
2019 - 2024 Capitol Region Natural Hazard Mitigation Plan Update

Municipal Annexes Document

This document has been prepared as part of Connecticut's Capitol Region Council of Governments multi-jurisdictional hazard mitigation plan update. It presents details on the hazard risks and vulnerabilities, mitigation capabilities, and planned mitigation strategies and actions of each municipality in the Capitol Region. The multi-jurisdictional plan should be referenced for additional details about regional hazards, initiatives, and other hazard mitigation information. This document is not intended as a stand-alone planning document.



Table of Contents

1 ANDOVER	1-1
COMMUNITY OVERVIEW.....	1-1
CRITICAL FACILITIES.....	1-1
CAPABILITIES.....	1-2
<i>New Capabilities</i>	1-2
CHALLENGES.....	1-2
<i>Challenges Overview</i>	1-2
<i>Hazard Losses</i>	1-3
MITIGATION STRATEGIES AND ACTIONS.....	1-7
<i>Noted Hazard Mitigation Needs</i>	1-7
<i>Status of Previous Mitigation Strategies and Actions</i>	1-7
<i>Active Mitigation Strategies and Actions</i>	1-9
2 AVON	2-1
COMMUNITY OVERVIEW.....	2-1
CRITICAL FACILITIES.....	2-1
CAPABILITIES.....	2-1
<i>New Capabilities</i>	2-2
CHALLENGES.....	2-2
<i>Challenges Overview</i>	2-2
<i>Hazard Losses</i>	2-3
MITIGATION STRATEGIES AND ACTIONS.....	2-7
<i>Noted Hazard Mitigation Needs</i>	2-7
<i>Status of Previous Mitigation Strategies and Actions</i>	2-7
<i>Active Mitigation Strategies and Actions</i>	2-10
3 BERLIN	3-1
COMMUNITY OVERVIEW.....	3-1
CRITICAL FACILITIES.....	3-1
CAPABILITIES.....	3-2
<i>New Capabilities</i>	3-3
CHALLENGES.....	3-3
<i>Challenges Overview</i>	3-3
<i>Hazard Losses</i>	3-4
MITIGATION STRATEGIES AND ACTIONS.....	3-9
<i>Noted Hazard Mitigation Needs</i>	3-9
<i>Status of Previous Mitigation Strategies and Actions</i>	3-9
<i>Active Mitigation Strategies and Actions</i>	3-13
4 BLOOMFIELD	4-1
COMMUNITY OVERVIEW.....	4-1
CRITICAL FACILITIES.....	4-1
CAPABILITIES.....	4-1
<i>New Capabilities</i>	4-2
CHALLENGES.....	4-2
<i>Challenges Overview</i>	4-2

<i>Hazard Losses</i>	4-3
MITIGATION STRATEGIES AND ACTIONS.....	4-7
<i>Noted Hazard Mitigation Needs</i>	4-7
<i>Status of Previous Mitigation Strategies and Actions</i>	4-7
<i>Active Mitigation Strategies and Actions</i>	4-8
5 BOLTON	5-1
COMMUNITY OVERVIEW.....	5-1
CRITICAL FACILITIES.....	5-1
CAPABILITIES.....	5-2
<i>New Capabilities</i>	5-2
CHALLENGES.....	5-2
<i>Challenges Overview</i>	5-2
<i>Hazard Losses</i>	5-3
MITIGATION STRATEGIES AND ACTIONS.....	5-7
<i>Noted Hazard Mitigation Needs</i>	5-7
<i>Status of Previous Mitigation Strategies and Actions</i>	5-7
<i>Active Mitigation Strategies and Actions</i>	5-9
6 CANTON	6-1
COMMUNITY OVERVIEW.....	6-1
CRITICAL FACILITIES.....	6-1
CAPABILITIES.....	6-1
<i>New Capabilities</i>	6-2
CHALLENGES.....	6-2
<i>Challenges Overview</i>	6-2
<i>Hazard Losses</i>	6-3
MITIGATION STRATEGIES AND ACTIONS.....	6-7
<i>Noted Hazard Mitigation Needs</i>	6-7
<i>Status of Previous Mitigation Strategies and Actions</i>	6-7
<i>Active Mitigation Strategies and Actions</i>	6-9
7 COLUMBIA	7-1
COMMUNITY OVERVIEW.....	7-1
CRITICAL FACILITIES.....	7-1
CAPABILITIES.....	7-2
<i>New Capabilities</i>	7-2
CHALLENGES.....	7-3
<i>Challenges Overview</i>	7-3
<i>Hazard Losses</i>	7-4
MITIGATION STRATEGIES AND ACTIONS.....	7-8
<i>Noted Hazard Mitigation Needs</i>	7-8
<i>Status of Previous Mitigation Strategies and Actions</i>	7-8
<i>Active Mitigation Strategies and Actions</i>	7-9
8 COVENTRY	8-1
COMMUNITY OVERVIEW.....	8-1
CRITICAL FACILITIES.....	8-1

CAPABILITIES.....	8-2
<i>New Capabilities</i>	8-3
CHALLENGES.....	8-3
<i>Challenges Overview</i>	8-3
<i>Hazard Losses</i>	8-4
MITIGATION STRATEGIES AND ACTIONS.....	8-8
<i>Noted Hazard Mitigation Needs</i>	8-8
<i>Status of Previous Mitigation Strategies and Actions</i>	8-9
<i>Active Mitigation Strategies and Actions</i>	8-10
9 EAST GRANBY.....	9-1
COMMUNITY OVERVIEW.....	9-1
CRITICAL FACILITIES.....	9-1
CAPABILITIES.....	9-2
CHALLENGES.....	9-2
<i>Challenges Overview</i>	9-2
<i>Hazard Losses</i>	9-2
MITIGATION STRATEGIES AND ACTIONS.....	9-6
<i>Noted Hazard Mitigation Needs</i>	9-6
<i>Status of Previous Mitigation Strategies and Actions</i>	9-6
<i>Active Mitigation Strategies and Actions</i>	9-8
10 EAST HARTFORD	10-1
COMMUNITY OVERVIEW.....	10-1
CRITICAL FACILITIES.....	10-1
CAPABILITIES.....	10-1
<i>New Capabilities Changes</i>	10-2
CHALLENGES.....	10-3
<i>Challenges Overview</i>	10-3
<i>Hazard Losses</i>	10-3
MITIGATION STRATEGIES AND ACTIONS.....	10-7
<i>Noted Hazard Mitigation Needs</i>	10-7
<i>Status of Previous Mitigation Strategies and Actions</i>	10-7
<i>Active Mitigation Strategies and Actions</i>	10-9
11 EAST WINDSOR.....	11-1
COMMUNITY OVERVIEW.....	11-1
CRITICAL FACILITIES.....	11-1
CAPABILITIES.....	11-3
<i>New Capabilities</i>	11-3
CHALLENGES.....	11-3
<i>Challenges Overview</i>	11-3
<i>Hazard Losses</i>	11-4
MITIGATION STRATEGIES AND ACTIONS.....	11-8
<i>Status of Previous Mitigation Strategies and Actions</i>	11-8
<i>Active Mitigation Strategies and Actions</i>	11-9

12 ELLINGTON	12-1
COMMUNITY OVERVIEW.....	12-1
CRITICAL FACILITIES.....	12-1
CAPABILITIES.....	12-2
<i>New Capabilities</i>	12-2
CHALLENGES.....	12-2
<i>Challenges Overview</i>	12-2
<i>Hazard Losses</i>	12-3
MITIGATION STRATEGIES AND ACTIONS.....	12-7
<i>Noted Hazard Mitigation Needs</i>	12-7
<i>Status of Previous Mitigation Strategies and Actions</i>	12-7
<i>Active Mitigation Strategies and Actions</i>	12-8
13 ENFIELD	13-1
COMMUNITY OVERVIEW.....	13-1
CRITICAL FACILITIES.....	13-1
CAPABILITIES.....	13-2
<i>New Capabilities</i>	13-3
CHALLENGES.....	13-4
<i>Challenges Overview</i>	13-4
<i>Hazard Losses</i>	13-4
MITIGATION STRATEGIES AND ACTIONS.....	13-8
<i>Status of Previous Mitigation Strategies and Actions</i>	13-8
<i>Active Mitigation Strategies and Actions</i>	13-10
14 FARMINGTON	14-1
COMMUNITY OVERVIEW.....	14-1
CRITICAL FACILITIES.....	14-1
CAPABILITIES.....	14-2
<i>New Capabilities</i>	14-2
CHALLENGES.....	14-3
<i>Challenges Overview</i>	14-3
<i>Hazard Losses</i>	14-3
MITIGATION STRATEGIES AND ACTIONS.....	14-7
<i>Status of Previous Mitigation Strategies and Actions</i>	14-7
<i>Active Mitigation Strategies and Actions</i>	14-8
15 GLASTONBURY	15-1
COMMUNITY OVERVIEW.....	15-1
CRITICAL FACILITIES.....	15-1
CAPABILITIES.....	15-2
<i>New Capabilities</i>	15-2
CHALLENGES.....	15-3
<i>Challenges Overview</i>	15-3
<i>Hazard Losses</i>	15-3
MITIGATION STRATEGIES AND ACTIONS.....	15-7
<i>Status of Previous Mitigation Strategies and Actions</i>	15-7

<i>Active Mitigation Strategies and Actions</i>	15-9
16 GRANBY	16-1
COMMUNITY OVERVIEW.....	16-1
CRITICAL FACILITIES.....	16-1
CAPABILITIES.....	16-2
CHALLENGES.....	16-3
<i>Challenges Overview</i>	16-3
<i>Hazard Losses</i>	16-4
MITIGATION STRATEGIES AND ACTIONS.....	16-8
<i>Noted Hazard Mitigation Needs</i>	16-8
<i>Status of Previous Mitigation Strategies and Actions</i>	16-8
<i>Active Mitigation Strategies and Actions</i>	16-10
17 HARTFORD	17-1
COMMUNITY OVERVIEW.....	17-1
CRITICAL FACILITIES.....	17-1
CAPABILITIES.....	17-1
<i>New Capabilities</i>	17-2
CHALLENGES.....	17-3
<i>Challenges Overview</i>	17-3
<i>Hazard Losses</i>	17-3
MITIGATION STRATEGIES AND ACTIONS.....	17-7
<i>Noted Hazard Mitigation Needs</i>	17-7
<i>Status of Previous Mitigation Strategies and Actions</i>	17-7
<i>Active Mitigation Strategies and Actions</i>	17-9
18 HEBRON	18-1
COMMUNITY OVERVIEW.....	18-1
CRITICAL FACILITIES.....	18-1
CAPABILITIES.....	18-2
<i>New Capabilities</i>	18-2
CHALLENGES.....	18-3
<i>Hazard Losses</i>	18-3
MITIGATION STRATEGIES AND ACTIONS.....	18-7
<i>Noted Hazard Mitigation Needs</i>	18-7
<i>Status of Previous Mitigation Strategies and Actions</i>	18-7
<i>Active Mitigation Strategies and Actions</i>	18-9
19 MANCHESTER	19-1
COMMUNITY OVERVIEW.....	19-1
CRITICAL FACILITIES.....	19-1
CAPABILITIES.....	19-1
<i>New Capabilities</i>	19-2
CHALLENGES.....	19-2
<i>Challenges Overview</i>	19-2
<i>Hazard Losses</i>	19-3
MITIGATION STRATEGIES AND ACTIONS.....	19-7

<i>Noted Hazard Mitigation Needs</i>	19-7
<i>Status of Previous Mitigation Strategies and Actions</i>	19-8
<i>Active Mitigation Strategies and Actions</i>	19-9
20 MANSFIELD	20-1
COMMUNITY OVERVIEW.....	20-1
CRITICAL FACILITIES.....	20-2
CAPABILITIES.....	20-3
<i>New Capabilities</i>	20-5
CHALLENGES.....	20-5
<i>Challenges Overview</i>	20-5
<i>Hazard Losses</i>	20-6
MITIGATION STRATEGIES AND ACTIONS.....	20-11
<i>Noted Hazard Mitigation Needs</i>	20-11
<i>Status of Previous Mitigation Strategies and Actions</i>	20-11
<i>Active Mitigation Strategies and Actions</i>	20-14
21 MARLBOROUGH	21-1
COMMUNITY OVERVIEW.....	21-1
CRITICAL FACILITIES.....	21-1
CAPABILITIES.....	21-1
<i>New Capabilities</i>	21-2
CHALLENGES.....	21-2
<i>Challenges Overview</i>	21-2
<i>Hazard Losses</i>	21-2
MITIGATION STRATEGIES AND ACTIONS.....	21-6
<i>Status of Previous Mitigation Strategies and Actions</i>	21-6
<i>Active Mitigation Strategies and Actions</i>	21-7
22 NEW BRITAIN	22-1
COMMUNITY OVERVIEW.....	22-1
CRITICAL FACILITIES.....	22-1
CAPABILITIES.....	22-2
<i>New Capabilities</i>	22-3
CHALLENGES.....	22-4
<i>Challenges Overview</i>	22-4
<i>Hazard Losses</i>	22-5
MITIGATION STRATEGIES AND ACTIONS.....	22-10
<i>Noted Hazard Mitigation Needs</i>	22-10
<i>Status of Previous Mitigation Strategies and Actions</i>	22-10
<i>Active Mitigation Strategies and Actions</i>	22-14
23 NEWINGTON	23-1
COMMUNITY OVERVIEW.....	23-1
CRITICAL FACILITIES.....	23-1
CAPABILITIES.....	23-1
<i>New Capabilities</i>	23-2
CHALLENGES.....	23-3

<i>Challenges Overview</i>	23-3
<i>Hazard Losses</i>	23-3
MITIGATION STRATEGIES AND ACTIONS.....	23-7
<i>Noted Hazard Mitigation Needs</i>	23-7
<i>Status of Previous Mitigation Strategies and Actions</i>	23-8
<i>Active Mitigation Strategies and Actions</i>	23-9
24 PLAINVILLE	24-1
COMMUNITY OVERVIEW.....	24-1
CRITICAL FACILITIES.....	24-1
CAPABILITIES.....	24-2
<i>New Capabilities</i>	24-4
CHALLENGES	24-4
<i>Challenges Overview</i>	24-4
<i>Hazard Losses</i>	24-6
MITIGATION STRATEGIES AND ACTIONS.....	24-10
<i>Noted Hazard Mitigation Needs</i>	24-10
<i>Status of Previous Mitigation Strategies and Actions</i>	24-10
<i>Active Mitigation Strategies and Actions</i>	24-14
25 ROCKY HILL.....	25-1
COMMUNITY OVERVIEW.....	25-1
CRITICAL FACILITIES.....	25-1
CAPABILITIES.....	25-1
<i>New Capabilities</i>	25-2
CHALLENGES	25-2
<i>Challenges Overview</i>	25-2
<i>Hazard Losses</i>	25-3
MITIGATION STRATEGIES AND ACTIONS.....	25-7
<i>Status of Previous Mitigation Strategies and Actions</i>	25-7
<i>Active Mitigation Strategies and Actions</i>	25-9
26 SIMSBURY	26-1
COMMUNITY OVERVIEW.....	26-1
CRITICAL FACILITIES.....	26-1
CAPABILITIES.....	26-1
<i>New Capabilities</i>	26-2
CHALLENGES	26-3
<i>Challenges Overview</i>	26-3
<i>Hazard Losses</i>	26-3
MITIGATION STRATEGIES AND ACTIONS.....	26-8
<i>Noted Hazard Mitigation Needs</i>	26-8
<i>Status of Previous Mitigation Strategies and Actions</i>	26-8
<i>Active Mitigation Strategies and Actions</i>	26-10
27 SOMERS	27-1
COMMUNITY OVERVIEW.....	27-1
CRITICAL FACILITIES.....	27-1

CAPABILITIES.....	27-2
CHALLENGES.....	27-3
<i>Challenges Overview</i>	27-3
<i>Hazard Losses</i>	27-3
MITIGATION STRATEGIES AND ACTIONS.....	27-7
<i>Noted Hazard Mitigation Needs</i>	27-7
<i>Status of Previous Mitigation Strategies and Actions</i>	27-8
<i>Active Mitigation Strategies and Actions</i>	27-9
28 SOUTH WINDSOR.....	28-1
COMMUNITY OVERVIEW.....	28-1
CRITICAL FACILITIES.....	28-1
CAPABILITIES.....	28-2
<i>New Capabilities</i>	28-2
CHALLENGES.....	28-3
<i>Challenges Overview</i>	28-3
<i>Hazard Losses</i>	28-3
MITIGATION STRATEGIES AND ACTIONS.....	28-7
<i>Status of Previous Mitigation Strategies and Actions</i>	28-7
<i>Active Mitigation Strategies and Actions</i>	28-9
29 SOUTHLINGTON	29-1
COMMUNITY OVERVIEW.....	29-1
CRITICAL FACILITIES.....	29-1
CAPABILITIES.....	29-2
<i>New Capabilities</i>	29-4
CHALLENGES.....	29-4
<i>Challenges Overview</i>	29-4
<i>Hazard Losses</i>	29-6
MITIGATION STRATEGIES AND ACTIONS.....	29-11
<i>Noted Hazard Mitigation Needs</i>	29-11
<i>Status of Previous Mitigation Strategies and Actions</i>	29-11
<i>Active Mitigation Strategies and Actions</i>	29-15
30 STAFFORD	30-1
COMMUNITY OVERVIEW.....	30-1
CRITICAL FACILITIES.....	30-1
CAPABILITIES.....	30-2
<i>New Capabilities</i>	30-2
CHALLENGES.....	30-3
<i>Challenges Overview</i>	30-3
<i>Hazard Losses</i>	30-4
MITIGATION STRATEGIES AND ACTIONS.....	30-8
<i>Noted Hazard Mitigation Needs</i>	30-8
<i>Status of Previous Mitigation Strategies and Actions</i>	30-8
<i>Active Mitigation Strategies and Actions</i>	30-10

31 SUFFIELD	31-1
COMMUNITY OVERVIEW.....	31-1
CRITICAL FACILITIES.....	31-1
CAPABILITIES.....	31-2
<i>New Capabilities.....</i>	<i>31-3</i>
CHALLENGES.....	31-3
<i>Challenges Overview</i>	<i>31-3</i>
<i>Hazard Losses.....</i>	<i>31-4</i>
MITIGATION STRATEGIES AND ACTIONS.....	31-8
<i>Noted Hazard Mitigation Needs</i>	<i>31-8</i>
<i>Status of Previous Mitigation Strategies and Actions.....</i>	<i>31-8</i>
<i>Active Mitigation Strategies and Actions.....</i>	<i>31-9</i>
32 TOLLAND.....	32-1
COMMUNITY OVERVIEW.....	32-1
CRITICAL FACILITIES.....	32-1
CAPABILITIES.....	32-2
<i>New Capabilities.....</i>	<i>32-2</i>
CHALLENGES.....	32-2
<i>Challenges Overview</i>	<i>32-2</i>
<i>Hazard Losses.....</i>	<i>32-3</i>
MITIGATION STRATEGIES AND ACTIONS.....	32-7
<i>Noted Hazard Mitigation Needs</i>	<i>32-7</i>
<i>Status of Previous Mitigation Strategies and Actions.....</i>	<i>32-8</i>
<i>Active Mitigation Strategies and Actions.....</i>	<i>32-9</i>
33 VERNON.....	33-1
COMMUNITY OVERVIEW.....	33-1
CRITICAL FACILITIES.....	33-1
CAPABILITIES.....	33-1
<i>New Capabilities.....</i>	<i>33-2</i>
CHALLENGES.....	33-2
<i>Challenges Overview</i>	<i>33-2</i>
<i>Hazard Losses.....</i>	<i>33-2</i>
MITIGATION STRATEGIES AND ACTIONS.....	33-7
<i>Noted Hazard Mitigation Needs</i>	<i>33-7</i>
<i>Status of Previous Mitigation Strategies and Actions.....</i>	<i>33-7</i>
<i>Active Mitigation Strategies and Actions.....</i>	<i>33-9</i>
34 WEST HARTFORD	34-1
COMMUNITY OVERVIEW.....	34-1
CRITICAL FACILITIES.....	34-1
CAPABILITIES.....	34-2
<i>New Capabilities.....</i>	<i>34-3</i>
CHALLENGES.....	34-3
<i>Challenges Overview</i>	<i>34-3</i>
<i>Hazard Losses.....</i>	<i>34-4</i>

MITIGATION STRATEGIES AND ACTIONS.....	34-8
<i>Noted Hazard Mitigation Needs</i>	34-8
<i>Status of Previous Mitigation Strategies and Actions</i>	34-8
<i>Active Mitigation Strategies and Actions</i>	34-10
35 WETHERSFIELD	35-1
COMMUNITY OVERVIEW.....	35-1
CRITICAL FACILITIES.....	35-1
CAPABILITIES.....	35-1
<i>New Capabilities</i>	35-2
CHALLENGES.....	35-3
<i>Challenges Overview</i>	35-3
<i>Hazard Losses</i>	35-3
MITIGATION STRATEGIES AND ACTIONS.....	35-7
<i>Noted Hazard Mitigation Needs</i>	35-7
<i>Status of Previous Mitigation Strategies and Actions</i>	35-7
<i>Active Mitigation Strategies and Actions</i>	35-10
36 WILLINGTON	36-1
COMMUNITY OVERVIEW.....	36-1
CRITICAL FACILITIES.....	36-1
CAPABILITIES.....	36-2
<i>New Capabilities</i>	36-3
CHALLENGES.....	36-3
<i>Challenges Overview</i>	36-3
<i>Hazard Losses</i>	36-4
MITIGATION STRATEGIES AND ACTIONS.....	36-8
<i>Noted Hazard Mitigation Needs</i>	36-8
<i>Status of Previous Mitigation Strategies and Actions</i>	36-9
<i>Active Mitigation Strategies and Actions</i>	36-11
37 WINDSOR.....	37-1
COMMUNITY OVERVIEW.....	37-1
CRITICAL FACILITIES.....	37-1
CAPABILITIES.....	37-2
<i>New Capabilities</i>	37-3
CHALLENGES.....	37-3
<i>Challenges Overview</i>	37-3
<i>Hazard Losses</i>	37-3
MITIGATION STRATEGIES AND ACTIONS.....	37-7
<i>Noted Hazard Mitigation Needs</i>	37-7
<i>Status of Previous Mitigation Strategies and Actions</i>	37-8
<i>Active Mitigation Strategies and Actions</i>	37-9

38 WINDSOR LOCKS..... 38-1

COMMUNITY OVERVIEW..... 38-1
CRITICAL FACILITIES..... 38-1
CAPABILITIES..... 38-2
 New Capabilities..... 38-2
CHALLENGES..... 38-3
 Challenges Overview..... 38-3
 Hazard Losses..... 38-4
MITIGATION STRATEGIES AND ACTIONS..... 38-8
 Status of Previous Mitigation Strategies and Actions..... 38-8
 Active Mitigation Strategies and Actions..... 38-9

Tables

Table 1-1: Critical Facilities, Andover..... 1-1
Table 1-2: Flood Event PA Reimbursements, Andover..... 1-3
Table 1-3: Hurricane Wind Event PA Reimbursements, Andover..... 1-4
Table 1-4: Winter Storm PA Reimbursements, Andover..... 1-4
Table 1-5: NCEI Database Losses since 2012, Andover..... 1-4
Table 1-6: Estimated Damages to Andover from a 1% Annual-Chance Flood..... 1-5
Table 1-7: Estimated Damages to Andover from a 1% Annual-Chance Hurricane..... 1-5
Table 1-8: Estimated Damages to Andover from a Probabilistic Earthquake..... 1-6
Table 1-9: Estimated Damages to Andover from Modeled Earthquake Scenarios..... 1-6
Table 1-10: Average Annualized Losses, Andover..... 1-6
Table 1-11: Status of Previous Mitigation Strategies and Actions, Andover..... 1-7
Table 2-1: Critical Facilities, Avon..... 2-1
Table 2-2: Flood Event PA Reimbursements, Avon..... 2-4
Table 2-3: Hurricane Wind Event PA Reimbursements, Avon..... 2-4
Table 2-4: Winter Storm PA Reimbursements, Avon..... 2-4
Table 2-5: NCEI Database Losses since 2012, Avon..... 2-5
Table 2-6: Estimated Damages to Avon from a 1% Annual-Chance Flood..... 2-5
Table 2-7: Estimated Damages to Avon from a 1% Annual-Chance Hurricane..... 2-6
Table 2-8: Estimated Damages to Avon from a Probabilistic Earthquake..... 2-6
Table 2-9: Estimated Damages to Avon from Modeled Earthquake Scenarios..... 2-6
Table 2-10: Average Annualized Losses, Avon..... 2-7
Table 2-11: Status of Previous Mitigation Strategies and Actions, Avon..... 2-8
Table 3-1: Critical Facilities, Berlin..... 3-1
Table 3-2: Flood Event PA Reimbursements, Berlin..... 3-5
Table 3-3: Hurricane Wind Event PA Reimbursements, Berlin..... 3-5
Table 3-4: Winter Storm PA Reimbursements, Berlin..... 3-5
Table 3-5: NCEI Database Losses since 2012, Berlin..... 3-6
Table 3-6: Estimated Damages to Berlin from a 1% Annual-Chance Flood..... 3-7
Table 3-7: Estimated Damages to Berlin from a 1% Annual-Chance Hurricane..... 3-7
Table 3-8: Estimated Damages to Berlin from a Probabilistic Earthquake..... 3-7
Table 3-9: Estimated Damages to Berlin from Modeled Earthquake Scenarios..... 3-8
Table 3-10: Estimated Impacts from a Severe Winter Storm Comparable to Winter Storm Alfred, Berlin..... 3-8
Table 3-11: Average Annualized Losses, Berlin..... 3-9
Table 3-12: Status of Previous Mitigation Strategies and Actions, Berlin..... 3-10
Table 4-1: Critical Facilities, Bloomfield..... 4-1
Table 4-2: Flood Event PA Reimbursements, Bloomfield..... 4-3

Table 4-3: Hurricane Wind Event PA Reimbursements, Bloomfield.....	4-4
Table 4-4: Winter Storm PA Reimbursements, Bloomfield	4-4
Table 4-5: Estimated Damages to Bloomfield from a 1% Annual-Chance Flood	4-5
Table 4-6: Estimated Damages to Bloomfield from a 1% Annual-Chance Hurricane	4-5
Table 4-7: Estimated Damages to Bloomfield from a Probabilistic Earthquake.....	4-6
Table 4-8: Estimated Damages to Bloomfield from Modeled Earthquake Scenarios.....	4-6
Table 4-9: Average Annualized Losses, Bloomfield	4-7
Table 4-10: Status of Previous Mitigation Strategies and Actions, Bloomfield	4-7
Table 5-1: Critical Facilities, Bolton.....	Error! Bookmark not defined.
Table 5-2: Flood Event PA Reimbursements	Error! Bookmark not defined.
Table 5-3: Hurricane Wind Event PA Reimbursements	Error! Bookmark not defined.
Table 5-4: Winter Storm PA Reimbursements.....	Error! Bookmark not defined.
Table 5-5: NCEI Database Losses since 2012, Bolton.....	Error! Bookmark not defined.
Table 5-6: Estimated Damages to Bolton from a 1% Annual-Chance Flood.....	Error! Bookmark not defined.
Table 5-7: Estimated Damages to Bolton from a 1% Annual-Chance Hurricane.....	Error! Bookmark not defined.
Table 5-8: Estimated Damages to Bolton from a Probabilistic Earthquake.....	Error! Bookmark not defined.
Table 5-9: Estimated Damages to Bolton from Modeled Earthquake Scenarios	5-6
Table 5-10: Average Annualized Losses, Bolton	Error! Bookmark not defined.
Table 5-11: Status of Previous Mitigation Strategies and Actions, Bolton	Error! Bookmark not defined.
Table 6-1: Critical Facilities, Canton.....	6-1
Table 6-2: Flood Event PA Reimbursements, Canton	6-4
Table 6-3: Hurricane Wind Event PA Reimbursements, Canton.....	6-4
Table 6-4: Winter Storm PA Reimbursements, Canton	6-4
Table 6-5: NCEI Database Losses since 2012, Canton.....	6-5
Table 6-6: Estimated Damages to Canton from a 1% Annual-Chance Flood.....	6-5
Table 6-7: Estimated Damages to Canton from a 1% Annual-Chance Hurricane.....	6-6
Table 6-8: Estimated Damages to Canton from a Probabilistic Earthquake.....	6-6
Table 6-9: Estimated Damages to Canton from Modeled Earthquake Scenarios	6-6
Table 6-10: Average Annualized Losses, Canton	6-7
Table 6-11: Status of Previous Mitigation Strategies and Actions, Canton	6-7
Table 7-1: Critical Facilities, Columbia	7-1
Table 7-2: Flood Event PA Reimbursements, Columbia	7-4
Table 7-3: Hurricane Wind Event PA Reimbursements, Columbia	7-5
Table 7-4: Winter Storm PA Reimbursements, Columbia	7-5
Table 7-5: Estimated Damages to Columbia from a 1% Annual-Chance Flood	7-6
Table 7-6: Estimated Damages to Columbia from a 1% Annual-Chance Hurricane	7-6
Table 7-7: Estimated Damages to Columbia from a Probabilistic Earthquake.....	7-6
Table 7-8: Estimated Damages to Columbia from Modeled Earthquake Scenarios.....	7-7
Table 7-9: Average Annualized Losses, Columbia.....	7-7
Table 7-10: Status of Previous Mitigation Strategies and Actions, Columbia.....	7-8
Table 8-1: Critical Facilities, Coventry.....	8-1
Table 8-2: Flood Event PA Reimbursements, Coventry	8-5
Table 8-3: Hurricane Wind Event PA Reimbursements, Coventry.....	8-5
Table 8-4: Winter Storm PA Reimbursements, Coventry	8-5
Table 8-5: NCEI Database Losses since 2012, Coventry.....	8-6
Table 8-6: Estimated Damages to Coventry from a 1% Annual-Chance Flood.....	8-6
Table 8-7: Estimated Damages to Coventry from a 1% Annual-Chance Hurricane	8-7
Table 8-8: Estimated Damages to Coventry from a Probabilistic Earthquake.....	8-7
Table 8-9: Estimated Damages to Coventry from Modeled Earthquake Scenarios.....	8-7
Table 8-10: Average Annualized Losses, Coventry	8-8
Table 8-11: Status of Previous Mitigation Strategies and Actions, Coventry	8-9
Table 9-1: Critical Facilities, East Granby.....	9-1
Table 9-2: Flood Event PA Reimbursements, East Granby	9-3

Table 9-3: Hurricane Wind Event PA Reimbursements, East Granby	9-3
Table 9-4: Winter Storm PA Reimbursements, East Granby	9-3
Table 9-5: NCEI Database Losses since 2012, East Granby	9-4
Table 9-6: Estimated Damages to East Granby from a 1% Annual-Chance Flood	9-4
Table 9-7: Estimated Damages to East Granby from a 1% Annual-Chance Hurricane	9-5
Table 9-8: Estimated Damages to East Granby from a Probabilistic Earthquake	9-5
Table 9-9: Estimated Damages to East Granby from Modeled Earthquake Scenarios	9-5
Table 9-10: Average Annualized Losses, East Granby	9-6
Table 9-11: Status of Previous Mitigation Strategies and Actions, East Granby	9-6
Table 10-1: Critical Facilities, East Hartford	10-1
Table 10-2: Flood Event PA Reimbursements, East Hartford	10-3
Table 10-3: Hurricane Wind Event PA Reimbursements, East Hartford	10-4
Table 10-4: Winter Storm PA Reimbursements, East Hartford	10-4
Table 10-5: NCEI Database Losses since 2012, East Hartford	10-4
Table 10-6: Estimated Damages to East Hartford from a 1% Annual-Chance Flood	10-5
Table 10-7: Estimated Damages to East Hartford from a 1% Annual-Chance Hurricane	10-5
Table 10-8: Estimated Damages to East Hartford from a Probabilistic Earthquake	10-6
Table 10-9: Estimated Damages to East Hartford from Modeled Earthquake Scenarios	10-6
Table 10-10: Average Annualized Losses, East Hartford	10-7
Table 10-11: Status of Previous Mitigation Strategies and Actions, East Hartford	10-7
Table 11-1: Critical Facilities, East Windsor	11-2
Table 11-2: Flood Event PA Reimbursements, East Windsor	11-5
Table 11-3: Hurricane Wind Event PA Reimbursements, East Windsor	11-5
Table 11-4: Winter Storm PA Reimbursements, East Windsor	11-5
Table 11-5: NCEI Database Losses since 2012, East Windsor	11-6
Table 11-6: Estimated Damages to East Windsor from a 1% Annual-Chance Flood	11-6
Table 11-7: Estimated Damages to East Windsor from a 1% Annual-Chance Hurricane	11-7
Table 11-8: Estimated Damages to East Windsor from a Probabilistic Earthquake	11-7
Table 11-9: Estimated Damages to East Windsor from Modeled Earthquake Scenarios	11-7
Table 11-10: Average Annualized Losses, East Windsor	11-8
Table 11-11: Status of Previous Mitigation Strategies and Actions, East Windsor	11-8
Table 12-1: Critical Facilities, Ellington	12-1
Table 12-2: Flood Event PA Reimbursements, Ellington	12-3
Table 12-3: Hurricane Wind Event PA Reimbursements, Ellington	12-3
Table 12-4: Winter Storm PA Reimbursements, Ellington	12-4
Table 12-5: NCEI Database Losses since 2012, Ellington	12-4
Table 12-6: Estimated Damages to Ellington from a 1% Annual-Chance Flood	12-5
Table 12-7: Estimated Damages to Ellington from a 1% Annual-Chance Hurricane	12-5
Table 12-8: Estimated Damages to Ellington from a Probabilistic Earthquake	12-6
Table 12-9: Estimated Damages to Ellington from Modeled Earthquake Scenarios	12-6
Table 12-10: Average Annualized Losses, Ellington	12-6
Table 12-11: Status of Previous Mitigation Strategies and Actions, Ellington	12-7
Table 13-1: Critical Facilities, Enfield	13-1
Table 13-2: Flood Event PA Reimbursements, Enfield	13-5
Table 13-3: Hurricane Wind Event PA Reimbursements, Enfield	13-5
Table 13-4: Winter Storm PA Reimbursements, Enfield	13-5
Table 13-5: NCEI Database Losses since 2012, Enfield	13-6
Table 13-6: Estimated Damages to Enfield from a 1% Annual-Chance Flood	13-7
Table 13-7: Estimated Damages to Enfield from a 1% Annual-Chance Hurricane	13-7
Table 13-8: Estimated Damages to Enfield from a Probabilistic Earthquake	13-7
Table 13-9: Estimated Damages to Enfield from Modeled Earthquake Scenarios	13-8
Table 13-10: Average Annualized Losses, Enfield	13-8
Table 13-11: Status of Previous Mitigation Strategies and Actions, Enfield	13-9

Table 14-1: Critical Facilities, Farmington.....	14-1
Table 14-2: Flood Event PA Reimbursements, Farmington	14-4
Table 14-3: Hurricane Wind Event PA Reimbursements, Farmington.....	14-4
Table 14-4: Winter Storm PA Reimbursements, Farmington	14-4
Table 14-5: NCEI Database Losses since 2012, Farmington.....	14-5
Table 14-6: Estimated Damages to Farmington from a 1% Annual-Chance Flood.....	14-5
Table 14-7: Estimated Damages to Farmington from a 1% Annual-Chance Hurricane	14-6
Table 14-8: Estimated Damages to Farmington from a Probabilistic Earthquake.....	14-6
Table 14-9: Estimated Damages to Farmington from Modeled Earthquake Scenarios	14-6
Table 14-10: Average Annualized Losses, Farmington	14-7
Table 14-11: Status of Previous Mitigation Strategies and Actions, Farmington	14-7
Table 15-1: Critical Facilities, Glastonbury.....	15-1
Table 15-2: Flood Event PA Reimbursements, Glastonbury.....	15-3
Table 15-3: Hurricane Wind Event PA Reimbursements, Glastonbury	15-4
Table 15-4: Winter Storm PA Reimbursements, Glastonbury	15-4
Table 15-5: NCEI Database Losses since 2012, Glastonbury	15-4
Table 15-6: Estimated Damages to Glastonbury from a 1% Annual-Chance Flood.....	15-5
Table 15-7: Estimated Damages to Glastonbury from a 1% Annual-Chance Hurricane	15-6
Table 15-8: Estimated Damages to Glastonbury from a Probabilistic Earthquake.....	15-6
Table 15-9: Estimated Damages to Glastonbury from Modeled Earthquake Scenarios	15-6
Table 15-10: Average Annualized Losses, Glastonbury	15-7
Table 15-11: Status of Previous Mitigation Strategies and Actions, Glastonbury	15-7
Table 16-1: Critical Facilities, Granby	16-1
Table 16-2: Flood Event PA Reimbursements, Granby.....	16-4
Table 16-3: Hurricane Wind Event PA Reimbursements, Granby	16-5
Table 16-4: Winter Storm PA Reimbursements, Granby.....	16-5
Table 16-5: NCEI Database Losses since 2012, Granby	16-5
Table 16-6: Estimated Damages to Granby from a 1% Annual-Chance Flood.....	16-6
Table 16-7: Estimated Damages to Granby from a 1% Annual-Chance Hurricane.....	16-6
Table 16-8: Estimated Damages to Granby from a Probabilistic Earthquake.....	16-7
Table 16-9: Estimated Damages to Granby from Modeled Earthquake Scenarios	16-7
Table 16-10: Average Annualized Losses, Granby	16-8
Table 16-11: Status of Previous Mitigation Strategies and Actions, Granby.....	16-8
Table 17-1: Flood Event PA Reimbursements, Hartford.....	17-3
Table 17-2: Hurricane Wind Event PA Reimbursements, Hartford	17-4
Table 17-3: Winter Storm PA Reimbursements, Hartford.....	17-4
Table 17-4: NCEI Database Losses since 2012,Hartford	17-4
Table 17-5: Estimated Damages to Hartford from a 1% Annual-Chance Flood.....	17-5
Table 17-6: Estimated Damages to Hartford from a 1% Annual-Chance Hurricane.....	17-6
Table 17-7: Estimated Damages to Hartford from a Probabilistic Earthquake	17-6
Table 17-8: Estimated Damages to Hartford from Modeled Earthquake Scenarios	17-6
Table 17-9: Average Annualized Losses, Hartford	17-7
Table 17-10: Status of Previous Mitigation Strategies and Actions, Hartford	17-7
Table 18-1: Critical Facilities, Hebron	18-1
Table 18-2: Flood Event PA Reimbursements, Hebron.....	18-4
Table 18-3: Hurricane Wind Event PA Reimbursements, Hebron	18-4
Table 18-4: Winter Storm PA Reimbursements, Hebron.....	18-4
Table 18-5: NCEI Database Losses since 2012, Hebron	18-5
Table 18-6: Estimated Damages to Hebron from a 1% Annual-Chance Flood	18-5
Table 18-7: Estimated Damages to Hebron from a 1% Annual-Chance Hurricane	18-6
Table 18-8: Estimated Damages to Hebron from a Probabilistic Earthquake	18-6
Table 18-9: Estimated Damages to Hebron from Modeled Earthquake Scenarios	18-6
Table 18-10: Average Annualized Losses, Hebron.....	18-7

Table 18-11: Status of Previous Mitigation Strategies and Actions, Hebron.....	18-8
Table 19-1: Critical Facilities, Manchester	19-1
Table 19-2: Flood Event PA Reimbursements, Manchester	19-3
Table 19-3: Hurricane Wind Event PA Reimbursements, Manchester.....	19-4
Table 19-4: Winter Storm PA Reimbursements, Manchester	19-4
Table 19-5: NCEI Database Losses since 2012, Manchester	19-5
Table 19-6: Estimated Damages to Manchester from a 1% Annual-Chance Flood	19-6
Table 19-7: Estimated Damages to Manchester from a 1% Annual-Chance Hurricane	19-6
Table 19-8: Estimated Damages to Manchester from a Probabilistic Earthquake	19-6
Table 19-9: Estimated Damages to Manchester from Modeled Earthquake Scenarios.....	19-7
Table 19-10: Average Annualized Losses, Manchester	19-7
Table 19-11: Status of Previous Mitigation Strategies and Actions, Manchester	19-8
Table 20-1: Critical Facilities, Mansfield	20-2
Table 20-2: Flood Event PA Reimbursements, Mansfield.....	20-7
Table 20-3: Hurricane Wind Event PA Reimbursements, Mansfield	20-7
Table 20-4: Winter Storm PA Reimbursements, Mansfield.....	20-8
Table 20-5: NCEI Database Losses since 2012, Mansfield	20-8
Table 20-6: Estimated Damages to Mansfield from a 1% Annual-Chance Flood	20-9
Table 20-7: Estimated Damages to Mansfield from a 1% Annual-Chance Hurricane	20-9
Table 20-8: Estimated Damages to Mansfield from a Probabilistic Earthquake	20-9
Table 20-9: Estimated Damages to Mansfield from Modeled Earthquake Scenarios.....	20-10
Table 20-10: Average Annualized Losses, Mansfield.....	20-10
Table 20-11: Status of Previous Mitigation Strategies and Actions, Mansfield.....	20-11
Table 21-1: Critical Facilities, Marlborough	21-1
Table 21-2: Flood Event PA Reimbursements, Marlborough	21-3
Table 21-3: Hurricane Wind Event PA Reimbursements, Marlborough.....	21-3
Table 21-4: Winter Storm PA Reimbursements, Marlborough	21-4
Table 21-5: Estimated Damages to Marlborough from a 1% Annual-Chance Flood	21-5
Table 21-6: Estimated Damages to Marlborough from a 1% Annual-Chance Hurricane	21-5
Table 21-7: Estimated Damages to Marlborough from a Probabilistic Earthquake	21-5
Table 21-8: Estimated Damages to Marlborough from Modeled Earthquake Scenarios.....	21-6
Table 21-9: Average Annualized Losses, Marlborough.....	21-6
Table 21-10: Status of Previous Mitigation Strategies and Actions, Marlborough	21-7
Table 22-1: Flood Event PA Reimbursements, New Britain.....	22-6
Table 22-2: Hurricane Wind Event PA Reimbursements, New Britain	22-6
Table 22-3: Winter Storm PA Reimbursements, New Britain.....	22-6
Table 22-4: NCEI Database Losses since 2012, New Britain	22-7
Table 22-5: Estimated Damages to New Britain from a 1% Annual-Chance Flood	22-8
Table 22-6: Estimated Damages to New Britain from a 1% Annual-Chance Hurricane.....	22-8
Table 22-7: Estimated Damages to New Britain from a Probabilistic Earthquake	22-8
Table 22-8: Estimated Damages to New Britain from Modeled Earthquake Scenarios	22-9
Table 22-9: Average Annualized Losses, New Britain.....	22-9
Table 22-10: Status of Previous Mitigation Strategies and Actions, New Britain.....	22-11
Table 23-1: Critical Facilities, Newington	23-1
Table 23-2: Flood Event PA Reimbursements, Newington.....	23-4
Table 23-3: Hurricane Wind Event PA Reimbursements, Newington	23-4
Table 23-4: Winter Storm PA Reimbursements, Newington.....	23-4
Table 23-5: NCEI Database Losses since 2012, Newington	23-5
Table 23-6: Estimated Damages to Newington from a 1% Annual-Chance Flood.....	23-5
Table 23-7: Estimated Damages to Newington from a 1% Annual-Chance Hurricane.....	23-6
Table 23-8: Estimated Damages to Newington from a Probabilistic Earthquake.....	23-6
Table 23-9: Estimated Damages to Newington from Modeled Earthquake Scenarios	23-6
Table 23-10: Average Annualized Losses, Newington	23-7

Table 23-11: Status of Previous Mitigation Strategies and Actions, Newington	23-8
Table 24-1: Critical Facilities, Plainville	24-1
Table 24-2: Summary of Dams Whose Failure Could Significantly Impact Plainville.....	24-5
Table 24-3: Flood Event PA Reimbursements, Plainville	24-6
Table 24-4: Hurricane Wind Event PA Reimbursements, Plainville.....	24-7
Table 24-5: Winter Storm PA Reimbursements, Plainville	24-7
Table 24-6: Estimated Damages to Plainville from a 1% Annual-Chance Flood	24-8
Table 24-7: Estimated Damages to Plainville from a 1% Annual-Chance Hurricane	24-8
Table 24-8: Estimated Damages to Plainville from a Probabilistic Earthquake	24-8
Table 24-9: Estimated Damages to Plainville from Modeled Earthquake Scenarios.....	24-9
Table 24-10: October 2011 Severe Winter Storm Losses for Plainville.	24-9
Table 24-11: Average Annualized Losses, Plainville	24-10
Table 24-12: Status of Previous Mitigation Strategies and Actions, Plainville	24-11
Table 25-1: Critical Facilities, Rocky Hill.....	25-1
Table 25-2: Flood Event PA Reimbursements, Rocky Hill.....	25-4
Table 25-3: Hurricane Wind Event PA Reimbursements, Rocky Hill.....	25-4
Table 25-4: Winter Storm PA Reimbursements, Rocky Hill	25-4
Table 25-5: Estimated Damages to Rocky Hill from a 1% Annual-Chance Flood	25-5
Table 25-6: Estimated Damages to Rocky Hill from a 1% Annual-Chance Hurricane	25-5
Table 25-7: Estimated Damages to Rocky Hill from a Probabilistic Earthquake.....	25-6
Table 25-8: Estimated Damages to Rocky Hill from Modeled Earthquake Scenarios	25-6
Table 25-9: Average Annualized Losses, Rocky Hill	25-6
Table 25-10: Status of Previous Mitigation Strategies and Actions, Rocky Hill	25-7
Table 26-1: Critical Facilities, Simsbury	26-1
Table 26-2: Flood Event PA Reimbursements, Simsbury.....	26-4
Table 26-3: Hurricane Wind Event PA Reimbursements, Simsbury	26-4
Table 26-4: Winter Storm PA Reimbursements, Simsbury	26-5
Table 26-5: NCEI Database Losses since 2012, Simsbury	26-5
Table 26-6: Estimated Damages to Simsbury from a 1% Annual-Chance Flood.....	26-6
Table 26-7: Estimated Damages to Simsbury from a 1% Annual-Chance Hurricane.....	26-6
Table 26-8: Estimated Damages to Simsbury from a Probabilistic Earthquake	26-6
Table 26-9: Estimated Damages to Simsbury from Modeled Earthquake Scenarios	26-7
Table 26-10: Average Annualized Losses, Simsbury	26-7
Table 26-11: Status of Previous Mitigation Strategies and Actions, Simsbury	26-9
Table 27-1: Critical Facilities, Somers	27-1
Table 27-2: Flood Event PA Reimbursements, Somers.....	27-4
Table 27-3: Hurricane Wind Event PA Reimbursements, Somers	27-4
Table 27-4: Winter Storm PA Reimbursements, Somers.....	27-4
Table 27-5: NCEI Database Losses since 2012, Somers	27-5
Table 27-6: Estimated Damages to Somers from a 1% Annual-Chance Flood	27-5
Table 27-7: Estimated Damages to Somers from a 1% Annual-Chance Hurricane.....	27-6
Table 27-8: Estimated Damages to Somers from a Probabilistic Earthquake	27-6
Table 27-9: Estimated Damages to Somers from Modeled Earthquake Scenarios	27-6
Table 27-10: Average Annualized Losses, Somers.....	27-7
Table 27-11: Status of Previous Mitigation Strategies and Actions, Somers.....	27-8
Table 28-1: Critical Facilities, South Windsor	28-1
Table 28-2: Flood Event PA Reimbursements, South Windsor.....	28-4
Table 28-3: Hurricane Wind Event PA Reimbursements, South Windsor	28-4
Table 28-4: Winter Storm PA Reimbursements, South Windsor.....	28-4
Table 28-5: NCEI Database Losses since 2012, South Windsor	28-5
Table 28-6: Estimated Damages to South Windsor from a 1% Annual-Chance Flood	28-6
Table 28-7: Estimated Damages to South Windsor from a 1% Annual-Chance Hurricane.....	28-6
Table 28-8: Estimated Damages to South Windsor from a Probabilistic Earthquake	28-6

Table 28-9: Estimated Damages to South Windsor from Modeled Earthquake Scenarios	28-7
Table 28-10: Average Annualized Losses, South Windsor	28-7
Table 28-11: Status of Previous Mitigation Strategies and Actions, South Windsor	28-8
Table 29-1: Critical Facilities, Southington	29-1
Table 29-2: Summary of Dams Whose Failure Could Significantly Impact Southington	29-6
Table 29-3: Flood Event PA Reimbursements, Southington	29-7
Table 29-4: Hurricane Wind Event PA Reimbursements, Southington	29-7
Table 29-5: Winter Storm PA Reimbursements, Southington	29-7
Table 29-6: NCEI Database Losses since 2012, Southington	29-8
Table 29-7: Estimated Damages to Southington from a 1% Annual-Chance Flood.....	29-8
Table 29-8: Estimated Damages to Southington from a 1% Annual-Chance Hurricane.....	29-9
Table 29-9: Estimated Damages to Southington from a Probabilistic Earthquake	29-9
Table 29-10: Estimated Damages to Southington from Modeled Earthquake Scenarios	29-9
Table 29-11: Average Annualized Losses, Southington	29-10
Table 29-12: Status of Previous Mitigation Strategies and Actions, Southington	29-12
Table 30-1: Critical Facilities, Stafford	30-1
Table 30-2: Flood Event PA Reimbursements, Stafford.....	30-4
Table 30-3: Hurricane Wind Event PA Reimbursements, Stafford	30-5
Table 30-4: Winter Storm PA Reimbursements, Stafford.....	30-5
Table 30-5: NCEI Database Losses since 2012, Stafford	30-5
Table 30-6: Estimated Damages to Stafford from a 1% Annual-Chance Flood	30-6
Table 30-7: Estimated Damages to Stafford from a 1% Annual-Chance Hurricane.....	30-6
Table 30-8: Estimated Damages to Stafford from a Probabilistic Earthquake	30-7
Table 30-9: Estimated Damages to Stafford from Modeled Earthquake Scenarios	30-7
Table 30-10: Average Annualized Losses, Stafford	30-8
Table 30-11: Status of Previous Mitigation Strategies and Actions, Stafford.....	30-8
Table 31-1: Critical Facilities, Suffield	31-2
Table 31-2: Flood Event PA Reimbursements, Suffield	31-4
Table 31-3: Hurricane Wind Event PA Reimbursements, Suffield	31-5
Table 31-4: Winter Storm PA Reimbursements, Suffield	31-5
Table 31-5: NCEI Database Losses since 2012, Suffield	31-5
Table 31-6: Estimated Damages to Suffield from a 1% Annual-Chance Flood	31-6
Table 31-7: Estimated Damages to Suffield from a 1% Annual-Chance Hurricane	31-6
Table 31-8: Estimated Damages to Suffield from a Probabilistic Earthquake	31-7
Table 31-9: Estimated Damages to Suffield from Modeled Earthquake Scenarios.....	31-7
Table 31-10: Average Annualized Losses, Suffield.....	31-7
Table 31-11: Status of Previous Mitigation Strategies and Actions, Suffield.....	31-8
Table 32-1: Critical Facilities, Tolland	32-1
Table 32-2: Flood Event PA Reimbursements, Tolland.....	32-4
Table 32-3: Hurricane Wind Event PA Reimbursements, Tolland	32-4
Table 32-4: Winter Storm PA Reimbursements, Tolland.....	32-4
Table 32-5: NCEI Database Losses since 2012, Tolland	32-5
Table 32-6: Estimated Damages to Tolland from a 1% Annual-Chance Flood	32-6
Table 32-7: Estimated Damages to Tolland from a 1% Annual-Chance Hurricane.....	32-6
Table 32-8: Estimated Damages to Tolland from a Probabilistic Earthquake	32-6
Table 32-9: Estimated Damages to Tolland from Modeled Earthquake Scenarios	32-7
Table 32-10: : Average Annualized Losses, Tolland	32-7
Table 32-11: Status of Previous Mitigation Strategies and Actions, Tolland.....	32-8
Table 33-1: Critical Facilities, Vernon	33-1
Table 33-2: Flood Event PA Reimbursements, Vernon.....	33-3
Table 33-3: Hurricane Wind Event PA Reimbursements, Vernon	33-3
Table 33-4: Winter Storm PA Reimbursements, Vernon.....	33-4
Table 33-5: NCEI Database Losses since 2012, Vernon	33-4

Table 33-6: Estimated Damages to Vernon from a 1% Annual-Chance Flood.....	33-5
Table 33-7: Estimated Damages to Vernon from a 1% Annual-Chance Hurricane.....	33-5
Table 33-8: Estimated Damages to Vernon from a Probabilistic Earthquake	33-6
Table 33-9: Estimated Damages to Vernon from Modeled Earthquake Scenarios	33-6
Table 33-10: Average Annualized Losses, Vernon	33-6
Table 33-11: Status of Previous Mitigation Strategies and Actions, Vernon	33-7
Table 34-1: Critical Facilities, West Hartford	34-2
Table 34-2: Flood Event PA Reimbursements, West Hartford	34-4
Table 34-3: Hurricane Wind Event PA Reimbursements, West Hartford	34-5
Table 34-4: Winter Storm PA Reimbursements, West Hartford.....	34-5
Table 34-5: NCEI Database Losses since 2012, West Hartford	34-5
Table 34-6: Estimated Damages to West Hartford from a 1% Annual-Chance Flood	34-6
Table 34-7: Estimated Damages to West Hartford from a 1% Annual-Chance Hurricane	34-6
Table 34-8: Estimated Damages to West Hartford from a Probabilistic Earthquake	34-7
Table 34-9: Estimated Damages to West Hartford from Modeled Earthquake Scenarios.....	34-7
Table 34-10: Average Annualized Losses, West Hartford.....	34-7
Table 34-11: Status of Previous Mitigation Strategies and Actions, West Hartford.....	34-9
Table 35-1: Critical Facilities, Wethersfield	35-1
Table 35-2: Flood Event PA Reimbursements, Wethersfield.....	35-4
Table 35-3: Hurricane Wind Event PA Reimbursements, Wethersfield	35-4
Table 35-4: Winter Storm PA Reimbursements, Wethersfield.....	35-4
Table 35-5: NCEI Database Losses since 2012, Wethersfield	35-5
Table 35-6: Estimated Damages to Wethersfield from a 1% Annual-Chance Flood	35-5
Table 35-7: Estimated Damages to Wethersfield from a 1% Annual-Chance Hurricane.....	35-6
Table 35-8: Estimated Damages to Wethersfield from a Probabilistic Earthquake	35-6
Table 35-9: Estimated Damages to Wethersfield from Modeled Earthquake Scenarios	35-6
Table 35-10: Average Annualized Losses, Wethersfield.....	35-7
Table 35-11: Status of Previous Mitigation Strategies and Actions, Wethersfield.....	35-7
Table 36-1: Critical Facilities, Willington.....	36-1
Table 36-2: Flood Event PA Reimbursements, Willington	36-5
Table 36-3: Hurricane Wind Event PA Reimbursements, Willington.....	36-5
Table 36-4: Winter Storm PA Reimbursements, Willington	36-6
Table 36-5: NCEI Database Losses since 2012, Willington.....	36-6
Table 36-6: Estimated Damages to Willington from a 1% Annual-Chance Flood.....	36-7
Table 36-7: Estimated Damages to Willington from a 1% Annual-Chance Hurricane.....	36-7
Table 36-8: Estimated Damages to Willington from a Probabilistic Earthquake.....	36-7
Table 36-9: Estimated Damages to Willington from Modeled Earthquake Scenarios	36-8
Table 36-10: Average Annualized Losses, Willington	36-8
Table 36-11: Status of Previous Mitigation Strategies and Actions, Willington	36-9
Table 37-1: Critical Facilities, Windsor.....	37-2
Table 37-2: Flood Event PA Reimbursements, Windsor.....	37-4
Table 37-3: Hurricane Wind Event PA Reimbursements, Windsor.....	37-4
Table 37-4: Winter Storm PA Reimbursements, Windsor	37-4
Table 37-5: NCEI Database Losses since 2012, Windsor.....	37-5
Table 37-6: Estimated Damages to Windsor from a 1% Annual-Chance Flood.....	37-6
Table 37-7: Estimated Damages to Windsor from a 1% Annual-Chance Hurricane	37-6
Table 37-8: Estimated Damages to Windsor from a Probabilistic Earthquake.....	37-6
Table 37-9: Estimated Damages to Windsor from Modeled Earthquake Scenarios	37-7
Table 37-10: Average Annualized Losses, Windsor	37-7
Table 37-11: Status of Previous Mitigation Strategies and Actions, Windsor	37-8
Table 38-1: Critical Facilities, Windsor Locks.....	38-2
Table 38-2: Flood Event PA Reimbursements, Windsor Locks	38-4
Table 38-3: Hurricane Wind Event PA Reimbursements, Windsor Locks.....	38-5

Table 38-4: Winter Storm PA Reimbursements, Windsor Locks	38-5
Table 38-5: NCEI Database Losses since 2012, Windsor Locks	38-5
Table 38-6: Estimated Damages to Windsor Locks from a 1% Annual-Chance Flood	38-6
Table 38-7: Estimated Damages to Windsor Locks from a 1% Annual-Chance Hurricane	38-6
Table 38-8: Estimated Damages to Windsor Locks from a Probabilistic Earthquake	38-7
Table 38-9: Estimated Damages to Windsor Locks from Modeled Earthquake Scenarios.....	38-7
Table 38-10: Average Annualized Losses, Windsor Locks.....	38-7
Table 38-11: Status of Previous Mitigation Strategies and Actions, Windsor Locks	38-8

Figures

Figure 1-1: Flood Plains, Dams, & Critical Facilities, Andover.....	1-16
Figure 2-1: Flood Plains, Dams, & Critical Facilities, Avon	2-17
Figure 2-2: Dam Breach Inundation Area, Avon	2-18
Figure 3-1: Flood Plains, Dams, & Critical Facilities, Berlin	3-19
Figure 3-2: Dam Breach Inundation Area, Berlin	3-20
Figure 4-1: Flood Plains, Dams, & Critical Facilities, Bloomfield.....	4-17
Figure 4-2: Dam Breach Inundation Area, Bloomfield	4-18
Figure 5-1: Flood Plains, Dams, & Critical Facilities, Bolton.....	5-19
Figure 6-1: Flood Plains, Dams, & Critical Facilities, Canton.....	6-15
Figure 6-2: Dam Breach Inundation Area, Canton.....	6-16
Figure 7-1: Flood Plains, Dams, & Critical Facilities, Columbia	7-15
Figure 8-1: Flood Plains, Dams, & Critical Facilities, Coventry.....	8-22
Figure 9-1: Flood Plains, Dams, & Critical Facilities, East Granby	9-15
Figure 9-2: Dam Breach Inundation Area, East Granby	9-16
Figure 10-1: Flood Plains, Dams, & Critical Facilities, East Hartford.....	10-17
Figure 10-2: Dam Breach Inundation Area, East Hartford	10-18
Figure 11-1: Flood Plains, Dams, & Critical Facilities, East Windsor	11-16
Figure 12-1: Flood Plains, Dams, & Critical Facilities, Ellington	12-13
Figure 12-2: Dam Breach Inundation Area, Ellington	12-14
Figure 13-1: Flood Plains, Dams, & Critical Facilities, Enfield	13-15
Figure 14-1: Flood Plains, Dams, & Critical Facilities, Farmington.....	14-15
Figure 14-2: Dam Breach Inundation Area, Farmington.....	14-16
Figure 15-1: Flood Plains, Dams, & Critical Facilities, Glastonbury	15-15
Figure 16-1: Flood Plains, Dams, & Critical Facilities, Granby	16-21
Figure 17-1: Flood Plains, Dams, & Critical Facilities, Hartford	17-15
Figure 18-1: Flood Plains, Dams, & Critical Facilities, Hebron	18-13
Figure 19-1: Flood Plains, Dams, & Critical Facilities, Manchester	19-15
Figure 19-2: Dam Breach Inundation Area, Manchester	19-16
Figure 20-1: Flood Plains, Dams, & Critical Facilities, Mansfield	20-25
Figure 20-2: Dam Breach Inundation Area, Mansfield	20-26
Figure 21-1: Flood Plains, Dams, & Critical Facilities, Marlborough	21-12
Figure 22-1: Flood Plains, Dams, & Critical Facilities, New Britain	22-23
Figure 22-2: Dam Breach Inundation Area, New Britain	22-24
Figure 23-1: Flood Plains, Dams, & Critical Facilities, Newington	23-15
Figure 23-2: Dam Breach Inundation Area, Newington.....	23-16
Figure 24-1: Flood Plains, Dams, & Critical Facilities, Plainville	24-27
Figure 24-2: Dam Breach Inundation Area, Plainville	24-28
Figure 25-1: Flood Plains, Dams, & Critical Facilities, Rocky Hill.....	25-12
Figure 26-1: Flood Plains, Dams, & Critical Facilities, Simsbury	26-21
Figure 26-2: Dam Breach Inundation Area, Simsbury	26-22
Figure 27-1: Flood Plains, Dams, & Critical Facilities, Somers	27-15

Figure 28-1: Flood Plains, Dams, & Critical Facilities, South Windsor	28-17
Figure 28-2: Dam Breach Inundation Area, South Windsor	28-18
Figure 29-1: Flood Plains, Dams, & Critical Facilities, Southington	29-21
Figure 29-2: Dam Breach Inundation Area, Southington	29-22
Figure 30-1: Flood Plains, Dams, & Critical Facilities, Stafford	30-15
Figure 30-2: Dam Breach Inundation Area, Stafford	30-16
Figure 31-1: Flood Plains, Dams, & Critical Facilities, Suffield	31-13
Figure 32-1: Flood Plains, Dams, & Critical Facilities, Tolland	32-17
Figure 33-1: Flood Plains, Dams, & Critical Facilities, Vernon	33-15
Figure 33-2: Dam Breach Inundation Area, Vernon	33-16
Figure 34-1: Flood Plains, Dams, & Critical Facilities, West Hartford	34-19
Figure 34-2: Dam Breach Inundation Area, West Hartford	34-20
Figure 35-1: Flood Plains, Dams, & Critical Facilities, Wethersfield	35-19
Figure 36-1: Flood Plains, Dams, & Critical Facilities, Willington.....	36-19
Figure 36-2: Dam Breach Inundation Area, Willington.....	36-20
Figure 37-1: Flood Plains, Dams, & Critical Facilities, Windsor.....	37-15
Figure 37-2: Dam Breach Inundation Area, Windsor.....	37-16
Figure 38-1: Flood Plains, Dams, & Critical Facilities, Windsor Locks.....	38-19



1 Andover

Community Overview

Andover is a rural community on the eastern edge of the Capitol Region with a population of about 3,300. The town is approximately 15.7 square miles and has an elevation of about 400 feet above sea level. Andover is located in the Willimantic River watershed. Several small rivers and streams flow through the town including the Hop and Skungamaug Rivers and their tributaries: Burnap and Staddle Brooks. Bear Swamp Brook runs through the Nathan Hale State Forest located in the northeast corner of town. The State-owned Bishop’s Conservation Area is located in the southwest corner of town and includes the 53-acre Bishop Swamp Pond. Andover Lake is a 155-acre lake in the southeast corner that provides recreational opportunities to members of the private association that owns it. The Doris Chamberlain Nature preserve with small pond and walking trails is located on Route 316 near School Road. The major transportation routes through Andover include state routes 6, 87, and 316. Principal industries include agriculture and small wood and machine shops.

Town staff report that there has been little new development since adoption of the 2014-2019 Capitol Region Natural Hazards Mitigation Plan Update (“2014 HMP”); most construction activity has been related to improvements and renovations of existing structures and has not increased the Town’s exposure to natural hazard risks.

Critical Facilities

Critical Facilities throughout the Capitol Region are listed in Appendix B. In Andover, these include the Volunteer Fire Department, the Andover Police Department, the Andover Elementary School, the Town Hall, the Town Garage, and the Public Library. The Fire Department, Police Department, and Elementary School are located adjacent to one another.

Table 1-1: Critical Facilities, Andover

Facility	Shelter	Generator
Volunteer Fire Department		X
Andover Police Department		
Andover Elementary School	Primary	
Town Hall		Partial
Andover Town Garage		
Andover Public Library		

Andover Elementary School is the primary shelter but is in need of an emergency generator. A generator is also needed for the Town Hall Community Room addition; currently the fire house generator covers the main Town Hall. Installation of a generator at the Town Hall Addition would allow it to be used as a back-up shelter.

Capabilities

Andover's hazard mitigation capabilities include its emergency response departments, shelter, department of public works operations, and relationships with neighboring communities. Hazard mitigation is incorporated, to some degree, into the community's Plan of Conservation and Development (POCD). POCD actions specifically address natural hazards.

Andover addresses drainage complaints as they are reported. The Town has a small budget of approximately \$10,000 per year for tree maintenance, and removes dangerous as they become aware of them, when possible. The Town has a woodchipper for removing fallen trees but does not own a bucket truck. Eversource maintains trees along power lines. Municipal staff report that its tree-maintenance capabilities are lacking.

Andover has established working relationships with neighboring towns for assistance when needed.

New Capabilities

The Town has not permitted any new construction in the FEMA-mapped special flood hazard area (SFHA). A map modernization effort by FEMA is currently underway for Tolland County, but its full extent, and how much of Andover it will cover, is unknown.

The reconstruction of the Bunker Hill Road bridge over the Hop River, historically an area of flood concern, is currently in the design phase. Completion of this project is expected to relieve flooding in this area and better maintain travel on this route during flood events.

Route 6 through Andover and the neighboring towns of Bolton and Coventry was a recent focus of a transportation corridor study and review of economic development opportunities. As a follow-up to this study, the Town anticipates reviewing its zoning regulations to consider revisions that could encourage commercial development at appropriate locations in the corridor. It is thought that focusing development in this way, with hazard risk awareness in mind, will limit risks posed by natural hazards.

Challenges

Challenges Overview

Storm damage from trees resulting in road blockages, power outages and debris accumulation is a major concern of the Town. Andover also contains significant forested land, including State Forest land, which poses some fire risk to residential areas. Andover identifies severe winter weather as its primary concern.

The Town has two areas of localized flooding concern: Bunker Hill Road and the bridge over Hop River, and the bridge on Long Hill Road over the Hop River. Debris accumulation and erosion of stream banks are the main contributors to flooding problems at those locations.

Andover also identifies failure of the dam at Andover Lake as a major concern.



Andover has not experienced a significant wildfire in many years and considers its risk of wildfire to be low due to the low incidence and limited development in the Town. The Town has no public water or pressurized hydrants and relies on cisterns and dry hydrants to supply firefighting water.

Hazard Losses

The economic losses faced by the community from natural hazards can be estimated by reviewing historic, and modeling future, loss figures. Loss estimates are summarized below.

Historic FEMA Payments

FEMA reimburses communities for hazard losses through programs including Public Assistance (PA) and the National Flood Insurance Program (NFIP). Combining PA and private flood insurance payments can give an estimate for total losses to a community.

The NFIP had paid four property damage claims in Andover as of August 2017, totaling \$4,980.94. Andover has had no Repetitive Loss (RL) Property claims to-date.

Total PA reimbursements to the community were as follows:

- Flood Events: \$8,980 (\$473 annually)
- Hurricane Events: \$50,882 (\$2,678 annually)
- Winter Storm Events: \$204,107 (\$10,742 annually)

These are summarized in the tables below.

Table 1-2: Flood Event PA Reimbursements, Andover

Incident	Oct. 2005
Declaration	12/16/05
Disaster No.	1619
Entity	FEMA PA Reimbursement
State	\$480
Nonprofit	\$0
Municipal	\$8,500
Total	\$8,980
Annualized	\$473



Table 1-3: Hurricane Wind Event PA Reimbursements, Andover

Incident	Aug. 2011 (T.S Irene)	Oct. 2012 (Storm Sandy)
Declaration	09/02/11	10/30/12
Disaster #	4023	4087
Entity	FEMA PA Reimbursement	
State	\$213	\$994
Nonprofit	\$15,758	\$0
Municipal	\$21,915	\$12,003
Total	\$37,885	\$12,997
Annualized	\$1,994	\$684

Table 1-4: Winter Storm PA Reimbursements, Andover

Incident	Mar 2003	Jan 2004	Feb 2005	May 2006	Mar 2011	Nov 2011	Mar 2013	Apr 2015
Declaration	3/11/03	1/15/04	2/17/05	5/2/06	3/3/11	11/17/11	3/21/13	4/8/15
Disaster #	4216	4215	4214	4106	4046	3266	3192	3176
Entity	FEMA PA Reimbursement							
State	\$3,354	\$3,469	\$4,958	\$4,513	\$5,647	\$865	\$4,703	\$9,101
Nonprofit	\$15,402	\$20,733	\$24,101	\$10,956	\$20,262	\$12,206	\$31,406	\$27,354
Municipal	\$0	\$0	\$0	\$0	\$3,251	\$1,827	\$0	\$0
Total	\$18,755	\$24,202	\$29,059	\$15,469	\$29,160	\$14,898	\$36,109	\$36,455
Annualized	\$987	\$1,274	\$1,529	\$814	\$1,535	\$784	\$1,900	\$1,919

National Centers for Environmental Information Losses

The National Centers for Environmental Information (NCEI) severe storm database was reviewed to identify events that had impacted the community. The table below summarizes events in that database that were specifically noted as having impacted Andover since 2012.

Table 1-5: NCEI Database Losses since 2012, Andover

Date	Event	Property Damage
7/10/2013	Tornado (EF1)	*\$17,000
2/25/2016	Thunderstorm	\$5,000
Total		\$55,000

*damages from storm divided between multiple communities

NCEI losses under other event categories (such as drought, high wind, flooding, and winter storms) were not specifically noted as impacting Andover, though they did impact Tolland County and nearby towns. NCEI losses are reported in Section II of this Plan.



HAZUS-MH Losses

CRCOG used FEMA’s Hazus-MH model to analyze the risks that the community might face from flooding, hurricanes, and earthquakes. The model estimates economic losses to the town due to damage to buildings and building contents, as well as other economic disruptions. Both residential and commercial structures are addressed. Losses from different hazards are summarized below. Where available, estimates from the previous and current versions of the HMP are provided side-by-side; differences between the two may have been caused by a combination of the following:

- Changes in methodology: such as hazard zone mapping
- Changes in data: such as population and property values
- Changes in the model: this HMP utilized Hazus-MH version 4.0 rather than 2.1
- Other factors: inherent in a complex software like Hazus-MH

More details are available in the Multi-Jurisdictional HMP. Ultimately, changes in the loss estimates reflect the reality that small differences in hazard event features can have a significant impact on losses incurred.

Table 1-6: Estimated Damages to Andover from a 1% Annual-Chance Flood

Loss Type	2014 Results	2018 Results
Households Displaced	57	50
People Needing Shelter	40	51
Buildings at Least Moderately Damaged	8	0
Economic Losses		
Residential Building & Content Losses	\$5,870,000	\$4,362,890
Other Building & Content Losses	\$4,400,000	\$3,353,726
Total Building & Content Loss	\$10,290,000	\$7,716,616
Total Business Interruption Losses	\$20,000	\$125,027
TOTAL	\$10,310,000	\$7,841,643

Table 1-7: Estimated Damages to Andover from a 1% Annual-Chance Hurricane

Loss Type	2014 Results (1938 event)	2018 Results (1% track)
Buildings at Least Moderately Damaged	126	1
Buildings Completely Damaged	6	0
Total Debris Generated (tons)	28,188	5625
Truckloads (at 25 tons/truck) of building debris	44	225
Economic Losses		
Residential Building & Content Losses	\$12,660,000	\$1,432,917
Other Building & Content Losses	\$990,000	\$59,433
Total Building & Content Loss	\$14,800,000	\$1,492,350
Total Business Interruption Losses	\$1,150,000	\$82,591
TOTAL LOSSES	\$15,950,000	\$1,574,941



Losses were calculated from a modeled probabilistic earthquake (1% annual-chance of occurrence), as well as for four specific scenarios with epicenters around Connecticut.

Table 1-8: Estimated Damages to Andover from a Probabilistic Earthquake

Loss Type	2018 Results
Wage Loss	\$267
Rent Loss	\$226
Relocation Loss	\$503
Income Loss	\$286
Inventory Loss	\$33
Total Business Disruption	\$1,314
Structural Loss	\$1,061
Non-Structural Loss	\$3,954
Total Building Loss	\$5,015
Total Content Loss	\$1,557
TOTAL LOSSES	\$7,886

Table 1-9: Estimated Damages to Andover from Modeled Earthquake Scenarios

Epicenter Location	Magnitude	Estimated Total Losses
East Haddam	6.4	\$94,657.41
Haddam	5.7	\$21,130.90
Portland	5.7	\$33,274.91
Stamford	5.7	\$699.29

Average Annualized Losses

Average Annualized Loss (AAL) figures are useful tools for comparison of the risks faced from different hazards with different likelihoods of occurring in a given time period. AAL estimates were prepared for each natural hazard which may impact Andover based on the methodologies discussed in Section II of the Multi-Jurisdictional HMP. Dam failure, drought, tornado, and wildfire losses were sourced from the 2014 Connecticut Natural Hazard Mitigation Plan Update, with dam failure data supplemented by the National Performance of Dams Program and the Connecticut Department of Energy & Environmental Protection. Earthquake and hurricane losses were calculated in HAZUS-MH. Losses for flooding came from NFIP claims, for winter storms from Public Assistance Reimbursements, and for thunderstorms from the NCEI database. These are presented in the table below in dollars per year. Note that Hurricanes and Tropical Storms represent the largest share of total annualized losses.

Table 1-10: Average Annualized Losses, Andover

Dam Failure	Drought	Earthquakes	Flooding	Hurricanes and Tropical Storms	Severe Winter Storms	Thunderstorms	Tornadoes	Wildfires	Total
\$203	\$0	\$7,886	\$604	\$223,832	\$10,742	\$1,202	\$960	\$2,027	\$247,457



Losses Summary

A review of the above loss estimates demonstrates that the Town of Andover has experienced significant expenses as a result of natural hazards and is at risk for additional losses if some of the less-frequent events were to occur. These actual and potential losses justify hazard mitigation actions to reduce losses in the future.

Mitigation Strategies and Actions

Noted Hazard Mitigation Needs

Over the course of Plan development, multiple hazard mitigation needs were noted.

The Long Hill Road over Hop River, an area of localized flooding, reportedly needs replacement or repair. The Town may wish to pursue replacement, and to consider impacts of the project on Hop River flooding and road access during flood events, during that project.

Many of the current Town staff are relatively new to the Town, and so don't have local knowledge of historic hazard events and needs. Additionally, as of March 2018, the Town did not have a DPW director. For these reasons, the Town should consider developing a formalized procedure for tracking hazard events in Town and passing that information on to new Town staff. Collecting information on the costs of these events would also be helpful.

There is a private pond in Town that is a good location for a new dry hydrant; a recent change in ownership of the pond presents an opportunity to develop a hydrant at that site.

Andover staff report that its tree maintenance budget is insufficient, and that acquisition of a bucket truck to use for tree removal is desired.

Status of Previous Mitigation Strategies and Actions

The Town of Andover reviewed the mitigation actions proposed in the 2014 HMP and determined the status of each. That information is included in the table below.

Table 1-11: Status of Previous Mitigation Strategies and Actions, Andover

Action #	Action	Notes	Status
GOAL: MINIMIZE LOSS OF LIFE, PROPERTY DAMAGE, AND COMMERCIAL DISRUPTION AND FACILITATE RECOVERY FROM NATURAL HAZARDS.			
Objective 1: Improve warning notification through Reverse-911 and evacuation assistance.			
1.1	Monitor implementation of Reverse-911 system, and plan for updates.	This is an ongoing effort and reclassified as a capability.	Capability
1.2	Educate the public on new warning notification system, sheltering facilities and other emergency preparedness measures.	This action was not completed due to staff and financial constraints.	Carry Forward
1.3	Coordinate with municipal agent for the elderly on special needs population list maintenance.	List exists and was used recently during power outages to help the elderly. Town wishes to pursue improvements.	Carry Forward with Revisions



Action #	Action	Notes	Status
Objective 2: Ensure adequate natural hazard response and recovery through zoning and public works activities.			
2.1	Areas draining into the Hop River will be monitored to identify and prevent future erosion.	Town has identified two bridges in need of replacement; Bunker Hill Road Bridge (currently in design phase) and Long Hill Road Bridge. A larger-scale study of drainage and erosion risk has not been performed.	Carry Forward with Revisions
2.2	Study debris and flooding issues on Parker Bridge Road.	Town monitored site and has not observed additional debris or flooding issues on Parker Bridge Road since the previous HMP. This action is no longer needed.	Drop
2.3	Educate property owners on property maintenance, especially around natural and artificial drainage systems.	This is an ongoing activity for the Town and is considered a capability.	Capability
2.4	Establish a list of, and agreements with, private tree service companies to ensure prompt debris removal service following storms.	This action has not been pursued: currently, contractors bid on an annual basis, giving the Town competitive pricing. However, the Town would like to switch to adding multiples and having a call down list.	Carry Forward with Revisions
2.5	Investigate the CROCOG service sharing initiative, especially surrounding tree and other debris removal equipment.	This action was not completed due to staff and financial constraints.	Carry Forward
Objective 3: Ensure capacity for emergency sheltering of residents.			
3.1	Improve shelter facility, especially sanitary facilities, handicapped accessibility and generator.	Andover has assessed its sheltering capacity and expansion options; it has determined that an emergency generator should be installed at the elementary school to improve that shelter, and another should be installed in the Town Hall Addition so that space can be made into a backup shelter. Those actions are carried forward.	Carry Forward with Revisions
3.2	Investigate animal sheltering alternatives.	Investigation showed that this is not a practical option for the Town.	Drop
Objective 4: Train first responders and provide proper support, including supplies and equipment.			
4.1	Continue to participate in National Incident Management System (NIMS) training.	CERT team trains and drills monthly. Everyone in firehouse is NIMS trained as well. This is a capability.	Capability
4.2	Coordinate with DEEP on maintenance of the Andover Lake Dam and of state forest land for structural integrity of dam, wild fire prevention and emergency response.	Dam is privately owned (by homeowner's association ALPOA) and DEEP is responsible for ensuring maintenance occurs. Town will ensure it is familiar with the status of dam maintenance.	Carry Forward with Revisions
Objective 5: Ensure residents are aware of the gas pipeline that runs through town.			
5.1	Coordinate with pipeline owner on public education and outreach regarding line and public safety.	Has happened as planned and it is the Town's desire to continue this effort through future coordination.	Carry Forward with Revisions



Active Mitigation Strategies and Actions

The Town proposed to initiate several new mitigation actions for the upcoming five years. Additionally, a number of actions from the previous planning period are being carried forward or replaced with revised actions. These are listed below.

Each of the following actions has been prioritized based on FEMA guidelines, listed from highest to lowest priority, and numbered.

Action #1

Enter the Sustainable CT program through Registration and review actions that can be undertaken to pursue Certification. Make progress with the actions related to hazard mitigation.

Goal	4. Increase the use of natural, "green," or "soft" hazard mitigation measures, such as open space preservation and green infrastructure.
Category	Natural Resources Protection
Lead	Planning
Cost	\$0 - \$10,000
Funding	Town Operating Budget
Timeframe	01/2019 - 12/2019
Priority	High

Action #2

Coordinate with municipal agent for the elderly to update the special needs population list.

Goal	8. Ensure community character and social equity are addressed in mitigation activities
Category	Preparedness & Emergency Response
Lead	Emergency Management
Cost	\$10,000 - \$25,000
Funding	Town Operating Budget / DEMHS
Timeframe	07/2019 - 06/2020
Priority	High

Action #3

Educate the public on new warning notification system, sheltering facilities and other emergency preparedness measures.

