Municipal Mitigation Goals, Objectives, and Strategies

While the risks from natural hazards confronting the seven municipalities of Central Connecticut may be largely similar, priorities, concerns, economic constraints, and capacity vary from town to town. Each town has a unique history and set of circumstances that dictate best practices; accordingly, space in this section is dedicated to review of hazard impacts in each town, accompanied by a profile of each town's current mitigation actions and goals, objectives, and strategies. Strategies were prioritized according to a variation on the STAPLEE criteria; each strategy was given a score of 1 to 3 (low to high) on each of the following criteria: social acceptability, technical feasibility, administrative feasibility, potential mitigation impact, legality, economic feasibility, and environmental responsibility. Strategies that achieved a cumulative score of 18 or higher qualified as "high" priority.

Berlin

Berlin is a primarily suburban community in the southeast corner of the region that boasts large rural areas. The town features mainly decentralized development, with a large retail strip flanking Rte 5/15 and three small village centers. With slightly more than 18,000 residents living on its 26 square miles in 2000, Berlin had a population density of 675 persons per square mile, slightly higher than the state as a whole. Median age in the town is 43, and 84% of the housing is single-family.

The Town's Plan of Conservation and Development reveals a strong concern for preserving the character of the community, with calls for preserving and protecting ridgelines, open meadows and fields, woodlands and forests, wetlands, watercourses, and flood hazard areas. The Plan also emphasizes smart growth principles, and establishes a service boundary for the town, beyond which sewer, water, and other municipal services are not extended.

Challenges

Berlin experiences recurrent flooding throughout the town, with regular, localized flooding at a handful of known locations 4-5 times per year. During larger events, floodwaters can divide the town into sections, separating the population centers of Kensington and East Berlin from Berlin. This complicates both evacuation and sheltering in emergencies. The Physical Services building complex floods during major events, to the point that staff remove low file drawers and place them on top of tables at the end of the day if very heavy rains are expected. Lately, concern has arisen in the town about the municipal storm water policy. Current policy requires flood-proofing and on-site water storage for properties within flood zones, but does not address the problem comprehensively, from a hydrological systems perspective. In interviews, several individuals from the town questioned whether a more systematic approach would go further in lessening the severity and frequency of floods.

The rupture of the Kenmere Dam in 1987 alerted Berlin to the potential risks it faces from its dams. Eight to ten dams affect the town of Berlin, and six category C dams lie within the town's boundaries. The 1987 failure loosed 80 million gallons of water into the town; because of the dam's location, most of this water inundated a golf course. Had the dam been situated differently, however, the outcome could have been far worse—a fact not lost on town staff, who are working on a Dam Breakage Emergency Response Plan.

Berlin also faces the usual challenges during winter storms; ice and snow make roads impassable, knock down tree limbs, and disrupt utility service. The combined effect leaves people stranded in their homes, potentially without heat or power. Removal of the ice and snow from Berlin's town-owned roads is handled by a combination of town workers and contractors; the town also handles debris removal.

Current Mitigation and Response Activities

- Berlin has flood control regulations in place that limit the type of development that may occur in the flood zone. Regulations also stipulate use of flood-resistant materials, flood-proofing, required elevation for buildings' lowest floors, and on-site water storage.
- The town is preparing a Dam Breakage Emergency Response Plan.
- During floods, the town uses sandbags to control flood waters, and evacuates people with homes in known flooding locations, including: sections of Farmington Avenue, residences

on Lower Lane, properties on Norton Road between the two schools, Massirio Drive, and the east side of New Britain Road.

- The town has an open space acquisition program, although it does not specifically target wetlands or flood-prone properties. It also encourages low-impact development.
- Berlin uses a reverse 911 system for emergency notifications, in combination with TV and radio announcements.
- Berlin does annual inspection and cleaning of its culverts.
- The town participates in the National Flood Insurance Program, and has begun mitigating its Repetitive Loss Properties: a single-family house at 79 Massirio Drive has been removed and the parcel is now vacant.
- The town participates in DEMHS Region 3 and follows its Regional Emergency Support Plan.

Goals, Objectives, and Strategies

Goal: reduce losses of life and property, and minimize economic consequences of natural hazards.

Objective 1: Update town policies and plans to encourage sound practices

	Strategy	Priority	Lead	Hazard
S1	Target wetland or flood plain properties for open space acquisition	High	Planning, Conservation Commission	Flooding
S2	Complete the Dam Breakage Emergency Plan	High	Planning	Dam Failure
S3	Revise subdivision / zoning code to offer incentives for low-impact	Medium	Planning	Flooding
S4	Conduct comprehensive study of storm-water issues across town; examine benefits (if any) of developing a strategic (rather than piecemeal) storm-water management plan	Medium	Planning, Public Works	Flooding

Objective 2: Ensure access to critical facilities

	Strategy	Priority	Lead	Hazard
S1	Relocate Physical Services building complex to higher ground	Medium	Public Works	Flooding

