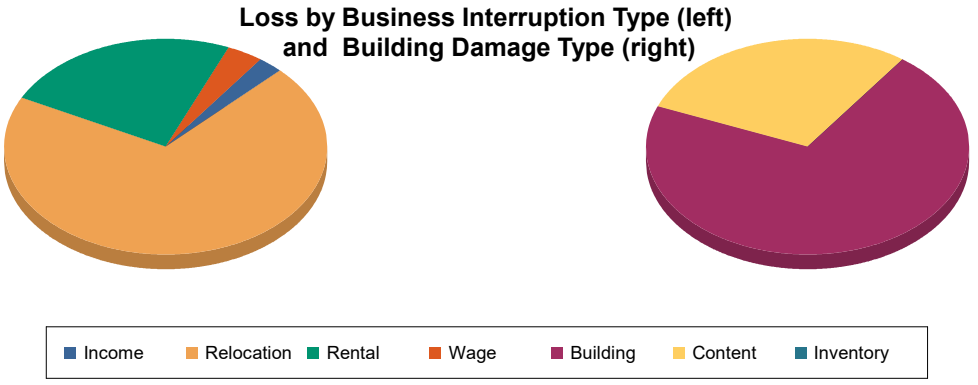
Economic Loss

The total economic loss estimated for the hurricane is 168.7 million dollars, which represents 9.02 % 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 169 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 93% of the total loss. Table 5 below provides a summary of the losses associated with the building damage.



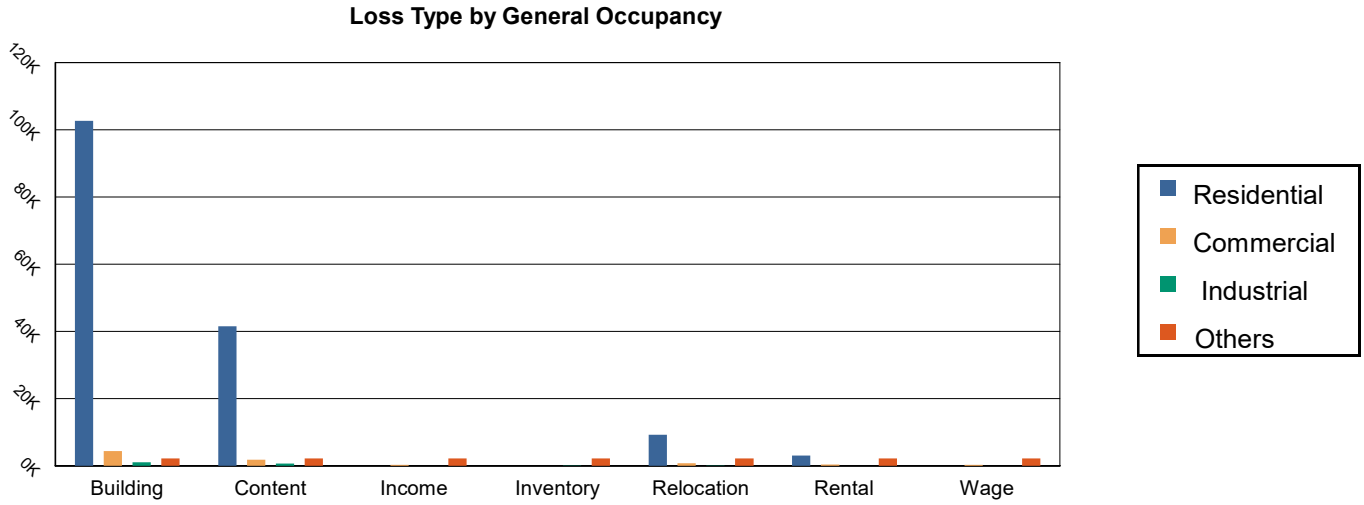


Table 5: Building-Related Economic Loss Estimates

(Thousands of dollars)

Category	Area	Residential	Commercial	Industrial	Others	Total
Property Damage						
	Building	102,664.84	4,443.11	1,100.14	1,203.72	109,411.81
	Content	41,519.02	1,786.43	690.23	453.36	44,449.03
	Inventory	0.00	42.69	96.41	14.54	153.64
	Subtotal	**144,183.86**	**6,272.23**	**1,886.78**	**1,671.62**	**154,014.48**
Business Interruption Loss						
	Income	1.06	305.39	11.20	39.75	357.39
	Relocation	9,283.01	755.00	86.45	214.51	10,338.97
	Rental	3,053.18	430.21	11.12	19.52	3,514.03
	Wage	2.47	277.31	18.40	225.59	523.77
	Subtotal	**12,339.72**	**1,767.91**	**127.17**	**499.36**	**14,734.16**

Total

Total	**156,523.58**	**8,040.14**	**2,013.94**	**2,170.98**	**168,748.64**

Appendix A: County Listing for the Region

Connecticut
- New London

Appendix B: Regional Population and Building Value Data

		Building Value (thousands of dollars)		
	Population	Residential	Non-Residential	Total
Connecticut				
New London	7,603	1,585,261	286,142	1,871,403
Total	**7,603**	**1,585,261**	**286,142**	**1,871,403**
Study Region Total	**7,603**	**1,585,261**	**286,142**	**1,871,403**

Hazus: Hurricane Global Risk Report

Region Name: OldLyme

Hurricane Scenario: Probabilistic 10-year Return Period

Print Date: Monday, October 7, 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 24.27 square miles and contains 2 census tracts. There are over 3 thousand households in the region and a total population of 7,603 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 1,871 million dollars (2014 dollars). Approximately 92% of the buildings (and 85% of the building value) are associated with residential housing.

Building Inventory

General Building Stock

Hazus estimates that there are 5,155 buildings in the region which have an aggregate total replacement value of 1,871 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.

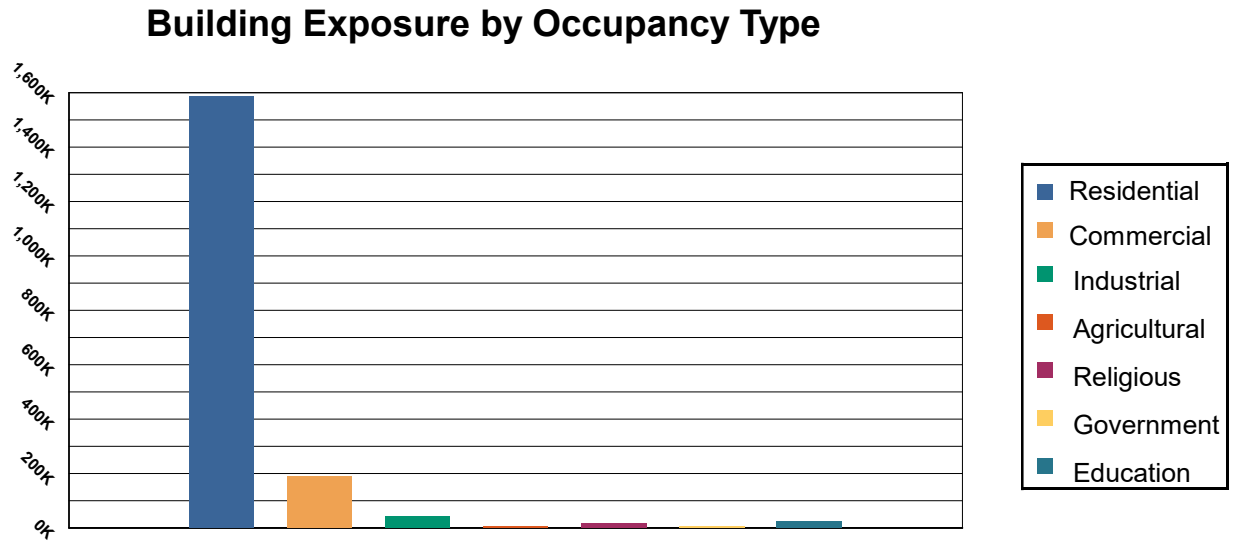


Table 1: Building Exposure by Occupancy Type

Occupancy	Exposure ($1000)	Percent of Tot
Residential	1,585,261	84.71 %
Commercial	188,392	10.07%
Industrial	43,115	2.30%
Agricultural	7,152	0.38%
Religious	18,115	0.97%
Government	7,334	0.39%
Education	22,034	1.18%
Total	**1,871,403**	**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 6 schools, 3 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.

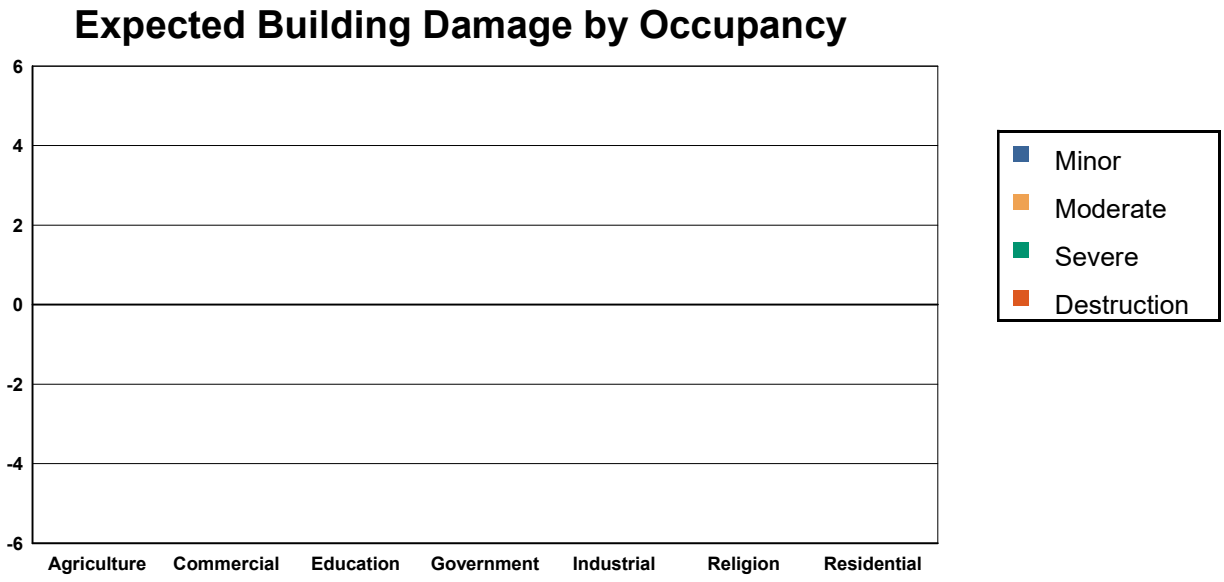


Table 2: Expected Building Damage by Occupancy : 10 - year Event

	None		Minor		Moderate		Severe		Destruction	
Occupancy	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**
Agriculture	26.00	100.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Commercial	265.00	100.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Education	11.00	100.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Government	6.00	100.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Industrial	90.00	100.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Religion	22.00	100.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Residential	4,735.00	100.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	**5,155.00**		**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	13	100.00	0	0.00	0	0.00	0	0.00	0	0.00
Masonry	231	100.00	0	0.00	0	0.00	0	0.00	0	0.00
MH	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Steel	178	100.00	0	0.00	0	0.00	0	0.00	0	0.00
Wood	4,501	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.

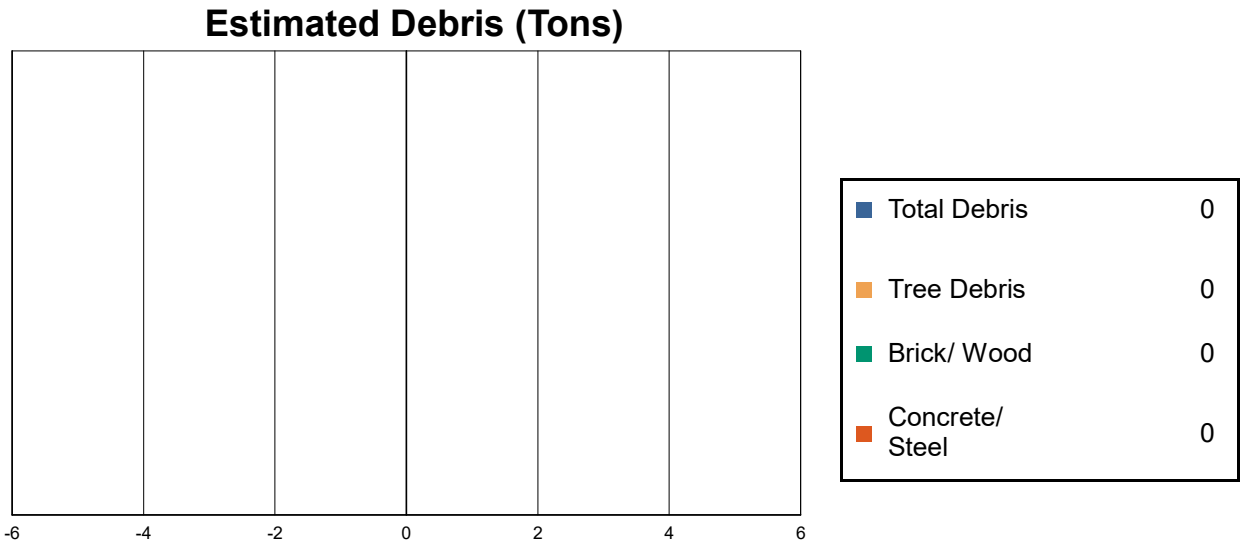
Thematic Map of Essential Facilities with greater than 50% moderate

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	3	0	0	3
Police Stations	1	0	0	1
Schools	6	0	0	6

Induced Hurricane Damage

Debris Generation

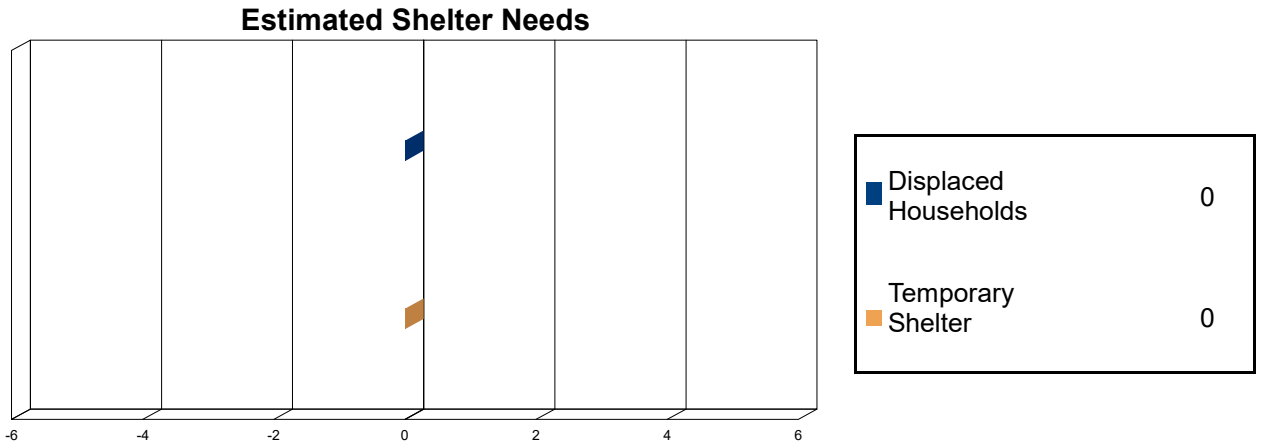


Hazus estimates the amount of debris that will be generated by the hurricane. The model breaks the debris into four general categories: a) Brick/Wood, b) Reinforced Concrete/Steel, c) Eligible Tree Debris, and d) Other Tree Debris. This distinction is made because of the different types of material handling 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 7,603) will seek temporary shelter in public shelters.

Economic Loss

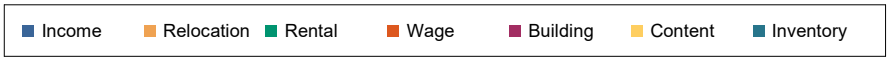
The total economic loss estimated for the hurricane is 0.0 million dollars, which represents 0.00 % of the total replacement value of the region's buildings.

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)**



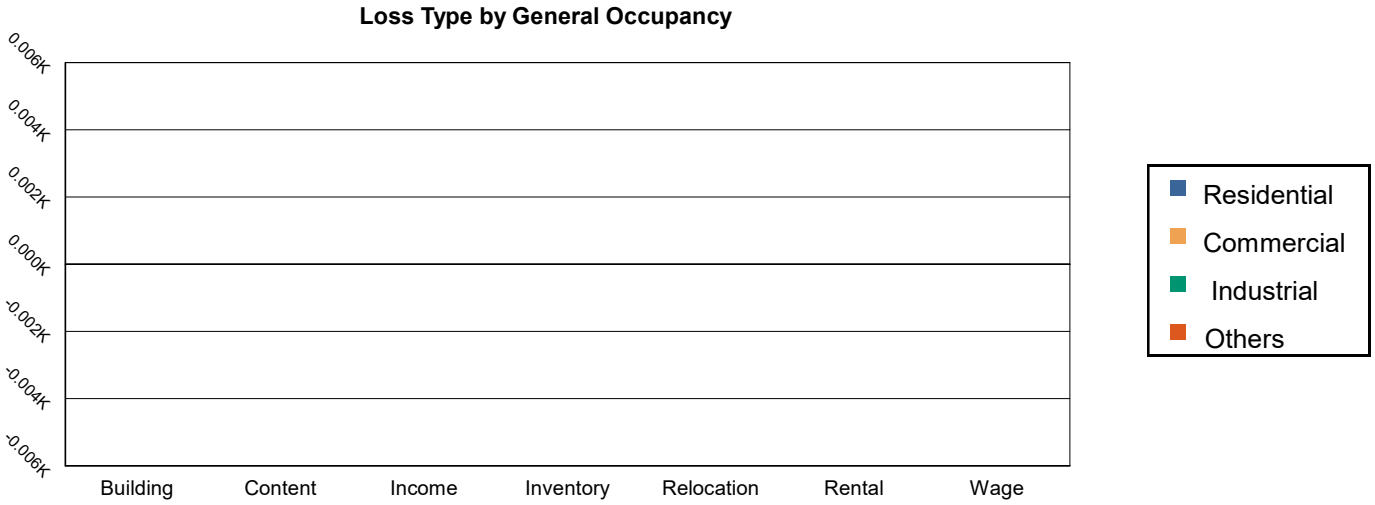


Table 5: Building-Related Economic Loss Estimates

(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
- New London

Appendix B: Regional Population and Building Value Data

		Building Value (thousands of dollars)		
	Population	Residential	Non-Residential	Total
Connecticut				
New London	7,603	1,585,261	286,142	1,871,403
Total	**7,603**	**1,585,261**	**286,142**	**1,871,403**
Study Region Total	**7,603**	**1,585,261**	**286,142**	**1,871,403**

Hazus: Hurricane Global Risk Report

Region Name: OldLyme

Hurricane Scenario: Probabilistic 20-year Return Period

Print Date: Monday, October 7, 2019

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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General Building Stock

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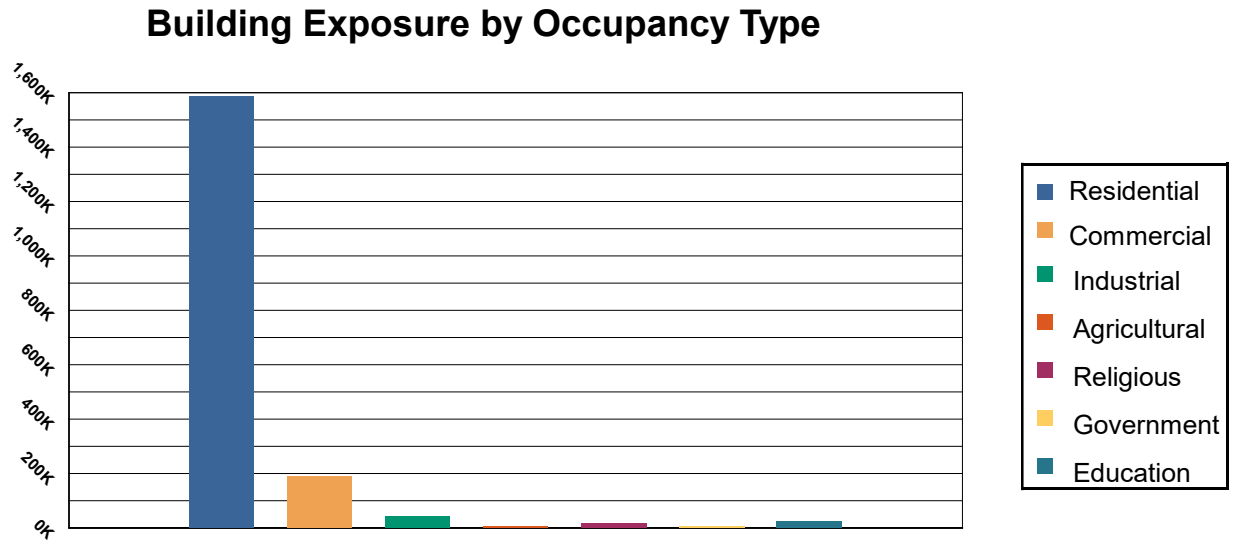

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Occupancy	Exposure ($1000)	Percent of Tot
Residential	1,585,261	84.71 %
Commercial	188,392	10.07%
Industrial	43,115	2.30%
Agricultural	7,152	0.38%
Religious	18,115	0.97%
Government	7,334	0.39%
Education	22,034	1.18%
Total	**1,871,403**	**100.00%**

Essential Facility Inventory

For essential facilities, there are no hospitals in the region with a total bed capacity of no beds. There are 6 schools, 3 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.

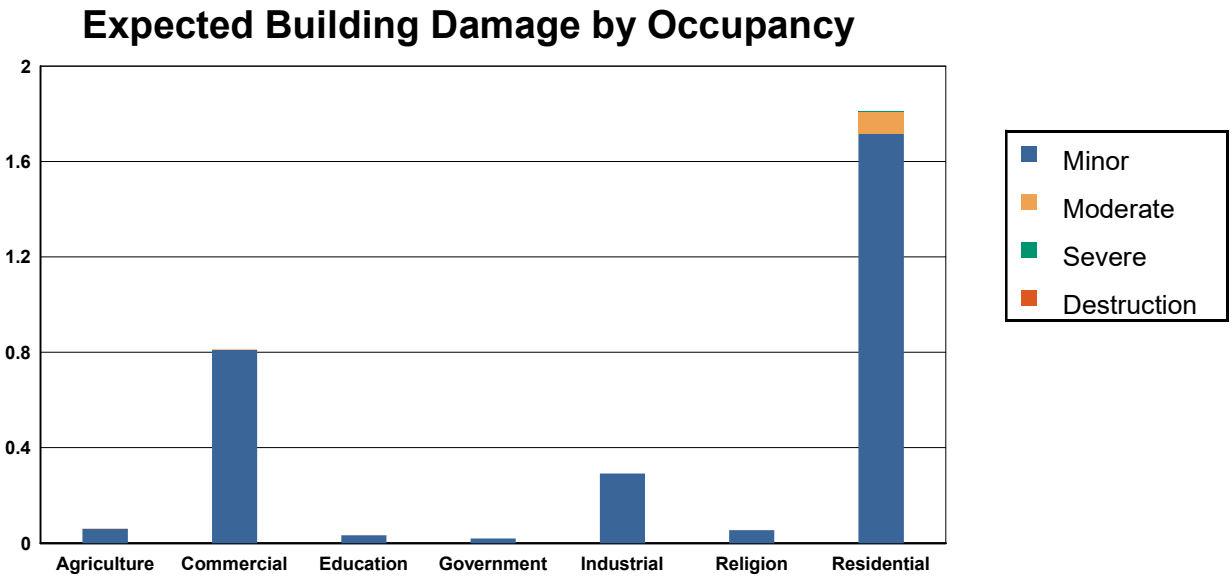


Table 2: Expected Building Damage by Occupancy : 20 - year Event

	None		Minor		Moderate		Severe		Destruction	
Occupancy	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**
Agriculture	25.94	99.77	0.06	0.23	0.00	0.00	0.00	0.00	0.00	0.00
Commercial	264.19	99.69	0.81	0.31	0.00	0.00	0.00	0.00	0.00	0.00
Education	10.97	99.70	0.03	0.30	0.00	0.00	0.00	0.00	0.00	0.00
Government	5.98	99.67	0.02	0.33	0.00	0.00	0.00	0.00	0.00	0.00
Industrial	89.71	99.68	0.29	0.32	0.00	0.00	0.00	0.00	0.00	0.00
Religion	21.95	99.75	0.05	0.25	0.00	0.00	0.00	0.00	0.00	0.00
Residential	4,733.19	99.96	1.72	0.04	0.09	0.00	0.00	0.00	0.00	0.00
Total	**5,151.92**		**2.99**		**0.09**		**0.00**		**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	13	99.66	0	0.34	0	0.00	0	0.00	0	0.00
Masonry	230	99.72	1	0.26	0	0.01	0	0.00	0	0.00
MH	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Steel	177	99.67	1	0.33	0	0.00	0	0.00	0	0.00
Wood	4,500	99.97	1	0.03	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.