Goal	6. Improve public outreach, education, and warning systems
Category	Education & Awareness
Lead	Emergency Management
Cost	\$10,000 - \$25,000
Funding	Town Operating Budget / Grants
Timeframe	07/2019 - 06/2021
Priority	High



Action #4

Complete replacement of Bunker Hill Road Bridge

Goal	5. Improve the resilience of local and regional utilities and infrastructure using strategies including adaptation, hardening, and creating redundancies.
Category	Structural Projects
Lead	Public Works
Cost	More than \$100,000
Funding	Grants
Timeframe	07/2019 - 06/2020
Priority	High

Action #5

Conduct outreach to local small businesses with the aim of preventing the accidental release and pollution from chemicals stored and used at their facilities during or following natural hazard events.

Goal	6. Improve public outreach, education, and warning systems
Category	Education & Awareness
Lead	Planning, in coordination with DEEP
Cost	\$0 - \$10,000
Funding	Materials & Resources Provided by CT DEEP
Timeframe	01/2019 - 12/2019
Priority	Medium

Action #6

Develop a formalized procedure for tracking hazard events in Town and passing that information onto new Town Staff. Collecting and tracking information on event costs & losses should be part of that procedure.

Goal	3. Improve institutional awareness and understanding of natural hazard impacts and mitigation within municipal governments and other decision-making bodies
Category	Education & Awareness
Lead	Emergency Management
Cost	\$0 - \$10,000
Funding	Town Operating Budget
Timeframe	01/2020 - 12/2020
Priority	Medium



Action #7

Pursue agreement with landowner of the small private pond that is a good location for a dry hydrant to install a dry hydrant at that site.

Goal	7. Improve the emergency response capabilities of the region and its communities
Category	Preparedness & Emergency Response
Lead	Fire Department
Cost	\$0 - \$10,000
Funding	Town Operating Budget / CT DEEP
Timeframe	07/2020 - 06/2021
Priority	Medium

Action #8

On an at-least annual basis, check on the status of maintenance of the Andover Lake Dam and determine whether Town intervention is required.

Goal	1. Minimize the impact of natural hazards on physical buildings and infrastructure
Category	Prevention
Lead	Public Works
Cost	\$0 - \$10,000
Funding	Town Operating Budget
Timeframe	01/2019 - 12/2023
Priority	Medium

Action #9

Participate in EMI courses or the seminars and annual conference held by the Connecticut Association of Flood Managers.

Goal	3. Improve institutional awareness and understanding of natural hazard impacts and mitigation within municipal governments and other decision-making bodies
Category	Education & Awareness
Lead	Planning
Cost	\$0 - \$10,000
Funding	Town Operating Budget
Timeframe	07/2019 - 06/2024
Priority	Medium



Action #10

Install emergency generator at the elementary school to improve its sheltering capabilities.

Goal	7. Improve the emergency response capabilities of the region and its communities
Category	Preparedness & Emergency Response
Lead	Emergency Management
Cost	\$10,000 - \$25,000
Funding	Town Operating Budget / DEMHS
Timeframe	07/2019 - 06/2020
Priority	Medium

Action #11

Review the LID Manual developed by the Northwest Hills Council of Governments and determine whether LID can be incorporated locally to increase rural resiliency.

Goal	1. Minimize the impact of natural hazards on physical buildings and infrastructure
Category	Prevention
Lead	Planning
Cost	\$10,000 - \$25,000
Funding	Town Operating Budget
Timeframe	07/2021 - 06/2022
Priority	Medium

Action #12

Perform a study of the Hop River channel and watershed to identify drainage problems and erosion risk zones.

Goal	3. Improve institutional awareness and understanding of natural hazard impacts and mitigation within municipal governments and other decision-making bodies
Category	Prevention
Lead	Public Works
Cost	\$25,000 - \$50,000
Funding	CT DEEP / DEMHS
Timeframe	07/2021 - 06/2022
Priority	Medium



Action #13

Initiate replacement of Long Hill Road Bridge. Consider impacts of that project on Hop River flooding and road access.

Goal	5. Improve the resilience of local and regional utilities and infrastructure using strategies including adaptation, hardening, and creating redundancies.
Category	Structural Projects
Lead	Public Works
Cost	More than \$100,000
Funding	Grants
Timeframe	07/2020 - 06/2022
Priority	Medium

Action #14

Establish a call-down list of private tree service companies that can be recruited to conduct debris removal and emergency tree maintenance following storms.

Goal	7. Improve the emergency response capabilities of the region and its communities
Category	Preparedness & Emergency Response
Lead	Public Works
Cost	\$0 - \$10,000
Funding	Town Operating Budget
Timeframe	07/2021 - 06/2023
Priority	Low

Action #15

Investigate the CRCOG service sharing initiative, especially surrounding tree and other debris removal equipment.

Goal	7. Improve the emergency response capabilities of the region and its communities
Category	Preparedness & Emergency Response
Lead	Public Works
Cost	\$0 - \$10,000
Funding	Town Operating Budget
Timeframe	07/2021 - 06/2023
Priority	Low



Action #16

Implement an education and outreach initiative related to the pipeline that passes through town and public safety.

Goal	6. Improve public outreach, education, and warning systems
Category	Education & Awareness
Lead	Emergency Management
Cost	\$0 - \$10,000
Funding	Town Operating Budget / Grants / DEMHS
Timeframe	01/2022 - 12/2023
Priority	Low

Action #17

Install emergency generator at the Town Hall Addition to make progress on converting that space into a backup shelter.

Goal	7. Improve the emergency response capabilities of the region and its communities
Category	Preparedness & Emergency Response
Lead	Emergency Management
Cost	\$10,000 - \$25,000
Funding	Town Operating Budget / DEMHS
Timeframe	07/2020 - 06/2021
Priority	Low

Action #18

Coordinate with CT SHPO to conduct historic resource surveys, focusing on areas within natural hazard risk zones (such as flood or wildfire hazard zones and areas near steep slopes), to support identification of vulnerable historic properties and preparation of resiliency plans across the state. This action leverages existing resources and best practices for protection of historic and cultural resources through an ongoing statewide initiative by CT SHPO.

Goal	8. Ensure community character and social equity are addressed in mitigation activities
Category	Property Protection
Lead	Planning, in coordination with SHPO
Cost	\$10,000 - \$25,000
Funding	SHPO
Timeframe	07/2021 - 06/2023
Priority	Low



Action #19

Acquire a bucket truck to use for tree maintenance and removal.

Goal	7. Improve the emergency response capabilities of the region and its communities
Category	Preparedness & Emergency Response
Lead	Public Works
Cost	More than \$100,000
Funding	Town Operating Budget / Grants
Timeframe	01/2023 - 12/2023
Priority	Low






Capitol Region Natural Hazards Mitigation Plan Update









Andover, Connecticut

Flood Plains, Dams & Critical Facilities

Dam Hazard Class



-  BB, A, AA OR Unclassified
-  Class B - Significant Hazard
-  Class C - High Hazard

Critical Facilities

-  Fire Station
-  Police Station
-  School
-  Healthcare Facility
-  Town Facility
-  Waste Water Facility
-  Emergency Center
-  NRHP Buildings/Sites

 NRHP Districts/Areas

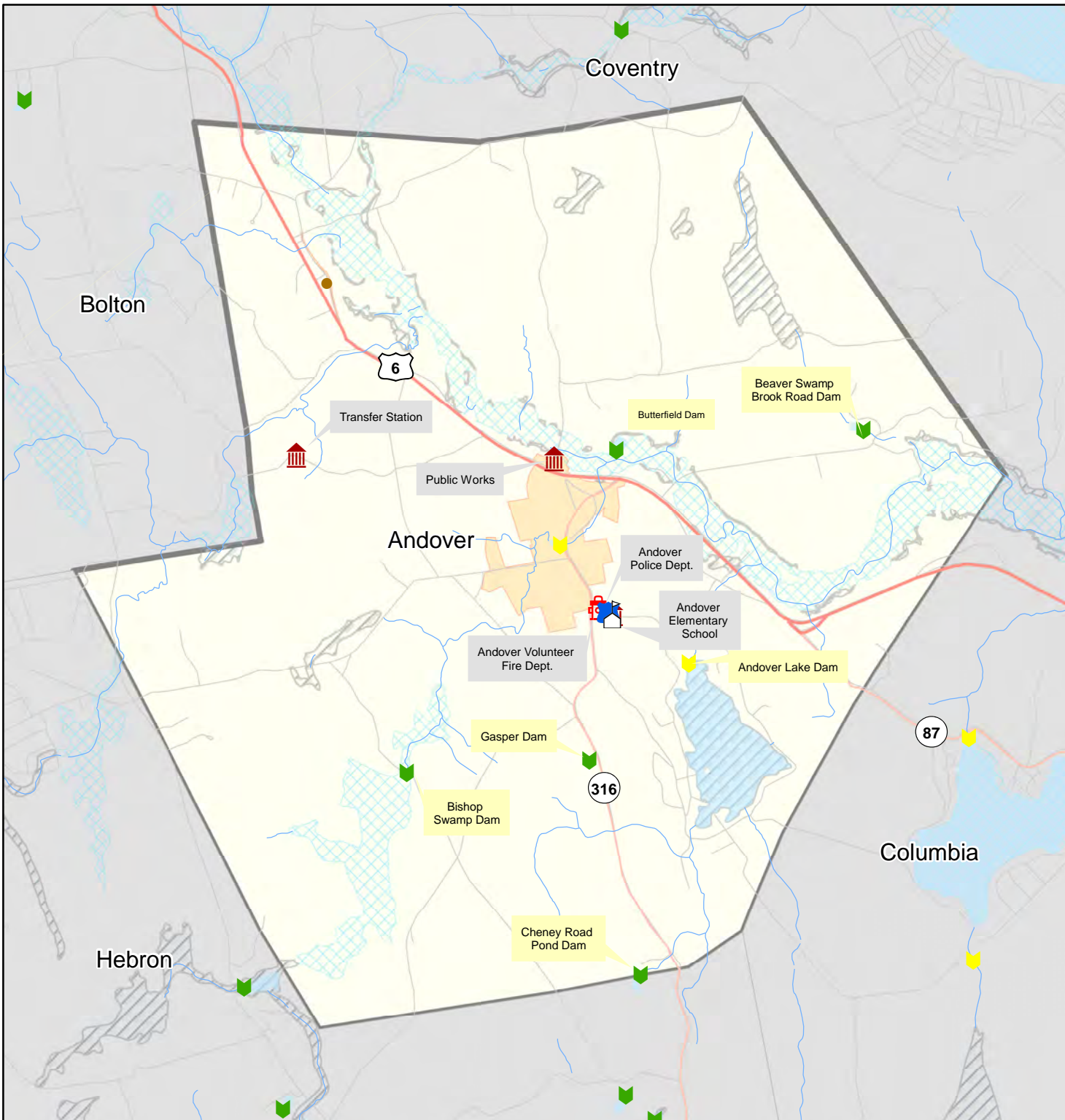
FEMA Flood Hazard Area

-  100 Year Flood Zone
-  500 Year Flood Zone

Data Sources: FEMA, National Register of Historic Places, CT DEEP, CRCOG, ESRI



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2 Avon

Community Overview

Avon is a suburban town in north-central Connecticut with a population of about 18,000. It has an average elevation of about 350 ft. The Town encompasses 23.5 square miles, lying entirely within the Farmington River watershed. The Farmington River forms the Town's western border then makes a U-turn in neighboring Farmington, to flow south to north in the eastern section of Avon. Major tributaries that course through Town include Big, Chidsey, Cider, Hawley, Nod, Roaring, Thompson, and Wiggin Brooks. Major state routes that pass through Avon include Routes 10 and 44. Insurance, printing, concrete products, poultry processing, reflective tapes, fiber optics, and medical facilities are the major industries in Avon.

A development project in the Village center is moving forward. Preliminary discussions about redevelopment of Fox Run Golf Course have occurred, but no specific plans have been proposed.

Critical Facilities

Critical Facilities throughout the Capitol Region are listed in Appendix B. In Avon, these include the Company 1 Volunteer Fire Department, the Town Hall Complex, the Public Works facility, and a number of medical facilities.

Table 2-1: Critical Facilities, Avon

Facility	Shelter	Generator
Company 1 Volunteer Fire Department	Primary	X
Town Hall Complex		
Avon High School	Secondary	X
Public Works		

Capabilities

Avon's hazard mitigation capabilities include its emergency response departments, primary and secondary shelter, zoning regulations, and coordination with the regional energy provider. Hazard mitigation is addressed specifically in the community's Plan of Conservation and Development.

The town of Avon consistently replaces and upgrades culverts and bridges and takes other steps to reduce its risk to flooding. Avon has strict floodplain regulations that encompass areas within both the 1% and 0.2% annual-chance floodplains, and that limit development within those areas. The town also maintains zoning regulations that address the sustainability of buildings using eight measures of sustainability.

Zoning regulations require cisterns and fire ponds in new developments. The town has a Fire Marshal who, among other duties, typically recommends sprinklers in all new homes.

Avon works closely with the electricity provider Eversource to coordinate tree trimming and respond to power outages. Coordination has been successful, though outages still occur occasionally. The Avon Public Works Director is the town’s Tree Warden.

New Capabilities

No new development or changes in land use have been approved recently in the floodplain.

The Farmington River bridge at Old Farms Road is scheduled to be replaced and upsized in the spring of 2019. A 1,000-foot section of Old Farms Road will be elevated with the bridge, which will have the capacity to convey a 4-percent annual-chance flood. Avon also recently replaced a box culvert at Old Wheeler Lane, though that project did not include upsizing.

New EAPs have been prepared for the Upper and Lower Unionville Reservoir dams, both of which are town-owned Class B dams.

Since adoption of the 2014-2019 Capitol Region Natural Hazards Mitigation Plan Update (“2014 HMP”), a furniture store on Waterville Road was approved to be constructed with a higher design-snow-load for the roof (greater than 30 pounds). This is an example of Avon building code requirements increasing the town’s capacity to withstand natural hazards.

A dry hydrant was recently installed on Oak Bluff. Other fire suppression capabilities have increased somewhat with minor improvements throughout Avon Water Company, and with the acquisition of Avon Water Company by Connecticut Water Company which has improved the company’s access to resources.

Coordination with Eversource has improved, and significant tree-trimming work has occurred. The Town evaluated potential microgrid use for the Town Hall complex and Company 1 Fire Department, with the nearby Village Center development benefiting as well; however, the microgrid appeared to have a poor benefit cost ratio, and application to PURA was not made.

Avon has been working to improve the Town’s mapping capabilities, though resources are still somewhat lacking (see Challenges).

Challenges

Challenges Overview

Flooding and winter weather can disrupt the transportation network in Avon, given the vast floodplain area and the steep terrain on the eastern edge of Town. Town staff also lack some basic resources to target mitigation and/or response measures, such as maps of structures in the floodplain and maps of Metropolitan District Commission (MDC) infrastructure that can be shared among public safety, planning, engineering and public works departments (see Capabilities).



Flooding is a concern for the Town of Avon, especially adjacent to Secret Lake and along the Farmington River. Beaver dams exacerbate existing flooding problems. There are at least two unnumbered FEMA A-zones in Avon that need to be studied by FEMA to establish BFEs. Town personnel have low confidence in the accuracy of the zones as currently mapped. Preliminary discussions about redevelopment of Fox Run Golf Course, adjacent to the Farmington River, have occurred, but no specific actions have been proposed; any future project in this area will need to be monitored.

Addressing repetitive flood claims is another challenge for the Town of Avon and its property owners. Among the property owners in Avon with flood insurance, three RL properties have filed multiple claims amounting to total payments of \$45,197. These repetitive flood claims make up most of the total flood loss claims filed in Avon. The three RL properties are located along Secret Lake and have rear walkout basements at risk of flooding. Other properties in the neighborhood have flood risk as well, although they may not file flood claims or may not be insured.

The Upper and Lower Unionville Reservoir dams are Class B and owned by the Town.

Avon has experienced a couple of small wildfires, both within Horse Guard State Park.

Hazard Losses

The economic losses faced by the community from natural hazards can be estimated by reviewing historic, and modeling future, loss figures. Loss estimates are summarized below.

Historic FEMA Payments

FEMA reimburses communities for hazard losses through programs including Public Assistance (PA) and the National Flood Insurance Program (NFIP). Combining PA and private flood insurance payments can give an estimate for total losses to a community.

Overall, the National Flood Insurance Program (NFIP) has paid 16 claims in Avon to date totaling \$50,059. Avon has seven RL property claims to date for three RL properties totaling \$45,197.

Total PA reimbursements to the community were as follows:

- Flood Events: \$57,349 (\$3,018 annually)
- Hurricane Events: \$150,136 (\$7,902 annually)
- Winter Storm Events: \$3,099,935 (\$163,154 annually)

These are summarized in the tables below.



Table 2-2: Flood Event PA Reimbursements, Avon

Incident	Sep 1999	Oct 2005
Declaration	9/23/1999	12/16/2005
Disaster No.	1302	1619
Entity	FEMA PA Reimbursement	
State	\$839	\$1,041
Municipal	\$5,276	\$50,193
Nonprofit	\$0	\$0
Total	\$6,115	\$51,234
Annualized	\$322	\$2,697

Table 2-3: Hurricane Wind Event PA Reimbursements, Avon

Incident	Aug - Sep 2011 (T.S. Irene)
Declaration	9/2/2011
Disaster #	4023
Entity	FEMA PA Reimbursement
State	\$1,557
Municipal	\$148,578
Nonprofit	\$0
Total	\$150,136
Annualized	\$7,902

Table 2-4: Winter Storm PA Reimbursements, Avon

Incident	Mar 2003	Dec 2003	Jan 2005	Feb 2006	Jan 2011	Oct 2011	Feb 2013
Declaration	3/11/03	1/15/04	2/17/05	5/2/06	3/3/11	11/17/11	3/21/13
Disaster #	3176	3192	3200	3266	1958	4046	4106
Entity	FEMA PA Reimbursement						
State	\$15,692	\$14,067	\$18,559	\$22,526	\$19,627	\$12,955	\$42,868
Municipal	\$67,869	\$76,057	\$68,339	\$83,677	\$60,687	\$2,452,359	\$127,211
Nonprofit	\$0	\$0	\$0	\$0	\$1,210	\$12,710	\$3,523
Total	\$83,561	\$90,124	\$86,898	\$106,203	\$81,524	\$2,478,024	\$173,601
Annualized	\$4,398	\$4,743	\$4,574	\$5,590	\$4,291	\$130,422	\$9,137

National Centers for Environmental Information Losses

The National Centers for Environmental Information (NCEI) severe storm database was reviewed to identify events that had impacted Avon. The table below summarizes events in that database that were specifically noted as having impacted Avon since 2012.



Table 2-5: NCEI Database Losses since 2012, Avon

Date	Event	Property Damage
11/1/2013	Thunderstorm	*\$8,300
Total		\$8,300

*damages from storm divided between multiple communities

NCEI losses under other event categories (such as drought, high wind, flooding, and winter storms) were not specifically noted as impacting Avon, though they did impact Hartford County and nearby towns. NCEI losses are reported in Section II of this Plan.

HAZUS-MH Losses

CRCOG used FEMA’s Hazus-MH model to analyze the risks that the community might face from flooding, hurricanes, and earthquakes. The model estimates economic losses due to damage to buildings and building contents, as well as other economic disruptions. Both residential and commercial structures are addressed. Losses from different hazards are summarized below. Where available, estimates from the previous and current versions of the HMP are provided side-by-side; differences between the two may have been caused by a combination of the following:

- Changes in methodology: such as hazard zone mapping
- Changes in data: such as population and property values
- Changes in the model: this HMP utilized Hazus-MH version 4.0 rather than 2.1
- Other factors: inherent in a complex software like Hazus-MH

More details are available in the Multi-Jurisdictional HMP. Ultimately, changes in the loss estimates reflect the reality that small differences in hazard event features can have a significant impact on losses incurred.

Table 2-6: Estimated Damages to Avon from a 1% Annual-Chance Flood

Loss Type	2014 Results	2018 Results
Households Displaced	312	219
People Needing Shelter	673	300
Buildings at Least Moderately Damaged	114	13
Economic Losses		
Residential Building & Content Losses	\$45,310,000	\$25,793,594
Other Building & Content Losses	\$133,460,000	\$43,298,499
Total Building & Content Loss	\$179,770,000	\$69,092,918
Total Business Interruption Losses	\$970,000	\$1,305,069
TOTAL	\$213,740,000	\$70,397,162



Table 2-7: Estimated Damages to Avon from a 1% Annual-Chance Hurricane

Loss Type	2014 Results (1938 event)	2018 Results (1% track)
Buildings at Least Moderately Damaged	372	1
Buildings Completely Damaged	15	0
Total Debris Generated (tons)	30,082	1540
Truckloads (at 25 tons/truck) of building debris	220	62
Economic Losses		
Residential Building & Content Losses	\$51,100,000	\$4,825,753
Other Building & Content Losses	\$11,200,000	\$146,599
Total Building & Content Loss	\$69,000,000	\$4,972,352
Total Business Interruption Losses	\$6,700,000	\$25,000
TOTAL LOSSES	\$75,700,000	\$4,997,352

Losses were calculated from a modeled probabilistic earthquake (1% annual-chance of occurrence), as well as for four specific scenarios with epicenters around Connecticut.

Table 2-8: Estimated Damages to Avon from a Probabilistic Earthquake

Loss Type	2018 Results
Wage Loss	\$4,964
Rent Loss	\$2,833
Relocation Loss	\$5,316
Income Loss	\$3,681
Inventory Loss	\$241
Total Business Disruption	\$17,035
Structural Loss	\$9,974
Non-Structural Loss	\$31,861
Total Building Loss	\$41,835
Total Content Loss	\$13,270
TOTAL LOSSES	\$72,140

Table 2-9: Estimated Damages to Avon from Modeled Earthquake Scenarios

Epicenter Location	Magnitude	Estimated Total Losses
East Haddam	6.4	\$219,352.59
Haddam	5.7	\$59,435.27
Portland	5.7	\$174,221.96
Stamford	5.7	\$8,441.19

Other Hazard Costs

A nor'easter on January 4, 2018, cost the town approximately \$35,500 in cleanup and response.



Average Annualized Losses

Average Annualized Loss (AAL) figures are useful tools for comparison of the risks faced from different hazards with different likelihoods of occurring in a given time period. AAL estimates were prepared for the community based on the methodologies discussed in Section II of the Multi-Jurisdictional HMP. Dam failure, drought, tornado, and wildfire losses were sourced from the 2014 Connecticut Natural Hazard Mitigation Plan Update, with dam failure data supplemented by the National Performance of Dams Program and the Connecticut Department of Energy & Environmental Protection. Earthquake and hurricane losses were calculated in HAZUS-MH. Losses for flooding came from NFIP claims, for winter storms from Public Assistance Reimbursements, and for thunderstorms from the NCEI database. These are presented in the table below.

Table 2-10: Average Annualized Losses, Avon

Dam Failure	Drought	Earthquakes	Flooding	Hurricanes and Tropical Storms	Severe Winter Storms	Thunderstorms	Tornadoes	Wildfires	Total
\$32	\$0	\$72,140	\$4,336	\$1,134,537	\$163,154	\$2,404	\$265,531	\$4,303	\$1,646,438

Losses Summary

A review of the above loss estimates demonstrates that the Town of Avon has experienced significant expenses as a result of natural hazards and is at risk for additional losses if some of the less-frequent events were to occur. These actual and potential losses justify hazard mitigation actions to reduce losses in the future.

Mitigation Strategies and Actions

Noted Hazard Mitigation Needs

Avon is not interested in RL property buyouts or buyouts of nearby at-risk properties, as they believe mitigation of the walkout basement flood risk is feasible through wet floodproofing or basement modification. Property owners in the area should report to the Town of Avon if they have taken any actions to reduce flood damage.

The town wishes to conduct emergency dam failure drills for the Upper and Lower Unionville Reservoir dams, as required by the dam EAPs.

Status of Previous Mitigation Strategies and Actions

The Town of Avon reviewed the mitigation actions proposed in the 2014 HMP and determined the status of each. That information is included in the table below.



Table 2-11: Status of Previous Mitigation Strategies and Actions, Avon

No.	Action	Notes	Status
GOAL: REDUCE LOSS OF LIFE & PROPERTY & CONSEQUENCES AS A RESULT OF NATURAL DISASTERS			
Objective 1: Have a plan for Emergency Responders to Respond to High Winds			
1.1	Develop and maintain agreements with local contractors for emergency tree and debris removal, to quickly restore access throughout town, for emergency response.	No agreement has been made. Service purchase approval process has been developed. Contracts are individually bid and secured. Action no longer needed.	Drop
Objective 2: Improve emergency responders' knowledge of emergency action plans			
2.1	Continue to participate in regional National Incident Management System (NIMS) and other emergency response trainings.	Staff updates training as required. New staff continues to train. This is a capability.	Complete
2.2	Inform municipal staff of revisions to emergency response action plan.	All departments have updated their plan annexes and have access to the EOP. The plan is routinely updated due to staff changes and new procedures. This is a capability	Complete
Objective 3: Ensure equipment is maintained in proper operative condition			
3.1	Fully implement new fleet management system	Completed. System is operating on all town vehicles and is managed by Public Works.	Complete
3.2	Investigate CROG services sharing initiative, and potential for shared equipment, such as a chipper.	Completed. Equipment has been purchased for regional use, Skid steer, and mini-excavator.	Complete
GOAL: REDUCE THE LOSS OF LIFE AND PROPERTY DURING ADVERSE WEATHER CONDITIONS			
Objective 1: Monitor Weather Conditions and relocate personnel in key locations to lower response times			
1.1	Continue with current practices of relocating personnel to the east side of the Farmington River as needed.	This is an established practice which is implemented on an as needed basis. The Town had also developed an automatic response plan with UCONN Fire Department, thought that plan is no longer in place.	Carry Forward with Revision
1.2	Use Connecticut Department of Transportation highway garage as staging area for local personnel.	This action was previously stated as "Talk to CT Department of Transportation about using State highway garage as staging area for local personnel." This action was accomplished. Units can be staged if necessary. The Town will continue to maintain a working relationship with CTDOT and will use the garage for staging on an as needed basis throughout the 2014-2019 plan period.	Complete
1.3	Provide satellite televisions for Public Works and Fire Departments to monitor information when power and cable are out.	Completed. Police and Fire Departments have satellite TV. The New EOC will not have this capability.	Complete



No.	Action	Notes	Status
Objective 2: Ensure adequate staffing and provide staff with necessary tools to respond to event.			
2.1	Upgrade more staff members to wireless communication systems.	All EOC staff have smart phones; many have laptops w/Wi-Fi.	Carry Forward with Revisions
2.2	Implement web-based GIS, and provide access to sensitive information for emergency responders.	A web-based program known as Community Explorer Online (CEO) is available to all responders. Continual and ongoing updates to the system will be made as plan program changes.	Complete
2.3	Map structures located in floodplains, and develop a targeted Reverse-911 list for those property owners.	GIS staff continues to develop data. Continual development and updates to the system will be made throughout the 2014 – 2019 planning period.	Carry Forward with Revisions
2.4	Acquire a portable generator and enable hook-ups at shelters and emergency response facilities.	Completed. All public safety facilities have backup generators; however, two communication sites have been identified as needing generators. Main shelter site is equipped with backup power	Complete
Objective 3: Coordinate with all local, state and federal agencies and authorities.			
3.1	Map, or obtain mapping of, MDC infrastructure in town.	Engineering staff are attempting to get data from MDC. Continual development and updates to the system were made throughout the 2014 – 2019 planning period.	Carry Forward with Revisions
3.2	Meet with MDC staff to discuss coordinated emergency response planning.	Participated in MDC yearly drills; Engineering staff are attempting to get data from MDC. Will continue to maintain a working relationship with MDC and will participate in future drills throughout the 2014 – 2019 planning period. This is a capability	Complete
3.3	Coordinate with other agencies on an as needed basis.	This is an established practice. This is a capability.	Complete
GOAL: REDUCE THE LOSS OF LIFE AND PROPERTY DURING SIGNIFICANT FLOODING EVENTS			
Objective 1: Continue to enforce the Town of Avon's flood plain regulations.			
1.1	Continue with current development review and enforcement practices.	Regulations require structures be built above the 500-year flood zone. Proposed development is routinely evaluated for conformance with floodplain regulations during the development review process. This practice will continue throughout the 2014-2019 plan period. This is a capability.	Complete



No.	Action	Notes	Status
Objective 2: Educate public in regards to town's emergency plan and emergency shelter.			
2.1	Use municipal website and town newsletter to periodically update residents.	The Town has undertaken a number of activities over the past five years to implement this strategic action. For example, relevant information is routinely posted on the town web site; pertinent articles have been written for the town newsletter and FEMA STEP training has been provided for all 5th grade students. This is a capability	Complete

Active Mitigation Strategies and Actions

The Town proposed to initiate several new mitigation actions for the upcoming five years. Additionally, a number of actions from the previous planning period are being carried forward or replaced with revised actions. These are listed below.

Each of the following actions has been prioritized based on FEMA guidelines, listed from highest to lowest priority, and numbered.

Action #1	
Develop written procedure for relocating personnel to areas at risk of isolation during floods.	
Goal	7. Improve the emergency response capabilities of the region and its communities
Category	Preparedness & Emergency Response
Lead	Emergency Management
Cost	\$0 - \$10,000
Funding	Town Operating Budget
Timeframe	01/2019 - 12/2019
Priority	High

Action #2	
Develop prioritized list of critical facility generator needs to guide future purchases.	
Goal	5. Improve the resilience of local and regional utilities and infrastructure using strategies including adaptation, hardening, and creating redundancies.
Category	Prevention
Lead	Emergency Management
Cost	\$0 - \$10,000
Funding	Town Operating Budget
Timeframe	01/2019 - 12/2019
Priority	High



Action #3

Enter the Sustainable CT program through Registration and review actions that can be undertaken to pursue Certification. Make progress with the actions related to hazard mitigation.

Goal	4. Increase the use of natural, "green," or "soft" hazard mitigation measures, such as open space preservation and green infrastructure.
Category	Natural Resources Protection
Lead	Planning
Cost	\$0 - \$10,000
Funding	Town Operating Budget
Timeframe	01/2019 - 12/2019
Priority	High

Action #4

Install a satellite television system at the new EOC, once it is completed, to allow for monitoring of information when power and cable are out.

Goal	7. Improve the emergency response capabilities of the region and its communities
Category	Preparedness & Emergency Response
Lead	Emergency Management
Cost	\$0 - \$10,000
Funding	Town Operating Budget / DEMHS
Timeframe	07/2019 - 06/2020
Priority	High

Action #5

Determine level of communication needed for all personnel and provide wireless communication in accordance with findings.

Goal	7. Improve the emergency response capabilities of the region and its communities
Category	Preparedness & Emergency Response
Lead	Emergency Management
Cost	\$10,000 - \$25,000
Funding	Town Operating Budget / Grants
Timeframe	07/2019 - 06/2021
Priority	High



Action #6

Conduct outreach to local small businesses with the aim of preventing the accidental release and pollution from chemicals stored and used at their facilities during or following natural hazard events.

Goal	6. Improve public outreach, education, and warning systems
Category	Education & Awareness
Lead	Planning, in coordination with DEEP
Cost	\$0 - \$10,000
Funding	Town Operating Budget / Materials & Resources Provided by CT DEEP
Timeframe	01/2019 - 12/2019
Priority	Medium

Action #7

Coordinate with NEMO and CRCOG to share resources and gain technical support for hazard mitigation actions involving stormwater management and public outreach, which have parallel benefits related to MS4 stormwater permit compliance.

Goal	1. Minimize the impact of natural hazards on physical buildings and infrastructure
Category	Prevention
Lead	Public Works
Cost	\$0 - \$10,000
Funding	Town Operating Budget
Timeframe	01/2020 - 12/2020
Priority	Medium

Action #8

Work with the Connecticut Water Company to designate new areas for fire protection.

Goal	7. Improve the emergency response capabilities of the region and its communities
Category	Preparedness & Emergency Response
Lead	Fire Department
Cost	\$0 - \$10,000
Funding	Town Operating Budget
Timeframe	01/2020 - 12/2020
Priority	Medium



Action #9

Work with MDC to determine whether transmission routes can be mapped and used for emergency planning and response in Avon.

Goal	5. Improve the resilience of local and regional utilities and infrastructure using strategies including adaptation, hardening, and creating redundancies.
Category	Prevention
Lead	Emergency Management
Cost	\$0 - \$10,000
Funding	Town Operating Budget
Timeframe	07/2020 - 06/2021
Priority	Medium

Action #10

Participate in EMI courses or the seminars and annual conference held by the Connecticut Association of Flood Managers.

Goal	3. Improve institutional awareness and understanding of natural hazard impacts and mitigation within municipal governments and other decision-making bodies
Category	Education & Awareness
Lead	Planning
Cost	\$0 - \$10,000
Funding	Town Operating Budget
Timeframe	07/2019 - 06/2024
Priority	Medium

Action #11

Link properties in areas of flood risk to the Reverse 911 database to enable targeted messages.

Goal	6. Improve public outreach, education, and warning systems
Category	Preparedness & Emergency Response
Lead	Emergency Management
Cost	\$10,000 - \$25,000
Funding	Town Operating Budget
Timeframe	01/2020 - 12/2022
Priority	Medium



Action #12

Develop a flood mitigation plan for Building 1 at the Town Complex using FEMA historic structure mitigation guidelines and public participation; this process can be used as a case-study for preservation-sensitive flood mitigation of historic properties.

Goal	8. Ensure community character and social equity are addressed in mitigation activities
Category	Property Protection
Lead	Planning
Cost	\$25,000 - \$50,000
Funding	Town Operating Budget / DEMHS
Timeframe	07/2021 - 06/2023
Priority	Medium

Action #13

Complete the replacement and upsizing of the Farmington River bridge at Old Farms Road

Goal	5. Improve the resilience of local and regional utilities and infrastructure using strategies including adaptation, hardening, and creating redundancies.
Category	Structural Projects
Lead	Public Works
Cost	\$50,000 - \$100,000
Funding	Town Operating Budget / Grants
Timeframe	01/2019 - 12/2019
Priority	Medium

Action #14

Contact the owners of Repetitive Loss Properties and nearby properties at risk to inquire about mitigation undertaken and suggest options for mitigating flooding in those areas. This should be accomplished with a letter directly mailed to each property owner.

Goal	1. Minimize the impact of natural hazards on physical buildings and infrastructure
Category	Property Protection
Lead	Planning
Cost	\$0 - \$10,000
Funding	Town Operating Budget / DEMHS
Timeframe	07/2021 - 06/2022
Priority	Low



Action #15

Coordinate with CT SHPO to conduct historic resource surveys, focusing on areas within natural hazard risk zones (such as flood or wildfire hazard zones and areas near steep slopes), to support identification of vulnerable historic properties and preparation of resiliency plans across the state. This action leverages existing resources and best practices for protection of historic and cultural resources through an ongoing statewide initiative by CT SHPO.

Goal	8. Ensure community character and social equity are addressed in mitigation activities
Category	Property Protection
Lead	Planning, in coordination with SHPO
Cost	\$10,000 - \$25,000
Funding	SHPO
Timeframe	07/2021 - 06/2023
Priority	Low

Action #16

Complete a feasibility study to determine the effectiveness of implementing a microgrid at the Avon Town Offices campus.

Goal	5. Improve the resilience of local and regional utilities and infrastructure using strategies including adaptation, hardening, and creating redundancies.
Category	Prevention
Lead	Public Works
Cost	\$25,000 - \$50,000
Funding	Grants
Timeframe	07/2023 - 06/2024
Priority	Low








Capitol Region Natural Hazards Mitigation Plan Update










Avon, Connecticut

Flood Plains, Dams & Critical Facilities

Dam Hazard Class



-  BB, A, AA OR Unclassified
-  Class B - Significant Hazard
-  Class C - High Hazard

Critical Facilities

-  Fire Station
-  Police Station
-  School
-  Healthcare Facility
-  State Facility
-  Town Facility
-  Waste Water Facility
-  Emergency Center
-  NRHP Buildings/Sites

 NRHP Districts/Areas

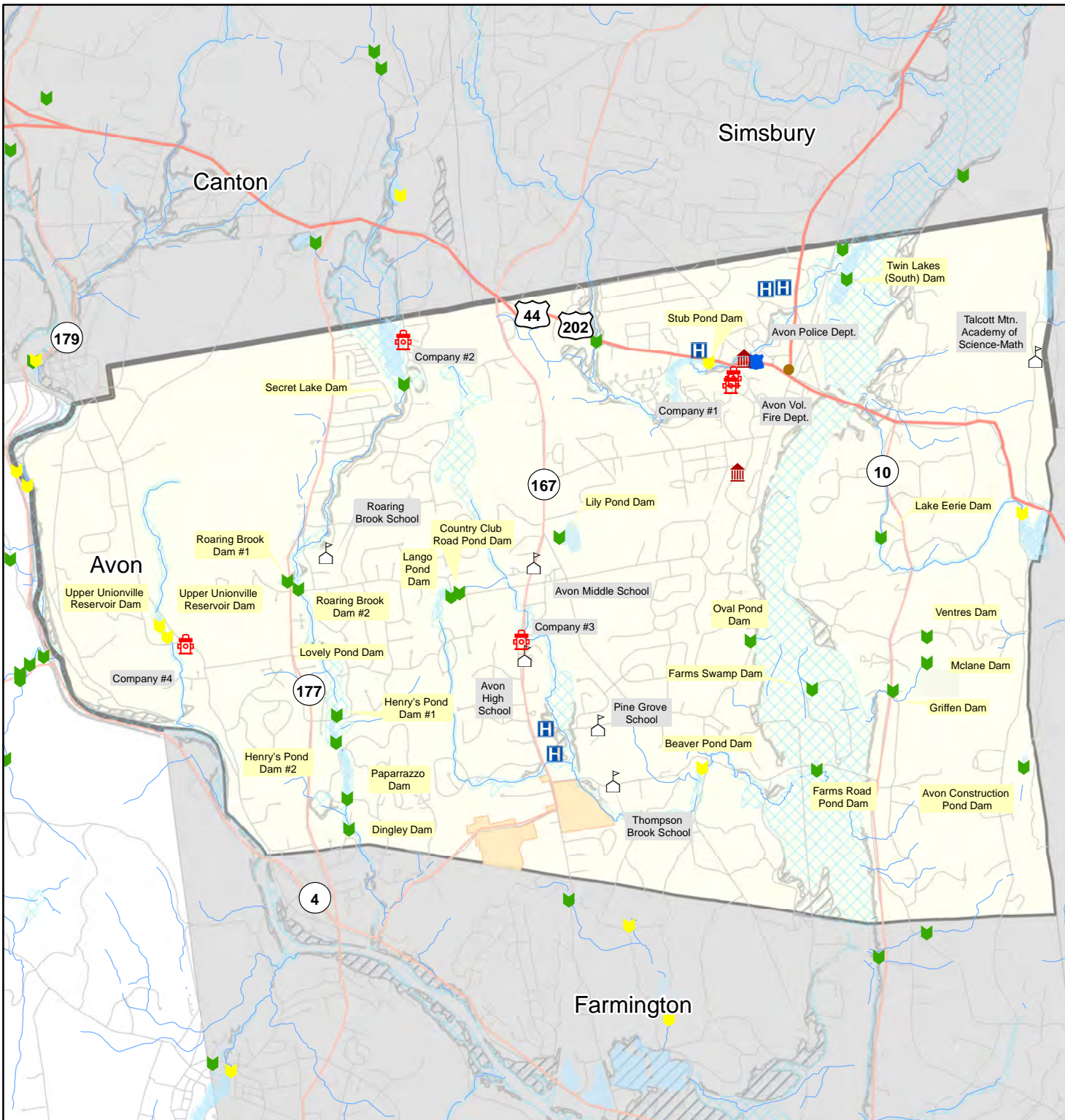
FEMA Flood Hazard Area

-  100 Year Flood Zone
-  500 Year Flood Zone

Data Sources: FEMA, National Register of Historic Places, CT DEEP, CRCOG, ESRI



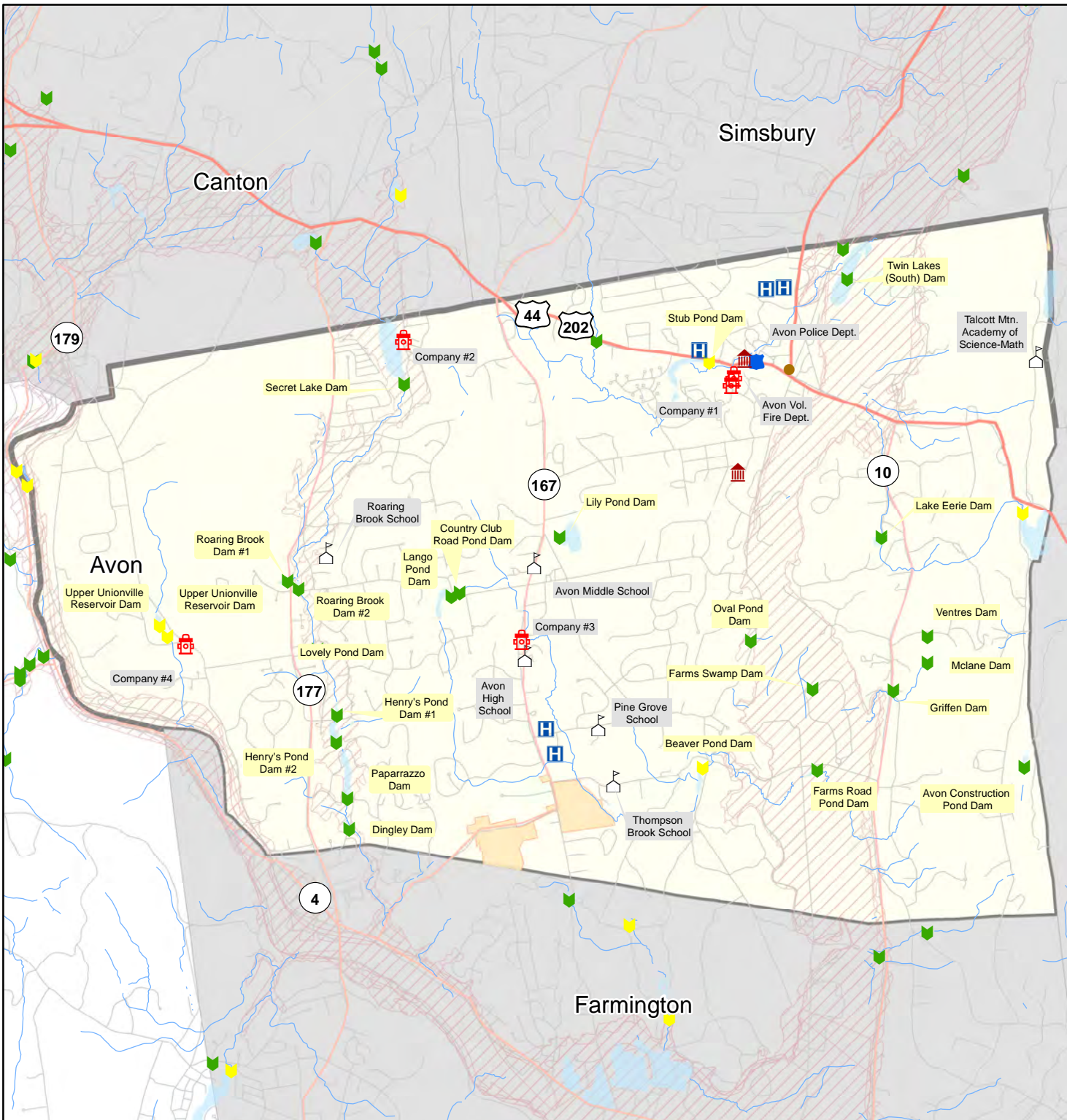
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Capitol Region Natural Hazards Mitigation Plan Update

Avon, Connecticut












Dam Breach Inundation Area & Critical Facilities



Dam Hazard Class

-  BB, A, AA OR Unclassified
-  Class B - Significant Hazard
-  Class C - High Hazard

Critical Facilities

-  Fire Station
-  Police Station
-  School
-  Healthcare Facility
-  State Facility
-  Town Facility
-  Waste Water Facility
-  Emergency Center
-  NRHP Buildings/Sites
-  NRHP Districts/Areas
-  Dam Breach Inundation Areas

Data Sources: FEMA, National Register of Historic Places, CT DEEP, CRCOG, ESRI



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3 Berlin

Community Overview

The Town of Berlin encompasses 26.3 square miles of land area and had 19,866 residents as of the 2010 census (a population density of 755 persons per square mile). Elevation ranges from approximately 15 to 767 feet. Nearly all the land area in Berlin drains to Mattabeset River, a tributary to the Connecticut River. Other major streams in Berlin include Belcher Brook, Willow Brook, and Webster Brook. A small portion of land in southern Berlin drains to Sodom Brook, a tributary to the Quinnipiac River.

Berlin is primarily a suburban community, with some rural areas. The town features mainly decentralized development, with a large retail strip located along the State Route 5/15 corridor and three distinct village centers (Berlin, East Berlin, and Kensington). In addition to State Route 5/15, other major transportation routes through Berlin include State Routes 9, 71, 71A, 72, 160, 364, and 372. An Amtrak commuter rail line and the Hartford Line commuter rail pass through Berlin and make a stop in the Kensington area on the west side of town. Berlin’s major businesses and industries include construction, manufacturing, retail trade, and health care and social assistance.

Critical Facilities

Critical Facilities throughout the Capitol Region are listed in Appendix B. In Berlin, these include the Town Hall (which serves as the Emergency Operations Center), the Police Department (back-up EOC), four volunteer fire stations, the Senior Center, three Elementary Schools, one Middle School (secondary shelter), one High School (primary shelter), the Public Works Facility, an Ambulance Facility, and Marjorie Moore Housing Complex. The Town Hall has full backup power from a generator. The municipal sewer system includes twelve sewer pumping stations; the Water Control Department moves a portable generator from station to station during outages. The Town’s Physical Services (Public Works) Complex at 19 Town Farm Lane is in the Special Flood Hazard Area (SFHA).

Table 3-1: Critical Facilities, Berlin

Facility	Shelter	Generator
Town Hall (EOC)		X
Berlin Fire Department		X
East Berlin Fire Department		
Kensington Fire Department		
South Kensington Fire Department		
Police Department (Backup EOC)		
Senior Center		
Berlin High School	Primary	800 kW
Berlin Middle School	Secondary	
3 Elementary Schools		
Marjorie Moore Section 8 Housing		
12 sewer pumping stations		1 portable

The Town of Berlin recently renovated the high school and upgraded from a 135-kW generator to an 800-kW generator. The new generator allows the high school to function as the primary shelter. Town departments are able to relocate some functions to the high school during emergency events that make their offices unusable. The 135-kW generator is being relocated to the middle school. Berlin also has identified warming/charging stations.

The Town is in discussions with the Housing Authority to pursue acquisition of a generator for the Senior Center; if a generator is obtained, this building could be used as a backup shelter.

Capabilities

The Town of Berlin's hazard mitigation capabilities include its sheltering capacity, Plan of Conservation and Development (POCD) and Emergency Operations Plan (EOP), training program, building codes and land use regulations, emergency supplies, and mutual aid agreements.

Berlin is committed preservation of open space and rehabilitation of flood hazard areas. The POCD emphasizes strategic and smart growth principles and redevelopment. The Town recognizes that the 1% and the 0.2% annual chance floodplains and floodways should be protected. The POCD incorporates elements of the initial hazard mitigation plan, including a discussion of climate change impacts on flooding, and the potential impacts of dam failure.

Berlin's municipal codes and ordinances limit any activities on floodplains that would increase flood risk, and stipulate multiple floodproofing requirements. The Town seeks conservation easements for all new developments and acquires properties (when funding allows) that provide ecosystem services. Subdivision regulations require burial of utilities in new developments.

Berlin maintains an Emergency Operations Plan, has identified a variety of resources to assist with response to hazard events, and runs a training program for its emergency personnel. The Everbridge emergency notification system provides alert coverage above the CT Alerts system.

Drainage and flooding complaints are submitted through the town website, to Public Works, or to the Police Department, and are then routed to either the Fire Department or Public Works. The Town regularly sandbags certain properties at risk of flooding and owns a sandbag loader to lower the response time. The Town also evacuates flooding areas when necessary.

Berlin has an annual inspection and maintenance schedule for its 37 bridges and its culverts. Bridge replacements are prioritized based on whether or not a bridge is undersized based on the most recent NRCC rainfall return periods. New construction is designed using the most recent NRCC rainfall return periods.

Removal of the ice and snow for town-owned roads is handled by town workers and contractors; the town handles debris removal. The Town has an informal program to review



snow accumulation on town-owned roofs each winter, with clearing occurring when depths are sufficiently deep or wet.

Town departments have sufficient supplies to be prepared for the next major storm event. The Town has several chainsaws and a wood chipper, and a chipping and trimming contractor on call. Much of the tree trimming near power lines is conducted by Eversource Energy. The Town has a limited budget for tree maintenance (~\$15,000) which is considered sufficient at this time.

Berlin maintains mutual aid agreements with surrounding communities for fire protection. The Town has two dry hydrants, three 10,000-gallon underground storage tanks, and hydrants connected to municipal water systems. The Fire Department can require dry hydrants or cisterns in new developments. The Town has three Open Burning Officials.

The Town hired a consultant to perform dam inspections on a two-year and 5-year basis for its two dams based on the inspection requirements of Connecticut DEEP. The Town has prepared Emergency Action Plans (EAPs) for both dams and has copies of EAPs prepared for other dams whose failure could affect Berlin.

New Capabilities

Bridges and culverts replaced since adoption of the 2016-2021 Hazard Mitigation Plan for the Former Central Connecticut Region (“2016 HMP”) include the Farmington Avenue bridge and a culvert on High Road. Additional bridges are being reviewed for future replacement.

Berlin has posted information encouraging residents to sign up for the Everbridge emergency notification system on its website and emergency management Facebook page. Additionally, the police department has reverse 9-1-1 capabilities.

The Town’s “Dam Breakage Plan” is scheduled for completion in July 2018. The plan evaluates the dam-failure inundation areas for the two Town-owned dams. The Town will encourage residents in the at-risk areas to sign up for the Everbridge emergency notification system.

Challenges

Challenges Overview

The natural hazards that present the highest risk to Berlin include flooding, winter storms, and tropical storms/hurricanes. There have been 10 federally declared disasters or emergencies since 1999 that resulted in reimbursement requests to FEMA. The types of events on this list are consistent with the high-risk hazards identified above.

Berlin has experienced recurrent flooding throughout Town, with regular, localized flooding at known locations four to five times per year. The Town has identified flood risk areas along Farmington Avenue, Brook Meadow, Route 9, Fleming Road, and portions of Park Drive. Additionally, the downtown, various business parks, and shopping centers are in proximity to



streams. Six Repetitive Loss (RL) properties are listed in Berlin. At least one of them has been acquired, removed, and is now vacant land near the Stop & Shop Supermarket plaza. The RL properties are located in known areas of flood risk.

During larger precipitation events, floodwaters may divide the town into sections, isolating population centers such as Kensington and East Berlin. This can complicate evacuation and sheltering during emergencies. Berlin does not have any fixed evacuation routes in place.

During winter storms, ice and snow make roads impassable and knock down tree limbs, disrupting utility service. People can become stranded, potentially without heat or power. Similarly, the primary problem with regards to tropical storms and hurricanes is downed trees which interrupting power supply and hindering travel. Secondary impacts are generally caused by heavy rainfall.

Berlin is served by three public water systems that are interconnected with one another. The greatest areas of wildfire concern are the areas of Town that do not have public water service. These areas are located on the Metacomet side and the Southington side of Berlin. At the time of development of the 2016 HMP, the Town anticipated that a major burn would occur in the Ragged Mountain Preserve in the coming years because a significant amount of deadfall had accumulated. A number of fires have indeed occurred in that area, including small ones on May 5 and August 9, 2015, a large one on July 25, 2016, and another minor fire on April 17, 2017. Hikers are common in this area which increases potential risk for an accidental fire. A major burn in 1984 continued for a week and a half in this area.

A total of twenty-three dams could affect the Town of Berlin with their failure, and six Class C (high hazard) dams lie within the Town boundaries. The rupture of the Kenmere Dam in 1987 forced 80 million gallons of water into town; most of this water inundated a golf course, but had the downstream area been developed differently the outcome could have been far worse.

Hazard Losses

The economic losses faced by Berlin from natural hazards can be estimated by reviewing historic, and modeling future, loss figures. Loss estimates are summarized below.

Historic FEMA Payments

FEMA reimburses communities for hazard losses through programs including Public Assistance (PA) and the National Flood Insurance Program (NFIP). Combining PA and private flood insurance payments can give an estimate for total losses to a community.

The NFIP has paid 61 property damage claims in Berlin as of August 2017, totaling \$365,993. Berlin has 19 RL property claims to date from 6 RL properties totaling \$251,540.

Total PA reimbursements to the community were as follows:



- Flood Events: \$27,067 (\$1,425 annually)
- Hurricane Events: \$663,974 (\$34,946 annually)
- Winter Storm Events: \$1,573,671 (\$82,825 annually)

These are summarized in the tables below.

Table 3-2: Flood Event PA Reimbursements, Berlin

Incident	Sep 1999	Oct 2005
Declaration	9/23/1999	12/16/2005
Disaster No.	1302	1619
Entity	FEMA PA Reimbursement	
State	\$921	\$1,142
Municipal	\$5,542	\$19,461
Nonprofit	\$0	\$0
Total	\$6,463	\$20,604
Annualized	\$340	\$1,084

Table 3-3: Hurricane Wind Event PA Reimbursements, Berlin

Incident	Aug - Sep 2011 (T.S. Irene)
Declaration	9/2/2011
Disaster #	4023
Entity	FEMA PA Reimbursement
State	\$874
Municipal	\$663,100
Nonprofit	\$0
Total	\$663,974
Annualized	\$34,946

Table 3-4: Winter Storm PA Reimbursements, Berlin

Incident	Mar 2003	Dec 2003	Jan 2005	Feb 2006	Jan 2011	Oct 2011	Feb 2013
Declaration	3/11/03	1/15/04	2/17/05	5/2/06	3/3/11	11/17/11	3/21/13
Disaster #	3176	3192	3200	3266	1958	4046	4106
Entity	FEMA PA Reimbursement						
State	\$17,225	\$15,442	\$20,372	\$24,727	\$21,544	\$8,885	\$41,868
Municipal	\$50,642	\$54,130	\$66,290	\$68,307	\$62,727	\$868,827	\$250,754
Nonprofit	\$0	\$0	\$0	\$0	\$1,933	\$0	\$0
Total	\$67,867	\$69,572	\$86,661	\$93,033	\$86,203	\$877,712	\$292,622
Annualized	\$3,572	\$3,662	\$4,561	\$4,896	\$4,537	\$46,195	\$15,401



National Centers for Environmental Information Losses

The table below summarizes events in the National Centers for Environmental Information (NCEI) severe storm database that were specifically noted as having impacted the community since 2012.

Table 3-5: NCEI Database Losses since 2012, Berlin

Date	Event	Property Damage
7/18/2012	Lightning	\$10,000
5/31/2015	Flood	\$0
Total Thunderstorm		\$10,000
Total Flood		\$0

NCEI losses under other event categories (such as drought, high wind, flooding, and winter storms) were not specifically noted as impacting this community, though they did impact Hartford County and nearby towns. NCEI losses are reported in Section II of this Plan.

HAZUS-MH Losses

CRCOG used FEMA’s Hazus-MH model to analyze the risks that the community might face from flooding, hurricanes, and earthquakes. The model estimates economic losses due to damage to buildings and building contents, as well as other economic disruptions. Both residential and commercial structures are addressed. Losses from different hazards are summarized below. Where available, estimates from the previous and current versions of the HMP are provided side-by-side; differences between the two may have been caused by a combination of the following:

- Changes in methodology: such as hazard zone mapping
- Changes in data: such as population and property values
- Changes in the model: this HMP utilized Hazus-MH version 4.0 rather than 2.1
- Other factors: inherent in a complex software like Hazus-MH

More details are available in the Multi-Jurisdictional HMP. Ultimately, changes in the loss estimates reflect the reality that small differences in hazard event features can have a significant impact on losses incurred.



Table 3-6: Estimated Damages to Berlin from a 1% Annual-Chance Flood

Loss Type	2014 Results	2018 Results
Households Displaced	667	327
People Needing Shelter	1,297	421
Buildings at Least Moderately Damaged	61	0
Economic Losses		
Residential Building & Content Losses	\$22,720,000	\$17,023,179
Other Building & Content Losses	\$85,250,000	\$45,505,720
Total Building & Content Loss	\$108,350,000	\$62,528,899
Total Business Interruption Losses	\$390,000	\$2,800,644
TOTAL	\$108,740,000	\$65,329,543

Table 3-7: Estimated Damages to Berlin from a 1% Annual-Chance Hurricane

Loss Type	2014 Results (1938 event)	2018 Results (1% track)
Buildings at Least Moderately Damaged	681	1
Buildings Completely Damaged	2	0
Total Debris Generated (tons)	271,695	1743
Truckloads (at 25 tons/truck) of building debris	10,868	70
Economic Losses		
Residential Building & Content Losses	\$10,321,900	\$5,255,482
Other Building & Content Losses	\$1,027,950	\$244,254
Total Building & Content Loss	\$11,692,790	\$5,499,736
Total Business Interruption Losses	\$342,940	\$39,531
TOTAL LOSSES	\$12,035,730	\$5,539,267

Losses were calculated from a modeled probabilistic earthquake (1% annual-chance of occurrence), as well as for four specific scenarios with epicenters around Connecticut.

Table 3-8: Estimated Damages to Berlin from a Probabilistic Earthquake

Loss Type	2018 Results
Wage Loss	\$3,771
Rent Loss	\$2,952
Relocation Loss	\$5,170
Income Loss	\$3,287
Inventory Loss	\$689
Total Business Disruption	\$15,869
Structural Loss	\$10,861
Non-Structural Loss	\$34,433
Total Building Loss	\$45,294
Total Content Loss	\$15,159
TOTAL LOSSES	\$76,322



Table 3-9: Estimated Damages to Berlin from Modeled Earthquake Scenarios

Epicenter Location	Magnitude	Estimated Total Losses
East Haddam	6.4	\$606,079.85
Haddam	5.7	\$253,458.21
Portland	5.7	\$1,264,160.15
Stamford	5.7	\$8,983.53

Other Hazard Costs

Table 3-10 below considers the impact of Severe Winter Storms on the Town of Berlin based on Winter Storm Alfred in late October 2011. Debris removal was the biggest impact, costing \$615,000.

Table 3-10: Estimated Impacts from a Severe Winter Storm Comparable to Winter Storm Alfred, Berlin

Impact of Severe Winter Storm	Estimated Losses
Number of Electrical Customers Served (2013)	9,622
Maximum Outages During Severe Winter Storm (2011)	6,868
Maximum Outages Percentage of Customers (2011)	71.38%
Number of Businesses Experiencing Outages	9
Total Lost Wages (Daily)	\$1,872.08
Average Lost Wages (Weekly)	\$55,514.00
Miles of Local Roads Plowed by Town of Berlin	103.72
Municipal Cost (Plowing, Road Treatment)	\$806,438.88

Sources: Eversource, CCRPA Internal Analysis

The total property damage related to the 1987 Kenmere Reservoir dam failure was \$187,000.

Average Annualized Losses

Average Annualized Loss (AAL) figures are useful tools for comparison of the risks faced from different hazards with different likelihoods of occurring in a given time period. AAL estimates were prepared for the community based on the methodologies discussed in Section II of the Multi-Jurisdictional HMP. Dam failure, drought, tornado, and wildfire losses were sourced from the 2014 Connecticut Natural Hazard Mitigation Plan Update, with dam failure data supplemented by the National Performance of Dams Program and the Connecticut Department of Energy & Environmental Protection. Earthquake and hurricane losses were calculated in HAZUS-MH. Losses for flooding came from NFIP claims, for winter storms from Public Assistance Reimbursements, and for thunderstorms from the NCEI database. These are presented in the table below in dollars per year. Note that Hurricanes and Tropical Storms represent the largest share of total annualized losses.



Table 3-11: Average Annualized Losses, Berlin

Dam Failure	Drought	Earthquakes	Flooding	Hurricanes and Tropical Storms	Severe Winter Storms	Thunderstorms	Tornadoes	Wildfires	Total
\$36	\$0	\$76,322	\$11,056	\$1,245,371	\$82,825	\$2,638	\$291,471	\$4,892	\$1,714,611

Losses Summary

A review of the above loss estimates demonstrates that the Town of Berlin has experienced significant expenses as a result of natural hazards and is at risk for additional losses if some of the less-frequent events were to occur. These actual and potential losses justify hazard mitigation actions to reduce losses in the future.

Mitigation Strategies and Actions

Noted Hazard Mitigation Needs

The Town has expressed interest in a number of potential mitigation approaches, including:

- Determine an efficient, inexpensive method, such as using local newspapers, social media, and the Town website, to encourage residents to sign up for the Everbridge system.
- Acquire one more portable generator to provide additional redundancy to the existing backup power supplies.
- Acquire an additional portable generator for the Water Control Department to properly keep water and sewer infrastructure functioning during extended power outages.
- Acquire a generator for the Worthington Fire District water system.
- Codify low-impact development incentives into the subdivision and zoning codes.
- Purchase or elevate a home on Becker Avenue that frequently floods.
- Relocate the Physical Services Complex to an area outside the SFHA.
- Provide maintenance for, or replace, the dry hydrant in Paper Goods Pond.

Status of Previous Mitigation Strategies and Actions

The Town of Berlin reviewed the mitigation actions proposed in the 2016 HMP and determined the status of each. That information is included in the table below.



Table 3-12: Status of Previous Mitigation Strategies and Actions, Berlin

No.	Action	Notes	Status
GOAL: UPDATE TOWN POLICIES AND PLANS TO ENCOURAGE SOUND PRACTICES			
Objective 1: Update Town Policies and Plans to Encourage Sound Practices			
1.1	Complete the Dam Breakage Emergency Plan. This plan evaluates the impact of dam failure of two Town-owned dams and includes failure inundation mapping. Once this is complete, the Town will prepare formal EAPs for the two dams.	This plan is due for completion in July 2018. Town is looking for bonding to fix one of the dams. Town also looking to set aside money in budget next year for preparing new inundation maps for both dams.	Carry Forward with Revisions
1.2	Revise the subdivision/zoning code to offer incentives for low-impact development. Low-impact development techniques are anticipated to reduce the amount of stormwater runoff from new developments which could reduce the amount of flooding experienced over time.	Town has not made progress on this due to staffing and budgetary constraints.	Carry Forward
1.3	Incorporate updated hazard mitigation information into community plan updates. Hazard mitigation information will be incorporated into future plan updates such as the POCD.	POCD update will be in 2023. This is standard procedure and is a capability.	Capability
1.4	Participate in the statewide Water Utility Coordinating Committee process. The Connecticut DPH is preparing a Coordinated Water Supply Plan for the entire state beginning in 2016. The Town Water Department will participate to address drought-related public water supply needs throughout the community.	Berlin is a member of the Central WUCC planning region. Drought concerns include changing rainfall patterns with more rainfall occurring in spot events and more time between rainfall events, resulting in drier soils, lower groundwater tables, and potential impacts to groundwater safe yield. This is a capability.	Complete
1.5	Ensure local officials have most updated version of the Connecticut Drought Management Plan. The Connecticut Drought Management Plan is periodically updated. Local officials, land use commissions, health departments, fire departments, and local water utilities should all be made aware of updates to this plan.	Current Drought Plan is still from 2003, update is still in development. Town will make local officials aware of the newest plan when it is released. This is considered a capability.	Capability
Objective 2: Ensure access to critical facilities			
2.1	Relocate Physical Services Complex to higher ground. The Physical Services Complex is located in the floodplain and is at risk of flooding which can render it inoperable during flood events. A grant is necessary to relocate the facility.	This could not be implemented due to budget limitations. Town is looking at moving gasoline lines; all of these are in floodplain.	Carry Forward with Revisions



No.	Action	Notes	Status
2.2	Create duplicate facilities for the Physical Services Complex at the High School. The Physical Services Complex is located in the floodplain and is at risk of flooding which can render it inoperable during flood events. The High School has facilities (offices, computers, auto shop) that could allow it to act as a backup facility.	High School is surrounded by areas of flood risk, and student activity associated with the school is not compatible with public works operations. Therefore, it is preferable to move the complex to the golf course and Sage Park, which is remote open space. Priority changed to "medium".	Carry Forward with Revisions
Objective 3: Improve capacity to deal with hazards by investing in necessary equipment and training.			
3.1	Acquire generators for shelters and other critical facilities. The need for three generators has been identified to ensure that backup power is available for critical town functions. These include the purchase of an 800 kW generator for the High School so this facility can be converted to the primary shelter (and potentially backup Public Works use), an additional portable for the Town for general use, and an additional portable generator for the Water Control Department to ensure that sewer pumping stations can be maintained during outages. If the 800 kW generator is acquired, the existing 135 kW generator at the High School will be refurbished and installed onto a flatbed truck for portable use.	High School's 800 KW generator was purchased in Winter 2016. The existing 135 KW generator is currently being pulled out from high school and the town is looking at options to move it to middle school. Town needs a new generator for senior center; town is currently in discussions with the Housing Authority to pursue a generator for the senior center.	Carry Forward with Revisions
3.2	Refurbish or replace the dry hydrant in Paper Goods Pond. The dry hydrant is in a deteriorated condition and needs repair or replacement to function properly.	Town believes it has sufficient firefighting capacity without this hydrant; it may be abandoned.	Drop
3.3	Encourage the City of Meriden to perform repairs to Merimere Reservoir Dam. Merimere Reservoir Dam was listed as being in "Poor" condition on the 2013 Connecticut DEEP dam summary list. Town officials will contact the City and Connecticut DEEP to encourage repairs to reduce the likelihood of failure.	Project initiated in 2016. Town did hold discussions on this with Meriden and DEEP in recent past. The City of Meriden considers the dam to be in good condition based on an inspection in October 2017.	Drop



No.	Action	Notes	Status
Objective 4: Enable residents to better help themselves through preparedness education			
4.1	Encourage sign-ups for the Everbridge emergency notification system. The Town recently contracted with Everbridge to provide a town-wide emergency notification system. The Town wishes to use an efficient, inexpensive method to encourage sign-ups for this system beyond the current announcement on the Town website. Targeted mailings may be used to encourage signups in particularly vulnerable areas, such as special flood hazard areas and dam failure inundation areas.	Posted info on town website and on emergency management fb page (ongoing actions). Reverse 911 is in place with the Police Department.	Capability
Objective 5: Mitigate impacts to properties in the National Flood Insurance Program			
5.1	Acquire or elevate the property at risk of flooding on Becker Avenue. A home on Becker Avenue is routinely flooded. The Town routinely sandbags the property, and has instituted an enhanced culvert maintenance program nearby to reduce the frequency of flooding. However, the building continues to be at risk of flooding. The town would like to elevate or acquire and demolish the structure, but needs a grant to do so.	Town made several attempts with obtained HMPG grant money, met the requirements, but was reportedly denied grant. Town is now looking to see if culverts located upstream could be re-routed. Problem persists.	Drop; Replaced with New Action Below
5.2	Study the Mattabeset River culvert at Route 9 for potential mitigation options. The culvert conveying the river under Route 9 is considered undersized, but modifications will be expensive and could have downstream impacts. A study is needed to analyze alternatives and their potential impacts. The Town should work with CT DOT to study this area.	The Town has approached CT DOT, but that department has not been able to begin work at this point. Progress on this action is the responsibility of the State, and the Town is removing this action from its list.	Drop
5.3	Work with RL owners to mitigate RLs upon property owner request. Repetitive loss properties in Berlin are typically only damaged during severe flood events. Six repetitive loss properties are located in Berlin that have experienced 19 flood losses. Mitigation could include acquisition/demolition, elevation, floodproofing, or other techniques.	The Town has the capacity to work with RL owners if approached. This is a capability.	Drop Replaced with New RL-related Actions Below
5.4	Update the local floodplain management ordinance to meet current model ordinance requirements. The Town of Berlin last updated this ordinance in 2008. Since that time, FEMA and the Connecticut DEEP have revised the model ordinance including recommending the increase of the freeboard requirement to two feet for new buildings and substantial improvements.	Progress has not yet been made on this action due to lack of resources.	Carry Forward



Active Mitigation Strategies and Actions

The Town proposed to initiate several new mitigation actions for the upcoming five years. Additionally, a number of actions from the previous planning period are being carried forward or replaced with revised actions. These are listed below.

Each of the following actions has been prioritized based on FEMA guidelines, listed from highest to lowest priority, and numbered.

<i>Action #1</i>	
Enter the Sustainable CT program through Registration and review actions that can be undertaken to pursue Certification. Make progress with the actions related to hazard mitigation.	
Goal	4. Increase the use of natural, "green," or "soft" hazard mitigation measures, such as open space preservation and green infrastructure.
Category	Natural Resources Protection
Lead	Planning
Cost	\$0 - \$10,000
Funding	Town Operating Budget
Timeframe	01/2019 - 12/2019
Priority	High

<i>Action #2</i>	
Revise the subdivision/zoning code to offer incentives for low-impact development.	
Goal	2. Ensure Municipal Codes and Regulations support hazard mitigation
Category	Prevention
Lead	Planning
Cost	\$0 - \$10,000
Funding	Town Operating Budget
Timeframe	07/2019 - 06/2020
Priority	High



Action #3

Acquire generators for shelters and other critical facilities. The need for three generators has been identified to ensure that backup power is available for critical town functions. These include the purchase of an additional portable for the Town for general use, an additional portable generator for the Water Control Department to ensure that sewer pumping stations can be maintained during outages, and a new generator for the senior center.

Goal	7. Improve the emergency response capabilities of the region and its communities
Category	Preparedness & Emergency Response
Lead	Emergency Management
Cost	\$10,000 - \$25,000
Funding	Town Operating Budget / DEMHS
Timeframe	01/2019 - 12/2020
Priority	High

Action #4

Complete the Dam Breakage Emergency Plan.

Goal	7. Improve the emergency response capabilities of the region and its communities
Category	Preparedness & Emergency Response
Lead	Emergency Management
Cost	\$25,000 - \$50,000
Funding	Grants
Timeframe	07/2020 - 06/2021
Priority	High

Action #5

Conduct outreach to local small businesses with the aim of preventing the accidental release and pollution from chemicals stored and used at their facilities during or following natural hazard events.

Goal	6. Improve public outreach, education, and warning systems
Category	Education & Awareness
Lead	Planning, in coordination with DEEP
Cost	\$0 - \$10,000
Funding	Town Operating Budget / Materials & Resources Provided by CT DEEP
Timeframe	01/2019 - 12/2019
Priority	Medium



Action #6

Update the local floodplain management ordinance to meet current State guidelines.

Goal	2. Ensure Municipal Codes and Regulations support hazard mitigation
Category	Prevention
Lead	Planning
Cost	\$0 - \$10,000
Funding	Town Operating Budget
Timeframe	01/2020 - 12/2020
Priority	Medium

Action #7

Coordinate with NEMO and CRCOG to share resources and gain technical support for hazard mitigation actions involving stormwater management and public outreach, which have parallel benefits related to MS4 stormwater permit compliance.

Goal	1. Minimize the impact of natural hazards on physical buildings and infrastructure
Category	Prevention
Lead	Public Works
Cost	\$0 - \$10,000
Funding	Town Operating Budget
Timeframe	01/2020 - 12/2020
Priority	Medium

Action #8

Participate in EMI courses or the seminars and annual conference held by the Connecticut Association of Flood Managers.

Goal	3. Improve institutional awareness and understanding of natural hazard impacts and mitigation within municipal governments and other decision-making bodies
Category	Education & Awareness
Lead	Planning
Cost	\$0 - \$10,000
Funding	Town Operating Budget
Timeframe	07/2019 - 06/2024
Priority	Medium



Action #9

Construct duplicate facilities for the Physical Services Complex at the golf course and Sage Park.

Goal	5. Improve the resilience of local and regional utilities and infrastructure using strategies including adaptation, hardening, and creating redundancies.
Category	Structural Projects
Lead	Public Works
Cost	More than \$100,000
Funding	Town Operating Budget / Grants
Timeframe	07/2022 - 06/2024
Priority	Medium

Action #10

Contact the owners of Repetitive Loss Properties and nearby properties at risk to inquire about mitigation undertaken and suggest options for mitigating flooding in those areas. This should be accomplished with a letter directly mailed to each property owner.

Goal	1. Minimize the impact of natural hazards on physical buildings and infrastructure
Category	Property Protection
Lead	Planning
Cost	\$0 - \$10,000
Funding	Town Operating Budget / DEMHS
Timeframe	07/2021 - 06/2022
Priority	Low

Action #11

Work with CT DEEP to complete a formal validation of the Repetitive Loss Property list and update the mitigation status of each listed property.

Goal	1. Minimize the impact of natural hazards on physical buildings and infrastructure
Category	Property Protection
Lead	Planning
Cost	\$10,000 - \$25,000
Funding	Town Operating Budget / CT DEEP / DEMHS
Timeframe	07/2021 - 06/2023
Priority	Low



Action #12

Explore rerouting of culverts upstream of Becker Avenue to protect Becker Avenue property.

Goal	1. Minimize the impact of natural hazards on physical buildings and infrastructure
Category	Structural Projects
Lead	Public Works
Cost	\$10,000 - \$25,000
Funding	Town Operating Budget
Timeframe	07/2021 - 06/2023
Priority	Low

Action #13

Coordinate with CT SHPO to conduct historic resource surveys, focusing on areas within natural hazard risk zones (such as flood or wildfire hazard zones and areas near steep slopes), to support identification of vulnerable historic properties and preparation of resiliency plans across the state. This action leverages existing resources and best practices for protection of historic and cultural resources through an ongoing statewide initiative by CT SHPO.

Goal	8. Ensure community character and social equity are addressed in mitigation activities
Category	Property Protection
Lead	Planning, in coordination with SHPO
Cost	\$10,000 - \$25,000
Funding	SHPO
Timeframe	07/2021 - 06/2023
Priority	Low

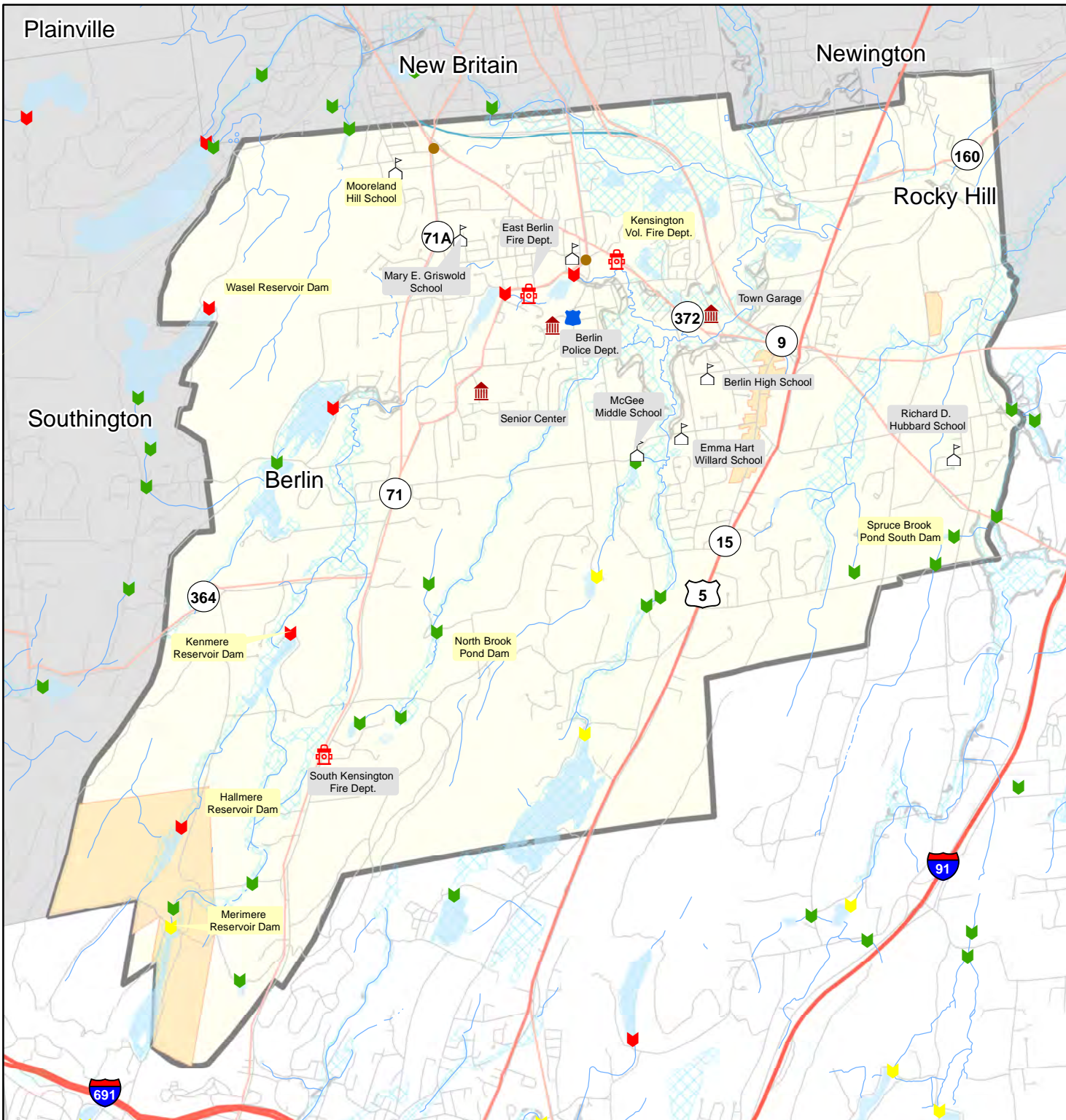
Action #14

Relocate gasoline lines feeding the Physical Services Complex to protect from flooding.

