

**ATTACHMENT 4B  
HAZUS- PROBABALISTIC  
HURRICANE MODEL**

# HAZUS-MH: Hurricane Event Report

**Region Name:** Patchogue - hurricane

**Hurricane Scenario:** Probabilistic

**Print Date:** Tuesday, February 22, 2005

**Disclaimer:**

*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.*

# Quick Assessment Report

February 22, 2005

## Regional Statistics

<b>Area (Square Miles)</b>	2
<b>Number of Census Tracts</b>	2
<b>Number of Buildings</b>	
Residential (x 1000)	2.0
Total (x 1000)	2.0
<b>Number of People in the Region (x 1000)</b>	11.0
<b>Building Exposure (\$ Millions)</b>	
Residential	574
Total	746

## Scenario Results

### Number of Residential Buildings Damaged

<b>Return</b>	<b>Minor</b>	<b>Moderate</b>	<b>Severe</b>	<b>Destruction</b>	<b>Total</b>
10	0	0	0	0	0
20	29	4	1	0	34
50	543	149	24	2	718
100	973	563	120	43	1,698
200	812	886	402	243	2,344
500	386	774	755	724	2,639
1000	187	542	857	1,114	2,700

### Number of Buildings Damaged

<b>Return</b>	<b>Minor</b>	<b>Moderate</b>	<b>Severe</b>	<b>Destruction</b>	<b>Total</b>
10	0	0	0	0	0
20	30	4	1	0	35
50	556	153	24	2	736
100	997	585	128	43	1,752
200	829	914	433	244	2,420
500	394	794	808	727	2,724
1000	192	556	918	1,120	2,787

### Shelter Requirements

<b>Return</b>	<b>Displaced Households (#Households)</b>	<b>Short Term Shelter (#People)</b>
10	0	0
20	0	0
50	29	8
100	182	46
200	838	214
500	2,384	608
1000	3,332	849

### Economic Loss (x 1000)

<b>Return/Perio</b>	<b><u>Property Damage (Capital Stock) Losses</u></b>		<b><u>Business Interruption (Income) Losses</u></b>
	<b>Residential</b>	<b>Total</b>	
10	0	0	0
20	693	721	13
50	9,850	11,002	1,851
100	46,493	58,241	11,434
200	156,015	201,765	37,331
500	350,383	454,686	72,417
1000	481,901	630,759	94,264
Annualized	2,495	3,197	524

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Study Region : Patchogue - hurricane

Scenario : Probabilistic

## Table of Contents

<b>Section</b>	<b>Page #</b>
<b>General Description of the Region</b>	<b>3</b>
<b>Building Inventory</b>	<b>4</b>
<b>General Buiding Stock</b>	
<b>Essential Facility Inventory</b>	
<b>Hurricane Scenario Parameters</b>	<b>5</b>
<b>Building Damage</b>	<b>6</b>
<b>General Building Stock</b>	
<b>Essential Facilities Damage</b>	
<b>Induced Hurricane Damage</b>	<b>8</b>
<b>Debris Generation</b>	
<b>Social Impact</b>	<b>8</b>
<b>Shelter Requirements</b>	
<b>Economic Loss</b>	<b>9</b>
<b>Building Losses</b>	
<b>Appendix A: County Listing for the Region</b>	<b>10</b>
<b>Appendix B: Regional Population and Building Value Data</b>	<b>11</b>

## 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):

- New York

**Note:**

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

The geographical size of the region is 2.35 square miles and contains 2 census tracts. There are over 4 thousand households in the region and has a total population of 11,943 people (2000 Census Bureau data). The distribution of population by State and County is provided in Appendix B.

There are an estimated 2 thousand buildings in the region with a total building replacement value (excluding contents) of 747 million dollars (2002 dollars). Approximately 97% of the buildings (and 77% of the building value) are associated with residential housing.

