## Plymouth

The gateway to Litchfield County from the east, the town of Plymouth is a suburb of the cities of Bristol and Waterbury. The town is primarily residential in nature, with commercial and retail development along Routes 6 and 72, and industrial uses located in Pequabuck and Greystone, and in the industrial park located off Harwinton Avenue. Route 6 (Main Street ) bisects the town from east to west and acts as the town's primary arterial, providing connections Route 8 to the west and Route 84 to the east via Route 72.

Plymouth had a population of 11,634 in the year 2000, with 522 people per square mile. The town has several distinct population centers within its 22.3 square miles: Terryville, which is the largest center in the eastern part of the town, and also Pequabuck, Fall Mountain, Lake Plymouth, East Church, Greystone, and Plymouth Center. Due to varied topography and historical settlement patterns, these population centers have remained fairly distinct over the years.

Plymouth's Plan of Conservation and Development was updated in 2005. A central focus of the plan was to increase economic development and conservation of open space. The plan also included sewer and water supply district mapping. Sewers, water and gas are available in densely populated portions of the town.

### Challenges

Winter storms and flooding represent the biggest natural hazard concerns for Plymouth. Winter plowing and deicing operations are performed exclusively by Public Works Department staff, and at times stretch manpower and resources beyond the available budget. Occasionally state forces are not available and the town will need to treat state roads, particularly when accidents occur. Plymouth has also had its emergency services strained during prolonged icing events, which can lead to power outages, shelter establishment and road closures throughout town. Preventive tree removal is also a high priority program that is under budgeted.

Plymouth experiences regular flooding in three of its subregional watershed basins: the Poland River to the Northeast, the Pequabuck River in central Terryville, and Hancock Brook to the south. In the Poland River watershed, flooding problems include:

- Residential flooding on North Main Street due to insufficient capacity
- River level at the North Main Street bridge coming within inches of breach
- Marsh Brook breaches on North Riverside Ave at Sandra Ave, causing significant bank erosion in the rear of properties on Hoye Street.

The Pequabuck River watershed faces the following flooding risks:

- Insufficient culvert and channel capacity, which causes flooding from Beach Avenue through the rear of properties on Main Street and across Main to the junction of the Pequabuck and Poland rivers
- Flooding in the post office parking area can render it unusable
- Flooding has caused significant damage to the river bank that protects the Water Pollution Control Facility on Canal Street
- Floodwaters nearly reach the electrical substation on Woodside Lane

Flooding issues with Hancock Brook, to the south, include:

- Road closures and washouts along Old Waterbury Road due to inadequate private culverts in the area
- Regular flooding along Todd Hollow Brook due to combination of culvert and downstream capacity
- Localized street flooding which affects private properties when storm events exceed street drainage capacity

Drainage easements in many places are not clearly defined, which complicates maintenance and repair efforts.

Plymouth's large proportion of open space leads to some local concern over wildfires. Although wildfires do sometimes occur in Plymouth, the existence of an all-terrain response vehicle helps first responders access and control them.

A final concern in Plymouth is access: Routes 6 and 72 are both crossed by low railroad bridges with restrictive clearances that limit the height of approaching vehicles. This limits the ability of trucks and other large vehicles to access the town, which could be problematic in the case of a natural hazard.

**Current Mitigation and Response Activities**

- Plymouth has flood control regulations that require certain improvements for development in the flood plain, including the use of flood resistant construction, raised connections to utilities and maintaining floodway capacity
- The Fire Department pumps out basements when they are inundated with more than 4 inches of water
- The Subdivision and site plan regulations require a zero increase in net runoff for new developments for the 25 year storm event for the Pequabuck and Poland River watersheds.
- Open Space Acquisition through subdivision regulations
- Annual Catch Basin cleaning
- The Town participates in DEMHS Region 5 for Regional Emergency Planning
- The town has intergovernmental mutual aid agreements in place with Burlington, Wolcott, Thomaston, Bristol, and Harwinton
- Completed NIMS training and a Tabletop exercise to test preparedness.
- The town has a portable 60KW generator that can be used when needed during an emergency.
- The centralized dispatch in Town Hall has been upgraded to allow for multiple dispatcher operation.
- Subdivision regulations require utilities to be buried.
- Town Hall is a Red Cross Certified Shelter.
- The EOC is located at 7 North Main St.