Objective 3: Improve capacity to deal with hazards by investing in necessary equipment & training

	Strategy	Priority	Lead	Hazard
S1	Acquire generators and shelter supplies to equip multiple shelters	High	Emergency Management	Winter Storms
S2	Improve coordination and efficiency by periodically exercising and evaluating response plans	High	Emergency Management	All
S3	Take advantage of regional WebEOC training as necessary	High	Emergency Management	All
S4	Invest in a sandbag loader, sandbags, and sand to help manage recurrent flooding	Medium	Public Works	Flooding
S5	Purchase chainsaws and a wood chipper to expedite removal of downed trees and other debris	Medium	Public Works	Winter Storms

Objective 4: Enable residents to better help themselves through preparedness education

	Strategy	Priority	Lead	Hazard
S1	Develop & distribute a pamphlet about household preparedness for natural hazards; postpdf of pamphlet on town website	High	Emergency Management, Staff	All
S2	Publish evacuation plan on town website	High	Emergency Management	All
S3	Encourage preparedness workshops in schools	High	Emergency Management	All

Objective 5: 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, Public Works	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

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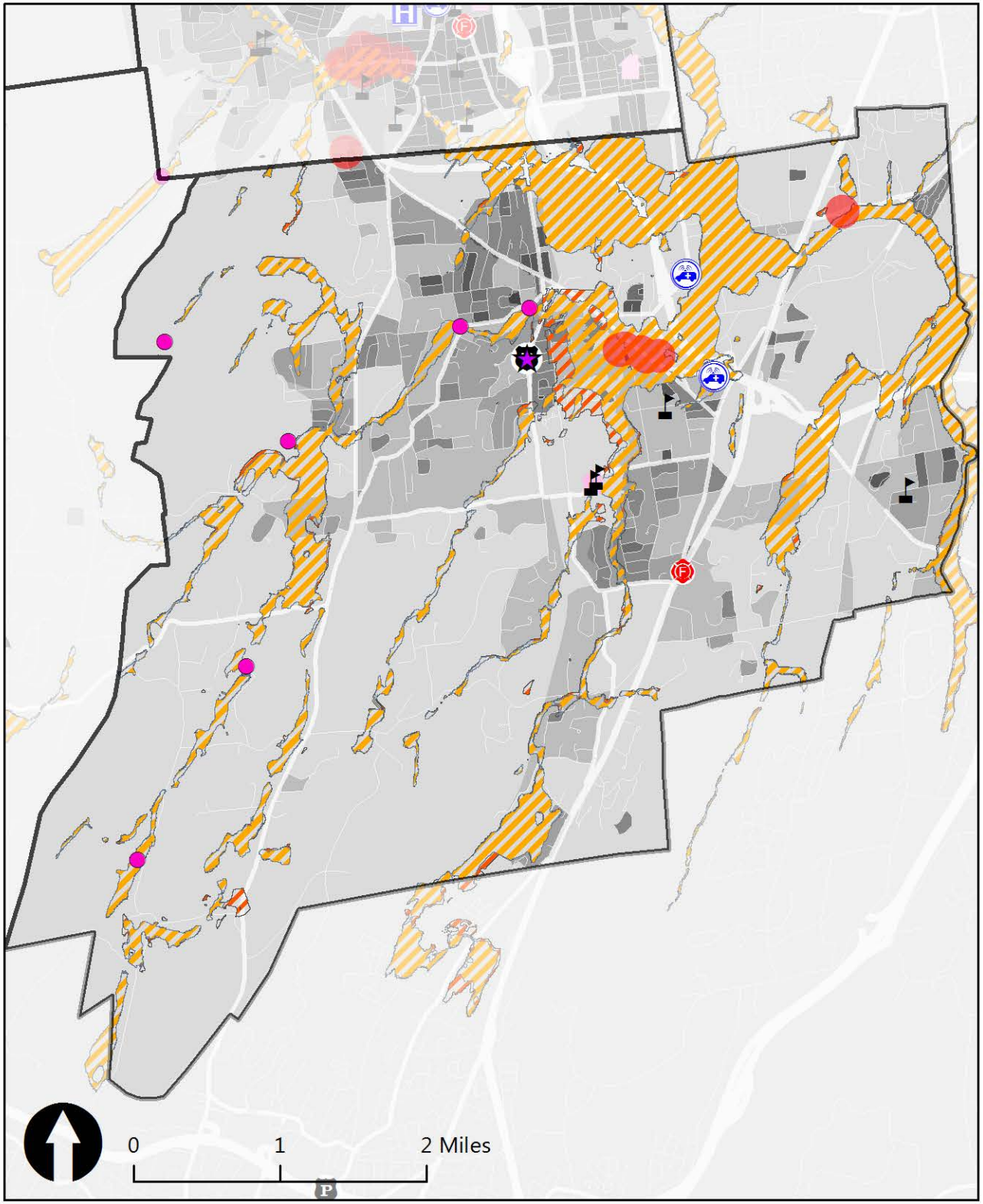
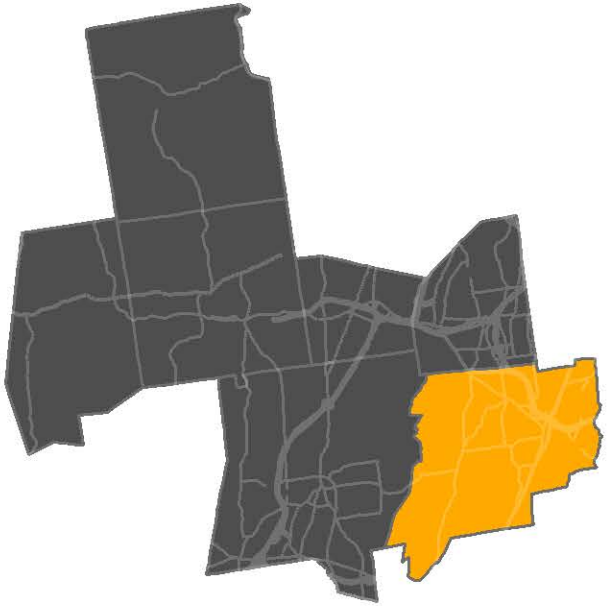
Flood Zones & Critical Facilities