## Building Inventory

### General Building Stock

HAZUS estimates that there are 2,819 buildings in the region which have an aggregate total replacement value of 747 million (2002 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**

<b>Occupancy</b>	<b>Exposure (\$1000)</b>	<b>Percent of Total</b>
Residential	574,568	76.9%
Commercial	131,303	17.6%
Industrial	13,505	1.8%
Agricultural	621	0.1%
Religious	14,129	1.9%
Government	2,975	0.4%
Education	9,891	1.3%
Total	746,992	100.0%

### 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, 1 fire stations, 2 police stations and no 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

# HAZUS-MH: Hurricane Event Report

**Region Name:** Patchogue - hurricane

**Hurricane Scenario:** Probabilistic 10-year Return Period

**Print Date:** Tuesday, February 22, 2005

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## 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 Volume 1: Chapter 6 of 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**

Occupancy	None		Minor		Moderate		Severe		Destruction	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Agriculture	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Commercial	77	100.00	0	0.00	0	0.00	0	0.00	0	0.00
Education	1	100.00	0	0.00	0	0.00	0	0.00	0	0.00
Government	2	100.00	0	0.00	0	0.00	0	0.00	0	0.00
Industrial	4	100.00	0	0.00	0	0.00	0	0.00	0	0.00
Religion	6	100.00	0	0.00	0	0.00	0	0.00	0	0.00
Residential	2,729	100.00	0	0.00	0	0.00	0	0.00	0	0.00
<b>Total</b>	<b>2,819</b>		<b>0</b>		<b>0</b>		<b>0</b>		<b>0</b>	

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

Building Type	None		Minor		Moderate		Severe		Destruction	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Concrete	48	100.00	0	0.00	0	0.00	0	0.00	0	0.00
Masonry	472	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	47	100.00	0	0.00	0	0.00	0	0.00	0	0.00
Wood	2,253	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. After one week, none of the beds will be in service. By 30 days, none will be operational.

**Table 4: Expected Damage to Essential Facilities**

<b>Classification</b>	Total	# Facilities		Expected Loss of Use < 1 day
		Probability of at Least Moderate Damage > 50%	Probability of Complete Damage > 50%	
Fire Stations	1	0	0	0
Police Stations	2	0	0	0
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 three general categories: a) Brick/Wood, b) Reinforced Concrete/Steel, and c) Trees. 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 0% of the total, Reinforced Concrete/Steel comprises of 0% of the total, with the remainder being 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 debris generated by the hurricane.

## 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 11,943) 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 4 below provides a summary of the losses associated with the building damage.

**Table 5: Building-Related Economic Loss Estimates**

(Thousands of dollars)

<b>Category</b>	<b>Area</b>	<b>Residential</b>	<b>Commercial</b>	<b>Industrial</b>	<b>Others</b>	<b>Total</b>
<b><u>Property Damage</u></b>						
	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
	<b>Subtotal</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>
<b><u>Business Interruption Loss</u></b>						
	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
	<b>Subtotal</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>
<b>Total</b>	<b>Total</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>

## **Appendix A: County Listing for the Region**

New York  
- Suffolk

## Appendix B: Regional Population and Building Value Data

	Building Value (thousands of dollars)			Total
	Population	Residential	Non-Residential	
<b>New York</b>				
Suffolk	11,943	574,568	172,424	746,992
<b>Total State</b>	<b>11,943</b>	<b>574,568</b>	<b>172,424</b>	<b>746,992</b>
<b>Total Study Region</b>	<b>11,943</b>	<b>574,568</b>	<b>172,424</b>	<b>746,992</b>

# HAZUS-MH: Hurricane Event Report

**Region Name:** Patchogue - hurricane

**Hurricane Scenario:** Probabilistic 20-year Return Period

**Print Date:** Tuesday, February 22, 2005

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## General Building Stock Damage

HAZUS estimates that about 5 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 Volume 1: Chapter 6 of 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**

Occupancy	None		Minor		Moderate		Severe		Destruction	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Agriculture	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Commercial	76	99.14	1	0.82	0	0.05	0	0.00	0	0.00
Education	1	99.19	0	0.80	0	0.02	0	0.00	0	0.00
Government	2	99.21	0	0.78	0	0.01	0	0.00	0	0.00
Industrial	4	99.23	0	0.76	0	0.01	0	0.00	0	0.00
Religion	6	99.19	0	0.77	0	0.04	0	0.00	0	0.00
Residential	2,695	98.75	29	1.07	4	0.16	1	0.02	0	0.00
<b>Total</b>	<b>2,784</b>		<b>30</b>		<b>4</b>		<b>1</b>		<b>0</b>	