Goal	5. Improve the resilience of local and regional utilities and infrastructure using strategies including adaptation, hardening, and creating redundancies.
Category	Property Protection
Lead	Public Works
Cost	\$50,000 - \$100,000
Funding	Grants
Timeframe	07/2023 - 06/2024
Priority	Low










Capitol Region Natural Hazards Mitigation Plan Update










Berlin, Connecticut

Flood Plains, Dams & Critical Facilities

Dam Hazard Class



-  BB, A, AA OR Unclassified
-  Class B - Significant Hazard
-  Class C - High Hazard

Critical Facilities

-  Fire Station
-  Police Station
-  School
-  Healthcare Facility
-  State Facility
-  Town Facility
-  Waste Water Facility
-  Emergency Center
-  NRHP Buildings/Sites

 NRHP Districts/Areas

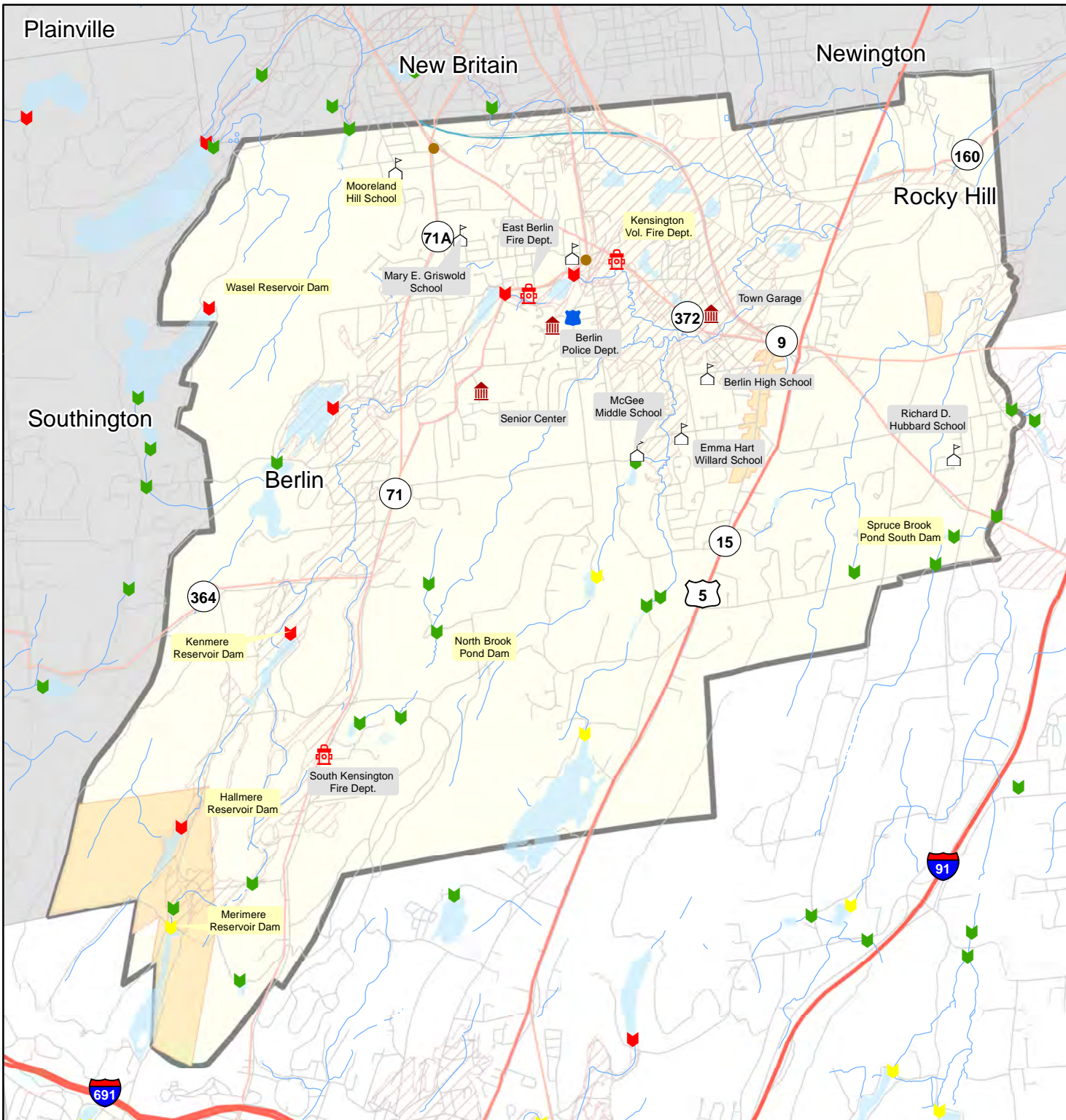
FEMA Flood Hazard Area

-  100 Year Flood Zone
-  500 Year Flood Zone

Data Sources: FEMA, National Register of Historic Places, CT DEEP, CRCOG, ESRI



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Capitol Region Natural Hazards Mitigation Plan Update












Berlin, Connecticut

Dam Breach Inundation Area & Critical Facilities

Dam Hazard Class

-  BB, A, AA OR Unclassified
-  Class B - Significant Hazard
-  Class C - High Hazard

Critical Facilities

-  Fire Station
-  Police Station
-  School
-  Healthcare Facility
-  State Facility
-  Town Facility
-  Waste Water Facility
-  Emergency Center
-  NRHP Buildings/Sites
-  NRHP Districts/Areas
-  Dam Breach Inundation Areas

Data Sources: FEMA, National Register of Historic Places, CT DEEP, CRCOG, ESRI



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4 Bloomfield

Community Overview

The Town of Bloomfield encompasses 26.4 square miles with an average elevation of about 150 feet. The 2010 Census reported Bloomfield’s population at 20,486. Bloomfield is primarily within the Park River Watershed. Portions of the Town at the northwest and eastern edges also drain to the Farmington River and directly to the Connecticut River via local brooks. Main water-courses within the Town include Wash, Tumbledown, Beaman, Griffin, and Mill Brooks. Four major flood control reservoirs owned by CT DEEP, and jointly maintained by DEEP and the Town, are located in Bloomfield within the Park River watershed. Large portions of an MDC reservoir and Penwood and Talcott Mountain State Parks are also located in the Town. Major transportation routes through Town include east-west state Routes 218 and 178, as well as north-south running routes 185, 187 and 189.

Bloomfield industries include insurance, aerospace products, specialized tools, electronics, gold and diamond products, diversified industries and agriculture. Bloomfield is reportedly the 14th busiest municipality in the state for construction; at the time of this plan, a new apartment complex had recently been completed in the town center, a new school was being built, 38 assisted living units had been submitted for permitting and approval, and a new development in Blue Hills had been completed with 20 duplexes, 40 townhouses, and multiple apartments. Despite this growth, Bloomfield has a significant amount of open space.

Critical Facilities

Critical Facilities throughout the Capitol Region are listed in Appendix B. In Bloomfield, these include the Carmen Arace School (primary shelter), the Blue Hills Fire Department (backup shelter), Police Department, Public Works Facility, Bloomfield Ambulance (EOC), Town Hall, and another Fire Department

Table 4-1: Critical Facilities, Bloomfield

Facility	Shelter	Generator
Carmen Arace School	Primary	X
Blue Hills Fire Department	Backup	X
Police Department		Needs replacing
Public Works Facility		X
Bloomfield Ambulance (EOC)		X
Town Hall		
Fire Department		

Capabilities

Bloomfield’s hazard mitigation capabilities include its primary and backup shelter, large state-owned flood control structures, property acquisition program, and zoning regulations. Hazard mitigation is incorporated into the community’s Plan of Conservation and Development (POCD). POCD actions specifically address natural hazards.

The Connecticut Department of Energy and Environmental Protection (DEEP) owns and manages most of large flood control structures within Bloomfield's borders. The Town does provide limited maintenance to flood control structures.

The Town has taken steps to reduce its vulnerability to flooding. Since 2008, there have been three demolitions of structures located totally or partially in the floodplains. The Old Masonic Hall at 3 Tunxis Avenue, a residential outbuilding at 60 Tunxis Avenue and the warming shed on Filley Park. The Town also adopted new zoning regulations which included a major overhaul and updating of the Floodplain section in 2009. That overhaul was in response to directives from FEMA to strengthen the regulations to continue the community's participation in the Flood Insurance Program.

Bloomfield coordinates with Eversource to maintain power lines and minimize outages. This coordination has been effective and productive, and fewer outages have occurred in recent years.

New Capabilities

Since adoption of the 2014-2019 Capitol Region Natural Hazards Mitigation Plan Update ("2014 HMP"), a number of changes to Bloomfield's hazard mitigation capabilities have occurred; examples include:

- A small FEMA map revision was completed near West Hartford and the Park River.
- The drainage culverts on Applewood Road were replaced to address structural issues that prevented proper function. Street flooding was occurring in this area.
- Stormwater system repairs and upgrades were completed on Ryefield Hollow.
- East Newberry Road drainage improvements were made to prevent some flood damage to private property.

Challenges

Challenges Overview

Flooding is a major concern for the Town of Bloomfield. Small areas of the community are frequently subject to flooding, including along Tunxis Avenue and the Town Center, especially around the library. The Wash Brook corridor is a significant problem for the Town, and in particular a Repetitive Loss (RL) property adjacent to it. Ensuring proper maintenance of streambeds to prevent flooding is also a challenge, as many run across private property. Federation Homes (elderly housing) is located in a FEMA flood zone; the Town would like to understand its damage costs and NFIP claims.

Another challenge to the Town is maintaining vehicle access through the town during and after disasters. Route 185 is a major east-west route over the ridge in western Bloomfield and the Farmington River in neighboring Simsbury. When Route 185 is closed due to debris or ice and snow, significant traffic volumes must be re-routed in Bloomfield.



Bloomfield’s tree maintenance budget has not increased in recent years; urban forestry efforts that the Town would like to make are impaired by lack of funding. This, in turn, limits the Town’s capability to mitigate treefall and downed limbs.

Hazard Losses

The economic losses faced by Bloomfield from natural hazards can be estimated by reviewing historic, and modeling future, loss figures. Loss estimates are summarized below.

Historic FEMA Payments

FEMA reimburses communities for hazard losses through programs including Public Assistance (PA) and the National Flood Insurance Program (NFIP). Combining PA and private flood insurance payments can give an estimate for total losses to a community.

The National Flood Insurance Program (NFIP) has paid 41 property damage claims in Bloomfield totaling \$333,146 to-date. The NFIP has paid out nine RL Property claims on three properties in Bloomfield to-date. These claims have totaled \$70,726.

Total PA reimbursements to the community were as follows:

- Flood Events: \$127,326 (\$6,701 annually)
- Hurricane Events: \$9,177 (\$483 annually)
- Winter Storm Events: \$3,432,164 (\$180,640 annually)

These are summarized in the tables below.

Table 4-2: Flood Event PA Reimbursements, Bloomfield

Incident	Sep 1999	Oct 2005
Declaration	9/23/1999	12/16/2005
Disaster No.	1302	1619
Entity	FEMA PA Reimbursement	FEMA PA Reimbursement
State	\$950	\$1,178
Municipal	\$0	\$125,197
Nonprofit	\$0	\$0
Total	\$950	\$126,375
Annualized	\$50	\$6,651



Table 4-3: Hurricane Wind Event PA Reimbursements, Bloomfield

Incident	Aug - Sep 2011 (T.S. Irene)
Declaration	9/2/2011
Disaster #	4023
Entity	FEMA PA Reimbursement
State	\$901
Municipal	\$8,276
Nonprofit	\$0
Total	\$9,177
Annualized	\$483

Table 4-4: Winter Storm PA Reimbursements, Bloomfield

Incident	Mar 2003	Dec 2003	Jan 2005	Feb 2006	Jan 2011	Oct 2011	Feb 2013
Declaration	3/11/03	1/15/04	2/17/05	5/2/06	3/3/11	11/17/11	3/21/13
Disaster #	3176	3192	3200	3266	1958	4046	4106
Entity	FEMA PA Reimbursement						
State	\$17,763	\$15,924	\$21,008	\$25,499	\$22,216	\$9,162	\$43,174
Municipal	\$41,450	\$56,829	\$60,126	\$67,929	\$88,130	\$2,827,518	\$110,201
Nonprofit	\$0	\$0	\$0	\$0	\$0	\$18,461	\$6,774
Total	\$59,212	\$72,752	\$81,134	\$93,428	\$110,347	\$2,855,141	\$160,150
Annualized	\$3,116	\$3,829	\$4,270	\$4,917	\$5,808	\$150,271	\$8,429

National Centers for Environmental Information Losses

The National Centers for Environmental Information (NCEI) severe storm database was reviewed to identify events that had impacted Bloomfield. There were no events in that database that were specifically noted as having impacted Bloomfield since 2012. NCEI losses under some event categories (such as drought, high wind, flooding, and winter storms) were also not specifically noted as impacting Bloomfield but did impact Hartford County and nearby towns. NCEI losses are reported in Section II of this Plan.

HAZUS-MH Losses

CRCOG used FEMA’s Hazus-MH model to analyze the risks that the community might face from flooding, hurricanes, and earthquakes. The model estimates economic losses to the town due to damage to buildings and building contents, as well as other economic disruptions. Both residential and commercial structures are addressed. Losses from different hazards are summarized below. Where available, estimates from the previous and current versions of the HMP are provided side-by-side; differences between the two may have been caused by a combination of the following:

- Changes in methodology: such as hazard zone mapping
- Changes in data: such as population and property values



- Changes in the model: this HMP utilized Hazus-MH version 4.0 rather than 2.1
- Other factors: inherent in a complex software like Hazus-MH

More details are available in the Multi-Jurisdictional HMP. Ultimately, changes in the loss estimates reflect the reality that small differences in hazard event features can have a significant impact on losses incurred.

Table 4-5: Estimated Damages to Bloomfield from a 1% Annual-Chance Flood

Loss Type	2014 Results	2018 Results
Households Displaced	197	335
People Needing Shelter	373	544
Buildings at Least Moderately Damaged	30	6
Economic Losses		
Residential Building & Content Losses	\$6,440,000	\$29,131,009
Other Building & Content Losses	\$15,160,000	\$22,121,116
Total Building & Content Loss	\$21,720,000	\$51,252,7125
Total Business Interruption Losses	\$120,000	\$920,031
TOTAL	\$21,840,000	\$52,172,157

Table 4-6: Estimated Damages to Bloomfield from a 1% Annual-Chance Hurricane

Loss Type	2014 Results (1938 event)	2018 Results (1% track)
Buildings at Least Moderately Damaged	742	2
Buildings Completely Damaged	36	0
Total Debris Generated (tons)	35,692	4139
Truckloads (at 25 tons/truck) of building debris	349	166
Economic Losses		
Residential Building & Content Losses	\$55,650,000	\$8,561,587
Other Building & Content Losses	\$20,250,000	\$413,027
Total Building & Content Loss	\$86,400,000	\$8,974,614
Total Business Interruption Losses	\$10,500,000	\$162,029
TOTAL LOSSES	\$96,900,000	\$9,136,643

Losses were calculated from a modeled probabilistic earthquake (1% annual-chance of occurrence), as well as for four specific scenarios with epicenters around Connecticut.



Table 4-7: Estimated Damages to Bloomfield from a Probabilistic Earthquake

Loss Type	2018 Results
Wage Loss	\$4,483
Rent Loss	\$3,412
Relocation Loss	\$5,809
Income Loss	\$3,173
Inventory Loss	\$674
Total Business Disruption	\$17,551
Structural Loss	\$12,500
Non-Structural Loss	\$34,519
Total Building Loss	\$47,019
Total Content Loss	\$14,559
TOTAL LOSSES	\$79,129

Table 4-8: Estimated Damages to Bloomfield from Modeled Earthquake Scenarios

Epicenter Location	Magnitude	Estimated Total Losses
East Haddam	6.4	\$324,456.71
Haddam	5.7	\$74,946.99
Portland	5.7	\$233,645.58
Stamford	5.7	\$8,228.15

Other Hazard Costs

The Town estimates that responding to a single severe winter storm event costs the Town \$65,000, and responding to a single severe thunderstorm costs \$25,000.

Average Annualized Losses

Average Annualized Loss (AAL) figures are useful tools for comparison of the risks faced from different hazards with different likelihoods of occurring in a given time period. AAL estimates were prepared for each natural hazard which may impact Bloomfield based on the methodologies discussed in Section II of the Multi-Jurisdictional HMP. Dam failure, drought, tornado, and wildfire losses were sourced from the 2014 Connecticut Natural Hazard Mitigation Plan Update, with dam failure data supplemented by the National Performance of Dams Program and the Connecticut Department of Energy & Environmental Protection. Earthquake and hurricane losses were calculated in HAZUS-MH. Losses for flooding came from NFIP claims, for winter storms from Public Assistance Reimbursements, and for thunderstorms from the NCEI database. These are presented in the table below in thousands of dollars per year. Note that Hurricanes and Tropical Storms represent the largest share of total annualized losses.



Table 4-9: Average Annualized Losses, Bloomfield

Dam Failure	Drought	Earthquakes	Flooding	Hurricanes and Tropical Storms	Severe Winter Storms	Thunderstorms	Tornadoes	Wildfires	Total
\$37	\$0	\$79,129	\$15,468	\$1,284,238	\$180,640	\$2,721	\$300,568	\$4,849	\$1,867,650

Losses Summary

A review of the above loss estimates demonstrates that the Town of Bloomfield has experienced significant expenses as a result of natural hazards and is at risk for additional losses if some of the less-frequent events were to occur. These actual and potential losses justify hazard mitigation actions to reduce losses in the future.

Mitigation Strategies and Actions

Noted Hazard Mitigation Needs

During the course of this Plan development, multiple hazard mitigation needs of Bloomfield were noted, including:

- The Police Department generator needs replacement.
- The generator for Public Works needs to be upgrade or supplemented to expand its backup power capacity.
- The tree maintenance and urban forestry budget requires an increase.
- The bridge over Wash Brook needs replacement with one that is appropriately sized.
- Education of public about the risks of living near the flood control systems is needed.

Status of Previous Mitigation Strategies and Actions

The Town of Bloomfield reviewed the mitigation actions proposed in the 2014 HMP and determined the status of each. That information is included in the table below.

Table 4-10: Status of Previous Mitigation Strategies and Actions, Bloomfield

Action #	Action	Notes	Status
GOAL: MINIMIZE LOSS OF LIFE, PROPERTY DAMAGE, AND COMMERCIAL DISRUPTION AND FACILITATE RECOVERY FROM NATURAL HAZARDS.			
Objective 1: Reduce the likelihood of flooding by improving natural and man-made drainage systems.			
1.1	Install storm water drainage on those Town roads where it currently does not exist; and improve/replace inadequate storm water systems that currently do exist.	Drainage culverts on Applewood Road replaced to address structural issues preventing proper function. Street flooding was occurring in this area. East Newberry Road drainage improvements made to prevent flood damage to private property. Stormwater system repairs/upgrades made at Ryefield Hollow. Additional progress is desired.	Carry Forward with Revisions



Action #	Action	Notes	Status
1.2	Encourage property owners to maintain and clear debris from stream channels.	Some progress has been made in connection to new MS4 requirements, and additional progress as those requirements are implemented is expected.	Carry Forward with Revisions
Objective 2: Where feasible, improve and/or modify existing structures that experience flooding to protect from flood damage.			
2.1	Improve awareness and encourage flood-proofing for threatened structures.	The Town continually works to improve property-owner awareness and encourage flood-proofing. This is a capability	Capability
2.2	Further study and pursue protection measures for Town Library. After a preliminary study options identified were to relocate to town hall site or add space to facility at higher elevation.	Progress has not been made due to continued unresolved questions of how to proceed. The basement is the part of the building that floods, so one potential outcome is that the building use could be changed to something that can tolerate flooding.	Carry Forward with Revisions
GOAL: REDUCE LOSS OF LIFE, PROPERTY AND ECONOMIC CONSEQUENCES AS A RESULT OF SEVERE WEATHER.			
Objective 1: Minimize potential debris from severe storms.			
1.1	Conduct a tree and vegetation inventory and develop a maintenance program.	Progress has not been made due to limited resources, although an urban canopy inventory is still desired.	Carry Forward with Revisions
Objective 2: Improve ability of public works to prepare and respond to severe weather.			
2.1	Ensure public works has adequate facilities and necessary equipment to be responsive to various storm types.	Action in progress, additional progress anticipated. A site for debris may be purchased. Public Works is renovating its facility. A chipper was purchased but a bucket truck has not been purchased.	Carry Forward with Revisions
Objective 3: Implement a resource sharing program with other public works departments.			
3.1	Continue to explore service sharing arrangements and engage in CRCOG's service sharing initiative.	The Town participates in service sharing arrangements. This is a capability.	Capability
Objective 4: Improve coordination among, and ability of, all town staff to respond appropriately to severe weather.			
4.1	Ensure that all town officials are familiar with emergency preparedness plans.	Town officials are all made familiar with emergency preparedness plans. This is a capability.	Completed
4.2	Improve/replace existing Town communication system in favor of one that is more reliable and has better coverage during storm events.	This has been submitted for the 2018 budget	Carry Forward

Active Mitigation Strategies and Actions

The Town proposed to initiate several new mitigation actions for the upcoming five years. Additionally, a number of actions from the previous planning period are being carried forward or replaced with revised actions. These are listed below.



Each of the following actions has been prioritized based on FEMA guidelines, listed from highest to lowest priority, and numbered.

<i>Action #1</i>	
Provide information about the risks of living near the Flood Control System to individuals considering purchasing property in that area.	
Goal	6. Improve public outreach, education, and warning systems
Category	Education & Awareness
Lead	Public Works
Cost	\$0 - \$10,000
Funding	Town Operating Budget
Timeframe	01/2019 - 12/2019
Priority	High

<i>Action #2</i>	
Enter the Sustainable CT program through Registration and review actions that can be undertaken to pursue Certification. Make progress with the actions related to hazard mitigation.	
Goal	4. Increase the use of natural, “green,” or “soft” hazard mitigation measures, such as open space preservation and green infrastructure.
Category	Natural Resources Protection
Lead	Planning
Cost	\$0 - \$10,000
Funding	Town Operating Budget
Timeframe	01/2019 - 12/2019
Priority	High

<i>Action #3</i>	
Review maps of flood risk associated with failure of the Hartford Flood Control System and determine needs for additional education or action.	
Goal	3. Improve institutional awareness and understanding of natural hazard impacts and mitigation within municipal governments and other decision-making bodies
Category	Prevention
Lead	Emergency Management
Cost	\$0 - \$10,000
Funding	Town Operating Budget
Timeframe	07/2019 - 06/2020
Priority	High



Action #4

Assess vulnerable population disaster preparedness and emergency assistance protocol to identify opportunities for improvement.

Goal	7. Improve the emergency response capabilities of the region and its communities
Category	Preparedness & Emergency Response
Lead	Emergency Management
Cost	\$0 - \$10,000
Funding	Town Operating Budget
Timeframe	07/2019 - 06/2020
Priority	High

Action #5

Conduct public outreach and a cost-benefit analysis to determine a preferred flood mitigation measure (from those determined through previous studies) to implement at the library.

Goal	1. Minimize the impact of natural hazards on physical buildings and infrastructure
Category	Property Protection
Lead	Public Works
Cost	\$10,000 - \$25,000
Funding	Town Operating Budget / DEMHS
Timeframe	07/2019 - 06/2021
Priority	High

Action #6

Replace Police Department emergency generator.

Goal	7. Improve the emergency response capabilities of the region and its communities
Category	Preparedness & Emergency Response
Lead	Emergency Management
Cost	\$10,000 - \$25,000
Funding	Town Operating Budget / DEMHS
Timeframe	07/2019 - 06/2021
Priority	High



Action #7

Upgrade or supplement Public Works emergency generator to expand its backup power capacity.

Goal	7. Improve the emergency response capabilities of the region and its communities
Category	Preparedness & Emergency Response
Lead	Public Works
Cost	\$10,000 - \$25,000
Funding	Town Operating Budget / DEMHS
Timeframe	07/2019 - 06/2021
Priority	High

Action #8

Improve/replace existing Town communication system in favor of one that is more reliable and has better coverage during storm events. Implement 2020-2021.

Goal	7. Improve the emergency response capabilities of the region and its communities
Category	Preparedness & Emergency Response
Lead	Emergency Management
Cost	\$50,000 - \$100,000
Funding	Grants / DEMHS
Timeframe	01/2020 - 12/2021
Priority	High

Action #9

Conduct outreach to local small businesses with the aim of preventing the accidental release and pollution from chemicals stored and used at their facilities during or following natural hazard events.

Goal	6. Improve public outreach, education, and warning systems
Category	Education & Awareness
Lead	Planning, in coordination with DEEP
Cost	\$0 - \$10,000
Funding	Materials & Resources Provided by CT DEEP
Timeframe	01/2019 - 12/2019
Priority	Medium



Action #10

Develop a simple guide for property owners laying out whether or not they should remove debris from their streams, and providing contacts for contractors that can assist them.

Goal	6. Improve public outreach, education, and warning systems
Category	Education & Awareness
Lead	Public Works
Cost	\$0 - \$10,000
Funding	Town Operating Budget
Timeframe	01/2020 - 12/2020
Priority	Medium

Action #11

Conduct public outreach and education campaign to residents living near the Flood Control System about the risks of living in that area.

Goal	6. Improve public outreach, education, and warning systems
Category	Education & Awareness
Lead	Public Works
Cost	\$0 - \$10,000
Funding	Town Operating Budget
Timeframe	01/2020 - 12/2020
Priority	Medium

Action #12

Coordinate with NEMO and CRCOG to share resources and gain technical support for hazard mitigation actions involving stormwater management and public outreach, which have parallel benefits related to MS4 stormwater permit compliance.

Goal	1. Minimize the impact of natural hazards on physical buildings and infrastructure
Category	Prevention
Lead	Public Works
Cost	\$0 - \$10,000
Funding	Town Operating Budget
Timeframe	01/2020 - 12/2020
Priority	Medium



Action #13

Identify funding sources and personnel to complete an urban tree canopy inventory and study.

Goal	3. Improve institutional awareness and understanding of natural hazard impacts and mitigation within municipal governments and other decision-making bodies
Category	Prevention
Lead	Planning
Cost	\$0 - \$10,000
Funding	Town Operating Budget
Timeframe	07/2020 - 06/2021
Priority	Medium

Action #14

Participate in EMI courses or the seminars and annual conference held by the Connecticut Association of Flood Managers.

Goal	3. Improve institutional awareness and understanding of natural hazard impacts and mitigation within municipal governments and other decision-making bodies
Category	Education & Awareness
Lead	Planning
Cost	\$0 - \$10,000
Funding	Town Operating Budget
Timeframe	07/2019 - 06/2024
Priority	Medium

Action #15

Work with MDC to identify potential hazard mitigation actions for MDC facilities, and list those actions in the next HMP Update.

Goal	5. Improve the resilience of local and regional utilities and infrastructure using strategies including adaptation, hardening, and creating redundancies.
Category	Property Protection
Lead	Public Works
Cost	\$10,000 - \$25,000
Funding	Town Operating Budget / DEMHS
Timeframe	07/2020 - 06/2022
Priority	Medium



Action #16

Complete a public campaign to educate property owners about the importance of maintaining and clearing debris from stream channels. The campaign should result in permanently available educational materials, such as through links on the Town website. The campaign should consider the importance of large woody debris in streams to the health of the river habitat.

Goal	6. Improve public outreach, education, and warning systems
Category	Education & Awareness
Lead	Public Works
Cost	\$10,000 - \$25,000
Funding	Town Operating Budget
Timeframe	01/2020 - 12/2022
Priority	Medium

Action #17

Conduct annual outreach campaign to educate residents on signing up for emergency alerts, building and maintaining disaster plans and kits, and improving their disaster readiness.

Goal	6. Improve public outreach, education, and warning systems
Category	Education & Awareness
Lead	Emergency Management
Cost	\$10,000 - \$25,000
Funding	Town Operating Budget
Timeframe	07/2019 - 06/2024
Priority	Medium

Action #18

Perform a town-wide drainage study to identify and prioritize stormwater drainage system improvement and replacement needs.

Goal	5. Improve the resilience of local and regional utilities and infrastructure using strategies including adaptation, hardening, and creating redundancies.
Category	Prevention
Lead	Public Works
Cost	\$10,000 - \$25,000
Funding	Town Operating Budget
Timeframe	07/2020 - 06/2022
Priority	Medium



Action #19

Increase budget for tree maintenance and urban forestry.

Goal	4. Increase the use of natural, "green," or "soft" hazard mitigation measures, such as open space preservation and green infrastructure.
Category	Natural Resources Protection
Lead	Public Works
Cost	\$50,000 - \$100,000
Funding	Town Operating Budget / Grants
Timeframe	01/2023 - 12/2024
Priority	Medium

Action #20

Contact the owners of Repetitive Loss Properties and nearby properties at risk to inquire about mitigation undertaken and suggest options for mitigating flooding in those areas. This should be accomplished with a letter directly mailed to each property owner.

Goal	1. Minimize the impact of natural hazards on physical buildings and infrastructure
Category	Property Protection
Lead	Planning
Cost	\$0 - \$10,000
Funding	Town Operating Budget / DEMHS
Timeframe	07/2021 - 06/2022
Priority	Low

Action #21

Develop an ordinance related to maintenance of and removal of debris from stream channels on private property. The ordinance should consider the importance of large woody debris in streams to the health of the river habitat.

Goal	2. Ensure Municipal Codes and Regulations support hazard mitigation
Category	Prevention
Lead	Planning
Cost	\$0 - \$10,000
Funding	Town Operating Budget
Timeframe	01/2021 - 12/2022
Priority	Low



Action #22

Coordinate with CT SHPO to conduct historic resource surveys, focusing on areas within natural hazard risk zones (such as flood or wildfire hazard zones and areas near steep slopes), to support identification of vulnerable historic properties and preparation of resiliency plans across the state. This action leverages existing resources and best practices for protection of historic and cultural resources through an ongoing statewide initiative by CT SHPO.

Goal	8. Ensure community character and social equity are addressed in mitigation activities
Category	Property Protection
Lead	Planning, in coordination with SHPO
Cost	\$10,000 - \$25,000
Funding	SHPO
Timeframe	07/2021 - 06/2023
Priority	Low

Action #23

**Identify site for debris storage.
Purchase a bucket truck for tree trimming and maintenance.**

Goal	7. Improve the emergency response capabilities of the region and its communities
Category	Preparedness & Emergency Response
Lead	Public Works
Cost	More than \$100,000
Funding	Town Operating Budget / Grants
Timeframe	01/2024 - 12/2024
Priority	Low






Capitol Region Natural Hazards Mitigation Plan Update










Bloomfield, Connecticut

Floodplains, Dams & Critical Facilities

Dam Hazard Class



-  BB, A, AA OR Unclassified
-  Class B - Significant Hazard
-  Class C - High Hazard

Critical Facilities

-  Fire Station
-  Police Station
-  School
-  Healthcare Facility
-  State Facility
-  Town Facility
-  Waste Water Facility
-  Emergency Center
-  NRHP Buildings/Sites

 NRHP Districts/Areas

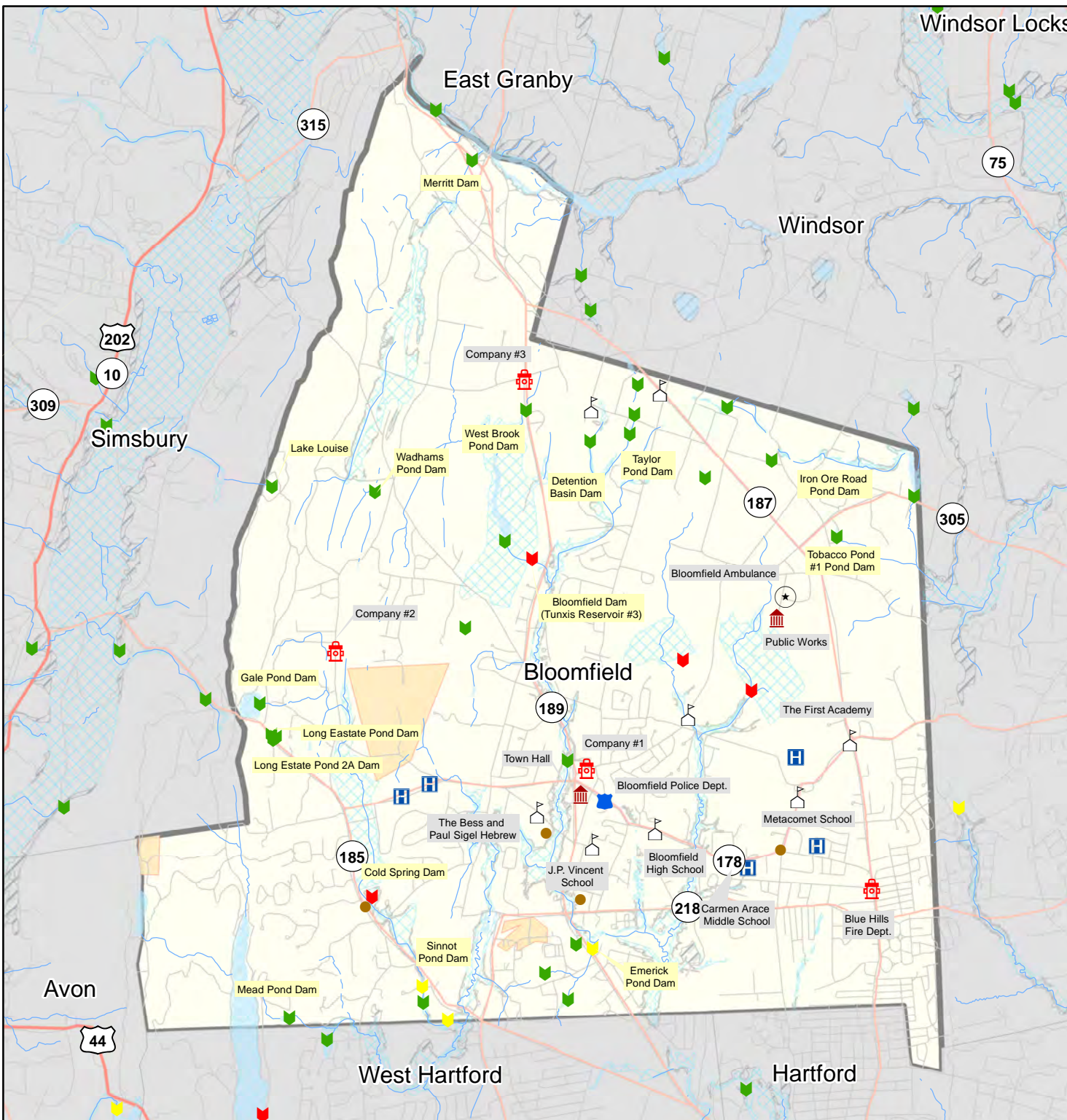
FEMA Flood Hazard Area

-  100 Year Flood Zone
-  500 Year Flood Zone

Data Sources: FEMA, National Register of Historic Places, CT DEEP, CRCOG, ESRI



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Capitol Region Natural Hazards Mitigation Plan Update












Bloomfield, Connecticut

Dam Breach Inundation Area & Critical Facilities

Dam Hazard Class

-  BB, A, AA OR Unclassified
-  Class B - Significant Hazard
-  Class C - High Hazard

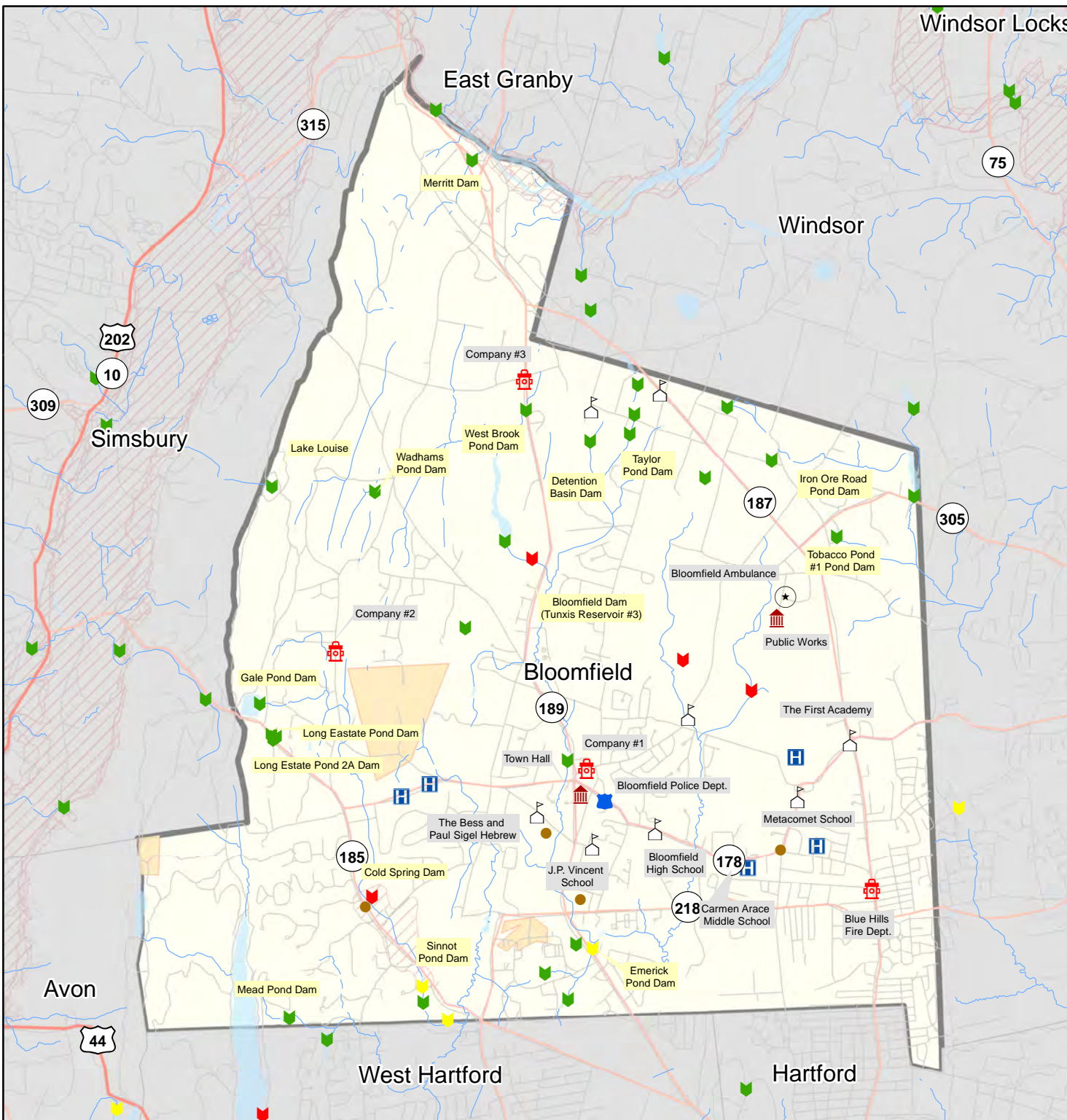
Critical Facilities

-  Fire Station
-  Police Station
-  School
-  Healthcare Facility
-  State Facility
-  Town Facility
-  Waste Water Facility
-  Emergency Center
-  NRHP Buildings/Sites
-  NRHP Districts/Areas
-  Dam Breach Inundation Areas

Data Sources: FEMA, National Register of Historic Places, CT DEEP, CRCOG, ESRI



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5 Bolton

Community Overview

Bolton is a rural community in Tolland County with a population of about 5,000. The town is approximately 14.4 square miles and has an elevation of about 700 feet above sea level. Bolton's elevation makes it the high point of the three watersheds it is divided among: the Hockanum River watershed, Willimantic River watershed, and Salmon River watershed. Principal watercourses in Bolton include Railroad Brook, Hop River, Porter Brook, Blackledge River and Baker Brook. A portion of the town lies in the Connecticut River watershed via the Roaring Brook subwatershed.

The main industries in Bolton include agriculture, manufacturing of printed circuits, commercial cleaning solvents, candy manufacturing, and small machine shop. Major transportation routes through Bolton include the terminus of Interstate 384 and state routes 44, 6 and 85. Little new development has occurred since adoption of the 2014-2019 Capitol Region Natural Hazards Mitigation Plan Update ("2014 HMP"); most construction activity is related to improvements and remodeling. Bolton officials report that recent development trends have not increased the Town's exposure to hazard risks. Bolton officials also note that the State Historic Preservation Office's digital mapping of historic districts in Town (see Figure 5-1) appear to include an area larger than what is recognized by the Town.

Critical Facilities

Critical Facilities throughout the Capitol Region are listed in Appendix B. In Bolton these include the Town Hall and Town Garage Complex, Resident State Trooper Building, Bolton Volunteer Fire Department, Bolton High School, Bolton Center School, Herrick Park Community Building, Bentley Memorial Library, and Notch Road Municipal Center. The Bolton High School is the primary sheltering facility, with the small Herrick Park Community Building serving as a secondary shelter or warming center.

Bolton also considers a fiber optic cable that runs beneath Route 44 to be a critical piece of infrastructure. This cable is a major transmission line for the eastern part of the State.

Table 5-1: Critical Facilities, Bolton

Facility	Shelter	Generator
Herrick Park Community Building	Minor Secondary	X
Bolton High School	Primary	X
Bolton Center School		
Town Garages		X
Town Hall		X
Resident State Trooper Building		
Bentley Memorial Library		
Bolton Volunteer Fire Department		X
Notch Road Municipal Center		

Since adoption of the 2014 HMP, a natural gas line was added to a limited area in Town; this fuel source feeds some of the Town’s critical buildings, including the Town Hall, Town Garages, Bolton Center School, Resident State Trooper Building, Bentley Memorial Library, Bolton Volunteer Fire Department, and Notch Road Municipal Center.

Capabilities

Bolton’s hazard mitigation capabilities include its emergency response departments, primary and secondary shelter, and ordinances regulating land use and development. The Town has many useful links on its website, including to the CROG regional online GIS service and to the FEMA disaster awareness resources for children page. Bolton has an Emergency Alert Program and residents are encouraged to sign up on the Town website. Hazard mitigation is addressed specifically in the community’s Plan of Conservation and Development (POCD). The HMP document itself is cited. POCD actions specifically address natural hazards.

Bolton’s tree warden conducts a tree survey annually to identify those at risk of falling and disrupting municipal operations. Trees are trimmed or removed as needed, based on this survey or public complaints. The Town has a very limited budget dedicated to tree trimming.

New Capabilities

Bolton’s hazard mitigation capabilities have improved since the previous HMP in a number of ways, including:

- New FEMA mapping is underway for Hop River and Bolton Lakes, improving the Town’s understanding of local flood risks.
- A map modernization effort by FEMA is currently underway for Tolland County, generally, but its full extent, and how much of Bolton it will cover, is unknown.
- As part of new MS4 requirements, the Town has recently passed Low Impact Development regulations to minimize stormwater runoff.

Challenges

Challenges Overview

Bolton residents, through an online survey, indicated that historically damaging natural hazards have included hurricanes and tropical storms, severe thunderstorms, and winter storms. Top hazard concerns include limited flooding, tornadoes and high winds, earthquakes, wildfires, and dam failure.

The Town has a couple of specific areas of concern with respect to flooding, as a result of an under-sized or older culvert. Flooding is typically localized, generally affecting roads rather than facilities and buildings. Bolton officials report that the risk to the Town from flooding is minimal, and undersized culverts and drainage systems are a primary cause of flooding that does occur. No culverts or bridges have been upgraded since adoption of the 2014 HMP. Lyman Road has a failing double culvert on the Blackledge River that needs to be replaced and upgraded. There



are a number of houses within the floodplain on the lower side of Deming Road that are at risk of flooding. Beaver dams at various locations are a concern for localized flooding.

Bolton officials note that the Notch Pond Dam in the northern section of Town, identified in the CT DEEP 2016 list of dams as being a Class BB dam, may in fact be a Class B.

Bolton does not have a town-wide public water system, and relies on fire ponds, cisterns, and dry hydrants to supply firefighting water. A brush fire occurred in Bolton Notch in the fall of 2017 that damaged a number of electric transmission poles. This area has very difficult-to-navigate terrain that is an obstacle to firefighting apparatus; furthermore, there is no water supply in this area for fire suppression. Wildfire risk in Bolton Notch is one of Bolton's top concerns.

In addition, some areas of Bolton are served by older electrical infrastructure and are especially vulnerable to power outages. As a result, many residents own their own generators; however, the safe operation of generators in houses is a concern to public safety officials. During power outages generators are needed for the operation of grinder pumps serving some residences.

Hazard Losses

The economic losses faced by Bolton from natural hazards can be estimated by reviewing historic, and modeling future, loss figures. Loss estimates are summarized below.

Historic FEMA Payments

FEMA reimburses communities for hazard losses through programs including Public Assistance (PA) and the National Flood Insurance Program (NFIP). Combining PA and private flood insurance payments can give an estimate for total losses to a community.

The National Flood Insurance Program had paid one property damage claim in Bolton as of August 2017, totaling \$3,989.54. Bolton has no Repetitive Loss (RL) Property claims to-date.

Total PA reimbursements to the community were as follows:

- Flood Events: \$4,066 (\$214 annually)
- Hurricane Events: \$74,086 (\$3,899 annually)
- Winter Storm Events: \$367,551 (\$19,345 annually)

These are summarized in the tables below.



Table 5-2: Flood Event PA Reimbursements

Incident	Oct. 2005
Declaration	12/16/05
Disaster No.	1619
Entity	FEMA PA Reimbursement
State	\$724
Nonprofit	\$0
Municipal	\$3,342
Total	\$4,066
Total Annualized	\$214

Table 5-3: Hurricane Wind Event PA Reimbursements

Incident	Aug. 2011 (T.S Irene)	Oct. 2012 (Storm Sandy)
Declaration	09/02/11	10/30/12
Disaster #	4023	4087
Entity	FEMA PA Reimbursement	
State	\$321	\$1,499
Nonprofit	\$0	\$0
Municipal	\$20,197	\$52,069
Total	\$20,518	\$53,568
Annualized	\$1,080	\$2,819

Table 5-4: Winter Storm PA Reimbursements

Incident	Feb. 2003	Dec. 2003	Jan. 2005	Feb. 2006	Jan. 2011	Oct. 2011	Feb. 2013	Jan. 2015
Declaration	3/11/03	1/15/04	0/17/05	5/02/06	3/3/11	11/17/11	03/21/13	4/8/15
Disaster #	3176	3192	3200	3266	1958	4046	4106	4213
Entity	FEMA PA Reimbursement							
State	\$5,056	\$5,230	\$7,475	\$6,805	\$8,513	\$1,304	\$7,091	\$13,721
Nonprofit	\$0	\$0	\$0	\$0	\$758	\$0	\$1,096	\$0
Municipal	\$16,201	\$19,536	\$18,757	\$20,050	\$27,738	\$130,178	\$47,614	\$30,428
Total	\$21,257	\$24,766	\$26,232	\$26,855	\$37,010	\$131,482	\$55,800	\$44,149
Annualized	\$1,119	\$1,303	\$1,381	\$1,413	\$1,948	\$6,920	\$2,937	\$2,324

National Centers for Environmental Information Losses

The National Centers for Environmental Information (NCEI) severe storm database was reviewed to identify events that had impacted Bolton. The table below summarizes events in that database that were specifically noted as having impacted Bolton since 2012.



Table 5-5: NCEI Database Losses since 2012, Bolton

Event ID	Date	Event	Property Damage
460030	6/17/2013	Thunderstorm Wind	\$10,000
656255	8/11/2016	Lightning	\$5,000
Total			\$15,000

NCEI losses under other event categories (such as drought, high wind, flooding, and winter storms) were not specifically noted as impacting Bolton, though they did impact Tolland County and nearby towns. NCEI losses are reported in Section II of this Plan.

HAZUS-MH Losses

CRCOG used FEMA’s Hazus-MH model to analyze the risks that the Town of Bolton might face from flooding, hurricanes, and earthquakes. The model estimates economic losses to the town due to damage to buildings and building contents, as well as other economic disruptions. Both residential and commercial structures are addressed. Losses from different hazards are summarized below. Where available, estimates from the previous and current versions of the HMP are provided side-by-side; differences between the two may have been caused by a combination of the following:

- Changes in methodology: such as hazard zone mapping
- Changes in data: such as population and property values
- Changes in the model: this HMP utilized Hazus-MH version 4.0 rather than 2.1
- Other factors: inherent in a complex software like Hazus-MH

More details are available in the Multi-Jurisdictional HMP. Ultimately, changes in the loss estimates reflect the reality that small differences in hazard event features can have a significant impact on losses incurred.

A flood having a 1% chance of occurring any given year (the 100-year flood) would be nearly \$2 million. The impacts of such a flood are summarized below:

Table 5-6: Estimated Damages to Bolton from a 1% Annual-Chance Flood

Loss Type	2014 Results	2018 Results
Households Displaced	34	22
People Needing Shelter	14	3
Buildings at Least Moderately Damaged	0	0
ECONOMIC LOSSES		
Residential Building & Content Losses	\$1,540,000	\$943,588
Other Building & Content Losses	\$440,000	\$251,645
Total Building & Content Loss	\$1,980,000	\$1,195,233
Total Business Interruption Losses	\$0.00	\$1,995
TOTAL	\$1,980,000	\$1,197,229



Table 5-7: Estimated Damages to Bolton from a 1% Annual-Chance Hurricane

Loss Type	2014 Results (1938 event)	2018 Results (1% track)
Buildings at Least Moderately Damaged	227	1
Buildings Completely Damaged	15	1
Total Debris Generated (tons)	25,149	4909
Truckloads (at 25 tons/truck) of building debris	88	196
ECONOMIC LOSSES		
Residential Building & Content Losses	\$19,985,000	\$2,121,188
Other Building & Content Losses	\$2,759,000	\$132,887
Total Building & Content Loss	\$22,744,000	\$2,254,075
Total Business Interruption Losses	\$2,571,000	\$143,691
TOTAL LOSSES	\$25,315,000	\$2,397,766

Losses were calculated from a modeled probabilistic earthquake (1% annual-chance of occurrence), as well as for four specific scenarios with epicenters around Connecticut.

Table 5-8: Estimated Damages to Bolton from a Probabilistic Earthquake

Loss Type	2018 Results
Wage Loss	\$3,235
Rent Loss	\$2,938
Relocation Loss	\$5,696
Income Loss	\$2,916
Inventory Loss	\$311
Total Business Disruption	\$15,095
Structural Loss	\$11,959
Non-Structural Loss	\$43,761
Total Building Loss	\$55,721
Total Content Loss	\$16,987
TOTAL LOSSES	\$87,803

Table 5-9: Estimated Damages to Bolton from Modeled Earthquake Scenarios

Epicenter Location	Magnitude	Estimated Total Losses
East Haddam	6.4	\$133,606.76
Haddam	5.7	\$29,086.28
Portland	5.7	\$67,376.62
Stamford	5.7	\$1,179.34

Average Annualized Losses

Average Annualized Loss (AAL) figures are useful tools for comparison of the risks faced from different hazards with different likelihoods of occurring in a given time period. AAL estimates were prepared for Bolton based on the methodologies discussed in Section II of the Multi-Jurisdictional HMP. Dam failure, drought, tornado, and wildfire losses were sourced from the 2014 Connecticut Natural Hazard Mitigation Plan Update, with dam failure data supplemented by the National Performance of Dams Program and the Connecticut Department of Energy &



Environmental Protection. Earthquake and hurricane losses were calculated in HAZUS-MH. Losses for flooding came from NFIP claims, for winter storms from Public Assistance Reimbursements, and for thunderstorms from the NCEI database. These are presented in the table below in thousands of dollars per year. Note that Hurricanes and Tropical Storms represent the largest share of total annualized losses.

Table 5-10: Average Annualized Losses, Bolton

Dam Failure	Drought	Earthquakes	Flooding	Hurricanes and Tropical Storms	Severe Winter Storms	Thunderstorms	Tornadoes	Wildfires	Total
\$306	\$0	\$13,170	\$319	\$337,477	\$19,345	\$1,813	\$1,447	\$1,891	\$375,767

Losses Summary

A review of the above loss estimates demonstrates that the Town of Bolton has experienced significant expenses as a result of natural hazards, and is at risk for additional losses if some of the less-frequent events were to occur. These actual and potential losses justify hazard mitigation actions to reduce losses in the future.

Mitigation Strategies and Actions

Noted Hazard Mitigation Needs

During the course of this Plan development, specific hazard mitigation needs were noted.

- The Town may wish to expand firefighting water sources, work with utilities to develop a tree-trimming program to protect power lines, or construct fire breaks and fire roads, in the northwest corner of Town, in the Bolton Notch and Freja Park area. The Town needs to continue discussions with DEEP about the possibility of using Notch Pond as a fire department water source.
- The Town has identified a pond on private property that would support a dry-hydrant; the Town may wish to develop an agreement with the landowner to use that pond.
- The Town has developed a town-wide cistern/dry hydrant plan to add water sources for fire suppression. This plan is being implemented as funds become available.
- Lyman Road has a failing double culvert on the Blackledge River that needs to be replaced and upgraded.
- Through an online survey, residents suggested that training road crews to repair power lines would be useful. However, this is neither feasible nor safe for town staff.

Status of Previous Mitigation Strategies and Actions

The Town of Bolton reviewed the mitigation actions proposed in the 2014 HMP and determined the status of each. That information is included in the table below.



Table 5-11: Status of Previous Mitigation Strategies and Actions, Bolton

No.	Action	Notes	Status
GOAL: REDUCE THE LOSS OF LIFE AND PROPERTY, AND ECONOMIC CONSEQUENCES OF NATURAL HAZARDS			
Objective 1: Ensure safe access throughout town during storm events and floods.			
1.1	Study Lyman Road culvert associated with Blackledge River and recommend improvements.	Study and full assessment underway. State inspected the culvert and it was deemed insufficient.	Carry Forward
1.2	Implement improvements recommended in above study. Because this is expected to be a long term, multi-year project, for the 2014-2019 Plan period, the action to be taken is to develop a scope of work for implementing the recommended improvements.	Study is still ongoing and recommendations are yet to be identified; upon completion of study, implementation of recommendations will be a Town priority depending on funding.	Carry Forward
1.3	Continue informal arrangements with private contractors for emergency tree/debris removal.	Informal arrangements developed annually. Although a continuous activity, Bolton would like to keep the action to maintain its high profile.	Carry Forward With Revisions
1.4	Monitor and maintain drainage and flood control systems.	While this is an existing capability, the Town will revise the action to have measurable metrics and keep it as a new action.	Carry Forward With Revisions
1.5	Study Johnson Road culvert/dam and recommend improvements.	Dam is located on private land and threatens flooding of private property, although homes are not expected to be flooded. The Town keeps pipes clear and sandbags on hand as needed. The Town studied feasibility of dredging the pond and found it not feasible. It was determined that the watercourse likely needs larger culverts to mitigate flooding.	Complete
1.6	Implement improvements recommended in above study. Because this is expected to be a long term, multi-year project, for the 2014-2019 Plan period, the action to be taken is to develop a scope of work for implementing the recommended improvements.	Study determined dredging was not feasible, and other actions difficult due to private ownership. Town will pursue improvement of culverts on watercourse. This action will be revised to reflect that and carried forward.	Carry Forward With Revisions
1.7	Monitor and manage Notch Pond Dam beaver population.	Some monitoring has been performed by the Town and has been very useful. Beaver dams present a problem at Sperry Pond as well, and a significant amount of drainageway clogging (at dams and otherwise) occurs on private property. Town wants to address beaver issues at multiple locations, and to educate homeowners on maintenance of culverts and spillways on private property. Action is Carried Forward with Revisions.	Carry Forward with Revisions
Objective 2: Reduce power outages resulting from natural hazards and their consequences.			
2.1	Pursue opportunities to update and/or underground transmission lines.	Power companies are doing this to some extent. Town wishes to continue to pursue this action.	Carry Forward with Revisions



No.	Action	Notes	Status
2.2	Maintain good communications with utility companies.	Modify to "Develop good written protocols for optimal communications with new gas company with the goal of building a relationship.	Carry Forward with Revisions
2.3	Conduct public outreach on safe operation of generators.	Add action to update website, add another to enhance permit enforcement for correct install of generators.	Carry Forward with Revisions
Objective 3: Ensure emergency services are prepared to respond to natural hazard events.			
3.1	Implement new town-wide communications system.	The Town has implemented the Everbridge emergency alert system.	Complete
3.2	Develop and implement plan to power residential grinder pumps during prolonged power outages.	Town developed a plan, implemented a test run, and identified areas for improvement. Action carried forward, revised to be a strategy to implement improvements.	Carry Forward with Revisions

Active Mitigation Strategies and Actions

The Town proposed to initiate several new mitigation actions for the upcoming five years. Additionally, a number of actions from the previous planning period are being carried forward or replaced with revised actions. These are listed below.

Each of the following actions has been prioritized based on FEMA guidelines, listed from highest to lowest priority, and numbered.

Action #1	
Consider and document the labor resource needs and benefits of participation in the Sustainable CT program.	
Goal	4. Regionally increase the use of natural, "green," or "soft" hazard mitigation measures, such as open space preservation and green infrastructure.
Category	Natural Resources Protection
Lead	Planning
Cost	\$0 - \$10,000
Funding	Town Operating Budget
Timeframe	01/2019 - 12/2019
Priority	High



Action #2

Assess vulnerable population disaster preparedness and emergency assistance protocol to identify opportunities for improvement.

Goal	7. Improve the emergency response capabilities of the region and its communities
Category	Preparedness & Emergency Response
Lead	Emergency Management
Cost	\$0 - \$10,000
Funding	Town Operating Budget
Timeframe	07/2019 - 06/2020
Priority	High

Action #3

Develop informal arrangements with private contractors for emergency tree/debris removal and evaluate these arrangements on an annual basis.

Goal	7. Improve the emergency response capabilities of the region and its communities
Category	Preparedness & Emergency Response
Lead	Public Works
Cost	\$0 - \$10,000
Funding	Town Operating Budget
Timeframe	07/2019 - 06/2023
Priority	High

Action #4

Adopt a regular maintenance schedule for keeping drainageways and drainage structures clear, especially following flood events.

Goal	1. Minimize the impact of natural hazards on physical buildings and infrastructure
Category	Prevention
Lead	Public Works
Cost	\$10,000 - \$25,000
Funding	Town Operating Budget
Timeframe	07/2019 - 06/2021
Priority	High



Action #5

Monitor and maintain drainage and flood control systems through the completion of annual inspections.

Goal	1. Minimize the impact of natural hazards on physical buildings and infrastructure
Category	Structural Projects
Lead	Public Works, Administration
Cost	\$10,000 - \$25,000
Funding	Town Operating Budget
Timeframe	07/2019 - 06/2023
Priority	High

Action #6

Update Everbridge system participant list and perform tests on an annual basis.

Goal	7. Improve the emergency response capabilities of the region and its communities
Category	Preparedness & Emergency Response
Lead	Emergency Management
Cost	\$10,000 - \$25,000
Funding	Town Operating Budget
Timeframe	07/2019 - 06/2024
Priority	High

Action #7

Develop and implement a tree trimming program for Bolton Notch to reduce fuel loads for wildfires, in addition to building a fire break for this area.

Goal	1. Minimize the impact of natural hazards on physical buildings and infrastructure
Category	Prevention, Natural Resource Protection
Lead	Emergency Management
Cost	\$25,000 - \$50,000
Funding	Town Operating Budget
Timeframe	07/2019 - 06/2023
Priority	High



Action #8

Implement the recommended improvements as identified in the plan to power residential grinder pumps during prolonged power outages.

Goal	5. Improve the resilience of local and regional utilities and infrastructure using strategies including adaptation, hardening, and creating redundancies.
Category	Preparedness & Emergency Response
Lead	Emergency Management, Administration, and in coordination with the Bolton Lakes Regional Water Pollution Control Authority
Cost	\$50,000 - \$100,000
Funding	Grants
Timeframe	07/2019 - 06/2022
Priority	High

Action #9

Develop and implement, in conjunction with DEEP and DOT, a solution for the Notch Pond Dam issues and address silting of Notch Pond to reduce flood risks and provide a possible firefighting water supply.

Goal	1. Minimize the impact of natural hazards on physical buildings and infrastructure
Category	Structural Projects
Lead	CT DOT, CT DEEP, Public Works, Administration
Cost	\$25,000 - \$500,000
Funding	Grants / CT DEEP / CT DOT
Timeframe	07/2019 - 06/2021
Priority	High

Action #10

Develop written protocols for optimal communications with new gas company.

Goal	5. Improve the resilience of local and regional utilities and infrastructure using strategies including adaptation, hardening, and creating redundancies.
Category	Preparedness & Emergency Response
Lead	Public Works, Public Safety, Emergency Management, Administration
Cost	\$0 - \$10,000
Funding	Town Operating Budget
Timeframe	01/2019 - 06/2019
Priority	Medium



Action #11

Conduct outreach to local small businesses with the aim of preventing the accidental release and pollution from chemicals stored and used at their facilities during or following natural hazard events.

Goal	6. Improve public outreach, education, and warning systems
Category	Education & Awareness
Lead	Planning, in coordination with DEEP
Cost	\$0 - \$10,000
Funding	Materials & Resources Provided by CT DEEP
Timeframe	01/2019 - 12/2019
Priority	Medium

Action #12

Conduct a review of the Everbridge system and conduct a test to ensure its effectiveness.

Goal	6. Improve public outreach, education, and warning systems
Category	Preparedness & Emergency Response
Lead	Public Safety, Emergency Management
Cost	\$0 - \$10,000
Funding	Town Operating Budget
Timeframe	07/2019 - 06/2020
Priority	Medium

Action #13

Coordinate with NEMO and CRCOG to share resources and gain technical support for hazard mitigation actions involving stormwater management and public outreach, which have parallel benefits related to MS4 stormwater permit compliance.

Goal	1. Minimize the impact of natural hazards on physical buildings and infrastructure
Category	Prevention
Lead	Public Works / Administration
Cost	\$0 - \$10,000
Funding	Town Operating Budget
Timeframe	01/2020 - 12/2020
Priority	Medium



Action #14

Pursue agreement with landowner of the small private pond that is a good location for a dry hydrant to install a dry hydrant at that site.

Goal	7. Improve the emergency response capabilities of the region and its communities
Category	Preparedness & Emergency Response
Lead	Fire Department / Administration
Cost	\$0 - \$10,000
Funding	Town Operating Budget / CT DEEP
Timeframe	07/2020 - 06/2021
Priority	Medium

Action #15

Work with the local electric utility (Eversource) to identify opportunities for improving the resilience of the power grid through tree trimming, hardening, burial, and response training

Goal	5. Improve the resilience of local and regional utilities and infrastructure using strategies including adaptation, hardening, and creating redundancies.
Category	Preparedness & Emergency Response
Lead	Public Works
Cost	\$0 - \$10,000
Funding	Town Operating Budget
Timeframe	07/2020 - 06/2021
Priority	Medium

Action #16

Educate private property owners on how to properly maintain culverts, spillways, and other drainageways to prevent obstructions, especially as related to beaver activity.

Goal	6. Improve public outreach, education, and warning systems
Category	Education & Awareness
Lead	Public Works, in coordination with DEEP and property owners
Cost	\$0 - \$10,000
Funding	Private Funding
Timeframe	07/2019 - 06/2022
Priority	Medium



Action #17

Participate in EMI courses or the seminars and annual conference held by the Connecticut Association of Flood Managers.

Goal	3. Improve institutional awareness and understanding of natural hazard impacts and mitigation within municipal governments and other decision-making bodies
Category	Education & Awareness
Lead	Planning
Cost	\$0 - \$10,000
Funding	Town Operating Budget
Timeframe	07/2019 - 06/2024
Priority	Medium

Action #18

Conduct public outreach on the safe operation of generators, including posting information to the town's website, and enhance permit enforcement for the correct installation of generators.

Goal	6. Improve public outreach, education, and warning systems
Category	Education & Awareness
Lead	Emergency Management, Building Official
Cost	\$10,000 - \$25,000
Funding	Town Operating Budget
Timeframe	01/2019 - 06/2019
Priority	Medium

Action #19

Develop a beaver monitoring and management program to address damming issues, specifically at Notch Pond Dam and Sperry Pond Dam.

Goal	1. Minimize the impact of natural hazards on physical buildings and infrastructure
Category	Prevention
Lead	Public Works, in coordination with DEEP and property owners
Cost	\$10,000 - \$25,000
Funding	Private Funding
Timeframe	07/2019 - 06/2022
Priority	Medium



Action #20

Review the Low Impact Development (LID) Regulations periodically and update as needed. Utilize the LID Manual developed by the Northwest Hills Council of Governments.

Goal	1. Minimize the impact of natural hazards on physical buildings and infrastructure
Category	Prevention
Lead	Planning
Cost	\$10,000 - \$25,000
Funding	Town Operating Budget
Timeframe	07/2021 - 06/2022
Priority	Medium

Action #21

Study Lyman Road culvert associated with Blackledge River and recommend improvements.

Goal	1. Minimize the impact of natural hazards on physical buildings and infrastructure
Category	Structural Projects
Lead	Public Works
Cost	\$25,000 - \$50,000
Funding	Town Operating Budget / Grants
Timeframe	07/2019 - 06/2020
Priority	Medium

Action #22

Conduct a study of the Hop River downstream of the Johnson Road culvert/dam to determine the feasibility and effectiveness of upsizing culverts to prevent flooding of private lands.

Goal	1. Minimize the impact of natural hazards on physical buildings and infrastructure
Category	Structural Projects
Lead	Public Works
Cost	\$25,000 - \$50,000
Funding	Private Funding
Timeframe	07/2019 - 06/2020
Priority	Medium



Action #23

Coordinate with CT SHPO to conduct additional historic resource surveys to support identification of vulnerable historic resources and preparation of resiliency plans across the state. This action leverages existing resources and best practices for protection of historic and cultural resources through an ongoing statewide CT SHPO initiative.

Goal	8. Ensure community character and social equity are addressed in mitigation activities
Category	Property Protection
Lead	Planning, in coordination with DEEP
Cost	\$25,000 - \$50,000
Funding	SHPO
Timeframe	07/2019 - 06/2021
Priority	Medium

Action #24

Conduct a wildfire vulnerability and needs assessment to guide mitigation actions in the northwest corner of Town, near Bolton Notch and Freja Park.

Goal	1. Minimize the impact of natural hazards on physical buildings and infrastructure
Category	Prevention
Lead	Fire Department
Cost	\$25,000 - \$50,000
Funding	Town Operating Budget / Grants
Timeframe	07/2021 - 06/2023
Priority	Medium

Action #25

Develop a scope of work document to implement any actions recommended by the Hop River/Johnson Road culvert/dam flood mitigation study.

Goal	1. Minimize the impact of natural hazards on physical buildings and infrastructure
Category	Structural Projects
Lead	Public Works, Administration, Property Owners
Cost	\$100,000 - \$250,000
Funding	Property Owners
Timeframe	07/2020 - 06/2021
Priority	Medium



Action #26

Implement improvements recommended in above Lyman Road study. Because this is expected to be a long term, multi-year project, the action to be taken is to develop a scope of work for implementing the recommended improvements.

Goal	1. Minimize the impact of natural hazards on physical buildings and infrastructure
Category	Structural Projects
Lead	Public Works, Administration
Cost	\$500,000 - \$600,000
Funding	Town Operating Budget / Grants
Timeframe	07/2020 - 06/2021
Priority	Medium

Action #27

Assess historic resources and their hazard readiness.

Goal	1. Minimize the impact of natural hazards on physical buildings and infrastructure
Category	Property Protection
Lead	Planning
Cost	\$25,000 - \$50,000
Funding	SHPO
Timeframe	07/2023 - 06/2024
Priority	Low

Action #28

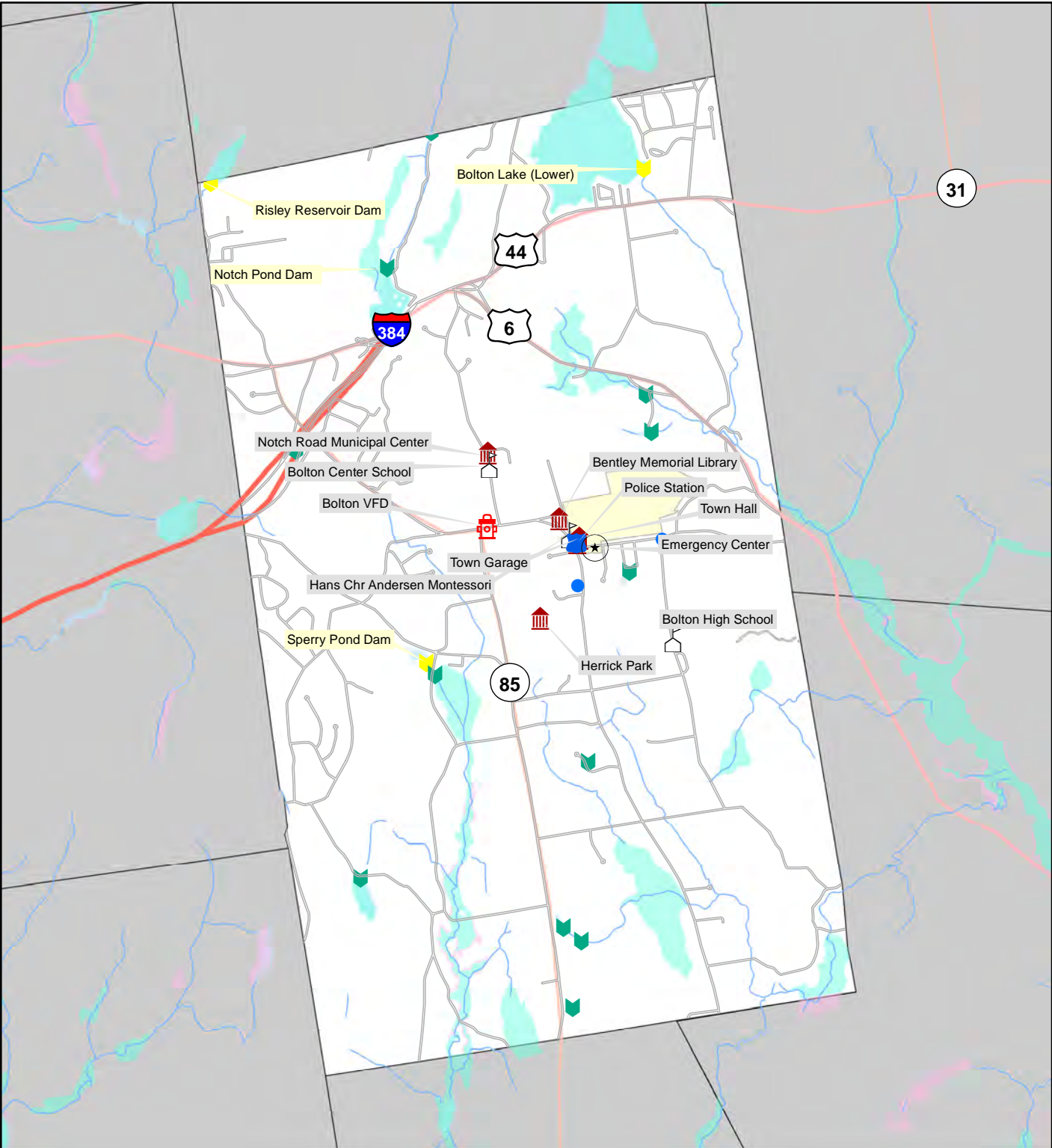
Conduct an evaluation to identify specific opportunities to update and/or underground transmission lines.

Goal	5. Improve the resilience of local and regional utilities and infrastructure using strategies including adaptation, hardening, and creating redundancies.
Category	Structural Projects
Lead	Public Works, Planning, Administration
Cost	More than \$100,000
Funding	Town Operating Budget / Grants
Timeframe	07/2020 - 06/2021
Priority	Low



**Capitol Region Natural Hazards
Mitigation Plan Update**

Bolton, Connecticut



Critical Facilities

- Emergency Center
- Fire Station
- Healthcare Facility
- Police Station
- Public Infrastructure
- School
- State Facility
- Town Facility
- Waste Water Facility
- NRHP Buildings/Sites
- NRHP Districts/Areas

Dam Hazard Class

- A, AA, BB or Unclassified
- Class B-Significant Hazard

FEMA Flood Hazard Area

- 100 Year Flood Zone
- 500 Year Flood Zone

Data Sources: FEMA, National Register of Historic Places, CT DEEP, CRCOG, ESRI







6 Canton

Community Overview

Canton is a rural town in Hartford County with a population of about 10,000. The Town encompasses 25 square miles and has an elevation ranging from 250 feet in Collinsville to 1100 feet in North Canton. Canton lies within the boundaries of the Farmington River Watershed. The principal watercourses in Town include the Farmington River and the Cherry, Barbour, and Jim Brooks. The major transportation routes that run through Canton include state routes 44, 202 and 179. Major industries located in Canton include plastic injection molding, small businesses and large commercial retail, restaurants, small farming, art galleries, and antique shops.

Critical Facilities

Critical Facilities throughout the Capitol Region are listed in Appendix B. In Canton these include the water pollution control facility (WPCF), the town garage (public works facility), the community shelter, and a new pet shelter facility.

Table 6-1: Critical Facilities, Canton

Facility	Shelter	Generator
Water Pollution Control Facility		
Town Public Works Garage		
Community Shelter	Primary	X
Pet Shelter Facility		
New Public Works Facility (active 2018)		X

The Public Works garage was relocated to a new Public Works Facility in 2018. The facility is closer to the WPCF, elevated two feet above the FEMA base flood elevation, and provided with dry land access to elevation two feet above the base flood elevation. The new address is 50 River Road. A new generator was installed.

Capabilities

Canton's hazard mitigation capabilities include its tree, road, and debris management programs, its emergency response departments, and its Community Emergency Response Team. Hazard mitigation is addressed specifically in the community's Plan of Conservation and Development.

Canton has a tree warden within its Public Works Department. Tree maintenance budgets are similar from year to year. The Town coordinates tree trimming around power lines with Eversource, and trimming has been vigorous in the last few years; nevertheless, the Town generally believes that trimming could be more aggressive, and that removal of entire trees rather than trimming would be preferable in some cases.

Debris from storms is typically processed at Dunning Sand & Gravel, while snow is brought to Town parking lots.

Canton is served by three volunteer fire departments. One facility is owned by the town. The Town is evaluating whether it should acquire a second station. The Town has been requiring developers to install fire tanks/cisterns in new developments without fire protection.

Community Emergency Response Teams (CERTs) are active in Canton.

New Capabilities

Since adoption of the 2014-2019 Capitol Region Natural Hazards Mitigation Plan Update (“2014 HMP”) there has been no new construction in the floodplain.

The Town recently obtained a new portable generator to be used as-needed during emergencies. The Town’s Emergency Operations Plan will be updated to describe its use; quick-connect switches will likely be installed at several locations such as shelters, warming stations, and cooking/food service facilities to enable its use during emergencies.

Since the 2014 HMP, the Town has established a pet sheltering facility.

Culverts have been replaced on Hansen Road and Bunker Hill Road; these were in-kind replacements, so capacity has not increased. The Bridge Street bridge will eventually be replaced, but the size and elevation will be the same.

A Federal Energy Regulatory Commission (FERC) application is pending for the Collinsville dam. New flashboards will raise the water surface elevation three feet. However, they are designed to detach during a flood, and will therefore not change the base flood elevation.

Heavier snow removal trucks have been acquired.

Challenges

Challenges Overview

The Town faces flooding challenges, especially at the sewage plant and town garage along the Farmington River, as well as at Dowd’s Corner where the East Branch of Rattlesnake Brook meets Rattlesnake Brook. Heavy rain will cause flooding on Old Canton Road, in particular. Residents have asked for assistance with the brook, but the topography makes it challenging to address through hydraulics. Private properties, including at least one commercial property, at Dowd’s Corner have experienced repetitive flood losses.

The Town Public Works Garage is currently located adjacent to the Farmington River, with its first floor about four feet under Base Flood Elevation; as noted above this facility was relocated in 2018. The row of homes on Powder Hill Road is near the Farmington River and the Nepaug River. A potential lawsuit against the town was related to flooding in this area.



The many upstream Farmington River dams remain a concern for the town. The MDC has repeatedly included the Town in emergency drills and planning for the Goodwin Dam, but not the others (Nepaug, Barkhamsted). The Town would like MDC to be more proactive in disseminating information about risks downstream and conducting planning and drills for the other dams. If the dam at the Barkhamsted Reservoir, located outside of Canton, failed, Canton would experience serious flooding along the Farmington River in about 20 minutes. Similarly, a failure in the Nepaug Reservoir Dam also located just outside of Canton, would quickly cause serious flooding in town.

Maintaining accessibility throughout Town during storms is another challenge, given the number of rivers and streams, and the steep slopes in many areas. Areas of potential concern include maintaining access in North Canton and maintaining access and power to the Town elderly housing development at 21 Dowd Avenue.

Canton experiences wildfires, though infrequently.

Hazard Losses

The economic losses faced by Canton from natural hazards can be estimated by reviewing historic, and modeling future, loss figures. Loss estimates are summarized below.

Historic FEMA Payments

FEMA reimburses communities for hazard losses through programs including Public Assistance (PA) and the National Flood Insurance Program (NFIP). Combining PA and private flood insurance payments can give an estimate for total losses to a community.

There has been \$96,103 in claims paid out on 18 losses to seven Repetitive Loss (RL) properties insured under the National Flood Insurance Program (NFIP). Overall, the NFIP has paid 25 claims in Canton totaling \$122,854 to-date.

Total PA reimbursements to the community were as follows:

- Flood Events: \$129,760 (\$6,829 annually)
- Hurricane Events: \$70,362 (\$3,703 annually)
- Winter Storm Events: \$915,235 (\$48,170 annually)

These are summarized in the tables below.



Table 6-2: Flood Event PA Reimbursements, Canton

Incident	Sep 1999	Oct 2005
Declaration	9/23/1999	12/16/2005
Disaster No.	1302	1619
Entity	FEMA PA Reimbursement	
State	\$477	\$592
Municipal	\$0	\$128,691
Nonprofit	\$0	\$0
Total	\$477	\$129,283
Annualized	\$25	\$6,804

Table 6-3: Hurricane Wind Event PA Reimbursements, Canton

Incident	Aug - Sep 2011 (T.S. Irene)	Oct - Nov 2012 (Storm Sandy)
Declaration	9/2/2011	10/30/2012
Disaster #	4023	4087
Entity	FEMA PA Reimbursement	FEMA PA Reimbursement
State	\$453	\$0
Municipal	\$33,659	\$0
Nonprofit	\$27,360	\$8,890
Total	\$61,472	\$8,890
Annualized	\$3,235	\$468

Table 6-4: Winter Storm PA Reimbursements, Canton

Incident	Mar 2003	Dec 2003	Jan 2005	Feb 2006	Jan 2011	Oct 2011	Feb 2013
Declaration	3/11/03	1/15/04	2/17/05	5/2/06	3/3/11	11/17/11	3/21/13
Disaster #	3176	3192	3200	3266	1958	4046	4106
Entity	FEMA PA Reimbursement						
State	\$8,924	\$8,000	\$10,554	\$12,810	\$11,161	\$4,603	\$21,691
Municipal	\$25,120	\$21,986	\$24,776	\$23,818	\$37,330	\$386,483	\$78,420
Nonprofit	\$0	\$0	\$0	\$0	\$41,253	\$146,966	\$51,341
Total	\$34,044	\$29,986	\$35,330	\$36,628	\$89,745	\$538,052	\$151,451
Annualized	\$1,792	\$1,578	\$1,859	\$1,928	\$4,723	\$28,319	\$7,971

National Centers for Environmental Information Losses

The National Centers for Environmental Information (NCEI) severe storm database was reviewed to identify events that had impacted Avon. The table below summarizes events in that database that were specifically noted as having impacted Canton since 2012.



Table 6-5: NCEI Database Losses since 2012, Canton

Date	Event	Property Damage
11/1/2013	Thunderstorm Wind	*\$8,300
4/6/2017	Lightning	\$2,500
Total		\$10,800

*damages from storm divided between multiple communities

NCEI losses under other event categories (such as drought, high wind, flooding, and winter storms) were not specifically noted as impacting Canton, though they did impact Hartford County and nearby towns. NCEI losses are reported in Section II of this Plan.

HAZUS-MH Losses

CRCOG used FEMA’s Hazus-MH model to analyze the risks that the community might face from flooding, hurricanes, and earthquakes. The model estimates economic losses due to damage to buildings and building contents, as well as other economic disruptions. Both residential and commercial structures are addressed. Losses from different hazards are summarized below. Where available, estimates from the previous and current versions of the HMP are provided side-by-side; differences between the two may have been caused by a combination of the following:

- Changes in methodology: such as hazard zone mapping
- Changes in data: such as population and property values
- Changes in the model: this HMP utilized Hazus-MH version 4.0 rather than 2.1
- Other factors: inherent in a complex software like Hazus-MH

More details are available in the Multi-Jurisdictional HMP. Ultimately, changes in the loss estimates reflect the reality that small differences in hazard event features can have a significant impact on losses incurred.