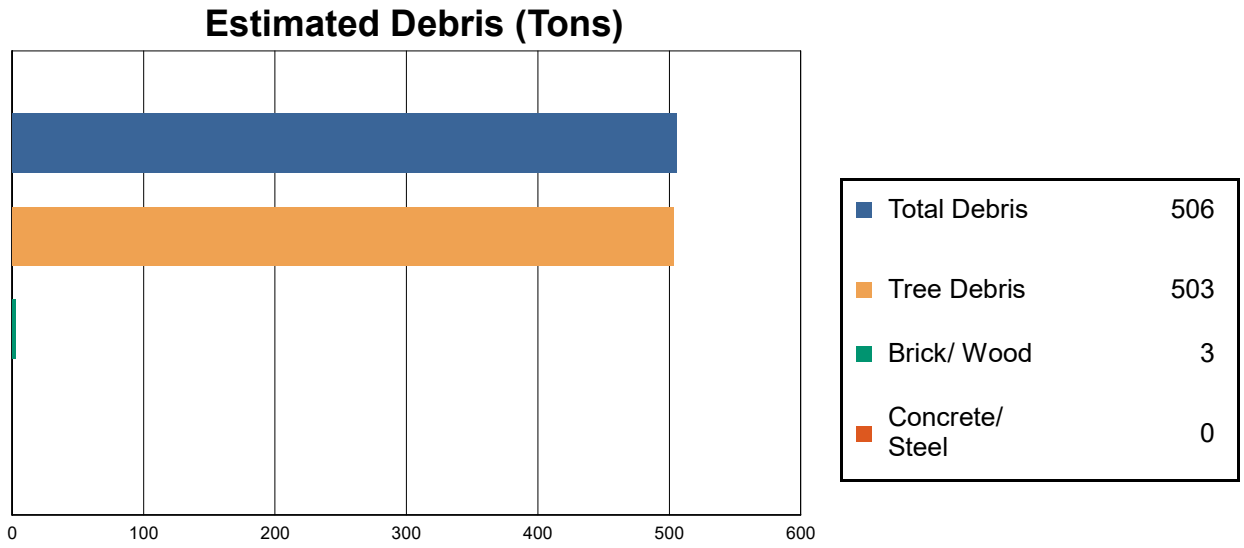
Thematic Map of Essential Facilities with greater than 50% moderate

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	3	0	0	3
Police Stations	1	0	0	1
Schools	6	0	0	6

Induced Hurricane Damage

Debris Generation

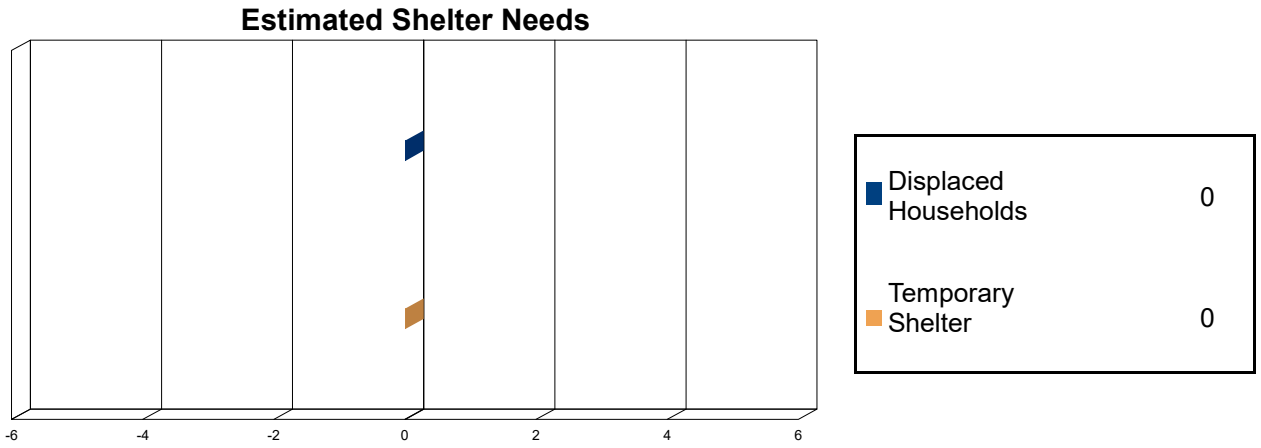


Hazus estimates the amount of debris that will be generated by the hurricane. The model breaks the debris into four general categories: a) Brick/Wood, b) Reinforced Concrete/Steel, c) Eligible Tree Debris, and d) Other Tree Debris. This distinction is made because of the different types of material handling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

The model estimates that a total of 506 tons of debris will be generated. Of the total amount, 390 tons (77%) is Other Tree Debris. Of the remaining 116 tons, Brick/Wood comprises 3% 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 113 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 7,603) will seek temporary shelter in public shelters.

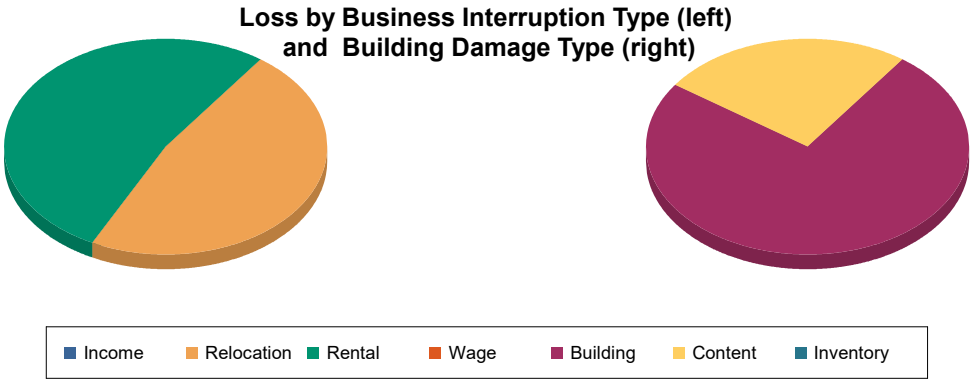
Economic Loss

The total economic loss estimated for the hurricane is 0.9 million dollars, which represents 0.05 % 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 97% of the total loss. Table 5 below provides a summary of the losses associated with the building damage.



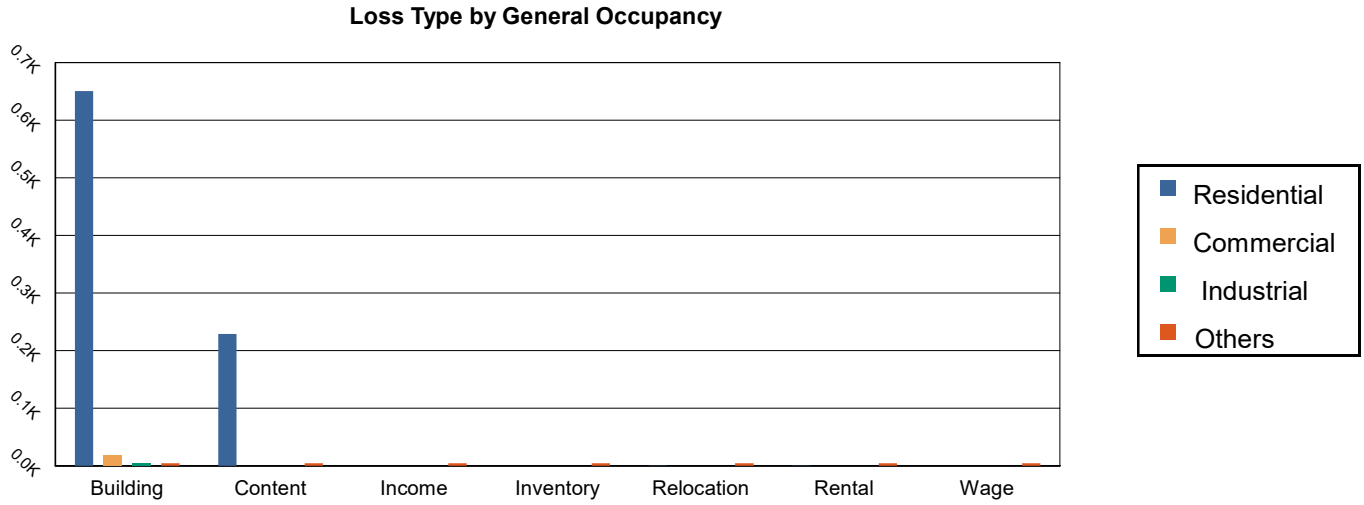


Table 5: Building-Related Economic Loss Estimates

(Thousands of dollars)

Category	Area	Residential	Commercial	Industrial	Others	Total
Property Damage						
	Building	650.26	18.84	4.31	4.75	678.16
	Content	228.81	0.00	0.00	0.00	228.81
	Inventory	0.00	0.00	0.00	0.00	0.00
	Subtotal	**879.06**	**18.84**	**4.31**	**4.75**	**906.96**
Business Interruption Loss						
	Income	0.00	0.00	0.00	0.00	0.00
	Relocation	0.38	0.01	0.00	0.00	0.39
	Rental	0.43	0.00	0.00	0.00	0.43
	Wage	0.00	0.00	0.00	0.00	0.00
	Subtotal	**0.82**	**0.01**	**0.00**	**0.00**	**0.83**

Total

Total	**879.88**	**18.85**	**4.31**	**4.75**	**907.79**

Appendix A: County Listing for the Region

Connecticut
- New London

Appendix B: Regional Population and Building Value Data

		Building Value (thousands of dollars)		
	Population	Residential	Non-Residential	Total
Connecticut				
New London	7,603	1,585,261	286,142	1,871,403
Total	**7,603**	**1,585,261**	**286,142**	**1,871,403**
Study Region Total	**7,603**	**1,585,261**	**286,142**	**1,871,403**

Hazus: Hurricane Global Risk Report

Region Name: OldLyme

Hurricane Scenario: Probabilistic 50-year Return Period

Print Date: Monday, October 7, 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 24.27 square miles and contains 2 census tracts. There are over 3 thousand households in the region and a total population of 7,603 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 1,871 million dollars (2014 dollars). Approximately 92% of the buildings (and 85% of the building value) are associated with residential housing.

Building Inventory

General Building Stock

Hazus estimates that there are 5,155 buildings in the region which have an aggregate total replacement value of 1,871 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.

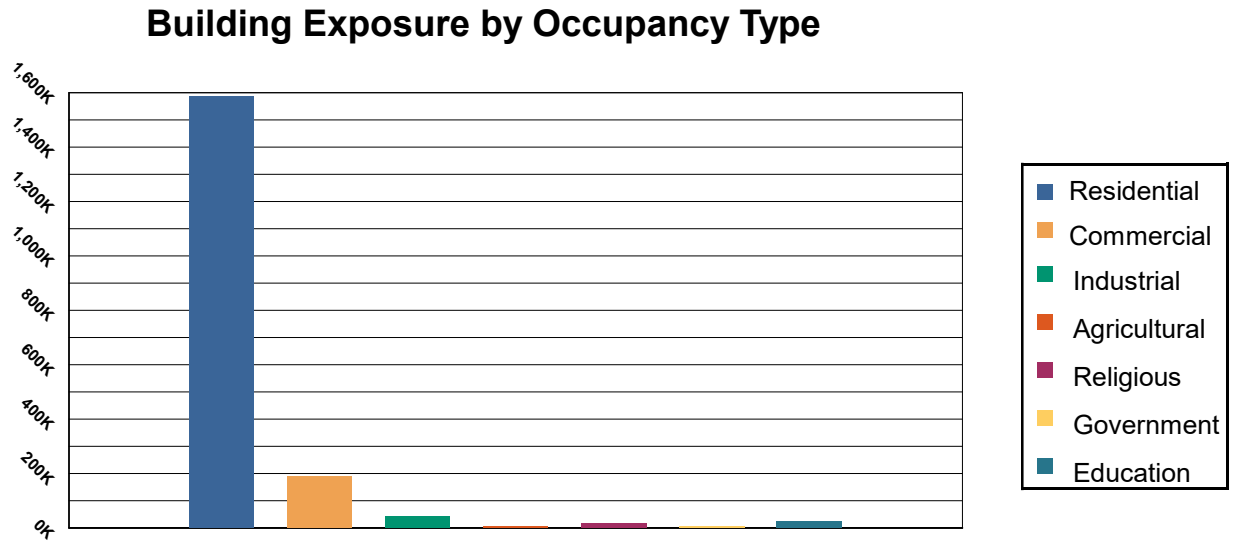


Table 1: Building Exposure by Occupancy Type

Occupancy	Exposure ($1000)	Percent of Tot
Residential	1,585,261	84.71 %
Commercial	188,392	10.07%
Industrial	43,115	2.30%
Agricultural	7,152	0.38%
Religious	18,115	0.97%
Government	7,334	0.39%
Education	22,034	1.18%
Total	**1,871,403**	**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 6 schools, 3 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 4 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.

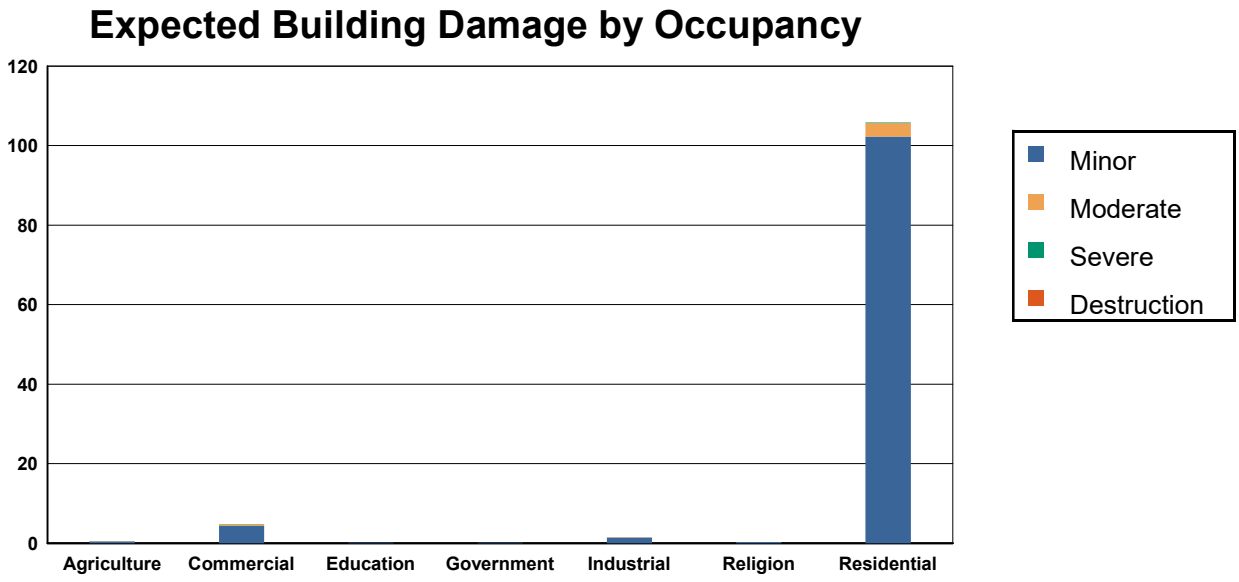


Table 2: Expected Building Damage by Occupancy : 50 - year Event

	None		Minor		Moderate		Severe		Destruction	
Occupancy	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**
Agriculture	25.47	97.96	0.46	1.78	0.05	0.20	0.01	0.06	0.00	0.00
Commercial	260.24	98.20	4.35	1.64	0.39	0.15	0.02	0.01	0.00	0.00
Education	10.84	98.55	0.16	1.42	0.00	0.03	0.00	0.00	0.00	0.00
Government	5.90	98.28	0.10	1.69	0.00	0.03	0.00	0.00	0.00	0.00
Industrial	88.51	98.35	1.44	1.60	0.04	0.05	0.01	0.01	0.00	0.00
Religion	21.69	98.57	0.31	1.39	0.01	0.04	0.00	0.00	0.00	0.00
Residential	4,629.22	97.77	102.29	2.16	3.38	0.07	0.11	0.00	0.00	0.00
Total	**5,041.86**		**109.10**		**3.89**		**0.15**		**0.00**	

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

Building Type	None		Minor		Moderate		Severe		Destruction	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Concrete	13	98.49	0	1.49	0	0.02	0	0.00	0	0.00
Masonry	225	97.59	5	2.17	1	0.22	0	0.02	0	0.00
MH	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Steel	175	98.33	3	1.56	0	0.11	0	0.01	0	0.00
Wood	4,402	97.81	96	2.12	3	0.07	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.

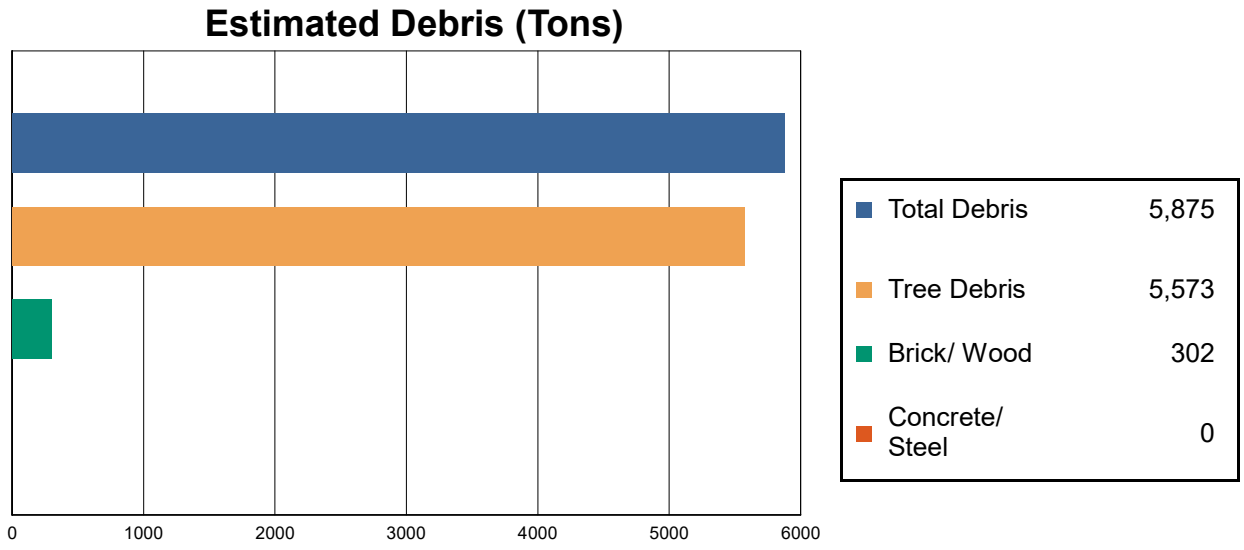
Thematic Map of Essential Facilities with greater than 50% moderate

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	3	0	0	3
Police Stations	1	0	0	1
Schools	6	0	0	6

Induced Hurricane Damage

Debris Generation

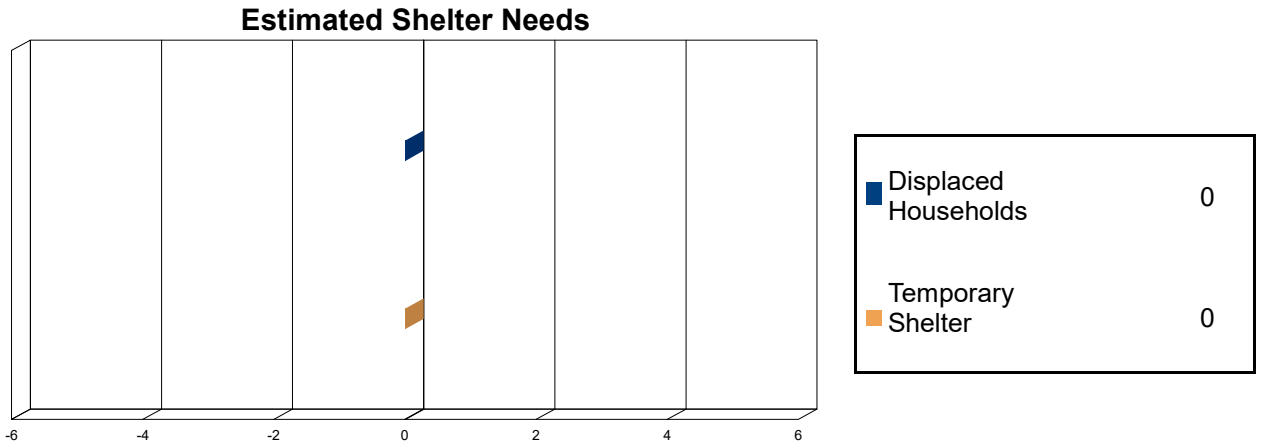


Hazus estimates the amount of debris that will be generated by the hurricane. The model breaks the debris into four general categories: a) Brick/Wood, b) Reinforced Concrete/Steel, c) Eligible Tree Debris, and d) Other Tree Debris. This distinction is made because of the different types of material handling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

The model estimates that a total of 5,875 tons of debris will be generated. Of the total amount, 4,309 tons (73%) is Other Tree Debris. Of the remaining 1,566 tons, Brick/Wood comprises 19% 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 12 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 1,264 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 7,603) will seek temporary shelter in public shelters.

Economic Loss

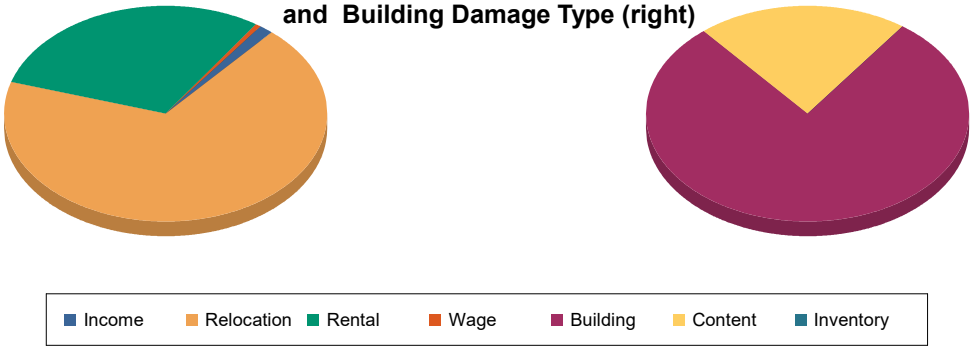
The total economic loss estimated for the hurricane is 8.0 million dollars, which represents 0.43 % of the total replacement value of the region's buildings.

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 8 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 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

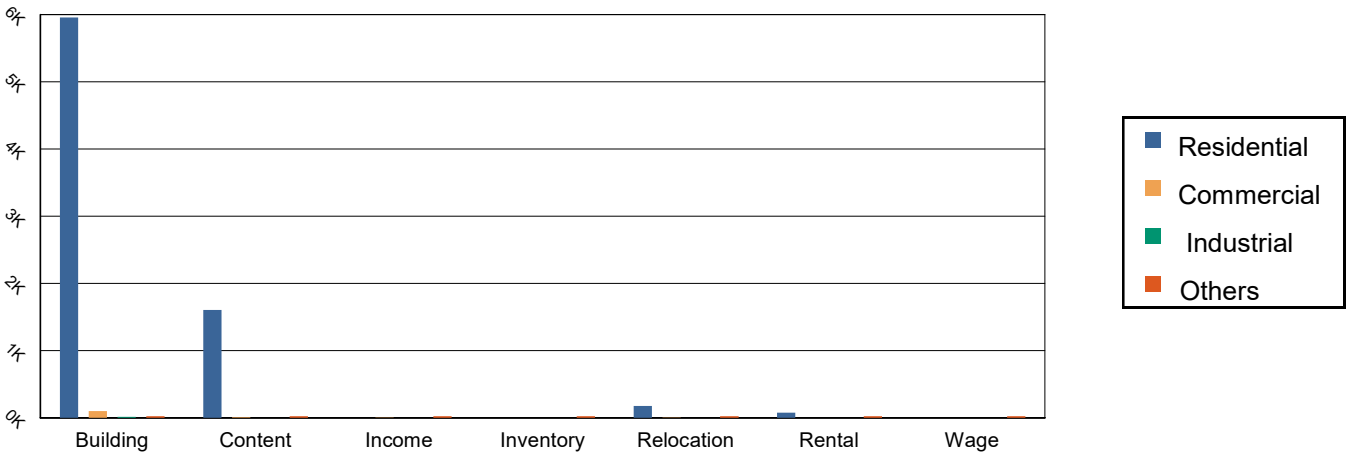


Table 5: Building-Related Economic Loss Estimates

(Thousands of dollars)

Category	Area	Residential	Commercial	Industrial	Others	Total
Property Damage						
	Building	5,954.43	99.98	17.19	25.46	6,097.07
	Content	1,605.58	9.59	2.78	0.97	1,618.92
	Inventory	0.00	0.16	0.47	0.09	0.73
	Subtotal	**7,560.01**	**109.73**	**20.45**	**26.53**	**7,716.71**
Business Interruption Loss						
	Income	0.00	3.32	0.00	0.00	3.32
	Relocation	176.65	3.96	0.09	0.21	180.91
	Rental	77.61	1.48	0.00	0.00	79.10
	Wage	0.00	1.18	0.00	0.01	1.19
	Subtotal	**254.26**	**9.94**	**0.09**	**0.23**	**264.52**

Total

Total	**7,814.27**	**119.66**	**20.54**	**26.75**	**7,981.23**

Appendix A: County Listing for the Region

Connecticut
- New London

Appendix B: Regional Population and Building Value Data

		Building Value (thousands of dollars)		
	Population	Residential	Non-Residential	Total
Connecticut				
New London	7,603	1,585,261	286,142	1,871,403
Total	**7,603**	**1,585,261**	**286,142**	**1,871,403**
Study Region Total	**7,603**	**1,585,261**	**286,142**	**1,871,403**

Hazus: Hurricane Global Risk Report

Region Name: OldLyme

Hurricane Scenario: Probabilistic 100-year Return Period

Print Date: Monday, October 7, 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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Appendix A contains a complete listing of the counties contained in the region.

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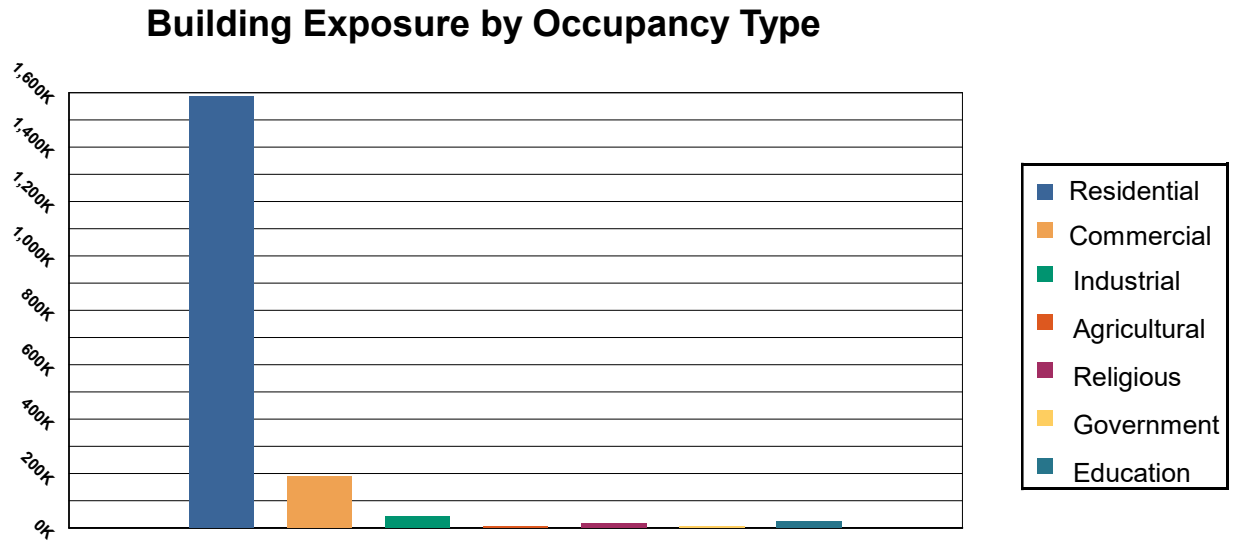
Hazus estimates that there are 5,155 buildings in the region which have an aggregate total replacement value of 1,871 million (2014 dollars). Table 1 presents the relative distribution of the value with respect to the general occupancies. Appendix B provides a general distribution of the building value by State and County.



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Occupancy	Exposure ($1000)	Percent of Tot
Residential	1,585,261	84.71 %
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Agricultural	7,152	0.38%
Religious	18,115	0.97%
Government	7,334	0.39%
Education	22,034	1.18%
Total	**1,871,403**	**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 6 schools, 3 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 38 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.