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

Building Type	None		Minor		Moderate		Severe		Destruction	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Concrete	48	98.99	0	1.01	0	0.00	0	0.00	0	0.00
Masonry	462	97.95	8	1.77	1	0.26	0	0.02	0	0.00
MH	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Steel	47	99.19	0	0.79	0	0.02	0	0.00	0	0.00
Wood	2,232	99.08	18	0.78	3	0.11	1	0.03	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. After one week, none of the beds will be in service. By 30 days, none will be operational.

**Table 4: Expected Damage to Essential Facilities**

<b>Classification</b>	Total	# Facilities		
		Probability of at Least Moderate Damage > 50%	Probability of Complete Damage > 50%	Expected Loss of Use < 1 day
Fire Stations	1	0	0	1
Police Stations	2	0	0	2
Schools	6	0	0	6

## **Debris Generation**

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

The model estimates that a total of 1,806 tons of debris will be generated. Of the total amount, Brick/Wood comprises 7% of the total, Reinforced Concrete/Steel comprises 0% of the total, with the remainder being Tree Debris. If the building debris tonnage is converted to an estimated number of truckloads, it will require 5 truckloads (@25 tons/truck) to remove the debris generated by the hurricane.

## **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 11,943) will seek temporary shelter in public shelters.

# Economic Loss

The total economic loss estimated for the hurricane is 0.7 million dollars, which represents 0.10 % 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. 1% 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 4 below provides a summary of the losses associated with the building damage.

**Table 5: Building-Related Economic Loss Estimates**  
(Thousands of dollars)

<b>Category</b>	<b>Area</b>	<b>Residential</b>	<b>Commercial</b>	<b>Industrial</b>	<b>Others</b>	<b>Total</b>
<u>Property Damage</u>						
	Building	661.22	22.00	1.35	4.17	688.74
	Content	32.25	0.00	0.00	0.00	32.25
	Inventory	0.00	0.00	0.00	0.00	0.00
	<b>Subtotal</b>	<b>693.47</b>	<b>22.00</b>	<b>1.35</b>	<b>4.17</b>	<b>720.99</b>
<u>Business Interruption Loss</u>						
	Income	0.00	0.00	0.00	0.00	0.00
	Relocation	8.75	0.48	0.01	0.05	9.30
	Rental	3.93	0.00	0.00	0.00	3.93
	Wage	0.00	0.00	0.00	0.00	0.00
	<b>Subtotal</b>	<b>12.68</b>	<b>0.48</b>	<b>0.01</b>	<b>0.05</b>	<b>13.22</b>
<u>Total</u>	<b>Total</b>	<b>706.15</b>	<b>22.48</b>	<b>1.36</b>	<b>4.22</b>	<b>734.21</b>

# HAZUS-MH: Hurricane Event Report

**Region Name:** Patchogue - hurricane

**Hurricane Scenario:** Probabilistic 50-year Return Period

**Print Date:** Tuesday, February 22, 2005

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## General Building Stock Damage

HAZUS estimates that about 180 buildings will be at least moderately damaged. This is over 6% of the total number of buildings in the region. There are an estimated 2 buildings that will be completely destroyed. The definition of the 'damage states' is provided in Volume 1: Chapter 6 of 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**

Occupancy	None		Minor		Moderate		Severe		Destruction	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Agriculture	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Commercial	62	80.31	11	14.69	3	4.44	0	0.55	0	0.01
Education	1	81.45	0	14.37	0	3.96	0	0.22	0	0.00
Government	2	81.98	0	13.94	0	3.88	0	0.20	0	0.00
Industrial	3	81.16	1	13.74	0	4.51	0	0.57	0	0.02
Religion	5	79.45	1	16.49	0	3.77	0	0.28	0	0.01
Residential	2,011	73.68	543	19.90	149	5.46	24	0.87	2	0.08
<b>Total</b>	<b>2,083</b>		<b>556</b>		<b>153</b>		<b>24</b>		<b>2</b>	

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

Building Type	None		Minor		Moderate		Severe		Destruction	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Concrete	38	78.17	8	15.98	3	5.65	0	0.20	0	0.00
Masonry	331	70.20	87	18.48	49	10.43	4	0.85	0	0.04
MH	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Steel	38	81.20	6	13.21	2	4.93	0	0.65	0	0.00
Wood	1,703	75.59	451	20.02	77	3.43	20	0.87	2	0.09

## 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. After one week, none of the beds will be in service. By 30 days, none will be operational.