## Goals, Objectives, and Strategies

***Goal: maximize survival of people, prevent and/or minimize injuries and preserve property and resources of the Town of Plymouth in the event of natural disasters.***

**Objective 1: Improve town infrastructure to reduce hazard impacts**

| | Strategy | Priority | Lead | Hazard |
|---|---|---|---|---|
| S1 | Resolve flooding problems on Todd Hollow Road and Beach Avenue by reconstructing the drainage systems and roads | High | Public Works | Flooding |
| S2 | Improve Bemis Street and Seymour Road | High | Public Works | Flooding |
| S3 | Upgrade bridges as necessary to alleviate flooding problems including North Main Street Bridge | High | Public Works | Flooding |
| S4 | Provide for an increase in selective tree trimming and removal | High | Public Works | Winter Storms, Wind Storms |
| S5 | Increase the railroad clearances on Rte 72 in Pequabuck | Medium | Public Works | All |

**Objective 2: Upgrade town facilities & assets to maximize response capabilities**

| | Strategy | Priority | Lead | Hazard |
|---|---|---|---|---|
| S1 | Certify the high school, fire houses, and Eli Terry Middle School as Red Cross shelters | High | Emergency Management | Winter Storms |
| S2 | Provide indoor space for equipment storage and build a salt shed at the highway facility | High | Public Works | Winter Storms |
| S3 | Upgrade fire trucks and the traffic signals on Main Street to allow for emergency signal preemption | High | Public Works, Fire Department | All |
| S4 | Install computer at EOC | High | Emergency Management | All |
| S5 | Improve communiciation system | High | Emergency Management | All |
| S6 | Follow the objectives listed in the Fire Department's Master Plan, including constructing a new Fire Station in the Fall Mountain area | Medium | Fire Department | All |
| S7 | Increase size of Police Department through Town Hall expansion | Medium | Police Department | All |

**Objective 3: Invest in training and equipment to increase response capacity**

| | Strategy | Priority | Lead | Hazard |
|---|---|---|---|---|
| S1 | Have a full-scale, multi-agency emergency response drill | High | Emergency Management | All |
| S2 | Train additional staff in WebEOC | High | Emergency Management | All |
| S3 | Purchase additional emergency generator for Plymouth Fire House | High | Fire Department | All |
| S4 | Take advantage of statewide Reverse-911 service through Everbridge | High | Administration, Emergency Management | All |
| S5 | Use GIS to improve and coordinate response services | Medium | Planning, Emergency Management | All |

**Objective 4: Use policy and planning tools to address potential impacts of hazards**

| | Strategy | Priority | Lead | Hazard |
|---|---|---|---|---|
| S1 | Prepare Dam Emergency Response Plan | High | Planning, Public Works | Dam Failure, Flooding |
| S2 | Update the Town Emergency Response Plan at regular intervals | High | Emergency Management | All |
| S3 | Update the Shelter Management Plan | High | Emergency Management | Winter Storms |
| S4 | Develop an Town Evacuation Plan | High | Emergency Management, Public Works | All |
| S5 | Develop low impact development regulations with incentives | Medium | Planning | Flooding |
| S6 | Prepare a town-wide Drainage / Flooding Study | Medium | Planning, Public Works | Flooding |
| S7 | Better define drainage easements | Medium | Planning, Public Works | Flooding |
| S8 | Use GIS to improve governmental and emergency services | Medium | Planning, Emergency Management | All |

**Objective 5: Enable residents to better help themselves through preparedness education**

| | Strategy | Priority | Lead | Hazard |
|---|---|---|---|---|
| S1 | Provide emergency planning tools on the town website | High | Emergency Management | All |
| S2 | Encourage preparedness workshops in schools | High | Emergency Management | All |
| S3 | Take advantage of statewide Reverse-911 service through Everbridge | High | Administration, Emergency Management | All |

**Objective 6: Coordinate plans & reponse efforts with neighboring parties to increase efficacy**

| | Strategy | Priority | Lead | Hazard |
|---|---|---|---|---|
| S1 | Coordinate dam releases with upstream dam owners prior to significant rainfall events to reduce potential for downstream flooding | High | Public Works, Dam Operators | Dam Failure, Flooding |
| S2 | Test coordination plans (above) with neighboring municipalities and other affected parties through a practice exercise, either tabletop or full-scale | High | Public Works, Dam Operators | Dam Failure, Flooding |