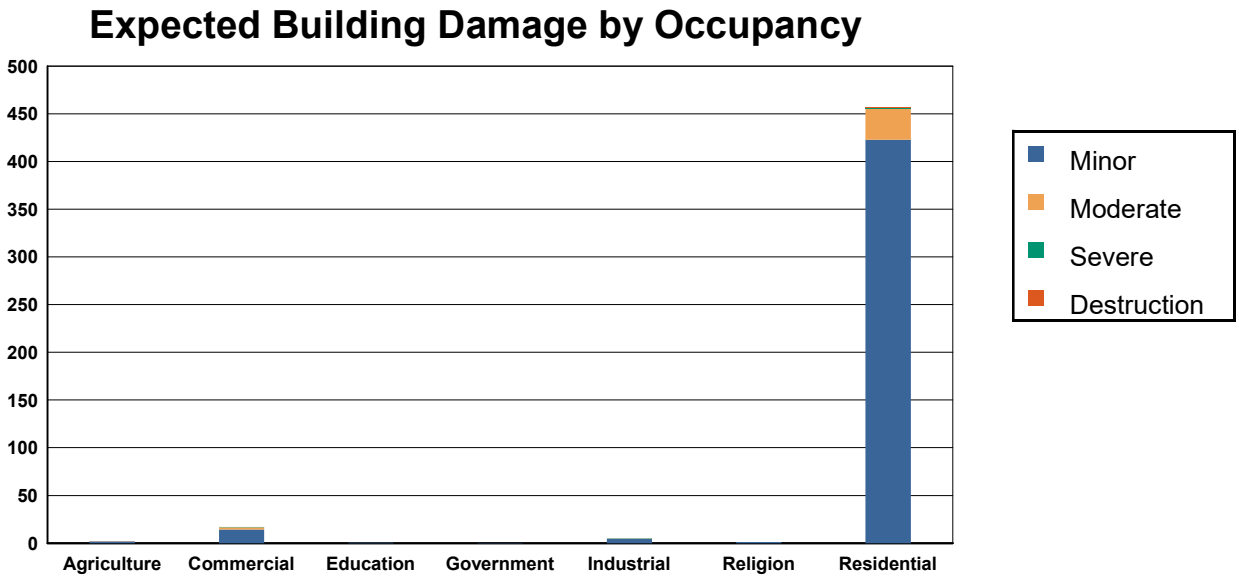


Table 2: Expected Building Damage by Occupancy : 100 - year Event

	None		Minor		Moderate		Severe		Destruction	
Occupancy	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**
Agriculture	23.75	91.35	1.75	6.73	0.34	1.32	0.15	0.57	0.01	0.04
Commercial	248.14	93.64	14.30	5.40	2.32	0.87	0.24	0.09	0.00	0.00
Education	10.50	95.47	0.47	4.28	0.03	0.25	0.00	0.00	0.00	0.00
Government	5.67	94.42	0.31	5.16	0.02	0.41	0.00	0.01	0.00	0.00
Industrial	84.91	94.34	4.55	5.06	0.48	0.53	0.06	0.07	0.00	0.00
Religion	20.78	94.45	1.14	5.20	0.07	0.33	0.00	0.02	0.00	0.00
Residential	4,277.93	90.35	422.84	8.93	32.66	0.69	0.88	0.02	0.70	0.01
Total	**4,671.68**		**445.36**		**35.92**		**1.33**		**0.71**	

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

Building Type	None		Minor		Moderate		Severe		Destruction	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Concrete	12	95.46	1	4.27	0	0.26	0	0.00	0	0.00
Masonry	211	91.34	17	7.37	3	1.15	0	0.13	0	0.01
MH	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Steel	168	94.46	8	4.69	1	0.75	0	0.10	0	0.00
Wood	4,070	90.41	401	8.91	29	0.64	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.

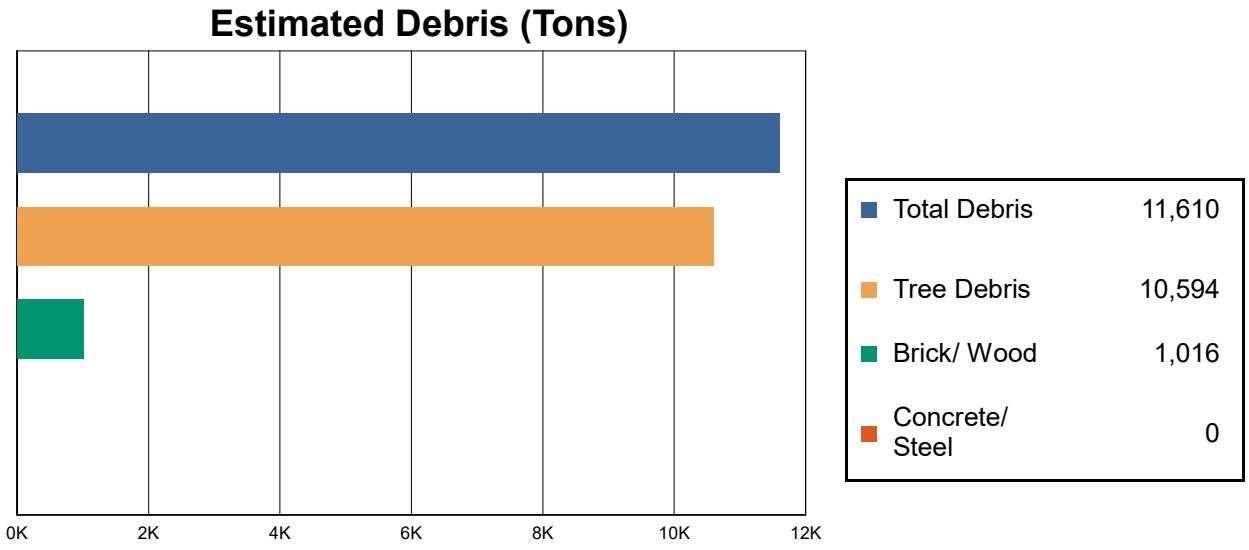
Thematic Map of Essential Facilities with greater than 50% moderate

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	3	0	0	3
Police Stations	1	0	0	1
Schools	6	0	0	6

Induced Hurricane Damage

Debris Generation

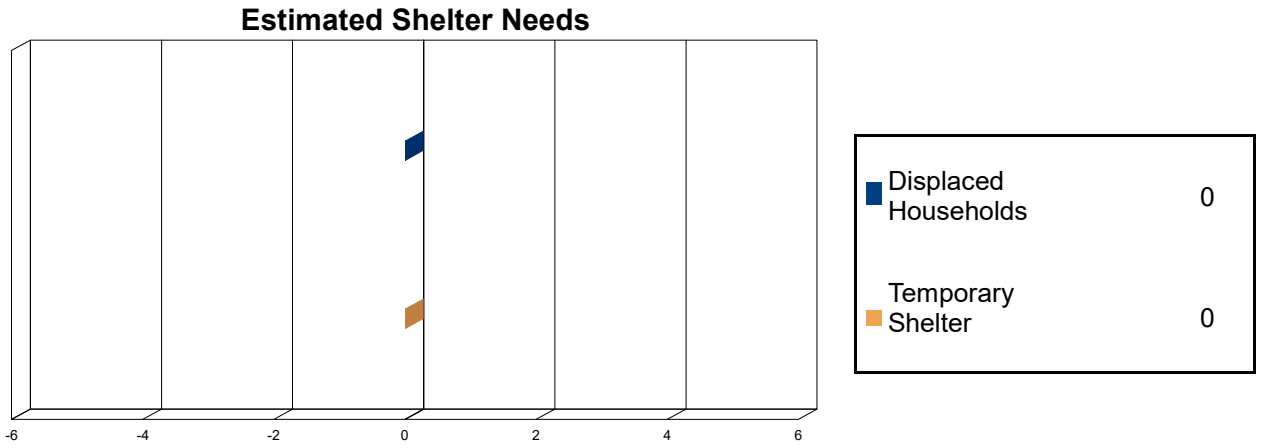


Hazus estimates the amount of debris that will be generated by the hurricane. The model breaks the debris into four general categories: a) Brick/Wood, b) Reinforced Concrete/Steel, c) Eligible Tree Debris, and d) Other Tree Debris. This distinction is made because of the different types of material handling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

The model estimates that a total of 11,610 tons of debris will be generated. Of the total amount, 8,180 tons (70%) is Other Tree Debris. Of the remaining 3,430 tons, Brick/Wood comprises 30% 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 41 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 2,414 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 7,603) will seek temporary shelter in public shelters.

Economic Loss

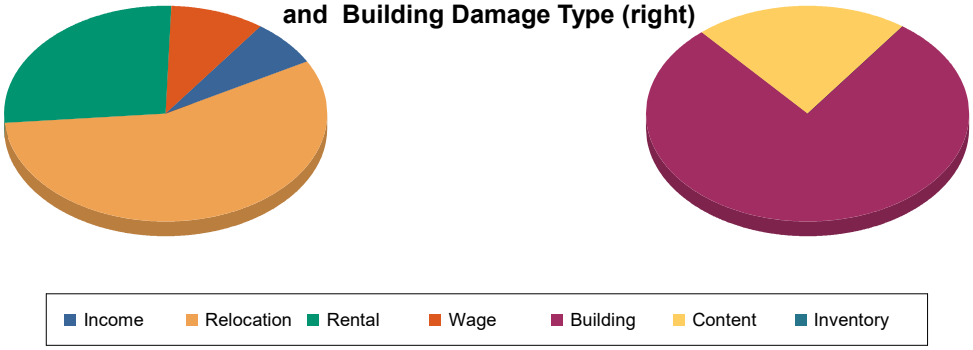
The total economic loss estimated for the hurricane is 19.0 million dollars, which represents 1.02 % of the total replacement value of the region's buildings.

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 19 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 96% 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

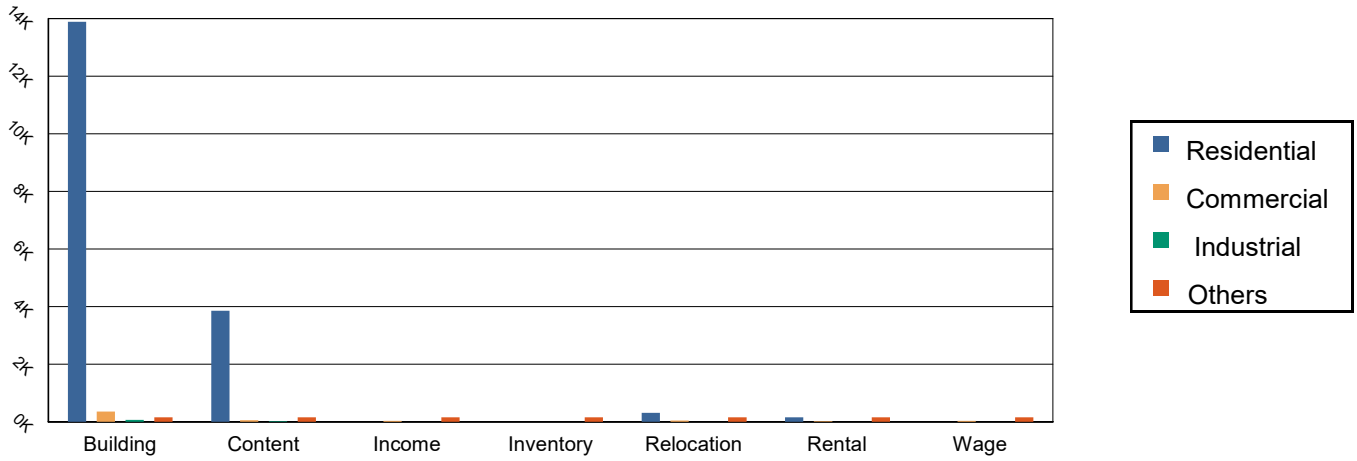


Table 5: Building-Related Economic Loss Estimates

(Thousands of dollars)

Category	Area	Residential	Commercial	Industrial	Others	Total
Property Damage						
	Building	13,884.64	353.66	67.73	93.96	14,399.99
	Content	3,852.00	52.61	21.95	15.00	3,941.55
	Inventory	0.00	1.29	3.43	0.77	5.49
	Subtotal	**17,736.64**	**407.56**	**93.10**	**109.73**	**18,347.03**
Business Interruption Loss						
	Income	0.00	34.84	0.37	10.57	45.78
	Relocation	314.82	41.64	2.03	10.89	369.38
	Rental	153.34	22.52	0.30	1.07	177.23
	Wage	0.00	31.38	0.62	28.90	60.90
	Subtotal	**468.16**	**130.38**	**3.31**	**51.44**	**653.29**

Total

Total	**18,204.80**	**537.95**	**96.41**	**161.17**	**19,000.32**

Appendix A: County Listing for the Region

Connecticut
- New London

Appendix B: Regional Population and Building Value Data

		Building Value (thousands of dollars)		
	Population	Residential	Non-Residential	Total
Connecticut				
New London	7,603	1,585,261	286,142	1,871,403
Total	**7,603**	**1,585,261**	**286,142**	**1,871,403**
Study Region Total	**7,603**	**1,585,261**	**286,142**	**1,871,403**

Hazus: Hurricane Global Risk Report

Region Name: OldLyme

Hurricane Scenario: Probabilistic 200-year Return Period

Print Date: Monday, October 7, 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 24.27 square miles and contains 2 census tracts. There are over 3 thousand households in the region and a total population of 7,603 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 1,871 million dollars (2014 dollars). Approximately 92% of the buildings (and 85% of the building value) are associated with residential housing.

Building Inventory

General Building Stock

Hazus estimates that there are 5,155 buildings in the region which have an aggregate total replacement value of 1,871 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.

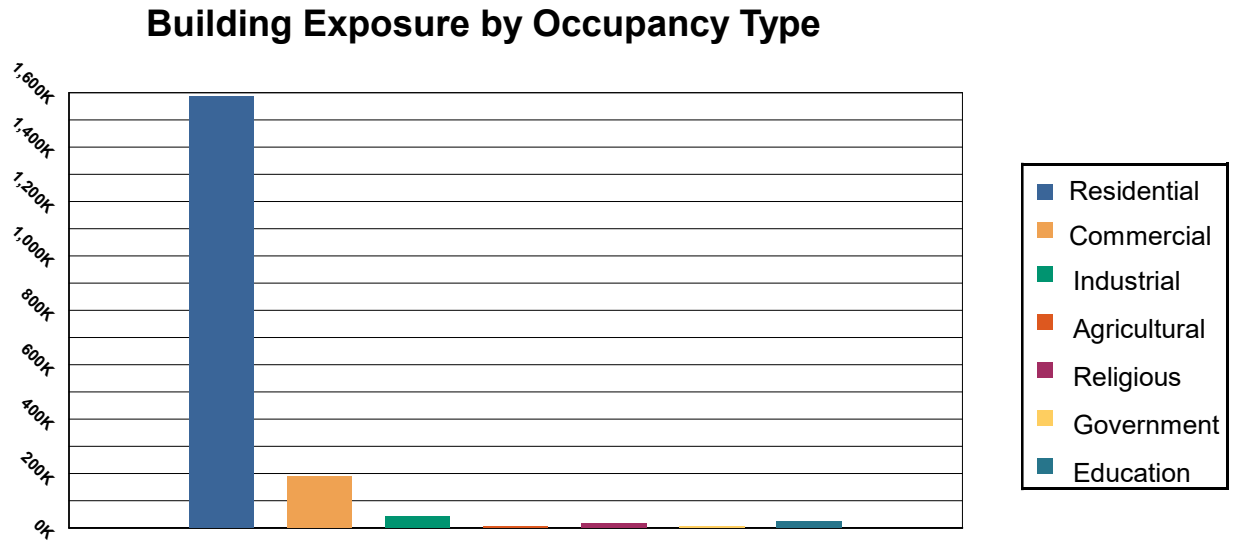


Table 1: Building Exposure by Occupancy Type

Occupancy	Exposure ($1000)	Percent of Tot
Residential	1,585,261	84.71 %
Commercial	188,392	10.07%
Industrial	43,115	2.30%
Agricultural	7,152	0.38%
Religious	18,115	0.97%
Government	7,334	0.39%
Education	22,034	1.18%
Total	**1,871,403**	**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 6 schools, 3 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 145 buildings will be at least moderately damaged. This is over 3% of the total number of buildings in the region. There are an estimated 6 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.

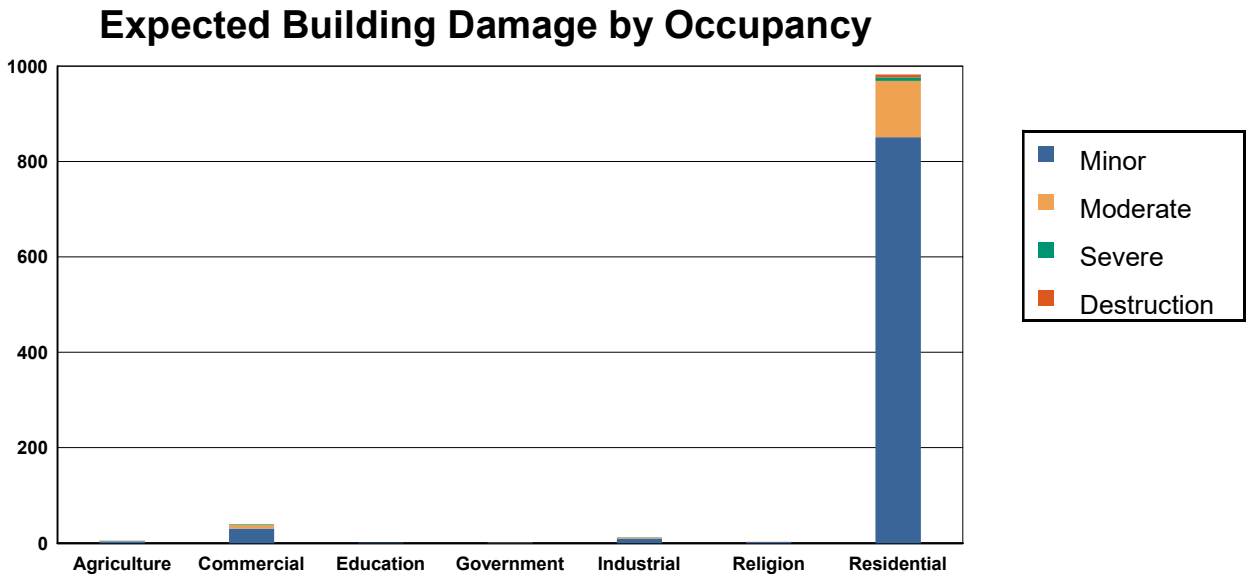


Table 2: Expected Building Damage by Occupancy : 200 - year Event

	None		Minor		Moderate		Severe		Destruction	
Occupancy	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**
Agriculture	20.92	80.48	3.60	13.86	0.96	3.69	0.46	1.78	0.05	0.19
Commercial	225.80	85.21	30.27	11.42	7.82	2.95	1.11	0.42	0.01	0.00
Education	9.82	89.25	1.03	9.40	0.14	1.29	0.01	0.06	0.00	0.00
Government	5.21	86.80	0.66	10.96	0.13	2.13	0.01	0.11	0.00	0.00
Industrial	77.84	86.48	9.71	10.79	2.13	2.37	0.30	0.34	0.02	0.02
Religion	19.03	86.51	2.58	11.71	0.37	1.68	0.02	0.10	0.00	0.00
Residential	3,752.46	79.25	850.98	17.97	118.00	2.49	7.49	0.16	6.08	0.13
Total	**4,111.07**		**898.83**		**129.55**		**9.40**		**6.15**	

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

Building Type	None		Minor		Moderate		Severe		Destruction	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Concrete	12	89.14	1	9.29	0	1.51	0	0.07	0	0.00
Masonry	188	81.47	34	14.59	8	3.44	1	0.43	0	0.07
MH	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Steel	154	86.79	18	9.92	5	2.80	1	0.50	0	0.00
Wood	3,570	79.32	811	18.01	108	2.40	7	0.15	6	0.13

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.

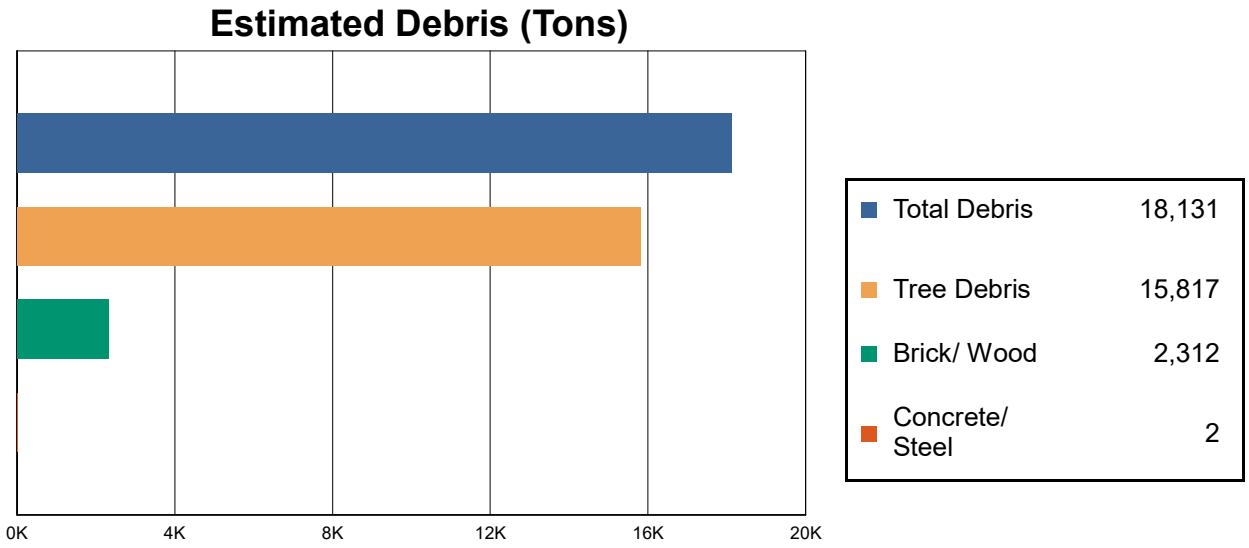
Thematic Map of Essential Facilities with greater than 50% moderate

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	3	0	0	3
Police Stations	1	0	0	1
Schools	6	0	0	6

Induced Hurricane Damage

Debris Generation

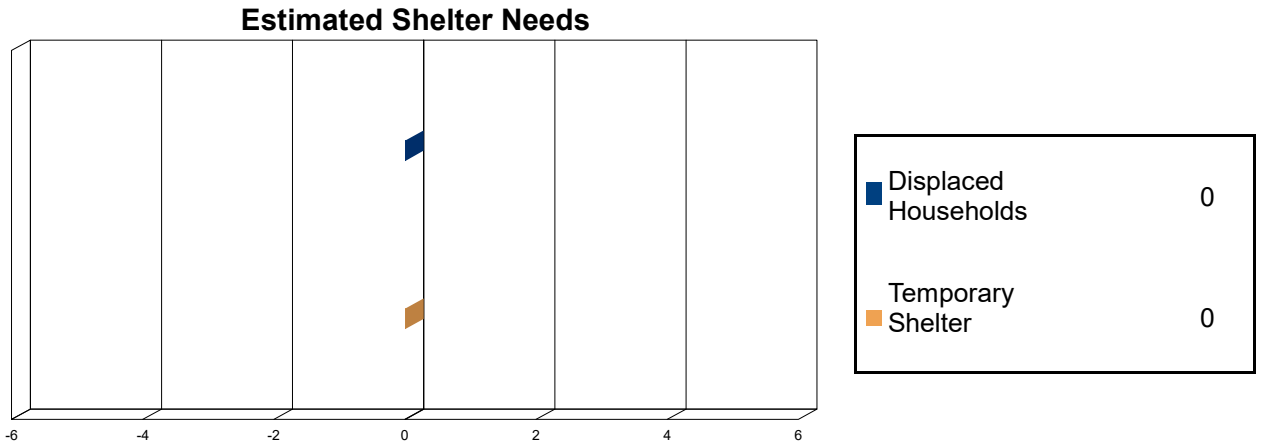


Hazus estimates the amount of debris that will be generated by the hurricane. The model breaks the debris into four general categories: a) Brick/Wood, b) Reinforced Concrete/Steel, c) Eligible Tree Debris, and d) Other Tree Debris. This distinction is made because of the different types of material handling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

The model estimates that a total of 18,131 tons of debris will be generated. Of the total amount, 12,203 tons (67%) is Other Tree Debris. Of the remaining 5,928 tons, Brick/Wood comprises 39% 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 93 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 3,614 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 7,603) will seek temporary shelter in public shelters.

Economic Loss

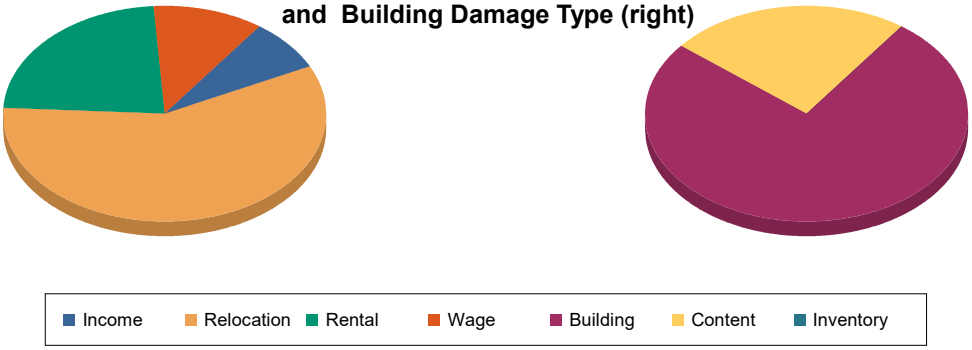
The total economic loss estimated for the hurricane is 39.9 million dollars, which represents 2.13 % of the total replacement value of the region's buildings.