Table 6-6: Estimated Damages to Canton from a 1% Annual-Chance Flood

Loss Type	2014 Results	2018 Results
Households Displaced	155	113
People Needing Shelter	245	124
Buildings at Least Moderately Damaged	34	0
Economic Losses		
Residential Building & Content Losses	\$16,300,000	\$9,890,298
Other Building & Content Losses	\$35,680,000	\$23,166,948
Total Building & Content Loss	\$51,980,000	\$33,057,247
Total Business Interruption Losses	\$180,000	\$1,203,110
TOTAL	\$52,170,000	\$34,260,357



Table 6-7: Estimated Damages to Canton from a 1% Annual-Chance Hurricane

Loss Type	2014 Results (1938 event)	2018 Results (1% track)
Buildings at Least Moderately Damaged	148	1
Buildings Completely Damaged	3	0
Total Debris Generated (tons)	23,947	336
Truckloads (at 25 tons/truck) of building debris	83	13
Economic Losses		
Residential Building & Content Losses	\$15,800,000	\$1,080,156
Other Building & Content Losses	\$2,200,000	\$31,925
Total Building & Content Loss	\$18,000,000	\$1,112,081
Total Business Interruption Losses	\$1,900,000	\$5,523
TOTAL LOSSES	\$19,900,000	\$1,117,604

Losses were calculated from a modeled probabilistic earthquake (1% annual-chance of occurrence), as well as for four specific scenarios with epicenters around Connecticut.

Table 6-8: Estimated Damages to Canton from a Probabilistic Earthquake

Loss Type	2018 Results
Wage Loss	\$1,508
Rent Loss	\$1,192
Relocation Loss	\$2,054
Income Loss	\$1,192
Inventory Loss	\$114
Total Business Disruption	\$6,060
Structural Loss	\$4,120
Non-Structural Loss	\$12,857
Total Building Loss	\$16,977
Total Content Loss	\$4,935
TOTAL LOSSES	\$27,971

Table 6-9: Estimated Damages to Canton from Modeled Earthquake Scenarios

Epicenter Location	Magnitude	Estimated Total Losses
East Haddam	6.4	\$52,829.98
Haddam	5.7	\$14,395.22
Portland	5.7	\$36,176.18
Stamford	5.7	\$3,423.48

Average Annualized Losses

Average Annualized Loss (AAL) figures are useful tools for comparison of the risks faced from different hazards with different likelihoods of occurring in a given time period. AAL estimates were prepared for Canton based on the methodologies discussed in Section II of the Multi-Jurisdictional HMP. Dam failure, drought, tornado, and wildfire losses were sourced from the 2014 Connecticut Natural Hazard Mitigation Plan Update, with dam failure data supplemented by the National Performance of Dams Program and the Connecticut Department of Energy &



Environmental Protection. Earthquake and hurricane losses were calculated in HAZUS-MH. Losses for flooding came from NFIP claims, for winter storms from Public Assistance Reimbursements, and for thunderstorms from the NCEI database. These are presented in the table below.

Table 6-10: Average Annualized Losses, Canton

Dam Failure	Drought	Earthquakes	Flooding	Hurricanes and Tropical Storms	Severe Winter Storms	Thunderstorms	Tornadoes	Wildfires	Total
\$18	\$0	\$27,971	\$10,062	\$645,191	\$48,170	\$1,367	\$151,003	\$4,571	\$888,353

Losses Summary

A review of the above loss estimates demonstrates that the Town of Canton has experienced significant expenses as a result of natural hazards and is at risk for additional losses if some of the less-frequent events were to occur. These actual and potential losses justify hazard mitigation actions to reduce losses in the future.

Mitigation Strategies and Actions

Noted Hazard Mitigation Needs

During the course of this Plan development, specific hazard mitigation needs were noted.

- Canton’s communications facilities need improvement.
- Canton may pursue acquisitions of homes in the Old Canton Road area.

Status of Previous Mitigation Strategies and Actions

The Town of Canton reviewed the mitigation actions proposed in the 2014 HMP and determined the status of each. That information is included in the table below.

Table 6-11: Status of Previous Mitigation Strategies and Actions, Canton

Action #	Action	Notes	Status
GOAL: REDUCE THE LOSS OF LIFE AND PROPERTY, AND ECONOMIC CONSEQUENCES OF NATURAL HAZARDS			
Objective 1: Reduce flooding damages to existing municipal infrastructure.			
1.1	Continue to monitor the availability of an appropriate site for relocating the town garage.	Site has been identified and construction of a new garage was completed in 2018	Completed
1.2	Maintain flood proofing measures protecting the sewage treatment facility.	Supervision and control measures have been established as standard operating practices. Flood proofing measures will continue to be maintained on a routine and as needed basis. This is a capability.	Completed



Action #	Action	Notes	Status
Objective 2: Reduce flooding damages to private properties.			
2.1	Develop a list of private properties for acquisition as they become available at Dowd's Corner.	Limited progress has been made on this action. Action will be reworded to provide flexibility and acquire homes as they become available.	Carry Forward with Revisions
2.2	Continue to review and enforce development regulations to prevent increased flood risks.	The Town has adopted new development regulations and Low Impact Development provisions to further mitigate flood risks. Development regulations are enforced. This is a capability.	Completed
2.3	Study potential impacts of Nepaug Reservoir Dam failure.	MDC has prepared a dam failure analysis and EAP, so the study has been completed; however, the Town reportedly does NOT have copies of the dam failure analysis for Nepaug and Barkhamsted and would like them.	Carry Forward with Revisions
2.4	Develop appropriate evacuation plan based on Nepaug Reservoir Dam failure.	MDC repeatedly conducts tabletop exercises with the Farmington River towns regarding the Goodwin Dam. Canton would like to do the same for the Nepaug and Barkhamsted Reservoir dams. Canton would like training and drills related to potential failure of these two dams.	Carry Forward with Revisions
2.5	Develop appropriate evacuation plan based on Barkhamsted Reservoir Dam failure studies	MDC repeatedly conducts tabletop exercises with the Farmington River towns regarding the Goodwin Dam. Canton would like to do the same for the Nepaug and Barkhamsted Reservoir dams. Canton would like training and drills related to potential failure of these two dams.	Carry Forward with Revisions
2.6	Enhance town warning system: sirens, public address systems, etc.	Town uses Q-Notify, Everbridge, a new local radio station, social media, and Facebook. This is a capability.	Completed
Objective 3: Ensure good traffic management during any type of hazard event.			
3.1	Maintain good communications with neighboring communities' public safety officials to coordinate road closures and detours.	Canton has a robust CERT that is well-engaged and can help with traffic; and mutual aid with surrounding towns. The town can use the sandbagging machine acquired through the regional sharing program and stored in East Hartford.	Completed
3.2	Educate residents on most common alternative routes in advance of storms through municipal website and other resident communications.	Common alternative routes are posted on the website and communicated to residents as part of standard pre-event operating procedures. This is a capability	Capability
Objective 4: Minimize power disruptions.			
4.1	Maintain good communications with Connecticut Light & Power.	CL&P has been acquired by Eversource, and communications are good. This is a capability.	Capability



Active Mitigation Strategies and Actions

The Town proposed to initiate several new mitigation actions for the upcoming five years. Additionally, a number of actions from the previous planning period are being carried forward or replaced with revised actions. These are listed below.

Each of the following actions has been prioritized based on FEMA guidelines, listed from highest to lowest priority, and numbered.

<i>Action #1</i>	
Enter the Sustainable CT program through Registration and review actions that can be undertaken to pursue Certification. Make progress with the actions related to hazard mitigation.	
Goal	4. Increase the use of natural, “green,” or “soft” hazard mitigation measures, such as open space preservation and green infrastructure.
Category	Natural Resources Protection
Lead	Planning
Cost	\$0 - \$10,000
Funding	Town Operating Budget
Timeframe	01/2019 - 12/2019
Priority	High

<i>Action #2</i>	
Conduct outreach and education campaign to residents and property owners downstream of large dams (Goodwin, Nepaug, and Barkhamsted) about risks and emergency alert systems. Work with MDC if possible.	
Goal	6. Improve public outreach, education, and warning systems
Category	Education & Awareness
Lead	Emergency Management
Cost	\$10,000 - \$25,000
Funding	Town Operating Budget
Timeframe	01/2019 - 12/2020
Priority	High

<i>Action #3</i>	
Complete a study of existing municipal communication capabilities to determine opportunities for building resilience into the system.	
Goal	7. Improve the emergency response capabilities of the region and its communities
Category	Preparedness & Emergency Response
Lead	Emergency Management
Cost	\$10,000 - \$25,000
Funding	Town Operating Budget / Grants / DEMHS
Timeframe	07/2019 - 06/2021
Priority	High



Action #4

Acquire updated radio communication equipment for municipal departments to use for emergency response.

Goal	7. Improve the emergency response capabilities of the region and its communities
Category	Preparedness & Emergency Response
Lead	Emergency Management
Cost	\$25,000 - \$50,000
Funding	Town Operating Budget / DEMHS
Timeframe	01/2020 - 12/2020
Priority	High

Action #5

Conduct outreach to local small businesses with the aim of preventing the accidental release and pollution from chemicals stored and used at their facilities during or following natural hazard events.

Goal	6. Improve public outreach, education, and warning systems
Category	Education & Awareness
Lead	Planning, in coordination with DEEP
Cost	\$0 - \$10,000
Funding	Materials & Resources Provided by CT DEEP
Timeframe	01/2019 - 12/2019
Priority	Medium

Action #6

Receive and file current dam failure analysis and EAP for all upstream MDC reservoirs.

Goal	7. Improve the emergency response capabilities of the region and its communities
Category	Preparedness & Emergency Response
Lead	Emergency Management
Cost	\$0 - \$10,000
Funding	Town Operating Budget
Timeframe	01/2020 - 12/2020
Priority	Medium



Action #7

Coordinate with NEMO and CRCOG to share resources and gain technical support for hazard mitigation actions involving stormwater management and public outreach, which have parallel benefits related to MS4 stormwater permit compliance.

Goal	1. Minimize the impact of natural hazards on physical buildings and infrastructure
Category	Prevention
Lead	Public Works
Cost	\$0 - \$10,000
Funding	Town Operating Budget
Timeframe	01/2020 - 12/2020
Priority	Medium

Action #8

Approach homeowners in Dowd's Corner, in particular on Old Canton Road, to offer assistance if they are interested in property acquisition.

Goal	1. Minimize the impact of natural hazards on physical buildings and infrastructure
Category	Property Protection
Lead	Planning
Cost	\$0 - \$10,000
Funding	Town Operating Budget
Timeframe	07/2020 - 06/2021
Priority	Medium

Action #9

Participate in EMI courses or the seminars and annual conference held by the Connecticut Association of Flood Managers.

Goal	3. Improve institutional awareness and understanding of natural hazard impacts and mitigation within municipal governments and other decision-making bodies
Category	Education & Awareness
Lead	Planning
Cost	\$0 - \$10,000
Funding	Town Operating Budget
Timeframe	07/2019 - 06/2024
Priority	Medium



Action #10

Conduct annual exercise with MDC that specifically includes the Nepaug and Barkhamsted Reservoir dams.

Goal	7. Improve the emergency response capabilities of the region and its communities
Category	Preparedness & Emergency Response
Lead	Emergency Management
Cost	\$10,000 - \$25,000
Funding	Town Operating Budget
Timeframe	07/2019 - 06/2024
Priority	Medium

Action #11

Conduct an assessment of the Farmington River and Nepaug River to identify possible flood mitigation activities in this area.

Goal	1. Minimize the impact of natural hazards on physical buildings and infrastructure
Category	Prevention
Lead	Planning
Cost	\$25,000 - \$50,000
Funding	Grants / CT DEEP / DEMHS
Timeframe	07/2021 - 06/2023
Priority	Medium

Action #12

Complete relocation of Town Garage outside of flood zone.

Goal	1. Minimize the impact of natural hazards on physical buildings and infrastructure
Category	Structural Projects
Lead	Planning
Cost	More than \$100,000
Funding	Town Operating Budget / Grants / DEMHS
Timeframe	07/2022 - 06/2024
Priority	Medium



Action #13

Contact the owners of Repetitive Loss Properties and nearby properties at risk to inquire about mitigation undertaken and suggest options for mitigating flooding in those areas. This should be accomplished with a letter directly mailed to each property owner.

Goal	1. Minimize the impact of natural hazards on physical buildings and infrastructure
Category	Property Protection
Lead	Planning
Cost	\$0 - \$10,000
Funding	Town Operating Budget / DEMHS
Timeframe	07/2021 - 06/2022
Priority	Low

Action #14

Coordinate with CT SHPO to conduct historic resource surveys, focusing on areas within natural hazard risk zones (such as flood or wildfire hazard zones and areas near steep slopes), to support identification of vulnerable historic properties and preparation of resiliency plans across the state. This action leverages existing resources and best practices for protection of historic and cultural resources through an ongoing statewide initiative by CT SHPO.

Goal	8. Ensure community character and social equity are addressed in mitigation activities
Category	Property Protection
Lead	Planning, in coordination with SHPO
Cost	\$10,000 - \$25,000
Funding	SHPO
Timeframe	07/2021 - 06/2023
Priority	Low

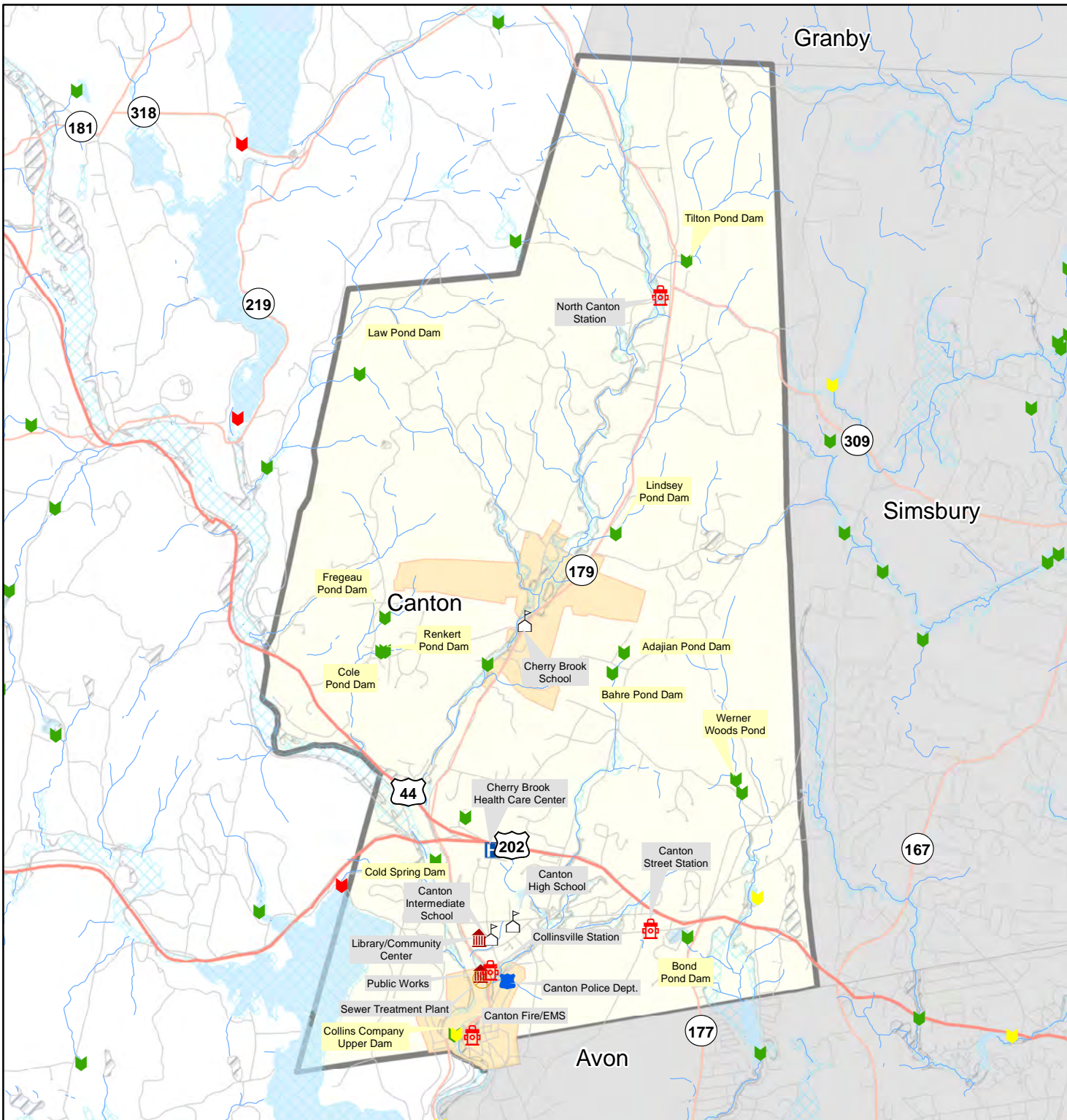
Action #15

Work with CT DEEP to complete a formal validation of the Repetitive Loss Property list and update the mitigation status of each listed property.

Goal	1. Minimize the impact of natural hazards on physical buildings and infrastructure
Category	Property Protection
Lead	Planning
Cost	\$10,000 - \$25,000
Funding	Town Operating Budget / CT DEEP / DEMHS
Timeframe	07/2021 - 06/2023
Priority	Low










Capitol Region Natural Hazards Mitigation Plan Update










Canton, Connecticut

Flood Plains, Dams & Critical Facilities

Dam Hazard Class



-  BB, A, AA OR Unclassified
-  Class B - Significant Hazard
-  Class C - High Hazard

Critical Facilities

-  Fire Station
-  Police Station
-  School
-  Healthcare Facility
-  State Facility
-  Town Facility
-  Waste Water Facility
-  Emergency Center
-  NRHP Buildings/Sites

 NRHP Districts/Areas

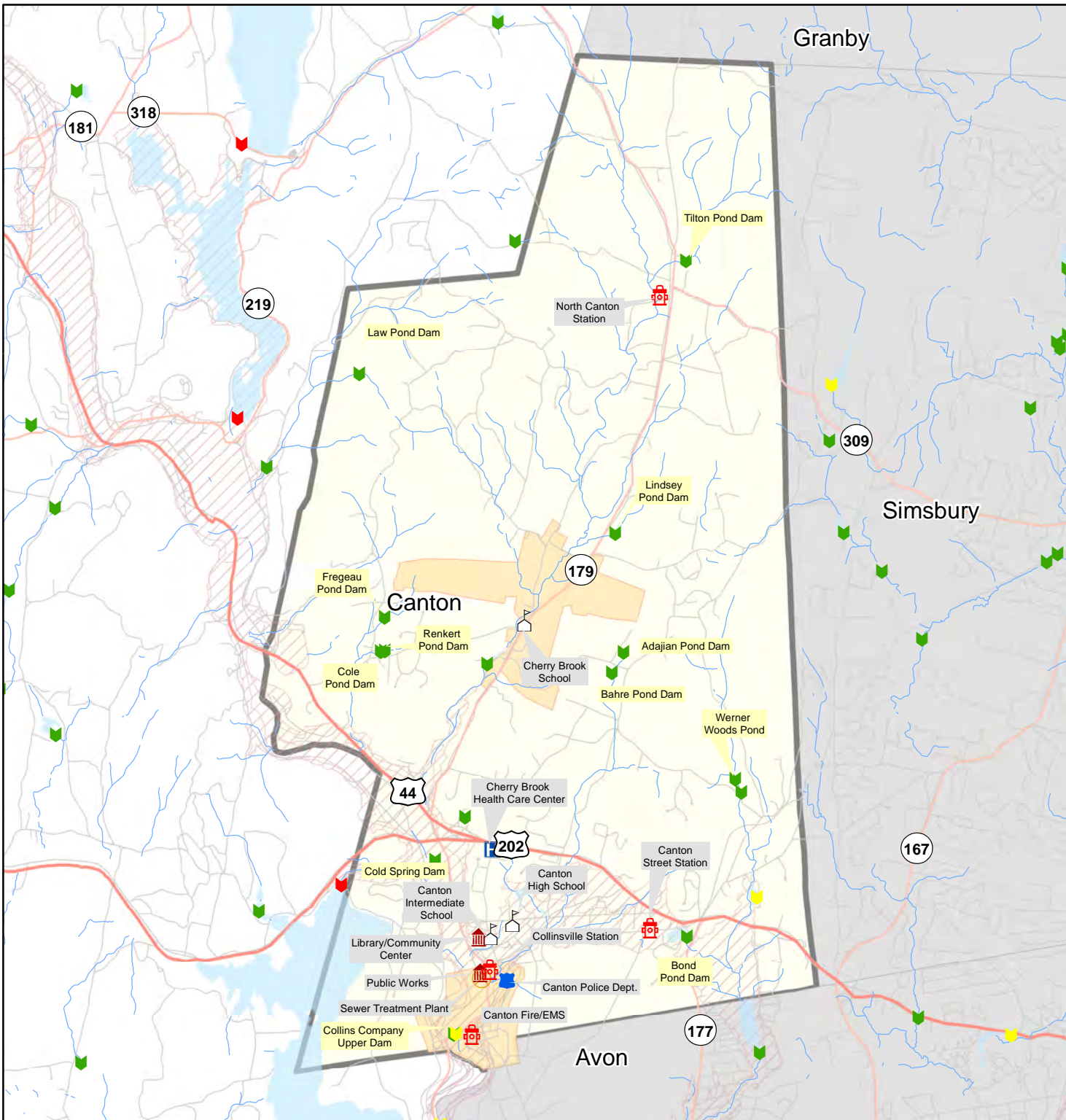
FEMA Flood Hazard Area

-  100 Year Flood Zone
-  500 Year Flood Zone

Data Sources: FEMA, National Register of Historic Places, CT DEEP, CRCOG, ESRI



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Capitol Region Natural Hazards Mitigation Plan Update












Canton, Connecticut

Dam Breach Inundation Area & Critical Facilities

Dam Hazard Class

-  BB, A, AA OR Unclassified
-  Class B - Significant Hazard
-  Class C - High Hazard

Critical Facilities

-  Fire Station
-  Police Station
-  School
-  Healthcare Facility
-  State Facility
-  Town Facility
-  Waste Water Facility
-  Emergency Center
-  NRHP Buildings/Sites
-  NRHP Districts/Areas
-  Dam Breach Inundation Areas

Data Sources: FEMA, National Register of Historic Places, CT DEEP, CRCOG, ESRI



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7 Columbia

Community Overview

Columbia has an area of 21.9 square miles (13,995 acres). The 2010 Census population count was 5,485 persons, a 10.3% increase from 2000 (4,971). Mainly rural with some agriculture, Columbia is about 10% developed. The Columbia Lake and Mono Pond areas are home to concentrations of the town's population. Although some of this population is seasonal, a growing portion of residents live there year-round. Columbia is made up of approximately 68% forested land; 10% is developed. Water bodies include Columbia Lake and Mono Pond. Columbia's elevation ranges from about 240 feet in the north/northeast section of town at the Willimantic River to about 770 feet at the peak of Post Hill in the southwest section.

Little new development has occurred since adoption of the former WinCOG's 2015 Hazard Mitigation Plan Update ("2015 HMP"). Most activity has been related to improvements of existing structures and has not increased the Town's hazard profile.

Critical Facilities

Critical Facilities throughout the Capitol Region are listed in Appendix B. In Columbia, critical facilities and cultural resources include a fire department, resident state trooper's office, preschools, the school, elderly facilities, a National Register historic district, group homes for individuals with special needs, a summer camp for youth, a commercial area along Route 6, a strip mall along Route 66, a telephone switch station, cell towers, an electrical substation, a defense sub-contractor facility, a hazardous material site, and two high potential loss dams.

Table 7-1: Critical Facilities, Columbia

Facility	Shelter	Generator
Town Hall (and Resident State Trooper Office)		X
Volunteer Fire Association (EOC)		X
Horace W. Porter School	Primary	X
Saxton B. Little Public Library		
Public Works Facility		X
4 Preschools		
3 Elderly Facilities		
7 group homes for individuals with special needs		
Summer camp for youth on Columbia Lake		
National Register Historic District		
Commercial area along Route 6		
Strip mall along Route 66 (toward Willimantic)		
Telephone switch station (Route 66)		
Two cell towers		
Electrical substation off Route 87		
Defense sub-contractor facility off Route 66		
Hazardous material site on Lakeview Park West		
Two high potential loss dams.		

A generator was added to Town Hall in 2013.

Capabilities

Columbia's hazard mitigation capabilities include its flood hazard district regulations, debris management and plowing services, and public warning notifications. Hazard mitigation is addressed specifically in the community's Plan of Conservation and Development (POCD). The HMP document itself is cited. POCD actions specifically address natural hazards.

Columbia spends approximately \$500-\$700 per year to maintain, monitor, and conduct planning for the two dams it owns: the Columbia Lake Dam (class C) and the Fagan Dam (class BB). A relatively recent Columbia Lake Dam renovation cost \$200,000.

The Town has consistently participated in the NFIP since September 16, 1982. The Town's Flood Hazard District Regulations were most recently updated on June 1, 1989 and include elevation requirements and strict construction demands. Structures may be required to be constructed with certain materials, elevated, flood proofed, watertight or anchored. It must be shown that any activity in the 100-year flood plain will not alter flood levels.

The Town monitors water levels at its dry hydrants during droughts. When a source becomes limited or unavailable, tankers can be used during a fire to move water from another location.

Columbia contributes to regional shelter facilities and performs debris management through Public Works with the assistance of the local electrical utility when necessary. The Town has implemented a Reverse 9-1-1 system and the State building code has been updated and locally adopted.

Plowing services are provided through Public Works; that department also cleans catch-basins on an annual basis.

The Town notifies the public when severe thunderstorms are to occur and performs debris management through Public Works with the assistance of the local electrical utility when necessary. The Town's capability to mitigate thunderstorm damage is relatively limited to town-owned facilities and rights-of-way. The local electrical utility performed an intensive trimming program near electrical lines following the severe storms in 2011.

The Town uses a variety of regulatory, preparedness, and public information programs to mitigate the effect of wildfires, including the Open Burning Program, maintenance of dry hydrants and cisterns, and educational programs on fire safety. The Town has completed a study to determine where new dry hydrants or cisterns should be installed to improve overall fire protection capabilities. Cisterns are required in new developments.

New Capabilities

Since adoption of the 2015 HMP, one culvert that was contributing to poor-drainage flooding was replaced with newer culvert. Several bridges have also been replaced in recent years,



although hydraulic improvements were not necessarily implemented in all cases; nevertheless, replacement of those bridges is expected to have improved the Town's access and evacuation capabilities.

Columbia has secured permits from the USACE to install bypass culverts and perform culvert repairs and replacements on the Hop River. This project will get underway in the coming years.

Two new water cisterns, as well as a new dry hydrant at Mono Pond, have been added to Columbia since the previous HMP, improving the Town's capability for fighting wildfires.

An updated Emergency Action Plan (EAP) has been completed for the Columbia Lake Dam. The Town is hoping to lower its risk classification from Class C.

Columbia has implemented the Everbridge warning system; additionally, the school system has a hazard notification system and it can use to communicate with parents.

A map modernization effort by FEMA is currently underway for Tolland County, but its full extent, and how much of Columbia it will cover, is unknown.

Challenges

Challenges Overview

Power outages and road blockages due to downed trees is a major concern for the Town. Floods, hurricanes, and winter storms, in that order, are the top concerns for Columbia. Dam failure is also a significant concern. There are 11 dams in Town ranging from Hazard Class AA (negligible hazard) to Hazard Class C (high hazard). Failure of the dam at the north end of Mono Pond (Class B) could cause serious damage, while failure of the Columbia Lake Dam (Class C) dam could cause catastrophic damage.

The overall risk of flooding is considered to be moderate. Flood sources include the Hop and Willimantic Rivers, and Columbia Lake. The Hop River experiences minor flooding and minor damage yearly, and a portion of Hop River Road is closed once a year because of high water events including ice jams. Other reported areas of flood risk include Parker Bridge and sections of Flanders Road.

Very limited losses may have occurred in the last 10 years; some losses of product have been reported by hay farmers, and on some occasions water levels in fire ponds and dry hydrants have dropped too low to provide a useful volume of water for firefighting. Quantitative information on these losses is not available. Recent droughts affected several residents who needed to drill new water supply wells.

Town staff estimate that wildfires burn less than five acres of land each year in Columbia.



Hazard Losses

The economic losses faced by Columbia from natural hazards can be estimated by reviewing historic, and modeling future, loss figures. Loss estimates are summarized below.

Historic FEMA Payments

FEMA reimburses communities for hazard losses through programs including Public Assistance (PA) and the National Flood Insurance Program (NFIP). Combining PA and private flood insurance payments can give an estimate for total losses to a community.

The Town of Columbia is home to one repetitive loss (RL) property, a non-residential property located in the 1% annual chance floodplain of the Hop River. The property has two reported losses with an average insurance payment of \$4,200 per loss and total losses of \$8,426. Overall, the NFIP has paid \$29,450 to 25 claims in Columbia.

Total PA reimbursements to the community were as follows:

- Flood Events: \$798 (\$42 annually)
- Hurricane Events: \$25,550 (\$1,345 annually)
- Winter Storm Events: \$172,079 (\$9,057 annually)

These are summarized in the tables below.

Table 7-2: Flood Event PA Reimbursements, Columbia

Incident	Oct 2005
Declaration	12/16/2005
Disaster No.	1619
Entity	FEMA PA Reimbursement
State	\$798
Municipal	\$0
Nonprofit	\$0
Total	\$798
Annualized	\$42



Table 7-3: Hurricane Wind Event PA Reimbursements, Columbia

Incident	Aug - Sep 2011 (T.S. Irene)	Oct - Nov 2012 (Storm Sandy)
Declaration	9/2/2011	10/30/2012
Disaster #	4023	4087
Entity	FEMA PA Reimbursement	
State	\$353	\$1,651
Municipal	\$23,546	\$0
Nonprofit	\$0	\$0
Total	\$23,899	\$1,651
Annualized	\$1,258	\$87

Table 7-4: Winter Storm PA Reimbursements, Columbia

Incident	Mar 2003	Dec 2003	Jan 2005	Feb 2006	Jan 2011	Oct 2011	Feb 2013	Jan 2015
Declaration	3/11/03	1/15/04	2/17/05	5/2/06	3/3/11	11/17/11	3/21/13	4/8/15
Disaster #	3176	3192	3200	3266	1958	4046	4106	4213
Entity	FEMA PA Reimbursement							
State	\$5,569	\$5,761	\$8,233	\$7,495	\$9,377	\$1,436	\$7,810	\$15,113
Municipal	\$9,005	\$13,275	\$10,878	\$0	\$28,077	\$3,230	\$28,620	\$18,203
Nonprofit	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Total	\$14,574	\$19,036	\$19,111	\$7,495	\$37,453	\$4,666	\$36,429	\$33,315
Annualized	\$767	\$1,002	\$1,006	\$394	\$1,971	\$246	\$1,917	\$1,753

National Centers for Environmental Information Losses

The National Centers for Environmental Information (NCEI) severe storm database was reviewed to identify events that had impacted Columbia. No events in that database that were specifically noted as having impacted Columbia since 2012, though they did impact Tolland County and nearby towns. NCEI losses are reported in Section II of this Plan.

HAZUS-MH Losses

CRCOG used FEMA’s Hazus-MH model to analyze the risks that the Town of Columbia might face from flooding, hurricanes, and earthquakes. The model estimates economic losses to the town due to damage to buildings and building contents, as well as other economic disruptions. Both residential and commercial structures are addressed. Losses from different hazards are summarized below.



Table 7-5: Estimated Damages to Columbia from a 1% Annual-Chance Flood

Loss Type	2018 Results
Households Displaced	49
People Needing Shelter	26
Buildings at Least Moderately Damaged	0
Economic Losses	
Residential Building & Content Losses	\$3,280,201
Other Building & Content Losses	\$18,043,365
Total Building & Content Loss	\$21,323,565
Total Business Interruption Losses	\$1,779,558
TOTAL	\$23,103,124

Table 7-6: Estimated Damages to Columbia from a 1% Annual-Chance Hurricane

Loss Type	2018 Results (1% track)
Buildings at Least Moderately Damaged	1
Buildings Completely Damaged	0
Total Debris Generated (tons)	7180
Truckloads (at 25 tons/truck) of building debris	287
Economic Losses	
Residential Building & Content Losses	\$2,373,622
Other Building & Content Losses	\$115,364
Total Building & Content Loss	\$2,488,986
Total Business Interruption Losses	\$144,636
TOTAL LOSSES	\$2,633,622

Losses were calculated from a modeled probabilistic earthquake (1% annual-chance of occurrence), as well as for four specific scenarios with epicenters around Connecticut.

Table 7-7: Estimated Damages to Columbia from a Probabilistic Earthquake

Loss Type	2018 Results
Wage Loss	\$461
Rent Loss	\$480
Relocation Loss	\$933
Income Loss	\$376
Inventory Loss	\$81
Total Business Disruption	\$2,330
Structural Loss	\$1,934
Non-Structural Loss	\$6,961
Total Building Loss	\$8,896
Total Content Loss	\$2,784
TOTAL LOSSES	\$14,010



Table 7-8: Estimated Damages to Columbia from Modeled Earthquake Scenarios

Epicenter Location	Magnitude	Estimated Total Losses
East Haddam	6.4	\$210,176.61
Haddam	5.7	\$41,646.15
Portland	5.7	\$43,051.85
Stamford	5.7	\$1,190.42

Other Hazard Costs

The Connecticut DEEP estimated the damage to the Columbia Lake Dam from the June 1982 flood to be \$20,000.

Recent droughts forced several residents to drill new water supply wells, which typically costs around \$6,000 per well.

As necessary following severe storms, the Town hires a tree service to do major cleanups for approximately \$900 per day. Smaller cleanups are handled by Town staff within current budget allocations. \$3,366 was paid to a tree service for cleanup following Hurricane Irene.

The overall cost of property damage due to wildfires is believed to be minimal since vacant lands are typically affected. The Town typically spends less than \$1,000 each year to fight wildfires, with most of the costs attributed to food, equipment, and provisions for the volunteer firefighters.

Average Annualized Losses

Average Annualized Loss (AAL) figures are useful tools for comparison of the risks faced from different hazards with different likelihoods of occurring in a given time period. AAL estimates were prepared for Columbia based on the methodologies discussed in Section II of the Multi-Jurisdictional HMP. Dam failure, drought, tornado, and wildfire losses were sourced from the 2014 Connecticut Natural Hazard Mitigation Plan Update, with dam failure data supplemented by the National Performance of Dams Program and the Connecticut Department of Energy & Environmental Protection. Earthquake and hurricane losses were calculated in HAZUS-MH. Losses for flooding came from NFIP claims, for winter storms from Public Assistance Reimbursements, and for thunderstorms from the NCEI database. These are presented in the table below in dollars per year. Note that Hurricanes and Tropical Storms represent the largest share of total annualized losses.

Table 7-9: Average Annualized Losses, Columbia

Dam Failure	Drought	Earthquakes	Flooding	Hurricanes and Tropical Storms	Severe Winter Storms	Thunderstorms	Tornadoes	Wildfires	Total
\$337	\$0	\$14,010	\$817	\$317,699	\$9,057	\$1,997	\$1,594	\$2,886	\$402,396



Losses Summary

A review of the above loss estimates demonstrates that the Town of Columbia has experienced significant expenses as a result of natural hazards and is at risk for additional losses if some of the less-frequent events were to occur. These actual and potential losses justify hazard mitigation actions to reduce losses in the future.

Mitigation Strategies and Actions

Noted Hazard Mitigation Needs

During the course of this Plan development, multiple hazard mitigation needs of Columbia were noted, including:

- Install bypass culverts and perform culvert repairs and replacements on the Hop River, as described in the permits granted by the USACE.
- Expand and increase funding for tree maintenance.
- Identify owner of the one RL Property owner and contact them about mitigation options.

Status of Previous Mitigation Strategies and Actions

The Town of Columbia reviewed the mitigation actions proposed in the 2015 HMP and determined the status of each. That information is included in the table below.

Table 7-10: Status of Previous Mitigation Strategies and Actions, Columbia

Action #	Action	Notes	Status
GOAL: TO REDUCE THE LOSS OF LIFE AND PROPERTY AND ECONOMIC CONSEQUENCES AS A RESULT OF NATURAL DISASTERS.			
Objective 1: To reduce the likelihood of flooding by improving existing natural and artificial drainage systems.			
1.1	Upgrade drainage on Hennequin Road, upgrading/retrofitting all culverts on the west side of Hennequin Road, from Recreation Park to Lake Road.	Design completed. Construction has begun.	Carry Forward
1.2	Encourage CT DOT to upgrade drainage system on Route 87 west of Lake Road to Curland and Vanderbilt to mitigate against icing.	Currently there is a legal action. Party has been notified and fined for illegal changes to drainage. State Jurisdiction. Drop.	Drop
1.3	Upgrade drainage system at Parker Bridge Road. Elevate road with cross culverts to mitigate against flooding.	Not yet started due to budgetary constraints.	Carry Forward with Revisions
1.4	Replace culvert pipe and possible basin retrofit at Macht Road.	Project underway, to be completed in 2018.	Carry Forward
Objective 2: Ensure access to critical facilities.			
Objective 3: Whenever practical, incorporate natural hazard mitigation strategies into existing town projects.			
3.1	Identify location for secondary access to Island Woods Subdivision and prepare and file map of proposed street in the office of the town clerk in accordance with CT General Statute Section 8-29.	No secondary access has yet been identified.	Carry Forward



Action #	Action	Notes	Status
Objective 4: Reduce the frequency and severity of power outages and road closures as a result of wind and ice storm events.			
4.1	Increase the amount of preventative tree maintenance.	This action has been partially completed, but additional budget increases are desired	Carry Forward with Revisions
4.2	Encourage tree management along private roads through public education on street plantings using Eversource Energy brochures.	Town does not feel this action would be productive.	Drop
Objective 5: To reduce the likelihood of wildfire hazards by improving water availability.			
5.1	Install fire protection water cistern at Island Woods Subdivision.	Action completed.	Complete
Objective 6: To reduce the likelihood of catastrophic loss as a result of dam failure.			
6.1	Create maps illustrating the inundation zone of all high hazard dams and distribute information to property owners with inundation area and info on emergency notification system.	An EAP has been completed for Columbia Lake Dam. Town is petitioning DEEP to change the dam classification (currently class C).	Complete
6.2	Create Emergency Operations Plan for Columbia Lake Dam (in progress).	An EAP has been completed for Columbia Lake Dam	Complete
Objective 7: To reduce the likelihood of flooding by improving bridge conditions.			
7.1	Update single-lane Roses Bridge Rd/Pucker Street bridge to a double-lane bridge.	Action completed.	Complete
Objective 8: Continue to educate the public in areas of natural disasters, mitigation activities, and preparedness.			
8.1	Distribute informational materials regarding emergency preparedness. Make 1,000 copies available at the senior center, events and town hall. Use Columbia Crossroads newsletter to notify residents of other resources.	Revise to use social media and Town magazine. Have Everbridge since last plan and a school hazard notification system.	Carry Forward with Revisions

Active Mitigation Strategies and Actions

The Town proposed to initiate several new mitigation actions for the upcoming five years. Additionally, a number of actions from the previous planning period are being carried forward or replaced with revised actions. These are listed below.

Each of the following actions has been prioritized based on FEMA guidelines, listed from highest to lowest priority, and numbered.

Action #1	
Enter the Sustainable CT program through Registration and review actions that can be undertaken to pursue Certification. Make progress with the actions related to hazard mitigation.	
Goal	4. Increase the use of natural, "green," or "soft" hazard mitigation measures, such as open space preservation and green infrastructure.
Category	Natural Resources Protection
Lead	Planning
Cost	\$0 - \$10,000
Funding	Town Operating Budget
Timeframe	01/2019 - 12/2019
Priority	High



Action #2

Identify location for secondary access to Island Woods Subdivision and prepare and file map of proposed street in the office of the town clerk in accordance with CT General Statute Section 8-29.

Goal	7. Improve the emergency response capabilities of the region and its communities
Category	Preparedness & Emergency Response
Lead	Planning
Cost	\$0 - \$10,000
Funding	Town Operating Budget
Timeframe	07/2019 - 06/2020
Priority	High

Action #3

Assess vulnerable population disaster preparedness and emergency assistance protocol to identify opportunities for improvement.

Goal	7. Improve the emergency response capabilities of the region and its communities
Category	Preparedness & Emergency Response
Lead	Emergency Management
Cost	\$0 - \$10,000
Funding	Town Operating Budget
Timeframe	07/2019 - 06/2020
Priority	High

Action #4

Install bypass culverts and perform culvert repairs and replacements on the Hop River, as described in the permits granted by the USACE.

Goal	1. Minimize the impact of natural hazards on physical buildings and infrastructure
Category	Structural Projects
Lead	Public Works
Cost	More than \$100,000
Funding	Grants
Timeframe	07/2022 - 06/2023
Priority	High



Action #5

Conduct outreach to local small businesses with the aim of preventing the accidental release and pollution from chemicals stored and used at their facilities during or following natural hazard events.

Goal	6. Improve public outreach, education, and warning systems
Category	Education & Awareness
Lead	Planning, in coordination with DEEP
Cost	\$0 - \$10,000
Funding	Materials & Resources Provided by CT DEEP
Timeframe	01/2019 - 12/2019
Priority	Medium

Action #6

Participate in EMI courses or the seminars and annual conference held by the Connecticut Association of Flood Managers.

Goal	3. Improve institutional awareness and understanding of natural hazard impacts and mitigation within municipal governments and other decision-making bodies
Category	Education & Awareness
Lead	Planning
Cost	\$0 - \$10,000
Funding	Town Operating Budget
Timeframe	07/2019 - 06/2024
Priority	Medium

Action #7

Review the LID Manual developed by the Northwest Hills Council of Governments and determine whether LID can be incorporated locally to increase rural resiliency.

Goal	1. Minimize the impact of natural hazards on physical buildings and infrastructure
Category	Prevention
Lead	Planning
Cost	\$10,000 - \$25,000
Funding	Town Operating Budget
Timeframe	07/2021 - 06/2022
Priority	Medium



Action #8

Progress through planning phase for drainage system upgrade at Parker Bridge Road. Road should be elevated with cross culverts to mitigate against flooding.

Goal	1. Minimize the impact of natural hazards on physical buildings and infrastructure
Category	Structural Projects
Lead	Public Works
Cost	\$25,000 - \$50,000
Funding	Grants
Timeframe	07/2021 - 06/2023
Priority	Medium

Action #9

Replace culvert pipe and perform basin retrofit, if necessary, at Macht Road.

Goal	1. Minimize the impact of natural hazards on physical buildings and infrastructure
Category	Structural Projects
Lead	Public Works
Cost	\$50,000 - \$100,000
Funding	Grants
Timeframe	07/2023 - 06/2024
Priority	Medium

Action #10

Complete drainage upgrade on Hennequin Road: upgrade/retrofit all culverts on the west side of Hennequin Road, from Recreation Park to Lake Road.

Goal	1. Minimize the impact of natural hazards on physical buildings and infrastructure
Category	Structural Projects
Lead	Public Works
Cost	More than \$100,000
Funding	Grants
Timeframe	07/2022 - 06/2024
Priority	Medium



Action #11

Contact the owners of Repetitive Loss Properties and nearby properties at risk to inquire about mitigation undertaken and suggest options for mitigating flooding in those areas. This should be accomplished with a letter directly mailed to each property owner.

Goal	1. Minimize the impact of natural hazards on physical buildings and infrastructure
Category	Property Protection
Lead	Planning
Cost	\$0 - \$10,000
Funding	Town Operating Budget / DEMHS
Timeframe	07/2021 - 06/2022
Priority	Low

Action #12

Increase the annual-budget for preventative tree maintenance.

Goal	5. Improve the resilience of local and regional utilities and infrastructure using strategies including adaptation, hardening, and creating redundancies.
Category	Natural Resources Protection
Lead	Public Works
Cost	\$0 - \$10,000
Funding	Town Operating Budget
Timeframe	01/2021 - 12/2022
Priority	Low

Action #13

Distribute informational materials regarding emergency preparedness through social media and the Town magazine.

Goal	6. Improve public outreach, education, and warning systems
Category	Education & Awareness
Lead	Emergency Management
Cost	\$0 - \$10,000
Funding	Town Operating Budget
Timeframe	01/2021 - 12/2022
Priority	Low



Action #14

Coordinate with CT SHPO to conduct historic resource surveys, focusing on areas within natural hazard risk zones (such as flood or wildfire hazard zones and areas near steep slopes), to support identification of vulnerable historic properties and preparation of resiliency plans across the state. This action leverages existing resources and best practices for protection of historic and cultural resources through an ongoing statewide initiative by CT SHPO.

Goal	8. Ensure community character and social equity are addressed in mitigation activities
Category	Property Protection
Lead	Planning, in coordination with SHPO
Cost	\$10,000 - \$25,000
Funding	SHPO
Timeframe	07/2021 - 06/2023
Priority	Low






Capitol Region Natural Hazards Mitigation Plan Update











Columbia, Connecticut

Flood Plains, Dams & Critical Facilities



Dam Hazard Class

-  BB, A, AA OR Unclassified
-  Class B - Significant Hazard
-  Class C - High Hazard

Critical Facilities

-  Fire Station
-  Police Station
-  School
-  Healthcare Facility
-  State Facility
-  Town Facility
-  Waste Water Facility
-  Emergency Center
-  NRHP Buildings/Sites
-  NRHP Districts/Areas

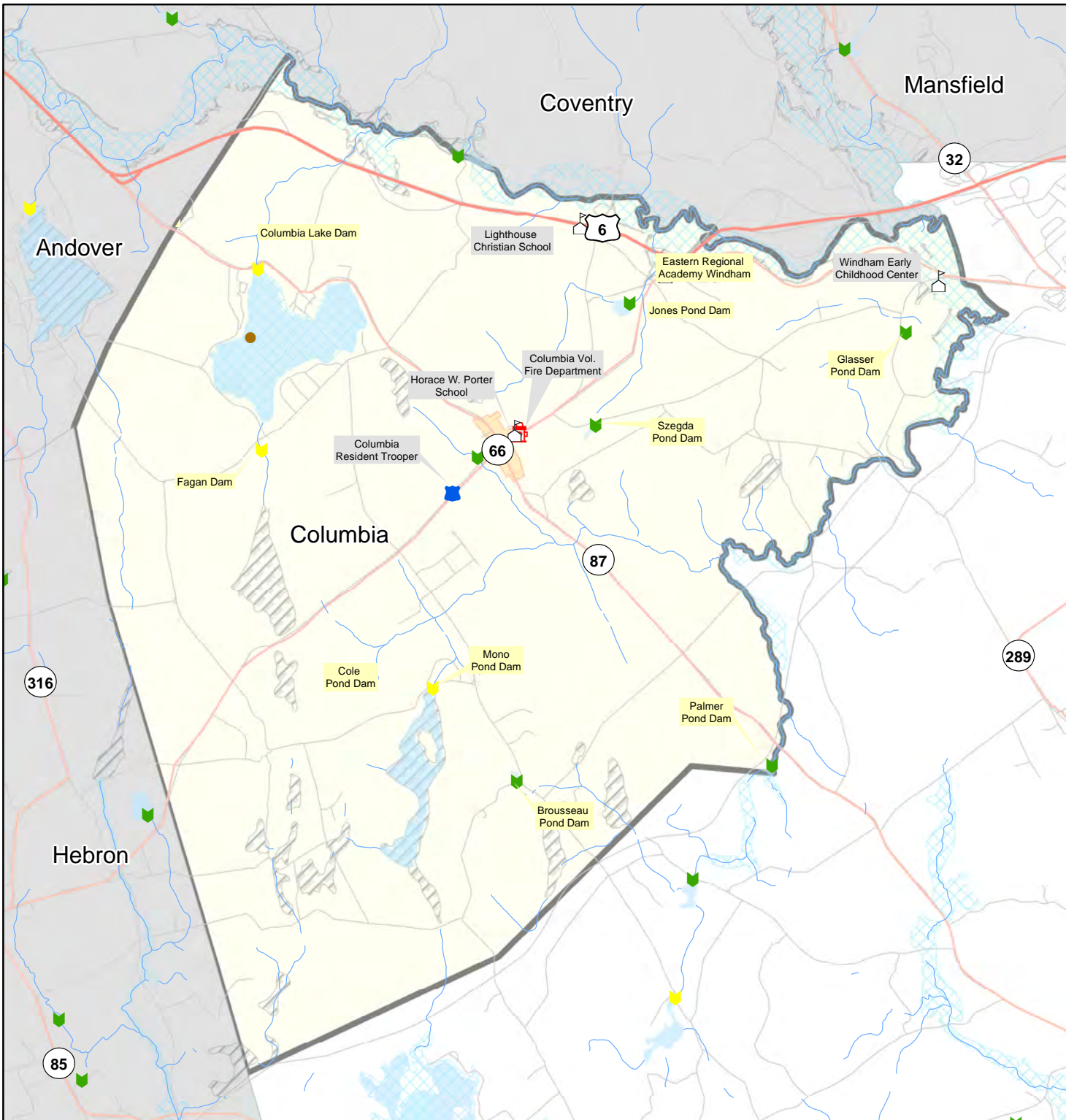
FEMA Flood Hazard Area

-  100 Year Flood Zone
-  500 Year Flood Zone

Data Sources: FEMA, National Register of Historic Places, CT DEEP, CRCOG, ESRI



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8 Coventry

Community Overview

Coventry has a total area of 38.1 square miles (24,388 acres). The 2010 Census population count was 12,435 persons, an 8.1% increase from 2000 (11,504). Mainly rural with some agriculture, Coventry is about 11% developed and approximately 65% forested. Coventry has concentrations of people in the vicinity of Coventry Lake and at the condominium complex off Merrow Road. Water bodies include Upper Bolton Lake and Coventry Lake. Coventry's elevation ranges from about 230 feet in the southeast corner of town at the Willimantic River to 934 feet at the peak of Grant Hill in the north/northwest section.

Little new development has occurred since adoption of the former WinCOG's 2015 Hazard Mitigation Plan Update ("2015 HMP"). Most development activity has related to improvements and has not increased the community's risk profile.

Critical Facilities

Critical Facilities throughout the Capitol Region are listed in Appendix B. In Coventry, critical facilities and cultural resources include two North Coventry Volunteer Fire Department stations, two Coventry Volunteer Fire Association stations, the elementary school on Wright's Mill Road, the elementary school on Cross Street, the middle school, the high school on Ripley Hill Road, the police department off Route 31, the equine hospital off Flanders Road, the historic Nathan Hale Homestead, the historic Strong Porter House, one elderly housing community off Route 31, two shopping plazas off Route 44 and off Route 31, the telephone switch station off South Street, the sewage treatment plant off Route 31, two pump stations and a drinking water well, and two high potential loss dams.

Table 8-1: Critical Facilities, Coventry

Facility	Shelter	Generator
Police Department		X
Coventry Town Hall		X
North Coventry Volunteer Fire Department Route 31 station		X
North Coventry Volunteer Fire Department Merrow Road station		X
Coventry Volunteer Fire Association Judd Road station		X
Coventry Volunteer Fire Association Route 31 station		X
Coventry High School (Ripley Hill Road)	Primary	X
Wright's Mill Road elementary school		
Cross Street elementary school		
Middle School		
Coventry Senior Center	Secondary	X
Equine Hospital		
Historic Nathan Hale Homestead		
Historic Strong Porter House		
Elderly Housing Community		(1)
Two shopping plazas		

Facility	Shelter	Generator
Telephone Switch Station		
Sewage Treatment Plant		X
Two pumping stations		X
Water supply wells		X
Two high potential loss dams		

1. For water pressure only

Coventry High School is the primary shelter, but its new gym was not built to seismic code. The school’s old gym is able to be used until this issue is resolved.

Capabilities

Coventry’s Plan of Conservation and Development includes policies on open space preservation designed to preserve natural resources and functions. The Town has received a Bronze certification within the SustainableCT program.

Coventry has implemented a Reverse 9-1-1 system to contact residents in cases of emergency conditions. The Town also uses its website, email-blasts, and social media outlets to communicate hazard information to residents.

The Town of Coventry has limited policies, programs, and resources dedicated to dam failure since most of these efforts are performed at the State level. The Town owns Lake Waumgumbaug Dam, which was reconstructed in 2017 and has a DEEP classification of Class A. The Town of Coventry expends a small amount of resources each year to maintain and monitor the Lake Waumgumbaug Dam. Maintenance and repair work was performed on the Roman Pond Dam since 2010 and the dam is no longer considered a significant hazard by the Town’s standards.

The Town of Coventry has consistently participated in the National Flood Insurance Program (NFIP) since June 4, 1980. Coventry’s current zoning regulations include limitations in the flood zone. The flood regulations were last revised on June 15, 2012. Proposed structures must meet elevation requirements and strict construction demands. Structures may be required to be constructed with certain materials, elevated, flood proofed, watertight or anchored. It must be shown that any activity in the 100-year flood plain will not significantly alter the flood levels. These regulations are posted on the Town website.

Town staff inspect the three “scour bridges” following flood events larger than a 10-year flood event. The Town has also implemented a series of drainage improvements at the western end of Avery Shore to reduce flood damages in the area. The Town has a formalized inspection and upgrade program for faulty culverts and catch basins, with inspections of areas conducted annually and faulty areas added to the capital improvement list.

The Town maintains shelter facilities and performs debris management through Public Works with the assistance of the local electrical utility when necessary. The State building code has been updated and locally adopted, and the Town’s sheltering resources and emergency



communications have been expanded. The Town notifies the public when severe thunderstorms are to occur. The Town’s capability to mitigate thunderstorm damage is relatively limited to town-owned facilities and rights-of-way. The local electrical utility performed intensive trimming near electrical lines following the severe storms in 2016 and ruggedized a main circuit around Wangumbaug Lake.

Plowing services are provided through the Town Public Works Department.

The Town uses a variety of regulatory, preparedness, and public information programs to mitigate the effect of wildfires, including the Open Burning Program, maintenance of dry hydrants and cisterns, and educational programs on fire safety. The Town has also installed additional dry hydrants and cisterns to improve overall fire protection capabilities and implemented a public education program. Coventry annually inspects dry hydrants.

New Capabilities

A recent FEMA floodplain remapping effort has expanded the mapped floodplains around Coventry Lake, improving the Town’s understanding of hazards in this area. A map modernization effort by FEMA is currently underway for Tolland County, but its full extent, and how much of Coventry it will cover, is unknown.

Coventry has replaced a number of bridges since adoption of the 2015 HMP, an effort that has included elevating and floodproofing bridge approaches.

The Town has recently initiated work on improvements to the DeCew Dam property, including improvements to trails and amenities, and erosion and sediment control. This project is expected to improve the state of that dam.

Coventry was awarded the Bronze Certification level within the SustainableCT program in October 2018.

Challenges

Challenges Overview

Coventry is predominantly forested with large wooded areas, including the Nathan Hale State Forest. This large, wooded area is a potential wildfire or brushfire site, but given the widespread forestation throughout the town, no one area is considered more vulnerable to this threat than another. Despite this vulnerability, Town staff report that wildfires are a minimal problem and do not require additional expenditures outside of normal operating budgets. Town staff feel additional dry hydrants and a forestry truck are needed to boost wildfire-fighting capabilities.

There are 24 dams in Coventry ranging from Hazard Class AA (negligible hazard) to Hazard Class B (significant hazard). The failure of the Roman Pond Dam (Class B) could cause serious damage and is of greatest concern in the town. Lake Waumbaug dam, identified by DEEP in 2010 as



a low hazard dam, was later identified by engineers as a high hazard after significant analysis and inspection. Eagleville Lake Dam, a Class C dam located on the eastern edge of town, has the potential of causing damage within the town if it were to fail.

The risk to Coventry from drought and from earthquakes is considered to be low.

The risk to Coventry from flooding is considered to be moderate. Flood sources include the Willimantic River, Skungamaug River, Ash Brook, Hop River, and Mill Brook. The town also has three “scour bridges” which, by CTDOT standards, may be undermined by soil erosion during certain rainfall or stream flow events, thus affecting their stability and safety. Two structures cross the Willimantic River, one on Brigham Road and another on Depot Road. The third crosses the Mill Brook on Depot Road. Flood damages have been relatively minor in recent years; no public assistance reimbursements were received for flooding in October 2005, April 2007, or October 2010, and no specific damage areas were reported. A clogged culvert has caused flooding of hay and corn fields during spring rain events in recent years.

The risk of Coventry to hurricanes is considered to be high. The Town received public assistance reimbursements following Hurricane Irene and Hurricane Sandy.

The risk of Coventry to severe winter storms is considered to be high. The Town received a public assistance reimbursement following heavy snow in January and February 2011, Winter Storm “Alfred” in late October 2011, and Winter Storm “Nemo” in February 2013. The heavy snows of January and February 2011 resulted in major damage to the roof of an equestrian riding center resulting in the building needing to be demolished and rebuilt.

The risk of Coventry to thunderstorms is considered to be moderate. The risk from tornadoes is considered to be low. The Town reported experiencing an EF-1 tornado on July 10, 2013 that traveled near the Wastewater Treatment Plant. One privately-owned building received roof damage and numerous trees were uprooted. Cleanup by town staff occurred during normal business hours within the regular budget.

Hazard Losses

The economic losses faced by Coventry from natural hazards can be estimated by reviewing historic, and modeling future, loss figures. Loss estimates are summarized below.

Historic FEMA Payments

FEMA reimburses communities for hazard losses through programs including Public Assistance (PA) and the National Flood Insurance Program (NFIP). Combining PA and private flood insurance payments can give an estimate for total losses to a community.

The NFIP has paid 13 property damage claims in Coventry totaling \$56,412 to-date. The Town of Coventry does not have any repetitive loss (RL) or severe repetitive loss (SRL) properties.

Total PA reimbursements to the community were as follows:



- Flood Events: \$47,846 (\$2,518 annually)
- Hurricane Events: \$137,775 (\$7,251 annually)
- Winter Storm Events: \$620,174 (\$32,641 annually)

These are summarized in the tables below.

Table 8-2: Flood Event PA Reimbursements, Coventry

Incident	Oct 2005
Declaration	12/16/2005
Disaster No.	1619
Entity	FEMA PA Reimbursement
State	\$1,808
Municipal	\$46,038
Nonprofit	\$0
Total	\$47,846
Annualized	\$2,518

Table 8-3: Hurricane Wind Event PA Reimbursements, Coventry

Incident	Aug - Sep 2011 (T.S. Irene)	Oct - Nov 2012 (Storm Sandy)
Declaration	9/2/2011	10/30/2012
Disaster #	4023	4087
Entity	FEMA PA Reimbursement	FEMA PA Reimbursement
State	\$800	\$3,742
Municipal	\$92,869	\$40,364
Nonprofit	\$0	\$0
Total	\$93,670	\$44,106
Annualized	\$4,930	\$2,321

Table 8-4: Winter Storm PA Reimbursements, Coventry

Incident	Mar 2003	Dec 2003	Jan 2005	Feb 2006	Jan 2011	Oct 2011	Feb 2013	Jan 2015
Declaration	3/11/03	1/15/04	2/17/05	5/2/06	3/3/11	11/17/11	3/21/13	4/8/15
Disaster #	3176	3192	3200	3266	1958	4046	4106	4213
Entity	FEMA PA Reimbursement							
State	\$12,626	\$13,060	\$18,665	\$16,992	\$21,258	\$3,256	\$17,705	\$34,262
Municipal	\$29,992	\$26,531	\$46,723	\$37,431	\$49,542	\$51,295	\$109,087	\$131,750
Nonprofit	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Total	\$42,618	\$39,591	\$65,388	\$54,423	\$70,799	\$54,551	\$126,792	\$166,011
Annualized	\$2,243	\$2,084	\$3,441	\$2,864	\$3,726	\$2,871	\$6,673	\$8,737



National Centers for Environmental Information Losses

The table below summarizes events in the National Centers for Environmental Information (NCEI) severe storm database that were specifically noted as having impacted the community since 2012.

Table 8-5: NCEI Database Losses since 2012, Coventry

Date	Event	Property Damage
8/10/2012	Thunderstorm Wind	\$4,000
9/18/2012	Thunderstorm Wind	\$5,000
6/11/2013	Thunderstorm Wind	\$15,000
7/10/2013	Tornado	*\$17,000
2/25/2016	Thunderstorm Wind	\$5,000
8/2/2017	Hail	\$0
Total		\$46,000

*damages from storm divided between multiple communities

NCEI losses under other event categories (such as drought, high wind, flooding, and winter storms) were not specifically noted as impacting this community, though they did impact Tolland County and nearby towns. NCEI losses are reported in Section II of this Plan.

HAZUS-MH Losses

CRCOG used FEMA’s Hazus-MH model to analyze the risks that the Town of Coventry might face from flooding, hurricanes, and earthquakes. The model estimates economic losses to the town due to damage to buildings and building contents, as well as other economic disruptions. Both residential and commercial structures are addressed. Losses from different hazards are summarized below.

Table 8-6: Estimated Damages to Coventry from a 1% Annual-Chance Flood

Loss Type	2018 Results
Households Displaced	147
People Needing Shelter	101
Buildings at Least Moderately Damaged	0
Economic Losses	
Residential Building & Content Losses	\$13,184,428
Other Building & Content Losses	\$6,895,584
Total Building & Content Loss	\$20,080,012
Total Business Interruption Losses	\$276,509
TOTAL	\$20,356,521



Table 8-7: Estimated Damages to Coventry from a 1% Annual-Chance Hurricane

Loss Type	2018 Results (1% track)
Buildings at Least Moderately Damaged	1
Buildings Completely Damaged	0
Total Debris Generated (tons)	12654
Truckloads (at 25 tons/truck) of building debris	506
Economic Losses	
Residential Building & Content Losses	\$5,172,547
Other Building & Content Losses	\$164,496
Total Building & Content Loss	\$5,337,043
Total Business Interruption Losses	\$308,622
TOTAL LOSSES	\$5,645,665

Losses were calculated from a modeled probabilistic earthquake (1% annual-chance of occurrence), as well as for four specific scenarios with epicenters around Connecticut.

Table 8-8: Estimated Damages to Coventry from a Probabilistic Earthquake

Loss Type	2018 Results
Wage Loss	\$665
Rent Loss	\$734
Relocation Loss	\$1,673
Income Loss	\$539
Inventory Loss	\$98
Total Business Disruption	\$3,709
Structural Loss	\$3,473
Non-Structural Loss	\$13,053
Total Building Loss	\$16,525
Total Content Loss	\$5,049
TOTAL LOSSES	\$25,283

Table 8-9: Estimated Damages to Coventry from Modeled Earthquake Scenarios

Epicenter Location	Magnitude	Estimated Total Losses
East Haddam	6.4	\$202,863.52
Haddam	5.7	\$38,524.25
Portland	5.7	\$55,306.21
Stamford	5.7	\$2,208.68

Average Annualized Losses

Average Annualized Loss (AAL) figures are useful tools for comparison of the risks faced from different hazards with different likelihoods of occurring in a given time period. AAL estimates were prepared for Coventry based on the methodologies discussed in Section II of the Multi-Jurisdictional HMP. Dam failure, drought, tornado, and wildfire losses were sourced from the 2014 Connecticut Natural Hazard Mitigation Plan Update, with dam failure data supplemented by the National Performance of Dams Program and the Connecticut Department of Energy &



Environmental Protection. Earthquake and hurricane losses were calculated in HAZUS-MH. Losses for flooding came from NFIP claims, for winter storms from Public Assistance Reimbursements, and for thunderstorms from the NCEI database. These are presented in the table below in dollars per year. Note that Hurricanes and Tropical Storms represent the largest share of total annualized losses.

Table 8-10: Average Annualized Losses, Coventry

Dam Failure	Drought	Earthquakes	Flooding	Hurricanes and Tropical Storms	Severe Winter Storms	Thunderstorms	Tornadoes	Wildfires	Total
\$764	\$0	\$25,283	\$4,003	\$842,675	\$32,641	\$4,526	\$3,614	\$4,930	\$918,436

Losses Summary

A review of the above loss estimates demonstrates that the Town of Coventry has experienced significant expenses as a result of natural hazards and is at risk for additional losses if some of the less-frequent events were to occur. These actual and potential losses justify hazard mitigation actions to reduce losses in the future.

Mitigation Strategies and Actions

Noted Hazard Mitigation Needs

During the course of this Plan development, multiple hazard mitigation needs of Coventry were noted, including:

- Complete a Regional Sheltering Plan.
- Assess the needs, and develop a cost-estimate, for retrofitting the new portion of the High School (specifically the new gym) so that it is up to seismic code.
- Pursue development of a micro-grid to encompass Town-owned facilities around, and including, the Town Hall.
- Work with FEMA to map Mill Brook in the Village.
- Replace culvert at Jones Crossing over Clark Brook, which drains to the Willimantic River. Town has approved funding for this project. Flooding here is an access problem.
- Determine whether it is more preferable or cost effective to replace the culvert that is contributing to flooding of hay and cornfields or to acquire the at-risk land.
- Install additional dry hydrants in areas not served by public water, as well as a water tower to feed hydrants in Coventry Village.
- Acquire a tanker truck to assist with fighting fires in areas remote from water sources.
- Complete an inventory and vulnerability analysis of trees along municipal rights-of-way (ROW), with a particular focus on tree death due to invasive pests and blight.



Status of Previous Mitigation Strategies and Actions

The Town of Coventry reviewed the mitigation actions proposed in the 2015 HMP and determined the status of each. That information is included in the table below.

Table 8-11: Status of Previous Mitigation Strategies and Actions, Coventry

Action #	Action	Notes	Status
GOAL: TO REDUCE THE LOSS OF LIFE AND PROPERTY AND ECONOMIC CONSEQUENCES AS A RESULT OF NATURAL DISASTERS.			
Objective 1: To reduce the likelihood of flooding by improving bridge conditions.			
1.1	Update single-lane Pucker Street bridge to a double-lane bridge with increased water capacity. Under design as of March 2014.	Action complete.	Complete
Objective 2: To reduce the likelihood of wildfire hazards by improving water availability.			
2.1	Seek grant for large 2,000 gallon tanker fire apparatus. Current largest capacity truck is 1000.	Action complete (Town now has 3,000-gallon truck).	Complete
Objective 3: To reduce the likelihood of flooding and icy conditions by improving existing road conditions.			
3.1	Improve the intersection of South Street, Swamp Road and Swamp Road Extension, where there are drainage problems.	Concepts underway – plan to apply for state and federal funding	Carry Forward with Revisions
3.2	Improve roads around the lake area where there are flash flooding issues.	Maple Road has been upgraded, other projects are ongoing.	Carry Forward with Revisions
Objective 4: To reduce the likelihood of flooding by improving existing natural and artificial drainage systems.			
4.1	Substantially change the collection of stormwater and improve redistribution through silted-in ponds along Mill Stream in the village from Coventry Lake to the Willimantic River.	Partially complete. From 275 down to Bradbury and Woods Lane some drainage improvements have been done (phase 1).	Carry Forward with Revisions
Objective 5: Reduce costs associated with providing emergency services and other public services in the event of a natural disaster.			
5.1	Upgrade all town plows to salt/slurry mixture spreaders.	Action complete. The Town now uses ClearLane (treated salt).	Complete
Objective 6: Reduce the amount of debris from severe storms through preventative tree management.			
6.1	Based on the results of the hazardous tree survey, remove dead, dying, dangerous or diseased trees. Focus on the Ash tree, which is suffering a massive regional die-off due to insect infestation.	Budget was increased from \$22k to \$35k. Carry forward with goal of removing 25-30 trees per year.	Carry Forward with Revisions
Objective 7: Expand activities related to emergency preparedness and improve natural hazard response capabilities.			
7.1	Upgrade town-wide communication systems.	Installed voting receivers, including additional transmission sites. Added additional town-wide frequency. Lightning protection needs to be addressed in the plan update.	Carry Forward with Revisions
Objective 8: Continue to educate the public in areas of natural disasters, mitigation activities, and preparedness.			



Action #	Action	Notes	Status
Objective 9: Educate the public in the areas of natural disasters, mitigation activities and preparedness.			
9.1	Educate the public on tree planting around power lines.	Multiple measures put in place: articles in newspaper, "America The Beautiful" grant, 25 trees planted per year, require demonstration of proper species selections related to power lines.	Capability
9.2	Visit schools and educate children about the risks of floods and other natural hazards and how to prepare for them.	Fire Department goes in and talks about fires.	Capability
9.3	Make available literature on natural disasters and preparedness at Coventry Town Hall and at the Booth & Dimock Memorial Library.	Complete. Town will update literature on annual basis.	Capability
9.4	Make available information on natural disasters and preparedness on Coventry's website with links to state and federal resources.	Complete. Town will update literature on annual basis.	Capability
Objective 10: To reduce the likelihood of flooding, evaluate property prone to flooding.			
10.1	Conduct a study and acquire property in the floodplain through grants and donations.	Actively pursuing two additional riverfront properties.	Carry Forward with Revisions
Objective 11: To reduce the likelihood of catastrophic loss as a result of dam failure.			
11.1	Design and improve Coventry Lake Gate, as it is currently compromised.	Action complete.	Complete
Objective 12: Update Flood Insurance Rate Maps (FIRMs) and Floodway Maps based on an engineered study.			
12.1	Urge FEMA to conduct an engineered study of the town to develop more accurate FIRMs and floodway maps (ex. Coventry Village area).	Continue to inquire with FEMA on needing improved mapping.	Carry Forward with Revisions

Active Mitigation Strategies and Actions

The Town proposed to initiate several new mitigation actions for the upcoming five years. Additionally, a number of actions from the previous planning period are being carried forward or replaced with revised actions. These are listed below.

Each of the following actions has been prioritized based on FEMA guidelines, listed from highest to lowest priority, and numbered.

Action #1	
Work with FEMA to map the Mill Brook floodplain in Coventry Village.	
Goal	3. Improve institutional awareness and understanding of natural hazard impacts and mitigation within municipal governments and other decision-making bodies
Category	Prevention
Lead	Planning
Cost	\$0 - \$10,000
Funding	CT DEEP / DEMHS / FEMA
Timeframe	07/2019 - 06/2020
Priority	High



Action #2

Develop a dry hydrant maintenance plan to guide hydrant cleaning, dredging, and replacement.

Goal	7. Improve the emergency response capabilities of the region and its communities
Category	Prevention
Lead	Fire Department
Cost	\$10,000 - \$25,000
Funding	CT DEEP
Timeframe	07/2019 - 06/2021
Priority	High

Action #3

Develop a process, to be built into DPW operations, to identify, evaluate, and address bridges with scour problems.

Goal	5. Improve the resilience of local and regional utilities and infrastructure using strategies including adaptation, hardening, and creating redundancies.
Category	Structural Projects
Lead	Public Works
Cost	\$10,000 - \$25,000
Funding	Grants
Timeframe	07/2019 - 06/2021
Priority	High

Action #4

Complete an inventory and vulnerability analysis of trees along municipal rights-of-way (ROW), with a particular focus on tree death due to invasive pests and blight.

Goal	5. Improve the resilience of local and regional utilities and infrastructure using strategies including adaptation, hardening, and creating redundancies.
Category	Prevention
Lead	Public Works
Cost	\$10,000 - \$25,000
Funding	Town Operating Budget
Timeframe	07/2019 - 06/2021
Priority	High



Action #5

Develop a prioritized list of needed road improvements around the lake area where flash flooding is an issue.

Goal	5. Improve the resilience of local and regional utilities and infrastructure using strategies including adaptation, hardening, and creating redundancies.
Category	Structural Projects
Lead	Public Works
Cost	\$25,000 - \$50,000
Funding	Town Operating Budget / Grants
Timeframe	07/2020 - 06/2021
Priority	High

Action #6

Complete upgrade of town-wide communications system.

Goal	7. Improve the emergency response capabilities of the region and its communities
Category	Preparedness & Emergency Response
Lead	Emergency Management
Cost	\$50,000 - \$100,000
Funding	Town Operating Budget
Timeframe	07/2021 - 06/2022
Priority	High

Action #7

Develop a micro-grid for municipal facilities around, and including, the Town Hall. Ideally the microgrid will service the high school (shelter), middle school, fire department, town hall, fueling station, and elderly housing complex.

Goal	5. Improve the resilience of local and regional utilities and infrastructure using strategies including adaptation, hardening, and creating redundancies.
Category	Structural Projects
Lead	Public Works
Cost	\$50,000 - \$100,000
Funding	Grants / CT DEEP PURA
Timeframe	07/2021 - 06/2022
Priority	High



Action #8

Complete the stormwater collection system improvements along Mill Stream in Coventry Village.

Goal	1. Minimize the impact of natural hazards on physical buildings and infrastructure
Category	Structural Projects
Lead	Public Works
Cost	\$50,000 - \$100,000
Funding	Grants
Timeframe	07/2021 - 06/2022
Priority	High

Action #9

Assess the needs, and develop a cost-estimate, for retrofitting the new High School gym to ensure it is up to seismic and wind code and can be used as an emergency shelter.

Goal	7. Improve the emergency response capabilities of the region and its communities
Category	Structural Projects
Lead	Public Works
Cost	More than \$100,000
Funding	Grants / Bonding
Timeframe	07/2022 - 06/2023
Priority	High

Action #10

Construct a water tower or cistern to serve Coventry Village to improve firefighting capacity in that area.

Goal	7. Improve the emergency response capabilities of the region and its communities
Category	Preparedness & Emergency Response
Lead	Public Works
Cost	More than \$100,000
Funding	Grants
Timeframe	07/2022 - 06/2023
Priority	High



Action #11

Replace culvert at Jones Crossing over Clark Brook, which drains to the Willimantic River.

Goal	1. Minimize the impact of natural hazards on physical buildings and infrastructure
Category	Structural Projects
Lead	Public Works
Cost	More than \$100,000
Funding	Grants / Bonding
Timeframe	07/2022 - 06/2023
Priority	High

Action #12

Complete improvements to the DeCew Dam park property, considering dam safety.

Goal	1. Minimize the impact of natural hazards on physical buildings and infrastructure
Category	Structural Projects
Lead	Public Works
Cost	More than \$100,000
Funding	Grants
Timeframe	07/2022 - 06/2023
Priority	High

Action #13

Increase funding to identify and address bridge scour problems.

Goal	5. Improve the resilience of local and regional utilities and infrastructure using strategies including adaptation, hardening, and creating redundancies.
Category	Prevention
Lead	Public Works
Cost	More than \$100,000
Funding	Town Operating Budget / Grants
Timeframe	07/2022 - 06/2023
Priority	High



Action #14

Conduct outreach to local small businesses with the aim of preventing the accidental release and pollution from chemicals stored and used at their facilities during or following natural hazard events.

Goal	6. Improve public outreach, education, and warning systems
Category	Education & Awareness
Lead	Planning, in coordination with DEEP
Cost	\$0 - \$10,000
Funding	Materials & Resources Provided by CT DEEP
Timeframe	01/2019 - 12/2019
Priority	Medium

Action #15

Participate in EMI courses or the seminars and annual conference held by the Connecticut Association of Flood Managers.

Goal	3. Improve institutional awareness and understanding of natural hazard impacts and mitigation within municipal governments and other decision-making bodies
Category	Education & Awareness
Lead	Planning
Cost	\$0 - \$10,000
Funding	Town Operating Budget
Timeframe	07/2019 - 06/2024
Priority	Medium

Action #16

Coordinate with NEMO and CRCOG to share resources and gain technical support for hazard mitigation actions involving stormwater management and public outreach, which have parallel benefits related to MS4 stormwater permit compliance.

Goal	1. Minimize the impact of natural hazards on physical buildings and infrastructure
Category	Prevention
Lead	Public Works
Cost	\$0 - \$10,000
Funding	Town Operating Budget
Timeframe	07/2020 - 06/2021
Priority	Medium



Action #17

Review the LID Manual developed by the Northwest Hills Council of Governments and determine whether LID can be incorporated locally to increase rural resiliency.

Goal	1. Minimize the impact of natural hazards on physical buildings and infrastructure
Category	Prevention
Lead	Planning
Cost	\$10,000 - \$25,000
Funding	Town Operating Budget
Timeframe	07/2021 - 06/2022
Priority	Medium

Action #18

Conduct a wildfire vulnerability and needs assessment to guide construction of additional dry hydrants and/or cisterns.

Goal	3. Improve institutional awareness and understanding of natural hazard impacts and mitigation within municipal governments and other decision-making bodies
Category	Prevention
Lead	Fire Department
Cost	\$25,000 - \$50,000
Funding	Town Operating Budget / Grants / CT DEEP
Timeframe	07/2021 - 06/2023
Priority	Medium

Action #19

Develop a plan for implementing lightning protection for the town-wide communication system.

Goal	5. Improve the resilience of local and regional utilities and infrastructure using strategies including adaptation, hardening, and creating redundancies.
Category	Preparedness & Emergency Response
Lead	Emergency Management
Cost	\$25,000 - \$50,000
Funding	Town Operating Budget / Grants
Timeframe	07/2021 - 06/2023
Priority	Medium



Action #20

Remove 100 to 150 hazardous trees, as identified in the hazardous tree survey completed prior to the previous HMP, over the next five years.

Goal	5. Improve the resilience of local and regional utilities and infrastructure using strategies including adaptation, hardening, and creating redundancies.
Category	Prevention
Lead	Public Works
Cost	\$25,000 - \$50,000
Funding	Town Operating Budget
Timeframe	01/2021 - 12/2023
Priority	Medium

Action #21

Increase funding for Right of Way tree removal.

Goal	5. Improve the resilience of local and regional utilities and infrastructure using strategies including adaptation, hardening, and creating redundancies.
Category	Prevention
Lead	Public Works
Cost	\$25,000 - \$50,000
Funding	Town Operating Budget / Grants
Timeframe	07/2021 - 06/2023
Priority	Medium

Action #22

Develop an Open Space Plan to guide acquisition and preservation; ensure hazard mitigation is considered in plan development.

Goal	4. Increase the use of natural, "green," or "soft" hazard mitigation measures, such as open space preservation and green infrastructure.
Category	Natural Resources Protection
Lead	Planning
Cost	\$50,000 - \$100,000
Funding	Town Operating Budget / Grants
Timeframe	07/2023 - 06/2024
Priority	Medium



Action #23

Apply for State and Federal funding for drainage improvements to the intersection of South Street, Swamp Road, and Swamp Road Extension.

Goal	1. Minimize the impact of natural hazards on physical buildings and infrastructure
Category	Structural Projects
Lead	Public Works
Cost	More than \$100,000
Funding	Town Operating Budget / Grants
Timeframe	07/2022 - 06/2024
Priority	Medium

Action #24

Upgrade all town plows to have magnesium chloride tanks.

Goal	7. Improve the emergency response capabilities of the region and its communities
Category	Preparedness & Emergency Response
Lead	Public Works
Cost	More than \$100,000
Funding	Grants
Timeframe	07/2022 - 06/2024
Priority	Medium

Action #25

Acquire a forestry truck with a water tank to assist with fighting fires in areas remote from water sources.

Goal	7. Improve the emergency response capabilities of the region and its communities
Category	Preparedness & Emergency Response
Lead	Fire Department
Cost	More than \$100,000
Funding	Town Operating Budget / Grants
Timeframe	01/2022 - 12/2024
Priority	Medium



Action #26

Acquire all-terrain firefighting trucks and open accessways to fight fires in forested areas.

Goal	7. Improve the emergency response capabilities of the region and its communities
Category	Preparedness & Emergency Response
Lead	Fire Department
Cost	More than \$100,000
Funding	Grants
Timeframe	07/2022 - 06/2024
Priority	Medium

Action #27

Determine whether it is more preferable or cost effective to replace the culvert on Pucker Street that is contributing to flooding of hay and cornfields or to acquire the at-risk land.