**Objective 7: Continue Participation in National Flood Insurance Program**

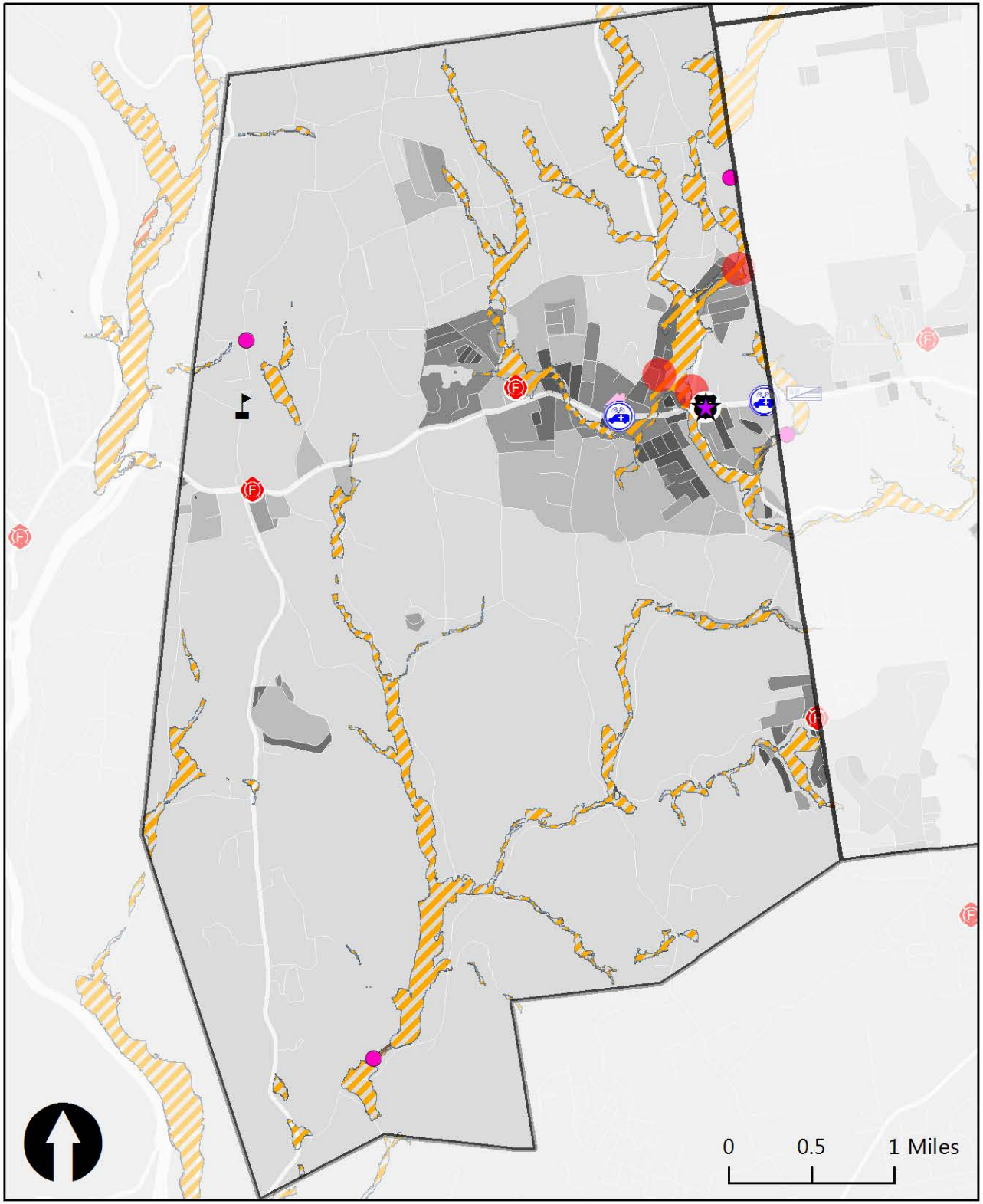
| | Strategy | Priority | Lead | Hazard |
|---|---|---|---|---|
| S1 | Continue enforcement of floodplain management ordinances by regulating all new and substantially improved construction in flood zones | High | Planning | Flooding |
| S2 | Work with FEMA to update FIRMs as necessary | High | Planning | Flooding |
| S3 | Continue to distribute information about the NFIP to homeowners | High | Planning | Flooding |
| S4 | Continue to assist homeowners with amendments to NFIP maps as necessary | High | Planning | Flooding |