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 40 million dollars. 6% 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

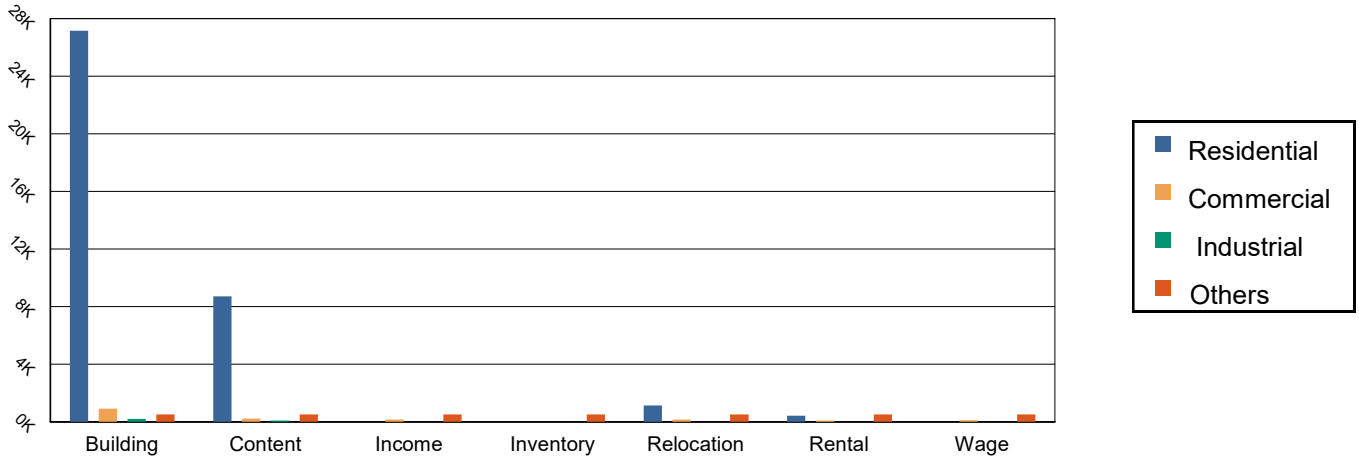


Table 5: Building-Related Economic Loss Estimates

(Thousands of dollars)

Category	Area	Residential	Commercial	Industrial	Others	Total
Property Damage						
	Building	27,151.28	904.05	201.26	248.25	28,504.85
	Content	8,710.84	220.53	96.14	58.52	9,086.02
	Inventory	0.00	5.79	14.33	2.91	23.03
	Subtotal	**35,862.12**	**1,130.37**	**311.73**	**309.67**	**37,613.90**
Business Interruption Loss						
	Income	0.00	148.57	2.84	27.71	179.13
	Relocation	1,138.72	148.07	13.06	42.24	1,342.08
	Rental	437.36	85.47	2.08	3.36	528.27
	Wage	0.00	121.07	4.63	131.76	257.46
	Subtotal	**1,576.08**	**503.19**	**22.61**	**205.07**	**2,306.94**

Total

Total	**37,438.20**	**1,633.56**	**334.34**	**514.74**	**39,920.83**

Appendix A: County Listing for the Region

Connecticut
- New London

Appendix B: Regional Population and Building Value Data

		Building Value (thousands of dollars)		
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New London	7,603	1,585,261	286,142	1,871,403
Total	**7,603**	**1,585,261**	**286,142**	**1,871,403**
Study Region Total	**7,603**	**1,585,261**	**286,142**	**1,871,403**

Hazus: Hurricane Global Risk Report

Region Name: OldLyme

Hurricane Scenario: Probabilistic 500-year Return Period

Print Date: Monday, October 7, 2019

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General Building Stock

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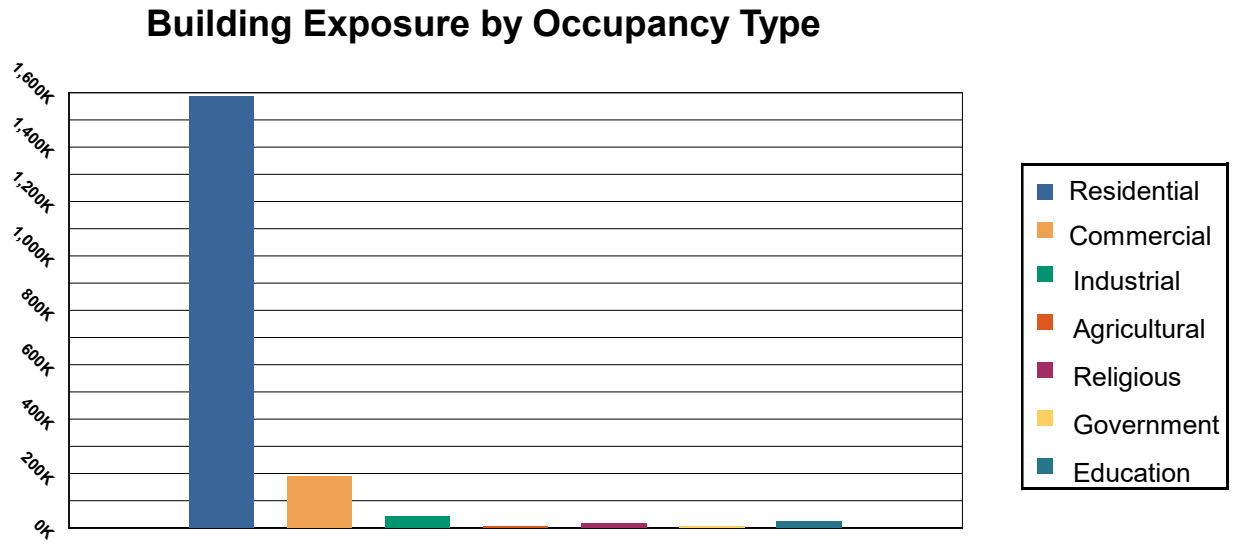

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Government	7,334	0.39%
Education	22,034	1.18%
Total	**1,871,403**	**100.00%**

Essential Facility Inventory

For essential facilities, there are no hospitals in the region with a total bed capacity of no beds. There are 6 schools, 3 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 490 buildings will be at least moderately damaged. This is over 10% of the total number of buildings in the region. There are an estimated 38 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.

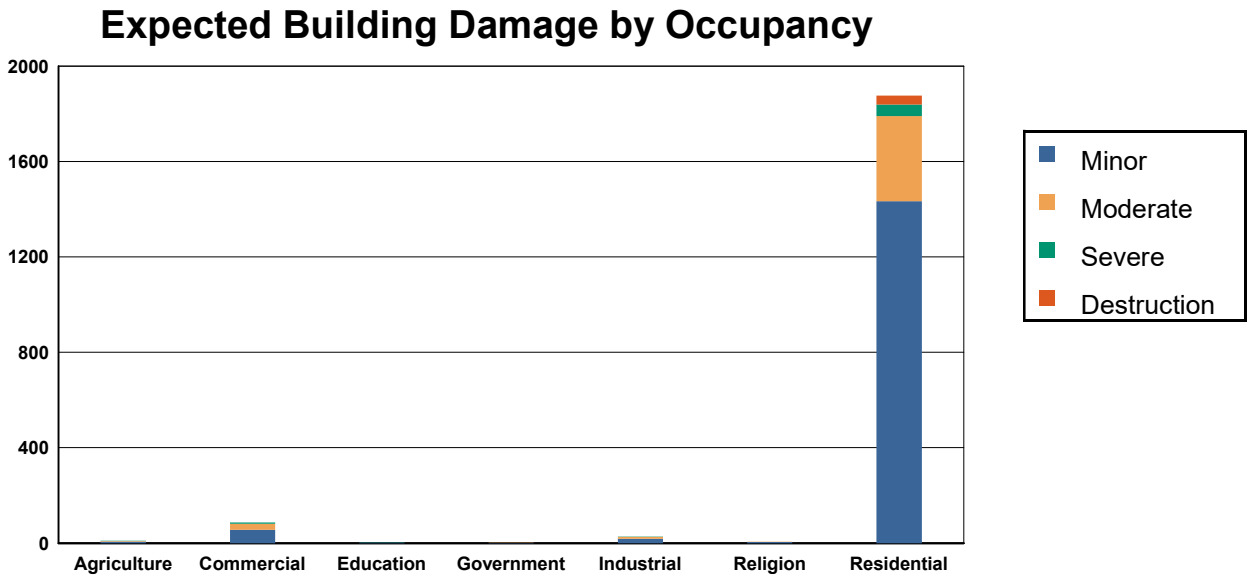


Table 2: Expected Building Damage by Occupancy : 500 - year Event

	None		Minor		Moderate		Severe		Destruction	
Occupancy	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**
Agriculture	15.86	60.99	6.31	24.26	2.43	9.33	1.21	4.66	0.20	0.76
Commercial	178.69	67.43	55.48	20.94	25.58	9.65	5.21	1.96	0.04	0.02
Education	8.11	73.73	2.11	19.18	0.71	6.47	0.07	0.63	0.00	0.00
Government	4.14	68.96	1.24	20.65	0.55	9.18	0.07	1.22	0.00	0.00
Industrial	62.07	68.97	18.03	20.03	8.21	9.12	1.62	1.79	0.07	0.08
Religion	15.22	69.18	5.01	22.77	1.59	7.21	0.19	0.85	0.00	0.00
Residential	2,859.04	60.38	1,433.83	30.28	355.93	7.52	48.83	1.03	37.37	0.79
Total	**3,143.13**		**1,522.00**		**394.99**		**57.19**		**37.68**	

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

Building Type	None		Minor		Moderate		Severe		Destruction	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Concrete	10	73.21	2	18.56	1	7.45	0	0.78	0	0.00
Masonry	147	63.42	57	24.77	23	9.79	4	1.61	1	0.41
MH	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Steel	124	69.51	33	18.34	17	9.74	4	2.39	0	0.02
Wood	2,719	60.42	1,372	30.48	330	7.32	45	1.00	35	0.79

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.

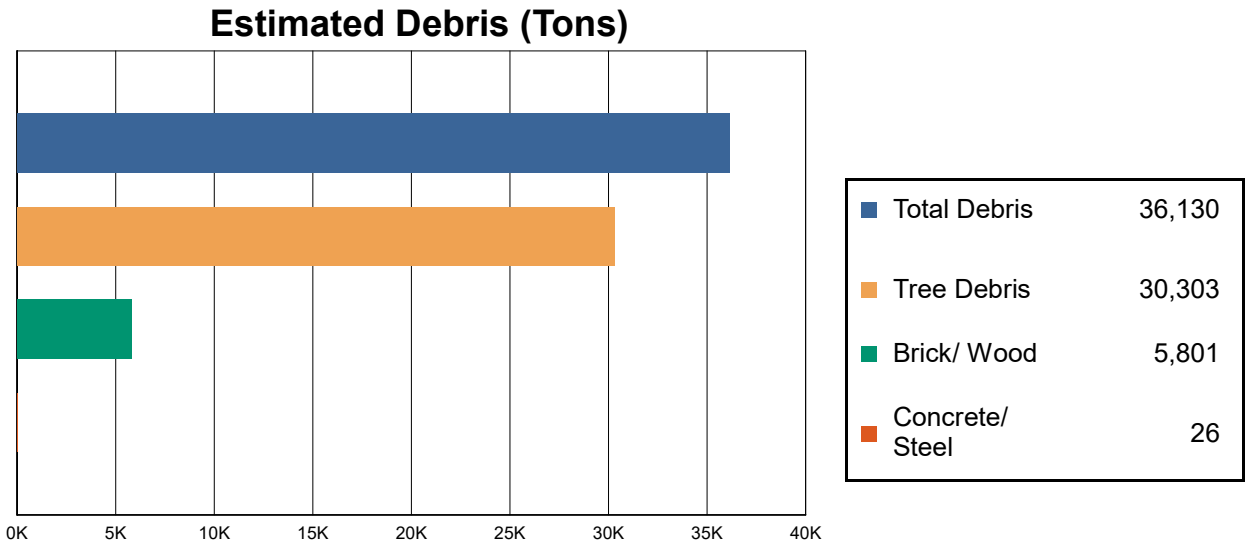
Thematic Map of Essential Facilities with greater than 50% moderate

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	3	0	0	3
Police Stations	1	0	0	1
Schools	6	0	0	0

Induced Hurricane Damage

Debris Generation

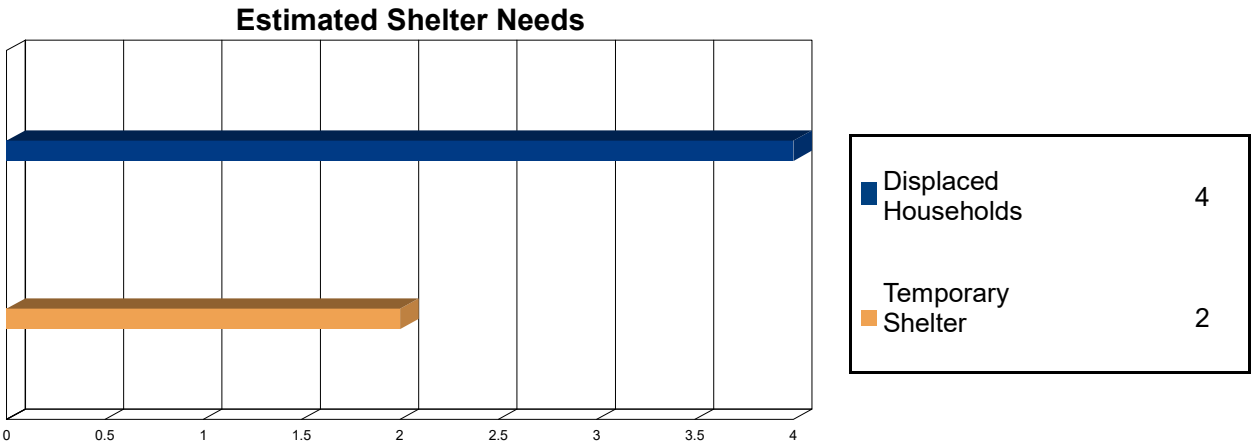


Hazus estimates the amount of debris that will be generated by the hurricane. The model breaks the debris into four general categories: a) Brick/Wood, b) Reinforced Concrete/Steel, c) Eligible Tree Debris, and d) Other Tree Debris. This distinction is made because of the different types of material handling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

The model estimates that a total of 36,130 tons of debris will be generated. Of the total amount, 23,360 tons (65%) is Other Tree Debris. Of the remaining 12,770 tons, Brick/Wood comprises 45% 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 233 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 6,943 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 4 households to be displaced due to the hurricane. Of these, 2 people (out of a total population of 7,603) will seek temporary shelter in public shelters.

Economic Loss

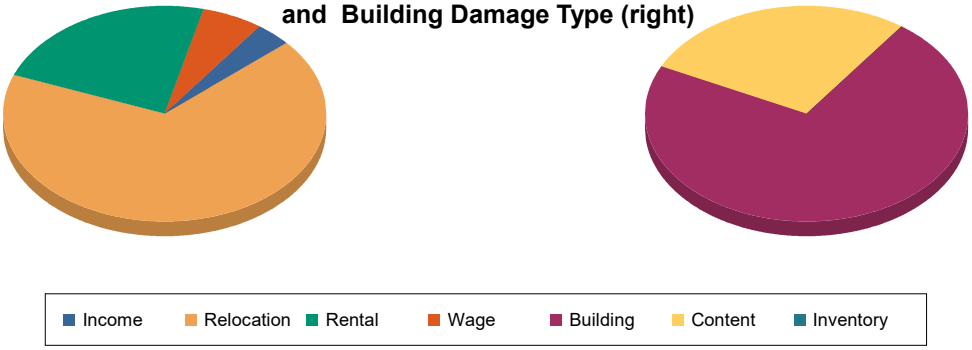
The total economic loss estimated for the hurricane is 107.2 million dollars, which represents 5.73 % of the total replacement value of the region's buildings.

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 107 million dollars. 8% 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 93% 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

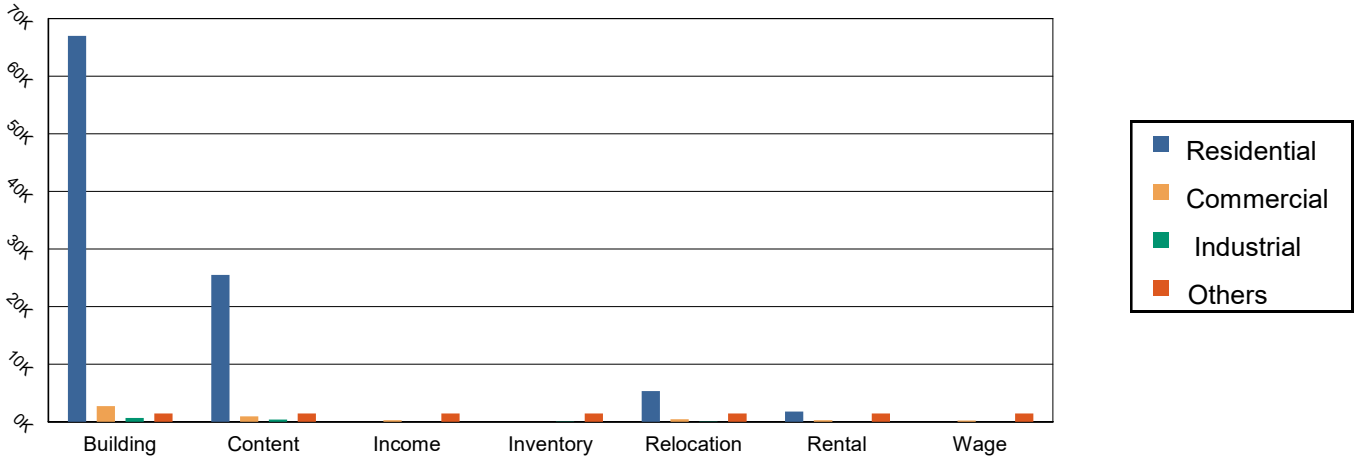


Table 5: Building-Related Economic Loss Estimates

(Thousands of dollars)

Category	Area	Residential	Commercial	Industrial	Others	Total
Property Damage						
	Building	67,012.64	2,701.97	657.73	737.44	71,109.78
	Content	25,501.11	957.50	385.06	243.17	27,086.83
	Inventory	0.00	24.40	54.94	9.31	88.65
	Subtotal	**92,513.75**	**3,683.86**	**1,097.72**	**989.92**	**98,285.25**
Business Interruption Loss						
	Income	0.34	263.41	7.20	46.86	317.81
	Relocation	5,316.86	460.31	50.49	131.29	5,958.94
	Rental	1,784.63	260.14	6.67	11.46	2,062.91
	Wage	0.79	232.20	11.81	285.69	530.49
	Subtotal	**7,102.61**	**1,216.06**	**76.17**	**475.30**	**8,870.14**

Total

Total	**99,616.36**	**4,899.92**	**1,173.90**	**1,465.22**	**107,155.40**

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- New London

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New London	7,603	1,585,261	286,142	1,871,403
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Hazus: Hurricane Global Risk Report

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Hurricane Scenario: Probabilistic 1000-year Return Period

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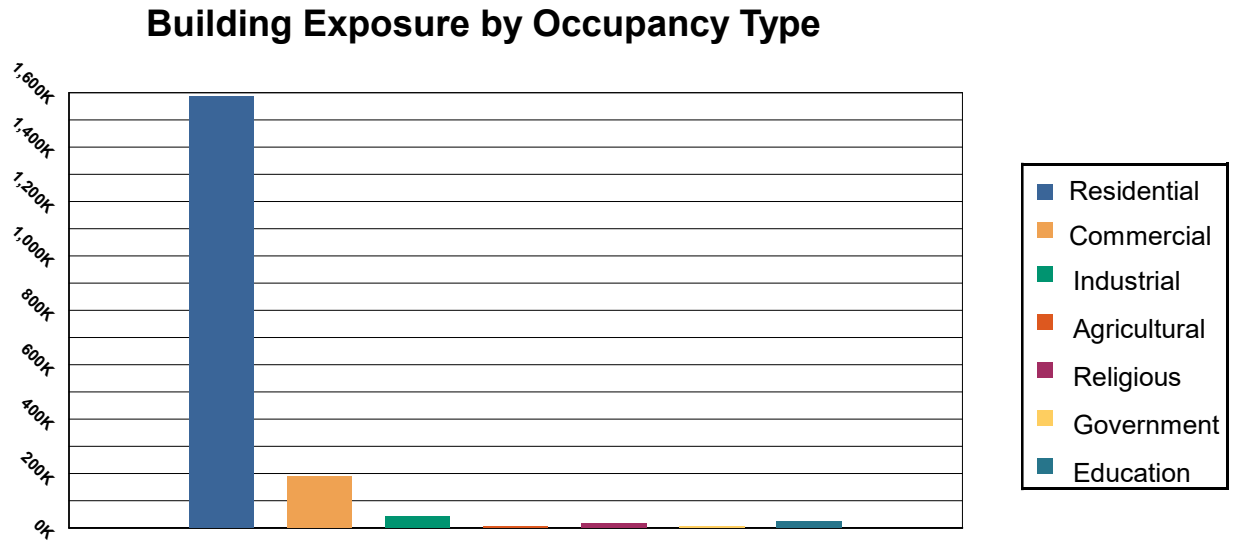

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Commercial	188,392	10.07%
Industrial	43,115	2.30%
Agricultural	7,152	0.38%
Religious	18,115	0.97%
Government	7,334	0.39%
Education	22,034	1.18%
Total	**1,871,403**	**100.00%**

Essential Facility Inventory

For essential facilities, there are no hospitals in the region with a total bed capacity of no beds. There are 6 schools, 3 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 832 buildings will be at least moderately damaged. This is over 16% of the total number of buildings in the region. There are an estimated 84 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.

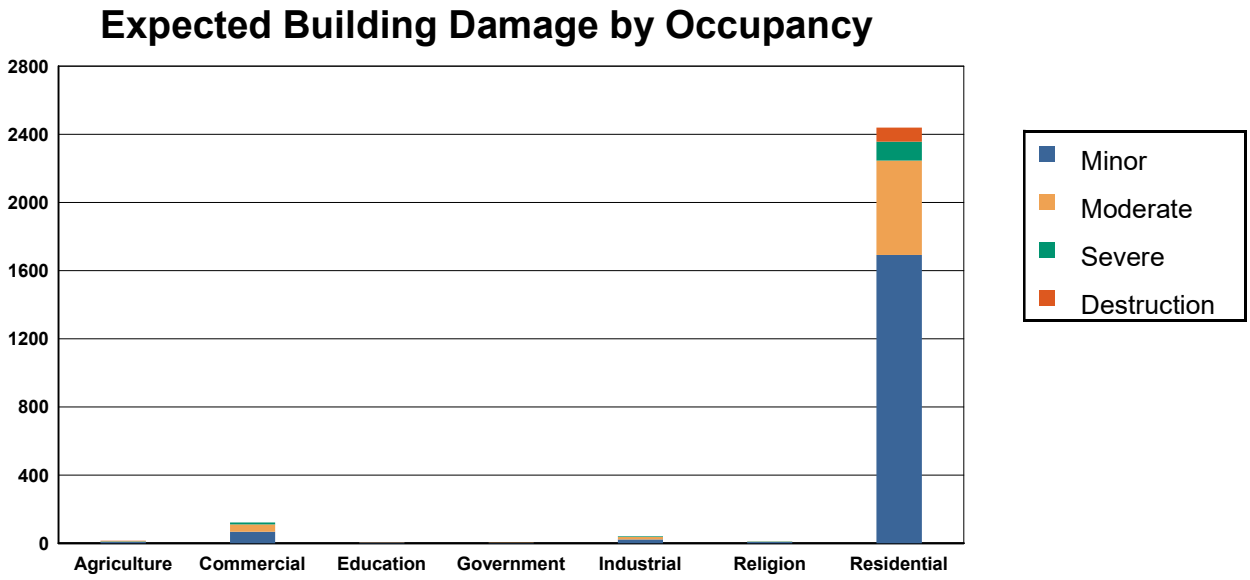


Table 2: Expected Building Damage by Occupancy : 1000 - year Event

	None		Minor		Moderate		Severe		Destruction	
Occupancy	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**
Agriculture	12.55	48.28	7.63	29.35	3.61	13.89	1.84	7.07	0.37	1.42
Commercial	143.33	54.09	67.57	25.50	42.55	16.06	11.45	4.32	0.11	0.04
Education	6.60	59.98	2.73	24.79	1.44	13.09	0.24	2.15	0.00	0.00
Government	3.26	54.34	1.50	25.06	1.01	16.77	0.23	3.84	0.00	0.00
Industrial	50.07	55.63	21.83	24.26	14.15	15.72	3.81	4.24	0.14	0.16
Religion	12.35	56.13	6.28	28.54	2.86	12.99	0.52	2.35	0.00	0.00
Residential	2,296.39	48.50	1,690.77	35.71	554.81	11.72	109.82	2.32	83.22	1.76
Total	**2,524.54**		**1,798.30**		**620.42**		**127.91**		**83.84**	

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

Building Type	None		Minor		Moderate		Severe		Destruction	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Concrete	8	59.87	3	23.22	2	14.37	0	2.54	0	0.00
Masonry	119	51.38	67	29.20	35	15.32	7	3.23	2	0.87
MH	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Steel	100	56.10	39	22.11	29	16.46	9	5.28	0	0.05
Wood	2,182	48.47	1,622	36.04	517	11.48	101	2.25	79	1.76

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.

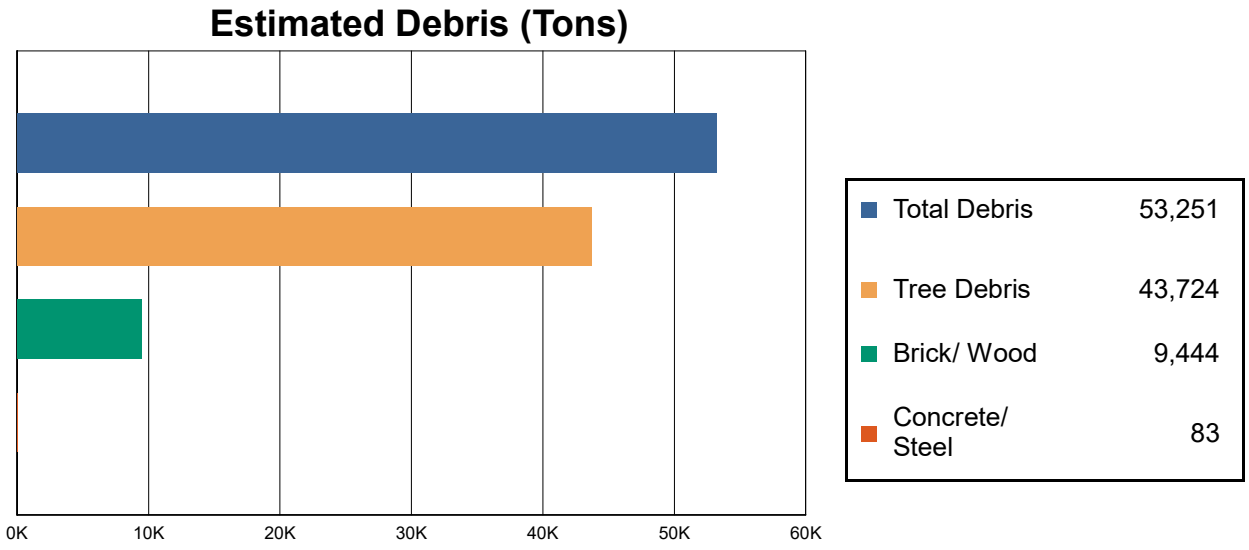
Thematic Map of Essential Facilities with greater than 50% moderate

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	3	0	0	3
Police Stations	1	0	0	1
Schools	6	0	0	0

Induced Hurricane Damage

Debris Generation

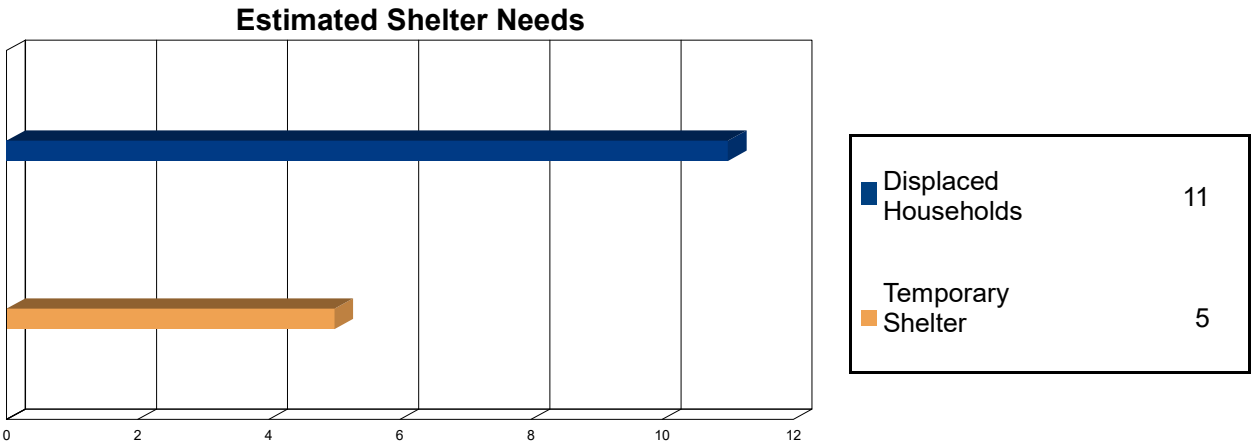


Hazus estimates the amount of debris that will be generated by the hurricane. The model breaks the debris into four general categories: a) Brick/Wood, b) Reinforced Concrete/Steel, c) Eligible Tree Debris, and d) Other Tree Debris. This distinction is made because of the different types of material handling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

The model estimates that a total of 53,251 tons of debris will be generated. Of the total amount, 33,722 tons (63%) is Other Tree Debris. Of the remaining 19,529 tons, Brick/Wood comprises 48% 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 381 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 10,002 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 11 households to be displaced due to the hurricane. Of these, 5 people (out of a total population of 7,603) will seek temporary shelter in public shelters.