Goal	3. Improve institutional awareness and understanding of natural hazard impacts and mitigation within municipal governments and other decision-making bodies
Category	Prevention
Lead	Public Works
Cost	\$0 - \$10,000
Funding	Town Operating Budget
Timeframe	07/2021 - 06/2022
Priority	Low

Action #28

Coordinate with CT SHPO to conduct outreach to historic property owners to educate them on methods of retrofitting their properties to be more hazard-resilient while maintaining historic character.

Goal	8. Ensure community character and social equity are addressed in mitigation activities
Category	Education & Awareness
Lead	Planning, in coordination with SHPO
Cost	\$0 - \$10,000
Funding	SHPO
Timeframe	01/2021 - 12/2022
Priority	Low



Action #29

Make progress with the hazard mitigation goals associated with SustainableCT certified actions.

Goal	8. Ensure community character and social equity are addressed in mitigation activities
Category	Prevention
Lead	Planning
Cost	\$0 - \$10,000
Funding	Town Operating Budget / CT DEEP
Timeframe	07/2021 - 06/2022
Priority	Low

Action #30

Coordinate with CT SHPO to conduct historic resource surveys, focusing on areas within natural hazard risk zones (such as flood or wildfire hazard zones and areas near steep slopes), to support identification of vulnerable historic properties and preparation of resiliency plans across the state. This action leverages existing resources and best practices for protection of historic and cultural resources through an ongoing statewide initiative by CT SHPO.

Goal	8. Ensure community character and social equity are addressed in mitigation activities
Category	Property Protection
Lead	Planning, in coordination with SHPO
Cost	\$10,000 - \$25,000
Funding	SHPO
Timeframe	07/2021 - 06/2023
Priority	Low

Action #31

Complete the Regional Sheltering Plan.

Goal	7. Improve the emergency response capabilities of the region and its communities
Category	Preparedness & Emergency Response
Lead	Emergency Management
Cost	\$25,000 - \$50,000
Funding	Grants
Timeframe	07/2023 - 06/2024
Priority	Low



Action #32

Acquire the Schmidt and Streude-Decew parcels, which are flood-prone.

Goal	4. Increase the use of natural, "green," or "soft" hazard mitigation measures, such as open space preservation and green infrastructure.
Category	Property Protection
Lead	Planning
Cost	More than \$100,000
Funding	Town Operating Budget / CT DEEP / DEMHS
Timeframe	07/2023 - 06/2024
Priority	Low






Capitol Region Natural Hazards Mitigation Plan Update










Coventry, Connecticut

Flood Plains, Dams & Critical Facilities

Dam Hazard Class



-  BB, A, AA OR Unclassified
-  Class B - Significant Hazard
-  Class C - High Hazard

Critical Facilities

-  Fire Station
-  Police Station
-  School
-  Healthcare Facility
-  State Facility
-  Town Facility
-  Waste Water Facility
-  Emergency Center
-  NRHP Buildings/Sites

 NRHP Districts/Areas

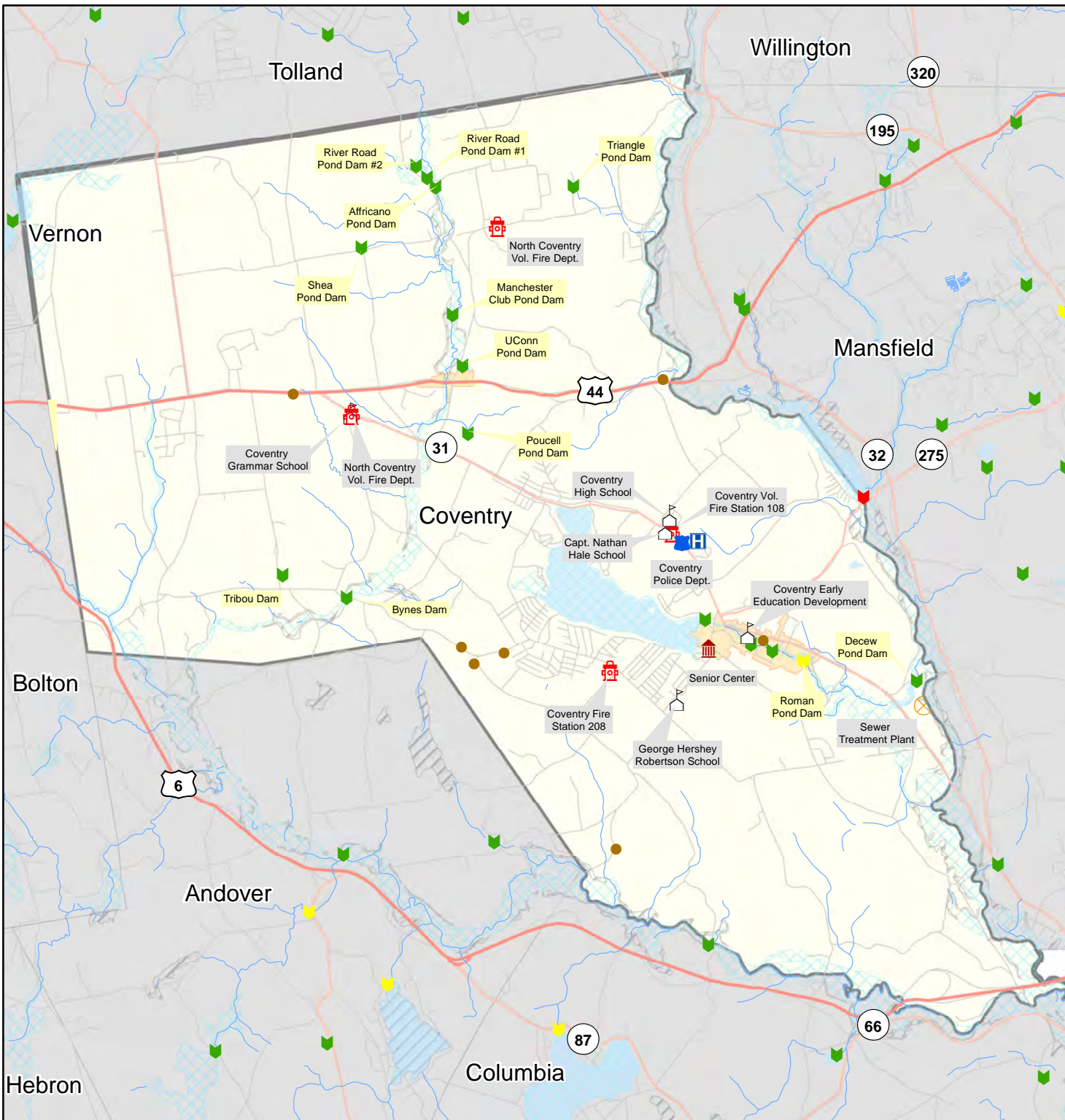
FEMA Flood Hazard Area

-  100 Year Flood Zone
-  500 Year Flood Zone

Data Sources: FEMA, National Register of Historic Places, CT DEEP, CRCOG, ESRI



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9 East Granby

Community Overview

East Granby is a rural community in the Capitol Region that covers encompasses about 17.5 sq. miles and has a population of approximately 5,277. Most of the land area in Town falls in the Farmington River Watershed, though the northeastern portion drains to the Stony Brook watershed. The Farmington River forms the southern municipal boundary. The Salmon and Muddy Brooks are major tributaries to the Farmington that flow through East Granby. Other watercourses running through town include Holcomb, Sanborn and Sheldon’s Brooks. Farming has traditionally been the mainstay of the Town however today’s principle industries include manufacturing and quarrying. Approximately 85% of the Town is developed. The major transportation routes through East Granby are State routes 20, 187 and 189. The Connecticut Air National Guard has a base in East Granby. Bradley International Airport, while primarily located in Windsor Locks to the east, has runway space in East Granby.

Critical Facilities

Critical Facilities throughout the Capitol Region are listed in Appendix B. In East Granby these include the Town Hall (serves as the Emergency Operations Center), an Ambulance facility, the Public Safety building, the South End Fire station the East Granby Recreation Building, the Parks and Recreation Office, the Public Library, the Department of Public Works facility, three sewer pumping stations, the Community Center / Senior Center (serves as the primary shelter), four schools, the Congregational Church, and two private senior housing facilities.

The Community Center shelter does not have showers; showers at Nufern-Coherent on Airport Park Road may be used as needed. The Town is interested in making the High School the primary shelter but needs to install a generator first. The Congregational Church could serve as a secondary shelter, but also needs a generator installed.

Approximately 30% of the Town is on the municipal water system.

Table 9-1: Critical Facilities, East Granby

Facility	Shelter	Generator
Town Hall (EOC)		X
Ambulance		X
Public Safety		X
South End Fire station		X
East Granby Recreation Building		
Park and Rec Office		
Library		
DPW		X
3 Sewer Pumping Stations		X
Community Center/Senior Center	Primary	X
Four Schools		

Facility	Shelter	Generator
Congregational Church		
Two private Senior Housing Facilities		Limited

Capabilities

East Granby has not permitted any new structures or had any demolitions in the floodplain since 2008. Hazard mitigation is addressed specifically in the community’s Plan of Conservation and Development.

East Granby has a grant through the State Local Bridge Grant Program to address scouring issues at Floodville Bridge.

Challenges

Challenges Overview

Areas known to be prone to flooding include Route 189 along Salmon Brook near Granby park (four to five houses are prone to flooding), and generally areas along Salmon Brook. The Floodville Bridge has scouring issues.

The area of Hatchett Hill is at risk from wildfires and currently has inadequate firefighting water supplies.

In the past, the Town experienced roof collapses due to heavy snow loads on flat roofed buildings.

Hazard Losses

The economic losses faced by East Granby from natural hazards can be estimated by reviewing historic, and modeling future, loss figures. Loss estimates are summarized below.

Historic FEMA Payments

FEMA reimburses communities for hazard losses through programs including Public Assistance (PA) and the National Flood Insurance Program (NFIP). Combining PA and private flood insurance payments can give an estimate for total losses to a community.

The NFIP has paid three property damage claims in East Granby totaling \$2,318 to-date. East Granby has no Repetitive Loss (RL) Property claims to-date.

Total PA reimbursements to the community were as follows:

- Flood Events: \$34,790 (\$1,831 annually)
- Hurricane Events: \$13,686 (\$720 annually)
- Winter Storm Events: \$770,810 (\$40,569 annually)



These are summarized in the tables below.

Table 9-2: Flood Event PA Reimbursements, East Granby

Incident	Sep 1999	Oct 2005
Declaration	9/23/1999	12/16/2005
Disaster No.	1302	1619
Entity	FEMA PA Reimbursement	
State	\$239	\$296
Municipal	\$0	\$34,255
Nonprofit	\$0	\$0
Total	\$239	\$34,551
Annualized	\$13	\$1,818

Table 9-3: Hurricane Wind Event PA Reimbursements, East Granby

Incident	Aug - Sep 2011 (T.S. Irene)
Declaration	9/2/2011
Disaster #	4023
Entity	FEMA PA Reimbursement
State	\$988
Municipal	\$12,699
Nonprofit	\$0
Total	\$13,686
Annualized	\$720

Table 9-4: Winter Storm PA Reimbursements, East Granby

Incident	Mar 2003	Dec 2003	Jan 2005	Feb 2006	Jan 2011	Oct 2011	Feb 2013
Declaration	3/11/03	1/15/04	2/17/05	5/2/06	3/3/11	11/17/11	3/21/13
Disaster #	3176	3192	3200	3266	1958	4046	4106
Entity	FEMA PA Reimbursement						
State	\$4,464	\$4,001	\$5,279	\$6,408	\$5,583	\$7,163	\$15,575
Municipal	\$8,663	\$22,879	\$21,600	\$21,145	\$39,916	\$555,322	\$52,812
Nonprofit	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Total	\$13,126	\$26,880	\$26,879	\$27,552	\$45,499	\$562,486	\$68,387
Annualized	\$691	\$1,415	\$1,415	\$1,450	\$2,395	\$29,605	\$3,599

National Centers for Environmental Information Losses

The table below summarizes events in the National Centers for Environmental Information (NCEI) severe storm database that were specifically noted as having impacted East Granby since 2012.



Table 9-5: NCEI Database Losses since 2012, East Granby

Date	Event	Property Damage
8/25/2015	Thunderstorm Wind	\$5,000
7/12/2017	Hail	\$0
Total		\$5,000

NCEI losses under other event categories (such as drought, high wind, flooding, and winter storms) were not specifically noted as impacting East Granby, though they did impact Hartford County and nearby towns. NCEI losses are reported in Section II of this Plan.

HAZUS-MH Losses

CRCOG used FEMA’s Hazus-MH model to analyze the risks that the Town of East Granby might face from flooding, hurricanes, and earthquakes. The model estimates economic losses to the town due to damage to buildings and building contents, as well as other economic disruptions. Both residential and commercial structures are addressed. Losses from different hazards are summarized below. Where available, estimates from the previous and current versions of the HMP are provided side-by-side; differences between the two may have been caused by a combination of the following:

- Changes in methodology: such as hazard zone mapping
- Changes in data: such as population and property values
- Changes in the model: this HMP utilized Hazus-MH version 4.0 rather than 2.1
- Other factors: inherent in a complex software like Hazus-MH

More details are available in the Multi-Jurisdictional HMP. Ultimately, changes in the loss estimates reflect the reality that small differences in hazard event features can have a significant impact on losses incurred.

Table 9-6: Estimated Damages to East Granby from a 1% Annual-Chance Flood

Loss Type	2014 Results	2018 Results
Households Displaced	67	49
People Needing Shelter	96	24
Buildings at Least Moderately Damaged	13	0
Economic Losses		
Residential Building & Content Losses	\$7,210,000	\$2,330,622
Other Building & Content Losses	\$6,110,000	\$5,390,141
Total Building & Content Loss	\$13,320,000	\$7,720,763
Total Business Interruption Losses	\$10,000	\$216,909
TOTAL	\$13,330,000	\$7,937,671



Table 9-7: Estimated Damages to East Granby from a 1% Annual-Chance Hurricane

Loss Type	2014 Results (1938 event)	2018 Results (1% track)
Buildings at Least Moderately Damaged	135	1
Buildings Completely Damaged	6	1
Total Debris Generated (tons)	21,073	2947
Truckloads (at 25 tons/truck) of building debris	67	118
Economic Losses		
Residential Building & Content Losses	\$13,580,000	\$2,664,244
Other Building & Content Losses	\$4,210,000	\$89,282
Total Building & Content Loss	\$17,790,000	\$2,753,526
Total Business Interruption Losses	\$2,010,000	\$16,642
TOTAL LOSSES	\$19,800,000	\$2,770,168

Losses were calculated from a modeled probabilistic earthquake (1% annual-chance of occurrence), as well as for four specific scenarios with epicenters around Connecticut.

Table 9-8: Estimated Damages to East Granby from a Probabilistic Earthquake

Loss Type	2018 Results
Wage Loss	\$846
Rent Loss	\$788
Relocation Loss	\$1,447
Income Loss	\$724
Inventory Loss	\$109
Total Business Disruption	\$3,915
Structural Loss	\$2,818
Non-Structural Loss	\$9,680
Total Building Loss	\$10,699
Total Content Loss	\$3,293
TOTAL LOSSES	\$17,850

Table 9-9: Estimated Damages to East Granby from Modeled Earthquake Scenarios

Epicenter Location	Magnitude	Estimated Total Losses
East Haddam	6.4	\$37,239.21
Haddam	5.7	\$8,653.59
Portland	5.7	\$22,688.93
Stamford	5.7	\$1,810.51

Average Annualized Losses

Average Annualized Loss (AAL) figures are useful tools for comparison of the risks faced from different hazards with different likelihoods of occurring in a given time period. AAL estimates were prepared for East Granby based on the methodologies discussed in Section II of the Multi-Jurisdictional HMP. Dam failure, drought, tornado, and wildfire losses were sourced from the 2014 Connecticut Natural Hazard Mitigation Plan Update, with dam failure data supplemented by the National Performance of Dams Program and the Connecticut Department of Energy &



Environmental Protection. Earthquake and hurricane losses were calculated in HAZUS-MH. Losses for flooding came from NFIP claims, for winter storms from Public Assistance Reimbursements, and for thunderstorms from the NCEI database. These are presented in the table below in dollars per year. Note that Hurricanes and Tropical Storms represent the largest share of total annualized losses.

Table 9-10: Average Annualized Losses, East Granby

Dam Failure	Drought	Earthquakes	Flooding	Hurricanes and Tropical Storms	Severe Winter Storms	Thunderstorms	Tornadoes	Wildfires	Total
\$9	\$0	\$17,850	\$1,892	\$322,721	\$40,569	\$684	\$75,531	\$3,264	\$462,519

Mitigation Strategies and Actions

Noted Hazard Mitigation Needs

During the course of this Plan development, multiple hazard mitigation needs of East Granby were noted, including:

- Install a generator at the High School to make progress on creating a primary shelter there.
- Install a generator at the Congregational Church to make progress on creating a backup shelter there.
- Install dry hydrant at Hatchett Hill.
- Construct access road at Tunxis/Spoonville across the Farmington River.

Status of Previous Mitigation Strategies and Actions

The Town of East Granby reviewed the mitigation actions proposed in the 2014-2019 Capitol Region Natural Hazards Mitigation Plan Update and determined the status of each. That information is included in the table below.

Table 9-11: Status of Previous Mitigation Strategies and Actions, East Granby

Action #	Action	Notes	Status
GOAL: REDUCE THE IMPACTS OF FLOODING ON PEOPLE AND PROPERTY.			
Objective 1: Strengthen land use regulations, and their implementation, to ensure flood risks do not increase.			
1.1	Consider requiring more low impact development measures through zoning regulations.	Adopted performance-based LID regulations in 2012.	Complete
1.2	Educate land use officials on low impact development techniques.	Town now has a land use manual in place.	Carry Forward with Revisions



Action #	Action	Notes	Status
Objective 2: Encourage acquisition of undeveloped land subject to flooding as open space.			
2.1	Develop an open space plan, with special attention paid to land along rivers and streams not only because of flooding concerns, but also for recreation and wildlife management interests.	Deferred; Cultural resources inventory created to identify open spaces. State funds were used to buy development rights for 400+ acres of farmland. 2016 POCD developed and working on hierarchy.	Carry Forward
Objective 3: Improve stormwater management practices to reduce runoff.			
3.1	Continue to implement measures under Phase II MS4 Stormwater program.	Town now has an environmental consultant working to identify stormwater outfalls, with 30 completed to date.	Drop
Objective 4: Ensure that vulnerable areas remain accessible during floods.			
4.1	Develop a plan for accessing flood prone areas, such as Winding Hill Road.	Identified two new routes for emergency access. Winding Hill Road has one additional access point via utility road.	Complete
4.2	Implement recommendations from above-mentioned plan.	Recommendations implemented, but still need a secondary access to Cowles Park.	Carry Forward with Revisions
4.3	Address Floydville Road culvert, either by cleaning or by replacing.	Completed. Culvert was replaced in 2011. No additional work needed.	Complete
GOAL: MINIMIZE LOSS OF LIFE, PROPERTY AND ECONOMIC CONSEQUENCES OF HIGH WIND AND WINTER STORM EVENTS.			
Objective 1: Ensure adequate tree trimming in public rights-of-way.			
1.1	Continue tree evaluation practices.	Tree Warden informally evaluates; but a more formal plan/process is needed along with the identification of areas with overhead wires.	Carry Forward with Revisions
1.2	Continue to contract out preventive maintenance of trees.	Purchased bucket truck in 2010, and cherry picker for medium trees. Preventative work now performed by town staff. A new action identifying a need for equipment to handle larger trees is listed below.	Drop



Action #	Action	Notes	Status
Objective 2: Minimize power outages.			
2.1	Analyze areas where outages occur and monitor new developments.	Existing capability / ongoing activity.	Capability
2.2	Work with utility to reduce outages in areas frequently without power.	Upgrades have been made. Worked with CL&P on aggressive tree cutbacks and identified a prioritized list of facilities for power restoration.	Complete
Objective 3: Communicate effectively with residents before, during and after hazard events.			
3.1	Continue to maintain special needs population list.	Update special needs population lists quarterly.	Capability
3.2	Monitor and ensure effective implementation of Reverse-911 system.	Complete - Everbridge system in place.	Complete
Objective 4: Ensure that roads in East Granby remain passable.			
4.1	Treat roads in advance of winter storms, when possible.	Existing capability / ongoing activity.	Capability
4.2	Continue to address state roads, when necessary to maintain safety.	Existing capability / ongoing activity.	Capability

Active Mitigation Strategies and Actions

The Town proposed to initiate several new mitigation actions for the upcoming five years. Additionally, a number of actions from the previous planning period are being carried forward or replaced with revised actions. These are listed below.

Each of the following actions has been prioritized based on FEMA guidelines, listed from highest to lowest priority, and numbered.

Action #1	
Enter the Sustainable CT program through Registration and review actions that can be undertaken to pursue Certification. Make progress with the actions related to hazard mitigation.	
Goal	4. Increase the use of natural, "green," or "soft" hazard mitigation measures, such as open space preservation and green infrastructure.
Category	Natural Resources Protection
Lead	Planning
Cost	\$0 - \$10,000
Funding	Town Operating Budget
Timeframe	01/2019 - 12/2019
Priority	High



Action #2

Install a generator at the High School to make progress on creating a primary shelter there.

Goal	7. Improve the emergency response capabilities of the region and its communities
Category	Preparedness & Emergency Response
Lead	Emergency Management
Cost	\$10,000 - \$25,000
Funding	Town Operating Budget / DEMHS
Timeframe	07/2019 - 06/2020
Priority	High

Action #3

Conduct a stormwater management study to determine local best management practices to reduce runoff.

Goal	3. Improve institutional awareness and understanding of natural hazard impacts and mitigation within municipal governments and other decision-making bodies
Category	Prevention
Lead	Planning
Cost	\$25,000 - \$50,000
Funding	Grants
Timeframe	07/2019 - 06/2021
Priority	High

Action #4

Conduct outreach to local small businesses with the aim of preventing the accidental release and pollution from chemicals stored and used at their facilities during or following natural hazard events.

Goal	6. Improve public outreach, education, and warning systems
Category	Education & Awareness
Lead	Planning, in coordination with DEEP
Cost	\$0 - \$10,000
Funding	Materials & Resources Provided by CT DEEP
Timeframe	01/2019 - 12/2019
Priority	Medium



Action #5

Coordinate with NEMO and CRCOG to share resources and gain technical support for hazard mitigation actions involving stormwater management and public outreach, which have parallel benefits related to MS4 stormwater permit compliance.

Goal	1. Minimize the impact of natural hazards on physical buildings and infrastructure
Category	Prevention
Lead	Public Works
Cost	\$0 - \$10,000
Funding	Town Operating Budget
Timeframe	01/2020 - 12/2020
Priority	Medium

Action #6

Participate in EMI courses or the seminars and annual conference held by the Connecticut Association of Flood Managers.

Goal	3. Improve institutional awareness and understanding of natural hazard impacts and mitigation within municipal governments and other decision-making bodies
Category	Education & Awareness
Lead	Planning
Cost	\$0 - \$10,000
Funding	Town Operating Budget
Timeframe	07/2019 - 06/2024
Priority	Medium

Action #7

Install a dry hydrant or cistern at Hatchett Hill.

Goal	7. Improve the emergency response capabilities of the region and its communities
Category	Preparedness & Emergency Response
Lead	Fire Department
Cost	\$10,000 - \$25,000
Funding	CT DEEP
Timeframe	07/2020 - 06/2021
Priority	Medium



Action #8

Work with MDC to identify potential hazard mitigation actions for MDC facilities, and list those actions in the next HMP Update.

Goal	5. Improve the resilience of local and regional utilities and infrastructure using strategies including adaptation, hardening, and creating redundancies.
Category	Property Protection
Lead	Public Works
Cost	\$10,000 - \$25,000
Funding	Town Operating Budget / DEMHS
Timeframe	07/2020 - 06/2022
Priority	Medium

Action #9

Install a generator at the Congregational Church to make progress on creating a backup shelter there.

Goal	7. Improve the emergency response capabilities of the region and its communities
Category	Preparedness & Emergency Response
Lead	Emergency Management
Cost	\$10,000 - \$25,000
Funding	Town Operating Budget / DEMHS
Timeframe	07/2020 - 06/2022
Priority	Medium

Action #10

Construct an access road across the Farmington River at Tunxis/Spoonville to provide an additional access/egress route.

Goal	7. Improve the emergency response capabilities of the region and its communities
Category	Preparedness & Emergency Response
Lead	Planning
Cost	More than \$100,000
Funding	Grants
Timeframe	07/2021 - 06/2023
Priority	Medium



Action #11

Construct a secondary access route to Cowles Park.

Goal	7. Improve the emergency response capabilities of the region and its communities
Category	Preparedness & Emergency Response
Lead	Planning
Cost	More than \$100,000
Funding	Grants
Timeframe	01/2022 - 12/2023
Priority	Medium

Action #12

Educate land use officials on low impact development techniques. Consider contacting UConn Extension for assistance.

Goal	3. Improve institutional awareness and understanding of natural hazard impacts and mitigation within municipal governments and other decision-making bodies
Category	Education & Awareness
Lead	Planning
Cost	\$0 - \$10,000
Funding	Town Operating Budget
Timeframe	07/2020 - 06/2022
Priority	Low

Action #13

Develop a formal process of tree evaluation and overhead wires. Consider collaborating with Eversource.

Goal	5. Improve the resilience of local and regional utilities and infrastructure using strategies including adaptation, hardening, and creating redundancies.
Category	Prevention
Lead	Public Works
Cost	\$0 - \$10,000
Funding	Town Operating Budget
Timeframe	07/2021 - 06/2023
Priority	Low



Action #14

Coordinate with CT SHPO to conduct historic resource surveys, focusing on areas within natural hazard risk zones (such as flood or wildfire hazard zones and areas near steep slopes), to support identification of vulnerable historic properties and preparation of resiliency plans across the state. This action leverages existing resources and best practices for protection of historic and cultural resources through an ongoing statewide initiative by CT SHPO.

Goal	8. Ensure community character and social equity are addressed in mitigation activities
Category	Property Protection
Lead	Planning, in coordination with SHPO
Cost	\$10,000 - \$25,000
Funding	SHPO
Timeframe	07/2021 - 06/2023
Priority	Low

Action #15

Develop an open space plan, with special attention paid to land along rivers and streams not only because of flooding concerns, but also for recreation and wildlife management interests.

Goal	4. Increase the use of natural, “green,” or “soft” hazard mitigation measures, such as open space preservation and green infrastructure.
Category	Natural Resources Protection
Lead	Planning
Cost	\$25,000 - \$50,000
Funding	Grants / CT DEEP
Timeframe	07/2021 - 06/2022
Priority	Low

Action #16

Acquire equipment necessary to maintain and remove large trees.

Goal	5. Improve the resilience of local and regional utilities and infrastructure using strategies including adaptation, hardening, and creating redundancies.
Category	Prevention
Lead	Public Works
Cost	\$50,000 - \$100,000
Funding	Grants
Timeframe	07/2023 - 12/2023
Priority	Low








Capitol Region Natural Hazards Mitigation Plan Update










East Granby, Connecticut

Flood Plains, Dams & Critical Facilities

Dam Hazard Class



-  BB, A, AA OR Unclassified
-  Class B - Significant Hazard
-  Class C - High Hazard

Critical Facilities

-  Fire Station
-  Police Station
-  School
-  Healthcare Facility
-  State Facility
-  Town Facility
-  Waste Water Facility
-  Emergency Center
-  NRHP Buildings/Sites

 NRHP Districts/Areas

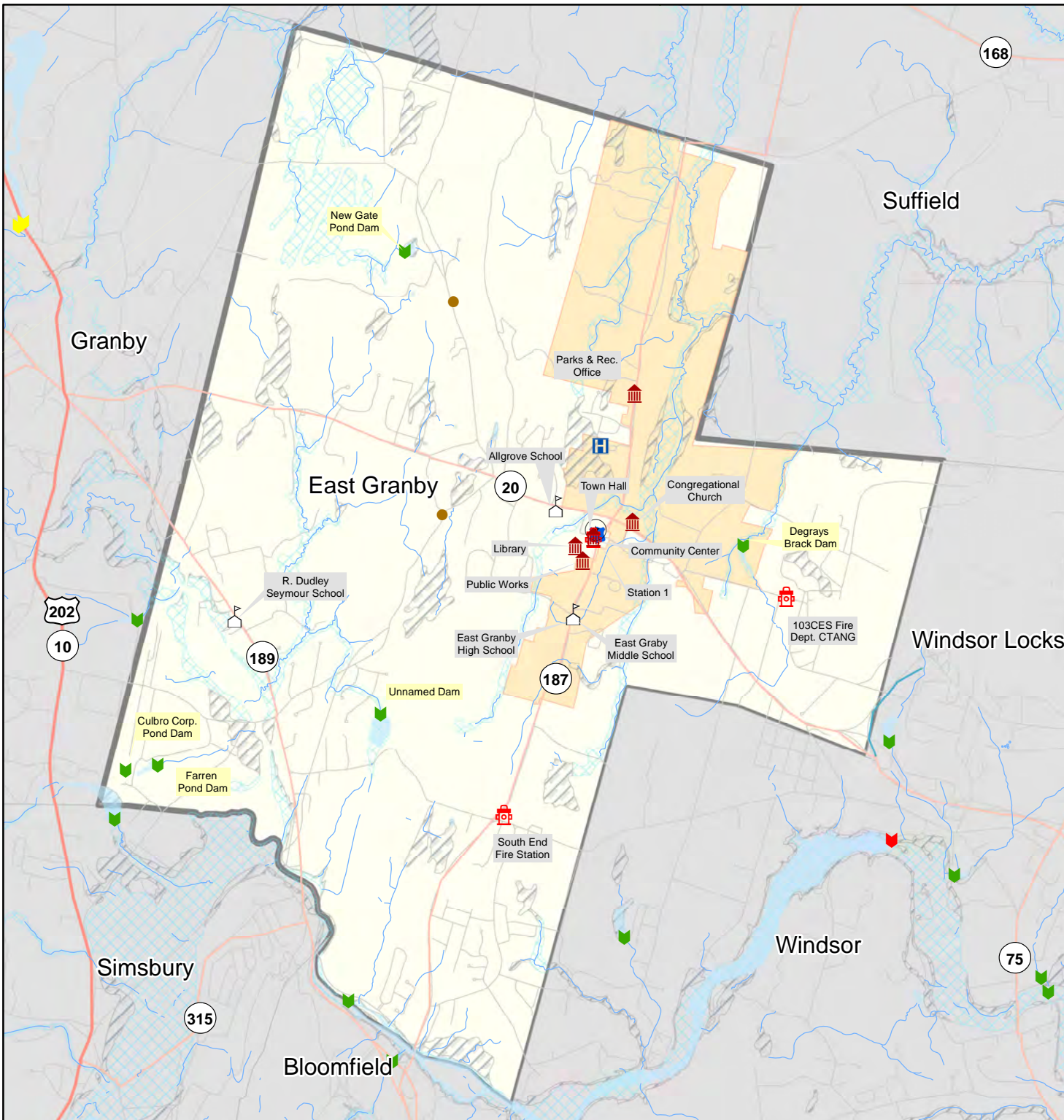
FEMA Flood Hazard Area

-  100 Year Flood Zone
-  500 Year Flood Zone

Data Sources: FEMA, National Register of Historic Places, CT DEEP, CRCOG, ESRI



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Capitol Region Natural Hazards Mitigation Plan Update












East Granby, Connecticut

Dam Breach Inundation Area & Critical Facilities

Dam Hazard Class

-  BB, A, AA OR Unclassified
-  Class B - Significant Hazard
-  Class C - High Hazard

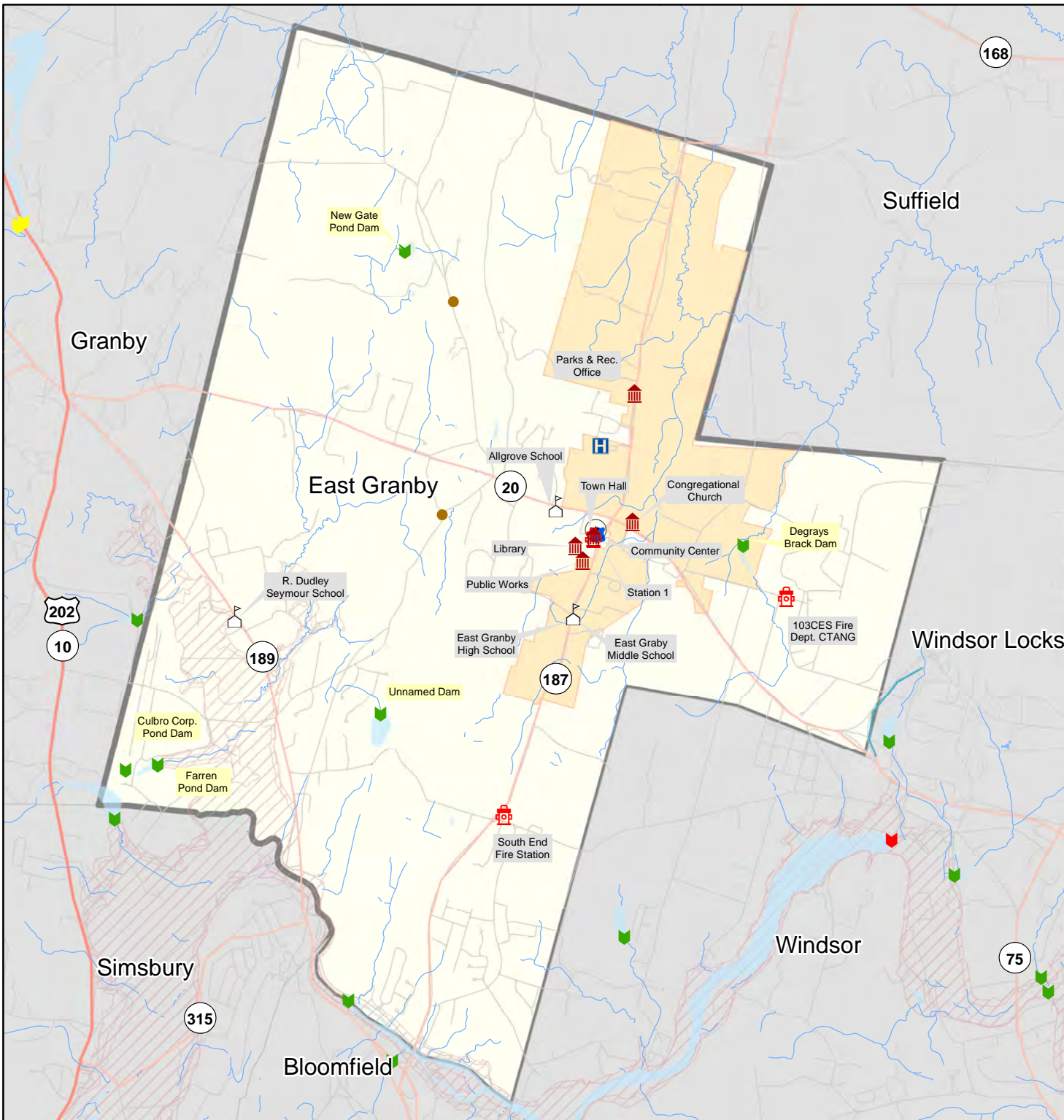
Critical Facilities

-  Fire Station
-  Police Station
-  School
-  Healthcare Facility
-  State Facility
-  Town Facility
-  Waste Water Facility
-  Emergency Center
-  NRHP Buildings/Sites
-  NRHP Districts/Areas
-  Dam Breach Inundation Areas

Data Sources: FEMA, National Register of Historic Places, CT DEEP, CRCOG, ESRI



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10 East Hartford

Community Overview

East Hartford is a suburban community of approximately 52,212 located east of the City of Hartford and west of the Town of Manchester. The Town covers slightly more than 18 square miles. East Hartford’s land area drains primarily to the Connecticut and Hockanum Rivers. There are four other primary waterways in Town: Burnham, Willow, Pewterpot, and Porter Brooks. Many regionally significant transportation routes traverse in East Hartford including Interstate 84 and 384, and Routes 2, 5, 15, and 44.

Principal industries include aerospace manufacturing and contractors, warehouse and distribution centers, as well as light industrial and retail businesses. Connecticut Natural Gas and the State Department of Information Technology, among others, maintain critical infrastructure in Town. East Hartford is home to the University of Connecticut Huskies football team, Goodwin College, Coca Cola, and Cabela’s retail store at Rentschler Field. Continued development of the former Rentschler Airfield promises to bring additional opportunities to the Town. Additional development is focused on the Silver Lane Corridor. The State’s commodities distribution facility, currently located in East Hartford, is being relocated to Manchester; this will open up space for redevelopment of that site.

Critical Facilities

Critical Facilities throughout the Capitol Region are listed in Appendix B. In East Hartford these include the Emergency Operations Center (EOC) on School Street, The High School (primary shelter), five fire houses, the library, the community cultural center, the new Senior Center, and the Middle School.

Table 10-1: Critical Facilities, East Hartford

Facility	Shelter	Generator
Emergency Operations Center		X
High School	Primary	X
Five fire houses		X
Library		
Community Cultural Center		
Senior Center		
Middle School		

There is interest in providing the Middle School with standby power and certifying it as a backup shelter.

Capabilities

Hazard mitigation is addressed specifically in East Hartford’s Plan of Conservation and Development (POCD). The HMP document itself is cited. POCD actions specifically address natural hazards.

Following historic flooding of the Connecticut River Valley in 1936 and 1938, the Army Corps of Engineers designed and constructed a levee system in East Hartford to protect the Town from future catastrophic flooding. The Town has operated and maintained the levee system since its initial construction and recently has undertaken a multi-year \$21 million capital improvement program dedicated to the system. These improvements have allowed the Town to obtain accreditation by FEMA and maintain active status on the U.S. Army Corps of Engineers' list of flood control systems.

The Metropolitan District Commission's (MDC) Clean Water Project presents substantial opportunities for the Town. As planning for the separation of storm water and sewer lines throughout the Region continues, it is critical for the Town to monitor impacts on flood control infrastructure.

East Hartford participates in the National Flood Insurance Program and carefully evaluates proposed development in hazard prone areas. Floodplain permits are reviewed and approved subject to the requirements of the adopted floodplain regulations.

The Town has made a number of roadway improvements, culvert repairs, and levee repairs. The Town has also permitted renovations, repairs or replacement of a parking lot, stormwater outfall, dock and pier; building additions; replacement of a house; as well as construction of a new magnet school, and demolition of a house and tobacco shed in the flood plain. In 2010 the Fire House was relocated 10 feet to avoid a flood zone. Currently, no new major capital improvements (such as bridge, culvert, or stormwater upgrades) are planned; this excludes the ongoing, multi-year capital improvement program for the flood control system.

The Town coordinates tree-trimming near power lines and power outage prevention and response with the local energy provider (Eversource). Coordination has been effective; Town personnel have noted that fewer outages are occurring than in the past.

Under the Direction of the Mayor, an effort is underway to expand the Town's GIS capacity and use. This can support Emergency Management needs of this community by providing a more robust GIS that can provide real-time tracking of debris, damaged structures, and infrastructure disruptions.

Firefighting water is available through the municipal water system throughout the Town.

New Capabilities Changes

A recent Letter of Map Revision for Willow Brook was approved by FEMA, improving the accuracy of the FIRM.

Since adoption of the 2014-2019 Capitol Region Natural Hazards Mitigation Plan Update ("2014 HMP"), the Town has acquired a brine truck to assist with street treatment prior to snow events. They have also designated locations to store snow removed from roads and lots.



The Town has been very proactive with tree maintenance and uses its tree-maintenance budget more efficiently than in the past.

Challenges

Challenges Overview

East Hartford reports that many stormwater drainage systems are undersized, but the Town does not have the funding to upsize them. During large rain events, poor-drainage flooding can cause a half-day to a full-day of impaired access.

East Hartford reports that wildfires are not a concern for the Town.

Hazard Losses

The economic losses faced by East Hartford from natural hazards can be estimated by reviewing historic, and modeling future, loss figures. Loss estimates are summarized below.

Historic FEMA Payments

FEMA reimburses communities for hazard losses through programs including Public Assistance (PA) and the National Flood Insurance Program (NFIP). Combining PA and private flood insurance payments can give an estimate for total losses to a community.

To date, the NFIP has paid 99 property damage claims in East Hartford totaling \$470,667. East Hartford has had 17 Repetitive Loss (RL) Property claims, totaling \$228,580, on six properties.

Total PA reimbursements to the community were as follows:

- Flood Events: \$38,908 (\$2,048 annually)
- Hurricane Events: \$396,892 (\$20,889 annually)
- Winter Storm Events: \$3,573,658 (\$188,087 annually)

These are summarized in the tables below.

Table 10-2: Flood Event PA Reimbursements, East Hartford

Incident	Sep 1999	Oct 2005
Declaration	9/23/1999	12/16/2005
Disaster No.	1302	1619
Entity	FEMA PA Reimbursement	
State	\$2,377	\$2,948
Municipal	\$0	\$33,584
Nonprofit	\$0	\$0
Total	\$2,377	\$36,531
Annualized	\$125	\$1,923



Table 10-3: Hurricane Wind Event PA Reimbursements, East Hartford

Incident	Aug - Sep 2011 (T.S. Irene)	Oct - Nov 2012 (Storm Sandy)
Declaration	9/2/2011	10/30/2012
Disaster #	4023	4087
Entity	FEMA PA Reimbursement	
State	\$2,649	\$0
Municipal	\$227,251	\$0
Nonprofit	\$166,137	\$854
Total	\$396,038	\$854
Annualized	\$20,844	\$45

Table 10-4: Winter Storm PA Reimbursements, East Hartford

Incident	Mar 2003	Dec 2003	Jan 2005	Feb 2006	Jan 2011	Oct 2011	Feb 2013
Declaration	3/11/03	1/15/04	2/17/05	5/2/06	3/3/11	11/17/11	3/21/13
Disaster #	3176	3192	3200	3266	1958	4046	4106
Entity	FEMA PA Reimbursement						
State	\$44,439	\$39,838	\$52,557	\$63,793	\$61,188	\$24,221	\$110,515
Municipal	\$78,826	\$142,374	\$126,101	\$108,696	\$280,894	\$1,876,587	\$542,562
Nonprofit		\$506	\$550	\$439	\$4,055	\$10,921	\$4,597
Total	\$123,265	\$182,718	\$179,208	\$172,928	\$346,136	\$1,911,728	\$657,674
Annualized	\$6,488	\$9,617	\$9,432	\$9,101	\$18,218	\$100,617	\$34,614

National Centers for Environmental Information Losses

The table below summarizes events in the National Centers for Environmental Information (NCEI) severe storm database that were specifically noted as having impacted East Hartford since 2012.

Table 10-5: NCEI Database Losses since 2012, East Hartford

Date	Event	Property Damage
9/8/2012	Thunderstorm Wind	\$2,000
6/27/2017	Hail	\$0
6/22/2012	Flood	\$0
Total Thunderstorm		\$2,000
Total Flood		\$0

NCEI losses under other event categories (such as drought, high wind, flooding, and winter storms) were not specifically noted as impacting East Hartford, though they did impact Hartford County and nearby towns. NCEI losses are reported in Section II of this Plan.



HAZUS-MH Losses

CRCOG used FEMA’s Hazus-MH model to analyze the risks that the Town of East Hartford might face from flooding, hurricanes, and earthquakes. The model estimates economic losses to the town due to damage to buildings and building contents, as well as other economic disruptions. Both residential and commercial structures are addressed. Losses from different hazards are summarized below. Where available, estimates from the previous and current versions of the HMP are provided side-by-side; differences between the two may have been caused by a combination of the following:

- Changes in methodology: such as hazard zone mapping
- Changes in data: such as population and property values
- Changes in the model: this HMP utilized Hazus-MH version 4.0 rather than 2.1
- Other factors: inherent in a complex software like Hazus-MH

More details are available in the Multi-Jurisdictional HMP. Ultimately, changes in the loss estimates reflect the reality that small differences in hazard event features can have a significant impact on losses incurred.

Table 10-6: Estimated Damages to East Hartford from a 1% Annual-Chance Flood

Loss Type	2014 Results	2018 Results
Households Displaced	422	1442
People Needing Shelter	997	2940
Buildings at Least Moderately Damaged	41	23
Residential Building & Content Losses		
Residential Building & Content Losses	\$14,330,000	\$78,235,001
Other Building & Content Losses	\$19,030,000	\$61,960,088
Total Building & Content Loss	\$33,360,000	\$140,195,089
Total Business Interruption Losses	\$18,000	\$2,623,480
TOTAL	\$33,550,000	\$142,818,569

Table 10-7: Estimated Damages to East Hartford from a 1% Annual-Chance Hurricane

Loss Type	2014 Results (1938 event)	2018 Results (1% track)
Buildings at Least Moderately Damaged	2,009	14
Buildings Completely Damaged	113	1
Total Debris Generated (tons)	49,140	7673
Truckloads (at 25 tons/truck) of building debris	1,100	307
Economic Losses		
Residential Building & Content Losses	\$168,500,000	\$25,935,994
Other Building & Content Losses	\$42,250,000	\$1,448,216
Total Building & Content Loss	\$210,750,000	\$27,384,210
Total Business Interruption Losses	\$30,350,000	\$1,800,232
TOTAL LOSSES	\$241,100,000	\$29,184,442



Losses were calculated from a modeled probabilistic earthquake (1% annual-chance of occurrence), as well as for four specific scenarios with epicenters around Connecticut.

Table 10-8: Estimated Damages to East Hartford from a Probabilistic Earthquake

Loss Type	2018 Results
Wage Loss	\$7,833
Rent Loss	\$7,653
Relocation Loss	\$11,782
Income Loss	\$6,020
Inventory Loss	\$776
Total Business Disruption	\$34,065
Structural Loss	\$22,287
Non-Structural Loss	\$67,153
Total Building Loss	\$89,441
Total Content Loss	\$26,144
TOTAL LOSSES	\$149,650

Table 10-9: Estimated Damages to East Hartford from Modeled Earthquake Scenarios

Epicenter Location	Magnitude	Estimated Total Losses
East Haddam	6.4	\$1,101,251.45
Haddam	5.7	\$287,258.66
Portland	5.7	\$1,337,845.59
Stamford	5.7	\$14,975.19

Other Hazard Costs

Town personnel estimate that a typical severe winter storm costs the Town about \$30,000 in response and recovery.

Average Annualized Losses

Average Annualized Loss (AAL) figures are useful tools for comparison of the risks faced from different hazards with different likelihoods of occurring in a given time period. AAL estimates were prepared for East Hartford based on the methodologies discussed in Section II of the Multi-Jurisdictional HMP. Dam failure, drought, tornado, and wildfire losses were sourced from the 2014 Connecticut Natural Hazard Mitigation Plan Update, with dam failure data supplemented by the National Performance of Dams Program and the Connecticut Department of Energy & Environmental Protection. Earthquake and hurricane losses were calculated in HAZUS-MH. Losses for flooding came from NFIP claims, for winter storms from Public Assistance Reimbursements, and for thunderstorms from the NCEI database. These are presented in the table below in dollars per year. Note that Hurricanes and Tropical Storms represent the largest share of total annualized losses.



Table 10-10: Average Annualized Losses, East Hartford

Dam Failure	Drought	Earthquakes	Flooding	Hurricanes and Tropical Storms	Severe Winter Storms	Thunderstorms	Tornadoes	Wildfires	Total
\$92	\$0	\$149,650	\$14,434	\$3,212,914	\$188,087	\$6,807	\$751,962	\$3,346	\$4,327,291

Losses Summary

A review of the above loss estimates demonstrates that the Town of East Hartford has experienced significant expenses as a result of natural hazards, and is at risk for additional losses if some of the less-frequent events were to occur. These actual and potential losses justify hazard mitigation actions to reduce losses in the future.

Mitigation Strategies and Actions

Noted Hazard Mitigation Needs

During the course of this Plan development, multiple hazard mitigation needs of East Hartford were noted, including:

- Enable the Middle School to run on backup power in order to pursue use of the building as a secondary emergency shelter.
- As planning for the separation of storm water and sewer lines throughout the Region continues, it is critical for the Town to monitor impacts on flood control infrastructure.

Status of Previous Mitigation Strategies and Actions

The Town of East Hartford reviewed the mitigation actions proposed in the 2014 HMP and determined the status of each. That information is included in the table below.

Table 10-11: Status of Previous Mitigation Strategies and Actions, East Hartford

Action #	Action	Notes	Status
REDUCE THE LIKELIHOOD OF LOSSES OF LIFE AND PROPERTY FROM FLOODING			
Objective 1: Ensure proper maintenance of flood control system.			
1.1	Continue to implement necessary repairs and upgrades required by FEMA and the Army Corps of Engineers to retain accreditation.	This is a capability. Individual projects are added to the flood control system manual as needed.	Capability
1.2	Continue periodic updates to the flood control system manual as system improvements are completed.	This is a capability. Individual projects are added to the flood control system manual as needed.	Capability
1.3	Train town employees, according to the updated manual, in proper flood fighting operation and maintenance techniques.	This is a capability. Recent examples include stop log exercise, pump stations, new equipment, safety training, vegetation maintenance.	Capability



Action #	Action	Notes	Status
Objective 2: Identify and pursue priority drainage improvement projects in existing natural and artificial drainage systems.			
2.1	Evaluate the condition and sustainability of existing drainage systems.	Willow Brook watershed has been evaluated. Burnham Brook watershed evaluation has not yet commenced. Other studies may be desired in the future. Action is replaced with watershed-specific projects.	Carry Forward with Revisions
2.2	Develop a capital improvement plan to improve existing drainage projects.	Town has a Capital Improvement Plan with specific drainage improvement projects listed.	Completed
2.3	Pursue priority drainage projects identified in capital improvement plan.	Howard Street and John Street drainage improvements have been completed. Additional projects are listed specifically as new actions.	Completed
Objective 3: Improve the ability of emergency responders to prepare for and respond to natural disasters.			
3.1	Exercise and refine critical components of National Incident Management System with an emphasis on interagency communication and cooperation.	This is an ongoing effort on the part of the Town and is considered a capability.	Capability
3.2	Participate in local, regional and state-wide natural disaster preparedness training.	The Town participates in local, regional, and state wide trainings. This is a capability.	Capability
Objective 4: Improve the ability of emergency responders to serve the special needs population during all types of emergencies.			
4.1	Develop and maintain an accessible registry of residents with special needs using a regional model.	The Town believes that maintaining a registry is problematic, and has improved its special needs population assistance procedures through other measures such that maintaining a registry is no longer considered necessary.	Drop
4.2	Use a public notification system.	Town uses Everbridge and social media to alert residents of hazardous conditions.	Capability
4.3	Continue training for the evacuation, sheltering and protection of special needs populations.	This is an ongoing effort. This is a capability.	Capability
Objective 5: Improve emergency communications to residents prior to and during natural disasters.			
5.1	Identify and acquire public notification system, like Reverse-911, for facilitating communication of critical information to residents of all means.	Town uses Everbridge and social media to alert residents of hazardous conditions.	Completed
5.2	Offer educational forums for residents on personal emergency planning.	Progress has been made on this action. The Town has a CERT that could potentially be used to supplement municipal educational efforts. Action will be revised to include measurable goals.	Carry Forward with Revisions



Action #	Action	Notes	Status
Objective 6: Improve awareness of flooding risks among property owners.			
6.1	Implement an educational system for property owners, including insurance education, evacuation strategies and business continuity planning.	This action has been completed and is now a capability. The Town has seen increased inquiries about hazard mitigation from businesses since implementing this action.	Completed

Active Mitigation Strategies and Actions

The Town proposed to initiate several new mitigation actions for the upcoming five years. Additionally, a number of actions from the previous planning period are being carried forward or replaced with revised actions. These are listed below.

Each of the following actions has been prioritized based on FEMA guidelines, listed from highest to lowest priority, and numbered.

Action #1	
Pursue accreditation of the Senior Center as an emergency shelter.	
Goal	7. Improve the emergency response capabilities of the region and its communities
Category	Preparedness & Emergency Response
Lead	Emergency Management
Cost	\$0 - \$10,000
Funding	Town Operating Budget
Timeframe	01/2019 - 12/2019
Priority	High

Action #2	
Consider and document the labor resource needs and benefits of participation in the Sustainable CT program.	
Goal	4. Increase the use of natural, “green,” or “soft” hazard mitigation measures, such as open space preservation and green infrastructure.
Category	Natural Resources Protection
Lead	Planning
Cost	\$0 - \$10,000
Funding	Town Operating Budget
Timeframe	01/2019 - 12/2019
Priority	High



Action #3

Complete a needs-assessment study to determine what would be needed in a new EOC facility, and to preliminarily identify existing facilities that could house that use.

Goal	7. Improve the emergency response capabilities of the region and its communities
Category	Preparedness & Emergency Response
Lead	Emergency Management
Cost	\$25,000 - \$50,000
Funding	Town Operating Budget / Grants / DEMHS
Timeframe	07/2020 - 06/2021
Priority	High

Action #4

In conjunction with the East Hartford Board of Education Facilities Department acquire an emergency generator for the Middle School as a step towards making it a sustainable emergency shelter.

Goal	7. Improve the emergency response capabilities of the region and its communities
Category	Preparedness & Emergency Response
Lead	Emergency Management
Cost	\$100,000
Funding	Town Board of Education Budget / DEMHS
Timeframe	01/2021 - 12/2023
Priority	High

Action #5

In conjunction with the East Hartford Board of Education Facilities Department acquire a true backup generator or improve the capabilities of the current cogeneration system at the East Hartford High School to improve its capabilities as a regional shelter.

Goal	7. Improve the emergency response capabilities of the region and its communities
Category	Preparedness & Emergency Response
Lead	Emergency Management
Cost	\$100,000
Funding	Town Board of Education Budget / DEMHS
Timeframe	07/2019 - 06/2021
Priority	High



Action #6

Conduct outreach to local small businesses with the aim of preventing the accidental release and pollution from chemicals stored and used at their facilities during or following natural hazard events.

Goal	6. Improve public outreach, education, and warning systems
Category	Education & Awareness
Lead	Planning, in coordination with DEEP
Cost	\$0 - \$10,000
Funding	Materials & Resources Provided by CT DEEP
Timeframe	01/2019 - 12/2019
Priority	Medium

Action #7

Coordinate with NEMO and CRCOG to share resources and gain technical support for hazard mitigation actions involving stormwater management and public outreach, which have parallel benefits related to MS4 stormwater permit compliance.

Goal	1. Minimize the impact of natural hazards on physical buildings and infrastructure
Category	Prevention
Lead	Public Works
Cost	\$0 - \$10,000
Funding	Town Operating Budget
Timeframe	01/2020 - 12/2020
Priority	Medium

Action #8

Review maps of flood risk associated with failure of the Flood Control System and determine needs for additional education or action.

Goal	3. Improve institutional awareness and understanding of natural hazard impacts and mitigation within municipal governments and other decision-making bodies
Category	Prevention
Lead	Emergency Management
Cost	\$0 - \$10,000
Funding	Town Operating Budget
Timeframe	07/2020 - 06/2021
Priority	Medium



Action #9

Participate in EMI courses or the seminars and annual conference held by the Connecticut Association of Flood Managers.

Goal	3. Improve institutional awareness and understanding of natural hazard impacts and mitigation within municipal governments and other decision-making bodies
Category	Education & Awareness
Lead	Planning
Cost	\$0 - \$10,000
Funding	Town Operating Budget
Timeframe	07/2019 - 06/2024
Priority	Medium

Action #10

Work with MDC to identify potential hazard mitigation actions for MDC facilities, and list those actions in the next HMP Update.

Goal	5. Improve the resilience of local and regional utilities and infrastructure using strategies including adaptation, hardening, and creating redundancies.
Category	Property Protection
Lead	Public Works
Cost	\$10,000 - \$25,000
Funding	Town Operating Budget / DEMHS
Timeframe	07/2020 - 06/2022
Priority	Medium

Action #11

Have the Town's Community Emergency Response Team run public education and training forums on personal emergency planning at least once annually.

Goal	6. Improve public outreach, education, and warning systems
Category	Education & Awareness
Lead	Emergency Management
Cost	\$10,000 - \$25,000
Funding	Town Operating Budget / Grants
Timeframe	07/2019 - 06/2024
Priority	Medium



Action #12

Initiate a vulnerability and adaptation study of critical facilities located within the flood zone protected by the Flood Control System; the purpose of this study would be to determine the need for and feasibility of floodproofing or relocating critical facilities that would be affected by flooding if the Flood Control System failed.

Goal	3. Improve institutional awareness and understanding of natural hazard impacts and mitigation within municipal governments and other decision-making bodies
Category	Prevention
Lead	Public Works
Cost	\$50,000 - \$100,000
Funding	Town Operating Budget / Grants
Timeframe	07/2023 - 06/2024
Priority	Medium

Action #13

Complete a drainage study of Burnham Brook.

Goal	3. Improve institutional awareness and understanding of natural hazard impacts and mitigation within municipal governments and other decision-making bodies
Category	Prevention
Lead	Public Works
Cost	\$50,000 - \$100,000
Funding	Town Operating Budget / Grants
Timeframe	07/2023 - 06/2024
Priority	Medium

Action #14

Contact the owners of Repetitive Loss Properties and nearby properties at risk to inquire about mitigation undertaken and suggest options for mitigating flooding in those areas. This should be accomplished with a letter directly mailed to each property owner.

Goal	1. Minimize the impact of natural hazards on physical buildings and infrastructure
Category	Property Protection
Lead	Planning
Cost	\$0 - \$10,000
Funding	Town Operating Budget / DEMHS
Timeframe	07/2021 - 06/2022
Priority	Low



Action #15

Develop a list of specific upcoming actions as part of the multi-year Flood Control System modification and reconstruction project to and include in the next HMP update.

Goal	1. Minimize the impact of natural hazards on physical buildings and infrastructure
Category	Prevention
Lead	Public Works
Cost	\$0 - \$10,000
Funding	Town Operating Budget
Timeframe	01/2021 - 12/2022
Priority	Low

Action #16

Develop a list individual drainage improvement projects from the CIP to include in the next HMP update.

Goal	1. Minimize the impact of natural hazards on physical buildings and infrastructure
Category	Prevention
Lead	Public Works
Cost	\$0 - \$10,000
Funding	Town Operating Budget
Timeframe	01/2021 - 12/2022
Priority	Low

Action #17

Monitor impacts on the Flood Control System and other flood control infrastructure of any CSO separation work in the Region.

Goal	3. Improve institutional awareness and understanding of natural hazard impacts and mitigation within municipal governments and other decision-making bodies
Category	Education & Awareness
Lead	Public Works
Cost	\$0 - \$10,000
Funding	Town Operating Budget
Timeframe	01/2021 - 12/2022
Priority	Low



Action #18

Work with CT DEEP to complete a formal validation of the Repetitive Loss Property list and update the mitigation status of each listed property.

Goal	1. Minimize the impact of natural hazards on physical buildings and infrastructure
Category	Property Protection
Lead	Planning
Cost	\$10,000 - \$25,000
Funding	CT DEEP / DEMHS
Timeframe	07/2021 - 06/2023
Priority	Low

Action #19

Coordinate with CT SHPO to conduct historic resource surveys, focusing on areas within natural hazard risk zones (such as flood or wildfire hazard zones and areas near steep slopes), to support identification of vulnerable historic properties and preparation of resiliency plans across the state. This action leverages existing resources and best practices for protection of historic and cultural resources through an ongoing statewide initiative by CT SHPO.

Goal	8. Ensure community character and social equity are addressed in mitigation activities
Category	Property Protection
Lead	Planning, in coordination with SHPO
Cost	\$10,000 - \$25,000
Funding	SHPO
Timeframe	07/2021 - 06/2023
Priority	Low

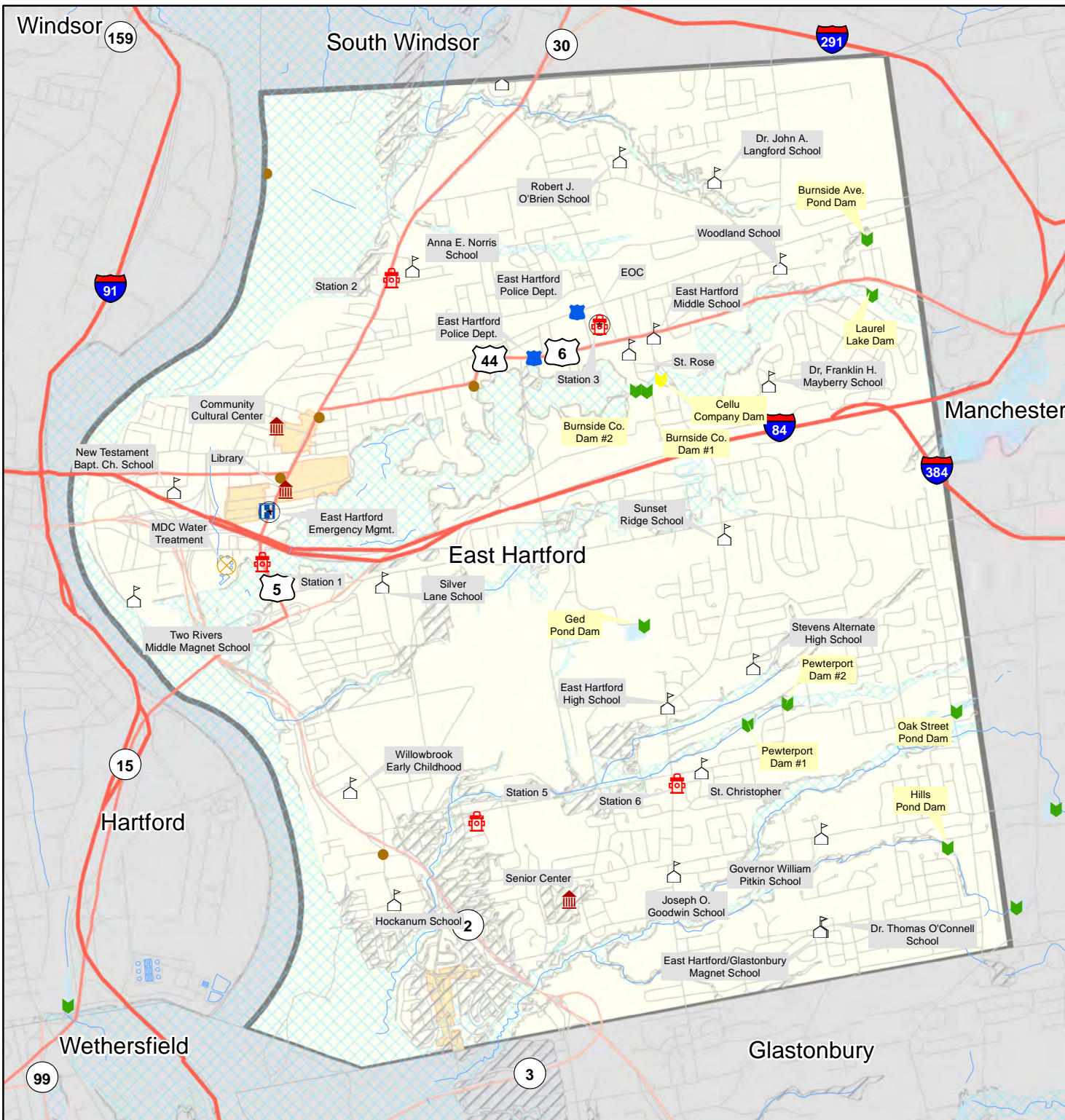
Action #20

Replace the McAuliffe Park culvert, repair the Porter/Main Street culvert, repair the Arbutus Street outfall.

Goal	1. Minimize the impact of natural hazards on physical buildings and infrastructure
Category	Structural Projects
Lead	Public Works
Cost	More than \$100,000
Funding	Grants
Timeframe	07/2023 - 06/2024
Priority	Low










Capitol Region Natural Hazards Mitigation Plan Update










East Hartford, Connecticut

Flood Plains, Dams & Critical Facilities

Dam Hazard Class



-  BB, A, AA OR Unclassified
-  Class B - Significant Hazard
-  Class C - High Hazard

Critical Facilities

-  Fire Station
-  Police Station
-  School
-  Healthcare Facility
-  State Facility
-  Town Facility
-  Waste Water Facility
-  Emergency Center
-  NRHP Buildings/Sites

 NRHP Districts/Areas

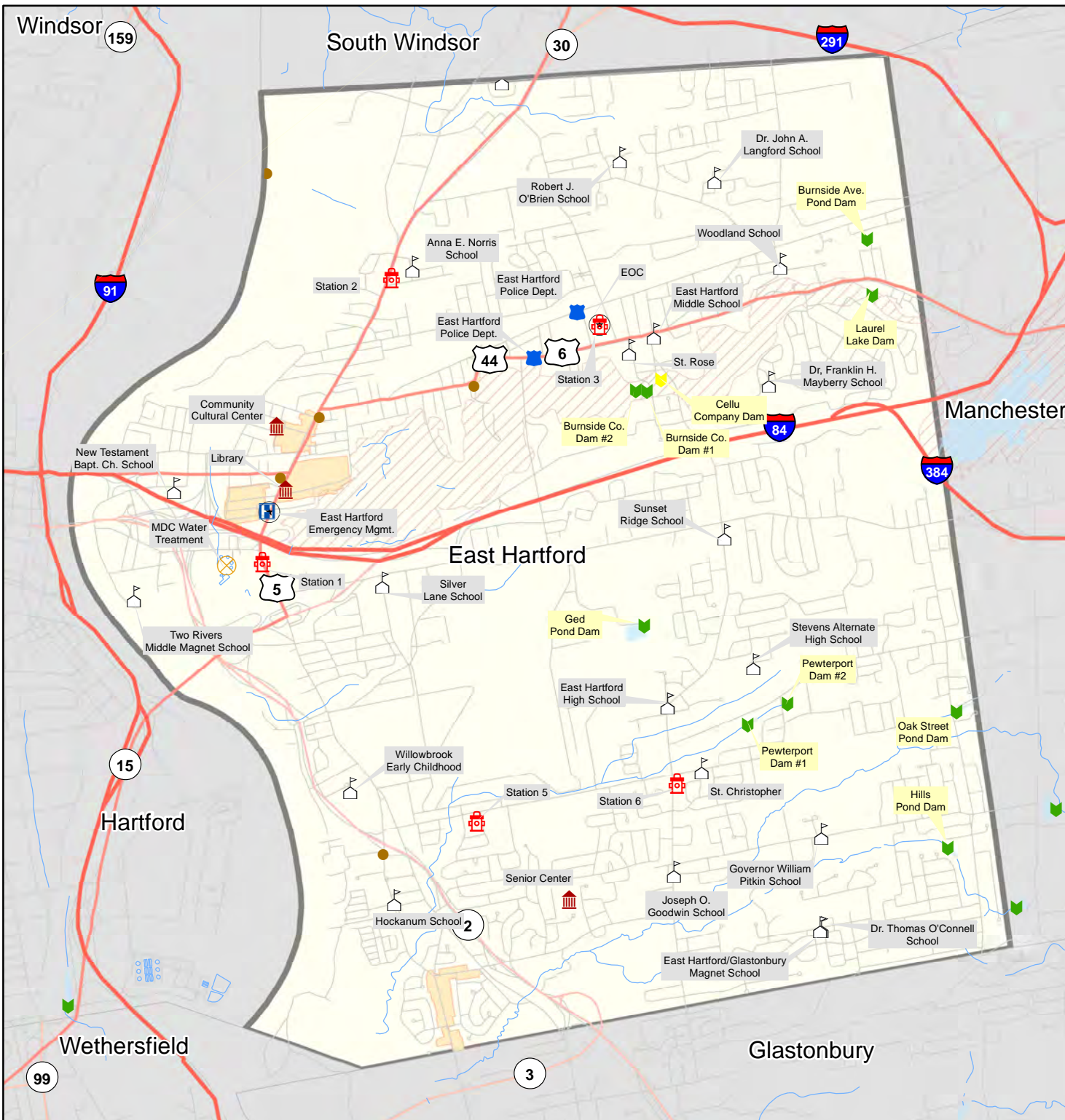
FEMA Flood Hazard Area

-  100 Year Flood Zone
-  500 Year Flood Zone

Data Sources: FEMA, National Register of Historic Places, CT DEEP, CRCOG, ESRI



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Capitol Region Natural Hazards Mitigation Plan Update












East Hartford, Connecticut

Dam Breach Inundation Area & Critical Facilities

Dam Hazard Class

-  BB, A, AA OR Unclassified
-  Class B - Significant Hazard
-  Class C - High Hazard

Critical Facilities

-  Fire Station
-  Police Station
-  School
-  Healthcare Facility
-  State Facility
-  Town Facility
-  Waste Water Facility
-  Emergency Center
-  NRHP Buildings/Sites
-  NRHP Districts/Areas
-  Dam Breach Inundation Areas

Data Sources: FEMA, National Register of Historic Places, CT DEEP, CRCOG, ESRI



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11 East Windsor

Community Overview

East Windsor has about 11,400 residents and a daytime population around 13,250 as people enter Town for work. The Town's land area is 26.3 square miles, giving it a population density of approximately 412 persons per square mile. Approximately 60% of residents are concentrated in Warehouse Point in the northwest section of Town and 40% are located in the Broad Brook area in the eastern-central section of town. Town officials report that the resident population is increasing, mostly with people employed in either Hartford or Springfield.

About 33% of the Town is developed, with most of the remaining area used for farming. In the last five years a new subdivision with 60 homes, called West River Farms, was constructed. Future developments may include the 122-unit Calamar elderly housing complex on Route 5 off Route 140, a possible 600-unit apartment complex on Phelps Road at Route 5, and two DOT roundabout projects in conjunction with construction of the train station. MMCT Venture, a collaboration between the Mohegan Tribe and the Mashantucket Pequot Tribal Nation, is expected to open a Casino in East Windsor within the next five years.

On the east side of the Connecticut River, the town lies at an elevation of about 160 feet. The eastern portion of town is within the Scantic River Watershed, while the western portion lies in the Connecticut Main Stem basin. Major waterways in East Windsor include the Connecticut and Scantic Rivers, along with tributaries including Broad, Chestnut, Ketch, Namerick and Spring Glen Brooks.

Interstate 91 crosses the northwest corner of East Windsor. State Route 5 is a major north-south thoroughfare, while State Routes 140 and 191 provide east-west access. Principal industries include: agriculture, support system facilities, and manufacture of small tools, paper boxes, electronics, aluminum by-products, farm implements and fertilizers. The largest employers in Town are Southern Auto Auction, Walmart, Kettlebrook Care and the companies at the Industrial Park.

Critical Facilities

Critical Facilities throughout the Capitol Region are listed in Appendix B. In East Windsor these include the High School, Middle School, Elementary School, Town Hall, three Fire Stations, Police Department, East Windsor Ambulance Association, Hunt Water Treatment Plant, 10 sewer pumping stations, Department of Public Works (DPW) Garage, the Senior Center, Kettle Brook care Center, Touchpoints at Chestnut, St. Johns Church, and Water Pollution Control Authority (WPCA). These are summarized in the table below.

Table 11-1: Critical Facilities, East Windsor

Facility	Shelter	Generator
Town Hall		
Warehouse Point Fire Dept. Station 138		X
Warehouse Point Fire Dept. Station 238		X
Broad Brook Fire Department		X
East Windsor Police Department		X
- Emergency Operations Center		
- Emergency Management		
- Human Services		
- Ambulance		
East Windsor High School	X	
East Windsor Middle School		
East Windsor Elementary School		
DPW Garage		
Water Pollution Control Authority Facility		X
10 Sewer Pumping Stations		X
Hunt Water Treatment Plant		
2 DPS/DPW Communication Towers		
Kettle Brook Care Center, LLC		
Albert J. Solnit Psychiatric Center North Campus		
Touchpoints at Chestnut		
Senior Center (Broad Brook Fire Dept. Floor 2)	Warming	X
St John's Church	Warming	

Law enforcement is provided by a full-time paid force of 26 regular officers and coordinated by six dispatchers. Fire service is provided by two volunteer fire departments; the Warehouse Point Volunteer Fire Department has two stations, and the Broad Brook Volunteer Fire Department has one. All vehicles are radio equipped and on the fire frequency and all fire stations have auxiliary generating equipment for emergency power.

East Windsor contracts the East Windsor Ambulance Association for emergency medical response. The Association operates five ambulances and three paramedic intercept vehicles.

The Emergency Management Agency has a part-time director and 30 volunteer staff members, six of whom also serve as the Advisory Council. The Agency has substantial equipment for use in disaster situations.

In addition to the critical facilities listed above, East Windsor has a number of historic sites and areas that contribute to community character and the local economy, and may be particularly vulnerable to the effects of natural disaster. These include:

- Windsorville historic district
- Old Box Company (a locally-designated historic site)
- Broadbrook Opera House
- East Windsor Academy



- Melrose School

Capabilities

East Windsor's hazard mitigation capabilities include its emergency response capabilities, regulation of flood risk areas, debris clearing, and snow management. Hazard mitigation is incorporated into the community's Plan of Conservation and Development (POCD). POCD actions specifically address natural hazards.

Since 2008, no new structures have been approved in the special flood hazard zone and a residential structure in the floodplain on North Water Street was recently removed through a demolition order.

Trees near powerlines are managed by the local energy provider (Eversource). The Town clears roads of debris but does not have the equipment to remove large trees.

East Windsor uses snow fencing to manage snow drifting. The Town feels they do an excellent job of snow management.

Two dry hydrants are located at Broadbrook Pond, one at Windsorville, and one at the Boat Dock.

New Capabilities

Four of the Town's ten sewer pumping stations were upgraded during 2016 and 2017; work included upgrading the station emergency generators. Upgrades were completed at the following stations:

- Mill Pond Pump Station (Originally installed in 1977)
- Route 5 (South Main Street) Pump Station (Originally installed in 1981)
- Industrial Park Pump Station (Originally installed in 1976)
- Scout Hall Pump Station (Built in 2000, no generator until this upgrade)

East Windsor is working toward making the High School the Town's primary shelter, with the Middle School transitioning to a secondary shelter. A 100KW portable generator has been purchased, but neither the Middle nor the High School have had hookups installed at this point.

Challenges

Challenges Overview

In addition to the hazards posed by natural disasters, East Windsor feels that motor transportation accidents involving dangerous materials, as well as possible aircraft accidents, are important hazards to consider because Interstate 91, U.S. Route 5 and State Route 140 pass through the town, and Bradley International Airport is in close proximity to the community.



Flooding is a concern for East Windsor. The following areas have been identified as particularly prone to flooding:

- Areas near the Connecticut River
- Bridge over Broad Brook on East Road between Melrose Road and Aspen Drive: this is a beaver-prone area; the river makes two sharp turns and then flows through an undersized culvert
- South Water Street and Bridge Street: homes here have flooded in the past; storm drains back up
- Mill Street and Church Street
- “Blue Ditch”: a drainage feature that allows water to flood near the WPCA if the Connecticut River is high

Dam failure is also a concern. The Broadbrook Pond Dam is Town-owned and in need of repair or replacement. The funding has not yet been secured to do this work; it is believed a bond will be necessary.

Shelter capacity is a concern for the Town. Risk Assessment flood model data suggests that in the event of a 10-Year flood the Town of East Windsor will need to provide emergency shelter for approximately 230 people. In the event of a 100-Year flood the Town will need to shelter approximately 350 people. In the event of a 500-Year flood the Town will need to shelter approximately 450 people.

Hazard Losses

The economic losses faced by East Windsor from natural hazards can be estimated by reviewing historic, and modeling future, loss figures. Loss estimates are summarized below.

Historic FEMA Payments

FEMA reimburses communities for hazard losses through programs including Public Assistance (PA) and the National Flood Insurance Program (NFIP). Combining PA and private flood insurance payments can give an estimate for total losses to a community.

The National Flood Insurance Program paid 23 property damage claims in East Windsor totaling \$281,502 to-date. East Windsor has not had any Repetitive Loss (RL) Property claims filed to-date.

Total PA reimbursements to the community were as follows:

- Flood Events: \$10,088 (\$531 annually)
- Hurricane Events: \$88,467 (\$4,656 annually)
- Winter Storm Events: \$565,525 (\$29,764 annually)

These are summarized in the tables below.



Table 11-2: Flood Event PA Reimbursements, East Windsor

Incident	Sep 1999	Oct 2005
Declaration	9/23/1999	12/16/2005
Disaster No.	1302	1619
Entity	FEMA PA Reimbursement	
State	\$518	\$642
Municipal	\$0	\$8,928
Nonprofit	\$0	\$0
Total	\$518	\$9,570
Annualized	\$27	\$504

Table 11-3: Hurricane Wind Event PA Reimbursements, East Windsor

Incident	Aug - Sep 2011 (T.S. Irene)
Declaration	9/2/2011
Disaster #	4023
Entity	FEMA PA Reimbursement
State	\$491
Municipal	\$87,977
Nonprofit	\$0
Total	\$88,467
Annualized	\$4,656

Table 11-4: Winter Storm PA Reimbursements, East Windsor

Incident	Mar 2003	Dec 2003	Jan 2005	Feb 2006	Jan 2011	Oct 2011	Feb 2013
Declaration	3/11/03	1/15/04	2/17/05	5/2/06	3/3/11	11/17/11	3/21/13
Disaster #	3176	3192	3200	3266	1958	4046	4106
Entity	FEMA PA Reimbursement						
State	\$9,678	\$8,676	\$11,446	\$13,893	\$12,105	\$4,992	\$23,524
Municipal	\$14,177	\$28,273	\$25,518	\$22,622	\$38,610	\$291,560	\$60,451
Nonprofit	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Total	\$23,855	\$36,949	\$36,964	\$36,515	\$50,715	\$296,552	\$83,975
Annualized	\$1,256	\$1,945	\$1,945	\$1,922	\$2,669	\$15,608	\$4,420

National Centers for Environmental Information Losses

The table below summarizes events in the National Centers for Environmental Information (NCEI) severe storm database that were specifically noted as having impacted East Windsor since 2012.



Table 11-5: NCEI Database Losses since 2012, East Windsor

Date	Event	Property Damage
7/1/2013	Tornado	*\$1,700,000
2/25/2016	Thunderstorm Wind	\$10,000
Total		**\$1,700,000

* Damages from storm divided between multiple communities

** "Total" figure does not equal the sum of the previous two figures due to rounding

NCEI losses under other event categories (such as drought, high wind, flooding, and winter storms) were not specifically noted as impacting East Windsor, though they did impact Hartford County and nearby towns. NCEI losses are reported in Section II of this Plan.

HAZUS-MH Losses

CRCOG used FEMA’s Hazus-MH model to analyze the risks that the community might face from flooding, hurricanes, and earthquakes. The model estimates economic losses to the town due to damage to buildings and building contents, as well as other economic disruptions. Both residential and commercial structures are addressed. Losses from different hazards are summarized below. Where available, estimates from the previous and current versions of the HMP are provided side-by-side; differences between the two may have been caused by a combination of the following:

- Changes in methodology: such as hazard zone mapping
- Changes in data: such as population and property values
- Changes in the model: this HMP utilized Hazus-MH version 4.0 rather than 2.1
- Other factors: inherent in a complex software like Hazus-MH

More details are available in the Multi-Jurisdictional HMP. Ultimately, changes in the loss estimates reflect the reality that small differences in hazard event features can have a significant impact on losses incurred.