**Table 4: Expected Damage to Essential Facilities**

Classification	Total	# Facilities		
		Probability of at Least Moderate Damage > 50%	Probability of Complete Damage > 50%	Expected Loss of Use < 1 day
Fire Stations	1	0	0	0
Police Stations	2	0	0	0
Schools	6	0	0	0

## **Debris Generation**

HAZUS estimates the amount of debris that will be generated by the hurricane. The model breaks the debris into three general categories: a) Brick/Wood, b) Reinforced Concrete/Steel, and c) Trees. 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 4,225 tons of debris will be generated. Of the total amount, Brick/Wood comprises 55% of the total, Reinforced Concrete/Steel comprises 0% of the total, with the remainder being 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 debris generated by the hurricane.

## **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 29 households to be displaced due to the hurricane. Of these, 8 people (out of a total population of 11,943) will seek temporary shelter in public shelters.

## Economic Loss

The total economic loss estimated for the hurricane is 12.9 million dollars, which represents 1.72 % 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 13 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 86% of the total loss. Table 4 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
<u>Property Damage</u>						
	Building	8,767.60	658.67	69.16	130.08	9,625.51
	Content	1,082.13	205.04	41.98	38.83	1,367.98
	Inventory	0.00	4.80	3.21	0.29	8.31
	<b>Subtotal</b>	<b>9,849.73</b>	<b>868.51</b>	<b>114.36</b>	<b>169.21</b>	<b>11,001.80</b>
<u>Business Interruption Loss</u>						
	Income	0.00	110.04	1.35	19.58	130.97
	Relocation	677.11	147.96	12.48	29.50	867.04
	Rental	505.82	73.33	1.76	1.92	582.82
	Wage	0.00	131.73	2.30	136.21	270.24
	<b>Subtotal</b>	<b>1,182.93</b>	<b>463.05</b>	<b>17.89</b>	<b>187.22</b>	<b>1,851.08</b>
<u>Total</u>	<b>Total</b>	<b>11,032.66</b>	<b>1,331.56</b>	<b>132.25</b>	<b>356.42</b>	<b>12,852.89</b>

# HAZUS-MH: Hurricane Event Report

**Region Name:** Patchogue - hurricane

**Hurricane Scenario:** Probabilistic 100-year Return Period

**Print Date:** Tuesday, February 22, 2005

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*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.*

## **General Building Stock**

HAZUS estimates that there are 2,819 buildings in the region which have an aggregate total replacement value of 747 million (2002 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**

<b>Occupancy</b>	<b>Exposure (\$1000)</b>	<b>Percent of Total</b>
Residential	574,568	76.9%
Commercial	131,303	17.6%
Industrial	13,505	1.8%
Agricultural	621	0.1%
Religious	14,129	1.9%
Government	2,975	0.4%
Education	9,891	1.3%
Total	746,992	100.0%

## **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, 1 fire stations, 2 police stations and no emergency operation facilities.

## General Building Stock Damage

HAZUS estimates that about 756 buildings will be at least moderately damaged. This is over 27% of the total number of buildings in the region. There are an estimated 43 buildings that will be completely destroyed. The definition of the 'damage states' is provided in Volume 1: Chapter 6 of 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**

Occupancy	None		Minor		Moderate		Severe		Destruction	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Agriculture	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Commercial	31	40.29	20	26.02	19	24.77	7	8.79	0	0.13
Education	0	40.62	0	25.30	0	25.40	0	8.65	0	0.04
Government	1	41.22	0	24.80	1	25.25	0	8.72	0	0.01
Industrial	2	41.25	1	23.25	1	25.07	0	10.20	0	0.23
Religion	2	39.19	2	30.80	1	23.01	0	6.87	0	0.13
Residential	1,031	37.76	973	35.66	563	20.62	120	4.39	43	1.57
<b>Total</b>	<b>1,067</b>		<b>997</b>		<b>585</b>		<b>128</b>		<b>43</b>	