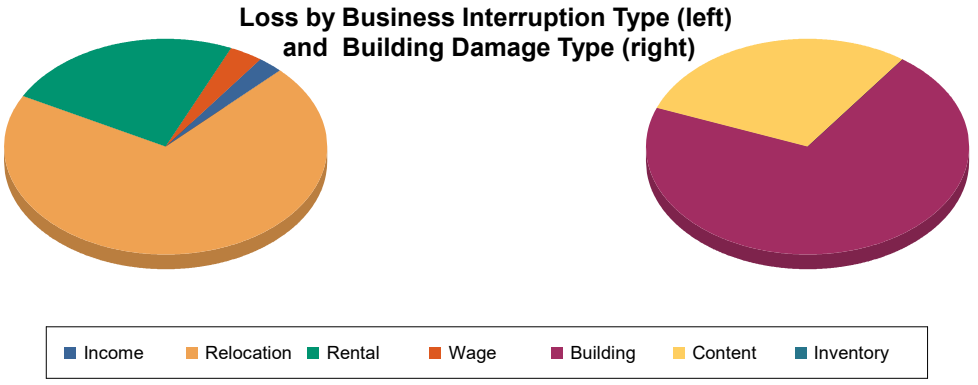
Economic Loss

The total economic loss estimated for the hurricane is 182.0 million dollars, which represents 9.72 % 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 182 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 93% of the total loss. Table 5 below provides a summary of the losses associated with the building damage.



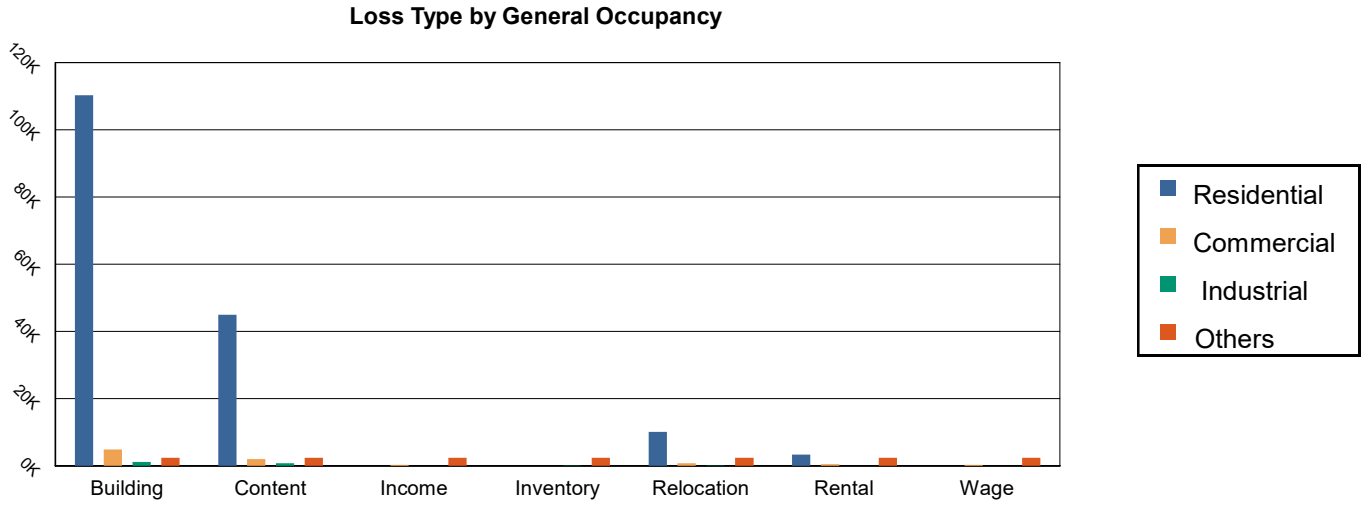


Table 5: Building-Related Economic Loss Estimates

(Thousands of dollars)

Category	Area	Residential	Commercial	Industrial	Others	Total
Property Damage						
	Building	110,273.02	4,825.83	1,196.94	1,307.71	117,603.51
	Content	44,980.78	1,969.10	757.57	501.44	48,208.89
	Inventory	0.00	46.48	105.54	15.63	167.65
	Subtotal	**155,253.80**	**6,841.42**	**2,060.04**	**1,824.79**	**165,980.06**
Business Interruption Loss						
	Income	1.25	333.65	12.18	40.37	387.46
	Relocation	10,097.39	820.81	94.06	235.46	11,247.73
	Rental	3,312.69	468.78	12.08	21.67	3,815.22
	Wage	2.93	301.75	20.02	229.38	554.07
	Subtotal	**13,414.26**	**1,925.00**	**138.34**	**526.88**	**16,004.47**

Total

Total	**168,668.06**	**8,766.41**	**2,198.38**	**2,351.67**	**181,984.53**

Appendix A: County Listing for the Region

Connecticut
- New London

Appendix B: Regional Population and Building Value Data

		Building Value (thousands of dollars)		
	Population	Residential	Non-Residential	Total
Connecticut				
New London	7,603	1,585,261	286,142	1,871,403
Total	**7,603**	**1,585,261**	**286,142**	**1,871,403**
Study Region Total	**7,603**	**1,585,261**	**286,142**	**1,871,403**

Hazus: Earthquake Global Risk Report

Region Name: OldLyme

Earthquake Scenario: Annualized

Print Date: October 17, 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 24.26 square miles and contains 2 census tracts. There are over 3 thousand households in the region which has a total population of 7,603 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 1,871 (millions of dollars). Approximately 92.00 % of the buildings (and 85.00% of the building value) are associated with residential housing.

The replacement value of the transportation and utility lifeline systems is estimated to be 441 and 16 (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 1,871 (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 88% 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 6 schools, 3 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 2 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 457.00 (millions of dollars). This inventory includes over 16.78 miles of highways, 17 bridges, 516.98 miles of pipes.

Table 1: Transportation System Lifeline Inventory

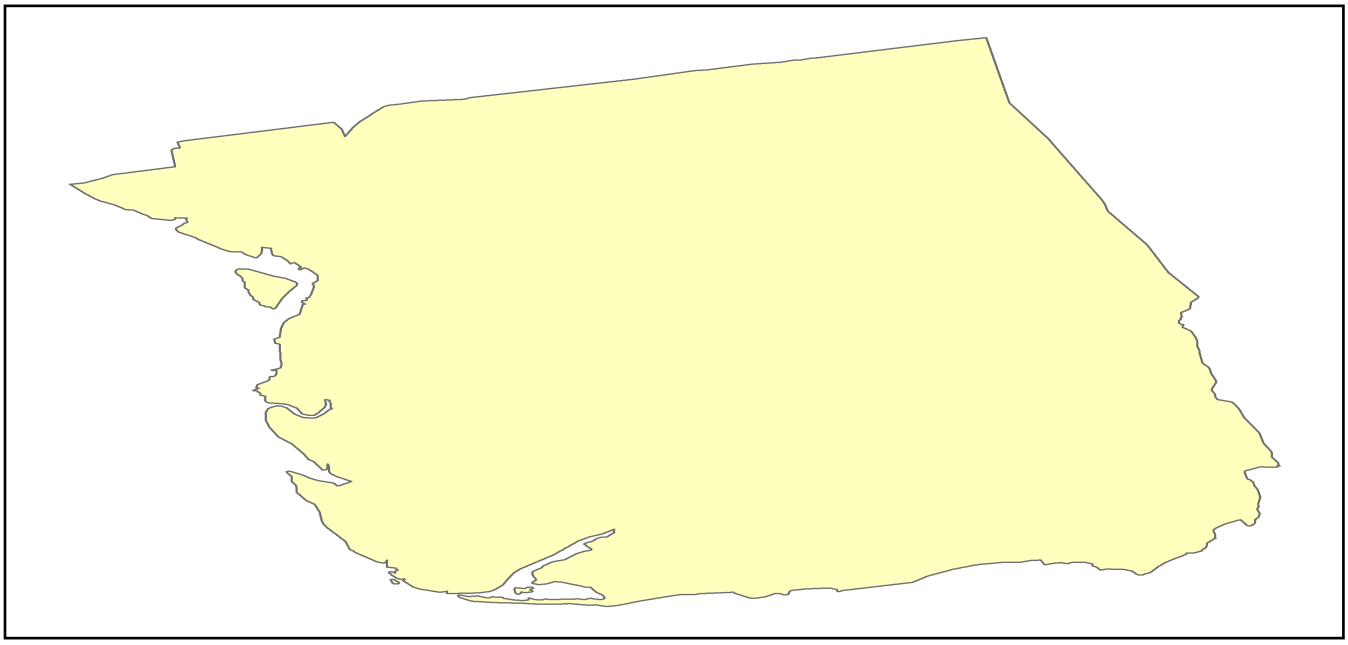
System	Component	# Locations/ # Segments	Replacement value (millions of dollars)
Highway	Bridges	17	196.8952
	Segments	8	187.0948
	Tunnels	0	0.0000
		Subtotal	**383.9900**
Railways	Bridges	0	0.0000
	Facilities	0	0.0000
	Segments	2	12.6164
	Tunnels	0	0.0000
		Subtotal	**12.6164**
Light Rail	Bridges	0	0.0000
	Facilities	0	0.0000
	Segments	2	44.5516
	Tunnels	0	0.0000
		Subtotal	**44.5516**
Bus	Facilities	0	0.0000
		Subtotal	**0.0000**
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	**441.20**

Table 2: Utility System Lifeline Inventory

System	Component	# Locations / Segments	Replacement value (millions of dollars)
Potable Water	Distribution Lines	NA	8.3256
	Facilities	0	0.0000
	Pipelines	0	0.0000
		Subtotal	**8.3256**
Waste Water	Distribution Lines	NA	4.9953
	Facilities	0	0.0000
	Pipelines	0	0.0000
		Subtotal	**4.9953**
Natural Gas	Distribution Lines	NA	3.3302
	Facilities	0	0.0000
	Pipelines	0	0.0000
		Subtotal	**3.3302**
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	**16.70**

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 7 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

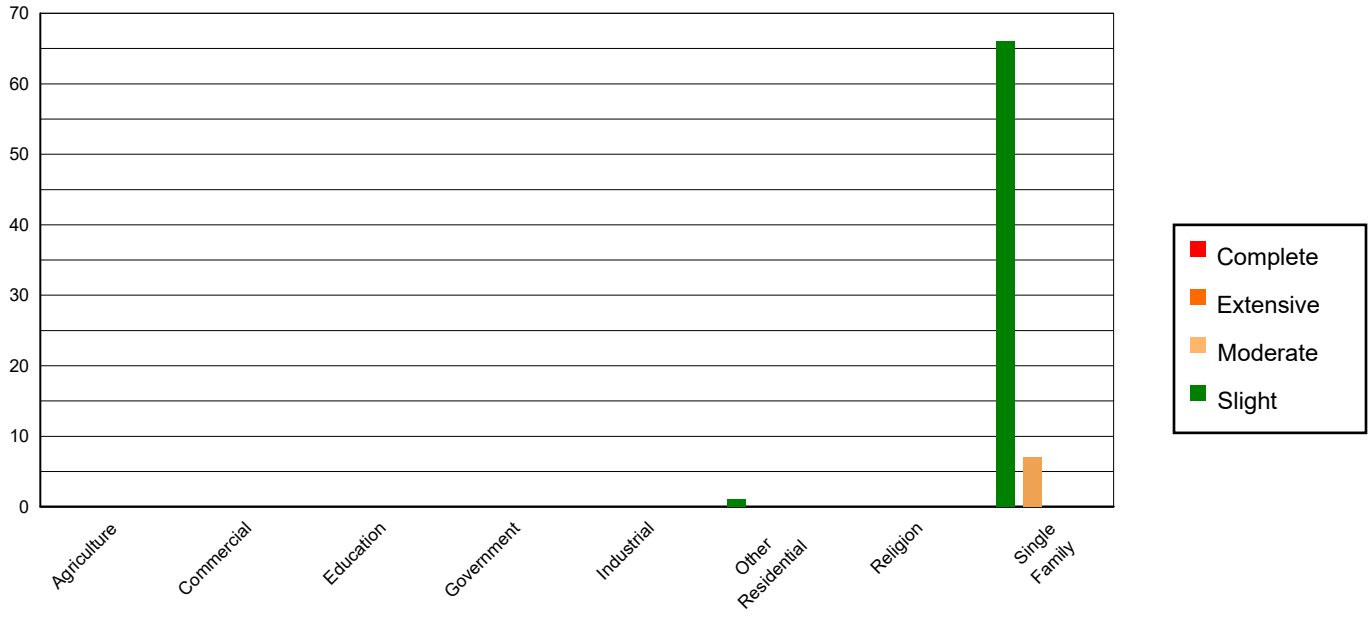


Table 3: Expected Building Damage by Occupancy

	None		Slight		Moderate		Extensive		Complete	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Agriculture	13.00	0.27	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Commercial	143.00	2.96	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	35.00	0.73	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Other Residential	158.00	3.28	1.00	1.49	0.00	0.00	0.00	0.00	0.00	0.00
Religion	12.00	0.25	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Single Family	4463.00	92.52	66.00	98.51	7.00	100.00	0.00	0.00	0.00	0.00
Total	**4,824**		**67**		**7**		**0**		**0**	

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

	None		Slight		Moderate		Extensive		Complete	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Wood	4466.00	92.58	56.00	83.58	4.00	57.14	0.00	0.00	0.00	0.00
Steel	94.00	1.95	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Concrete	6.00	0.12	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Precast	2.00	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
RM	13.00	0.27	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
URM	243.00	5.04	11.00	16.42	3.00	42.86	0.00	0.00	0.00	0.00
MH	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	**4,824**		**67**		**7**		**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	6	0	0	6
EOCs	1	0	0	1
PoliceStations	1	0	0	1
FireStations	3	0	0	3

Transportation Lifeline Damage

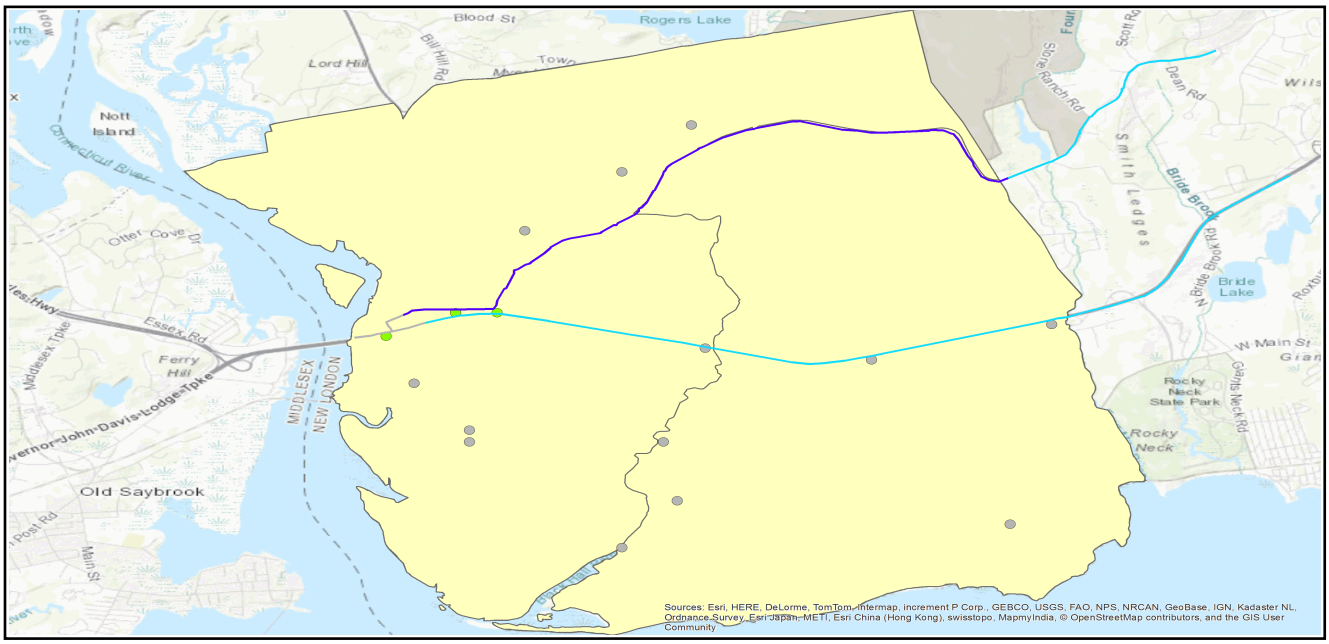


Table 6: Expected Damage to the Transportation Systems

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	8	0	0	6	6
	Bridges	17	0	0	17	17
	Tunnels	0	0	0	0	0
Railways	Segments	2	0	0	2	2
	Bridges	0	0	0	0	0
	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	0	0	0	0	0
Bus	Facilities	0	0	0	0	0
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	259	0	0
Waste Water	155	0	0
Natural Gas	103	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 74.00% 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 0 households to be displaced due to the earthquake. Of these, 0 people (out of a total population of 7,603) 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
0	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

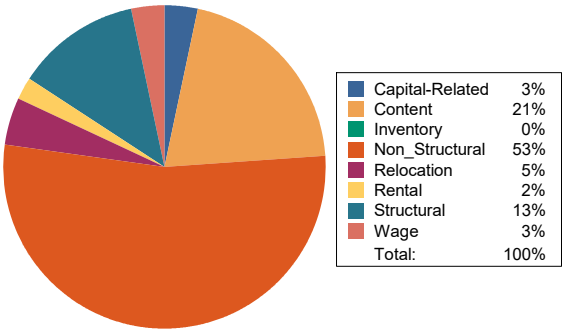
The total economic loss estimated for the earthquake is 0.05 (millions of dollars), which includes building and lifeline related losses based on the region's available inventory. The following three sections provide more detailed information about these losses.

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 0.02 (millions of dollars); 14 % 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 66 % 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)

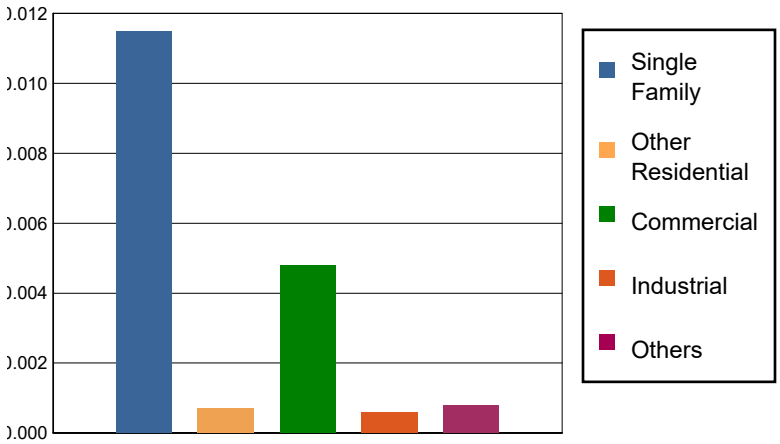


Table 11: Building-Related Economic Loss Estimates

(Millions of dollars)

Category	Area	Single Family	Other Residential	Commercial	Industrial	Others	Total
Income Losses							
	Wage	0.0000	0.0000	0.0006	0.0000	0.0000	0.0006
	Capital-Related	0.0000	0.0000	0.0006	0.0000	0.0000	0.0006
	Rental	0.0001	0.0000	0.0003	0.0000	0.0000	0.0004
	Relocation	0.0004	0.0000	0.0004	0.0000	0.0001	0.0009
	Subtotal	**0.0005**	**0.0000**	**0.0019**	**0.0000**	**0.0001**	**0.0025**
Capital Stock Losses							
	Structural	0.0014	0.0001	0.0006	0.0001	0.0001	0.0023
	Non_Structural	0.0071	0.0005	0.0015	0.0003	0.0004	0.0098
	Content	0.0025	0.0001	0.0008	0.0002	0.0002	0.0038
	Inventory	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	Subtotal	**0.0110**	**0.0007**	**0.0029**	**0.0006**	**0.0007**	**0.0159**
	Total	**0.01**	**0.00**	**0.00**	**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	187.0948	0.0000	0.00
	Bridges	196.8952	0.0345	0.02
	Tunnels	0.0000	0.0000	0.00
	Subtotal	**383.9900**	**0.0345**	
Railways	Segments	12.6164	0.0000	0.00
	Bridges	0.0000	0.0000	0.00
	Tunnels	0.0000	0.0000	0.00
	Facilities	0.0000	0.0000	0.00
	Subtotal	**12.6164**	**0.0000**	
Light Rail	Segments	44.5516	0.0000	0.00
	Bridges	0.0000	0.0000	0.00
	Tunnels	0.0000	0.0000	0.00
	Facilities	0.0000	0.0000	0.00
	Subtotal	**44.5516**	**0.0000**	
Bus	Facilities	0.0000	0.0000	0.00
	Subtotal	**0.0000**	**0.0000**	
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	**441.16**	**0.03**	

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	8.3256	0.0000	0.00
	Subtotal	**8.3256**	**0.0000**	
Waste Water	Pipelines	0.0000	0.0000	0.00
	Facilities	0.0000	0.0000	0.00
	Distribution Lines	4.9953	0.0000	0.00
	Subtotal	**4.9953**	**0.0000**	
Natural Gas	Pipelines	0.0000	0.0000	0.00
	Facilities	0.0000	0.0000	0.00
	Distribution Lines	3.3302	0.0000	0.00
	Subtotal	**3.3302**	**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	**16.65**	**0.00**	

Appendix A: County Listing for the Region

New London,CT

Appendix B: Regional Population and Building Value Data

State	County Name	Population	Building Value (millions of dollars)		
			Residential	Non-Residential	Total
Connecticut					
	New London	7,603	1,585	286	1,871
Total Region		**7,603**	**1,585**	**286**	**1,871**

Hazus: Earthquake Global Risk Report

Region Name: OldLyme

Earthquake Scenario: EastHaddam

Print Date: October 17, 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 24.26 square miles and contains 2 census tracts. There are over 3 thousand households in the region which has a total population of 7,603 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 1,871 (millions of dollars). Approximately 92.00 % of the buildings (and 85.00% of the building value) are associated with residential housing.

The replacement value of the transportation and utility lifeline systems is estimated to be 441 and 16 (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 1,871 (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 88% 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 6 schools, 3 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 2 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 457.00 (millions of dollars). This inventory includes over 16.78 miles of highways, 17 bridges, 516.98 miles of pipes.