Table 11-6: Estimated Damages to East Windsor from a 1% Annual-Chance Flood

Loss Type	2014 Results	2018 Results
Households Displaced	164	212
People Needing Shelter	346	383
Buildings at Least Moderately Damaged	26	10
Economic Losses		
Residential Building & Content Losses	\$13,370,000	\$18,105,73
Other Building & Content Losses	\$4,590,000	\$17,435,197
Total Building & Content Loss	\$17,960,000	\$35,540,929
Total Business Interruption Losses	\$10,000	\$655,803
TOTAL	\$17,970,000	\$36,196,732



Table 11-7: Estimated Damages to East Windsor from a 1% Annual-Chance Hurricane

Loss Type	2014 Results (1938 event)	2018 Results (1% track)
Buildings at Least Moderately Damaged	22	1
Buildings Completely Damaged	4	1
Total Debris Generated (tons)	36,294	9567
Truckloads (at 25 tons/truck) of building debris	218	383
Economic Losses		
Residential Building & Content Losses	\$35,830,000	\$9,052,607
Other Building & Content Losses	\$10,250,000	\$442,697
Total Building & Content Loss	\$46,060,000	\$9,495,304
Total Business Interruption Losses	\$6,380,000	\$423,244
TOTAL LOSSES	\$52,460,000	\$9,918,548

Table 11-8: Estimated Damages to East Windsor from a Probabilistic Earthquake

Loss Type	2018 Results
Wage Loss	\$2,035
Rent Loss	\$1,776
Relocation Loss	\$2,740
Income Loss	\$1,594
Inventory Loss	\$264
Total Business Disruption	\$8,409
Structural Loss	\$5,736
Non-Structural Loss	\$16,105
Total Building Loss	\$21,841
Total Content Loss	\$6,253
TOTAL LOSSES	\$36,503

Table 11-9: Estimated Damages to East Windsor from Modeled Earthquake Scenarios

Epicenter Location	Magnitude	Estimated Total Losses
East Haddam	6.4	\$130,749.85
Haddam	5.7	\$25,494.79
Portland	5.7	\$54,897.50
Stamford	5.7	\$3,380.74

Average Annualized Losses

Average Annualized Loss (AAL) figures are useful tools for comparison of the risks faced from different hazards with different likelihoods of occurring in a given time period. AAL estimates were prepared for East Windsor based on the methodologies discussed in Section II of the Multi-Jurisdictional HMP. Dam failure, drought, tornado, and wildfire losses were sourced from the 2014 Connecticut Natural Hazard Mitigation Plan Update, with dam failure data supplemented by the National Performance of Dams Program and the Connecticut Department of Energy & Environmental Protection. Earthquake and hurricane losses were calculated in HAZUS-MH. Losses for flooding came from NFIP claims, for winter storms from Public Assistance Reimbursements, and for thunderstorms from the NCEI database. These are



presented in the table below in dollars per year. Note that Hurricanes and Tropical Storms represent the largest share of total annualized losses.

Table 11-10: Average Annualized Losses, East Windsor

Dam Failure	Drought	Earthquakes	Flooding	Hurricanes and Tropical Storms	Severe Winter Storms	Thunderstorms	Tornadoes	Wildfires	Total
\$20	\$0	\$36,503	\$7,939	\$699,730	\$29,764	\$1,482	\$163,767	\$4,879	\$944,085

Losses Summary

A review of the above loss estimates demonstrates that the Town of East Windsor has experienced significant expenses as a result of natural hazards, and is at risk for additional losses if some of the less-frequent events were to occur. These actual and potential losses justify hazard mitigation actions to reduce losses in the future.

Mitigation Strategies and Actions

Status of Previous Mitigation Strategies and Actions

The Town of East Windsor reviewed the mitigation actions proposed in the 2014-2019 Capitol Region Natural Hazards Mitigation Plan Update and determined the status of each. That information is included in the table below.

Table 11-11: Status of Previous Mitigation Strategies and Actions, East Windsor

Action #	Action	Notes	Status
GOAL: ENSURE SAFETY OF RESIDENTS AND PROPERTIES DURING PROLONGED POWER OUTAGES CAUSED BY WINTER STORMS, HURRICANES (HIGH WINDS), OTHER NATURAL DISASTERS, AND MANMADE DISASTERS SUCH AS TERRORISM OR ACCIDENTS.			
Objective 1: Ensure reliable alternative power sources at key government buildings.			
1.1	Obtain funding through grant opportunities and Town appropriation to place new gen-sets in High School, Town Garage (replace), Scout Hall and Broad Brook Middle School.	Town Garage generator replaced, portable generator for HS and middle school. Need hookups and electrical engineer to wire the HS for generator.	Carry Forward with Revisions
Objective 2: Identify special needs individuals and establish means of communicating with the public.			
2.1	Continue to maintain special needs population lists.	Town has a list but it has not been updated recently due to changes in administrative responsibilities.	Carry Forward with Revisions
2.2	Familiarize town staff with Reverse-911 as system implementation begins.	Action complete. Town now has functional Everbridge system.	Complete
2.3	Use town media, including newsletter, website and other means to educate residents on personal planning for emergencies.	This is part of the Town's standard operating procedures. This is a capability	Capability



Action #	Action	Notes	Status
Objective 3: Maintain existing generator equipment.			
3.1	Obtain service contracts and maintain gen-sets at Police Department, Town Garage, Town Hall, Broad Book Fire, and the Prospect Hill Antenna site.	Public works holds service contracts. This is a capability.	Capability
Objective 4: Establish the East Windsor High School as a fully functional emergency shelter.			
4.1	Maintain commitment from electrical contractor to supply 60 kW generator in times of mass power outage.	This action will be phased-out: Town has acquired a portable generator for high school and middle school, now needs hookups and to rewire the high school for this generator. Once that is complete the 60W generator commitment will no longer be necessary.	Drop
4.2	Continue to train shelter staff associated with Emergency Management.	Training is a capability, but Town has noted that it is difficult to attract volunteers.	Capability.
4.3	Recruit more volunteers for shelter staff.	Town has not succeeded in recruiting may volunteers and feels it is lacking in shelter staff.	Carry Forward with Revisions

Active Mitigation Strategies and Actions

The Town proposed to initiate several new mitigation actions for the upcoming five years. Additionally, a number of actions from the previous planning period are being carried forward or replaced with revised actions. These are listed below.

Each of the following actions has been prioritized based on FEMA guidelines, listed from highest to lowest priority, and numbered.

Action #1	
Enter the Sustainable CT program through Registration and review actions that can be undertaken to pursue Certification. Make progress with the actions related to hazard mitigation.	
Goal	4. Increase the use of natural, "green," or "soft" hazard mitigation measures, such as open space preservation and green infrastructure.
Category	Natural Resources Protection
Lead	Planning
Cost	\$0 - \$10,000
Funding	Town Operating Budget
Timeframe	01/2019 - 12/2019
Priority	High



Action #2

Assign maintenance of special needs population list to specific department to ensure annual updates.

Goal	8. Ensure community character and social equity are addressed in mitigation activities
Category	Preparedness & Emergency Response
Lead	Emergency Management
Cost	\$0 - \$10,000
Funding	Town Operating Budget
Timeframe	07/2019 - 06/2024
Priority	High

Action #3

Hire an electrical engineer to wire the High School for a permanent generator.

Goal	7. Improve the emergency response capabilities of the region and its communities
Category	Preparedness & Emergency Response
Lead	Public Works
Cost	\$25,000 - \$50,000
Funding	Town Operating Budget / Grants / DEMHS
Timeframe	01/2020 - 12/2020
Priority	High

Action #4

Conduct outreach to local small businesses with the aim of preventing the accidental release and pollution from chemicals stored and used at their facilities during or following natural hazard events.

Goal	6. Improve public outreach, education, and warning systems
Category	Education & Awareness
Lead	Planning, in coordination with DEEP
Cost	\$0 - \$10,000
Funding	Materials & Resources Provided by CT DEEP
Timeframe	01/2019 - 12/2019
Priority	Medium



Action #5

Coordinate with NEMO and CROG to share resources and gain technical support for hazard mitigation actions involving stormwater management and public outreach, which have parallel benefits related to MS4 stormwater permit compliance.

Goal	1. Minimize the impact of natural hazards on physical buildings and infrastructure
Category	Prevention
Lead	Public Works
Cost	\$0 - \$10,000
Funding	Town Operating Budget
Timeframe	01/2020 - 12/2020
Priority	Medium

Action #6

Increase use of social media to communicate with the community on planning for emergencies.

Goal	6. Improve public outreach, education, and warning systems
Category	Education & Awareness
Lead	Emergency Management
Cost	\$0 - \$10,000
Funding	Town Operating Budget
Timeframe	07/2020 - 06/2021
Priority	Medium

Action #7

Participate in EMI courses or the seminars and annual conference held by the Connecticut Association of Flood Managers.

Goal	3. Improve institutional awareness and understanding of natural hazard impacts and mitigation within municipal governments and other decision-making bodies
Category	Education & Awareness
Lead	Planning
Cost	\$0 - \$10,000
Funding	Town Operating Budget
Timeframe	07/2019 - 06/2024
Priority	Medium



Action #8

Improve ability of emergency responders to prepare & respond to wind events through training drills.

Goal	7. Improve the emergency response capabilities of the region and its communities
Category	Preparedness & Emergency Response
Lead	Emergency Management
Cost	\$10,000 - \$25,000
Funding	Town Operating Budget / DEMHS
Timeframe	07/2020 - 06/2022
Priority	Medium

Action #9

Conduct an outreach program to recruit volunteers to staff emergency shelters.

Goal	7. Improve the emergency response capabilities of the region and its communities
Category	Education & Awareness
Lead	Emergency Management
Cost	\$10,000 - \$25,000
Funding	Town Operating Budget
Timeframe	01/2020 - 12/2022
Priority	Medium

Action #10

Replace the emergency generator at the WPCA

Goal	7. Improve the emergency response capabilities of the region and its communities
Category	Preparedness & Emergency Response
Lead	Public Works
Cost	\$10,000 - \$25,000
Funding	Town Operating Budget
Timeframe	07/2020 - 06/2022
Priority	Medium

Action #11

Develop Open Space Plan to guide acquisition, preservation, & efforts to incentivize redevelopment and infill over development of new land. Consider hazard mitigation is in plan development.

Goal	4. Increase the use of natural, "green," or "soft" hazard mitigation measures, such as open space preservation and green infrastructure.
Category	Natural Resources Protection
Lead	Planning
Cost	\$50,000 - \$100,000
Funding	Grants
Timeframe	07/2023 - 06/2024
Priority	Medium



Action #12

Implement recommendations of the study of the dam on Main Street near Depot Street intersection.

Goal	1. Minimize the impact of natural hazards on physical buildings and infrastructure
Category	Structural Projects
Lead	Public Works
Cost	\$50,000 - \$100,000
Funding	Grants
Timeframe	07/2023 - 06/2024
Priority	Medium

Action #13

Implement recommendations of NRCS, including installation of a detention basin in Rockville Road/East Road area to reduce road closures and washouts.

Goal	4. Increase the use of natural, "green," or "soft" hazard mitigation measures, such as open space preservation and green infrastructure.
Category	Structural Projects
Lead	Public Works
Cost	\$50,000 - \$100,000
Funding	Grants
Timeframe	07/2023 - 06/2024
Priority	Medium

Action #14

Increase the public works staff and equipment availability.

Goal	7. Improve the emergency response capabilities of the region and its communities
Category	Prevention
Lead	Public Works
Cost	More than \$100,000
Funding	Town Operating Budget
Timeframe	01/2022 - 12/2024
Priority	Medium



Action #15

Coordinate with CT SHPO to conduct historic resource surveys, focusing on areas within natural hazard risk zones (such as flood or wildfire hazard zones and areas near steep slopes), to support identification of vulnerable historic properties and preparation of resiliency plans across the state. This action leverages existing resources and best practices for protection of historic and cultural resources through an ongoing statewide initiative by CT SHPO.

Goal	8. Ensure community character and social equity are addressed in mitigation activities
Category	Property Protection
Lead	Planning, in coordination with SHPO
Cost	\$10,000 - \$25,000
Funding	SHPO
Timeframe	07/2021 - 06/2023
Priority	Low

Action #16

Install a hookup at the Middle School to allow a portable emergency generator to be connected.

Goal	7. Improve the emergency response capabilities of the region and its communities
Category	Preparedness & Emergency Response
Lead	Public Works
Cost	\$10,000 - \$25,000
Funding	Town Operating Budget
Timeframe	07/2021 - 06/2023
Priority	Low

Action #17

Conduct a study to identify appropriate flood control measures and monitoring regimes for the WPCA and surrounding area, including Blue Ditch.

Goal	3. Improve institutional awareness and understanding of natural hazard impacts and mitigation within municipal governments and other decision-making bodies
Category	Structural Projects
Lead	Public Works
Cost	\$25,000 - \$50,000
Funding	Grants
Timeframe	07/2023 - 06/2024
Priority	Low



Action #18

Work with property owners, contractors and the DEEP to regularly remove beaver dams causing flooding on East Road and elsewhere.

Goal	1. Minimize the impact of natural hazards on physical buildings and infrastructure
Category	Prevention
Lead	Public Works
Cost	\$25,000 - \$50,000
Funding	Town Operating Budget / Grants / CT DEEP
Timeframe	01/2023 - 12/2024
Priority	Low

Action #19

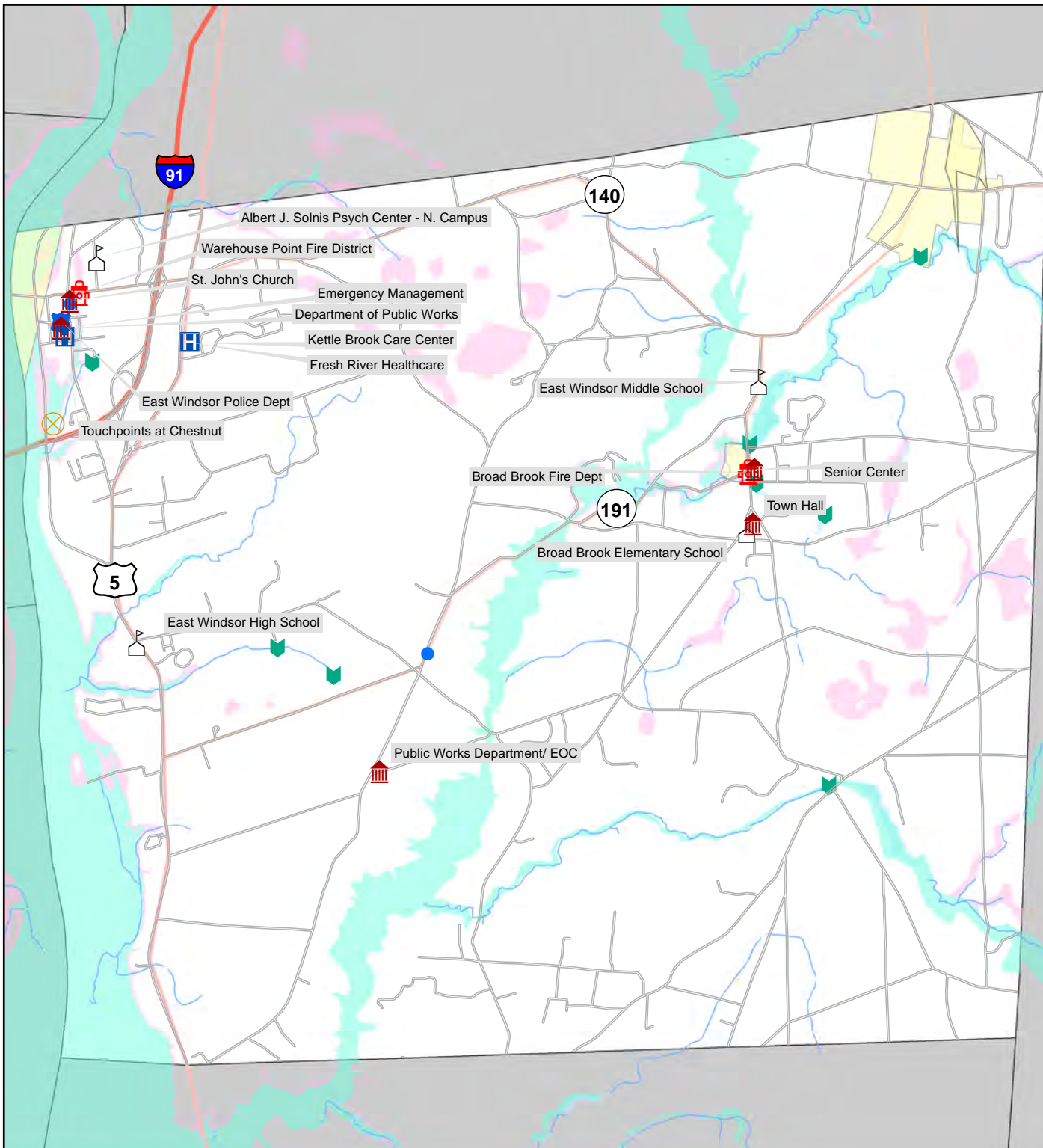
Buyout property on the west side of South Water Street to avoid repetitive flooding in the area.

Goal	1. Minimize the impact of natural hazards on physical buildings and infrastructure
Category	Property Protection
Lead	Planning
Cost	More than \$100,000
Funding	Town Operating Budget / CT DEEP / DEMHS
Timeframe	07/2023 - 06/2024
Priority	Low














Capitol Region Natural Hazards Mitigation Plan Update


East Windsor, Connecticut Flood Plains, Dams & Critical Facilities





Critical Facilities

-  Emergency Center
-  Fire Station
-  Healthcare Facility
-  Police Station
-  Public Infrastructure
-  School
-  State Facility
-  Town Facility
-  Waste Water Facility
-  NRHP Buildings/Sites
-  NRHP Districts/Areas

Dam Hazard Class

-  A, AA, BB or Unclassified

FEMA Flood Hazard Area

-  100 Year Flood Zone
-  500 Year Flood Zone

Data Sources: FEMA, National Register of Historic Places, CT DEEP, CRCOG, ESRI





12 Ellington

Community Overview

Ellington is a growing community that covers 34 square miles with a population of approximately 16,195 (2017, CT Department of Public Health). Ellington lies between 100 and 800 feet above sea level and is part of three watersheds, the Scantic to the west, the Hockanum in the middle, and the Willimantic to the east. Principal watercourses that run through Ellington include Broad, Charters, Creamery, Kimball’s, Marsh, Martins and Muddy Brooks. With over 5,500 acres under cultivation, Ellington remains one of the largest agricultural production towns in Connecticut. Major thoroughfares in Ellington include north-south state route 83 and east-west state route 140. The eastern highlands ridgeline runs through the central part of town. This area contains extensive areas of upland forest including more than 1,200 acres of the Shenipsit State Forest.

New development since adoption of the 2014-2019 Capitol Region Natural Hazards Mitigation Plan Update (“2014 HMP”) has been minimal, and has not occurred in floodplains or other notable hazard areas; hazard exposure has not increased due to development.

Critical Facilities

Critical facilities throughout the Capitol Region are listed in Appendix B. In Ellington these include the High School, Middle School, Windermere School, Crystal Lake Elementary School, Center School, Town Hall, Public Works Department (DPW), Fire Station 43, Resident State Trooper Office, Library, and a sewer pump station.

Most critical municipal facilities are located within a two-mile radius in the Town’s center. Critical facilities are summarized in the Table below.

Table 12-1: Critical Facilities, Ellington

Facility	Shelter	Generator
Town Hall		X
Public Works Department		X
Board of Education Facilities		X
Fire Station 43		X
Resident State Trooper Office		X
High School	X	X
Middle School	Backup	X
Windermere School		X
Crystal Lake Elementary School	X	X
Hall Memorial Library		X
Sewer Pumping Station		X

Capabilities

Hazard mitigation is incorporated, to some degree, into Ellington's Plan of Conservation and Development (POCD). POCD actions specifically address natural hazards.

No new construction or demolition has occurred since 2008 in floodplains or other vulnerable areas. No changes have been made to zoning, floodplain or inland wetlands regulations since 2008 which would increase or decrease Ellington's vulnerability to natural hazards.

DPW staff are staged at the Crystal Lake Fire Department prior to forecast storm events to assist with response and recovery when that area becomes isolated from the rest of Town. Mutual aid agreements are in place with Vernon and Tolland to assist in that area.

A small portion of Ellington is served by public water, and a dry-hydrant program ensures firefighting water is available for other areas of Town. The Town Fire Marshal works with the CT Water Company to have hydrants installed when new water lines are added.

Tree maintenance is primarily addressed by the local utility company Eversource. The Town budgets \$25,000 annually for tree-removal, on a case-by-case basis, on Town-owned property only. Costs are often shared with Eversource on "pop-up" tree removals.

New Capabilities

The Route 74 Bridge over the Hockanum River has undergone major improvements since adoption of the 2014 HMP. The bridge was built in 1983. A small culvert was being replaced at the time of development of the current Hazard Mitigation Plan.

A map modernization effort by FEMA is currently underway for Tolland County, but its full extent, and how much of Ellington it will cover, is unknown.

The Town is currently working to implement Low-Impact-Development regulations as part of its efforts to meet new MS4 requirements. A contractor has been hired to do this work.

Challenges

Challenges Overview

For Ellington, the natural hazards that have the greatest impact on the community are winter storms and hurricanes/tropical storms. A major challenge is maintaining public/emergency access from town center out toward the Crystal Lake community. Access is essential via State Routes 140 and 30. If Route 140 becomes blocked it becomes very difficult for emergency responders to get to Crystal Lake.

During times of lengthy town-wide power outages access to fuel could be limited by lack of generator power at fuel distribution facilities in and around town. The most recent major disasters reported by Ellington Town staff were Hurricanes Irene and Sandy, the 2013 Blizzard, and the 2015 Blizzard. Town staff report that there have been no known significant flooding issues since 2014.



Hazard Losses

The economic losses faced by Ellington from natural hazards can be estimated by reviewing historic, and modeling future, loss figures. Loss estimates are summarized below.

Historic FEMA Payments

FEMA reimburses communities for hazard losses through programs including Public Assistance (PA) and the National Flood Insurance Program (NFIP). Combining PA and private flood insurance payments can give an estimate for total losses to a community.

The NFIP has paid four property damage claims in Ellington totaling \$8,954 to-date; none have been Repetitive Loss (RL) Property claims.

Total PA reimbursements to the community were as follows:

- Flood Events: \$37,271 (\$1,962 annually)
- Hurricane Events: \$70,462 (\$3,709 annually)
- Winter Storm Events: \$1,275,223 (\$67,117 annually)

These are summarized in the tables below.

Table 12-2: Flood Event PA Reimbursements, Ellington

Incident	Oct 2005
Declaration	12/16/2005
Disaster No.	1619
Entity	FEMA PA Reimbursement
State	\$2,269
Municipal	\$35,003
Nonprofit	\$0
Total	\$37,271
Annualized	\$1,962

Table 12-3: Hurricane Wind Event PA Reimbursements, Ellington

Incident	Aug - Sep 2011 (T.S. Irene)	Oct - Nov 2012 (Storm Sandy)
Declaration	9/2/2011	10/30/2012
Disaster #	4023	4087
Entity	FEMA PA Reimbursement	FEMA PA Reimbursement
State	\$1,004	\$4,695
Municipal	\$44,076	\$20,687
Nonprofit	\$0	\$0
Total	\$45,081	\$25,381
Annualized	\$2,373	\$1,336



Table 12-4: Winter Storm PA Reimbursements, Ellington

Incident	Mar 2003	Dec 2003	Jan 2005	Feb 2006	Jan 2011	Oct 2011	Feb 2013	Jan 2015
Declaration	3/11/03	1/15/04	2/17/05	5/2/06	3/3/11	11/17/11	3/21/13	4/8/15
Disaster #	3176	3192	3200	3266	1958	4046	4106	4213
Entity	FEMA PA Reimbursement							
State	\$15,841	\$16,386	\$23,419	\$21,319	\$26,672	\$4,085	\$22,214	\$42,988
Municipal	\$31,849	\$40,143	\$48,860	\$43,627	\$77,626	\$633,363	\$123,182	\$88,471
Nonprofit	\$0	\$0	\$0	\$0	\$0	\$15,178	\$0	\$0
Total	\$47,690	\$56,529	\$72,279	\$64,946	\$104,297	\$652,626	\$145,396	\$131,458
Annualized	\$2,510	\$2,975	\$3,804	\$3,418	\$5,489	\$34,349	\$7,652	\$6,919

National Centers for Environmental Information Losses

The National Centers for Environmental Information (NCEI) severe storm database was reviewed to identify events that had impacted Ellington. The table below summarizes events in that database that were specifically noted as having impacted Ellington since 2012.

Table 12-5: NCEI Database Losses since 2012, Ellington

Date	Event	Property Damage
6/22/2012	Thunderstorm Wind	\$10,000
8/10/2012	Thunderstorm Wind	\$3,000
8/4/2013	Thunderstorm Wind	*\$2,500
7/27/2014	Hail	\$5,000
9/2/2014	Thunderstorm Wind	\$5,000
7/22/2016	Thunderstorm Wind	\$50,000
Total		\$75,500

* Damages from storm divided between multiple communities

NCEI losses under other event categories (such as drought, high wind, flooding, and winter storms) were not specifically noted as impacting Ellington, though they did impact Tolland County and nearby towns. NCEI losses are reported in Section II of this Plan.

HAZUS-MH Losses

CRCOG used FEMA’s Hazus-MH model to analyze the risks that the Town of Ellington might face from flooding, hurricanes, and earthquakes. The model estimates economic losses to the town due to damage to buildings and building contents, as well as other economic disruptions. Both residential and commercial structures are addressed. Losses from different hazards are summarized below. Where available, estimates from the previous and current versions of the HMP are provided side-by-side; differences between the two may have been caused by a combination of the following:



- Changes in methodology: such as hazard zone mapping
- Changes in data: such as population and property values
- Changes in the model: this HMP utilized Hazus-MH version 4.0 rather than 2.1
- Other factors: inherent in a complex software like Hazus-MH

More details are available in the Multi-Jurisdictional HMP. Ultimately, changes in the loss estimates reflect the reality that small differences in hazard event features can have a significant impact on losses incurred.

Table 12-6: Estimated Damages to Ellington from a 1% Annual-Chance Flood

Loss Type	2014 Results	2018 Results
Households Displaced	132	210
People Needing Shelter	130	306
Buildings at Least Moderately Damaged	0	0
Economic Losses		
Residential Building & Content Losses	\$1,620,000	\$5,900,814
Other Building & Content Losses	\$9,460,000	\$8,246,928
Total Building & Content Loss	\$11,080,000	\$14,147,742
Total Business Interruption Losses	\$40,000	\$470,916
TOTAL	\$11,120,000	\$14,618,658

Table 12-7: Estimated Damages to Ellington from a 1% Annual-Chance Hurricane

Loss Type	2014 Results (1938 event)	2018 Results (1% track)
Buildings at Least Moderately Damaged	699	1
Buildings Completely Damaged	54	0
Total Debris Generated (tons)	57,551	9198
Truckloads (at 25 tons/truck) of building debris	314	368
Economic Losses		
Residential Building & Content Losses	\$63,640,000	\$7,967,558
Other Building & Content Losses	\$14,245,000	\$367,180
Total Building & Content Loss	\$87,370,000	\$8,334,738
Total Business Interruption Losses	\$9,485,000	\$544,541
TOTAL LOSSES	\$96,855,000	\$8,879,279

Losses were calculated from a modeled probabilistic earthquake (1% annual-chance of occurrence), as well as for four specific scenarios with epicenters around Connecticut.



Table 12-8: Estimated Damages to Ellington from a Probabilistic Earthquake

Loss Type	2018 Results
Wage Loss	\$1,126
Rent Loss	\$1,368
Relocation Loss	\$2,285
Income Loss	\$915
Inventory Loss	\$191
Total Business Disruption	\$5,884
Structural Loss	\$4,973
Non-Structural Loss	\$17,116
Total Building Loss	\$22,089
Total Content Loss	\$6,252
TOTAL LOSSES	\$34,226

Table 12-9: Estimated Damages to Ellington from Modeled Earthquake Scenarios

Epicenter Location	Magnitude	Estimated Total Losses
East Haddam	6.4	\$123,500.26
Haddam	5.7	\$24,132.54
Portland	5.7	\$44,612.11
Stamford	5.7	\$3,086.37

Average Annualized Losses

Average Annualized Loss (AAL) figures are useful tools for comparison of the risks faced from different hazards with different likelihoods of occurring in a given time period. AAL estimates were prepared for Ellington based on the methodologies discussed in Section II of the Multi-Jurisdictional HMP. Dam failure, drought, tornado, and wildfire losses were sourced from the 2014 Connecticut Natural Hazard Mitigation Plan Update, with dam failure data supplemented by the National Performance of Dams Program and the Connecticut Department of Energy & Environmental Protection. Earthquake and hurricane losses were calculated in HAZUS-MH. Losses for flooding came from NFIP claims, for winter storms from Public Assistance Reimbursements, and for thunderstorms from the NCEI database. These are presented in the table below in dollars per year. Note that Hurricanes and Tropical Storms represent the largest share of total annualized losses.

Table 12-10: Average Annualized Losses, Ellington

Dam Failure	Drought	Earthquakes	Flooding	Hurricanes and Tropical Storms	Severe Winter Storms	Thunderstorms	Tornadoes	Wildfires	Total
\$959	\$0	\$34,226	\$2,197	\$1,057,291	\$67,117	\$5,679	\$4,534	\$4,469	\$1,176,473



Losses Summary

A review of the above loss estimates demonstrates that the Town of Ellington has experienced significant expenses as a result of natural hazards, and is at risk for additional losses if some of the less-frequent events were to occur. These actual and potential losses justify hazard mitigation actions to reduce losses in the future.

Mitigation Strategies and Actions

Noted Hazard Mitigation Needs

During the course of this Plan development, multiple hazard mitigation needs of Ellington were noted, including:

- Address isolation of Crystal Lake community
- Increase the number of dry-hydrants in Town

Status of Previous Mitigation Strategies and Actions

The Town of Ellington reviewed the mitigation actions proposed in the 2014 HMP and determined the status of each. That information is included in the table below.

Table 12-11: Status of Previous Mitigation Strategies and Actions, Ellington

Action #	Action	Notes	Status
GOAL: REDUCE ECONOMIC AND SOCIAL IMPACT CAUSED BY LOSS OF POWER.			
Objective 1: Provide auxiliary power to critical facilities.			
1.1	Work with the Capitol Region Emergency Planning Commission to obtain generators for all five schools and town hall complex.	Done. Windermere School and the library now have generators.	Complete
1.2	Complete strategic plan for evacuating and sheltering special needs populations with emphasis on sheltering in place for those not able to get to designated shelters (i.e. Snipsic Village Community Building)	Action complete.	Complete
1.3	Encourage private fuel dispensaries to install back-up generator power to ensure continued access to fuel for residential and business transportation, heating/cooling and power needs.	No direct outreach, though a few did add generators when renovated.	Carry Forward
GOAL: MINIMIZE DAMAGE RESULTING FROM FLOODING.			
Objective 1: Ensure infrastructure is constructed to FEMA standards			
1.1	Continue to work with CRCOG to advance Windermere Bridge renovation project on DOT list.	This is a State project; the Town does not need to be involved.	Drop
1.2	Work with State DOT to ensure safe/emergency vehicular passage to the Crystal Lake community prior to, during and after storms (Routes 140 and 30).	No action to date but should be kept and revisited.	Carry Forward
1.3	Continue to work with CRCOG to advance Route 74 bridge renovation project on DOT list in Vernon.	Project has been completed.	Complete
Objective 2: Ensure buildings are constructed to FEMA standards.			
2.1	Continue to implement & enforce local building & zoning regulations to prevent development in risk-prone areas.	Existing capability / ongoing activity.	Capability
Objective 3: Protect the integrity of "Great Swamp" and other wetlands from development pressure.			
3.1	Educate public on property owners' responsibility to maintain drainage systems.	Existing capability / ongoing activity.	Capability



Active Mitigation Strategies and Actions

The Town proposed to initiate several new mitigation actions for the upcoming five years. Additionally, a number of actions from the previous planning period are being carried forward or replaced with revised actions. These are listed below.

Each of the following actions has been prioritized based on FEMA guidelines, listed from highest to lowest priority, and numbered.

Action #1

Assess possible alternate routes to Crystal Lake, or other solutions to the risk of isolation in that area (such as stationing personnel there) to determine the cost-effectiveness of different options.

Goal	7. Improve the emergency response capabilities of the region and its communities
Category	Preparedness & Emergency Response
Lead	Planning
Cost	\$0 - \$10,000
Funding	Town Operating Budget
Timeframe	07/2019 - 06/2020
Priority	High

Action #2

Work with State DOT to advance road improvement and maintenance projects to ensure access to and egress from the Crystal Lake community remains open during and after storms (Routes 140 and 30).

Goal	7. Improve the emergency response capabilities of the region and its communities
Category	Structural Projects
Lead	Public Works
Cost	\$0 - \$10,000
Funding	Town Operating Budget / Grants
Timeframe	07/2019 - 06/2020
Priority	High

Action #3

Conduct outreach to local small businesses with the aim of preventing the accidental release and pollution from chemicals stored and used at their facilities during or following natural hazard events.

Goal	6. Improve public outreach, education, and warning systems
Category	Education & Awareness
Lead	Planning, in coordination with DEEP
Cost	\$0 - \$10,000
Funding	Materials & Resources Provided by CT DEEP
Timeframe	01/2019 - 12/2019
Priority	Medium



Action #4

Coordinate with NEMO and CROG to share resources and gain technical support for hazard mitigation actions involving stormwater management and public outreach, which have parallel benefits related to MS4 stormwater permit compliance.

Goal	1. Minimize the impact of natural hazards on physical buildings and infrastructure
Category	Prevention
Lead	Public Works
Cost	\$0 - \$10,000
Funding	Town Operating Budget
Timeframe	01/2020 - 12/2020
Priority	Medium

Action #5

Participate in EMI courses or the seminars and annual conference held by the Connecticut Association of Flood Managers.

Goal	3. Improve institutional awareness and understanding of natural hazard impacts and mitigation within municipal governments and other decision-making bodies
Category	Education & Awareness
Lead	Planning
Cost	\$0 - \$10,000
Funding	Town Operating Budget
Timeframe	07/2019 - 06/2024
Priority	Medium

Action #6

Perform an outreach effort to private fuel dispensaries encouraging them to install back-up generator power to ensure continued access to fuel for residential and business transportation, heating/cooling, and power needs.

Goal	5. Improve the resilience of local and regional utilities and infrastructure using strategies including adaptation, hardening, and creating redundancies.
Category	Preparedness & Emergency Response
Lead	Emergency Management
Cost	\$10,000 - \$25,000
Funding	Town Operating Budget
Timeframe	07/2020 - 06/2022
Priority	Medium



Action #7

Explore feasibility and cost/benefit balance of developing a microgrid for the Town Hall / Board of Education / Center School complex and/or the Resident-State-Trooper / Recreation Department / Fire Station 43 / Public Works complex.

Goal	5. Improve the resilience of local and regional utilities and infrastructure using strategies including adaptation, hardening, and creating redundancies.
Category	Prevention
Lead	Public Works
Cost	\$10,000 - \$25,000
Funding	Town Operating Budget / Grants / CT DEEP
Timeframe	01/2020 - 12/2022
Priority	Medium

Action #8

Seek Certification within the Sustainable CT program and make progress with the hazard mitigation goals associated with SustainableCT certified actions.

Goal	4. Increase the use of natural, "green," or "soft" hazard mitigation measures, such as open space preservation and green infrastructure.
Category	Natural Resources Protection
Lead	Planning
Cost	\$0 - \$10,000
Funding	Town Operating Budget
Timeframe	07/2021 - 06/2022
Priority	Low

Action #9

Coordinate with CT SHPO to conduct historic resource surveys, focusing on areas within natural hazard risk zones (such as flood or wildfire hazard zones and areas near steep slopes), to support identification of vulnerable historic properties and preparation of resiliency plans across the state. This action leverages existing resources and best practices for protection of historic and cultural resources through an ongoing statewide initiative by CT SHPO.

Goal	8. Ensure community character and social equity are addressed in mitigation activities
Category	Property Protection
Lead	Planning, in coordination with SHPO
Cost	\$10,000 - \$25,000
Funding	SHPO
Timeframe	07/2021 - 06/2023
Priority	Low



Action #10

Conduct a wildfire vulnerability and needs assessment to guide construction of additional dry hydrants and/or cisterns and fire roads through forested areas.

Goal	3. Improve institutional awareness and understanding of natural hazard impacts and mitigation within municipal governments and other decision-making bodies
Category	Prevention
Lead	Fire Department
Cost	\$25,000 - \$50,000
Funding	Town Operating Budget / Grants / CT DEEP
Timeframe	07/2023 - 06/2024
Priority	Low








Capitol Region Natural Hazards Mitigation Plan Update











Ellington, Connecticut

Flood Plains, Dams & Critical Facilities



Dam Hazard Class

-  BB, A, AA OR Unclassified
-  Class B - Significant Hazard
-  Class C - High Hazard

Critical Facilities

-  Fire Station
-  Police Station
-  School
-  Healthcare Facility
-  State Facility
-  Town Facility
-  Waste Water Facility
-  Emergency Center
-  NRHP Buildings/Sites
-  NRHP Districts/Areas

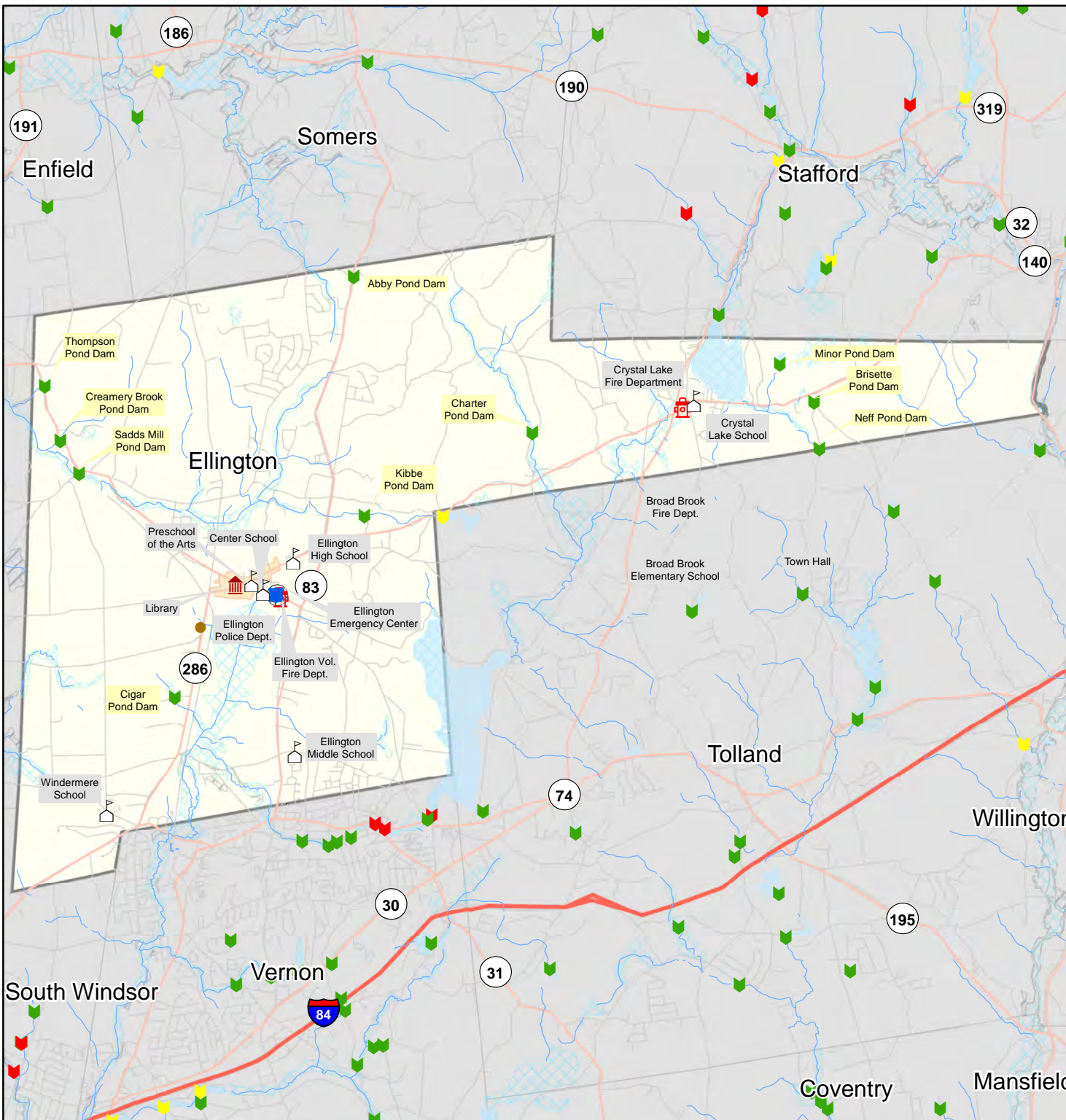
FEMA Flood Hazard Area

-  100 Year Flood Zone
-  500 Year Flood Zone

Data Sources: FEMA, National Register of Historic Places, CT DEEP, CRCOG, ESRI



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Capitol Region Natural Hazards Mitigation Plan Update












Ellington, Connecticut

Dam Breach Inundation Area & Critical Facilities

Dam Hazard Class

-  BB, A, AA OR Unclassified
-  Class B - Significant Hazard
-  Class C - High Hazard

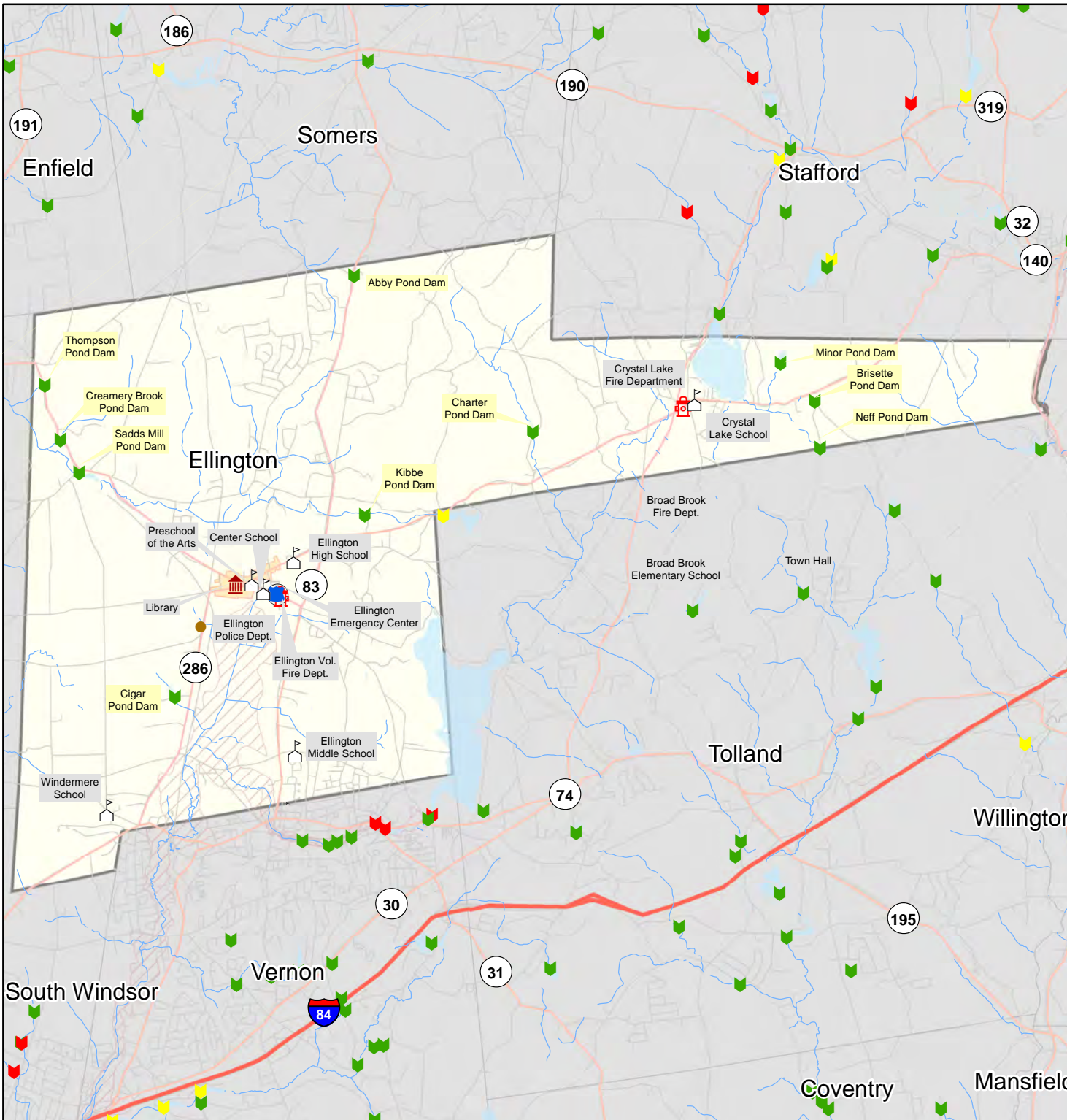
Critical Facilities

-  Fire Station
-  Police Station
-  School
-  Healthcare Facility
-  State Facility
-  Town Facility
-  Waste Water Facility
-  Emergency Center
-  NRHP Buildings/Sites
-  NRHP Districts/Areas
-  Dam Breach Inundation Areas

Data Sources: FEMA, National Register of Historic Places, CT DEEP, CRCOG, ESRI



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13 Enfield

Community Overview

The Town of Enfield encompasses 33.4 square miles with an estimated population of approximately 44,600 people. Enfield is located along the Massachusetts border and is in both the Connecticut River mainstem watershed (eastern drainage) and the Scantic River watershed which drains to the west. Elevation is approximately 154 feet above sea level. The main watercourses include Grape, Pierce and Terry Brook as well as the Connecticut and Scantic River. Parks in Enfield include: Powder Hollow Park, Scantic River State Park, Lafayette Park, and Hazardville Historic District.

Interstate 91 travels north-south in Enfield while other main transportation routes are 190, 192 and 220. Major industries include insurance, manufacturing of a variety of products, warehousing and distribution of toys, clothing, and pharmaceuticals, processing of food and dairy products, vegetable and tobacco farming, and ice cream production. New development since adoption of the 2014-2019 Capitol Region Natural Hazards Mitigation Plan Update (“2014 HMP”) includes two “flex” buildings at zero King Street, the Mayfield apartment complex of 34 buildings with 10 apartments each, and the Villages subdivision with 34 houses.

Critical Facilities

Critical facilities throughout the Capitol Region are listed in Appendix B. In Enfield these include the Town Hall, Police Station, EMS facility, DPW campus, Water Pollution Control Facility, Sewer Pumping Stations, six fire stations, schools, senior housing, medical facilities, and State Prisons.

Table 13-1: Critical Facilities, Enfield

Facility	Shelter	Generator
Town Hall (Backup EOC)		X
Police Station (EOC)		X
EMS Facility		2 Portable
DPW Campus (building & yard)		
6 Fire Stations		X
Water Pollution Control Facility		X
Sewer Pumping Stations		
JFK Middle School	Primary	X
Enfield High School	Partial	X
6 Elementary Schools		
7 Private Schools		
St Joseph’s Home for the Elderly		X
Parkway Pavilion Health & Rehabilitation Center		
Allied Rehabilitation Centers		
Home for Adults with Developmental Disabilities		
Community Health Resources Group		
Home for Adults with Chronic Mental Illness		
5 State Prisons		

JFK Middle School, the Town’s primary emergency shelter, has an aged boiler that is failing and needs to be replaced. The Town is considering designating the High School as the primary shelter until this is addressed. Currently, the High School is developing a memorandum of agreement (MOU) with St. Joseph Home for the Elderly to use the High School as a “stop-over” shelter when necessary. The High School building has been expanded since the previous HMP.

Enfield also recognizes three apartment complexes as high risk areas due to their high population density; these are Mayfield, Georgetown, and Foxhill.

Capabilities

Hazard mitigation is incorporated, to some degree, as a specific element in Enfield’s Plan of Conservation and Development.

The Town adopted a Flood Hazard Mitigation Plan (FHMP) in 2000 to assist the community in identifying localized flood prone areas, flood hazards and risks, and strategies for preventing the loss of life and reducing property damages. The Town updated and incorporated its FHMP into the 2008 Capitol Region Natural Hazards Mitigation Plan, and maintains its currency. The Town of Enfield has several structural and regulatory flood mitigation tactics currently in place. The Town requires flood compensation on all applications.

The Town has completed, or is currently working on, most of the planned mitigation projects included in the 2000 FHMP, including drainage system improvements, dredging, catch basin cleanings, GIS implementation, and property acquisitions among other things. Equally important to these structural and property remedies are the education and outreach efforts that Enfield has made. All-hazard workshops are offered twice a year for emergency management personnel and non-profit organizations, and flood insurance policy seminars are available for homeowners.

The Town of Enfield has pursued a number of approaches to help reduce the community’s vulnerability to flooding and prepare for emergencies. Examples of such actions by the Town in recent years include, but are not limited to the following accomplishments:

- Implemented a GIS system which both citizens and staff can access. This database provides detailed information, including wetlands.
- Continued its comprehensive road resurfacing/rebuilding program which was initiated in 2000. Any street contemplated for improvement under this program is also assessed for flooding problems, and corrected where such action is feasible.
- Implemented an erosion control effort for areas of Town vulnerable to rapid slope deterioration, particularly the area along the west bank of the Scantic River with its escarpment soils. One location in particular – Cloud Street has several residential properties threatened due severe erosion from rainfall runoff. An extensive slope stabilization project was implemented and completed in 2010 to save these properties.



- Conducted extensive stream clearing and bank stabilization work in Beeman’s Brook which flows through a heavily development residential neighborhood.
- Trained over 150 Town of Enfield employees in the Red Cross Shelter Worker program.
- Established a local television station – E-TV to broadcast emergency alerts with a scrolling banner, commonly referred to as “Chy-Alerts.”
- Implemented the Everbridge phone/message alert system to inform citizens of emergency situations in Enfield.
- Established and actively share important information with citizens through social media. Enfield Emergency Management Facebook wall presently has over 1,200 “likes.”
- Established a Community Emergency Response Team (CERT), whose primary mission is shelter operations, with a secondary mission of providing emergency support such as HAM radio operations.
- Hosted the Capitol Region Full Scale Exercise in May 2010 which simulated an active shooter/hostage situation in a public school. Students (Grades 6, 7, and 8) actively participated in the exercise. This was the second time Enfield has hosted a full-scale exercise for the Capitol Region within 5 years, the first one occurring in May 2005.
- Completely revised its Inland Wetlands and Watercourses Regulations in March 2011.
- Continue to reduce the volume of storm-water entering the Town’s Water Pollution Control’s sanitary sewage system by systematic elimination of infiltration and inflow. Progress in recent years has not been as substantive as in prior time periods due to reduced funding.
- Totally reorganized its land-use review and regulation structure by creating a Development Services Department which is comprised of Planning, Zoning Enforcement, Inland Wetlands, Conservation Commission, Blight Enforcement, Building Code Inspection, Housing Code Enforcement, Economic Development and Community Development (CDBG). Tasked assigned to Development Services is the Assistant Town Engineer who also serves as the Town’s NFIP Administrator.

Enfield has a tree warden responsible for tree trimming and maintenance. Most work is contracted out.

New Capabilities

Enfield is undertaking a significant overhaul to its Water Pollution Control Facility. This project includes measures to improve the resiliency of the site, which is adjacent to the Connecticut River. The Town worked closely with the State on this project.

Since the 2014 HMP, Enfield has acquired emergency generators for its two shelters, developed a Vehicle Replacement Plan to guide upgrades of its Public Works fleet, and offered flood policy seminars to homeowners.



Challenges

Challenges Overview

Flooding is the most significant hazard affecting Enfield . Water bodies that pose potential flood hazards include Beemans Brook, Waterworks Brook, Grape Brook, Freshwater Brook, Jawbuck Brook, Shaker Lake, Terry Brook, Boweyns Brook, Buckhorn Brook, and the Connecticut River. Freshwater Brook flooding affects the mall and the High Street Neighborhoods.

The Town experienced significant flooding in October 2005, when the area received two significant rainfalls in a one-week period. Interstate 91 in Enfield was flooded and closed. Parts of Route 5 and the Enfield Square Mall, as well as numerous residential areas, suffered severe flooding. The closure of the Interstate and flooding on Route 5 resulted in serious traffic congestion and hindered emergency response. FEMA eventually awarded the Town disaster aid to help cover the costs of repairs to municipal infrastructure.

Hazard Losses

The economic losses faced by Enfield from natural hazards can be estimated by reviewing historic, and modeling future, loss figures. Loss estimates are summarized below.

Historic FEMA Payments

FEMA reimburses communities for hazard losses through programs including Public Assistance (PA) and the National Flood Insurance Program (NFIP). Combining PA and private flood insurance payments can give an estimate for total losses to a community.

The NFIP has paid 57 property damage claims in Enfield totaling \$301,225 to-date. Enfield has had fifteen Repetitive Loss (RL) Property claims to-date on six properties totaling \$169,140.

Total PA reimbursements to the community were as follows:

- Flood Events: \$314,488 (\$16,552 annually)
- Hurricane Events: \$92,135 (\$4,849 annually)
- Winter Storm Events: \$7,324,344 (\$385,492 annually)

These are summarized in the tables below.



Table 13-2: Flood Event PA Reimbursements, Enfield

Incident	Sep 1999	Oct 2005
Declaration	9/23/1999	12/16/2005
Disaster No.	1302	1619
Entity	FEMA PA Reimbursement	
State	\$2,071	\$2,568
Municipal	\$10,925	\$282,315
Nonprofit	\$0	\$16,608
Total	\$12,997	\$301,491
Annualized	\$684	\$15,868

Table 13-3: Hurricane Wind Event PA Reimbursements, Enfield

Incident	Aug - Sep 2011 (T.S. Irene)
Declaration	9/2/2011
Disaster #	4023
Entity	FEMA PA Reimbursement
State	\$25,199
Municipal	\$66,936
Nonprofit	\$0
Total	\$92,135
Annualized	\$4,849

Table 13-4: Winter Storm PA Reimbursements, Enfield

Incident	Mar 2003	Dec 2003	Jan 2005	Feb 2006	Jan 2011	Oct 2011	Feb 2013
Declaration	3/11/03	1/15/04	2/17/05	5/2/06	3/3/11	11/17/11	3/21/13
Disaster #	3176	3192	3200	3266	1958	4046	4106
Entity	FEMA PA Reimbursement						
State	\$43,934	\$39,222	\$67,211	\$74,640	\$72,283	\$290,259	\$143,617
Municipal	\$86,000	\$99,932	\$120,327	\$139,620	\$118,955	\$5,746,641	\$208,294
Nonprofit	\$0	\$0	\$0	\$0	\$0	\$73,408	\$0
Total	\$129,934	\$139,154	\$187,539	\$214,260	\$191,238	\$6,110,308	\$351,911
Annualized	\$6,839	\$7,324	\$9,870	\$11,277	\$10,065	\$321,595	\$18,522

National Centers for Environmental Information Losses

The table below summarizes events in the National Centers for Environmental Information (NCEI) severe storm database that were specifically noted as having impacted Enfield since 2012.



Table 13-5: NCEI Database Losses since 2012, Enfield

Date	Event	Property Damage
8/5/2012	Thunderstorm Wind	\$3,000
9/18/2012	Thunderstorm Wind	\$15,000
7/1/2013	Tornado	\$25,000
7/2/2014	Thunderstorm Wind	\$3,000
7/27/2014	Lightning	\$50,000
	Thunderstorm Wind	\$15,000
	Hail	\$0
7/28/2014	Thunderstorm Wind	\$20,000
2/25/2016	Thunderstorm Wind	\$5,000
8/11/2016	Thunderstorm Wind	\$6,000
Total		\$142,000

NCEI losses under other event categories (such as drought, high wind, flooding, and winter storms) were not specifically noted as impacting Enfield, though they did impact Hartford County and nearby towns. NCEI losses are reported in Section II of this Plan.

HAZUS-MH Losses

CRCOG used FEMA’s Hazus-MH model to analyze the risks that the community might face from flooding, hurricanes, and earthquakes. The model estimates economic losses to the town due to damage to buildings and building contents, as well as other economic disruptions. Both residential and commercial structures are addressed. Losses from different hazards are summarized below. Where available, estimates from the previous and current versions of the HMP are provided side-by-side; differences between the two may have been caused by a combination of the following:

- Changes in methodology: such as hazard zone mapping
- Changes in data: such as population and property values
- Changes in the model: this HMP utilized Hazus-MH version 4.0 rather than 2.1
- Other factors: inherent in a complex software like Hazus-MH

More details are available in the Multi-Jurisdictional HMP. Ultimately, changes in the loss estimates reflect the reality that small differences in hazard event features can have a significant impact on losses incurred.



Table 13-6: Estimated Damages to Enfield from a 1% Annual-Chance Flood

Loss Type	2014 Results	2018 Results
Households Displaced	1,197	368
People Needing Shelter	578	502
Buildings at Least Moderately Damaged	135	0
Economic Losses		
Residential Building & Content Losses	\$39,020,000	\$16,688,745
Other Building & Content Losses	\$51,720,000	\$38,597,555
Total Building & Content Loss	\$90,740,000	\$55,286,300
Total Business Interruption Losses	\$45,000	\$2,231,189
TOTAL	*\$91,120,000	\$57,517,488

* The "TOTAL" figure is extracted from the HAZUS model, not calculated as the sum of the other figures presented here; for that reason, this figure may not be equal to the sum of the other figures presented.

Table 13-7: Estimated Damages to Enfield from a 1% Annual-Chance Hurricane

Loss Type	2014 Results (1938 event)	2018 Results (1% track)
Buildings at Least Moderately Damaged	1,509	4
Buildings Completely Damaged	89	1
Total Debris Generated (tons)	57,113	12272
Truckloads (at 25 tons/truck) of building debris	756	491
Economic Losses		
Residential Building & Content Losses	\$131,700,000	\$28,484,330
Other Building & Content Losses	\$30,400,000	\$1,410,805
Total Building & Content Loss	\$162,100,000	\$29,895,135
Total Business Interruption Losses	\$21,200,000	\$1,306,855
TOTAL LOSSES	\$183,300,000	\$31,201,990

Losses were calculated from a modeled probabilistic earthquake (1% annual-chance of occurrence), as well as for four specific scenarios with epicenters around Connecticut.

Table 13-8: Estimated Damages to Enfield from a Probabilistic Earthquake

Loss Type	2018 Results
Wage Loss	\$6,178
Rent Loss	\$5,639
Relocation Loss	\$9,069
Income Loss	\$4,429
Inventory Loss	\$653
Total Business Disruption	\$25,968
Structural Loss	\$18,639
Non-Structural Loss	\$54,654
Total Building Loss	\$73,293
Total Content Loss	\$21,389
TOTAL LOSSES	\$120,650



Table 13-9: Estimated Damages to Enfield from Modeled Earthquake Scenarios

Epicenter Location	Magnitude	Estimated Total Losses
East Haddam	6.4	\$234,506.61
Haddam	5.7	\$48,686.62
Portland	5.7	\$101,948.14
Stamford	5.7	\$10,770.58

Average Annualized Losses

Average Annualized Loss (AAL) figures are useful tools for comparison of the risks faced from different hazards with different likelihoods of occurring in a given time period. AAL estimates were prepared for Enfield based on the methodologies discussed in Section II of the Multi-Jurisdictional HMP. Dam failure, drought, tornado, and wildfire losses were sourced from the 2014 Connecticut Natural Hazard Mitigation Plan Update, with dam failure data supplemented by the National Performance of Dams Program and the Connecticut Department of Energy & Environmental Protection. Earthquake and hurricane losses were calculated in HAZUS-MH. Losses for flooding came from NFIP claims, for winter storms from Public Assistance Reimbursements, and for thunderstorms from the NCEI database. These are presented in the table below in dollars per year. Note that Hurricanes and Tropical Storms represent the largest share of total annualized losses.

Table 13-10: Average Annualized Losses, Enfield

Dam Failure	Drought	Earthquakes	Flooding	Hurricanes and Tropical Storms	Severe Winter Storms	Thunderstorms	Tornadoes	Wildfires	Total
\$80	\$0	\$120,650	\$24,479	\$2,799,295	\$385,492	\$5,931	\$655,158	\$6,184	\$3,997,267

Losses Summary

A review of the above loss estimates demonstrates that the Town of Enfield has experienced significant expenses as a result of natural hazards, and is at risk for additional losses if some of the less-frequent events were to occur. These actual and potential losses justify hazard mitigation actions to reduce losses in the future.

Mitigation Strategies and Actions

Status of Previous Mitigation Strategies and Actions

The Town of Enfield reviewed the mitigation actions proposed in the 2014 HMP and determined the status of each. That information is included in the table below.



Table 13-11: Status of Previous Mitigation Strategies and Actions, Enfield

Action #	Action	Notes	Status
GOAL: REDUCE LOSS OF LIFE AND PROPERTY AND NEGATIVE ECONOMIC CONSEQUENCES OF FLOODING.			
Objective 1: Implement flood hazard mitigation projects identified in the 2000 Flood Hazard Mitigation Plan and subsequent hazard planning efforts.			
1.1	Continue to pursue funding opportunities to implement remaining projects.	Denied twice but now have a grant for Freshwater Brook. Under contract for dredging the pond and developing an action plan for the dam.	Carry Forward with Revisions
1.2	Maintain currency of the Flood Hazard Mitigation Plan.	Existing capability / ongoing activity.	Capability
Objective 2: Ensure that future development does not increase flood risk.			
2.1	Continue to review development applications broadly, with administration's input.	Existing capability / ongoing activity.	Capability
GOAL: REDUCE LOSS OF LIFE AND PROPERTY AND ECONOMIC CONSEQUENCES OF OTHER NATURAL HAZARDS.			
Objective 1: Ensure adequate protection of all residents.			
1.1	Continue to involve the Visiting Nurses Association, the Housing Authority, and social service agencies in planning and training efforts.	Existing capability / ongoing activity.	Capability
1.2	Continue to maintain a list of special needs population.	Existing capability / ongoing activity.	Capability
1.3	Monitor implementation of Reverse-911 system and use to its greatest potential.	Existing capability / ongoing activity.	Capability
GOAL: REDUCE POWER OUTAGES AND ENSURE SAFETY OF PROPERTY AND LIFE AS A RESULT OF NATURAL HAZARDS.			
Objective 1: Establish effective tree maintenance program for town right-of-way.			
1.1	Fund and institute routine maintenance of trees in town right-of-way either through town staff or private contractor.	Contractors are funded for tree maintenance work.	Capability
Objective 2: Ensure access to power for residents in emergency situations.			
2.1	Obtain generators for shelters.	Shelters have generators.	Completed
2.2	Educate residents on emergency preparedness and services available in the event of an emergency through town website and workshops.	Town previously offered biannual workshops for emergency management workers. Flood policy seminars are available to homeowners.	Capability
2.3	Modify the Town of Enfield zoning & planning codes and ordinances to require group homes to have an emergency generator to provide power for essential home utilities, i.e. heat, refrigerator, lighting, etc. during power outages, thus enabling the residents to "shelter in place."	Zoning regulations do not allow new group homes; group homes that do exist in Town were grandfathered in, and such a regulation would not apply to them. Action would not be effective.	Drop
GOAL: ENSURE CAPACITY OF TOWN TO REMOVE SNOW.			
Objective 1: Maintain an adequate staffing and fleet of trucks and equipment to clear roads in a timely manner.			
1.1	Upgrade and replace public works fleet.	Vehicle Replacement Plan developed. Currently lacking funding to implement.	Carry Forward with Revisions



Action #	Action	Notes	Status
1.2	Fund adequate staff and private labor.	Town has adequate staff for most scenarios and maintains an on-call list of private contractors to assist with snow removal and other hazard response/recovery activities.	Capability

Active Mitigation Strategies and Actions

The Town proposed to initiate several new mitigation actions for the upcoming five years. Additionally, a number of actions from the previous planning period are being carried forward or replaced with revised actions. These are listed below.

Each of the following actions has been prioritized based on FEMA guidelines, listed from highest to lowest priority, and numbered.

Action #1

Enter the Sustainable CT program through Registration and review actions that can be undertaken to pursue Certification. Make progress with the actions related to hazard mitigation.

Goal	4. Increase the use of natural, "green," or "soft" hazard mitigation measures, such as open space preservation and green infrastructure.
Category	Natural Resources Protection
Lead	Planning
Cost	\$0 - \$10,000
Funding	Town Operating Budget
Timeframe	01/2019 - 12/2019
Priority	High

Action #2

Implement Vehicle Replacement Plan to upgrade and replace public works fleet.

Goal	7. Improve the emergency response capabilities of the region and its communities
Category	Preparedness & Emergency Response
Lead	Public Works
Cost	More than \$100,000
Funding	Town Operating Budget
Timeframe	07/2022 - 06/2023
Priority	High



Action #3

Conduct outreach to local small businesses with the aim of preventing the accidental release and pollution from chemicals stored and used at their facilities during or following natural hazard events.

Goal	6. Improve public outreach, education, and warning systems
Category	Education & Awareness
Lead	Planning, in coordination with DEEP
Cost	\$0 - \$10,000
Funding	Materials & Resources Provided by CT DEEP
Timeframe	01/2019 - 12/2019
Priority	Medium

Action #4

Coordinate with NEMO and CRCOG to share resources and gain technical support for hazard mitigation actions involving stormwater management and public outreach, which have parallel benefits related to MS4 stormwater permit compliance.

Goal	1. Minimize the impact of natural hazards on physical buildings and infrastructure
Category	Prevention
Lead	Public Works
Cost	\$0 - \$10,000
Funding	Town Operating Budget
Timeframe	01/2020 - 12/2020
Priority	Medium

Action #5

Participate in EMI courses or the seminars and annual conference held by the Connecticut Association of Flood Managers.

Goal	3. Improve institutional awareness and understanding of natural hazard impacts and mitigation within municipal governments and other decision-making bodies
Category	Education & Awareness
Lead	Planning
Cost	\$0 - \$10,000
Funding	Town Operating Budget
Timeframe	07/2019 - 06/2024
Priority	Medium



Action #6

Complete and implement Freshwater Brook dam action plan to mitigate flooding on I-91 and Route 5.

Goal	1. Minimize the impact of natural hazards on physical buildings and infrastructure
Category	Structural Projects
Lead	Public Works
Cost	More than \$100,000
Funding	Grants / CT DEEP
Timeframe	07/2022 - 06/2024
Priority	Medium

Action #7

Pursue opportunities to bury utilities in appropriate locations and scenarios, such as during a road reconstruction.

Goal	5. Improve the resilience of local and regional utilities and infrastructure using strategies including adaptation, hardening, and creating redundancies.
Category	Prevention
Lead	Public Works
Cost	More than \$100,000
Funding	Grants
Timeframe	07/2022 - 06/2024
Priority	Medium

Action #8

Contact the owners of Repetitive Loss Properties and nearby properties at risk to inquire about mitigation undertaken and suggest options for mitigating flooding in those areas. This should be accomplished with a letter directly mailed to each property owner.

Goal	1. Minimize the impact of natural hazards on physical buildings and infrastructure
Category	Property Protection
Lead	Planning
Cost	\$0 - \$10,000
Funding	Town Operating Budget / DEMHS
Timeframe	07/2021 - 06/2022
Priority	Low



Action #9

Coordinate with CT SHPO to conduct historic resource surveys, focusing on areas within natural hazard risk zones (such as flood or wildfire hazard zones and areas near steep slopes), to support identification of vulnerable historic properties and preparation of resiliency plans across the state. This action leverages existing resources and best practices for protection of historic and cultural resources through an ongoing statewide initiative by CT SHPO.

Goal	8. Ensure community character and social equity are addressed in mitigation activities
Category	Property Protection
Lead	Planning, in coordination with SHPO
Cost	\$10,000 - \$25,000
Funding	SHPO
Timeframe	07/2021 - 06/2023
Priority	Low

Action #10

Work with CT DEEP to complete a formal validation of the Repetitive Loss Property list and update the mitigation status of each listed property.

Goal	1. Minimize the impact of natural hazards on physical buildings and infrastructure
Category	Property Protection
Lead	Planning
Cost	\$10,000 - \$25,000
Funding	Town Operating Budget / CT DEEP / DEMHS
Timeframe	07/2021 - 06/2023
Priority	Low

Action #11

Send information to residents about emergency preparedness and services available in the event of an emergency by mailing out a newsletter and including information in tax bills.

Goal	6. Improve public outreach, education, and warning systems
Category	Education & Awareness
Lead	Emergency Management
Cost	\$10,000 - \$25,000
Funding	Town Operating Budget
Timeframe	01/2021 - 12/2023
Priority	Low








Capitol Region Natural Hazards Mitigation Plan Update










Enfield, Connecticut

Flood Plains, Dams & Critical Facilities

Dam Hazard Class



-  BB, A, AA OR Unclassified
-  Class B - Significant Hazard
-  Class C - High Hazard

Critical Facilities

-  Fire Station
-  Police Station
-  School
-  Healthcare Facility
-  State Facility
-  Town Facility
-  Waste Water Facility
-  Emergency Center
-  NRHP Buildings/Sites

 NRHP Districts/Areas

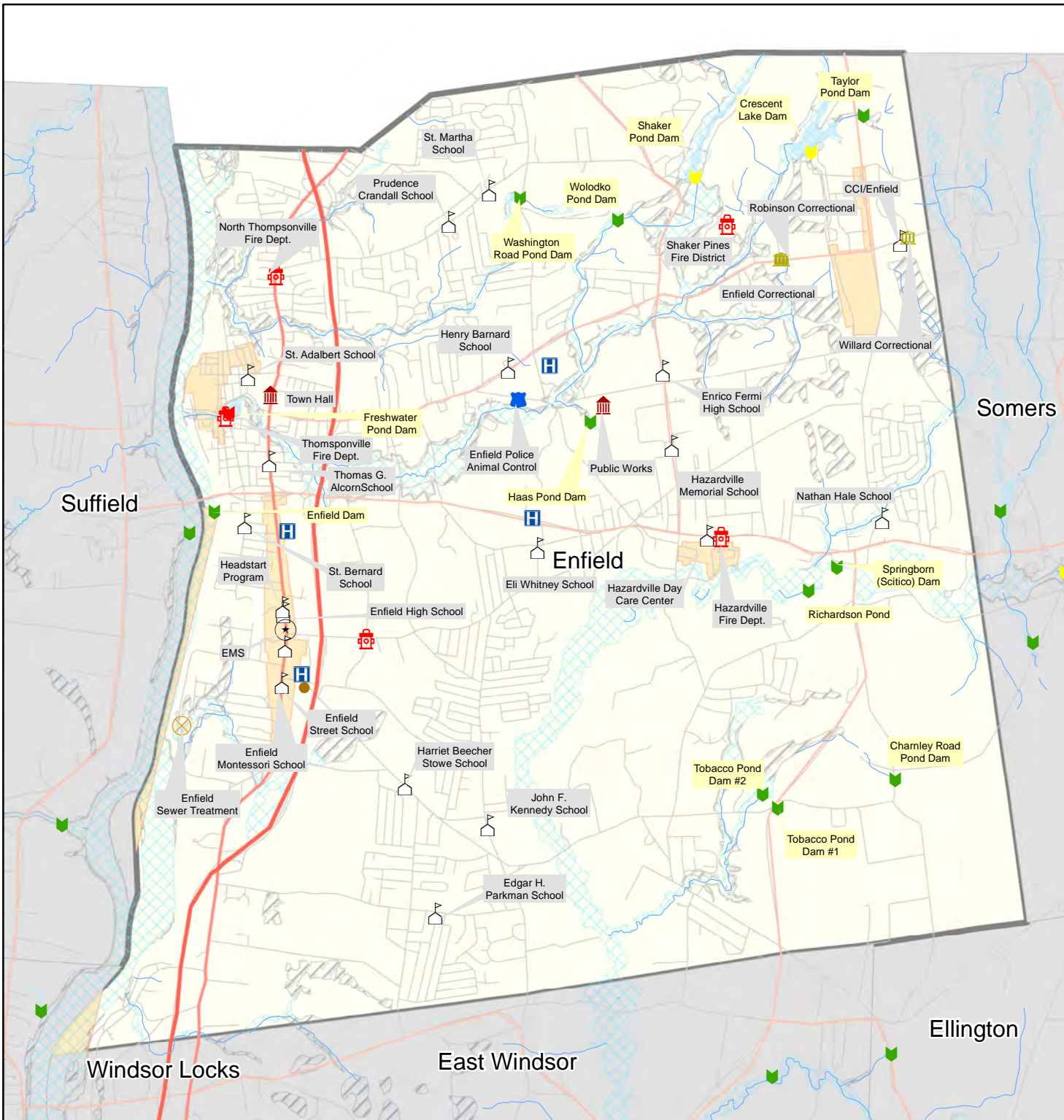
FEMA Flood Hazard Area

-  100 Year Flood Zone
-  500 Year Flood Zone

Data Sources: FEMA, National Register of Historic Places, CT DEEP, CRCOG, ESRI



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14 Farmington

Community Overview

Farmington is located in the southwest corner of the Capitol Region. It has a land area of 28.1 square miles and a population of approximately 25,000. Farmington’s elevation is between 160-245 feet. The majority of Farmington’s land area is located in the Farmington River watershed, but the eastern portion of Town is within the Park River Watershed. The main watercourses in Town include the Farmington and Pequabuck Rivers and Great, Hyde and Scott Swamp Brooks. Several major transportation routes traverse Farmington, including Interstate 84, and routes 4, 6, 9 and 10. The University of Connecticut’s John Dempsey Hospital and medical and dental schools are located in Farmington. Principal industries located in town include numerous national and international corporate facilities, banking, insurance, retail (West Farms Mall), biomedical research and product development, aerospace engineering and products, laser research and production, precision and specialty manufacturing, manufacture of ball bearing spindles, springs, flow and level switches, fans, metals and plastics.

The Bridgehampton development in the western part of town is about half complete. No large development projects are underway.

Critical facilities

Critical facilities throughout the Capitol Region are listed in Appendix B. In Farmington these include the Police Department (EOC) and Irving Robbins Middle School (shelter). Other critical facilities include fire stations, schools, the library, Town Hall, and other municipal departments.

Table 14-1: Critical Facilities, Farmington

Facility	Shelter	Generator
Police Department (EOC)		X
Irving Robbins Middle School	X	X
East Farms School		
Farmington high School		
Noah Wallace School		
Union School		
West District School		
West Woods Upper Elementary School		
East Farmington Fire Station		
Farmington Fire Station		
Oakland Gardens Fire Station		
Southwest Fire Station		
Tunxis Hose Fire Station		
Farmington Library		
Highway and Grounds Department		
Town Hall		
Senior/Community Center		
Water Pollution Control Plant		

Farmington’s Emergency Operations Center is located in the Police Department. The Police Department is also the Public Safety Access Point (PSAP) for the Towns of Burlington and Farmington and is the communications center for all Police/Fire operations in Farmington and Fire operations in the Town of Burlington. The Irving Robbins Middle School has a new generator that can maintain power for the entire facility; the building is now a full shelter.

Capabilities

Farmington’s hazard mitigation capabilities include its emergency responders, snow and tree management, and regulations limiting construction in hazard zones. Hazard mitigation is addressed specifically in the community’s Plan of Conservation and Development.

The Town has not permitted any recent new construction in the floodplain. The Farmington Center Bridge over the Farmington River was replaced in 2010; capacity was not significantly changed.

Firefighting capabilities are fairly extensive within Farmington. The Town has not required any new cisterns or dry hydrants in the last few years for neighborhoods, but has required private water tanks for individual large homes located in areas without fire protection. This requirement is decided on a case-by-case basis.

Farmington coordinates the trimming of trees near powerlines with the local energy provider (Eversource). The Town reports that this relationship has been positive and has effectively lowered the number of outages that residents experience; however, some residents have complained that the tree clearing is excessive. Utilities are required to be underground in new developments.

The Town’s snow management is considered to be sufficient. New plows are purchased each year to maintain the fleet.

New Capabilities

Since adoption of the 2014-2019 Capitol Region Natural Hazards Mitigation Plan Update (“2014 HMP”), a new emergency generator was installed at the Irving Robbins Middle School, allowing the facility to operate as a full shelter.

A Repetitive Loss (RL) property on Dorset Lane is traversed by a small stream at the same elevation as the rear of the house. Culverts under the street were upsized from 18 inches to 42 inches and flooding has subsequently decreased. The State’s RLP list has noted that the risk at this site has been mitigated.

Farmington is currently pursuing funding for a riverbank stabilization project at the cemetery.

The Town plans to utilize the Reverse 911 communications system along with the proposed hydrologic study of the Farmington River in order to warn the owners six RL properties of



potential flooding incidences based upon rainfall predictions. This will allow for the early mitigation and evacuation of affected properties, thereby reducing the potential for loss of life and mitigating the loss of property.

Challenges

Challenges Overview

Farmington's transportation network is frequently disrupted by flooding because of the Farmington River and its tributaries. The traffic impacts of road closures in and around Farmington are compounded by the limited number of river (Farmington and Pequabuck) crossings.

During the 2011 Hurricane Irene flooding event, the main roads leading to the Town's emergency shelter became flooded and inaccessible. There is a significant gap in the Town's ability to provide a shelter during flooding events. Currently there are no other schools equipped with generator backup power.

The Farmington Police Department (EOC and emergency communications center) is located in the 1% annual chance flood plain and has come close to flooding during past storms. The Town has no alternate site to move the communications center.

There are six RL properties in Farmington. The low lying area of these houses makes physical mitigation difficult, and homeowners are not interested in selling their property; the Town is therefore left with mitigation in the form of early warning (see Capabilities). Two RLPs on Round Hill Road (which have been handed down for generations and which the owners are not interested in selling) are surrounded by water during flood events; this impairs access, but does not cause significant damage.

Hazard Losses

The economic losses faced by the community from natural hazards can be estimated by reviewing historic, and modeling future, loss figures. Loss estimates are summarized below.

Historic FEMA Payments

FEMA reimburses communities for hazard losses through programs including Public Assistance (PA) and the National Flood Insurance Program (NFIP). Combining PA and private flood insurance payments can give an estimate for total losses to a community.

The NFIP has paid 125 property damage claims in Farmington totaling \$1,335,198 to-date. Farmington also has six properties that suffer repetitive flood loss. The NFIP has paid out claims totaling over \$813,365 in twenty RL claims on these properties to-date.

Total PA reimbursements to the community were as follows:



- Flood Events: \$80,109 (\$4,216 annually)
- Hurricane Events: \$145,915 (\$7,680 annually)
- Winter Storm Events: \$3,650,608 (\$192,137 annually)

These are summarized in the tables below.

Table 14-2: Flood Event PA Reimbursements, Farmington

Incident	Sep 1999	Oct 2005
Declaration	9/23/1999	12/16/2005
Disaster No.	1302	1619
Entity	FEMA PA Reimbursement	FEMA PA Reimbursement
State	\$1,175	\$1,457
Municipal	\$60,666	\$15,406
Nonprofit	\$1,405	\$0
Total	\$63,246	\$16,863
Annualized	\$3,329	\$888

Table 14-3: Hurricane Wind Event PA Reimbursements, Farmington

Incident	Aug - Sep 2011 (T.S. Irene)
Declaration	9/2/2011
Disaster #	4023
Entity	FEMA PA Reimbursement
State	\$1,659
Municipal	\$144,256
Nonprofit	\$0
Total	\$145,915
Annualized	\$7,680

Table 14-4: Winter Storm PA Reimbursements, Farmington

Incident	Mar 2003	Dec 2003	Jan 2005	Feb 2006	Jan 2011	Oct 2011	Feb 2013
Declaration	3/11/03	1/15/04	2/17/05	5/2/06	3/3/11	11/17/11	3/21/13
Disaster #	3176	3192	3200	3266	1958	4046	4106
Entity	FEMA PA Reimbursement						
State	\$27,188	\$24,210	\$31,486	\$36,005	\$34,643	\$25,561	\$60,626
Municipal	\$53,300	\$65,109	\$65,321	\$74,326	\$73,308	\$2,386,386	\$186,730
Nonprofit		\$78,128	\$78,665	\$90,032	\$627	\$40,500	\$218,457
Total	\$80,488	\$167,447	\$175,473	\$200,363	\$108,578	\$2,452,447	\$465,813
Annualized	\$4,236	\$8,813	\$9,235	\$10,545	\$5,715	\$129,076	\$24,516



National Centers for Environmental Information Losses

The table below summarizes events in the National Centers for Environmental Information (NCEI) severe storm database that were specifically noted as having impacted Farmington since 2012.