Berlin





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: Berlin

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

Table of Contents

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

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 36 square miles and contains 111 census blocks. The region contains over 1 thousand households and has a total population of 3,799 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 1,690 buildings in the region with a total building replacement value (excluding contents) of 317 million dollars (2006 dollars). Approximately 92.43% of the buildings (and 83.22% of the building value) are associated with residential housing.

Building Inventory

General Building Stock

Hazus estimates that there are 1,690 buildings in the region which have an aggregate total replacement value of 317 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	263,869	83.2%
Commercial	23,715	7.5%
Industrial	18,285	5.8%
Agricultural	1,183	0.4%
Religion	2,555	0.8%
Government	4,268	1.3%
Education	3,183	1.0%
Total	**317,058**	**100.00%**

Table 2

Building Exposure by Occupancy Type for the Scenario

Occupancy	Exposure ($1000)	Percent of Total
Residential	217,414	81.7%
Commercial	21,026	7.9%
Industrial	17,143	6.4%
Agricultural	1,068	0.4%
Religion	2,164	0.8%
Government	4,268	1.6%
Education	3,183	1.2%
Total	**266,266**	**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 3 schools, 3 fire stations, no police stations and no 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:	LH_FLOOD_FULL
Scenario Name:	Flood100
Return period Analyzed:	100
Analysis Option Analyzed:	No What-Ifs

General Building Stock Damage

Hazus estimates that about 7 buildings will be at least moderately damaged. This is over 88% of the total number of buildings in the scenario. There are an estimated 6 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	0	0.00	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	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Industrial	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	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	0	0.00	0	0.00	0	0.00	1	14.29	6	85.71
Total	**0**		**0**		**0**		**0**		**1**		**6**	

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	0	0.00	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	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Steel	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Wood	0	0.00	0	0.00	0	0.00	0	0.00	1	14.29	6	85.71

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	3	1	0	1
Hospitals	0	0	0	0
Police Stations	0	0	0	0
Schools	3	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 4,219 tons of debris will be generated. Of the total amount, Finishes comprises 21% of the total, Structure comprises 46% of the total. If the debris tonnage is converted into an estimated number of truckloads, it will require 169 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 54 households will be displaced due to the flood. Displacement includes households evacuated from within or very near to the inundated area. Of these, 51 people (out of a total population of 3,799) will seek temporary shelter in public shelters.

Economic Loss

The total economic loss estimated for the flood is 17.65 million dollars, which represents 6.63 % 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 17.65 million dollars. 1% of the estimated losses were related to the business interruption of the region. The residential occupancies made up 45.43% 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	5.44	0.99	0.90	1.09	8.42
	Content	2.58	1.97	1.87	2.24	8.66
	Inventory	0.00	0.02	0.38	0.00	0.41
	Subtotal	**8.02**	**2.98**	**3.15**	**3.33**	**17.48**
Business Interruption						
	Income	0.00	0.01	0.00	0.00	0.01
	Relocation	0.00	0.00	0.00	0.00	0.00
	Rental Income	0.00	0.00	0.00	0.00	0.00
	Wage	0.00	0.01	0.00	0.15	0.16
	Subtotal	**0.00**	**0.02**	**0.00**	**0.15**	**0.17**
ALL	**Total**	**8.02**	**2.99**	**3.15**	**3.49**	**17.65**

Appendix A: County Listing for the Region

Connecticut

- Hartford

Appendix B: Regional Population and Building Value Data

		Building Value (thousand of dollars)		
	Population	Residential	Non-Residential	Total
Connecticut				
Litchfield	3,799	263,869	53,189	317,058
Total	3,799	263,869	53,189	317,058
Total Study Region	3,799	263,869	53,189	317,058