Table 1: Transportation System Lifeline Inventory

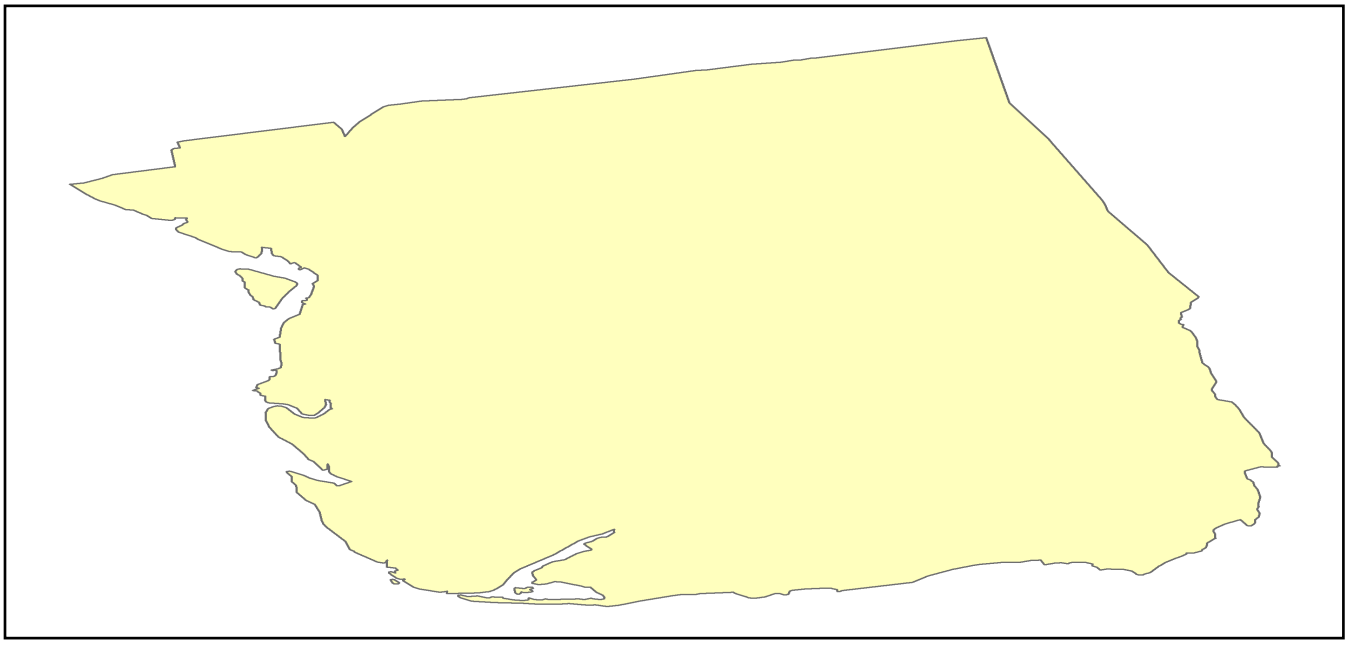
System	Component	# Locations/ # Segments	Replacement value (millions of dollars)
Highway	Bridges	17	196.8952
	Segments	8	187.0948
	Tunnels	0	0.0000
		Subtotal	**383.9900**
Railways	Bridges	0	0.0000
	Facilities	0	0.0000
	Segments	2	12.6164
	Tunnels	0	0.0000
		Subtotal	**12.6164**
Light Rail	Bridges	0	0.0000
	Facilities	0	0.0000
	Segments	2	44.5516
	Tunnels	0	0.0000
		Subtotal	**44.5516**
Bus	Facilities	0	0.0000
		Subtotal	**0.0000**
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	**441.20**

Table 2: Utility System Lifeline Inventory

System	Component	# Locations / Segments	Replacement value (millions of dollars)
Potable Water	Distribution Lines	NA	8.3256
	Facilities	0	0.0000
	Pipelines	0	0.0000
		Subtotal	**8.3256**
Waste Water	Distribution Lines	NA	4.9953
	Facilities	0	0.0000
	Pipelines	0	0.0000
		Subtotal	**4.9953**
Natural Gas	Distribution Lines	NA	3.3302
	Facilities	0	0.0000
	Pipelines	0	0.0000
		Subtotal	**3.3302**
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	**16.70**

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 1,395 buildings will be at least moderately damaged. This is over 27.00 % of the buildings in the region. There are an estimated 184 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

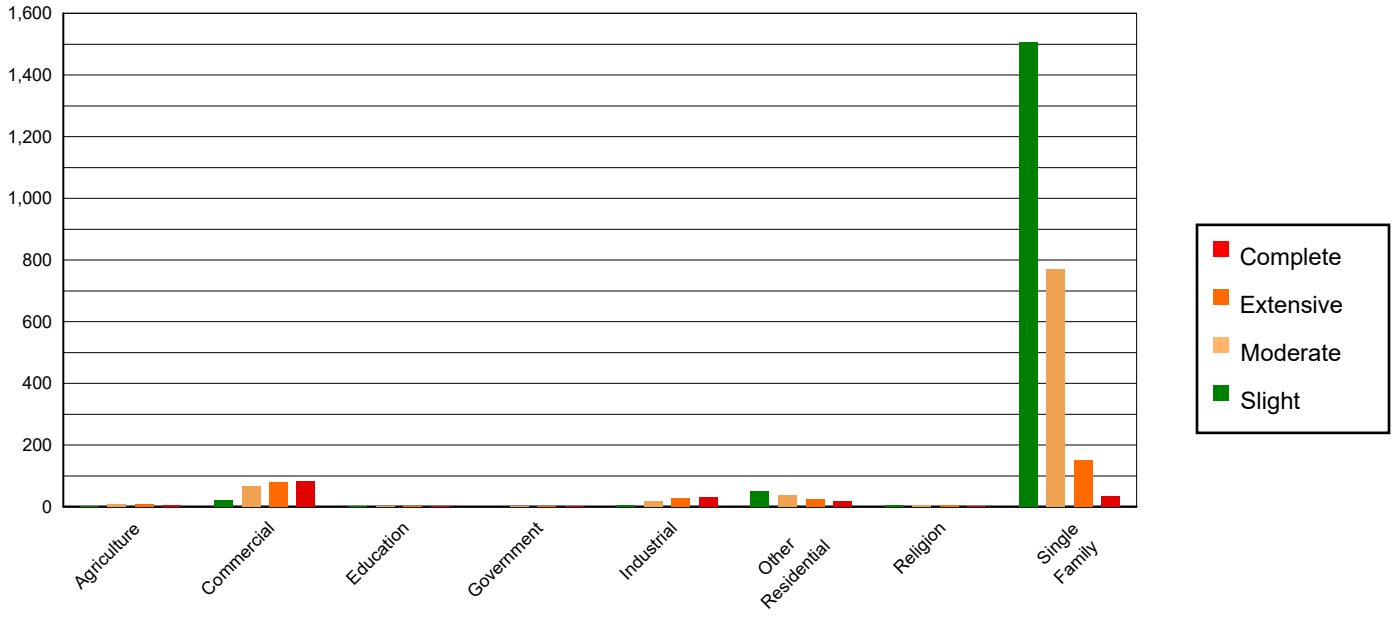


Table 3: Expected Building Damage by Occupancy

	None		Slight		Moderate		Extensive		Complete	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Agriculture	1.17	0.05	2.60	0.16	7.87	0.87	7.49	2.47	6.88	3.74
Commercial	12.98	0.60	22.41	1.41	64.93	7.15	80.73	26.65	83.95	45.56
Education	0.53	0.02	0.88	0.06	2.56	0.28	3.45	1.14	3.58	1.94
Government	0.22	0.01	0.37	0.02	1.20	0.13	1.92	0.63	2.30	1.25
Industrial	3.61	0.17	5.91	0.37	19.06	2.10	28.75	9.49	32.67	17.73
Other Residential	63.42	2.93	48.76	3.06	37.92	4.18	23.68	7.82	17.22	9.35
Religion	4.92	0.23	4.36	0.27	4.79	0.53	4.20	1.39	3.73	2.02
Single Family	2079.67	95.99	1508.05	94.65	769.68	84.77	152.68	50.41	33.92	18.41
Total	**2,167**		**1,593**		**908**		**303**		**184**	

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

	None		Slight		Moderate		Extensive		Complete	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Wood	2114.16	97.58	1523.95	95.65	766.73	84.44	137.11	45.27	19.47	10.57
Steel	3.62	0.17	6.42	0.40	32.52	3.58	67.13	22.16	85.85	46.59
Concrete	0.58	0.03	1.04	0.07	5.57	0.61	11.41	3.77	13.89	7.54
Precast	0.24	0.01	0.35	0.02	1.85	0.20	3.78	1.25	5.93	3.22
RM	2.54	0.12	2.54	0.16	10.59	1.17	17.36	5.73	15.82	8.58
URM	45.38	2.09	59.04	3.71	90.73	9.99	66.10	21.82	43.30	23.50
MH	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	**2,167**		**1,593**		**908**		**303**		**184**	

*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	6	6	0	0
EOCs	1	1	0	0
PoliceStations	1	1	0	0
FireStations	3	3	0	0

Transportation Lifeline Damage

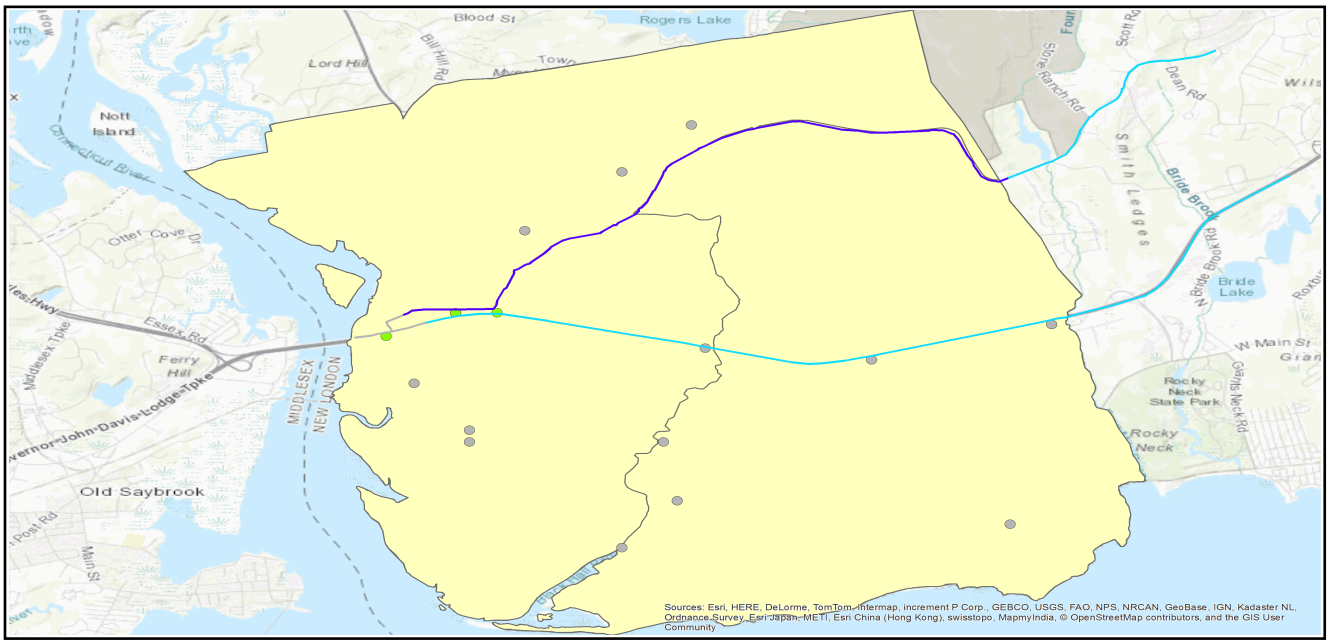


Table 6: Expected Damage to the Transportation Systems

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	8	0	0	6	6
	Bridges	17	4	0	13	14
	Tunnels	0	0	0	0	0
Railways	Segments	2	0	0	2	2
	Bridges	0	0	0	0	0
	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	0	0	0	0	0
Bus	Facilities	0	0	0	0	0
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	259	0	0
Waste Water	155	0	0
Natural Gas	103	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

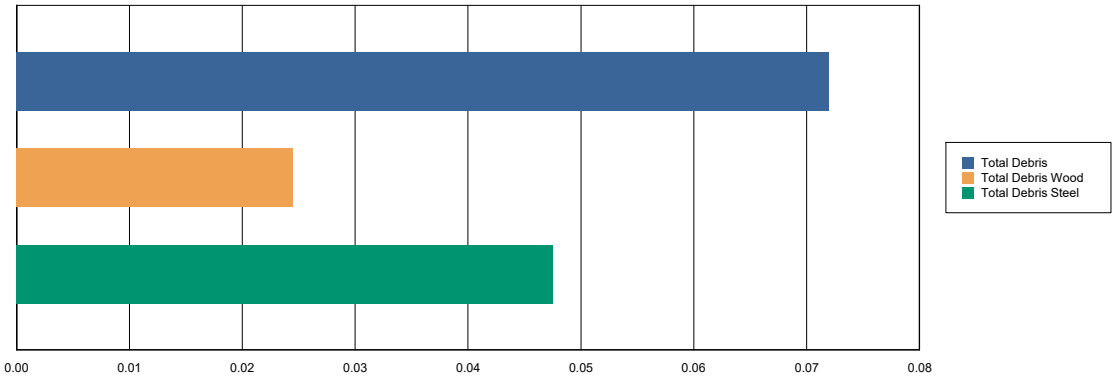
Fires often occur after an earthquake. Because of the number of fires and the lack of water to fight the fires, they can often burn out of control. Hazus uses a Monte Carlo simulation model to estimate the number of ignitions and the amount of burnt area. For this scenario, the model estimates that there 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 72,000 tons of debris will be generated. Of the total amount, Brick/Wood comprises 34.00% 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 2,880 truckloads (@25 tons/truck) to remove the debris generated by the earthquake.

Earthquake Debris (millions of tons)



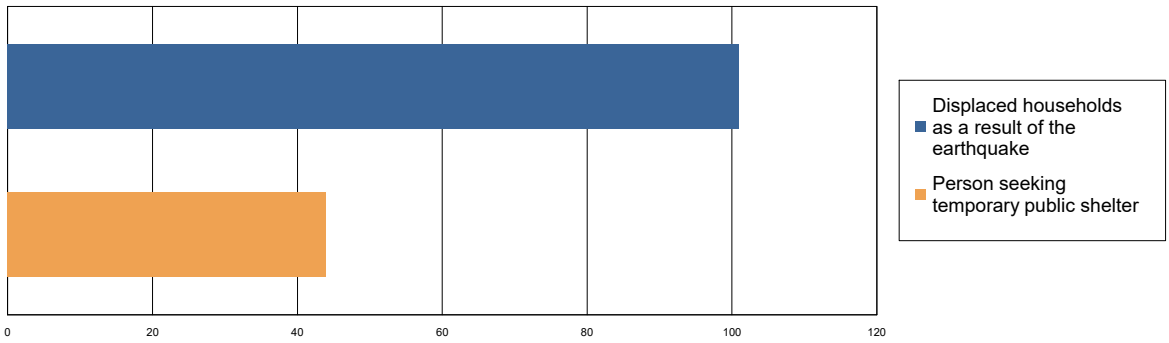
Brick/ Wood	Reinforced Concrete/Steel	Total Debris	Truck Load
0.02	0.05	0.07	2,880 (@25 tons/truck)

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 101 households to be displaced due to the earthquake. Of these, 44 people (out of a total population of 7,603) 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
101	44

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	1.67	0.49	0.07	0.15
	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	3.01	0.91	0.14	0.28
	Other-Residential	6.73	1.99	0.33	0.65
	Single Family	13.70	2.75	0.33	0.63
	Total	**25**	**6**	**1**	**2**
2 PM	Commercial	98.11	28.77	4.42	8.63
	Commuting	0.07	0.09	0.15	0.03
	Educational	38.31	11.58	1.90	3.71
	Hotels	0.00	0.00	0.00	0.00
	Industrial	22.30	6.71	1.06	2.07
	Other-Residential	1.48	0.44	0.07	0.14
	Single Family	3.07	0.64	0.08	0.15
	Total	**163**	**48**	**8**	**15**
5 PM	Commercial	69.91	20.48	3.17	6.10
	Commuting	1.27	1.68	2.86	0.55
	Educational	4.04	1.22	0.20	0.39
	Hotels	0.00	0.00	0.00	0.00
	Industrial	13.94	4.19	0.66	1.29
	Other-Residential	2.66	0.78	0.13	0.25
	Single Family	5.43	1.13	0.14	0.26
	Total	**97**	**29**	**7**	**9**

Economic Loss

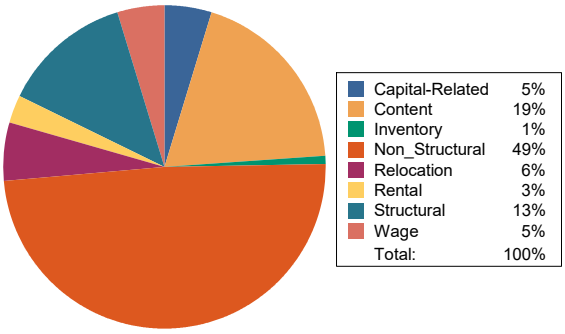
The total economic loss estimated for the earthquake is 386.93 (millions of dollars), which includes building and lifeline related losses based on the region's available inventory. The following three sections provide more detailed information about these losses.

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 352.28 (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 43 % 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)

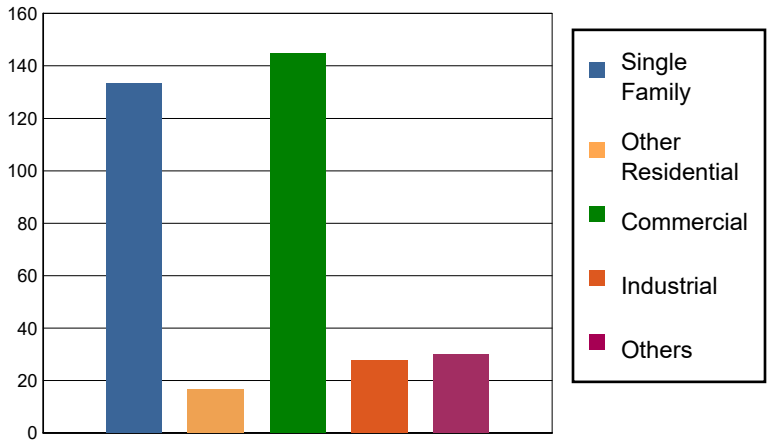


Table 11: Building-Related Economic Loss Estimates

(Millions of dollars)

Category	Area	Single Family	Other Residential	Commercial	Industrial	Others	Total
Income Losses							
	Wage	0.0000	0.1254	14.6929	0.5287	1.0037	16.3507
	Capital-Related	0.0000	0.0535	15.6143	0.3108	0.2067	16.1853
	Rental	2.0793	1.3511	5.8982	0.1335	0.3350	9.7971
	Relocation	7.4395	0.8744	8.4678	0.7545	2.8854	20.4216
	Subtotal	**9.5188**	**2.4044**	**44.6732**	**1.7275**	**4.4308**	**62.7547**
Capital Stock Losses							
	Structural	17.0217	1.9158	18.6521	3.6900	5.2763	46.5559
	Non_Structural	78.8291	10.0178	56.4043	13.2392	14.0670	172.5574
	Content	27.8337	2.2712	24.4910	7.5531	6.2675	68.4165
	Inventory	0.0000	0.0000	0.5805	1.3142	0.1046	1.9993
	Subtotal	**123.6845**	**14.2048**	**100.1279**	**25.7965**	**25.7154**	**289.5291**
	Total	**133.20**	**16.61**	**144.80**	**27.52**	**30.15**	**352.28**

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	187.0948	0.0000	0.00
	Bridges	196.8952	34.6409	17.59
	Tunnels	0.0000	0.0000	0.00
	Subtotal	**383.9900**	**34.6409**	
Railways	Segments	12.6164	0.0000	0.00
	Bridges	0.0000	0.0000	0.00
	Tunnels	0.0000	0.0000	0.00
	Facilities	0.0000	0.0000	0.00
	Subtotal	**12.6164**	**0.0000**	
Light Rail	Segments	44.5516	0.0000	0.00
	Bridges	0.0000	0.0000	0.00
	Tunnels	0.0000	0.0000	0.00
	Facilities	0.0000	0.0000	0.00
	Subtotal	**44.5516**	**0.0000**	
Bus	Facilities	0.0000	0.0000	0.00
	Subtotal	**0.0000**	**0.0000**	
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	**441.16**	**34.64**	

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	8.3256	0.0000	0.00
	Subtotal	**8.3256**	**0.0000**	
Waste Water	Pipelines	0.0000	0.0000	0.00
	Facilities	0.0000	0.0000	0.00
	Distribution Lines	4.9953	0.0000	0.00
	Subtotal	**4.9953**	**0.0000**	
Natural Gas	Pipelines	0.0000	0.0000	0.00
	Facilities	0.0000	0.0000	0.00
	Distribution Lines	3.3302	0.0000	0.00
	Subtotal	**3.3302**	**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	**16.65**	**0.00**	

Appendix A: County Listing for the Region

New London,CT

Appendix B: Regional Population and Building Value Data

State	County Name	Population	Building Value (millions of dollars)		
			Residential	Non-Residential	Total
Connecticut					
	New London	7,603	1,585	286	1,871
Total Region		**7,603**	**1,585**	**286**	**1,871**

Hazus: Earthquake Global Risk Report

Region Name: OldLyme

Earthquake Scenario: Haddam

Print Date: October 17, 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 24.26 square miles and contains 2 census tracts. There are over 3 thousand households in the region which has a total population of 7,603 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 1,871 (millions of dollars). Approximately 92.00 % of the buildings (and 85.00% of the building value) are associated with residential housing.

The replacement value of the transportation and utility lifeline systems is estimated to be 441 and 16 (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 1,871 (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 88% 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 6 schools, 3 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 2 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 457.00 (millions of dollars). This inventory includes over 16.78 miles of highways, 17 bridges, 516.98 miles of pipes.

Table 1: Transportation System Lifeline Inventory

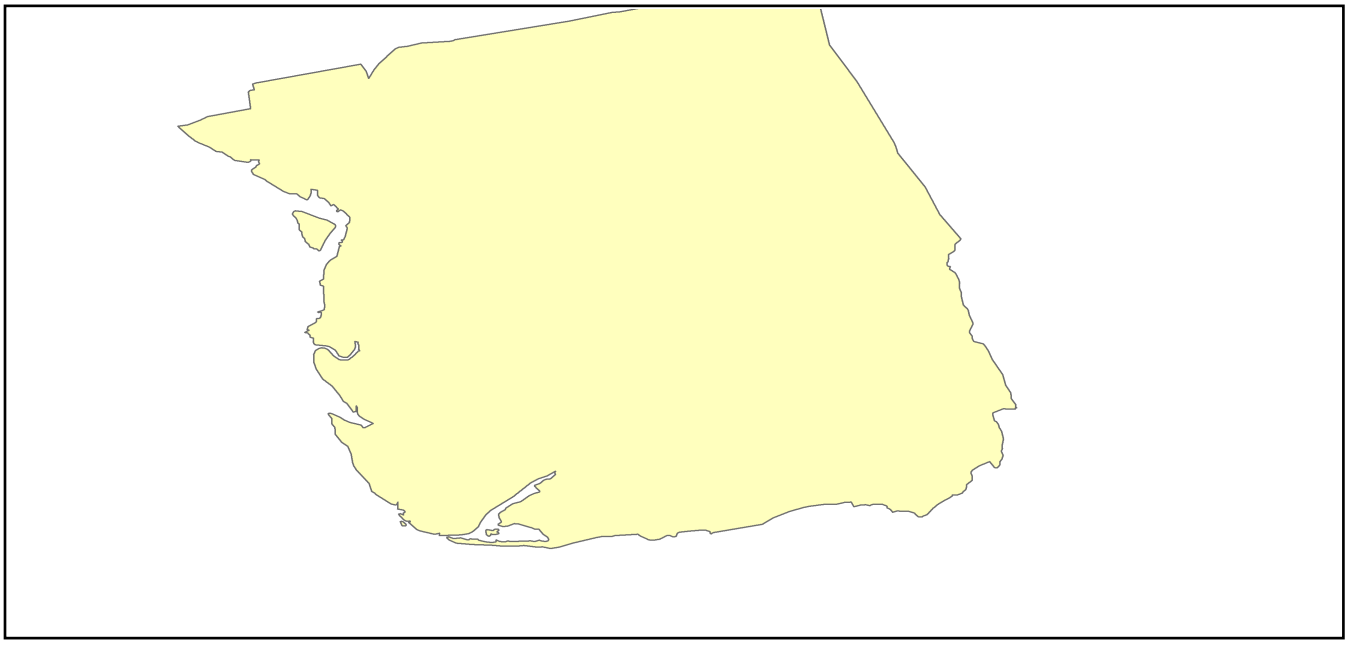
System	Component	# Locations/ # Segments	Replacement value (millions of dollars)
Highway	Bridges	17	196.8952
	Segments	8	187.0948
	Tunnels	0	0.0000
		Subtotal	**383.9900**
Railways	Bridges	0	0.0000
	Facilities	0	0.0000
	Segments	2	12.6164
	Tunnels	0	0.0000
		Subtotal	**12.6164**
Light Rail	Bridges	0	0.0000
	Facilities	0	0.0000
	Segments	2	44.5516
	Tunnels	0	0.0000
		Subtotal	**44.5516**
Bus	Facilities	0	0.0000
		Subtotal	**0.0000**
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	**441.20**

Table 2: Utility System Lifeline Inventory

System	Component	# Locations / Segments	Replacement value (millions of dollars)
Potable Water	Distribution Lines	NA	8.3256
	Facilities	0	0.0000
	Pipelines	0	0.0000
		Subtotal	**8.3256**
Waste Water	Distribution Lines	NA	4.9953
	Facilities	0	0.0000
	Pipelines	0	0.0000
		Subtotal	**4.9953**
Natural Gas	Distribution Lines	NA	3.3302
	Facilities	0	0.0000
	Pipelines	0	0.0000
		Subtotal	**3.3302**
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	**16.70**

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 401 buildings will be at least moderately damaged. This is over 8.00 % of the buildings in the region. There are an estimated 12 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

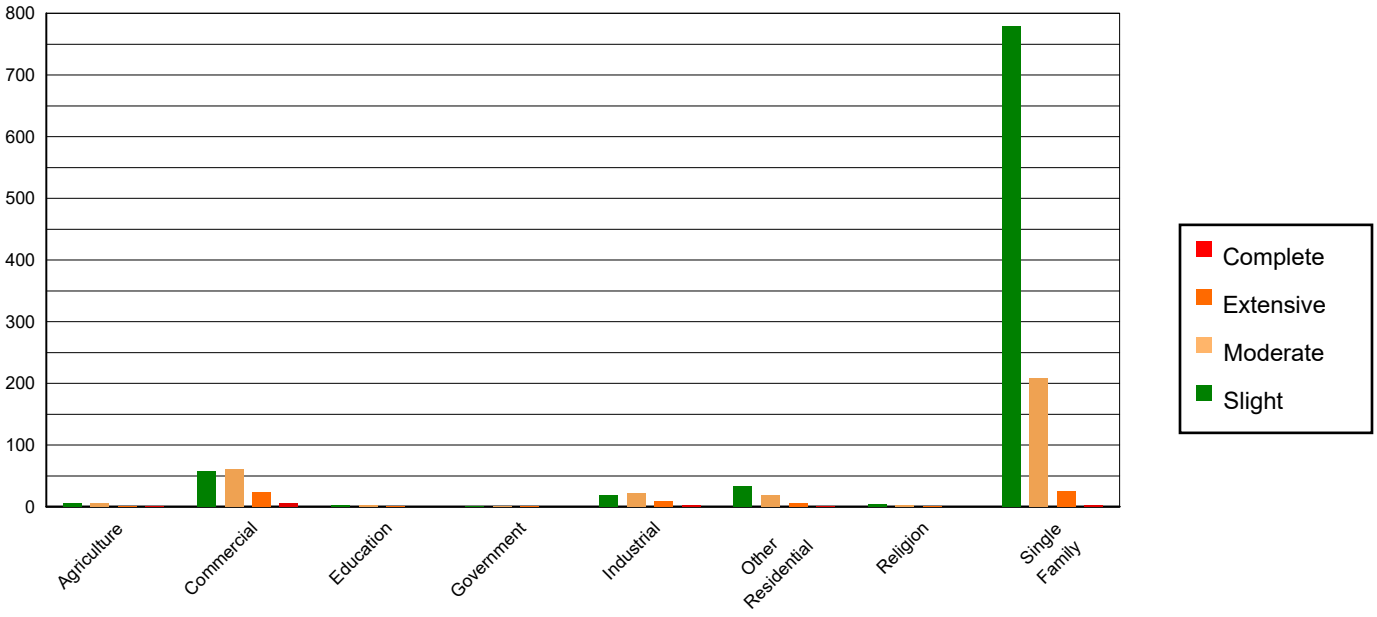


Table 3: Expected Building Damage by Occupancy

	None		Slight		Moderate		Extensive		Complete	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Agriculture	12.52	0.33	6.32	0.70	5.06	1.57	1.74	2.60	0.36	2.97
Commercial	118.96	3.09	57.88	6.41	60.27	18.70	22.81	34.06	5.08	42.32
Education	4.86	0.13	2.35	0.26	2.61	0.81	0.96	1.43	0.22	1.84
Government	2.38	0.06	1.23	0.14	1.57	0.49	0.66	0.98	0.16	1.30
Industrial	37.83	0.98	18.50	2.05	22.50	6.98	9.13	13.63	2.05	17.07
Other Residential	132.43	3.44	33.44	3.70	18.81	5.83	5.38	8.04	0.94	7.87
Religion	13.33	0.35	4.15	0.46	3.20	0.99	1.11	1.66	0.21	1.78
Single Family	3528.71	91.63	778.85	86.28	208.28	64.62	25.18	37.59	2.98	24.85
Total	**3,851**		**903**		**322**		**67**		**12**	