Table 14-5: NCEI Database Losses since 2012, Farmington

Date	Event	Property Damage
7/18/2016	Thunderstorm Wind	\$5,000
Total		\$5,000

NCEI losses under other event categories (such as drought, high wind, flooding, and winter storms) were not specifically noted as impacting Farmington, though they did impact Hartford County and nearby towns. NCEI losses are reported in Section II of this Plan.

HAZUS-MH Losses

CRCOG used FEMA’s Hazus-MH model to analyze the risks that the community might face from flooding, hurricanes, and earthquakes. The model estimates economic losses to the town due to damage to buildings and building contents, as well as other economic disruptions. Both residential and commercial structures are addressed. Losses from different hazards are summarized below. Where available, estimates from the previous and current versions of the HMP are provided side-by-side; differences between the two may have been caused by a combination of the following:

- Changes in methodology: such as hazard zone mapping
- Changes in data: such as population and property values
- Changes in the model: this HMP utilized Hazus-MH version 4.0 rather than 2.1
- Other factors: inherent in a complex software like Hazus-MH

More details are available in the Multi-Jurisdictional HMP. Ultimately, changes in the loss estimates reflect the reality that small differences in hazard event features can have a significant impact on losses incurred.

Table 14-6: Estimated Damages to Farmington from a 1% Annual-Chance Flood

Loss Type	2014 Results	2018 Results
Households Displaced	748	247
People Needing Shelter	1,992	367
Buildings at Least Moderately Damaged	393	0
Economic Losses		
Residential Building & Content Losses	\$92,150,000	\$20,660,048
Other Building & Content Losses	\$135,120,000	\$56,215,119
Total Building & Content Loss	\$227,270,000	\$76,875,167
Total Business Interruption Losses	\$1,200,000	\$2,325,028
TOTAL	\$228,470,000	\$79,200,194



Table 14-7: Estimated Damages to Farmington from a 1% Annual-Chance Hurricane

Loss Type	2014 Results (1938 event)	2018 Results (1% track)
Buildings at Least Moderately Damaged	667	1
Buildings Completely Damaged	27	0
Total Debris Generated (tons)	39,248	2408
Truckloads (at 25 tons/truck) of building debris	374	96
Economic Losses		
Residential Building & Content Losses	\$67,080,000	\$6,076,267
Other Building & Content Losses	\$21,020,000	\$1,410,805
Total Building & Content Loss	\$88,100,000	\$6,311,216
Total Business Interruption Losses	\$11,740,000	\$47,787
TOTAL LOSSES	\$99,840,000	\$6,359,003

Losses were calculated from a modeled probabilistic earthquake (1% annual-chance of occurrence), as well as for four specific scenarios with epicenters around Connecticut.

Table 14-8: Estimated Damages to Farmington from a Probabilistic Earthquake

Loss Type	2018 Results
Wage Loss	\$7,234
Rent Loss	\$4,559
Relocation Loss	\$8,075
Income Loss	\$5,345
Inventory Loss	\$617
Total Business Disruption	\$25,830
Structural Loss	\$14,555
Non-Structural Loss	\$45,810
Total Building Loss	\$60,366
Total Content Loss	\$19,669
TOTAL LOSSES	\$105,864

Table 14-9: Estimated Damages to Farmington from Modeled Earthquake Scenarios

Epicenter Location	Magnitude	Estimated Total Losses
East Haddam	6.4	\$471,145.65
Haddam	5.7	\$122,893.57
Portland	5.7	\$494,239.95
Stamford	5.7	\$12,458.58

Other Hazard Costs

Town officials estimate that a typical severe winter storm event will cost the Town about \$35,000 in overtime and equipment. This estimate is based on the January 4th and 5th, 2018, snowstorm.



Average Annualized Losses

Average Annualized Loss (AAL) figures are useful tools for comparison of the risks faced from different hazards with different likelihoods of occurring in a given time period. AAL estimates were prepared for Farmington based on the methodologies discussed in Section II of the Multi-Jurisdictional HMP. Dam failure, drought, tornado, and wildfire losses were sourced from the 2014 Connecticut Natural Hazard Mitigation Plan Update, with dam failure data supplemented by the National Performance of Dams Program and the Connecticut Department of Energy & Environmental Protection. Earthquake and hurricane losses were calculated in HAZUS-MH. Losses for flooding came from NFIP claims, for winter storms from Public Assistance Reimbursements, and for thunderstorms from the NCEI database. These are presented in the table below in dollars per year. Note that Hurricanes and Tropical Storms represent the largest share of total annualized losses.

Table 14-10: Average Annualized Losses, Farmington

Dam Failure	Drought	Earthquakes	Flooding	Hurricanes and Tropical Storms	Severe Winter Storms	Thunderstorms	Tornadoes	Wildfires	Total
\$45	\$0	\$105,864	\$39,353	\$1,588,528	\$192,137	\$3,365	\$371,785	\$5,208	\$2,306,287

Losses Summary

A review of the above loss estimates demonstrates that the Town of Farmington has experienced significant expenses as a result of natural hazards, and is at risk for additional losses if some of the less-frequent events were to occur. These actual and potential losses justify hazard mitigation actions to reduce losses in the future.

Mitigation Strategies and Actions

Status of Previous Mitigation Strategies and Actions

The Town of Farmington reviewed the mitigation actions proposed in the 2014 HMP and determined the status of each. That information is included in the table below.

Table 14-11: Status of Previous Mitigation Strategies and Actions, Farmington

Action #	Action	Notes	Status
GOAL: REDUCE TRAFFIC CONGESTION DUE TO FLOODING OF MAJOR EAST/WEST ROUTE (MEADOW ROAD)			
Objective 1: Implement traffic study to improve access to alternate routes (Town Strategic Plan)			
1.1	Consider the feasibility of a fourth bridge over the Farmington River. Because this is expected to be a long term, multi-year project, for the 2014-2019 Plan period, the action to be taken is to develop a scope of work for a feasibility study.	A design has been completed. The next steps are permitting and securing of funds.	Carry Forward



Action #	Action	Notes	Status
Objective 2: Consider the elevation of Meadow Road to reduce incidents of flooding			
2.1	Conduct an engineering and feasibility study of elevating Meadow Road and installing culverts to allow flow in both directions. Because this is expected to be a long term, multi-year project, for the 2014-2019 Plan period, the action to be taken is to develop a scope of work and Request for Proposal (RFP) for the study.	No progress has been made on this action due to lack of resources. Carry Forward.	Carry Forward with Revisions
Objective 2: Ensure that future development does not increase flood risk.			
1.1	Improve communications with the Army Corps of Engineers to obtain advance warning of releases from the Goodwin Dam.	A drill was conducted in 2017. MDC and the Army Corps have been notifying the town of releases.	Complete
1.2	Consider partnering with neighboring watershed communities to conduct a hydrologic study of the Farmington River.	No progress has been made on this action due to lack of resources. Carry Forward.	Carry Forward with Revisions
1.3	Consider performing a town-wide hydrologic study.	No progress has been made on this action due to lack of resources. The Town Council has cut funding for this effort several times. Carry Forward.	Carry Forward with Revisions
2.1	Continue to work with the Capitol Region Emergency Planning Committee on obtaining generators and other supplies.	A new generator has been installed at the High School	Capability
4.1	Continue to use the town newsletter and website to release relevant information.	This is a capability. Everbridge is also used to release important emergency information to residents.	Capability
5.1	The current shelter becomes inaccessible during flooding events. The Town plans to make Irving A. Robbins School our shelter. The school is also a medical backup shelter to the University of Connecticut Health Center.	This action has been completed	Complete
6.1	Establish the Farmington Fire Station as a backup dispatch center and EOC. The site needs to be equipped with phone lines and communications equipment.	The Farmington Fire Station has been abandoned as a backup EOC locations. The Southwest Fire Station will be the new backup EOC. Carry revised action forward.	Carry Forward with Revisions
7.1	Design a permanent retaining wall system or structure such as steel sheet piling to prevent further erosion of the existing gravel embankment.	This refers to the cemetery on Garden Street. Limited progress has been made. Regulatory agencies and FEMA have not endorsed submitted designs. Bank stabilization is still needed. Carry forward revised action.	Carry Forward with Revisions

Active Mitigation Strategies and Actions

The Town proposed to initiate several new mitigation actions for the upcoming five years. Additionally, a number of actions from the previous planning period are being carried forward or replaced with revised actions. These are listed below.



Each of the following actions has been prioritized based on FEMA guidelines, listed from highest to lowest priority, and numbered.

Action #1

Enter the Sustainable CT program through Registration and review actions that can be undertaken to pursue Certification. Make progress with the actions related to hazard mitigation.

Goal	4. Increase the use of natural, “green,” or “soft” hazard mitigation measures, such as open space preservation and green infrastructure.
Category	Natural Resources Protection
Lead	Planning
Cost	\$0 - \$10,000
Funding	Town Operating Budget
Timeframe	01/2019 - 12/2019
Priority	High

Action #2

Identify funding sources and requirements to conduct a town-wide hydrologic study.

Goal	3. Improve institutional awareness and understanding of natural hazard impacts and mitigation within municipal governments and other decision-making bodies
Category	Prevention
Lead	Public Works
Cost	\$0 - \$10,000
Funding	Town Operating Budget / Grants / CT DEEP / DEMHS
Timeframe	07/2019 - 06/2020
Priority	High

Action #3

Develop a new concept for a permanent erosion prevention measure at the cemetery on Garden Street that will be accepted by regulatory agencies. Complete a grant application to implement the new concept.

Goal	1. Minimize the impact of natural hazards on physical buildings and infrastructure
Category	Structural Projects
Lead	Public Works
Cost	\$10,000 - \$25,000
Funding	Town Operating Budget
Timeframe	07/2019 - 06/2021
Priority	High



Action #4

Conduct outreach to local small businesses with the aim of preventing the accidental release and pollution from chemicals stored and used at their facilities during or following natural hazard events.

Goal	6. Improve public outreach, education, and warning systems
Category	Education & Awareness
Lead	Planning, in coordination with DEEP
Cost	\$0 - \$10,000
Funding	Materials & Resources Provided by CT DEEP
Timeframe	01/2019 - 12/2019
Priority	Medium

Action #5

Coordinate with NEMO and CRCOG to share resources and gain technical support for hazard mitigation actions involving stormwater management and public outreach, which have parallel benefits related to MS4 stormwater permit compliance.

Goal	1. Minimize the impact of natural hazards on physical buildings and infrastructure
Category	Prevention
Lead	Public Works
Cost	\$0 - \$10,000
Funding	Town Operating Budget
Timeframe	01/2020 - 12/2020
Priority	Medium

Action #6

Develop a scope of work and Request for Proposals (RFP) for an engineering and feasibility study of elevating Meadow Road and installing culverts to allow flow in both directions.

Goal	1. Minimize the impact of natural hazards on physical buildings and infrastructure
Category	Structural Projects
Lead	Public Works
Cost	\$0 - \$10,000
Funding	Town Operating Budget
Timeframe	07/2020 - 06/2021
Priority	Medium



Action #7

Participate in EMI courses or the seminars and annual conference held by the Connecticut Association of Flood Managers.

Goal	3. Improve institutional awareness and understanding of natural hazard impacts and mitigation within municipal governments and other decision-making bodies
Category	Education & Awareness
Lead	Planning
Cost	\$0 - \$10,000
Funding	Town Operating Budget
Timeframe	07/2019 - 06/2024
Priority	Medium

Action #8

Explore the feasibility of a fourth bridge over the Farmington River. For the current planning period, develop a report of permitting needs and possible funding sources to allow for next steps to be taken during the next Plan period.

Goal	7. Improve the emergency response capabilities of the region and its communities
Category	Preparedness & Emergency Response
Lead	Public Works
Cost	\$10,000 - \$25,000
Funding	Town Operating Budget
Timeframe	07/2020 - 06/2022
Priority	Medium

Action #9

Work with MDC to identify potential hazard mitigation actions for MDC facilities, and list those actions in the next HMP Update.

Goal	5. Improve the resilience of local and regional utilities and infrastructure using strategies including adaptation, hardening, and creating redundancies.
Category	Property Protection
Lead	Public Works
Cost	\$10,000 - \$25,000
Funding	Town Operating Budget / DEMHS
Timeframe	07/2020 - 06/2022
Priority	Medium



Action #10

Conduct an assessment of the Town's snow-removal capabilities to identify opportunities for improvement.

Goal	7. Improve the emergency response capabilities of the region and its communities
Category	Preparedness & Emergency Response
Lead	Public Works
Cost	\$25,000 - \$50,000
Funding	Town Operating Budget / Grants
Timeframe	07/2021 - 06/2023
Priority	Medium

Action #11

Establish the Southwest Fire Station as a backup EOC.

Goal	7. Improve the emergency response capabilities of the region and its communities
Category	Preparedness & Emergency Response
Lead	Emergency Management
Cost	\$25,000 - \$50,000
Funding	Town Operating Budget / Grants / DEMHS
Timeframe	01/2021 - 12/2023
Priority	Medium

Action #12

Identify, possibly in cooperation with neighboring watershed communities, funding sources and requirements to conduct a hydrologic study of the Farmington River.

Goal	3. Improve institutional awareness and understanding of natural hazard impacts and mitigation within municipal governments and other decision-making bodies
Category	Prevention
Lead	Public Works
Cost	\$0 - \$10,000
Funding	Town Operating Budget
Timeframe	07/2021 - 06/2022
Priority	Low



Action #13

Contact the owners of Repetitive Loss Properties and nearby properties at risk to inquire about mitigation undertaken and suggest options for mitigating flooding in those areas. This should be accomplished with a letter directly mailed to each property owner.

Goal	1. Minimize the impact of natural hazards on physical buildings and infrastructure
Category	Property Protection
Lead	Planning
Cost	\$0 - \$10,000
Funding	Town Operating Budget / DEMHS
Timeframe	07/2021 - 06/2022
Priority	Low

Action #14

Coordinate with CT SHPO to conduct outreach to historic property owners to educate them on methods of retrofitting their properties to be more hazard-resilient while maintaining historic character.

Goal	8. Ensure community character and social equity are addressed in mitigation activities
Category	Education & Awareness
Lead	Planning, in coordination with SHPO
Cost	\$0 - \$10,000
Funding	SHPO
Timeframe	01/2021 - 12/2022
Priority	Low

Action #15

Work with CT DEEP to complete a formal validation of the Repetitive Loss Property list and update the mitigation status of each listed property.

Goal	1. Minimize the impact of natural hazards on physical buildings and infrastructure
Category	Property Protection
Lead	Planning
Cost	\$10,000 - \$25,000
Funding	Town Operating Budget / CT DEEP / DEMHS
Timeframe	07/2021 - 06/2023
Priority	Low



Action #16

Coordinate with CT SHPO to conduct historic resource surveys, focusing on areas within natural hazard risk zones (such as flood or wildfire hazard zones and areas near steep slopes), to support identification of vulnerable historic properties and preparation of resiliency plans across the state. This action leverages existing resources and best practices for protection of historic and cultural resources through an ongoing statewide initiative by CT SHPO.

Goal	8. Ensure community character and social equity are addressed in mitigation activities
Category	Property Protection
Lead	Planning, in coordination with SHPO
Cost	\$10,000 - \$25,000
Funding	SHPO
Timeframe	07/2021 - 06/2023
Priority	Low






Capitol Region Natural Hazards Mitigation Plan Update










Farmington, Connecticut

Flood Plains, Dams & Critical Facilities

Dam Hazard Class



-  BB, A, AA OR Unclassified
-  Class B - Significant Hazard
-  Class C - High Hazard

Critical Facilities

-  Fire Station
-  Police Station
-  School
-  Healthcare Facility
-  State Facility
-  Town Facility
-  Waste Water Facility
-  Emergency Center
-  NRHP Buildings/Sites

 NRHP Districts/Areas

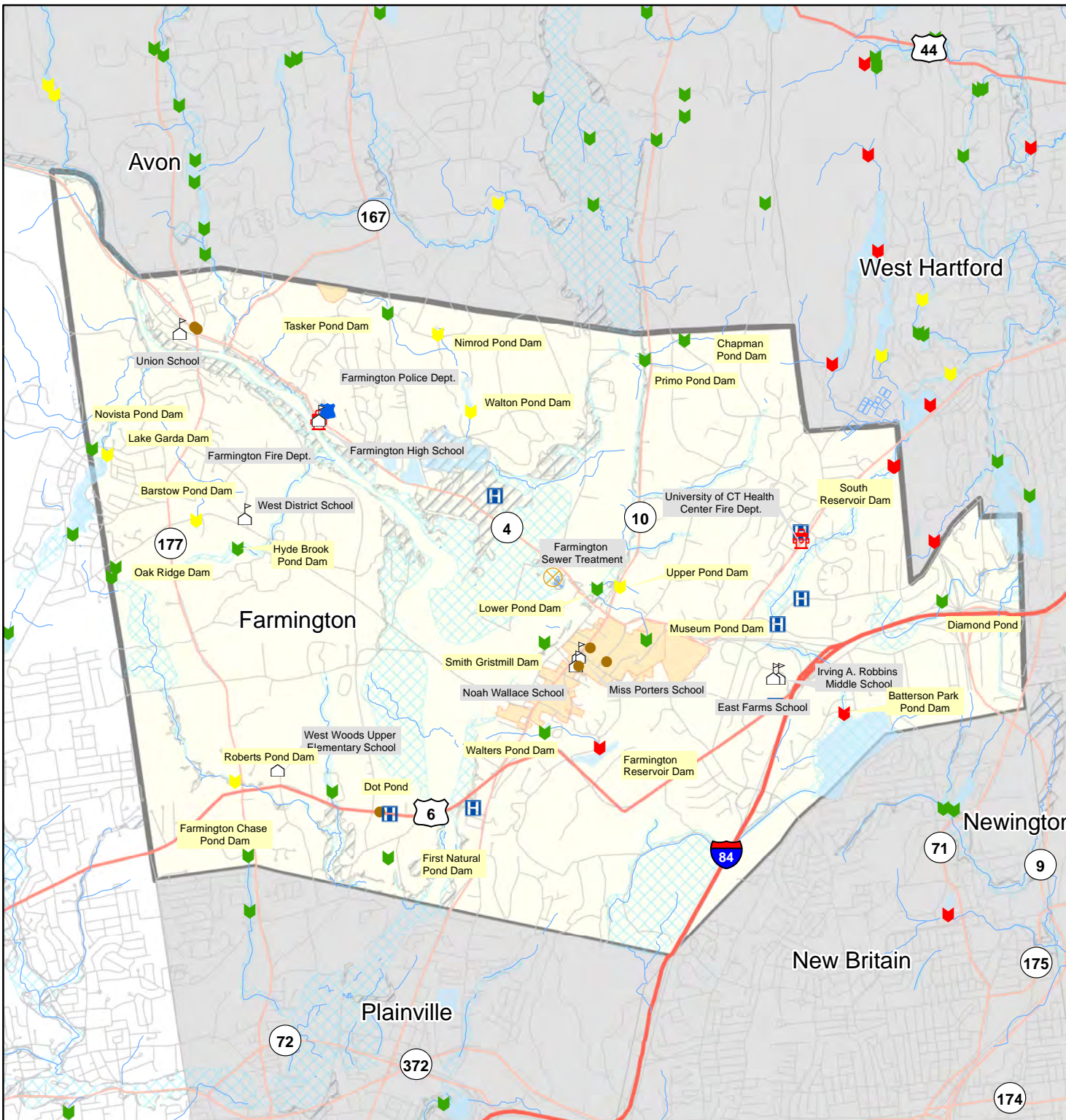
FEMA Flood Hazard Area

-  100 Year Flood Zone
-  500 Year Flood Zone

Data Sources: FEMA, National Register of Historic Places, CT DEEP, CRCOG, ESRI



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Capitol Region Natural Hazards Mitigation Plan Update












Farmington, Connecticut

Dam Breach Inundation Area & Critical Facilities

Dam Hazard Class

-  BB, A, AA OR Unclassified
-  Class B - Significant Hazard
-  Class C - High Hazard

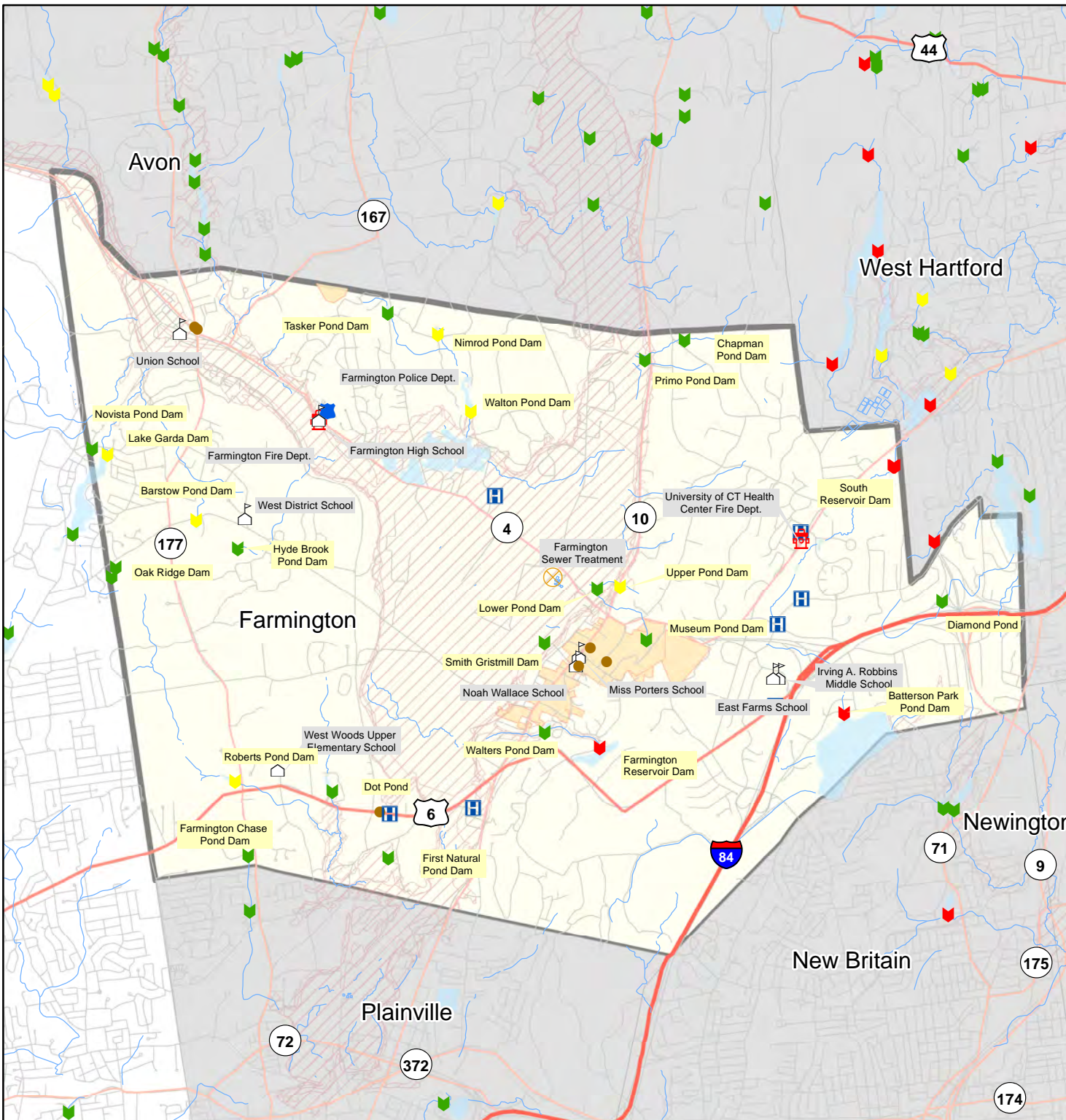
Critical Facilities

-  Fire Station
-  Police Station
-  School
-  Healthcare Facility
-  State Facility
-  Town Facility
-  Waste Water Facility
-  Emergency Center
-  NRHP Buildings/Sites
-  NRHP Districts/Areas
-  Dam Breach Inundation Areas

Data Sources: FEMA, National Register of Historic Places, CT DEEP, CRCOG, ESRI



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15 Glastonbury

Community Overview

The Town of Glastonbury encompasses 51.37 square miles with an estimated population of over 34,000 people. The elevation ranges from about 80 to 800 feet. The Town lies primarily in the Main Stem of the Connecticut River drainage basin while a small portion in the northeast corner of Glastonbury drains to the Hockanum Watershed. In addition to the Connecticut River which flows along the western boundary, main watercourses include Hubbard, Roaring, Salmon and Slab Gut Brooks. Major transportation routes through Glastonbury include Routes 2, 3, 17, 83 and 94. Glastonbury’s major industries include insurance and financial services, technology and banking, computer services, medical and adult care facilities, agriculture, as well as retail. Multiple new developments are underway as population continues to grow. A 250-unit apartment complex has been built off New London Turnpike, a 145-unit complex is under construction on Hebron Avenue, and construction on 100 units on Glastonbury Boulevard is expected to begin soon. A number of new renovations and redevelopments are underway downtown, including 30,000 square feet of commercial space under construction.

Critical Facilities

Critical Facilities throughout the Capitol Region are listed in Appendix B. A number of Glastonbury critical facilities are listed here.

The Glastonbury Emergency Operations Center (EOC) is located in the Town Hall. The secondary EOC is the police department (formerly the primary EOC location). During emergencies, Glastonbury EOC personnel prefer to be out in the community, rather than stationed at the EOC. The Town funds four fire stations, but the crews are volunteer. All four have standby emergency generators.

The High School is the primary shelter. The Community Center serves as the secondary shelter. Emergency supplies are kept at the Facilities Maintenance Barn located adjacent to the EOC, Town Hall, and Police Department; an emergency generator was being installed at the Facilities Maintenance barn as this HMP was being developed. Numerous charging and warming centers are dispersed throughout the town, given its large size.

Table 15-1: Critical Facilities, Glastonbury

Facility	Shelter	Generator
Town Hall (EOC)		X
Police Department (Secondary EOC)		X
Glastonbury High School	Primary	X
Glastonbury East Hartford Magnet School		X
Glastonbury Community Center	Secondary	X
Facilities Maintenance Barn (Emergency Supply Storage)		X
Four Volunteer Fire Stations		X
Eight (8) Sewage Pumping Stations		X

Facility	Shelter	Generator
Center Village		X
Village Green & Knox Lane Annex		X
Herbert T. Clark Housing		X
Genesis Health Care Facility		X
Mountain Laurel Health Care Facility		X
Naubuc Green		X
Ambulance Facility		X

Capabilities

Hazard mitigation is addressed specifically in Glastonbury’s Plan of Conservation and Development.

Nearly 92% of land at risk of flooding in Glastonbury is in the Flood Zone or otherwise zoned for resource protection /agriculture, recreation or public use. Development is generally restricted from the floodplain. The Town adopted enhanced Inland Wetlands and Watercourses Regulations in 2010 which could reduce its overall level of vulnerability.

Glastonbury coordinates tree-trimming near powerlines and power outage prevention and response with the regional energy provider (Eversource). This relationship has been positive and trimming efforts have been effective at minimizing outages. Some work has been controversial, as property owners near the lines are upset about the extent of clearing.

New Capabilities

Glastonbury has acquired emergency generators using taxpayer funds. A STEAP grant for \$300,000 (approximate) provided funding for transitioning the Facilities Maintenance Barn to an emergency preparedness support facility.

The Town has undertaken a lot of work over the past few years in response to the storms of 2011. They have found it helpful to post written and electronic messages in town during events.

Several bridge and drainage projects have been completed by the Town since the previous HMP. A major drainage project underway at Tryon Street and Dug Road should reduce flooding in South Glastonbury. The Blackledge River Dam has been removed.

Glastonbury has a Fire Marshal; this official requires construction of new cisterns or dry hydrants as is deemed necessary.

Glastonbury was awarded the Silver Certification within the SustainableCT program in October 2018.



Challenges

Challenges Overview

Glastonbury has experienced disruptions and damages due to flooding and severe storms. Ten percent of Glastonbury's land area is located in the 100-year floodplain.

The April, 2017 winter storm was notable for its wind and tree damage.

Droughts tend not to be a significant hazard in Glastonbury; however, some residents on private wells use significant amounts of water for turf irrigation, which can have an impact on groundwater supplies. Residents may not understand possible adverse outcomes. Efforts by the Town to provide public education concerning drought conditions continue, as applicable.

The Mill Street Dam, Addison Pond Dam, and Buckingham Reservoir Dam are all dams of note within the Town.

Hazard Losses

The economic losses faced by the community from natural hazards can be estimated by reviewing historic, and modeling future, loss figures. Loss estimates are summarized below.

Historic FEMA Payments

FEMA reimburses communities for hazard losses through programs including Public Assistance (PA) and the National Flood Insurance Program (NFIP). Combining PA and private flood insurance payments can give an estimate for total losses to a community.

Since 1978, the NFIP has paid 47 property damage claims in Glastonbury totaling \$161,877. Glastonbury has not had any Repetitive Loss (RL) Property claims.

Total PA reimbursements to the community were as follows:

- Flood Events: \$14,900 (\$784 annually)
- Hurricane Events: \$144,778 (\$7,620 annually)
- Winter Storm Events: \$4,097,815 (\$215,674 annually)

These are summarized in the tables below.

Table 15-2: Flood Event PA Reimbursements, Glastonbury

Incident	Sep 1999	Oct 2005
Declaration	9/23/1999	12/16/2005
Disaster No.	1302	1619
Entity	FEMA PA Reimbursement	
State	\$1,597	\$1,980
Municipal	\$0	\$11,323



Nonprofit	\$0	\$0
Total	\$1,597	\$13,303
Annualized	\$84	\$700

Table 15-3: Hurricane Wind Event PA Reimbursements, Glastonbury

Incident	Aug - Sep 2011 (T.S. Irene)
Declaration	9/2/2011
Disaster #	4023
Entity	FEMA PA Reimbursement
State	\$1,514
Municipal	\$143,264
Nonprofit	\$0
Total	\$144,778
Annualized	\$7,620

Table 15-4: Winter Storm PA Reimbursements, Glastonbury

Incident	Mar 2003	Dec 2003	Jan 2005	Feb 2006	Jan 2011	Oct 2011	Feb 2013
Declaration	3/11/03	1/15/04	2/17/05	5/2/06	3/3/11	11/17/11	3/21/13
Disaster #	3176	3192	3200	3266	1958	4046	4106
Entity	FEMA PA Reimbursement						
State	\$29,850	\$26,760	\$35,304	\$42,851	\$37,335	\$15,397	\$72,555
Municipal	\$79,400	\$112,790	\$117,653	\$126,722	\$155,942	\$2,973,619	\$271,636
Nonprofit	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Total	\$109,251	\$139,550	\$152,957	\$169,573	\$193,277	\$2,989,016	\$344,191
Annualized	\$5,750	\$7,345	\$8,050	\$8,925	\$10,172	\$157,317	\$18,115

National Centers for Environmental Information Losses

The table below summarizes events in the National Centers for Environmental Information (NCEI) severe storm database that were specifically noted as having impacted the community since 2012.

Table 15-5: NCEI Database Losses since 2012, Glastonbury

Date	Event	Property Damage
8/10/2012	Microburst	\$110,000
9/18/2012	Thunderstorm Wind	\$5,000
6/23/2015	Thunderstorm Wind	\$15,000
2/25/2016	Thunderstorm Wind	\$5,000
2/25/2016	Thunderstorm Wind	\$5,000
8/11/2016	Thunderstorm Wind	\$95,000
8/11/2016	Flood	\$0



Date	Event	Property Damage
8/2/2017	Hail	\$0
Total Thunderstorm		\$235,000
Total Flood		\$0

NCEI losses under other event categories (such as drought, high wind, flooding, and winter storms) were not specifically noted as impacting this community, though they did impact Hartford County and nearby towns. NCEI losses are reported in Section II of this Plan.

HAZUS-MH Losses

CRCOG used FEMA’s Hazus-MH model to analyze the risks that the community might face from flooding, hurricanes, and earthquakes. The model estimates economic losses to the town due to damage to buildings and building contents, as well as other economic disruptions. Both residential and commercial structures are addressed. Losses from different hazards are summarized below. Where available, estimates from the previous and current versions of the HMP are provided side-by-side; differences between the two may have been caused by a combination of the following:

- Changes in methodology: such as hazard zone mapping
- Changes in data: such as population and property values
- Changes in the model: this HMP utilized Hazus-MH version 4.0 rather than 2.1
- Other factors: inherent in a complex software like Hazus-MH

More details are available in the Multi-Jurisdictional HMP. Ultimately, changes in the loss estimates reflect the reality that small differences in hazard event features can have a significant impact on losses incurred.

Table 15-6: Estimated Damages to Glastonbury from a 1% Annual-Chance Flood

Loss Type	2014 Results	2018 Results
Households Displaced	278	441
People Needing Shelter	456	658
Buildings at Least Moderately Damaged	10	2
Residential Building & Content Losses	\$13,590,000	\$44,246,359
Other Building & Content Losses	\$22,010,000	\$48,905,896
Total Building & Content Loss	\$35,600,000	\$93,152,255
Total Business Interruption Losses	\$120,000	\$1,772,302
TOTAL	\$35,720,000	\$94,924,557



Table 15-7: Estimated Damages to Glastonbury from a 1% Annual-Chance Hurricane

Loss Type	2014 Results (1938 event)	2018 Results (1% track)
Buildings at Least Moderately Damaged	1,342	1
Buildings Completely Damaged	78	0
Total Debris Generated (tons)	90,099	17411
Truckloads (at 25 tons/truck) of building debris	724	696
Economic Losses		
Residential Building & Content Losses	\$144,360,000	\$20,999,437
Other Building & Content Losses	\$42,373,000	\$1,607,988
Total Building & Content Loss	186,733,000	\$22,607,425
Total Business Interruption Losses	\$24,173,000	\$977,172
TOTAL LOSSES	\$210,906,000	\$23,584,597

Losses were calculated from a modeled probabilistic earthquake (1% annual-chance of occurrence), as well as for four specific scenarios with epicenters around Connecticut.

Table 15-8: Estimated Damages to Glastonbury from a Probabilistic Earthquake

Loss Type	2018 Results
Wage Loss	\$6,990
Rent Loss	\$7,301
Relocation Loss	\$12,208
Income Loss	\$5,343
Inventory Loss	\$870
Total Business Disruption	\$32,711
Structural Loss	\$23,909
Non-Structural Loss	\$64,940
Total Building Loss	\$88,849
Total Content Loss	\$27,953
TOTAL LOSSES	\$149,513

Table 15-9: Estimated Damages to Glastonbury from Modeled Earthquake Scenarios

Epicenter Location	Magnitude	Estimated Total Losses
East Haddam	6.4	\$1,806,399.69
Haddam	5.7	\$637,761.74
Portland	5.7	\$3,078,672.58
Stamford	5.7	\$14,376.15

Average Annualized Losses

Average Annualized Loss (AAL) figures are useful tools for comparison of the risks faced from different hazards with different likelihoods of occurring in a given time period. AAL estimates were prepared for each natural hazard that may impact the community based on the methodologies discussed in Section II of the Multi-Jurisdictional HMP. Dam failure, drought, tornado, and wildfire losses were sourced from the 2014 Connecticut Natural Hazard Mitigation Plan Update, with dam failure data supplemented by the National Performance of Dams



Program and the Connecticut Department of Energy & Environmental Protection. Earthquake and hurricane losses were calculated in HAZUS-MH. Losses for flooding came from NFIP claims, for winter storms from Public Assistance Reimbursements, and for thunderstorms from the NCEI database. These are presented in the table below in dollars per year. Note that Hurricanes and Tropical Storms represent the largest share of total annualized losses.

Table 15-10: Average Annualized Losses, Glastonbury

Dam Failure	Drought	Earthquakes	Flooding	Hurricanes and Tropical Storms	Severe Winter Storms	Thunderstorms	Tornadoes	Wildfires	Total
\$62	\$0	\$149,513	\$5,044	\$2,158,179	\$215,674	\$4,572	\$505,108	\$9,530	\$3,047,682

Losses Summary

A review of the above loss estimates demonstrates that the Town of Glastonbury has experienced significant expenses as a result of natural hazards, and is at risk for additional losses if some of the less-frequent events were to occur. These actual and potential losses justify hazard mitigation actions to reduce losses in the future.

Mitigation Strategies and Actions

Status of Previous Mitigation Strategies and Actions

The community reviewed the mitigation actions proposed in the 2014-2019 Capitol Region Natural Hazards Mitigation Plan Update and determined the status of each. That information is included in the table below.

Table 15-11: Status of Previous Mitigation Strategies and Actions, Glastonbury

Action #	Action	Notes	Status
GOAL: REDUCE LOSS OF LIFE, PROPERTY AND ECONOMIC CONSEQUENCES FROM NATURAL DISASTERS SUCH AS WINTER STORMS, HURRICANES AND FLOODING.			
Objective 1: Improve ability to clear roadways as a result of storm events, which may be impassable due to snow, flooding or debris in order to improve emergency access and to assist in expediting utility restoration as required.			
1.1	Secure contractual tree removal services and equipment prior to storm response and cleanup.	This action has been completed.	Completed
1.2	Procure additional Town equipment to expedite cleanup operations as a result of storm events which include large scale snow blowing/removal and debris collection equipment.	Current resources are believed to be sufficient at this time.	Drop
Objective 2: Expand the Town's tree maintenance program for tree trimming located within public right of ways to mitigate the delay in the restoration process of utilities, such as electricity, natural gas and public water service.			
2.1	Increase the Town budget for the trimming and removal of potentially hazardous trees.	The Town has not been able to increase the budget, but current resources are believed sufficient at this time. Drop this action.	Drop



Action #	Action	Notes	Status
Objective 3: Improve Town’s ability to provide emergency shelter for residents and small pets.			
3.1	Increase inventory of emergency response supplies and acquire storage for same (food, water, cots, oxygen cylinders, signs, electronic devices (charging stations) etc.)	This action has been completed.	Completed
Objective 4: Continue to enhance capabilities to track high risk population and provide emergency notification systems to reach isolated/special needs population.			
4.1	Continue voluntary registry and classifications of those individuals who may require special assistance in an emergency.	This is an ongoing effort. This is a capability	Capability
4.2	Develop and implement messaging system to provide early alert system to isolated and high risk population utilizing Everbridge (reverse 911), Board of Education notification system and social media.	Messaging systems have been setup using Reverse 911, social media, and electronic message boards. This action is complete.	Completed
Objective 5: Enhance public information efforts and promote public education for residents and businesses of Glastonbury as to how to prepare for a natural disaster and the necessary precautions that should be taken to protect their assets during an extended power outage.			
5.1	Develop materials instructing residents on measures to take care of their own properties (bleeding water lines etc.), and services offered by the Town. Post information on town website, social media and produce for distribution in welcome packets, with tax mailings and through other periodic offerings. Create checklist for public to utilize during emergencies.	This action has been completed.	Completed
5.2	Identify and purchase generator/battery powered messaging signs to provide important safety emergency information to public during times of extended power outages.	This action has been completed.	Completed
Objective 6: Establish state of the art Emergency Operations Center (EOC) with secondary and backup EOC for redundancy.			
6.1	Relocate EOC to Academy Building from Police Training Room to improve overall operational efficiencies. Police Training Room will be utilized as backup EOC. Identify and purchase supplemental equipment/enhancements to operate effectively (GIS software for accessing/monitoring damage reports, technology, phone/alert systems, storage). In addition to the primary and secondary EOC locations an additional contingency to utilize Fire Company #3 and #4 may be required based on specific extenuating needs.	This action has been completed.	Completed
Objective 7: Enhance overall functionality of Town operations and specified business community during extended power outages.			
7.1	Installation of a new emergency generator at the Community Center as this facility can be utilized as an emergency shelter. In addition to providing emergency power to the compressed natural gas filing station located at the Community Center which provides fuel for vehicles within the Town fleet.	This action has been completed.	Completed



Action #	Action	Notes	Status
7.2	Purchase mobile generators to be utilized as primary and backup power sources for Town operations.	This action has been completed.	Completed
7.3	Replace inoperable generator at Town Hall/Academy complex.	This action has been completed.	Completed
7.4	Replace inadequate generators at Police, Highway and Parks Maintenance Facility.	This action has been completed.	Completed
7.5	Review feasibility of micro-grid system(s) within the Town Center area to supplement Town Facilities as well as specific business community operations such as gas stations and grocery stores. This system could be utilized in the event of an extended power outage.	Study was completed, and Town determined not to pursue a microgrid	Drop
Objective 8: Maintain strict control of development to and near flood prone areas.			
8.1	Continue to implement and enforce regulations.	This is an ongoing effort. This is a capability	Capability
Objective 9: Improve public safety's capabilities to reach isolated population.			
9.1	Consider drainage improvements to Shoddy Mill, Forest Lane and other areas of periodic flooding.	Drainage improvements assessed and determined not to be cost effective. Town will not pursue.	Drop
9.2	Consider purchasing additional watercraft for emergency rescue operations during flooding.	Town considered this action and determined not to pursue it.	Drop

Active Mitigation Strategies and Actions

The Town proposed to initiate several new mitigation actions for the upcoming five years. Additionally, a number of actions from the previous planning period are being carried forward or replaced with revised actions. These are listed below.

Each of the following actions has been prioritized based on FEMA guidelines, listed from highest to lowest priority, and numbered.

Action #1	
Complete the Tryon Street and Doug Road drainage project to reduce flooding in South Glastonbury.	
Goal	1. Minimize the impact of natural hazards on physical buildings and infrastructure
Category	Structural Projects
Lead	Public Works
Cost	More than \$100,000
Funding	Grants
Timeframe	07/2019 - 06/2021
Priority	High



Action #2

Conduct outreach to local small businesses with the aim of preventing the accidental release and pollution from chemicals stored and used at their facilities during or following natural hazard events.

Goal	6. Improve public outreach, education, and warning systems
Category	Education & Awareness
Lead	Planning, in coordination with DEEP
Cost	\$0 - \$10,000
Funding	Materials & Resources Provided by CT DEEP
Timeframe	01/2019 - 12/2019
Priority	Medium

Action #3

Coordinate with NEMO and CRCOG to share resources and gain technical support for hazard mitigation actions involving stormwater management and public outreach, which have parallel benefits related to MS4 stormwater permit compliance.

Goal	1. Minimize the impact of natural hazards on physical buildings and infrastructure
Category	Prevention
Lead	Engineering
Cost	\$0 - \$10,000
Funding	Town Operating Budget
Timeframe	01/2020 - 12/2020
Priority	Medium

Action #4

Participate in EMI courses or the seminars and annual conference held by the Connecticut Association of Flood Managers.

Goal	3. Improve institutional awareness and understanding of natural hazard impacts and mitigation within municipal governments and other decision-making bodies
Category	Education & Awareness
Lead	Planning
Cost	\$0 - \$10,000
Funding	Town Operating Budget
Timeframe	07/2019 - 06/2024
Priority	Medium



Action #5

Apply the same flood damage prevention guidelines to the Connecticut River floodplain and other isolated flood zones not associated with Roaring Brook, Salmon Brook, Grindle Brook, and Meadow Drain.

Goal	2. Ensure Municipal Codes and Regulations support hazard mitigation
Category	Prevention
Lead	Planning
Cost	\$0 - \$10,000
Funding	Town Operating Budget
Timeframe	07/2020 - 06/2021
Priority	Medium

Action #6

Work with MDC to identify potential hazard mitigation actions for MDC facilities, and list those actions in the next HMP Update.

Goal	5. Improve the resilience of local and regional utilities and infrastructure using strategies including adaptation, hardening, and creating redundancies.
Category	Property Protection
Lead	Public Works
Cost	\$10,000 - \$25,000
Funding	Town Operating Budget / DEMHS
Timeframe	07/2020 - 06/2022
Priority	Medium

Action #7

Conduct outreach to private property owners encouraging them to remove dangerous trees and branches on their property.

Goal	6. Improve public outreach, education, and warning systems
Category	Education & Awareness
Lead	Parks & Recreation
Cost	\$10,000 - \$25,000
Funding	Town Operating Budget
Timeframe	07/2020 - 06/2022
Priority	Medium



Action #8

Adopt best-practices guidelines for contractors performing major tree clearing projects to minimize impacts on drainage.

Goal	6. Improve public outreach, education, and warning systems
Category	Education & Awareness
Lead	Planning / Parks & Recreation
Cost	\$10,000 - \$25,000
Funding	Town Operating Budget
Timeframe	07/2020 - 06/2022
Priority	Medium

Action #9

Carry out a campaign to educate property owners on the impact of using water, especially private well water, to irrigate turf during droughts. Include alternative options.

Goal	6. Improve public outreach, education, and warning systems
Category	Education & Awareness
Lead	Health & Communications
Cost	\$10,000 - \$25,000
Funding	Town Operating Budget
Timeframe	01/2020 - 12/2022
Priority	Medium

Action #10

Update the Storm Drainage Management Reports prepared for the Roaring Brook, Salmon Brook, Grindle Brook and Meadow Drain watersheds to ensure their continued use as policy guidelines for development within these areas to prevent downstream flooding, erosion, and property damage.

Goal	2. Ensure Municipal Codes and Regulations support hazard mitigation
Category	Prevention
Lead	Planning
Cost	\$10,000 - \$25,000
Funding	Town Operating Budget
Timeframe	07/2020 - 06/2022
Priority	Medium



Action #11

Update the Town-wide storm drainage management program/Master Drainage Studies. Provide recommendations pertaining to the latest innovative techniques to manage stormwater quality and quantity, such as biofilters and rain gardens.

Goal	2. Ensure Municipal Codes and Regulations support hazard mitigation
Category	Prevention
Lead	Planning
Cost	\$10,000 - \$25,000
Funding	Town Operating Budget / Grants
Timeframe	07/2020 - 06/2022
Priority	Medium

Action #12

Identify long-term stream channel erosion problems and prioritize for remediation. Include specific remediation projects in the next HMP update.

Goal	1. Minimize the impact of natural hazards on physical buildings and infrastructure
Category	Structural Projects
Lead	Public Works
Cost	\$25,000 - \$50,000
Funding	Grants
Timeframe	07/2021 - 06/2023
Priority	Medium

Action #13

Make progress with the hazard mitigation goals associated with SustainableCT certified actions.

Goal	4. Increase the use of natural, "green," or "soft" hazard mitigation measures, such as open space preservation and green infrastructure.
Category	Natural Resources Protection
Lead	Planning
Cost	\$0 - \$10,000
Funding	Town Operating Budget
Timeframe	07/2021 - 06/2022
Priority	Low



Action #14

Promote the use of drywells and other infiltration structures to direct runoff and precipitation into structures for groundwater recharge

Goal	4. Increase the use of natural, "green," or "soft" hazard mitigation measures, such as open space preservation and green infrastructure.
Category	Property Protection
Lead	Planning
Cost	\$0 - \$10,000
Funding	Town Operating Budget
Timeframe	07/2021 - 06/2022
Priority	Low

Action #15

Adopt new Drought Ordinances that reflect and promote the findings and recommendations of the 2003 Connecticut Drought Preparedness and Response Plan (or future updates to that document).

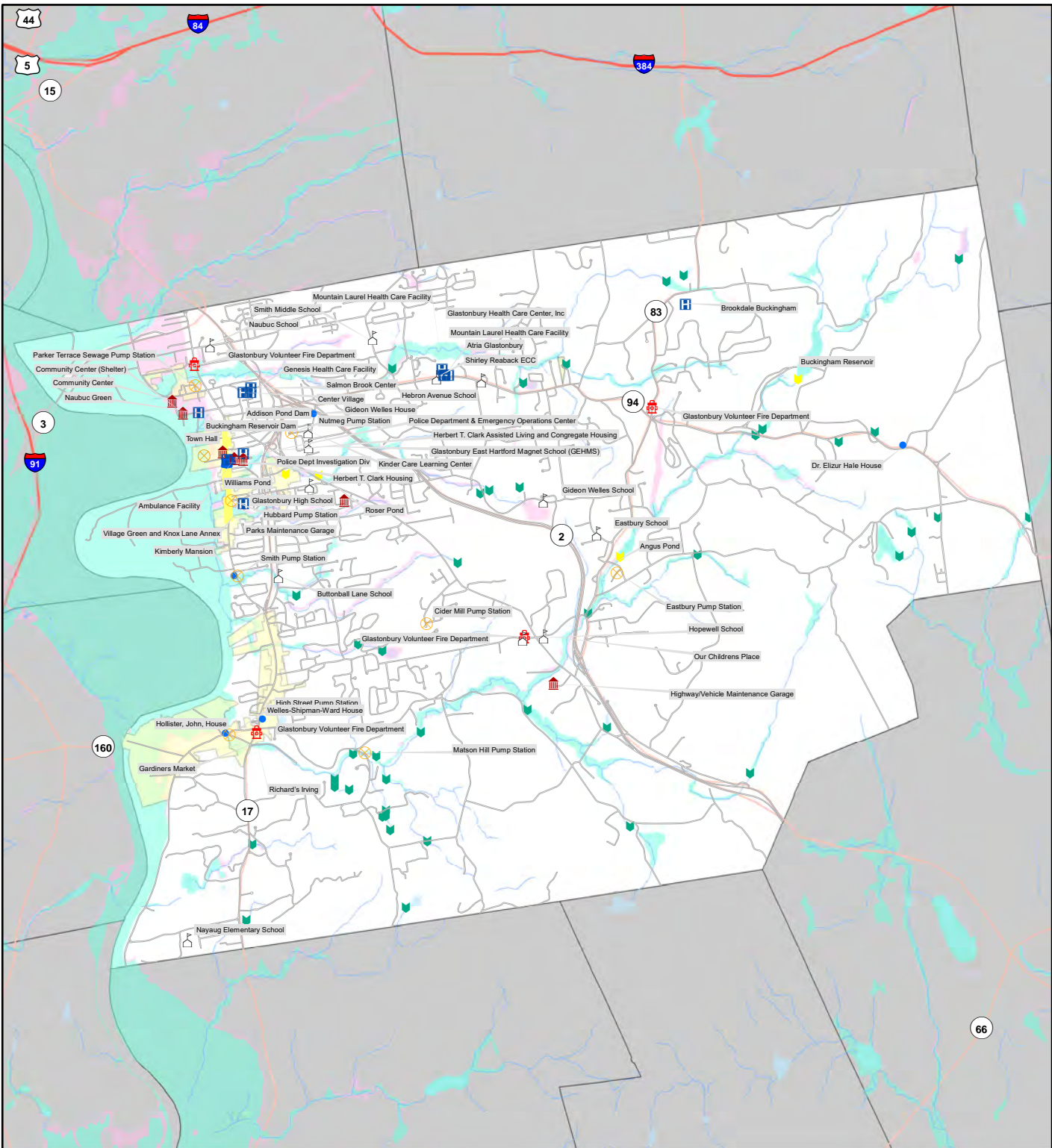
Goal	2. Ensure Municipal Codes and Regulations support hazard mitigation
Category	Prevention
Lead	Planning
Cost	\$0 - \$10,000
Funding	Town Operating Budget
Timeframe	07/2021 - 06/2022
Priority	Low

Action #16

Coordinate with CT SHPO to conduct historic resource surveys, focusing on areas within natural hazard risk zones (such as flood or wildfire hazard zones and areas near steep slopes), to support identification of vulnerable historic properties and preparation of resiliency plans across the state. This action leverages existing resources and best practices for protection of historic and cultural resources through an ongoing statewide initiative by CT SHPO.

Goal	8. Ensure community character and social equity are addressed in mitigation activities
Category	Property Protection
Lead	Planning, in coordination with SHPO
Cost	\$10,000 - \$25,000
Funding	SHPO
Timeframe	07/2021 - 06/2023
Priority	Low





Capitol Region Natural Hazards Mitigation Plan Update

Glastonbury, Connecticut

Flood Plains, Dams & Critical Facilities

Critical Facilities

- Emergency Center
- Fire Station
- Healthcare Facility
- Police Station
- Public Infrastructure
- School
- State Facility
- Town Facility
- Waste Water Facility
- NRHP Buildings/Sites
- NRHP Districts/Areas

Dam Hazard Class

- A, AA, BB or Unclassified
- Class B-Significant Hazard

FEMA Flood Hazard Area

- 100 Year Flood Zone
- 500 Year Flood Zone

Data Sources: FEMA, National Register of Historic Places, CT DEEP, CRCOG, ESRI



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16 Granby

Community Overview

Granby is a rural, low density residential community with a land area of 40.7 square miles and an estimated population of 11,300, resulting in a population density of only 284 persons per square mile. Population is growing, with an estimated 7 new single family homes constructed a year. A 33-unit building has recently been completed, and a large residential development is under construction that will include 130 apartments, 50 homes, and an additional 34 units approved.

Granby’s elevation ranges from less than 200 feet to over 1000 feet above sea level. The main watercourses running through Granby include Beech, Bissell, Dismal, Higley, Hungary, Mountain and Salmon (East and West Branches) Brooks; all drain eventually to the Farmington River.

Major transportation routes include state routes 10/202, 20, 189 and 219. Restaurants and retail space account for most commercial development in Town. The largest employers in Granby are the Town itself, the YMCA, Stop & Shop, Meadowbrook Nursing Home, and Geissler’s Supermarket. The largest property owner is McLean Game Refuge.

Most homes in Town have their own private wells and septic systems. It is estimated that as many as 20% of single family homes have backup generators. Limits on access to public water and sewer infrastructure restrict high density development outside of the Granby Center area.

Critical Facilities

Critical Facilities throughout the Capitol Region are listed in Appendix B. In Granby these include the Town Hall, Police Station (EOC), public library, Department of Public Works, 3 Fire Houses, Salmon Brook Water Company, 2 Sewer Pump Stations, the Middle School (primary shelter), the Senior Center (backup shelter), the High School, 2 Elementary Schools, the Meadow Brook Nursing Home, the YMCA, and Stony Hill Village senior housing (which has a walk-in emergency clinic). The DPW stores emergency shelter cots and supplies, which are used at the Middle School. A portable generator that primarily serves the sewer pumping stations is also stored at the DPW; if necessary, this generator can be connected to the Senior Center. The Meadow Brook Nursing Home has agreed to shelter residents needing special assistance during a disaster. The YMCA is available for showering for those staying at shelters following an emergency.

Table 16-1: Critical Facilities, Granby

Facility	Shelter	Generator
Town Hall		X
Police (EOC)		X
Public Library		
Department of Public Works		Portable
3 Fire Houses		X

Facility	Shelter	Generator
Salmon Brook Water Company		X
2 Sewer Pumping Stations		1 Portable
Middle School	Primary	X
Senior Center	Secondary	X
High School		
2 Elementary Schools		
Meadow Brook Nursing Home	Special Assistance	X
YMCA	Showers	X
Stony Hill Village		
Stony Hill Village Walk-In Clinic		

Capabilities

Hazard mitigation is addressed specifically in Granby’s Plan of Conservation and Development (POCD). The HMP document itself is cited. POCD actions specifically address natural hazards, including climate change.

Granby uses the Everbridge Reverse 9-1-1 system to warn residents of impending disasters.

The Department of Public Works is responsible for re-opening roads that are blocked by fallen trees.

The Town’s YMCA can made available for residents to shower, and the Town distributes water for residents who lose both power and water pressure.

The Town has a community emergency response team (CERT) that can be activated to help coordinate emergency response. The CERT was formed in 2010, following the guidelines of Homeland Security, and works closely with the Fire Department and Emergency Management Director. Large plastic coated maps have been created through the Town’s GIS system and provided to every fire station along with multiple copies to the Police Department and CERT. The Town’s GIS is fully functional and assists with hazard mitigation and response.

The Town has added generators to all of its fire houses, the Senior Center, and Schools. CERT is now working on a plan to utilize these buildings during future emergencies.

Granby has an excellent understanding of the unique challenges posed by its significant elevation variations. While the steep terrain can be difficult to navigate during winter storms, Town crews are well trained and equipped to address such circumstances. New equipment and personnel are made available as necessary.

The Lost Acres Fire Department (LAFD) has an excellent understanding of forests fires and is well equipped to address the situation should it arise. The LAFD regularly updates its equipment as needed.



The Town has an excellent understanding of local flooding and is prepared to address areas of flooding. In most cases this involves short term road closures. No new development is anticipated within the areas of potential flooding. Granby has had no new construction or demolition since 2008 in floodplains or other vulnerable areas. The Town did a complete review and adopted modifications to Section 8.18 of the Zoning Regulation Special Flood Hazard Areas in September of 2008. These changes were adopted in accordance with recommendations of the Connecticut Department of Energy and Environmental Protection (DEEP). The changes are designed to decrease Granby's vulnerability to flooding.

Hurricane Irene, which occurred in August of 2011, provided an opportunity for the Town to test its preparation for such major events. Early on the Emergency Management team was activated. Many roads were flooded during the height of the storm and the Town quickly closed such roads and re-routed traffic. As expected the floodwaters quickly receded after the storm and the Town returned to normal. The October 2011 snowstorm, proved a much greater problem. Again the emergency management team was called into operation. However, the heavy snowfall and resulting tree and power line damage completely crippled the Town. The power outages were extensive and prolonged. The Town's emergency shelter proved to be a great help in accommodating those without power, but also proved inadequate. In response to these events the Town has added generators to most of its public building and plans are being considered as to the future use of these building during prolonged emergencies.

Challenges

Challenges Overview

Granby's large elevation variation results in unique hazard concerns. Winter weather often hovers around 32 degrees, and even a slight decrease in temperature due to the increase in elevation will result in a snow/ice division. This is a common occurrence in Granby, where ice/snow conditions may be found in half the town while rain falls in the remaining portion.

The Town contains significant forested lands, including state forest and the privately held properties of the McLean Game Refuge and Granby Land Trust; therefore wildfire is a significant concern.

Only a small portion of the Town is within the 1%-annual-chance flood zone and very little development has occurred or is allowed to occur within the area; therefore the Town has had relatively minor losses due to flooding. Because of its steep terrain, when flooding does occur, the flood waters quickly recede following the storm. Areas at risk of flooding include the center of Town, some higher elevation areas, and in particular Salmon Brook Street.

The Town is completely dependent on groundwater for its potable water supply. Most homes in Granby have individual wells, most of which are bedrock wells, though gravel pack or point wells are not uncommon. The Town has no history of droughts seriously impacting local wells, though shallow wells can be temporarily impacted; however, wells cannot operate without electricity and prolonged electrical outages will result in potable water and sewage disposal



issues. Most residents (and all of those who live at higher elevations) who lose power will also lose water. Areas that need to be prioritized during emergencies include the Meadowbrook Nursing Home and the water tanks and pumps that service the Salmon Brook Water District.

Granby is serviced by two water companies, the Salmon Brook Water District and the Aquarian Water Company, that are both supplied by well water. The Aquarian Water Company’s wells are located in Simsbury. The Salmon Brook Water District has a 190,000 gallon water tank off of Pendleton Road and wells located near the Town’s Salmon Brook Park. There is no history of water supply quantity problems. The Town works cooperatively with the Salmon Brook Water District to maintain the quality of the water.

Hazard Losses

The economic losses faced by the community from natural hazards can be estimated by reviewing historic, and modeling future, loss figures. Loss estimates are summarized below.

Historic FEMA Payments

FEMA reimburses communities for hazard losses through programs including Public Assistance (PA) and the National Flood Insurance Program (NFIP). Combining PA and private flood insurance payments can give an estimate for total losses to a community.

The NFIP has paid 17 property damage claims in Granby totaling \$98,904 to-date. The NFIP has paid out four Repetitive Loss (RL) Property claims on one property in Granby to-date. These claims have totaled \$23,045.

Total PA reimbursements to the community were as follows:

- Flood Events: \$11,940 (\$628 annually)
- Hurricane Events: \$85,139 (\$4,481 annually)
- Winter Storm Events: \$2,230,681 (\$117,404 annually)

These are summarized in the tables below.

Table 16-2: Flood Event PA Reimbursements, Granby

Incident	Sep 1999	Oct 2005
Declaration	9/23/1999	12/16/2005
Disaster No.	1302	1619
Entity	FEMA PA Reimbursement	
State	\$523	\$649
Municipal	\$0	\$10,768
Nonprofit	\$0	\$0
Total	\$523	\$11,416
Annualized	\$28	\$601



Table 16-3: Hurricane Wind Event PA Reimbursements, Granby

Incident	Aug - Sep 2011 (T.S. Irene)
Declaration	9/2/2011
Disaster #	4023
Entity	FEMA PA Reimbursement
State	\$496
Municipal	\$84,643
Nonprofit	\$0
Total	\$85,139
Annualized	\$4,481

Table 16-4: Winter Storm PA Reimbursements, Granby

Incident	Mar 2003	Dec 2003	Jan 2005	Feb 2006	Jan 2011	Oct 2011	Feb 2013
Declaration	3/11/03	1/15/04	2/17/05	5/2/06	3/3/11	11/17/11	3/21/13
Disaster #	3176	3192	3200	3266	1958	4046	4106
Entity	FEMA PA Reimbursement						
State	\$9,782	\$8,769	\$11,569	\$14,043	\$12,235	\$5,046	\$23,777
Municipal	\$21,492	\$30,404	\$33,468	\$31,303	\$39,537	\$1,925,978	\$63,279
Nonprofit	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Total	\$31,274	\$39,173	\$45,037	\$45,346	\$51,772	\$1,931,023	\$87,056
Annualized	\$1,646	\$2,062	\$2,370	\$2,387	\$2,725	\$101,633	\$4,582

National Centers for Environmental Information Losses

The table below summarizes events in the National Centers for Environmental Information (NCEI) severe storm database that were specifically noted as having impacted this community since 2012.

Table 16-5: NCEI Database Losses since 2012, Granby

Date	Event	Property Damage
8/5/2012	Thunderstorm Wind	\$5,000
8/9/2013	Flash Flood	\$30,000
5/31/2015	Flood	\$0
3/17/2016	Thunderstorm Wind	\$500
7/22/2016	Thunderstorm Wind	\$30,000
6/19/2017	Thunderstorm Wind	\$1,000
7/13/2017	Lightning	\$1,000
Total Thunderstorm		\$37,500
Total Flood		\$30,000



NCEI losses under other event categories (such as drought, high wind, flooding, and winter storms) were not specifically noted as impacting this community, though they did impact Hartford County and nearby towns. NCEI losses are reported in Section II of this Plan.

HAZUS-MH Losses

CRCOG used FEMA’s Hazus-MH model to analyze the risks that the community might face from flooding, hurricanes, and earthquakes. The model estimates economic losses due to damage to buildings and building contents, as well as other economic disruptions. Both residential and commercial structures are addressed. Losses from different hazards are summarized below. Where available, estimates from the previous and current versions of the HMP are provided side-by-side; differences between the two may have been caused by a combination of the following:

- Changes in methodology: such as hazard zone mapping
- Changes in data: such as population and property values
- Changes in the model: this HMP utilized Hazus-MH version 4.0 rather than 2.1
- Other factors: inherent in a complex software like Hazus-MH

Table 16-6: Estimated Damages to Granby from a 1% Annual-Chance Flood

Loss Type	2014 Results	2018 Results
Households Displaced	290	126
People Needing Shelter	538	89
Buildings at Least Moderately Damaged	66	0
Residential Building & Content Losses		
Residential Building & Content Losses	\$26,430,000	\$7,898,266
Other Building & Content Losses	\$15,940,000	\$3,707,379
Total Building & Content Loss	42,370,000	\$11,605,645
Total Business Interruption Losses	\$90,000	\$150,109
TOTAL	\$42,450,000	\$11,755,754

Table 16-7: Estimated Damages to Granby from a 1% Annual-Chance Hurricane

Loss Type	2014 Results (1938 event)	2018 Results (1% track)
Buildings at Least Moderately Damaged	200	1
Buildings Completely Damaged	9	0
Total Debris Generated (tons)	39,975	594
Truckloads (at 25 tons/truck) of building debris	93	24
Economic Losses		
Residential Building & Content Losses	\$26,053,000	\$2,248,353
Other Building & Content Losses	\$1,783,000	\$32,515
Total Building & Content Loss	\$27,836,000	\$2,280,868
Total Business Interruption Losses	\$2,111,000	\$2,925
TOTAL LOSSES	\$29,947,000	\$2,283,793



Losses were calculated from a modeled probabilistic earthquake (1% annual-chance of occurrence), as well as for four specific scenarios with epicenters around Connecticut.

Table 16-8: Estimated Damages to Granby from a Probabilistic Earthquake

Loss Type	2018 Results
Wage Loss	\$1,077
Rent Loss	\$780
Relocation Loss	\$1,550
Income Loss	\$902
Inventory Loss	\$53
Total Business Disruption	\$4,361
Structural Loss	\$3,267
Non-Structural Loss	\$11,375
Total Building Loss	\$14,642
Total Content Loss	\$4,100
TOTAL LOSSES	\$23,104

Table 16-9: Estimated Damages to Granby from Modeled Earthquake Scenarios

Epicenter Location	Magnitude	Estimated Total Losses
East Haddam	6.4	\$34,757.22
Haddam	5.7	\$8,628.11
Portland	5.7	\$20,437.89
Stamford	5.7	\$2,585.40

More details are available in the Multi-Jurisdictional HMP. Ultimately, changes in the loss estimates reflect the reality that small differences in hazard event features can have a significant impact on losses incurred.

Average Annualized Losses

Average Annualized Loss (AAL) figures are useful tools for comparison of the risks faced from different hazards with different likelihoods of occurring in a given time period. AAL estimates were prepared for the community based on the methodologies discussed in Section II of the Multi-Jurisdictional HMP. Dam failure, drought, tornado, and wildfire losses were sourced from the 2014 Connecticut Natural Hazard Mitigation Plan Update, with dam failure data supplemented by the National Performance of Dams Program and the Connecticut Department of Energy & Environmental Protection. Earthquake and hurricane losses were calculated in HAZUS-MH. Losses for flooding came from NFIP claims, for winter storms from Public Assistance Reimbursements, and for thunderstorms from the NCEI database. These are presented in the table below.



Table 16-10: Average Annualized Losses, Granby

Dam Failure	Drought	Earthquakes	Flooding	Hurricanes and Tropical Storms	Severe Winter Storms	Thunderstorms	Tornadoes	Wildfires	Total
\$20	\$0	\$23,104	\$3,231	\$707,252	\$117,404	\$1,498	\$165,528	\$7,561	\$1,025,599

Losses Summary

A review of the above loss estimates demonstrates that the community has experienced significant expenses as a result of natural hazards, and is at risk for additional losses if some of the less-frequent events were to occur. These actual and potential losses justify hazard mitigation actions to reduce losses in the future.

Mitigation Strategies and Actions

Noted Hazard Mitigation Needs

During the course of this Plan development, multiple hazard mitigation needs of Granby were noted, including:

- The portable generator at the DPW needs replacement.
- The two sewer pumping stations need permanent backup generators installed so that the Public Works portable generator can be used at other locations.
- The Town feels its existing analog communication system is antiquated and must be replaced. The estimated cost of replacement is \$3 million.

Status of Previous Mitigation Strategies and Actions

The community reviewed the mitigation actions proposed in the 2014-2019 Capitol Region Natural Hazards Mitigation Plan Update and determined the status of each. That information is included in the table below.

Table 16-11: Status of Previous Mitigation Strategies and Actions, Granby

Action #	Action	Notes	Status
GOAL: REDUCE PROPERTY DAMAGE DUE TO UNSAFE CONDITIONS RESULTING FROM WINTER STORMS.			
Objective 1: Improve snow removal equipment and techniques.			
1.1	Pursue increased funding for equipment and labor as necessary.	The Town has purchased new and improved snow removal equipment (trucks, loader and back hoe). Need large wood chipper and new utility vehicle	Carry Forward with Revisions
1.2	Continue to pursue opportunities for service and equipment sharing with neighboring communities through CRCOG’s service sharing initiative and otherwise.	No opportunity for snow equipment sharing but Granby has participated in service sharing opportunities in the past and will continue to pursue these.	Capability



Action #	Action	Notes	Status
1.3	Improve Public Works personnel contracts to ensure adequate staffing for storm situations.	Contracts have been revised and the Town feels that, absent unforeseen circumstances staffing is adequate for most storms. Lacking MOU's with local vendors to prep for storm response.	Capability
Objective 2: Remove and prevent impediments to snow removal operations.			
2.1	Educate private snow-removal contractors and residents on not obstructing roads and the right-of-way.	Continuing efforts have been made. Outreach will be conducted periodically.	Capability
2.2	Enforce existing ordinance prohibiting roadway obstructions.	Lacking an ordinance to address these concerns.	Carry Forward with Revisions
Objective 3: Educate public on hazardous conditions during storm events - promote safe driving techniques.			
3.1	Continue to issue press releases and advisories.	Actively using the Everbridge Aware emergency notification system, which notifies its citizens through a variety of communication devices based on their preferences. Need to create social media and update Town website.	Carry Forward with Revisions
GOAL: IMPLEMENT GUIDELINES AND REGULATIONS TO REDUCE EXPOSURE TO PROPERTY DAMAGE AND LOSS OF LIFE AS A RESULT OF FLOODING.			
Objective 1: Restrict development of buffer areas in flood prone zones and promote best development practices for minimizing environmental impacts.			
1.1	Continue to work with FEMA and DEEP to maintain zoning, subdivision and wetlands regulations current with best practices.	The Town updated its Flood Hazard Regulations following recommendations of the State DEEP and FEMA (2008).	Carry Forward with Revisions
1.2	Update the stormwater management plan as necessary.	A comprehensive Stormwater Management Plan was revised and adopted in 2008.	Carry Forward with Revisions
1.3	Investigate participation in the National Flood Insurance Program's Community Rating System.	Town does not believe participation in CRS on its own is feasible at this time. It will consider participating in a regional CRS program if available in the future.	Completed
Objective 2: Maintain waterways, drainage and other structures in critical flood areas.			
2.1	Address priority bridges, culverts and other drainage projects as may be identified in Capital Improvement Plan.	Town was in final stages of a complete reconstruction of the Silver Street Bridge. Numerous drainage projects have been completed, mostly in conjunction with road reconstruction projects.	Carry Forward with Revisions
2.2	Work with DEEP to continue to monitor dams as necessary.	This is an established practice. Periodic monitoring of dams and retention ponds in town with DEEP will continue.	Capability
Objective 3: Ensure traffic safety during flood events.			
3.1	Regularly update the communication protocols with neighboring communities on road closures and detour routing.	DPW and Police provide this service. Updates will be made periodically.	Capability
3.2	Educate police personnel on detour routing protocols to ensure alternative routes can accommodate trucks.	Continuing training will continue to be conducted periodically.	Capability



Action #	Action	Notes	Status
3.3	Use GIS technology in coordinating and prioritizing response.	New maps with updated information recently produced for first responders. GIS technology is available, and education continues.	Carry Forward with Revisions
GOAL: REDUCE PERSONAL PROPERTY DAMAGE AND POWER FAILURES CAUSED BY HIGH WINDS			
Objective 1: Aggressively work with utility companies to identify high risk areas and promote tree trimming. Status: Tree trimming is ongoing and aggressive.			
Objective 2: Relocate high density utility facilities underground.			
2.1	Create a long-range plan for placing utility facilities underground.	Town will continue to work with the utilities to develop an appropriate plan, including actions other than utility burial.	Carry Forward with Revisions
Objective 3: Promote an ongoing tree maintenance program along public rights-of-way.			
3.1	Seek to increase local budget for tree trimming.	Since storms of 2011 the DPW has been actively involved in tree trimming. More funds are still needed.	Carry Forward
GOAL: REDUCE PERSONAL PROPERTY DAMAGE AND LOSS OF LIFE RESULTING FROM FOREST FIRES.			
Objective 1: Promote forest management to reduce fire risks.			
1.1	Develop and implement timber management program for town-owned property.	Town discussed developing and implementing a timber management plan, subject to public review process.	Carry Forward
1.2	Promote timber management planning with other major landholders including McLean Game Refuge, Granby Land Trust and the State.	Deferred due to limited municipal staff and funding availability.	Carry Forward with Revisions
Objective 2: Determine and implement best practices to facilitate forest-fire fighting.			
2.1	Promote and implement best practices, such as fire roads, dry hydrants, etc.	Town developed relationship with Lost Acres Fire Department to review the developments. Have dry hydrants at some subdivisions (currently have six and want to add ten). Hydrants required where public water is available.	Carry Forward with Revisions
2.2	Consider regulations requiring dry hydrant installations in new developments.	The Town is working with the Lost Acres Fire Dept. on a dry hydrant requirement.	Carry Forward with Revisions

Active Mitigation Strategies and Actions

The Town proposed to initiate several new mitigation actions for the upcoming five years. Additionally, a number of actions from the previous planning period are being carried forward or replaced with revised actions. These are listed below.

Each of the following actions has been prioritized based on FEMA guidelines, listed from highest to lowest priority, and numbered.



Action #1

Review snow removal policy for emergency situations and adopt a policy that will limit road obstruction.

Goal	2. Ensure Municipal Codes and Regulations support hazard mitigation
Category	Prevention
Lead	Public Works
Cost	\$0 - \$10,000
Funding	Town Operating Budget
Timeframe	01/2019 - 12/2019
Priority	High

Action #2

Develop the Town's social media presence and utilize that media to improve public communication about natural hazards.

Goal	6. Improve public outreach, education, and warning systems
Category	Education & Awareness
Lead	Emergency Management
Cost	\$0 - \$10,000
Funding	Town Operating Budget
Timeframe	01/2019 - 12/2019
Priority	High

Action #3

Update the Town website to include up-to-date information about natural hazards.

Goal	6. Improve public outreach, education, and warning systems
Category	Education & Awareness
Lead	Emergency Management
Cost	\$0 - \$10,000
Funding	Town Operating Budget
Timeframe	01/2019 - 12/2019
Priority	High



Action #4

Develop a standard operating procedure to address trees that fall into streams and block bridges and culverts.

Goal	1. Minimize the impact of natural hazards on physical buildings and infrastructure
Category	Prevention
Lead	Public Works
Cost	\$0 - \$10,000
Funding	Town Operating Budget
Timeframe	01/2019 - 12/2019
Priority	High

Action #5

Consider and document the labor resource needs and benefits of participation in the Sustainable CT program.

Goal	4. Increase the use of natural, "green," or "soft" hazard mitigation measures, such as open space preservation and green infrastructure.
Category	Natural Resources Protection
Lead	Planning
Cost	\$0 - \$10,000
Funding	Town Operating Budget
Timeframe	01/2019 - 12/2019
Priority	High

Action #6

Develop and implement timber management program for town-owned property.

Goal	4. Increase the use of natural, "green," or "soft" hazard mitigation measures, such as open space preservation and green infrastructure.
Category	Natural Resources Protection
Lead	Public Works
Cost	\$10,000 - \$25,000
Funding	Town Operating Budget / Grants / CT DEEP
Timeframe	01/2019 - 12/2020
Priority	High



Action #7

Increase local budget for tree trimming.

Goal	4. Increase the use of natural, "green," or "soft" hazard mitigation measures, such as open space preservation and green infrastructure.
Category	Natural Resources Protection
Lead	Public Works
Cost	\$25,000 - \$50,000
Funding	Town Operating Budget / Grants
Timeframe	01/2020 - 12/2020
Priority	High

Action #8

Replace analog communication system and acquire new computers for the EOC.

Goal	7. Improve the emergency response capabilities of the region and its communities
Category	Preparedness & Emergency Response
Lead	Emergency Management
Cost	\$25,000 - \$50,000
Funding	Grants / DEMHS
Timeframe	07/2020 - 06/2021
Priority	High

Action #9

Complete the reconstruction of the Silver Street Bridge.

Goal	5. Improve the resilience of local and regional utilities and infrastructure using strategies including adaptation, hardening, and creating redundancies.
Category	Structural Projects
Lead	Public Works
Cost	\$50,000 - \$100,000
Funding	Grants
Timeframe	07/2019 - 06/2020
Priority	High



Action #10

Conduct outreach to local small businesses with the aim of preventing the accidental release and pollution from chemicals stored and used at their facilities during or following natural hazard events.

Goal	6. Improve public outreach, education, and warning systems
Category	Education & Awareness
Lead	Planning, in coordination with DEEP
Cost	\$0 - \$10,000
Funding	Materials & Resources Provided by CT DEEP
Timeframe	01/2019 - 12/2019
Priority	Medium

Action #11

Coordinate with NEMO and CRCOG to share resources and gain technical support for hazard mitigation actions involving stormwater management and public outreach, which have parallel benefits related to MS4 stormwater permit compliance.

Goal	1. Minimize the impact of natural hazards on physical buildings and infrastructure
Category	Prevention
Lead	Public Works
Cost	\$0 - \$10,000
Funding	Town Operating Budget
Timeframe	01/2020 - 12/2020
Priority	Medium

Action #12

Pursue opportunities, including MOUs and CRCOG's service sharing initiative, for service and equipment sharing with neighboring communities. Specifically, the Fire Department needs access to a utility vehicle.

Goal	7. Improve the emergency response capabilities of the region and its communities
Category	Preparedness & Emergency Response
Lead	Emergency Management
Cost	\$0 - \$10,000
Funding	Town Operating Budget
Timeframe	01/2020 - 12/2020
Priority	Medium



Action #13

Establish ordinance to prevent road obstruction due to illegal snow removal.

Goal	2. Ensure Municipal Codes and Regulations support hazard mitigation
Category	Prevention
Lead	Planning
Cost	\$0 - \$10,000
Funding	Town Operating Budget
Timeframe	01/2020 - 12/2020
Priority	Medium

Action #14

Draft a regulation requiring dry hydrant installation in new developments.

Goal	2. Ensure Municipal Codes and Regulations support hazard mitigation
Category	Prevention
Lead	Planning
Cost	\$0 - \$10,000
Funding	Town Operating Budget
Timeframe	01/2020 - 12/2020
Priority	Medium

Action #15

Conduct outreach to promote timber management planning with major landholders.

Goal	6. Improve public outreach, education, and warning systems
Category	Natural Resources Protection
Lead	Public Works
Cost	\$0 - \$10,000
Funding	Town Operating Budget
Timeframe	07/2020 - 06/2021
Priority	Medium

Action #16

Pursue MOUs with local vendors on an annual basis to provide assistance during and following storms.

Goal	7. Improve the emergency response capabilities of the region and its communities
Category	Preparedness & Emergency Response
Lead	Emergency Management
Cost	\$0 - \$10,000
Funding	Town Operating Budget
Timeframe	07/2019 - 06/2024
Priority	Medium



Action #17

Annually evaluate and update training protocols, particularly in relation to flooding.

Goal	3. Improve institutional awareness and understanding of natural hazard impacts and mitigation within municipal governments and other decision-making bodies
Category	Education & Awareness
Lead	Public Works
Cost	\$0 - \$10,000
Funding	Town Operating Budget
Timeframe	07/2019 - 06/2024
Priority	Medium

Action #18

Participate in EMI courses or the seminars and annual conference held by the Connecticut Association of Flood Managers.