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

Building Type	None		Minor		Moderate		Severe		Destruction	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Concrete	17	36.10	11	23.05	16	32.30	4	8.55	0	0.00
Masonry	157	33.36	126	26.75	154	32.63	31	6.47	4	0.79
MH	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Steel	19	40.48	10	21.56	13	26.91	5	10.95	0	0.09
Wood	896	39.78	871	38.64	360	15.98	88	3.90	38	1.70

## **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. After one week, none of the beds will be in service. By 30 days, none will be operational.

**Table 4: Expected Damage to Essential Facilities**

<b>Classification</b>	<b>Total</b>	<b># Facilities</b>		
		<b>Probability of at Least Moderate Damage &gt; 50%</b>	<b>Probability of Complete Damage &gt; 50%</b>	<b>Expected Loss of Use &lt; 1 day</b>
Fire Stations	1	0	0	0
Police Stations	2	0	0	0
Schools	6	0	0	0

## **Debris Generation**

HAZUS estimates the amount of debris that will be generated by the hurricane. The model breaks the debris into three general categories: a) Brick/Wood, b) Reinforced Concrete/Steel, and c) Trees. 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 11,063 tons of debris will be generated. Of the total amount, Brick/Wood comprises 82% of the total, Reinforced Concrete/Steel comprises 1% of the total, with the remainder being Tree Debris. If the building debris tonnage is converted to an estimated number of truckloads, it will require 367 truckloads (@25 tons/truck) to remove the debris generated by the hurricane.

## **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 182 households to be displaced due to the hurricane. Of these, 46 people (out of a total population of 11,943) will seek temporary shelter in public shelters.

The total economic loss estimated for the hurricane is 69.7 million dollars, which represents 9.33 % 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 70 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 78% of the total loss. Table 4 below provides a summary of the losses associated with the building damage.

**Table 5: Building-Related Economic Loss Estimates**  
(Thousands of dollars)

<b>Category</b>	<b>Area</b>	<b>Residential</b>	<b>Commercial</b>	<b>Industrial</b>	<b>Others</b>	<b>Total</b>
<u>Property Damage</u>						
	Building	36,398.45	5,562.38	660.72	1,068.25	43,689.80
	Content	10,094.87	3,160.68	548.81	633.77	14,438.13
	Inventory	0.00	68.23	42.33	2.14	112.69
	<b>Subtotal</b>	<b>46,493.32</b>	<b>8,791.29</b>	<b>1,251.86</b>	<b>1,704.15</b>	<b>58,240.62</b>
<u>Business Interruption Loss</u>						
	Income	2.15	463.73	5.49	41.44	512.81
	Relocation	5,050.19	1,228.30	101.80	285.32	6,665.60
	Rental	2,634.67	672.38	16.72	19.59	3,343.36
	Wage	5.08	595.76	9.30	301.90	912.04
	<b>Subtotal</b>	<b>7,692.08</b>	<b>2,960.16</b>	<b>133.31</b>	<b>648.26</b>	<b>11,433.81</b>
<u>Total</u>	<b>Total</b>	<b>54,185.40</b>	<b>11,751.44</b>	<b>1,385.17</b>	<b>2,352.41</b>	<b>69,674.43</b>

# HAZUS-MH: Hurricane Event Report

**Region Name:** Patchogue - hurricane

**Hurricane Scenario:** Probabilistic 200-year Return Period

**Print Date:** Tuesday, February 22, 2005

***Disclaimer:***

*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.*

# Building Inventory

## General Building Stock

HAZUS estimates that there are 2,819 buildings in the region which have an aggregate total replacement value of 747 million (2002 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**

<b>Occupancy</b>	<b>Exposure (\$1000)</b>	<b>Percent of Total</b>
Residential	574,568	76.9%
Commercial	131,303	17.6%
Industrial	13,505	1.8%
Agricultural	621	0.1%
Religious	14,129	1.9%
Government	2,975	0.4%
Education	9,891	1.3%
Total	746,992	100.0%

## 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, 1 fire stations, 2 police stations and no emergency operation facilities.