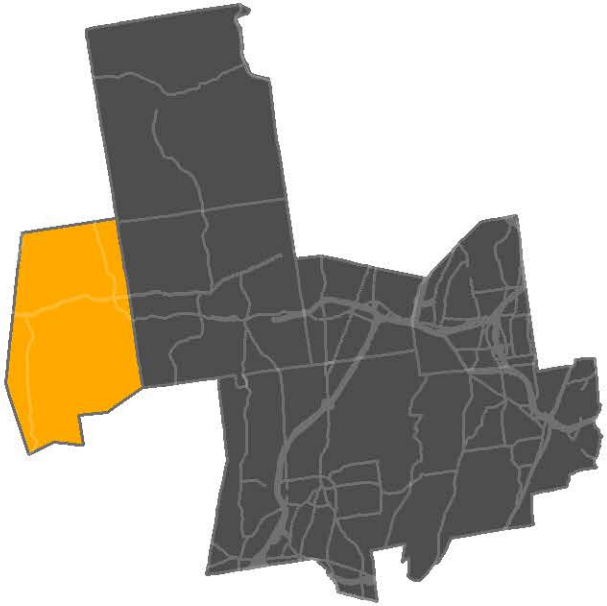
**Contributors**

Mark Sekorski (Fire Chief), Paul Schwanka (Civil Preparedness Director), Khara Dodds (Dir of Planning & Economic Development), Anthony Lorenzetti (Director of Public Works), Bill Kuehn (former Director of Planning & Economic Development), Tim Pollack (former Interim Director of Public Works), Karl Paulette (former Interim Highway Superintendent), Bill Herzman (former Building Official), Tony Orsini (former Emergency Management Director)

# Flood Zones & Critical Facilities

## Plymouth



### Critical Facilites

- Power_Plant
- Hospitals
- Ambulance
- Fire
- Police
- Waste Water
- Schools
- Primary Shelters
- RLP Zone
- Class C Dams
- Town Halls

### Flood Zones

- 100 Year Flood
- 500 Year Flood

### Pop/square mile

- 0 - 1,000
- 1,000 - 2,000
- 2,000 - 3,000
- 3,000 - 4,000
- 4,000 - 5,000
- 5,000 - 10,000
- 10,000+

# Hazus-MH: Flood Event Report

**Region Name:** Plymouth

**Flood Scenario:** Flood100

**Print Date** Wednesday, October 1, 2014

***Disclaimer:***

*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*

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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 22 square miles and contains 222 census blocks. The region contains over 4 thousand households and has a total population of 11,564 people (2000 Census Bureau data). The distribution of population by State and County for the study region is provided in Appendix B .

There are an estimated 4,718 buildings in the region with a total building replacement value (excluding contents) of 954 million dollars (2006 dollars). Approximately 91.61% of the buildings (and 75.43% of the building value) are associated with residential housing.

## Building Inventory

### General Building Stock

Hazus estimates that there are 4,718 buildings in the region which have an aggregate total replacement value of 954 million (2006 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 | 719,783 | 75.4% |
| Commercial | 86,407 | 9.1% |
| Industrial | 114,722 | 12.0% |
| Agricultural | 2,399 | 0.3% |
| Religion | 15,887 | 1.7% |
| Government | 6,564 | 0.7% |
| Education | 8,427 | 0.9% |
| **Total** | **954,189** | **100.00%** |

**Table 2**

**Building Exposure by Occupancy Type for the Scenario**

| Occupancy | Exposure ($1000) | Percent of Total |
|---|---|---|
| Residential | 461,374 | 72.5% |
| Commercial | 67,540 | 10.6% |
| Industrial | 87,120 | 13.7% |
| Agricultural | 1,667 | 0.3% |
| Religion | 11,030 | 1.7% |
| Government | 4,909 | 0.8% |
| Education | 3,095 | 0.5% |
| **Total** | **636,735** | **100.00%** |

### Essential Facility Inventory

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

## 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:** | CCRPA Disaster Resilience |
| **Scenario Name:** | Flood100 |
| **Return period Analyzed:** | 100 |
| **Analysis Option Analyzed:** | No What-Ifs |

## General Building Stock Damage

Hazus estimates that about 35 buildings will be at least moderately damaged. This is over 26% 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 Volume 1: Chapter 5.3 of 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.