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

	None		Slight		Moderate		Extensive		Complete	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Wood	3567.25	92.63	783.52	86.80	193.80	60.13	16.13	24.08	0.73	6.05
Steel	69.62	1.81	38.59	4.27	56.76	17.61	24.57	36.69	6.01	50.06
Concrete	11.72	0.30	6.22	0.69	9.78	3.03	3.90	5.82	0.86	7.18
Precast	5.31	0.14	1.92	0.21	3.00	0.93	1.72	2.57	0.19	1.62
RM	29.77	0.77	6.95	0.77	8.53	2.65	3.47	5.18	0.13	1.05
URM	167.34	4.35	65.52	7.26	50.42	15.64	17.18	25.66	4.09	34.04
MH	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	**3,851**		**903**		**322**		**67**		**12**	

*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	6	0	0	3
EOCs	1	0	0	0
PoliceStations	1	0	0	1
FireStations	3	0	0	1

Transportation Lifeline Damage

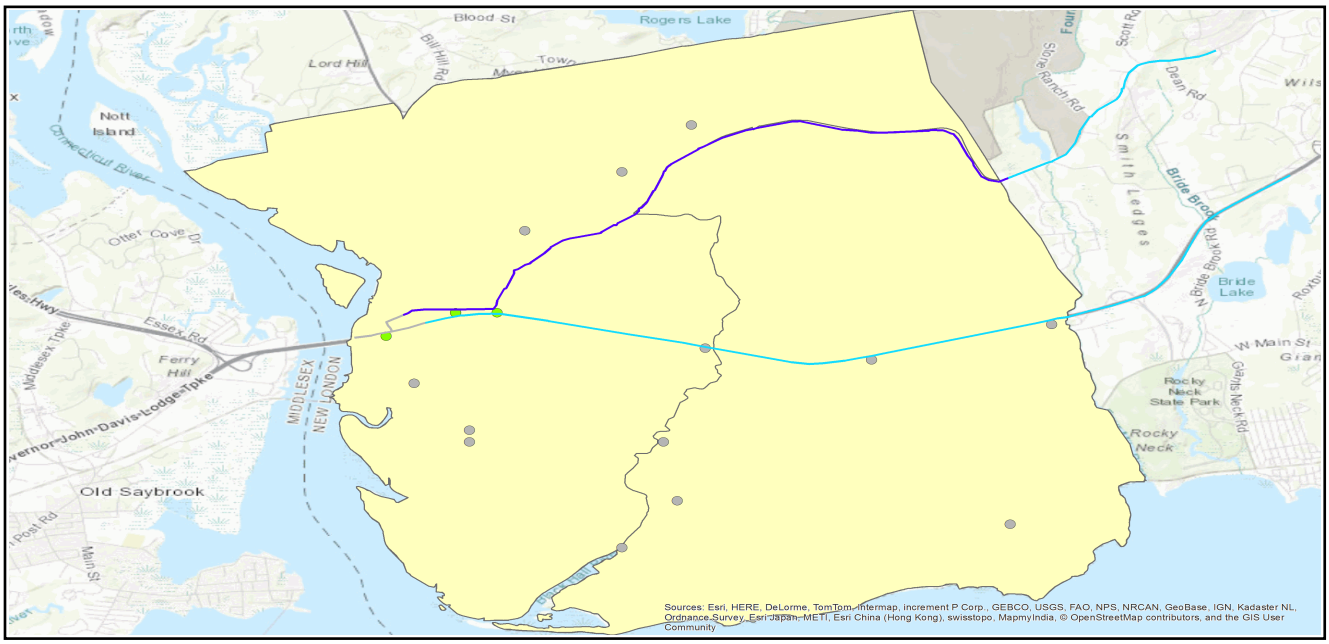


Table 6: Expected Damage to the Transportation Systems

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	8	0	0	6	6
	Bridges	17	0	0	17	17
	Tunnels	0	0	0	0	0
Railways	Segments	2	0	0	2	2
	Bridges	0	0	0	0	0
	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	0	0	0	0	0
Bus	Facilities	0	0	0	0	0
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	259	0	0
Waste Water	155	0	0
Natural Gas	103	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

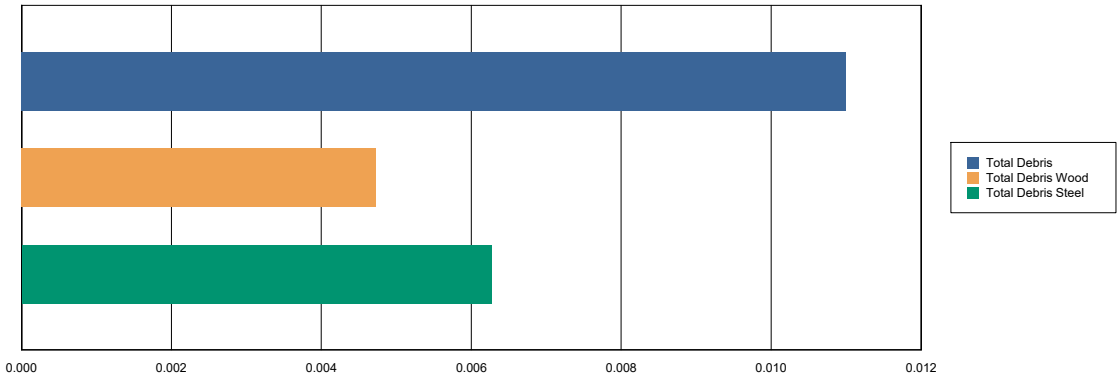
Fires often occur after an earthquake. Because of the number of fires and the lack of water to fight the fires, they can often burn out of control. Hazus uses a Monte Carlo simulation model to estimate the number of ignitions and the amount of burnt area. For this scenario, the model estimates that there 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 11,000 tons of debris will be generated. Of the total amount, Brick/Wood comprises 43.00% 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 440 truckloads (@25 tons/truck) to remove the debris generated by the earthquake.

Earthquake Debris (millions of tons)



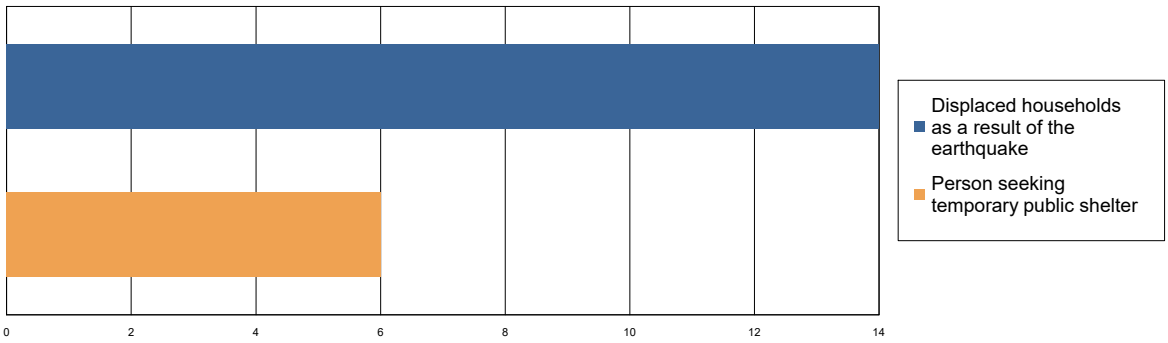
Brick/ Wood	Reinforced Concrete/Steel	Total Debris	Truck Load
0.00	0.01	0.01	440 (@25 tons/truck)

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 14 households to be displaced due to the earthquake. Of these, 6 people (out of a total population of 7,603) 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
14	6

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	0.17	0.04	0.00	0.01
	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	0.33	0.07	0.01	0.02
	Other-Residential	0.74	0.15	0.02	0.04
	Single Family	2.60	0.35	0.03	0.06
	Total	**4**	**1**	**0**	**0**
2 PM	Commercial	10.22	2.16	0.26	0.51
	Commuting	0.01	0.01	0.01	0.00
	Educational	3.75	0.82	0.11	0.21
	Hotels	0.00	0.00	0.00	0.00
	Industrial	2.44	0.53	0.07	0.13
	Other-Residential	0.16	0.03	0.00	0.01
	Single Family	0.57	0.08	0.01	0.01
	Total	**17**	**4**	**0**	**1**
5 PM	Commercial	7.24	1.53	0.19	0.36
	Commuting	0.11	0.13	0.24	0.05
	Educational	0.38	0.08	0.01	0.02
	Hotels	0.00	0.00	0.00	0.00
	Industrial	1.53	0.33	0.04	0.08
	Other-Residential	0.29	0.06	0.01	0.01
	Single Family	1.01	0.14	0.01	0.02
	Total	**11**	**2**	**1**	**1**

Economic Loss

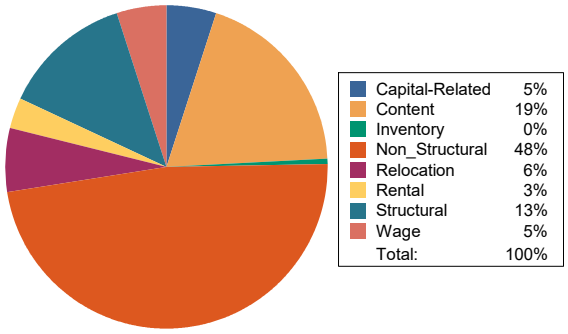
The total economic loss estimated for the earthquake is 77.21 (millions of dollars), which includes building and lifeline related losses based on the region's available inventory. The following three sections provide more detailed information about these losses.

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 72.29 (millions of dollars); 20 % 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 54 % 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)

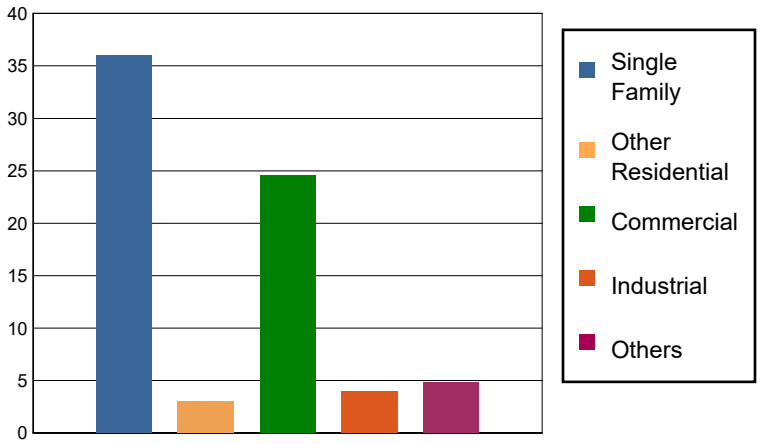


Table 11: Building-Related Economic Loss Estimates

(Millions of dollars)

Category	Area	Single Family	Other Residential	Commercial	Industrial	Others	Total
Income Losses							
	Wage	0.0000	0.0245	3.3095	0.1068	0.2183	3.6591
	Capital-Related	0.0000	0.0104	3.4224	0.0631	0.0383	3.5342
	Rental	0.4651	0.2570	1.3839	0.0326	0.0749	2.2135
	Relocation	1.6221	0.1893	2.0368	0.2161	0.6275	4.6918
	Subtotal	**2.0872**	**0.4812**	**10.1526**	**0.4186**	**0.9590**	**14.0986**
Capital Stock Losses							
	Structural	4.1152	0.3540	3.3176	0.6944	0.9304	9.4116
	Non_Structural	21.4739	1.7483	7.6414	1.6887	1.9669	34.5192
	Content	8.3092	0.4605	3.3533	0.9737	0.9071	14.0038
	Inventory	0.0000	0.0000	0.0739	0.1692	0.0145	0.2576
	Subtotal	**33.8983**	**2.5628**	**14.3862**	**3.5260**	**3.8189**	**58.1922**
	Total	**35.99**	**3.04**	**24.54**	**3.94**	**4.78**	**72.29**

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	187.0948	0.0000	0.00
	Bridges	196.8952	4.9194	2.50
	Tunnels	0.0000	0.0000	0.00
	Subtotal	**383.9900**	**4.9194**	
Railways	Segments	12.6164	0.0000	0.00
	Bridges	0.0000	0.0000	0.00
	Tunnels	0.0000	0.0000	0.00
	Facilities	0.0000	0.0000	0.00
	Subtotal	**12.6164**	**0.0000**	
Light Rail	Segments	44.5516	0.0000	0.00
	Bridges	0.0000	0.0000	0.00
	Tunnels	0.0000	0.0000	0.00
	Facilities	0.0000	0.0000	0.00
	Subtotal	**44.5516**	**0.0000**	
Bus	Facilities	0.0000	0.0000	0.00
	Subtotal	**0.0000**	**0.0000**	
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	**441.16**	**4.92**	

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	8.3256	0.0000	0.00
	Subtotal	**8.3256**	**0.0000**	
Waste Water	Pipelines	0.0000	0.0000	0.00
	Facilities	0.0000	0.0000	0.00
	Distribution Lines	4.9953	0.0000	0.00
	Subtotal	**4.9953**	**0.0000**	
Natural Gas	Pipelines	0.0000	0.0000	0.00
	Facilities	0.0000	0.0000	0.00
	Distribution Lines	3.3302	0.0000	0.00
	Subtotal	**3.3302**	**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	**16.65**	**0.00**	

Appendix A: County Listing for the Region

New London,CT

Appendix B: Regional Population and Building Value Data

State	County Name	Population	Building Value (millions of dollars)		
			Residential	Non-Residential	Total
Connecticut					
	New London	7,603	1,585	286	1,871
Total Region		**7,603**	**1,585**	**286**	**1,871**

Hazus: Earthquake Global Risk Report

Region Name: OldLyme

Earthquake Scenario: Portland

Print Date: October 17, 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 24.26 square miles and contains 2 census tracts. There are over 3 thousand households in the region which has a total population of 7,603 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 1,871 (millions of dollars). Approximately 92.00 % of the buildings (and 85.00% of the building value) are associated with residential housing.

The replacement value of the transportation and utility lifeline systems is estimated to be 441 and 16 (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 1,871 (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 88% 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 6 schools, 3 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 2 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 457.00 (millions of dollars). This inventory includes over 16.78 miles of highways, 17 bridges, 516.98 miles of pipes.

Table 1: Transportation System Lifeline Inventory

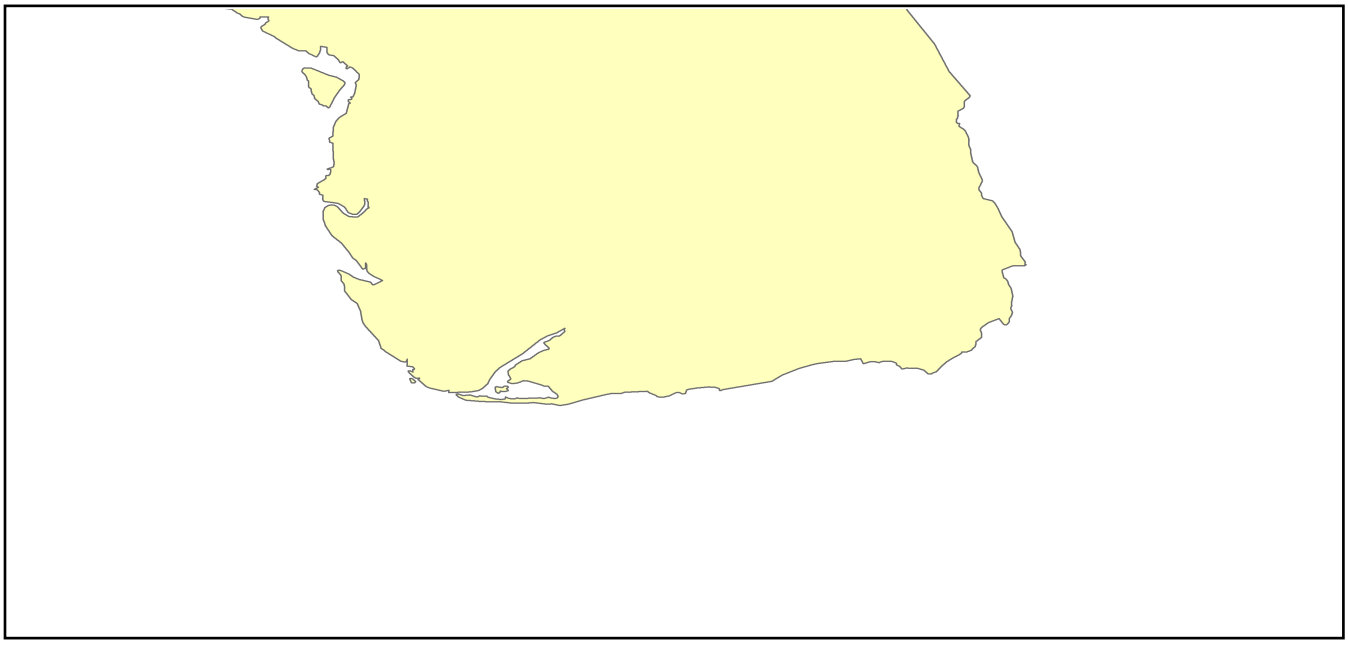
System	Component	# Locations/ # Segments	Replacement value (millions of dollars)
Highway	Bridges	17	196.8952
	Segments	8	187.0948
	Tunnels	0	0.0000
		Subtotal	**383.9900**
Railways	Bridges	0	0.0000
	Facilities	0	0.0000
	Segments	2	12.6164
	Tunnels	0	0.0000
		Subtotal	**12.6164**
Light Rail	Bridges	0	0.0000
	Facilities	0	0.0000
	Segments	2	44.5516
	Tunnels	0	0.0000
		Subtotal	**44.5516**
Bus	Facilities	0	0.0000
		Subtotal	**0.0000**
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	**441.20**

Table 2: Utility System Lifeline Inventory

System	Component	# Locations / Segments	Replacement value (millions of dollars)
Potable Water	Distribution Lines	NA	8.3256
	Facilities	0	0.0000
	Pipelines	0	0.0000
		Subtotal	**8.3256**
Waste Water	Distribution Lines	NA	4.9953
	Facilities	0	0.0000
	Pipelines	0	0.0000
		Subtotal	**4.9953**
Natural Gas	Distribution Lines	NA	3.3302
	Facilities	0	0.0000
	Pipelines	0	0.0000
		Subtotal	**3.3302**
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	**16.70**

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 142 buildings will be at least moderately damaged. This is over 3.00 % of the buildings in the region. There are an estimated 1 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

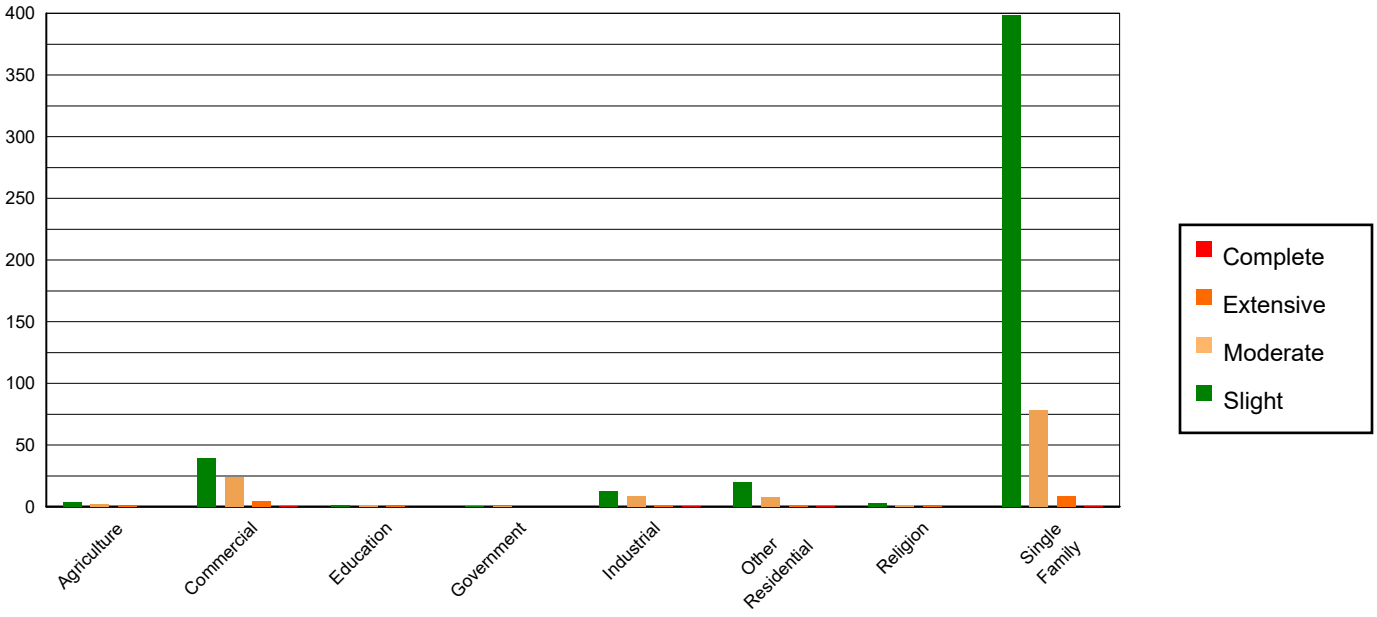


Table 3: Expected Building Damage by Occupancy

	None		Slight		Moderate		Extensive		Complete	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Agriculture	19.98	0.44	3.80	0.79	1.83	1.47	0.36	2.12	0.03	1.83
Commercial	196.98	4.35	39.08	8.16	23.74	19.16	4.64	27.03	0.56	31.40
Education	8.19	0.18	1.61	0.34	1.00	0.81	0.18	1.04	0.03	1.46
Government	4.34	0.10	0.90	0.19	0.62	0.50	0.12	0.68	0.02	0.85
Industrial	66.22	1.46	13.12	2.74	8.80	7.10	1.66	9.70	0.20	10.96
Other Residential	161.43	3.56	19.73	4.12	8.15	6.58	1.51	8.80	0.18	10.03
Religion	17.50	0.39	2.69	0.56	1.46	1.18	0.31	1.81	0.04	2.27
Single Family	4058.37	89.53	398.19	83.11	78.33	63.20	8.38	48.83	0.74	41.20
Total	**4,533**		**479**		**124**		**17**		**2**	

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

	None		Slight		Moderate		Extensive		Complete	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Wood	4102.04	90.49	390.80	81.57	64.50	52.05	4.08	23.79	0.01	0.30
Steel	140.04	3.09	29.38	6.13	21.77	17.57	3.89	22.65	0.48	26.56
Concrete	23.79	0.52	4.73	0.99	3.47	2.80	0.45	2.62	0.04	2.10
Precast	8.80	0.19	1.47	0.31	1.44	1.16	0.44	2.56	0.01	0.64
RM	40.39	0.89	4.26	0.89	3.40	2.75	0.79	4.60	0.01	0.42
URM	217.96	4.81	48.48	10.12	29.34	23.68	7.51	43.79	1.26	69.98
MH	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	**4,533**		**479**		**124**		**17**		**2**	

*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	6	0	0	6
EOCs	1	0	0	1
PoliceStations	1	0	0	1
FireStations	3	0	0	3

Transportation Lifeline Damage

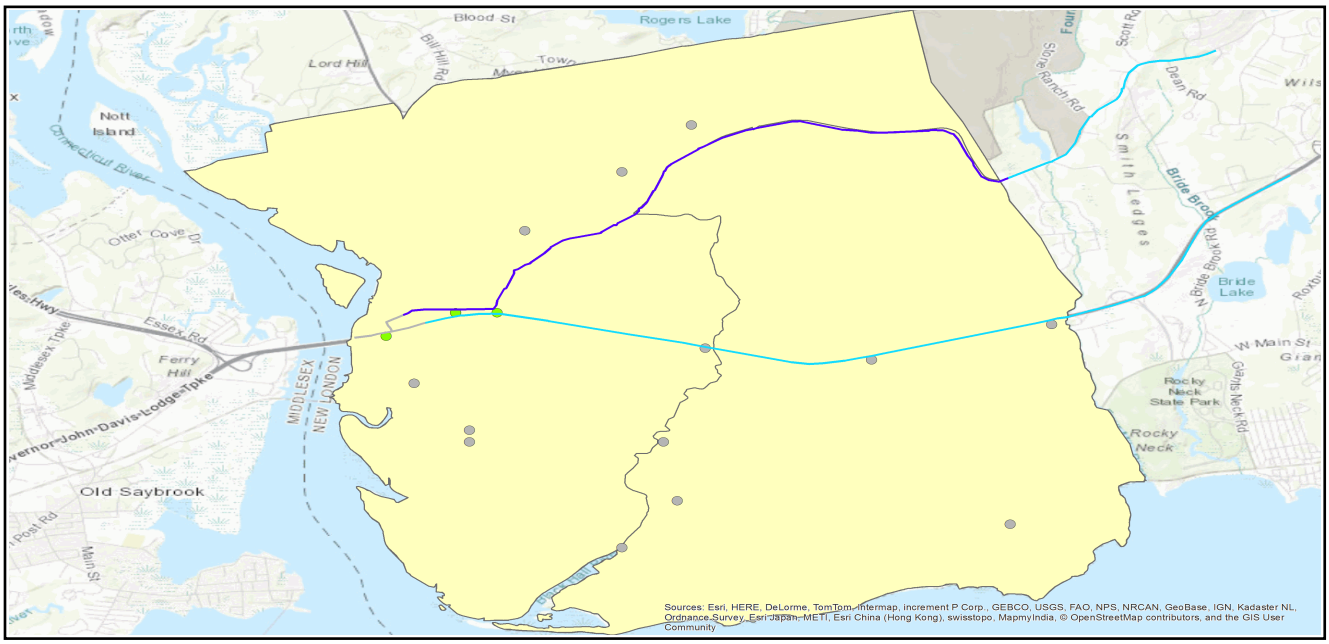


Table 6: Expected Damage to the Transportation Systems

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	8	0	0	6	6
	Bridges	17	0	0	17	17
	Tunnels	0	0	0	0	0
Railways	Segments	2	0	0	2	2
	Bridges	0	0	0	0	0
	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	0	0	0	0	0
Bus	Facilities	0	0	0	0	0
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	259	0	0
Waste Water	155	0	0
Natural Gas	103	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

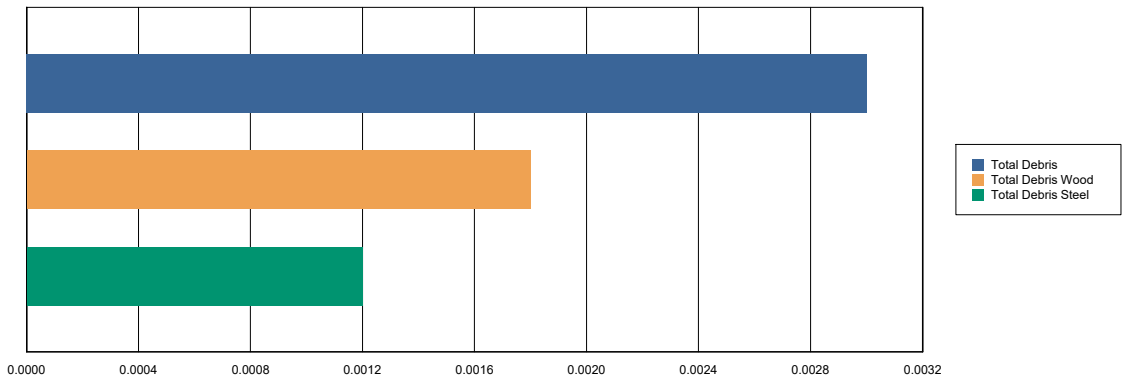
Fires often occur after an earthquake. Because of the number of fires and the lack of water to fight the fires, they can often burn out of control. Hazus uses a Monte Carlo simulation model to estimate the number of ignitions and the amount of burnt area. For this scenario, the model estimates that there 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 3,000 tons of debris will be generated. Of the total amount, Brick/Wood comprises 60.00% 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 120 truckloads (@25 tons/truck) to remove the debris generated by the earthquake.