## General Building Stock Damage

HAZUS estimates that about 1,591 buildings will be at least moderately damaged. This is over 56% of the total number of buildings in the region. There are an estimated 244 buildings that will be completely destroyed. The definition of the 'damage states' is provided in Volume 1: Chapter 6 of 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**

Occupancy	None		Minor		Moderate		Severe		Destruction	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Agriculture	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Commercial	12	15.53	14	18.40	24	31.05	26	34.01	1	1.01
Education	0	15.58	0	16.53	0	30.71	0	36.82	0	0.35
Government	0	15.93	0	16.41	1	30.23	1	37.28	0	0.15
Industrial	1	16.40	1	15.46	1	29.41	1	37.48	0	1.24
Religion	1	14.05	1	23.23	2	32.83	2	28.64	0	1.25
Residential	385	14.12	812	29.76	886	32.47	402	14.74	243	8.91
<b>Total</b>	<b>399</b>		<b>829</b>		<b>914</b>		<b>433</b>		<b>244</b>	

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

Building Type	None		Minor		Moderate		Severe		Destruction	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Concrete	6	13.47	6	12.61	17	35.80	18	38.12	0	0.00
Masonry	59	12.57	91	19.22	183	38.86	118	24.97	21	4.38
MH	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Steel	8	16.02	6	12.73	14	29.83	19	40.87	0	0.54
Wood	334	14.84	755	33.50	674	29.90	270	12.01	220	9.76

## 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. After one week, none of the beds will be in service. By 30 days, none will be operational.

**Table 4: Expected Damage to Essential Facilities**

<b>Classification</b>	Total	# Facilities		
		Probability of at Least Moderate Damage > 50%	Probability of Complete Damage > 50%	Expected Loss of Use < 1 day
Fire Stations	1	1	0	0
Police Stations	2	2	0	0
Schools	6	6	0	0

## **Debris Generation**

HAZUS estimates the amount of debris that will be generated by the hurricane. The model breaks the debris into three general categories: a) Brick/Wood, b) Reinforced Concrete/Steel, and c) Trees. 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 28,768 tons of debris will be generated. Of the total amount, Brick/Wood comprises 91% of the total, Reinforced Concrete/Steel comprises of 2% of the total, with the remainder being Tree Debris. If the building debris tonnage is converted to an estimated number of truckloads, it will require 1075 truckloads (@25 tons/truck) to remove the debris generated by the hurricane.

## **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 838 households to be displaced due to the hurricane. Of these, 214 people (out of a total population of 11,943) will seek temporary shelter in public shelters.

The total economic loss estimated for the hurricane is 239.1 million dollars, which represents 32.01 % 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 239 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 74% of the total loss. Table 4 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
<u>Property Damage</u>						
	Building	112,292.37	20,099.86	2,337.01	3,870.63	138,599.87
	Content	43,722.31	13,929.91	2,192.01	2,855.66	62,699.89
	Inventory	0.00	289.26	169.38	6.70	465.34
	<b>Subtotal</b>	<b>156,014.68</b>	<b>34,319.02</b>	<b>4,698.40</b>	<b>6,733.00</b>	<b>201,765.10</b>
<u>Business Interruption Loss</u>						
	Income	33.03	3,592.34	25.23	43.40	3,693.99
	Relocation	14,357.15	3,552.45	250.57	903.00	19,063.18
	Rental	7,317.50	2,193.93	50.25	68.69	9,630.37
	Wage	77.98	4,550.26	42.95	272.56	4,943.75
	<b>Subtotal</b>	<b>21,785.66</b>	<b>13,888.98</b>	<b>369.00</b>	<b>1,287.65</b>	<b>37,331.30</b>
<u>Total</u>	<b>Total</b>	<b>177,800.35</b>	<b>48,208.00</b>	<b>5,067.40</b>	<b>8,020.65</b>	<b>239,096.40</b>