**Table 3: Expected Building Damage by Occupancy**

| | 1-10 | | 11-20 | | 21-30 | | 31-40 | | 41-50 | | Substantially | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Occupancy** | **Count** | **(%)** | **Count** | **(%)** | **Count** | **(%)** | **Count** | **(%)** | **Count** | **(%)** | **Count** | **(%)** |
| Agricultural | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 |
| Commercial | 0 | 0.00 | 1 | 100.0 | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 |
| Education | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 |
| Government | 0 | 0.00 | 1 | 100.0 | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 |
| Industrial | 0 | 0.00 | 3 | 25.00 | 5 | 41.67 | 3 | 25.00 | 1 | 8.33 | 0 | 0.00 |
| Religion | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 |
| Residential | 0 | 0.00 | 2 | 9.52 | 2 | 9.52 | 13 | 61.90 | 4 | 19.05 | 0 | 0.00 |
| **Total** | **0** | | **7** | | **7** | | **16** | | **5** | | **0** | |

**Table 4: Expected Building Damage by Building Type**

| Building | 1-10 | | 11-20 | | 21-30 | | 31-40 | | 41-50 | | Substantially | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Type** | **Count** | **(%)** | **Count** | **(%)** | **Count** | **(%)** | **Count** | **(%)** | **Count** | **(%)** | **Count** | **(%)** |
| Concrete | 0 | 0.00 | 0 | 0.00 | 1 | 100.00 | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 |
| ManufHousing | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 |
| Masonry | 0 | 0.00 | 2 | 50.00 | 1 | 25.00 | 1 | 25.00 | 0 | 0.00 | 0 | 0.00 |
| Steel | 0 | 0.00 | 3 | 33.33 | 3 | 33.33 | 2 | 22.22 | 1 | 11.11 | 0 | 0.00 |
| Wood | 0 | 0.00 | 2 | 9.09 | 3 | 13.64 | 13 | 59.09 | 4 | 18.18 | 0 | 0.00 |

## 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 Building Damage by Occupancy**

| | | # Facilities | | |
|---|---|---|---|---|
| **Classification** | Total | At Least Moderate | At Least Substantial | Loss of Use |
| Fire Stations | 1 | 1 | 0 | 1 |
| Hospitals | 0 | 0 | 0 | 0 |
| Police Stations | 1 | 0 | 0 | 0 |
| Schools | 5 | 1 | 0 | 1 |

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

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

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

## Induced Flood Damage

### Debris Generation

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

The model estimates that a total of 1,754 tons of debris will be generated. Of the total amount, Finishes comprises 55% of the total, Structure comprises 24% of the total. If the debris tonnage is converted into an estimated number of truckloads, it will require 70 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 266 households will be displaced due to the flood. Displacement includes households evacuated from within or very near to the inundated area. Of these, 418 people (out of a total population of 11,564) will seek temporary shelter in public shelters.

## Economic Loss

The total economic loss estimated for the flood is 67.33 million dollars, which represents 10.57 % of the total replacement value of the scenario buildings

### Building-Related Losses

The building losses are broken into two categories: direct building losses and business interruption losses. The direct building losses are the estimated costs to repair or replace the damage caused to the building and its contents. The business interruption losses are the losses associated with inability to operate a business because of the damage sustained during the flood. Business interruption losses also include the temporary living expenses for those people displaced from their homes because of the flood.

The total building-related losses were 67.01 million dollars. 0% of the estimated losses were related to the business interruption of the region. The residential occupancies made up 12.51% 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 | 5.52 | 2.32 | 10.31 | 0.94 | 19.09 |
| | Content | 2.89 | 8.49 | 28.01 | 5.98 | 45.36 |
| | Inventory | 0.00 | 0.19 | 2.36 | 0.01 | 2.56 |
| | **Subtotal** | **8.42** | **10.99** | **40.68** | **6.92** | **67.01** |
| Business Interruption | | | | | | |
| | Income | 0.01 | 0.00 | 0.01 | 0.01 | 0.03 |
| | Relocation | 0.00 | 0.02 | 0.00 | 0.01 | 0.03 |
| | Rental Income | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | Wage | 0.00 | 0.04 | 0.01 | 0.21 | 0.26 |
| | **Subtotal** | **0.01** | **0.07** | **0.02** | **0.23** | **0.32** |
| ALL | **Total** | **8.42** | **11.06** | **40.70** | **7.15** | **67.33** |

## Appendix A: County Listing for the Region

Connecticut

- Litchfield

## Appendix B: Regional Population and Building Value Data

| | | Building Value (thousand of dollars) | | |
|---|---|---|---|---|
| | Population | Residential | Non-Residential | Total |
| **Connecticut** | | | | |
| Litchfield | 11,564 | 719,783 | 234,406 | 954,189 |
| **Total** | 11,564 | 719,783 | 234,406 | 954,189 |
| **Total Study Region** | 11,564 | 719,783 | 234,406 | 954,189 |