Earthquake Debris (millions of tons)



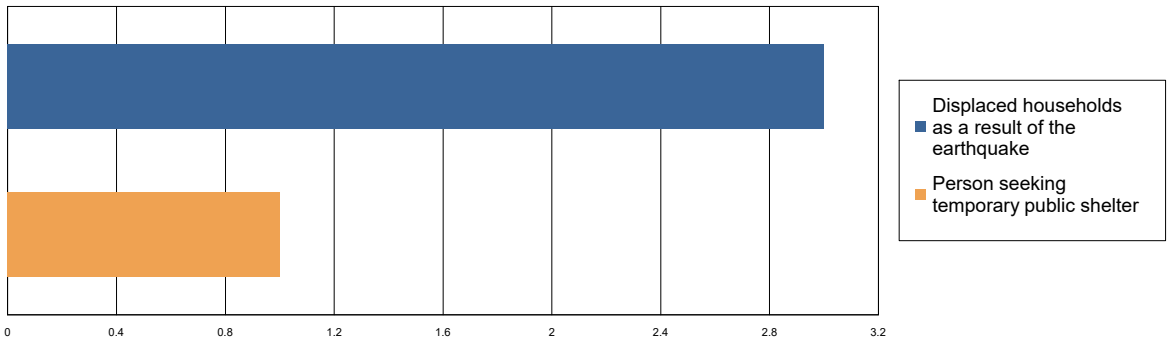
Brick/ Wood	Reinforced Concrete/Steel	Total Debris	Truck Load
0.00	0.00	0.00	120 (@25 tons/truck)

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 3 households to be displaced due to the earthquake. Of these, 1 people (out of a total population of 7,603) 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
3	1

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	0.04	0.01	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	0.06	0.01	0.00	0.00
	Other-Residential	0.24	0.04	0.00	0.01
	Single Family	0.99	0.11	0.01	0.02
	Total	**1**	**0**	**0**	**0**
2 PM	Commercial	2.34	0.38	0.04	0.07
	Commuting	0.00	0.00	0.00	0.00
	Educational	0.86	0.15	0.02	0.03
	Hotels	0.00	0.00	0.00	0.00
	Industrial	0.48	0.08	0.01	0.01
	Other-Residential	0.05	0.01	0.00	0.00
	Single Family	0.22	0.03	0.00	0.00
	Total	**4**	**1**	**0**	**0**
5 PM	Commercial	1.66	0.27	0.03	0.05
	Commuting	0.01	0.02	0.03	0.01
	Educational	0.09	0.02	0.00	0.00
	Hotels	0.00	0.00	0.00	0.00
	Industrial	0.30	0.05	0.00	0.01
	Other-Residential	0.10	0.02	0.00	0.00
	Single Family	0.38	0.05	0.00	0.01
	Total	**3**	**0**	**0**	**0**

Economic Loss

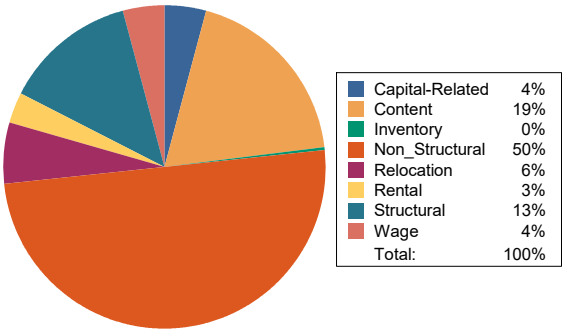
The total economic loss estimated for the earthquake is 23.94 (millions of dollars), which includes building and lifeline related losses based on the region's available inventory. The following three sections provide more detailed information about these losses.

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 22.99 (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 61 % 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)

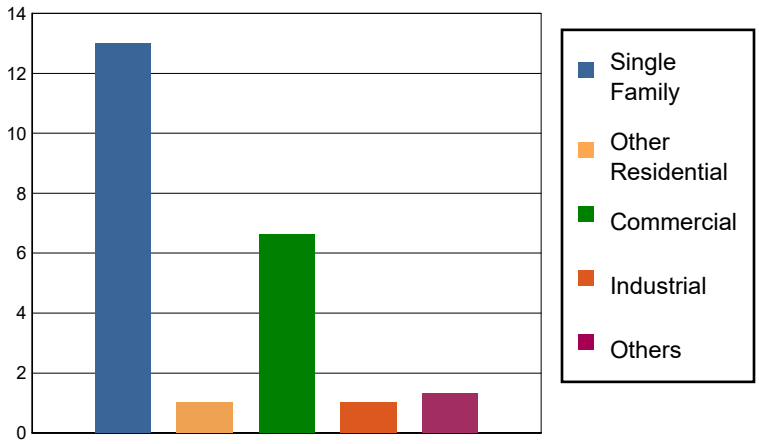


Table 11: Building-Related Economic Loss Estimates

(Millions of dollars)

Category	Area	Single Family	Other Residential	Commercial	Industrial	Others	Total
Income Losses							
	Wage	0.0000	0.0056	0.8912	0.0258	0.0616	0.9842
	Capital-Related	0.0000	0.0023	0.9136	0.0153	0.0108	0.9420
	Rental	0.1732	0.0864	0.4055	0.0088	0.0199	0.6938
	Relocation	0.5843	0.0670	0.5670	0.0609	0.1738	1.4530
	Subtotal	**0.7575**	**0.1613**	**2.7773**	**0.1108**	**0.2661**	**4.0730**
Capital Stock Losses							
	Structural	1.6487	0.1218	0.8415	0.1671	0.2448	3.0239
	Non_Structural	7.8997	0.5846	2.0146	0.4493	0.5450	11.4932
	Content	2.6860	0.1488	0.9565	0.2652	0.2697	4.3262
	Inventory	0.0000	0.0000	0.0211	0.0460	0.0041	0.0712
	Subtotal	**12.2344**	**0.8552**	**3.8337**	**0.9276**	**1.0636**	**18.9145**
	Total	**12.99**	**1.02**	**6.61**	**1.04**	**1.33**	**22.99**

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	187.0948	0.0000	0.00
	Bridges	196.8952	0.9510	0.48
	Tunnels	0.0000	0.0000	0.00
	Subtotal	**383.9900**	**0.9510**	
Railways	Segments	12.6164	0.0000	0.00
	Bridges	0.0000	0.0000	0.00
	Tunnels	0.0000	0.0000	0.00
	Facilities	0.0000	0.0000	0.00
	Subtotal	**12.6164**	**0.0000**	
Light Rail	Segments	44.5516	0.0000	0.00
	Bridges	0.0000	0.0000	0.00
	Tunnels	0.0000	0.0000	0.00
	Facilities	0.0000	0.0000	0.00
	Subtotal	**44.5516**	**0.0000**	
Bus	Facilities	0.0000	0.0000	0.00
	Subtotal	**0.0000**	**0.0000**	
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	**441.16**	**0.95**	

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	8.3256	0.0000	0.00
	Subtotal	**8.3256**	**0.0000**	
Waste Water	Pipelines	0.0000	0.0000	0.00
	Facilities	0.0000	0.0000	0.00
	Distribution Lines	4.9953	0.0000	0.00
	Subtotal	**4.9953**	**0.0000**	
Natural Gas	Pipelines	0.0000	0.0000	0.00
	Facilities	0.0000	0.0000	0.00
	Distribution Lines	3.3302	0.0000	0.00
	Subtotal	**3.3302**	**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	**16.65**	**0.00**	

Appendix A: County Listing for the Region

New London,CT

Appendix B: Regional Population and Building Value Data

State	County Name	Population	Building Value (millions of dollars)		
			Residential	Non-Residential	Total
Connecticut					
	New London	7,603	1,585	286	1,871
Total Region		**7,603**	**1,585**	**286**	**1,871**

Hazus: Earthquake Global Risk Report

Region Name: OldLyme

Earthquake Scenario: Stamford

Print Date: October 17, 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 24.26 square miles and contains 2 census tracts. There are over 3 thousand households in the region which has a total population of 7,603 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 1,871 (millions of dollars). Approximately 92.00 % of the buildings (and 85.00% of the building value) are associated with residential housing.

The replacement value of the transportation and utility lifeline systems is estimated to be 441 and 16 (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 1,871 (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 88% 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 6 schools, 3 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 2 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 457.00 (millions of dollars). This inventory includes over 16.78 miles of highways, 17 bridges, 516.98 miles of pipes.

Table 1: Transportation System Lifeline Inventory

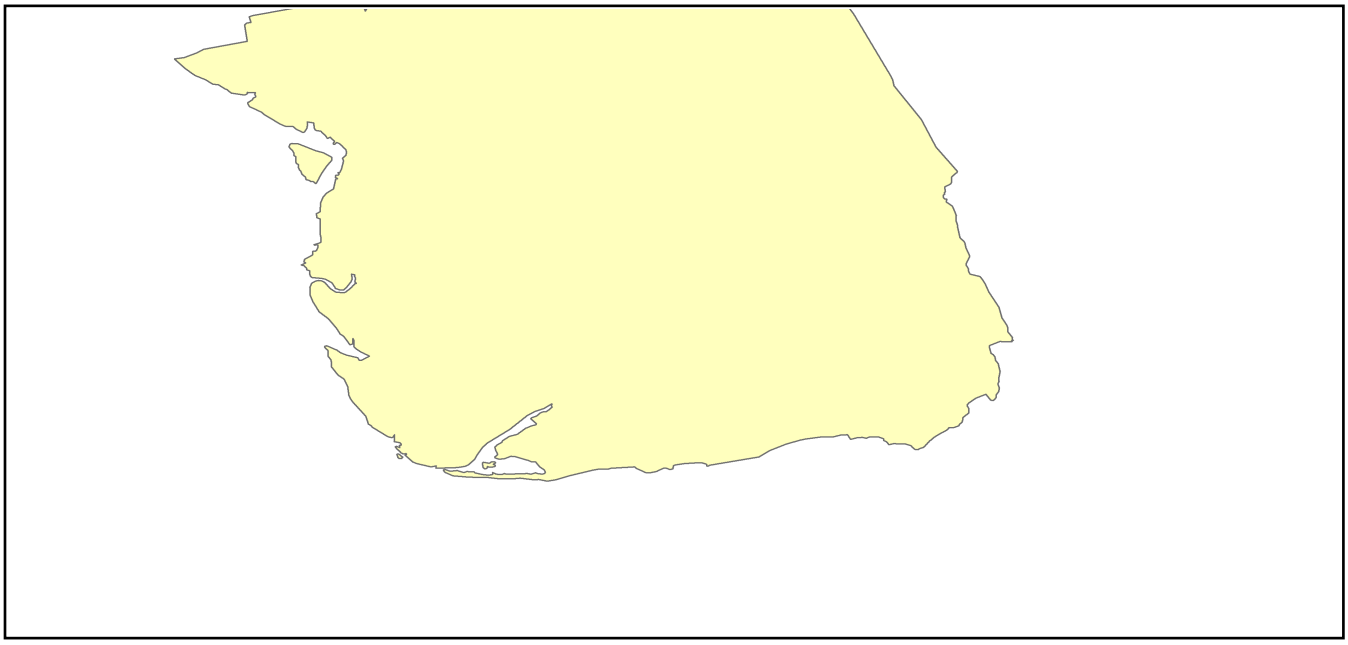
System	Component	# Locations/ # Segments	Replacement value (millions of dollars)
Highway	Bridges	17	196.8952
	Segments	8	187.0948
	Tunnels	0	0.0000
		Subtotal	**383.9900**
Railways	Bridges	0	0.0000
	Facilities	0	0.0000
	Segments	2	12.6164
	Tunnels	0	0.0000
		Subtotal	**12.6164**
Light Rail	Bridges	0	0.0000
	Facilities	0	0.0000
	Segments	2	44.5516
	Tunnels	0	0.0000
		Subtotal	**44.5516**
Bus	Facilities	0	0.0000
		Subtotal	**0.0000**
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	**441.20**

Table 2: Utility System Lifeline Inventory

System	Component	# Locations / Segments	Replacement value (millions of dollars)
Potable Water	Distribution Lines	NA	8.3256
	Facilities	0	0.0000
	Pipelines	0	0.0000
		Subtotal	**8.3256**
Waste Water	Distribution Lines	NA	4.9953
	Facilities	0	0.0000
	Pipelines	0	0.0000
		Subtotal	**4.9953**
Natural Gas	Distribution Lines	NA	3.3302
	Facilities	0	0.0000
	Pipelines	0	0.0000
		Subtotal	**3.3302**
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	**16.70**

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 18 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

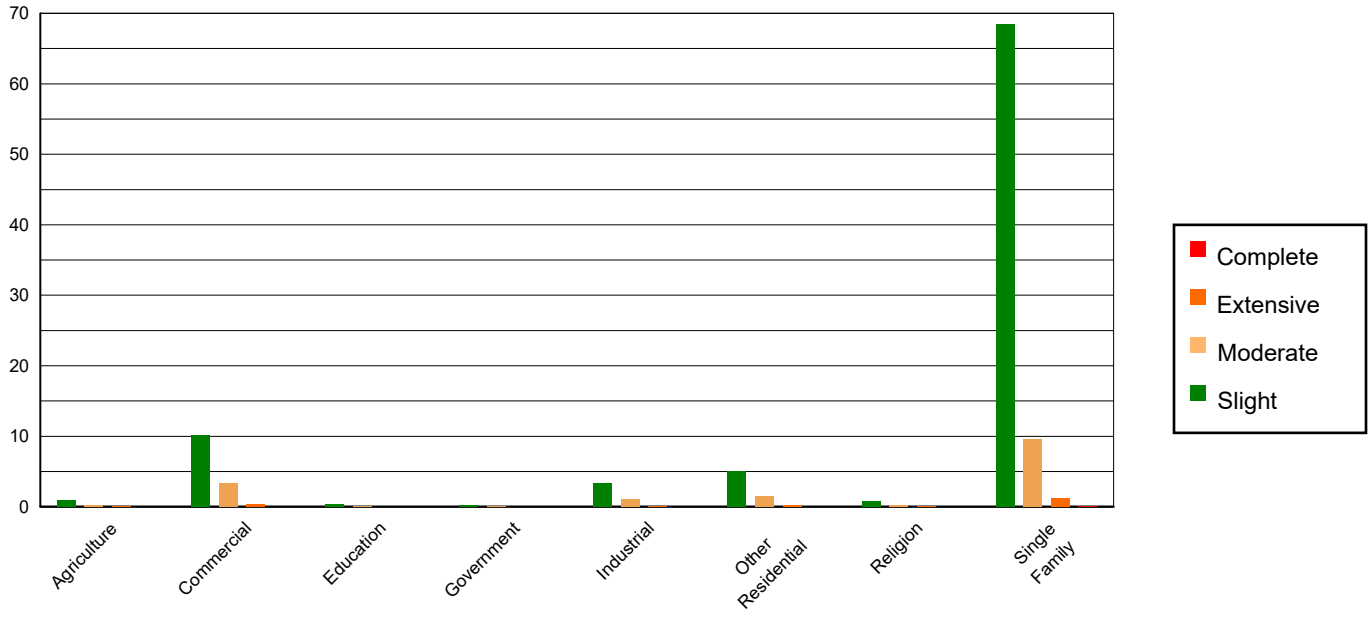


Table 3: Expected Building Damage by Occupancy

	None		Slight		Moderate		Extensive		Complete	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Agriculture	24.74	0.49	0.95	1.07	0.27	1.64	0.03	1.66	0.00	1.15
Commercial	251.02	4.97	10.13	11.35	3.39	20.71	0.43	20.88	0.03	20.28
Education	10.46	0.21	0.40	0.44	0.13	0.79	0.02	0.75	0.00	0.90
Government	5.70	0.11	0.22	0.24	0.07	0.44	0.01	0.40	0.00	0.36
Industrial	85.48	1.69	3.26	3.66	1.11	6.78	0.13	6.33	0.01	5.30
Other Residential	184.19	3.65	5.01	5.61	1.56	9.55	0.22	10.49	0.02	12.73
Religion	20.88	0.41	0.78	0.88	0.29	1.77	0.04	2.03	0.00	2.52
Single Family	4464.67	88.46	68.49	76.76	9.56	58.31	1.20	57.45	0.08	56.76
Total	**5,047**		**89**		**16**		**2**		**0**	

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

	None		Slight		Moderate		Extensive		Complete	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Wood	4495.08	89.06	60.84	68.18	5.04	30.78	0.45	21.54	0.00	0.00
Steel	186.97	3.70	6.38	7.15	2.01	12.26	0.19	8.88	0.00	3.30
Concrete	31.20	0.62	0.99	1.10	0.28	1.71	0.01	0.65	0.00	0.00
Precast	11.19	0.22	0.56	0.62	0.35	2.12	0.06	2.91	0.00	0.66
RM	46.71	0.93	1.37	1.53	0.68	4.15	0.09	4.31	0.00	0.00
URM	276.00	5.47	19.10	21.40	8.03	48.99	1.29	61.71	0.14	96.04
MH	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	**5,047**		**89**		**16**		**2**		**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	6	0	0	6
EOCs	1	0	0	1
PoliceStations	1	0	0	1
FireStations	3	0	0	3

Transportation Lifeline Damage

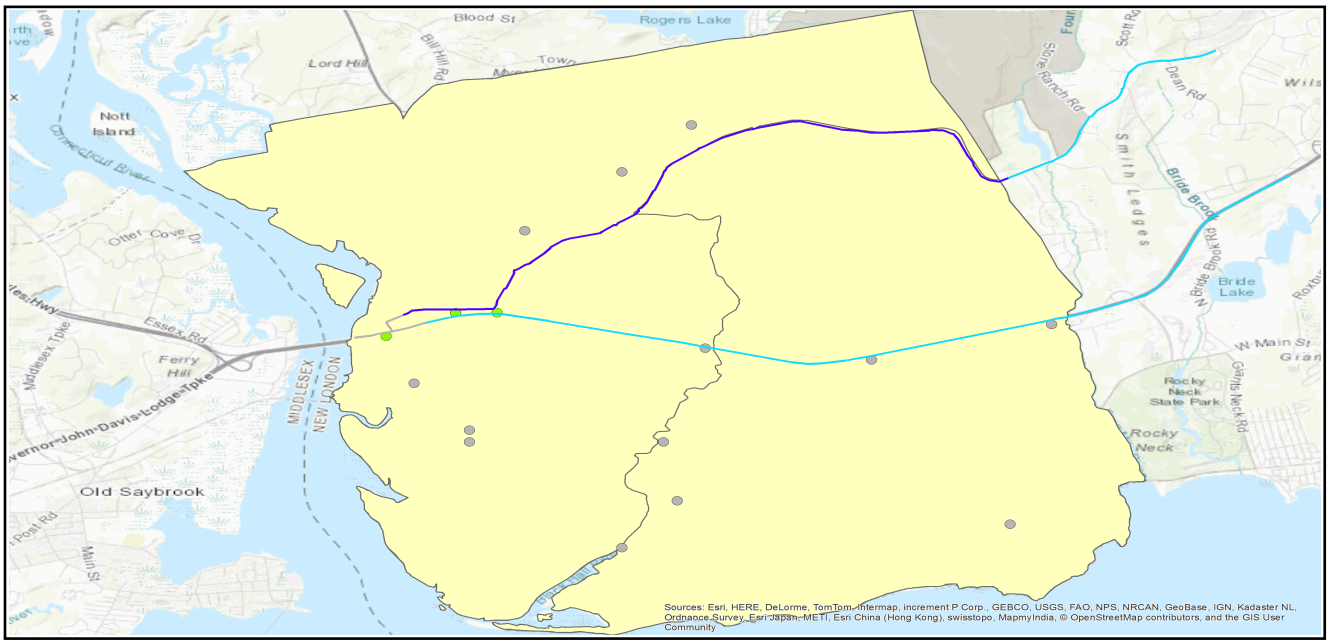


Table 6: Expected Damage to the Transportation Systems

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	8	0	0	6	6
	Bridges	17	0	0	17	17
	Tunnels	0	0	0	0	0
Railways	Segments	2	0	0	2	2
	Bridges	0	0	0	0	0
	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	0	0	0	0	0
Bus	Facilities	0	0	0	0	0
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	259	0	0
Waste Water	155	0	0
Natural Gas	103	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 74.00% 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 0 households to be displaced due to the earthquake. Of these, 0 people (out of a total population of 7,603) 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
0	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	0.04	0.01	0.00	0.00
	Single Family	0.14	0.01	0.00	0.00
	Total	**0**	**0**	**0**	**0**
2 PM	Commercial	0.30	0.04	0.00	0.01
	Commuting	0.00	0.00	0.00	0.00
	Educational	0.11	0.01	0.00	0.00
	Hotels	0.00	0.00	0.00	0.00
	Industrial	0.05	0.01	0.00	0.00
	Other-Residential	0.01	0.00	0.00	0.00
	Single Family	0.03	0.00	0.00	0.00
	Total	**0**	**0**	**0**	**0**
5 PM	Commercial	0.21	0.03	0.00	0.00
	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	0.03	0.00	0.00	0.00
	Other-Residential	0.02	0.00	0.00	0.00
	Single Family	0.05	0.01	0.00	0.00
	Total	**0**	**0**	**0**	**0**

Economic Loss

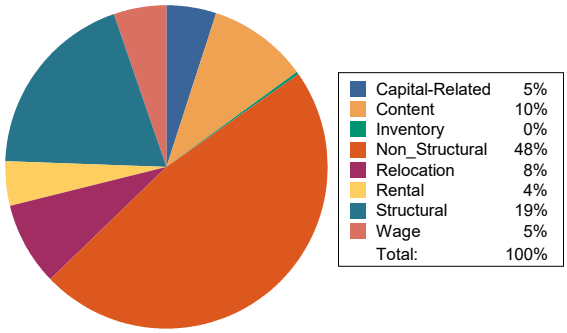
The total economic loss estimated for the earthquake is 2.25 (millions of dollars), which includes building and lifeline related losses based on the region's available inventory. The following three sections provide more detailed information about these losses.

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 2.21 (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 60 % 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)

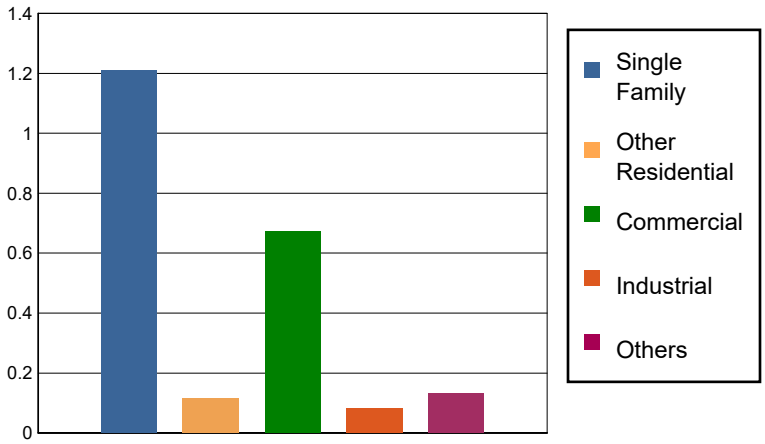


Table 11: Building-Related Economic Loss Estimates

(Millions of dollars)

Category	Area	Single Family	Other Residential	Commercial	Industrial	Others	Total
Income Losses							
	Wage	0.0000	0.0006	0.1050	0.0027	0.0092	0.1175
	Capital-Related	0.0000	0.0002	0.1054	0.0016	0.0016	0.1088
	Rental	0.0229	0.0147	0.0571	0.0010	0.0024	0.0981
	Relocation	0.0734	0.0115	0.0701	0.0069	0.0225	0.1844
	Subtotal	**0.0963**	**0.0270**	**0.3376**	**0.0122**	**0.0357**	**0.5088**
Capital Stock Losses							
	Structural	0.2397	0.0216	0.1092	0.0199	0.0334	0.4238
	Non_Structural	0.7476	0.0589	0.1693	0.0311	0.0484	1.0553
	Content	0.1279	0.0082	0.0552	0.0160	0.0155	0.2228
	Inventory	0.0000	0.0000	0.0013	0.0027	0.0002	0.0042
	Subtotal	**1.1152**	**0.0887**	**0.3350**	**0.0697**	**0.0975**	**1.7061**
	Total	**1.21**	**0.12**	**0.67**	**0.08**	**0.13**	**2.21**

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	187.0948	0.0000	0.00
	Bridges	196.8952	0.0345	0.02
	Tunnels	0.0000	0.0000	0.00
	Subtotal	**383.9900**	**0.0345**	
Railways	Segments	12.6164	0.0000	0.00
	Bridges	0.0000	0.0000	0.00
	Tunnels	0.0000	0.0000	0.00
	Facilities	0.0000	0.0000	0.00
	Subtotal	**12.6164**	**0.0000**	
Light Rail	Segments	44.5516	0.0000	0.00
	Bridges	0.0000	0.0000	0.00
	Tunnels	0.0000	0.0000	0.00
	Facilities	0.0000	0.0000	0.00
	Subtotal	**44.5516**	**0.0000**	
Bus	Facilities	0.0000	0.0000	0.00
	Subtotal	**0.0000**	**0.0000**	
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	**441.16**	**0.03**	

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	8.3256	0.0000	0.00
	Subtotal	**8.3256**	**0.0000**	
Waste Water	Pipelines	0.0000	0.0000	0.00
	Facilities	0.0000	0.0000	0.00
	Distribution Lines	4.9953	0.0000	0.00
	Subtotal	**4.9953**	**0.0000**	
Natural Gas	Pipelines	0.0000	0.0000	0.00
	Facilities	0.0000	0.0000	0.00
	Distribution Lines	3.3302	0.0000	0.00
	Subtotal	**3.3302**	**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	**16.65**	**0.00**	

Appendix A: County Listing for the Region

New London,CT

Appendix B: Regional Population and Building Value Data

State	County Name	Population	Building Value (millions of dollars)		
			Residential	Non-Residential	Total
Connecticut					
	New London	7,603	1,585	286	1,871
Total Region		**7,603**	**1,585**	**286**	**1,871**