# HAZUS-MH: Hurricane Event Report

**Region Name:** Patchogue - hurricane

**Hurricane Scenario:** Probabilistic 500-year Return Period

**Print Date:** Tuesday, February 22, 2005

***Disclaimer:***

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## General Building Stock Damage

HAZUS estimates that about 2,330 buildings will be at least moderately damaged. This is over 83% of the total number of buildings in the region. There are an estimated 727 buildings that will be completely destroyed. The definition of the 'damage states' is provided in Volume 1: Chapter 6 of 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**

Occupancy	None		Minor		Moderate		Severe		Destruction	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Agriculture	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Commercial	4	5.82	7	8.65	18	22.92	45	58.76	3	3.85
Education	0	6.05	0	7.30	0	20.91	1	64.11	0	1.63
Government	0	6.19	0	7.46	0	20.56	1	64.96	0	0.83
Industrial	0	6.19	0	6.93	1	19.79	3	63.08	0	4.01
Religion	0	4.84	1	10.67	2	27.13	3	51.58	0	5.78
Residential	90	3.28	386	14.15	774	28.35	755	27.68	724	26.53
<b>Total</b>	<b>95</b>		<b>394</b>		<b>794</b>		<b>808</b>		<b>727</b>	

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

Building Type	None		Minor		Moderate		Severe		Destruction	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Concrete	3	5.26	2	5.20	10	21.01	33	68.49	0	0.04
Masonry	18	3.78	42	8.99	129	27.25	221	46.72	63	13.26
MH	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Steel	3	6.37	3	5.41	8	18.02	32	68.43	1	1.76
Wood	74	3.30	362	16.05	653	29.00	504	22.37	660	29.28

## 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. After one week, none of the beds will be in service. By 30 days, none will be operational.

**Table 4: Expected Damage to Essential Facilities**

<b>Classification</b>	Total	# Facilities		
		Probability of at Least Moderate Damage > 50%	Probability of Complete Damage > 50%	Expected Loss of Use < 1 day
Fire Stations	1	1	0	0
Police Stations	2	2	0	0
Schools	6	6	0	0

## **Debris Generation**

HAZUS estimates the amount of debris that will be generated by the hurricane. The model breaks the debris into three general categories: a) Brick/Wood, b) Reinforced Concrete/Steel, and c) Trees. 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 59,985 tons of debris will be generated. Of the total amount, Brick/Wood comprises 94% of the total, Reinforced Concrete/Steel comprises of 3% of the total, with the remainder being Tree Debris. If the building debris tonnage is converted to an estimated number of truckloads, it will require 2323 truckloads (@25 tons/truck) to remove the debris generated by the hurricane.

## **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 2,384 households to be displaced due to the hurricane. Of these, 608 people (out of a total population of 11,943) will seek temporary shelter in public shelters.

# Economic Loss

The total economic loss estimated for the hurricane is 527.1 million dollars, which represents 70.56 % 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 527 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 74% of the total loss. Table 4 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
<u>Property Damage</u>						
	Building	243,375.40	43,358.75	4,895.79	8,419.10	300,049.04
	Content	107,008.07	34,363.51	5,085.92	7,073.88	153,531.38
	Inventory	0.00	697.60	393.28	14.85	1,105.73
	<b>Subtotal</b>	<b>350,383.47</b>	<b>78,419.87</b>	<b>10,374.98</b>	<b>15,507.83</b>	<b>454,686.15</b>
<u>Business Interruption Loss</u>						
	Income	97.02	7,514.62	56.66	95.66	7,763.97
	Relocation	26,760.06	6,533.42	411.06	1,718.28	35,422.81
	Rental	14,141.74	4,320.14	94.53	137.23	18,693.65
	Wage	229.07	9,571.99	96.58	638.44	10,536.08
	<b>Subtotal</b>	<b>41,227.90</b>	<b>27,940.17</b>	<b>658.83</b>	<b>2,589.61</b>	<b>72,416.50</b>
<u>Total</u>	<b>Total</b>	<b>391,611.37</b>	<b>106,360.03</b>	<b>11,033.81</b>	<b>18,097.44</b>	<b>527,102.65</b>