Goal	3. Improve institutional awareness and understanding of natural hazard impacts and mitigation within municipal governments and other decision-making bodies
Category	Education & Awareness
Lead	Planning
Cost	\$0 - \$10,000
Funding	Town Operating Budget
Timeframe	07/2019 - 06/2024
Priority	Medium

Action #19

Evaluate and update the stormwater management plan to state requirements.

Goal	2. Ensure Municipal Codes and Regulations support hazard mitigation
Category	Prevention
Lead	Planning
Cost	\$10,000 - \$25,000
Funding	Town Operating Budget / Grants
Timeframe	07/2020 - 06/2022
Priority	Medium



Action #20

Conduct outreach efforts to prevent road obstruction due to illegal snow removal.

Goal	5. Improve the resilience of local and regional utilities and infrastructure using strategies including adaptation, hardening, and creating redundancies.
Category	Education & Awareness
Lead	Public Works
Cost	\$10,000 - \$25,000
Funding	Town Operating Budget
Timeframe	01/2020 - 12/2022
Priority	Medium

Action #21

Evaluate and update the zoning, subdivision and wetland regulations to ensure they limit exposure to natural hazards.

Goal	2. Ensure Municipal Codes and Regulations support hazard mitigation
Category	Prevention
Lead	Planning
Cost	\$10,000 - \$25,000
Funding	Town Operating Budget / Grants
Timeframe	01/2020 - 12/2022
Priority	Medium

Action #22

Conduct a wildfire vulnerability and needs assessment to guide construction of additional dry hydrants and/or cisterns and fire roads through forested areas.

Goal	3. Improve institutional awareness and understanding of natural hazard impacts and mitigation within municipal governments and other decision-making bodies
Category	Prevention
Lead	Fire Department
Cost	\$25,000 - \$50,000
Funding	Town Operating Budget / Grants / CT DEEP / DEMHS
Timeframe	07/2021 - 06/2023
Priority	Medium



Action #23

Update GIS technology to coordinate and prioritize response.

Goal	7. Improve the emergency response capabilities of the region and its communities
Category	Preparedness & Emergency Response
Lead	Planning
Cost	\$25,000 - \$50,000
Funding	Town Operating Budget / Grants / DEMHS
Timeframe	01/2021 - 12/2023
Priority	Medium

Action #24

Contact the owners of Repetitive Loss Properties and nearby properties at risk to inquire about mitigation undertaken and suggest options for mitigating flooding in those areas. This should be accomplished with a letter directly mailed to each property owner.

Goal	1. Minimize the impact of natural hazards on physical buildings and infrastructure
Category	Property Protection
Lead	Planning
Cost	\$0 - \$10,000
Funding	Town Operating Budget / DEMHS
Timeframe	07/2021 - 06/2022
Priority	Low

Action #25

Generate a list of priority bridge, culvert, and other drainage projects identified in the Capital Improvement Plan to be included as individual actions in the next HMP update.

Goal	1. Minimize the impact of natural hazards on physical buildings and infrastructure
Category	Structural Projects
Lead	Public Works
Cost	\$0 - \$10,000
Funding	Town Operating Budget
Timeframe	07/2021 - 06/2022
Priority	Low



Action #26

Complete an analysis of costs and benefits of joining the FEMA Community Rating System.

Goal	1. Minimize the impact of natural hazards on physical buildings and infrastructure
Category	Prevention
Lead	Planning
Cost	\$0 - \$10,000
Funding	Town Operating Budget
Timeframe	01/2021 - 12/2022
Priority	Low

Action #27

Coordinate with CT SHPO to conduct outreach to historic property owners to educate them on methods of retrofitting their properties to be more hazard-resilient while maintaining historic character.

Goal	8. Ensure community character and social equity are addressed in mitigation activities
Category	Education & Awareness
Lead	Planning, in coordination with SHPO
Cost	\$0 - \$10,000
Funding	SHPO
Timeframe	01/2021 - 12/2022
Priority	Low

Action #28

Coordinate with CT SHPO to conduct historic resource surveys, focusing on areas within natural hazard risk zones (such as flood or wildfire hazard zones and areas near steep slopes), to support identification of vulnerable historic properties and preparation of resiliency plans across the state. This action leverages existing resources and best practices for protection of historic and cultural resources through an ongoing statewide initiative by CT SHPO.

Goal	8. Ensure community character and social equity are addressed in mitigation activities
Category	Property Protection
Lead	Planning, in coordination with SHPO
Cost	\$10,000 - \$25,000
Funding	SHPO
Timeframe	07/2021 - 06/2023
Priority	Low



Action #29

Create a long-range plan for relocating high density utility facilities.

Goal	5. Improve the resilience of local and regional utilities and infrastructure using strategies including adaptation, hardening, and creating redundancies.
Category	Structural Projects
Lead	Public Works
Cost	\$25,000 - \$50,000
Funding	Town Operating Budget / Grants
Timeframe	07/2023 - 06/2024
Priority	Low

Action #30

Purchase large wood chipper and new utility vehicle.

Goal	7. Improve the emergency response capabilities of the region and its communities
Category	Preparedness & Emergency Response
Lead	Public Works
Cost	More than \$100,000
Funding	Grants
Timeframe	01/2024 - 12/2024
Priority	Low













Capitol Region Natural Hazards Mitigation Plan Update

Granby, Connecticut



Flood Plains, Dams
& Critical Facilities

Critical Facilities



-  Emergency Center
-  Fire Station
-  Healthcare Facility
-  Police Station
-  Public Infrastructure
-  School
-  State Facility
-  Town Facility
-  Waste Water Facility
-  NRHP Buildings/Sites

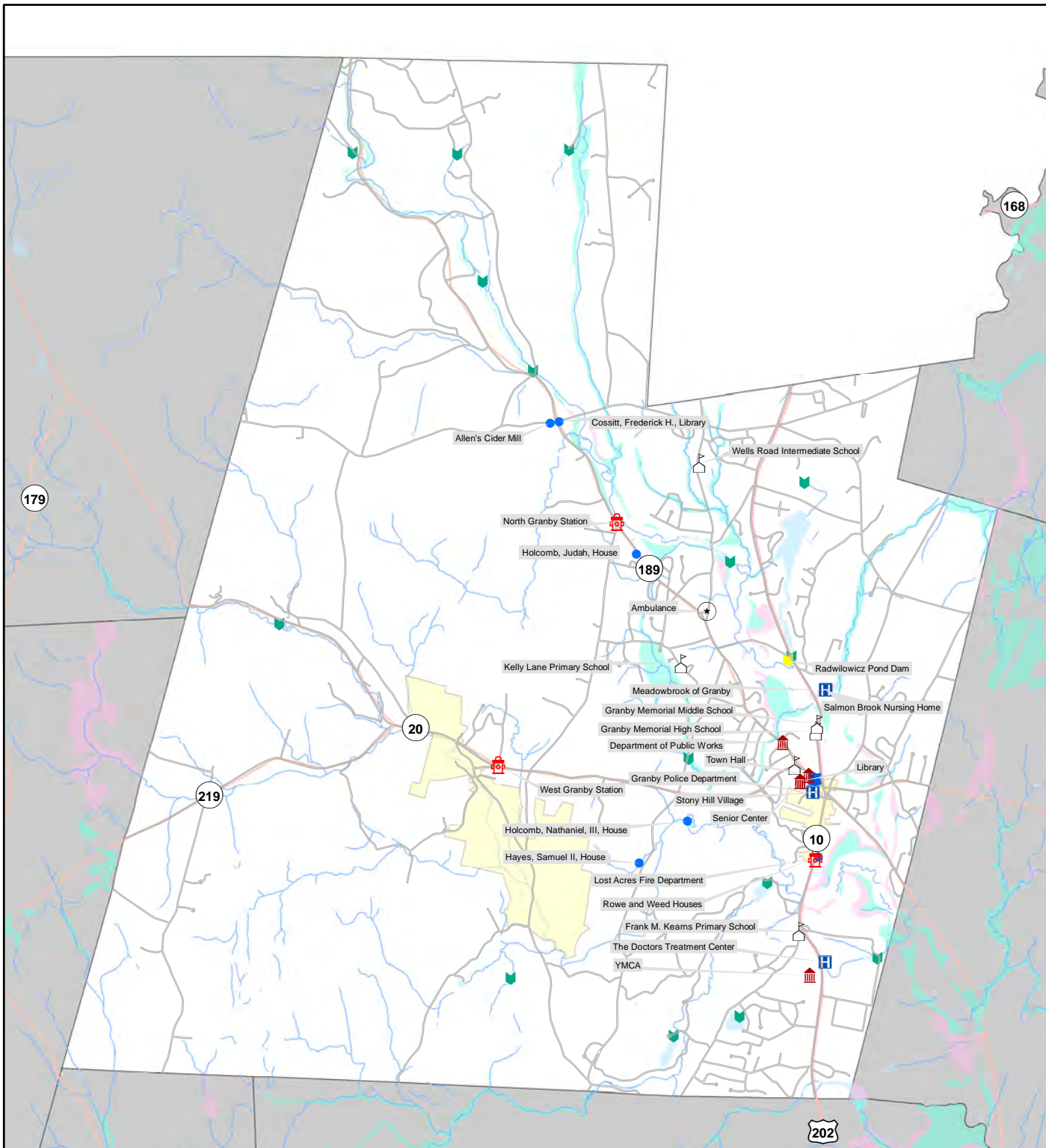
 NRHP Districts/Areas

Dam Hazard Class

-  A, AA, BB or Unclassified
-  Class B-Significant Hazard

FEMA Flood Hazard Area

-  100 Year Flood Zone
-  500 Year Flood Zone



Data Sources: FEMA, National Register of Historic Places, CT DEEP, CRCOG, ESRI







17 Hartford

Community Overview

Hartford, Connecticut's capital city, is an urban community centrally located within the Region. It has a land area of 17.3 square miles and an estimated population of nearly 125,000. The elevation ranges from approximately 30 to 150 feet above sea level. Hartford drains to the Connecticut River to the east and the Park River to the west. Other watercourses in the City include Cemetery and Gully Brooks. Interstates 91 and 84 intersect in Hartford. State routes 44, 187 and 189 also traverse the City. An Amtrak commuter rail line and the Hartford Line commuter rail each stop in the City, and CTfastrak, a regional Bus Rapid Transit System, has stations in Hartford.

Hartford is home to the Capitol and numerous state facilities. Brainard Airport is located in the southeastern corner of the City. Numerous industries and businesses operate throughout Hartford, including many insurance companies. The City also houses three major hospitals: Hartford, Connecticut Children's, and St. Francis. The City is also home to Trinity College and the University of Hartford. The University of Connecticut and University of St. Joseph have branches in the Downtown area. Hartford attracts visitors throughout the year to its historic, arts and cultural venues including the Convention Center, XL Center, Dunkin' Donuts Park, Riverfront Recapture, Comcast Music Theater, Wadsworth Athenaeum, Connecticut Science Center, Old State House, Mark Twain and Harriet Beecher Stowe Houses, and Bushnell Center for Performing Arts.

Critical Facilities

Critical Facilities throughout the Capitol Region are listed in Appendix B. In Hartford these include the Emergency Operations Center, housed at the Fire Headquarters. The Fire Chief is also the Emergency Management Director.

Capabilities

Hazard mitigation is addressed specifically in Hartford's Plan of Conservation and Development.

The Army Corps of Engineers built a dike in Hartford along the Connecticut River following historic floods in 1936 and 1938. The City has maintained the levee system for 80 years, and has a capital improvement program (CIP) specifically devoted to the system. CIP projects undertaken in the past include rip-rap repair, vegetation removal, animal burrow repair, construction of access roads, system testing and analysis, pump-station generator replacement, backstop installation, valve operator replacement, sediment removal, dredging, monitoring instrument installation, and drainage improvements. The flood control system is an Accredited Levee under FEMA's map modernization project.

Hartford has not approved any building construction within the 1% annual chance floodplain and has undertaken significant work since 2008 to reduce its vulnerability to flooding as detailed in the list below:

The Metropolitan District Commission's (MDC) Clean Water Project and new, statewide MS4 Stormwater Drainage requirements, pose significant opportunities and challenges for the City. As planning for the separation of storm water and sewer lines in the City and region, much of which discharges to the Connecticut River in Hartford, moves forward, it is critical for the City to monitor potential impacts on flood control infrastructure.

Hartford has fourteen Neighborhood Revitalization Zone (NRZ) Committees that meet regularly as part of "Hartford 2000," a coalition with a mission to "strengthen the collective power of the NRZs and to serve as an advocate for neighborhood issues." City personnel feel these NRZs are a good way to reach the public in Hartford; Fire and Police personnel attend these meetings.

Hartford has a Flood Commission charged with ongoing management of Hartford's flood risks. The City has two private consulting companies on-call to provide continuing services to Hartford regarding flood control.

New Capabilities

The Flood Commission, with assistance from the consultants, recently prepared two submittals for the U.S. Army Corps of Engineers: a System Wide Improvement Framework (SWIF) and a Semi-Qualitative Risk Assessment (SQRA). Both are under review.

The City recently fixed a problem with the Weston Street culvert which was clogged and would not function properly. The City has switched from using sand to using a salt-sand mix for road de-icing, decreasing issues related to drainage system clogging.

In recent years Hartford has implemented new initiatives and completed projects that mitigate hazards, each of which is highlighted in more detail in the Multi-Jurisdictional HMP. These are:

- The City of Hartford Climate Action Plan, which sets forth environmental stewardship initiatives in six action areas: energy, food, landscape, transportation, waste, and water.
- Green Infrastructure Zoning Regulations that promote environmental sustainability in new development, including reducing threats to water quality from stormwater runoff.
- The Hartford Boathouse was designed to allow flood waters into the lower boat-storage level using flood grates and flood-resistant materials. Critical systems are located on the second level. The building also has a community and function room.
- The Parkville Microgrid is a natural gas powered fuel cell that is able to power a school, senior center, library, health center, gas station, and grocery store in a power outage. The system feeds excess energy back into the regional grid under normal conditions.

It is likely that in the coming years towns on the Park River upstream of Hartford will perform maintenance activities for the river; CT DEEP has contacted these Towns to inform them that



maintenance will be required. Funding and resources for such maintenance has not yet been sourced, so it is unclear what the timeframe for improvements will be. It is important to note that the impact of maintenance on Hartford’s flood risk is not clear at this point.

Hartford was awarded the Silver Certification level within the SustainableCT program in October 2018.

Challenges

Challenges Overview

Historically, Hartford has suffered significant losses from flooding and continues to be vulnerable to the risks posed by flooding.

Hazard Losses

The economic losses faced by Hartford from natural hazards can be estimated by reviewing historic, and modeling future, loss figures. Loss estimates are summarized below.

Historic FEMA Payments

FEMA reimburses communities for hazard losses through programs including Public Assistance (PA) and the National Flood Insurance Program (NFIP). Combining PA and private flood insurance payments can give an estimate for total losses to a community.

The NFIP has paid 52 property damage claims in Hartford totaling \$656,509 to-date. Hartford has had 11 Repetitive Loss (RL) Property claims to-date on three properties with payments totaling \$117,755.

Total PA reimbursements to the community were as follows:

- Flood Events: \$276,561 (\$14,556 annually)
- Hurricane Events: \$773,573 (\$40,714 annually)
- Winter Storm Events: \$17,295,315 (\$910,280 annually)

These are summarized in the tables below.

Table 17-1: Flood Event PA Reimbursements, Hartford

Incident	Sep 1999	Oct 2005
Declaration	9/23/1999	12/16/2005
Disaster No.	1302	1619
Entity	FEMA PA Reimbursement	
State	\$92,630	\$51,987
Municipal	\$65,979	\$0
Nonprofit	\$0	\$65,965
Total	\$158,609	\$117,952
Annualized	\$8,348	\$6,208



Table 17-2: Hurricane Wind Event PA Reimbursements, Hartford

Incident	Aug - Sep 2011 (T.S. Irene)	Oct - Nov 2012 (Storm Sandy)
Declaration	9/2/2011	10/30/2012
Disaster #	4023	4087
Entity	FEMA PA Reimbursement	
State	\$358,574	\$117,578
Municipal	\$240,798	\$0
Nonprofit	\$56,623	\$0
Total	\$655,995	\$117,578
Annualized	\$34,526	\$6,188

Table 17-3: Winter Storm PA Reimbursements, Hartford

Incident	Mar 2003	Dec 2003	Jan 2005	Feb 2006	Jan 2011	Oct 2011	Feb 2013
Declaration	3/11/03	1/15/04	2/17/05	5/2/06	3/3/11	11/17/11	3/21/13
Disaster #	3176	3192	3200	3266	1958	4046	4106
Entity	FEMA PA Reimbursement						
State	\$298,900	\$237,901	\$294,637	\$340,113	\$422,927	\$5,717,066	\$795,677
Municipal	\$218,122	\$190,502	\$251,403	\$316,330	\$326,283	\$5,121,195	\$2,191,316
Nonprofit	\$12,121	\$14,357	\$22,366	\$12,162	\$45,324	\$282,277	\$184,337
Total	\$529,143	\$442,759	\$568,406	\$668,605	\$794,533	\$11,120,538	\$3,171,330
Annualized	\$27,850	\$23,303	\$29,916	\$35,190	\$41,818	\$585,291	\$166,912

National Centers for Environmental Information Losses

The table below summarizes events in the National Centers for Environmental Information (NCEI) severe storm database that were specifically noted as having impacted the community since 2012.

Table 17-4: NCEI Database Losses since 2012, Hartford

Date	Event	Property Damage
6/22/2012	Thunderstorm Wind	\$15,000
6/22/2012	Flood	\$0
7/7/2013	Thunderstorm Wind	\$30,000
7/10/2013	Flash Flood	\$3,000
11/1/2013	Thunderstorm Wind	*\$8,300
2/25/2016	Thunderstorm Wind	\$15,000
10/24/2017	Flood	\$0
Total Thunderstorm		\$68,300
Total Flood		\$3,000

* Damages from storm divided between multiple communities



NCEI losses under other event categories (such as drought, high wind, flooding, and winter storms) were not specifically noted as impacting this community, though they did impact Hartford County and nearby towns. NCEI losses are reported in Section II of this Plan.

HAZUS-MH Losses

CRCOG used FEMA’s Hazus-MH model to analyze the risks that the community might face from flooding, hurricanes, and earthquakes. The model estimates economic losses due to damage to buildings and building contents, as well as other economic disruptions. Both residential and commercial structures are addressed. Losses from different hazards are summarized below. Where available, estimates from the previous and current versions of the HMP are provided side-by-side; differences between the two may have been caused by a combination of the following:

- Changes in methodology: such as hazard zone mapping
- Changes in data: such as population and property values
- Changes in the model: this HMP utilized Hazus-MH version 4.0 rather than 2.1
- Other factors: inherent in a complex software like Hazus-MH

More details are available in the Multi-Jurisdictional HMP. Ultimately, changes in the loss estimates reflect the reality that small differences in hazard event features can have a significant impact on losses incurred.

Table 17-5: Estimated Damages to Hartford from a 1% Annual-Chance Flood

Loss Type	2014 Results	2018 Results
Households Displaced	812	441
People Needing Shelter	2,034	984
Buildings at Least Moderately Damaged	61	1
All Building Loss		\$21,159,886
All Content Loss		\$39,035,955
Residential Building & Content Losses	\$38,770,000	\$30,312,678
Other Building & Content Losses	\$165,740,000	\$29,881,786
Total Building & Content Loss	\$204,510,000	\$60,194,463
Total Business Interruption Losses	\$1,950,000	\$1,435,037
TOTAL	\$206,450,000	\$61,629,500

Losses were calculated from a modeled probabilistic earthquake (1% annual-chance of occurrence), as well as for four specific scenarios with epicenters around Connecticut.



Table 17-6: Estimated Damages to Hartford from a 1% Annual-Chance Hurricane

Loss Type	2014 Results (1938 event)	2018 Results (1% track)
Buildings at Least Moderately Damaged	3134	7
Buildings Completely Damaged	58	1
Total Debris Generated (tons)	88,973	11487
Truckloads (at 25 tons/truck) of building debris	2820	459
Economic Losses		
Residential Building & Content Losses	\$343,675,000	\$43,308,799
Other Building & Content Losses	\$140,680,000	\$3,923,419
Total Building & Content Loss	\$484,355,000	\$47,232,218
Total Business Interruption Losses	\$80,175,000	\$4,561,075
TOTAL LOSSES	\$564,530,000	\$51,793,293

Table 17-7: Estimated Damages to Hartford from a Probabilistic Earthquake

Loss Type	2018 Results
Wage Loss	\$28,753
Rent Loss	\$28,358
Relocation Loss	\$39,064
Income Loss	\$21,579
Inventory Loss	\$1,380
Total Business Disruption	\$119,133
Structural Loss	\$68,628
Non-Structural Loss	\$209,683
Total Building Loss	\$278,311
Total Content Loss	\$80,103
TOTAL LOSSES	\$477,547

Table 17-8: Estimated Damages to Hartford from Modeled Earthquake Scenarios

Epicenter Location	Magnitude	Estimated Total Losses
East Haddam	6.4	\$3,297,825.23
Haddam	5.7	\$753,818.68
Portland	5.7	\$3,971,143.17
Stamford	5.7	\$49,519.13

Average Annualized Losses

Average Annualized Loss (AAL) figures are useful tools for comparison of the risks faced from different hazards with different likelihoods of occurring in a given time period. AAL estimates were prepared for the community based on the methodologies discussed in Section II of the Multi-Jurisdictional HMP. Dam failure, drought, tornado, and wildfire losses were sourced from the 2014 Connecticut Natural Hazard Mitigation Plan Update, with dam failure data supplemented by the National Performance of Dams Program and the Connecticut Department of Energy & Environmental Protection. Earthquake and hurricane losses were calculated in HAZUS-MH. Losses for flooding came from NFIP claims, for winter storms from Public Assistance Reimbursements, and for thunderstorms from the NCEI database. These are



presented in the table below in dollars per year. Note that Hurricanes and Tropical Storms represent the largest share of total annualized losses.

Table 17-9: Average Annualized Losses, Hartford

Dam Failure	Drought	Earthquakes	Flooding	Hurricanes and Tropical Storms	Severe Winter Storms	Thunderstorms	Tornadoes	Wildfires	Total
\$223	\$0	\$477,547	\$31,832	\$7,821,964	\$910,280	\$16,572	\$1,830,682	\$3,230	\$11,092,331

Losses Summary

A review of the above loss estimates demonstrates that the City of Hartford has experienced significant expenses as a result of natural hazards, and is at risk for additional losses if some of the less-frequent events were to occur. These actual and potential losses justify hazard mitigation actions to reduce losses in the future.

Mitigation Strategies and Actions

Noted Hazard Mitigation Needs

During the course of this Plan development, specific hazard mitigation needs were noted.

- There is a need for more table-top drills to practice different emergency scenarios. Implementing a more frequent drill schedule may help address this issue.
- A culvert at New Park Avenue near a tire facility that needs attention.
- Many drainage swales that are clogged with sand from years when the City used sand for deicing need to be cleared.
- The City of Hartford owns Batterson Park in Farmington and is responsible for the levee EOP; this needs to be developed.

Status of Previous Mitigation Strategies and Actions

The City of Hartford reviewed the mitigation actions proposed in the 2014-2019 Capitol Region Natural Hazards Mitigation Plan Update and determined the status of each. That information is included in the table below.

Table 17-10: Status of Previous Mitigation Strategies and Actions, Hartford

Action #	Action	Notes	Status
GOAL: REDUCE LOSS OF LIFE, PROPERTY AND ECONOMIC CONSEQUENCES AS A RESULT OF NATURAL DISASTERS			
Objective 1: Reduce the likelihood of flooding by improving existing natural and artificial drainage systems.			
1.1	Pursue priority drainage projects identified in Capital Improvement Plan.	This is an established and sustained effort. Work is expected to be undertaken annually contingent upon availability of funding.	Capability



Action #	Action	Notes	Status
Objective 2: Address combined sewer overflows. The MDC has made systematic improvements to the sewer systems within city limits to address overflow issues consistent with heavy rains.			
2.1	Continue to participate in the MDC's Clean Water Project planning process.	This is an established and sustained effort. Staff will continue participation in periodic meetings with MDC.	Capability
2.2	Ensure that the City's flood control pump stations can handle changes that may result from MDC measures to address combined sewer overflows.	This is an established and sustained effort. Reviews are conducted as information becomes available.	Capability
Objective 3: Ensure proper maintenance of flood control system. The City's DPW has a detailed plan for maintaining the existing flood control systems.			
3.1	Continue to implement necessary repairs and upgrades required by FEMA and the Army Corps of Engineers to retain certification.	This is an established and sustained effort.	Capability
3.2	Update the flood control system maintenance manual.	This is an established and sustained effort. Periodic updates will be made as needed.	Capability
3.3	Train City employees, according to the updated manual, in proper maintenance techniques.	Delayed as flood control system was updated. Now that manual update is complete, carry forward	Carry Forward
3.4	Upgrade flood control facilities to automate warning systems and as many other features as possible to increase safety.	Deferred due to lack of resources. This action is dropped and replaced by a new action to implement the recommendations of the System Wide Improvement Framework and Semi-Qualitative Risk Assessment for the Hartford Flood Control System.	Drop
Objective 4: Develop system for identifying and addressing potential debris hazards. The Department of Public Works has contingent plans and resources to address potential post-storm debris issues and is working with the State's Interagency Debris Management Task Force CCM Municipal Management Bulletin #13-24.			
4.1	Pursue priority debris related projects, especially along the North Branch of the Park River, identified in the Capital Improvement Plan	This is an established and sustained effort.	Capability
4.2	Inspect and clean Park River relief conduit.	This is an established and sustained effort.	Capability
Objective 5: Improve the ability of emergency responders to prepare and respond to natural disasters. Hartford Fire Department's Department Directive titled "Storm Warnings and Preparedness" (DD 4.1 EOP) directly addresses the preparation levels necessary to effectively organize and respond to natural disasters. CRCOG's Regional Emergency Support Plan (RESP Plan) also provides preparedness and response direction.			
5.1	Continue with National Incident Management System (NIMS) and Incident Management Team training, with a particular focus on response to natural disasters.	This is an established and sustained effort.	Capability
5.2	Investigate communications systems that will allow for emergency personnel to communicate in currently uncovered areas, and will facilitate interdepartmental communications along the flood control system.	System is upgraded continuously.	Capability



Action #	Action	Notes	Status
5.3	Research, identify means, including potential acquisition of public address systems, for facilitating communications with residents, especially those in low-income areas vulnerable to disasters.	The City takes full advantage of social media (twitter, Facebook) plus outreach through the NRZ groups and the four CERT teams	Completed
Objective 6: Improve the ability of emergency responders to serve special needs populations during natural disasters. The Hartford Fire Department's Special Services division in conjunction with the City of Hartford's CERT team have prepared and trained to address this specific issue. CROG's Regional Emergency Support Plan (RESP Plan) also provides preparedness and response direction.			
6.1	Take full advantage of the Reverse-911 system.	City utilizes Reverse-911 system effectively. This is a capability	Capability
6.2	Continue training for evacuation of special needs populations.	Lists of special needs citizens are maintained in the computer aid dispatch (CAD) system managed by ES&T.	Capability
6.3	Support regional assessments of how to identify, maintain and use databases of special needs populations.	The FD Special Services Unit works with the City Health Department to do this	Capability
Objective 7: Improve emergency communications to residents prior to and during natural disasters. Hartford Fire Department has several communication methods in place such as Twitter, Facebook, Social Media, Media, Everbridge Notification System, as well as a new method soon to be implemented utilizing a smart phone app.			
7.1	Continue to offer educational forums for residents on personal emergency planning.	14 NRZ and four CERT meetings are regularly occurring	Capability
7.2	Consider applying to FEMA's Community Rating System (CRS) program to help reduce flood insurance premiums for property owners.	City has considered this but is not interested at this time.	Drop
Objective 8: Ensure ability of City to safely shelter in place, and when necessary, evacuate residents and visitors. The City has several shelters in place to serve as gathering points in an emergency. The Hartford Fire Department's Special Services division in conjunction with the City of Hartford's CERT team have prepared and trained to address this specific issue. CROG's Regional Emergency Support Plan (RESP Plan) also provides preparedness and response direction.			
8.1	Participate in local and regional hurricane evacuation training.	City participates in such trainings. This is a capability	Capability
GOAL: ENSURE THE ABILITY TO DISTRIBUTE COMMODITIES.			
Objective 9: Improve viability of food commodities during natural disasters. The Hartford Fire Department's Special Services division in conjunction with the City of Hartford's CERT team have prepared and trained to address this specific issue. CROG's Regional Emergency Support Plan (RESP Plan) also provides preparedness and response direction. The City's Board of Education also has a plan to address this issue.			
9.1	Maintain refrigeration for perishable food items.	The City Health Department and others complete this action. This is a capability	Capability

Active Mitigation Strategies and Actions

The City proposed to initiate several new mitigation actions for the upcoming five years. Additionally, a number of actions from the previous planning period are being carried forward or replaced with revised actions. These are listed below.



Each of the following actions has been prioritized based on FEMA guidelines, listed from highest to lowest priority, and numbered.

Action #1

Develop an EAP for the Batterson Park levee in Farmington & provide it to the Town of Farmington.

Goal	7. Improve the emergency response capabilities of the region and its communities
Category	Preparedness & Emergency Response
Lead	Emergency Management
Cost	\$25,000 - \$50,000
Funding	Grants
Timeframe	01/2020 - 12/2020
Priority	High

Action #2

Supplement or replace the generators at the city's Fire Houses to support their roles as emergency places of refuge.

Goal	7. Improve the emergency response capabilities of the region and its communities
Category	Preparedness & Emergency Response
Lead	Fire Department
Cost	More than \$100,000
Funding	Town Operating Budget / DEMHS
Timeframe	07/2022 - 06/2023
Priority	High

Action #3

Conduct outreach to local small businesses with the aim of preventing the accidental release and pollution from chemicals stored and used at their facilities during or following natural hazard events.

Goal	6. Improve public outreach, education, and warning systems
Category	Education & Awareness
Lead	Planning, in coordination with DEEP
Cost	\$0 - \$10,000
Funding	Materials & Resources Provided by CT DEEP
Timeframe	01/2019 - 12/2019
Priority	Medium



Action #4

Coordinate with NEMO and CROG to share resources and gain technical support for hazard mitigation actions involving stormwater management and public outreach, which have parallel benefits related to MS4 stormwater permit compliance.

Goal	1. Minimize the impact of natural hazards on physical buildings and infrastructure
Category	Prevention
Lead	Public Works
Cost	\$0 - \$10,000
Funding	Town Operating Budget
Timeframe	01/2020 - 12/2020
Priority	Medium

Action #5

Participate in EMI courses or the seminars and annual conference held by the Connecticut Association of Flood Managers.

Goal	3. Improve institutional awareness and understanding of natural hazard impacts and mitigation within municipal governments and other decision-making bodies
Category	Education & Awareness
Lead	Planning
Cost	\$0 - \$10,000
Funding	Town Operating Budget
Timeframe	07/2019 - 06/2024
Priority	Medium

Action #6

Work with MDC to identify potential hazard mitigation actions for MDC facilities, and list those actions in the next HMP Update.

Goal	5. Improve the resilience of local and regional utilities and infrastructure using strategies including adaptation, hardening, and creating redundancies.
Category	Property Protection
Lead	Public Works
Cost	\$10,000 - \$25,000
Funding	Town Operating Budget / DEMHS
Timeframe	07/2020 - 06/2022
Priority	Medium



Action #7

Determine the best course for addressing drainage issues at the culvert on New Park Avenue near the tire facility. Complete the determined action or include it in the next plan.

Goal	1. Minimize the impact of natural hazards on physical buildings and infrastructure
Category	Structural Projects
Lead	Public Works
Cost	More than \$100,000
Funding	Town Operating Budget / Grants
Timeframe	07/2022 - 06/2024
Priority	Medium

Action #8

Complete implementation of System Wide Improvement Framework and Semi-Qualitative Risk Assessment for the Hartford Flood Control System, submitted to USACE in 2018.

Goal	1. Minimize the impact of natural hazards on physical buildings and infrastructure
Category	Structural Projects
Lead	Public Works
Cost	More than \$100,000
Funding	Grants
Timeframe	07/2022 - 06/2024
Priority	Medium

Action #9

Contact the owners of Repetitive Loss Properties and nearby properties at risk to inquire about mitigation undertaken and suggest options for mitigating flooding in those areas. This should be accomplished with a letter directly mailed to each property owner.

Goal	1. Minimize the impact of natural hazards on physical buildings and infrastructure
Category	Property Protection
Lead	Planning
Cost	\$0 - \$10,000
Funding	Town Operating Budget / DEMHS
Timeframe	07/2021 - 06/2022
Priority	Low



Action #10

Coordinate with CT SHPO to conduct outreach to historic property owners to educate them on methods of retrofitting their properties to be more hazard-resilient while maintaining historic character.

Goal	8. Ensure community character and social equity are addressed in mitigation activities
Category	Education & Awareness
Lead	Planning, in coordination with SHPO
Cost	\$0 - \$10,000
Funding	SHPO
Timeframe	01/2021 - 12/2022
Priority	Low

Action #11

Make progress with the hazard mitigation goals associated with SustainableCT certified actions.

Goal	4. Increase the use of natural, “green,” or “soft” hazard mitigation measures, such as open space preservation and green infrastructure.
Category	Natural Resources Protection
Lead	Planning
Cost	\$0 - \$10,000
Funding	Town Operating Budget
Timeframe	07/2021 - 06/2022
Priority	Low

Action #12

Coordinate with CT SHPO to conduct historic resource surveys, focusing on areas within natural hazard risk zones (such as flood or wildfire hazard zones and areas near steep slopes), to support identification of vulnerable historic properties and preparation of resiliency plans across the state. This action leverages existing resources and best practices for protection of historic and cultural resources through an ongoing statewide initiative by CT SHPO.

Goal	8. Ensure community character and social equity are addressed in mitigation activities
Category	Property Protection
Lead	Planning, in coordination with SHPO
Cost	\$10,000 - \$25,000
Funding	SHPO
Timeframe	07/2021 - 06/2023
Priority	Low



Action #13

**Conduct tabletop natural hazard emergency response drills with local departments more frequently.
Ensure multiple hazard scenarios are drilled.**

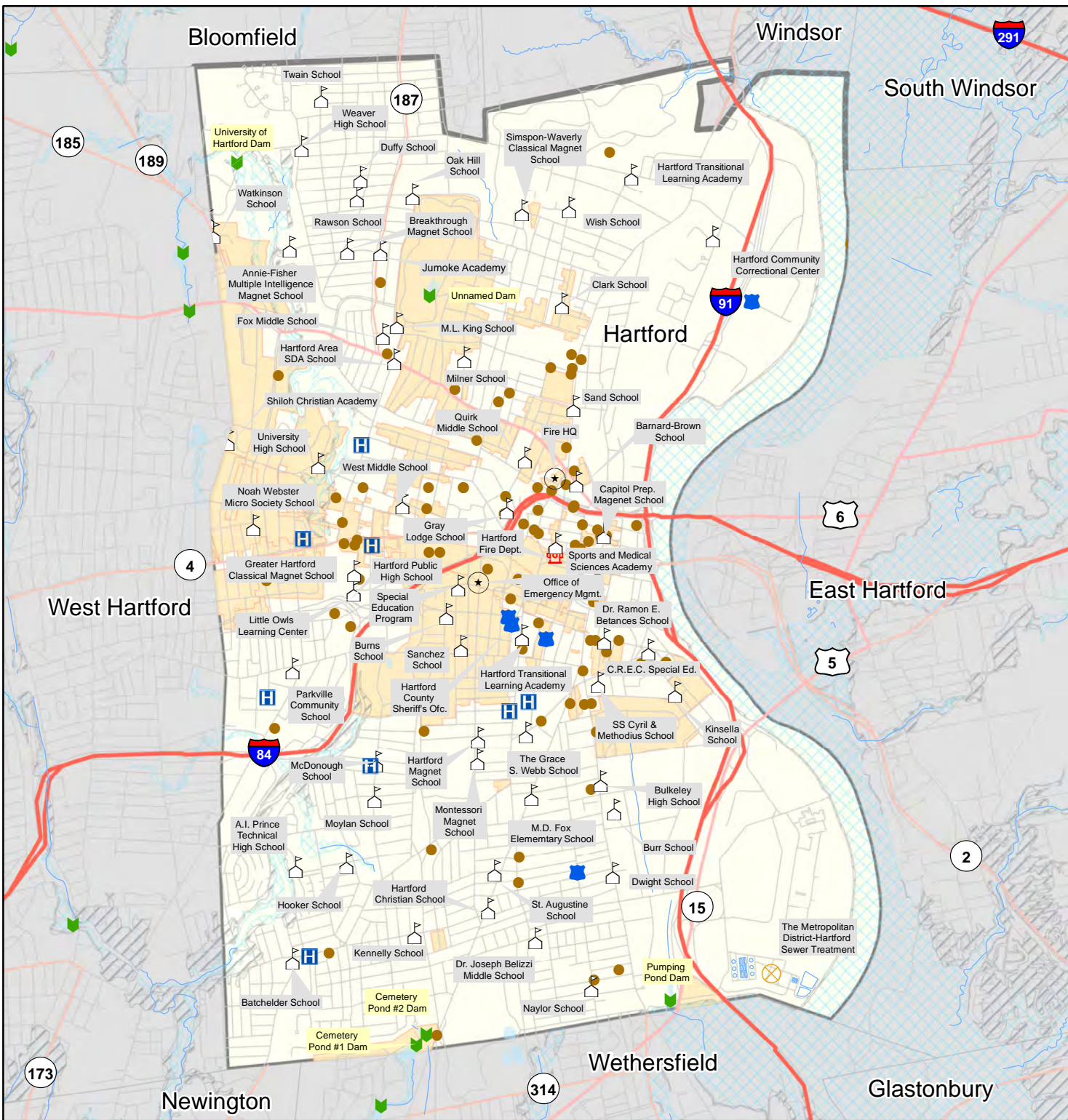
Goal	7. Improve the emergency response capabilities of the region and its communities
Category	Preparedness & Emergency Response
Lead	Emergency Management
Cost	\$25,000 - \$50,000
Funding	Town Operating Budget / DEMHS
Timeframe	01/2023 - 12/2024
Priority	Low

Action #14

Increase DPW budget or personnel to allow for proper maintenance of drainage swales.

Goal	1. Minimize the impact of natural hazards on physical buildings and infrastructure
Category	Prevention
Lead	Public Works
Cost	More than \$100,000
Funding	Town Operating Budget
Timeframe	01/2024 - 12/2024
Priority	Low














Capitol Region Natural Hazards Mitigation Plan Update




Hartford, Connecticut

Flood Plains, Dams & Critical Facilities




Critical Facilities

-  Fire Station
-  Police Station
-  School
-  Healthcare Facility
-  State Facility
-  Town Facility
-  Waste Water Facility
-  Emergency Center
-  NRHP Buildings/Sites

Dam Hazard Class

-  BB, A, AA OR Unclassified
-  Class B - Significant Hazard
-  Class C - High Hazard

FEMA Flood Hazard Area

-  100 Year Flood Zone
-  500 Year Flood Zone
-  NRHP Districts/Areas

Data Sources: FEMA, National Register of Historic Places, CT DEEP, CRCOG, ESRI



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18 Hebron

Community Overview

Hebron is a rural community in Tolland County that covers 37 square miles with an estimated population of 9,700 (2010 Census). Most of the residential development in Hebron consists of single family homes. Recently, most new development has been constructed near the center of town.

Elevation in Hebron ranges from 300 to over 650 feet above sea level. Most water drains to the Salmon River Watershed, but a small portion in the northeast drains to the Willimantic Watershed. The principal watercourses in Hebron are Fawn, Mint, Raymond and Senate Brooks. The 184 acre Amston Lake is located in the southeast portion of Town.

Major transportation routes through Hebron include state routes 66, 85, 207 and 316.

Critical Facilities

Critical Facilities throughout the Capitol Region are listed in Appendix B. A number of Hebron critical facilities are listed here.

Table 18-1: Critical Facilities, Hebron

Facility	Shelter	Generator
Town Hall (EOC)		X
Library		X
Senior Living Facility		X
RHAM High School	In Progress	X
RHAM Middle School	In Progress	X

Since adoption of the 2014-2019 Capitol Region Natural Hazards Mitigation Plan Update (“2014 HMP”), Hebron relocated the EOC to Town Hall. This site now has emergency backup power and internet capability. The Library is considered the internet hub of the Town and has also had backup power and alternate heating and cooling added since the last plan update. All Town buildings, including schools, have been or are currently being converted to use gas as fuel.

A new, large Senior Living Facility was being completed at the time of this Plan development in the downtown area of Hebron. The development was installing its own dry-hydrant and back-up power generation.

Hebron, Andover and Marlborough share a regional middle/high school (RHAM) located in the center of the town of Hebron. The high school is being considered for use as a regional general population shelter while the middle school is being considered for use as a special needs shelter. Electrical upgrades, generators and fuel capacity sufficient to provide power to operate

bathroom and cooking facilities are needed to enable the schools to be used as emergency shelters.

Capabilities

Hazard mitigation is incorporated into Hebron's Plan of Conservation and Development. The HMP document itself is cited.

Public water service, provided through a private water company, has recently been extended, and is available in several neighborhoods including the Town Center and the Amston Lake area; however, there are no hydrants. Hebron has a robust fire suppression program that primarily relies on tanker trucks to transport water. The Fire Department has inventoried all fire ponds and dry hydrants in Town and is now working to develop a plan for additional dry hydrant locations. The High School has a sprinkler system and is serviced by CT Water.

The Town of Hebron has worked to limit its vulnerability to flood hazards. No new construction has occurred in a floodplain since 2008. The building codes are based on FEMA requirements or reference FEMA recognized ASCE 24 construction standards.

Eversource has a contract with Asplundh Tree Services to provide tree maintenance services in Hebron. Additionally, the Town has its own bucket truck and crew for tree removal needs impacting Town property.

Amston Lake's water level is controlled by an earthen dam with a concrete spillway. The outlet of the lake is an unnamed watercourse that feeds into Raymond Brook. The dam was recently repaired and upgraded.

The Town actively seeks to protect sensitive lands. Approximately 20% of the Town's land area is permanently protected open space.

New Capabilities

The Town recently updated its Plan of Conservation and Development and assessed its infrastructure needs as part of that process.

A map modernization effort by FEMA is currently underway for Tolland County, but its full extent, and how much of Hebron it will cover, is unknown.

One bridge replacement was underway at the time of development of this Hazard Mitigation Plan.

The Hebron CERT team has increased three-fold in size since the 2014 HMP, and merged with the Andover CERT.

Hebron received the Bronze Certification within the SustainableCT program in October 2018



Challenges

The Town relies primarily on groundwater for its drinking water. Most residences and businesses have private wells. The Town's most extensive aquifer is located in the Raymond Brook Marsh area. Among the challenges facing Hebron in the event of a natural disaster are providing adequate water supply and emergency shelter for residents. The Town and Chatham Health District will need to monitor the available capacity of the sewer treatment plant and ability of the Town's ground water reserves to address the needs of future development including fire suppression particularly in the event of drought. The Town will also need to assess the capability of the RHAM middle and high school to serve as regional emergency shelters.

Power loss is particularly challenging because of the residences and businesses that rely on wells and grinder pumps. A wind storm in November 2017 damaged property and required sheltering of one individual.

There are no public water hydrants in Town; the Fire Department relies on dry hydrants and tanker trucks to find and transport water for fire suppression.

Debris management after storm events is another concern for the Town. Hebron's landfill is capped and cannot be used for debris disposal.

The NFIP has paid three property damage claims in Hebron totaling \$5,043.26 to-date. Hebron has no Repetitive Loss (RL) Property claims to-date.

Hazard Losses

The economic losses faced by Hebron from natural hazards can be estimated by reviewing historic, and modeling future, loss figures. Loss estimates are summarized below.

Historic FEMA Payments

FEMA reimburses communities for hazard losses through programs including Public Assistance (PA) and the National Flood Insurance Program (NFIP). Combining PA and private flood insurance payments can give an estimate for total losses to a community.

The NFIP has paid three property damage claims in Hebron totaling \$5,043 to-date. Hebron has not had any Repetitive Loss (RL) Property claims to-date.

Total PA reimbursements to the community were as follows:

- Flood Events: \$1,408 (\$74 annually)
- Hurricane Events: \$121,009 (\$6,369 annually)
- Winter Storm Events: \$513,068 (\$27,004 annually)

These are summarized in the tables below.



Table 18-2: Flood Event PA Reimbursements, Hebron

Incident	Oct 2005
Declaration	12/16/2005
Disaster No.	1619
Entity	FEMA PA Reimbursement
State	\$1,408
Municipal	\$0
Nonprofit	\$0
Total	\$1,408
Annualized	\$74

Table 18-3: Hurricane Wind Event PA Reimbursements, Hebron

Incident	Aug - Sep 2011 (T.S. Irene)	Oct - Nov 2012 (Storm Sandy)
Declaration	9/2/2011	10/30/2012
Disaster #	4023	4087
Entity	FEMA PA Reimbursement	
State	\$623	\$2,915
Municipal	\$61,537	\$48,339
Nonprofit	\$6,742	\$854
Total	\$68,902	\$52,107
Annualized	\$3,626	\$2,742

Table 18-4: Winter Storm PA Reimbursements, Hebron

Incident	Mar 2003	Dec 2003	Jan 2005	Feb 2006	Jan 2011	Oct 2011	Feb 2013	Jan 2015
Declaration	3/11/03	1/15/04	2/17/05	5/2/06	3/3/11	11/17/11	3/21/13	4/8/15
Disaster #	3176	3192	3200	3266	1958	4046	4106	4213
Entity	FEMA PA Reimbursement							
State	\$9,835	\$10,173	\$14,539	\$13,235	\$16,558	\$2,536	\$16,101	\$26,687
Municipal	\$36,013	\$33,444	\$41,826	\$26,187	\$47,786	\$23,474	\$69,739	\$48,273
Nonprofit	\$0	\$0	\$3,696	\$3,566	\$12,082	\$4,815	\$30,810	\$21,691
Total	\$45,848	\$43,616	\$60,061	\$42,989	\$76,426	\$30,826	\$116,650	\$96,652
Annualized	\$2,413	\$2,296	\$3,161	\$2,263	\$4,022	\$1,622	\$6,139	\$5,087

National Centers for Environmental Information Losses

The table below summarizes events in the National Centers for Environmental Information (NCEI) severe storm database that were specifically noted as having impacted the community since 2012.



Table 18-5: NCEI Database Losses since 2012, Hebron

Date	Event	Property Damage
7/2/2012	Lightning	\$10,000
9/18/2012	Thunderstorm Wind	\$5,000
10/7/2013	Thunderstorm Wind	\$5,000
2/25/2016	Thunderstorm Wind	\$5,000
Total		\$25,000

NCEI losses under other event categories (such as drought, high wind, flooding, and winter storms) were not specifically noted as impacting this community, though they did impact Tolland County and nearby towns. NCEI losses are reported in Section II of this Plan.

HAZUS-MH Losses

CRCOG used FEMA’s Hazus-MH model to analyze the risks that the community might face from flooding, hurricanes, and earthquakes. The model estimates economic losses to the town due to damage to buildings and building contents, as well as other economic disruptions. Both residential and commercial structures are addressed. Losses from different hazards are summarized below. Where available, estimates from the previous and current versions of the HMP are provided side-by-side; differences between the two may have been caused by a combination of the following:

- Changes in methodology: such as hazard zone mapping
- Changes in data: such as population and property values
- Changes in the model: this HMP utilized Hazus-MH version 4.0 rather than 2.1
- Other factors: inherent in a complex software like Hazus-MH

More details are available in the Multi-Jurisdictional HMP. Ultimately, changes in the loss estimates reflect the reality that small differences in hazard event features can have a significant impact on losses incurred.

Table 18-6: Estimated Damages to Hebron from a 1% Annual-Chance Flood

Loss Type	2014 Results	2018 Results
Households Displaced	74	68
People Needing Shelter	37	29
Buildings at Least Moderately Damaged	0	0
Residential Building & Content Losses	\$2,870,000	\$2,992,955
Other Building & Content Losses	\$1,520,000	\$729,492
Total Building & Content Loss	\$4,400,000	\$3,722,447
Total Business Interruption Losses	\$0	\$12,169
TOTAL	\$4,400,000	\$3,734,616



Table 18-7: Estimated Damages to Hebron from a 1% Annual-Chance Hurricane

Loss Type	2014 Results (1938 event)	2018 Results (1% track)
Buildings at Least Moderately Damaged	335	1
Buildings Completely Damaged	22	0
Total Debris Generated (tons)	69,870	14,963
Truckloads (at 25 tons/truck) of building debris	140	599
Economic Losses		
Residential Building & Content Losses	\$38,940,000	\$8,023,397
Other Building & Content Losses	\$3,190,000	\$162,566
Total Building & Content Loss	\$42,130,000	\$8,185,963
Total Business Interruption Losses	\$3,970,000	\$242,921
TOTAL LOSSES	\$46,100,000	\$8,428,884

Losses were calculated from a modeled probabilistic earthquake (1% annual-chance of occurrence), as well as for four specific scenarios with epicenters around Connecticut.

Table 18-8: Estimated Damages to Hebron from a Probabilistic Earthquake

Loss Type	2018 Results
Wage Loss	\$847
Rent Loss	\$683
Relocation Loss	\$1,473
Income Loss	\$764
Inventory Loss	\$53
Total Business Disruption	\$3,820
Structural Loss	\$2,970
Non-Structural Loss	\$11,164
Total Building Loss	\$14,133
Total Content Loss	\$4,419
TOTAL LOSSES	\$22,373

Table 18-9: Estimated Damages to Hebron from Modeled Earthquake Scenarios

Epicenter Location	Magnitude	Estimated Total Losses
East Haddam	6.4	\$465,366.87
Haddam	5.7	\$135,841.37
Portland	5.7	\$154,764.85
Stamford	5.7	\$2,010.38

Average Annualized Losses

Average Annualized Loss (AAL) figures are useful tools for comparison of the risks faced from different hazards with different likelihoods of occurring in a given time period. AAL estimates were prepared for the community based on the methodologies discussed in Section II of the Multi-Jurisdictional HMP. Dam failure, drought, tornado, and wildfire losses were sourced from the 2014 Connecticut Natural Hazard Mitigation Plan Update, with dam failure data supplemented by the National Performance of Dams Program and the Connecticut Department



of Energy & Environmental Protection. Earthquake and hurricane losses were calculated in HAZUS-MH. Losses for flooding came from NFIP claims, for winter storms from Public Assistance Reimbursements, and for thunderstorms from the NCEI database. These are presented in the table below in dollars per year. Note that Hurricanes and Tropical Storms represent the largest share of total annualized losses.

Table 18-10: Average Annualized Losses, Hebron

Dam Failure	Drought	Earthquakes	Flooding	Hurricanes and Tropical Storms	Severe Winter Storms	Thunderstorms	Tornadoes	Wildfires	Total
\$595	\$0	\$22,373	\$207	\$656,385	\$27,004	\$3,526	\$2,815	\$4,847	\$717,751

Losses Summary

A review of the above loss estimates demonstrates that the community has experienced significant expenses as a result of natural hazards, and is at risk for additional losses if some of the less-frequent events were to occur. These actual and potential losses justify hazard mitigation actions to reduce losses in the future.

Mitigation Strategies and Actions

Noted Hazard Mitigation Needs

During the course of this Plan development, multiple hazard mitigation needs of Hebron were noted.

- The Town and Chatham Health District will need to monitor the available capacity of the sewer treatment plant and ability of the town’s ground water reserves to address the needs of future development including fire suppression particularly in the event of drought.
- The Town will need to assess the capability of the RHAM middle and high school to serve as regional emergency shelters. Electrical upgrades, generators and fuel capacity sufficient to provide power to operate bathroom and cooking facilities are needed to enable the schools to be used as emergency shelters.

Status of Previous Mitigation Strategies and Actions

The community reviewed the mitigation actions proposed in the 2014 HMP and determined the status of each. That information is included in the table below.



Table 18-11: Status of Previous Mitigation Strategies and Actions, Hebron

Action #	Action	Notes	Status
GOAL: ASSURE ADEQUACY OF RESPONSE TO WINTER STORMS.			
Objective 1: Provide adequate equipment, staff and other resources to maintain passable roads and facilitate power restoration.			
1.1	Maintain and implement equipment replacement schedules.	This is performed as part of the Town's standard operations. This is a capability.	Capability
1.2	Investigate regional service sharing initiatives.	Town's services are sufficient and this action is no longer needed.	Drop
1.3	Continue informal arrangements with private contractors.	This is part of the Town's standard operations. This is a capability.	Capability
1.4	Continue with tree maintenance program.	This is part of the Town's standard operations. This is a capability.	Capability
1.5	Expand salt/sand storage facilities.	Town now believes its salt/sand storage facilities are sufficient and this action is no longer needed.	Drop
Objective 2: Educate public on how to prepare for hazardous conditions.			
2.1	Continue to maintain special needs population list for monitoring during emergency situations.	This is performed as part of the Town's standard operations. This is a capability.	Capability
2.2	Develop and disseminate public outreach materials to citizens.	The Hebron CERT team conducts public outreach, and the Town has an info booth that includes natural hazards information each year at the Hebron Harvest Fair.	Capability
GOAL: OPTIMIZE MITIGATION ACTIVITIES AGAINST NATURAL HAZARDS.			
Objective 1: Minimize risk of forest fires.			
1.1	Continue to encourage installation of dry hydrants in new developments without water sources.	Further research required, including potential of codifying this into current development regulations if not there already.	Carry Forward with Revisions
1.2	Develop and implement timber management plan for town-owned forested land. Because this is expected to be a long term, multi-year project, for the 2014-2019 Plan period, the action to be taken is to complete a draft plan.	No progress was made due to limited staff and budget.	Carry Forward with Revisions
Objective 2: Minimize risk from flooding.			
2.1	Continue to monitor bridges and culverts for adequate flow capacity.	This is a capability.	Capability
2.2	Continue to enforce development regulations to minimize impacts on wetlands and flood zones.	Change this to a strategy to update regulations when new FIRM maps are issued - consider higher regulatory standards during that update	Carry Forward with Revisions
Objective 3: Improve ability of town and residents to prepare for and respond to severe weather.			
3.1	Establish RHAM High School as a regional shelter. Because this is expected to be a long term, multi-year project, for the 2014-2019 Plan period, the action to be taken is to develop a scope of work for establishing the school as a shelter.	Still a priority for Hebron. RHAM still needs electrical system improvements.	Carry Forward with Revisions
3.2	Establish Town Hall as the Emergency Operations Center with generator	This has been completed.	Completed



Action #	Action	Notes	Status
3.3	Establish the Fairgrounds as a shelter for pets and other animals and as a staging location for shuttle service to and from the shelter. Because this is expected to be a long term, multi-year project, for the 2014-2019 Plan period, the action to be taken is to develop a scope of work for establishing the school as a shelter.	Town has determined that this action is not practical for this community.	Drop
Objective 4: Improve School Security and response to emergency situations.			
4.1	Establish a security review of all schools, reevaluate current school plans, and establish Standard Operations Plan (SOP) for all schools in the Town of Hebron. Because this is expected to be a long term, multi-year project, for the 2014-2019 Plan period, the action to be taken is to complete the security review and evaluation of current school plans.	Major changes to school security capabilities (including improved radio communication, smartphone apps, and other programs) have improved school SOPs and make additional action unnecessary.	Drop

Active Mitigation Strategies and Actions

The Town proposed to initiate several new mitigation actions for the upcoming five years. Additionally, a number of actions from the previous planning period are being carried forward or replaced with revised actions. These are listed below.

Each of the following actions has been prioritized based on FEMA guidelines, listed from highest to lowest priority, and numbered.

Action #1	
Assess the capability of the RHAM middle and high school to serve as regional emergency shelters.	
Goal	7. Improve the emergency response capabilities of the region and its communities
Category	Preparedness & Emergency Response
Lead	Emergency Management
Cost	\$0 - \$10,000
Funding	Town Operating Budget
Timeframe	07/2019 - 06/2020
Priority	High

Action #2	
Perform study to determine Town's ability to maintain sufficient water supply to use for wildfire suppression in the future given continued development. Consider the effect of droughts and climate change.	
Goal	7. Improve the emergency response capabilities of the region and its communities
Category	Prevention
Lead	Planning
Cost	\$10,000 - \$25,000
Funding	Town Operating Budget / Grants
Timeframe	07/2019 - 06/2021
Priority	High



Action #3

Conduct outreach to local small businesses with the aim of preventing the accidental release and pollution from chemicals stored and used at their facilities during or following natural hazard events.

Goal	6. Improve public outreach, education, and warning systems
Category	Education & Awareness
Lead	Planning, in coordination with DEEP
Cost	\$0 - \$10,000
Funding	Materials & Resources Provided by CT DEEP
Timeframe	01/2019 - 12/2019
Priority	Medium

Action #4

Participate in EMI courses or the seminars and annual conference held by the Connecticut Association of Flood Managers.

Goal	3. Improve institutional awareness and understanding of natural hazard impacts and mitigation within municipal governments and other decision-making bodies
Category	Education & Awareness
Lead	Planning
Cost	\$0 - \$10,000
Funding	Town Operating Budget
Timeframe	07/2019 - 06/2024
Priority	Medium

Action #5

Update floodplain regulations when new FIRM maps are issues by FEMA to be at or higher than regulatory standards.

Goal	2. Ensure Municipal Codes and Regulations support hazard mitigation
Category	Prevention
Lead	Planning
Cost	\$10,000 - \$25,000
Funding	Town Operating Budget
Timeframe	07/2020 - 06/2022
Priority	Medium



Action #6

Review the LID Manual developed by the Northwest Hills Council of Governments and determine whether LID can be incorporated locally to increase rural resiliency.

Goal	1. Minimize the impact of natural hazards on physical buildings and infrastructure
Category	Prevention
Lead	Planning
Cost	\$10,000 - \$25,000
Funding	Town Operating Budget
Timeframe	07/2021 - 06/2022
Priority	Medium

Action #7

Perform upgrades to the electrical system, generators, and fuel capacity of the RHAM Middle and High Schools so that they can operate bathroom and cooking facilities and be used as emergency shelters.

Goal	7. Improve the emergency response capabilities of the region and its communities
Category	Structural Projects
Lead	Public Works
Cost	More than \$100,000
Funding	Town Operating Budget / Grants / DEMHS
Timeframe	07/2022 - 06/2024
Priority	Medium

Action #8

Coordinate with NEMO and CRCOG to share resources and gain technical support for hazard mitigation actions involving stormwater management and public outreach, which have parallel benefits related to MS4 stormwater permit compliance.

Goal	1. Minimize the impact of natural hazards on physical buildings and infrastructure
Category	Prevention
Lead	Public Works
Cost	\$0 - \$10,000
Funding	Town Operating Budget
Timeframe	01/2019 - 12/2020
Priority	Low



Action #9

Complete a draft timber management plan for Town-owned forested land.

Goal	1. Minimize the impact of natural hazards on physical buildings and infrastructure
Category	Prevention
Lead	Fire Department
Cost	\$0 - \$10,000
Funding	Town Operating Budget / CT DEEP
Timeframe	07/2021 - 06/2022
Priority	Low

Action #10

Make progress with the hazard mitigation goals associated with SustainableCT certified actions.

Goal	4. Increase the use of natural, "green," or "soft" hazard mitigation measures, such as open space preservation and green infrastructure.
Category	Natural Resources Protection
Lead	Planning
Cost	\$0 - \$10,000
Funding	Town Operating Budget
Timeframe	07/2021 - 06/2022
Priority	Low

Action #11

Coordinate with CT SHPO to conduct historic resource surveys, focusing on areas within natural hazard risk zones (such as flood or wildfire hazard zones and areas near steep slopes), to support identification of vulnerable historic properties and preparation of resiliency plans across the state. This action leverages existing resources and best practices for protection of historic and cultural resources through an ongoing statewide initiative by CT SHPO.

Goal	8. Ensure community character and social equity are addressed in mitigation activities
Category	Property Protection
Lead	Planning, in coordination with SHPO
Cost	\$10,000 - \$25,000
Funding	SHPO
Timeframe	07/2021 - 06/2023
Priority	Low












Capitol Region Natural Hazards Mitigation Plan Update




Hebron, Connecticut

Flood Plains, Dams & Critical Facilities




Critical Facilities

-  Fire Station
-  Police Station
-  School
-  Healthcare Facility
-  State Facility
-  Town Facility
-  Waste Water Facility
-  Emergency Center
-  NRHP Buildings/Sites

Dam Hazard Class

-  BB, A, AA OR Unclassified
-  Class B - Significant Hazard
-  Class C - High Hazard

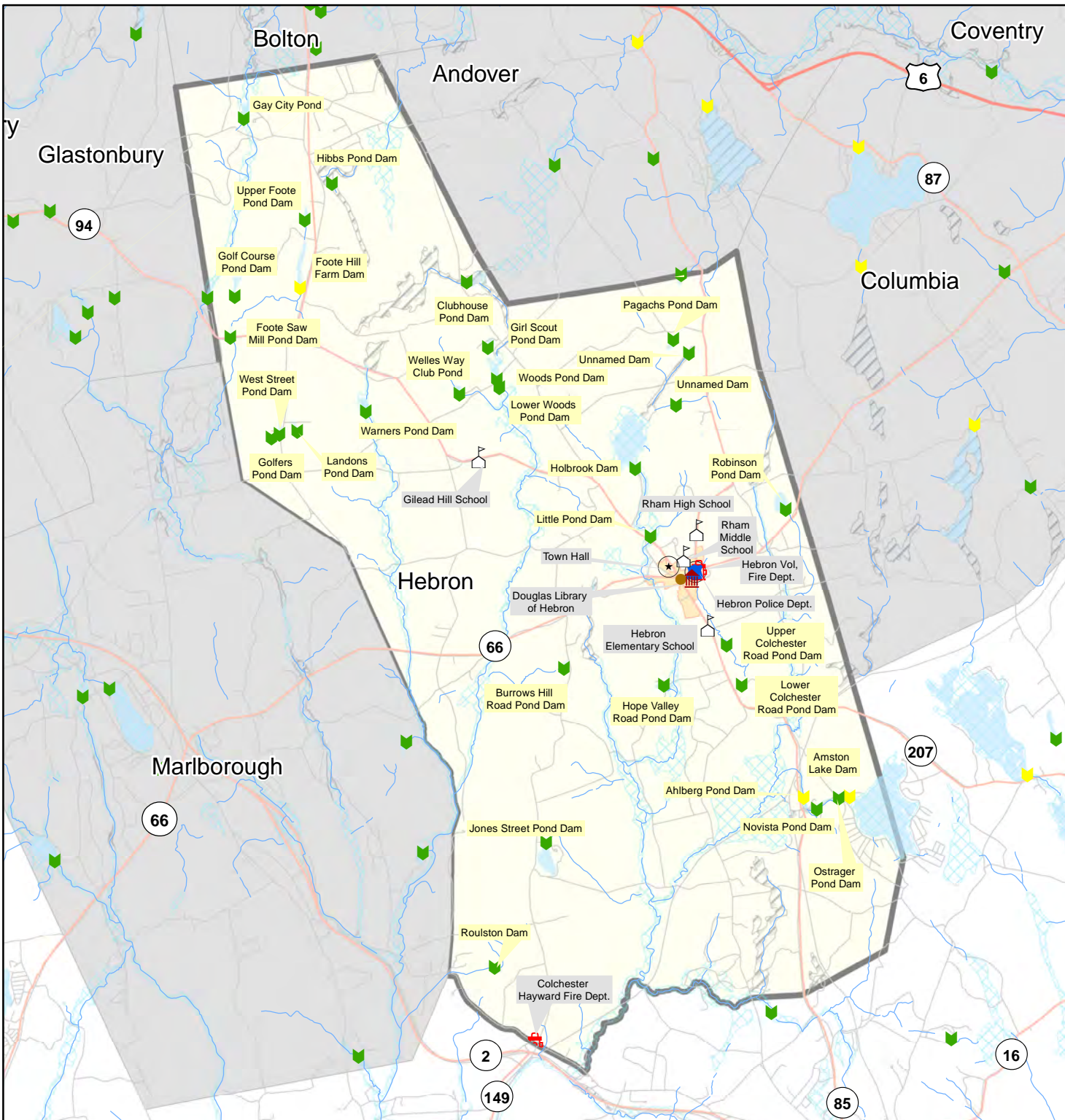
FEMA Flood Hazard Area

-  100 Year Flood Zone
-  500 Year Flood Zone
-  NRHP Districts/Areas

Data Sources: FEMA, National Register of Historic Places, CT DEEP, CRCOG, ESRI



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19 Manchester

Community Overview

Manchester is a fully suburban community of over 58,000 covering about 27.3 square miles. Elevation ranges from about 80 to 500 feet above sea level. Manchester’s land area drains primarily to the Hockanum River and its watershed. Small areas along the southern border of the town drain to the main stem of the Connecticut River Watershed. Other major waterways in Manchester include: Bigelow, Birch Mountain, Lydall and Porter Brooks. Regionally significant transportation routes in Manchester include Interstates 84, 384 and 291, as well as state routes 44/6 and 83. Principal industries include: engineered fibers, steel metal fabrication, plastics, machine tool companies, printing, warehouse/distribution facilities, electronic equipment, aircraft and missile components. Manchester is also home to one of the largest regional retail concentrations in New England; the Buckland Hills area includes over 3 million square feet of retail and services anchored by the Buckland Hills Mall, over 300 hotel rooms, restaurants, and movie theaters. Historic resources include the Cheney Brothers National Register Historic District and the downtown Main Street National Historic Register district.

Little new development was noted since adoption of the 2014-2019 Capitol Region Natural Hazards Mitigation Plan Update (“2014 HMP”); most construction has consisted of redevelopment of retail buildings that has not increased the Town’s exposure to hazards.

Critical Facilities

Critical Facilities throughout the Capitol Region are listed in Appendix B. In Manchester, these facilities include the Wastewater Treatment Plant (WWTP), Police Department, and Senior Center and High School (both shelters).

Table 19-1: Critical Facilities, Manchester

Facility	Shelter	Generator
Police Department		X
Fire Department		
Senior Center	X	X
High School	X	X
Wastewater Treatment Plant		X
Facilities Management Building (EOC)		
Department of Public Works Facility		

Since the 2014 Plan, the WWTP has been upgraded, a generator was installed at the Senior Center and the Police Department generator was updated to run on natural gas.

Capabilities

Hazard mitigation is addressed specifically in Manchester’s Plan of Conservation and Development.

Manchester owns and operates its own water company. The protection and management of significant forested watershed land and the multiple stratified-drift aquifers relied upon by the residents of Manchester is paramount. In addition, Manchester has a significant open space recreation area of regional importance.

Since 2008, Manchester Public Works has received Flood Plain Zone and Wetlands Permit approval for five projects including structural improvements to stormwater drainage infrastructure in Special Flood Hazard Areas (SFHA) that help mitigate flood risks. No new construction of primary residential or commercial structures has been permitted in the SFHA. The Planning and Zoning Commission and Inland Wetlands and Watercourses Agency has approved several minor structural renovations, installation of accessory structures and site improvements in regulated areas in accordance with the flood hazard reduction and resource compensation standards outlined in the Zoning and Inland Wetlands and Watercourses Regulations. Manchester revised its Flood Plain Zone regulations in 2008 to meet National Flood Insurance Program standards. In accordance with these standards, encroachments in the floodway are prohibited and any reduction of water holding capacity in the SFHA caused by filling or construction must be compensated for elsewhere.

The Town addresses tree maintenance on an as-needed basis and does not currently have the capacity to proactively manage its trees. Eversource currently performs the majority of tree maintenance activities in Manchester.

New Capabilities

Since adoption of the 2014 HMP, Manchester has migrated to a new storm mix for road treatment that uses less sand and therefore reduces drainageway-clogging issues.

A previously breached dam has been removed in the last five years.

Challenges

Challenges Overview

The Manchester Fire Chief has determined that wildfire is of minimal concern in Town, due mostly to the community's built-out nature. The majority of the Town is on public water with hydrants. No additional fire suppression capabilities are needed. The vast and rugged forested landscape of the Case Mountain Recreation Area poses some fire risk, especially at the natural/residential interface.

Flood-risk areas in Manchester are well known and have not changed in recent years. There is some hazard potential to Manchester if there is a failure of an impoundment in towns upstream.

Damage to the power grid from falling trees and branches is a problem.



Hazard Losses

The economic losses faced by the community from natural hazards can be estimated by reviewing historic, and modeling future, loss figures. Loss estimates are summarized below.

Historic FEMA Payments

FEMA reimburses communities for hazard losses through programs including Public Assistance (PA) and the National Flood Insurance Program (NFIP). Combining PA and private flood insurance payments can give an estimate for total losses to a community.

The NFIP has paid 27 property damage claims in Manchester totaling \$118,082 to-date. Manchester has had four Repetitive Loss (RL) Property claims on two properties totaling \$43,204 to-date.

Total PA reimbursements to the community were as follows:

- Flood Events: \$74,618 (\$3,927 annually)
- Hurricane Events: \$101,157 (\$5,324 annually)
- Winter Storm Events: \$7,236,430 (\$380,865 annually)

These are summarized in the tables below.

Table 19-2: Flood Event PA Reimbursements, Manchester

Incident	Sep 1999	Oct 2005
Declaration	9/23/1999	12/16/2005
Disaster No.	1302	1619
Entity	FEMA PA Reimbursement	
State	\$2,701	\$3,349
Municipal	\$0	\$68,568
Nonprofit	\$0	\$0
Total	\$2,701	\$71,917
Annualized	\$142	\$3,785



Table 19-3: Hurricane Wind Event PA Reimbursements, Manchester

Incident	Aug - Sep 2011 (T.S. Irene)
Declaration	9/2/2011
Disaster #	4023
Entity	FEMA PA Reimbursement
State	\$3,106
Municipal	\$98,052
Nonprofit	\$0
Total	\$101,157
Annualized	\$5,324

Table 19-4: Winter Storm PA Reimbursements, Manchester

Incident	Mar 2003	Dec 2003	Jan 2005	Feb 2006	Jan 2011	Oct 2011	Feb 2013
Declaration	3/11/03	1/15/04	2/17/05	5/2/06	3/3/11	11/17/11	3/21/13
Disaster #	3176	3192	3200	3266	1958	4046	4106
Entity	FEMA PA Reimbursement						
State	\$55,715	\$49,783	\$65,225	\$76,956	\$70,323	\$40,275	\$129,965
Municipal	\$136,596	\$167,112	\$202,915	\$179,688	\$195,625	\$5,499,155	\$277,249
Nonprofit	\$0	\$0	\$2,830	\$3,380	\$16,606	\$61,727	\$5,304
Total	\$192,311	\$216,896	\$270,969	\$260,024	\$282,554	\$5,601,157	\$412,518
Annualized	\$10,122	\$11,416	\$14,262	\$13,685	\$14,871	\$294,798	\$21,711

National Centers for Environmental Information Losses

The table below summarizes events in the National Centers for Environmental Information (NCEI) severe storm database that were specifically noted as having impacted the community since 2012.



Table 19-5: NCEI Database Losses since 2012, Manchester

Date	Event	Property Damage
6/22/2012	Thunderstorm Wind	\$5,000
6/22/2012	Flood	\$0
7/28/2012	Flood	\$0
8/10/2012	Thunderstorm Wind	\$10,000
9/18/2012	Thunderstorm Wind	\$10,000
5/21/2013	Hail	\$0
6/17/2013	Thunderstorm Wind	\$5,000
8/11/2016	Thunderstorm Wind	\$25,000
8/11/2016	Flood	\$0
6/27/2017	Hail	\$0
8/2/2017	Hail	\$0
8/2/2017	Flash Flood	\$10,000
Total Thunderstorm		\$55,000
Total Flood		\$10,000

NCEI losses under other event categories (such as drought, high wind, flooding, and winter storms) were not specifically noted as impacting this community, though they did impact Hartford County and nearby towns. NCEI losses are reported in Section II of this Plan.

HAZUS-MH Losses

CRCOG used FEMA’s Hazus-MH model to analyze the risks that the community might face from flooding, hurricanes, and earthquakes. The model estimates economic losses due to damage to buildings and building contents, as well as other economic disruptions. Both residential and commercial structures are addressed. Losses from different hazards are summarized below. Where available, estimates from the previous and current versions of the HMP are provided side-by-side; differences between the two may have been caused by a combination of the following:

- Changes in methodology: such as hazard zone mapping
- Changes in data: such as population and property values
- Changes in the model: this HMP utilized Hazus-MH version 4.0 rather than 2.1
- Other factors: inherent in a complex software like Hazus-MH

More details are available in the Multi-Jurisdictional HMP. Ultimately, changes in the loss estimates reflect the reality that small differences in hazard event features can have a significant impact on losses incurred.



Table 19-6: Estimated Damages to Manchester from a 1% Annual-Chance Flood

Loss Type	2014 Results	2018 Results
Households Displaced	542	219
People Needing Shelter	983	277
Buildings at Least Moderately Damaged	11	0
Economic Losses		
Residential Building & Content Losses	\$16,900,000	\$8,730,809
Other Building & Content Losses	\$47,180,000	\$22,958,483
Total Building & Content Loss	\$64,080,000	\$31,689,292
Total Business Interruption Losses	\$280,000	\$1,465,406
TOTAL	\$64,350,000	\$33,154,698

Table 19-7: Estimated Damages to Manchester from a 1% Annual-Chance Hurricane

Loss Type	2014 Results (1938 event)	2018 Results (1% track)
Buildings at Least Moderately Damaged	2,475	4
Buildings Completely Damaged	132	1
Total Debris Generated (tons)	70,116 tons	13,094 tons
Truckloads (at 25 tons/truck) of building debris	1,357	524
Economic Losses		
Residential Building & Content Losses	\$226,970,000	\$44,626,987
Other Building & Content Losses	\$54,870,000	\$2,282,716
Total Building & Content Loss	\$281,840,000	\$46,909,703
Total Business Interruption Losses	\$37,900,000	\$2,549,480
TOTAL LOSSES	\$319,740,000	\$49,459,183

Losses were calculated from a modeled probabilistic earthquake (1% annual-chance of occurrence), as well as for four specific scenarios with epicenters around Connecticut.

Table 19-8: Estimated Damages to Manchester from a Probabilistic Earthquake

Loss Type	2018 Results
Wage Loss	\$10,644
Rent Loss	\$8,897
Relocation Loss	\$13,755
Income Loss	\$8,091
Inventory Loss	\$895
Total Business Disruption	\$42,281
Structural Loss	\$26,272
Non-Structural Loss	\$84,518
Total Building Loss	\$110,790
Total Content Loss	\$33,259
TOTAL LOSSES	\$186,330



Table 19-9: Estimated Damages to Manchester from Modeled Earthquake Scenarios

Epicenter Location	Magnitude	Estimated Total Losses
East Haddam	6.4	\$1,532,205.00
Haddam	5.7	\$348,228.77
Portland	5.7	\$1,175,637.21
Stamford	5.7	\$17,387.13

Average Annualized Losses

Average Annualized Loss (AAL) figures are useful tools for comparison of the risks faced from different hazards with different likelihoods of occurring in a given time period. AAL estimates were prepared for the community based on the methodologies discussed in Section II of the Multi-Jurisdictional HMP. Dam failure, drought, tornado, and wildfire losses were sourced from the 2014 Connecticut Natural Hazard Mitigation Plan Update, with dam failure data supplemented by the National Performance of Dams Program and the Connecticut Department of Energy & Environmental Protection. Earthquake and hurricane losses were calculated in HAZUS-MH. Losses for flooding came from NFIP claims, for winter storms from Public Assistance Reimbursements, and for thunderstorms from the NCEI database. These are presented in the table below.

Table 19-10: Average Annualized Losses, Manchester

Dam Failure	Drought	Earthquakes	Flooding	Hurricanes and Tropical Storms	Severe Winter Storms	Thunderstorms	Tornadoes	Wildfires	Total
\$104	\$0	\$186,330	\$7,035	\$3,651,044	\$380,865	\$7,735	\$854,504	\$5,093	\$5,092,710

Losses Summary

A review of the above loss estimates demonstrates that the Town of Manchester has experienced significant expenses as a result of natural hazards, and is at risk for additional losses if some of the less-frequent events were to occur. These actual and potential losses justify hazard mitigation actions to reduce losses in the future.

Mitigation Strategies and Actions

Noted Hazard Mitigation Needs

During the course of this Plan development, hazard mitigation needs of Manchester were noted, including:

- Town Staff wish to know the locations of RL properties.
- The Police Chief believes the EOC requires hardening or other actions to make it more resilient to natural hazards.



Status of Previous Mitigation Strategies and Actions

The Town of Manchester reviewed the mitigation actions proposed in the 2014 HMP and determined the status of each. That information is included in the table below.

Table 19-11: Status of Previous Mitigation Strategies and Actions, Manchester

Action #	Action	Notes	Status
GOAL: MINIMIZE LOSS TO CRITICAL INFRASTRUCTURE DUE TO FLOODING, WINTER STORMS, HURRICANES AND HIGH WINDS			
Objective 1: To reinforce, renovate and upgrade existing critical town facilities.			
1.1	Implement needed improvements to build a new Emergency Operations Center, when funding is available, at the Department of Public Works facility to withstand hurricanes and other disasters.	A new EOC was put into facilities management building. It was placed there but the building was not retrofitted or hardened. This work should be a new strategy in the plan update.	Carry Forward with Revisions
1.2	Implement needed upgrades to electrical system at the Senior Center, which is the primary emergency shelter to allow year-round use.	Action complete.	Complete
1.3	Install operating generators at all primary and tertiary shelters and designated alternate care sites.	Action complete.	Complete
Objective 2: To upgrade existing transportation infrastructure in order to allow for continuity of operations.			
2.1	Upgrade identified flood prone roadways to reduce potential for access being blocked due to flooding.	Ongoing activity but needs metrics for plan update.	Carry Forward with Revisions
2.2	Maintain list of on-call consultant engineers who can provide necessary assistance for structural and other specialized engineering assistance in response to impacts from natural disasters.	Existing capability / ongoing activity.	Capability
2.3	Upgrade bridge and/or other structure replacements based upon potential impact from flood hazards.	Keep - there are easement issues being worked through. Construction is expected in next year. Update strategy to reflect current status.	Carry Forward with Revisions
Objective 3: To upgrade existing communication system in order to facilitate efficient emergency response in a natural disaster.			
3.1	Upgrade Emergency Operations Center communications system, including any necessary building upgrades.	Action completed.	Complete
GOAL: REDUCE THE LIKELIHOOD OF FLOODING DAMAGES THROUGH MONITORING AND INCREASED PUBLIC AWARENESS			
Objective 1: Coordinate with the Town of Vernon to monitor dams and potential flooding along Hockanum River.			
1.1	Continue communications with Vernon emergency management personnel.	Existing capability / ongoing activity.	Capability
Objective 2: Raise awareness of flooding risks among property owners.			
2.1	Determine real estate disclosure practices in high risk areas.	Current state-required disclosure is sufficient.	Drop



Action #	Action	Notes	Status
2.2	Implement an educational system for property owners, including appropriate materials and means for information dissemination. (Include information on importance of properly maintaining private trees).	Not completed. Revisit and select realistic and measurable tactics.	Carry Forward with Revisions
Objective 3: Raise awareness of public health concerns from flooding of private wells and/or on-site septic systems.			
3.1	Continue to update identified private properties including businesses, food service establishments, daycares and group homes served by private wells and/or on-site septic systems located within known flood risks.	Summer intern mapped septic systems and wells to some extent. This work was started, but Manchester would like to add a strategy to complete it and potentially add new items, again using an intern.	Carry Forward with Revisions
3.2	Implement an educational program for private owners including materials and recommendations for appropriate remediation of private utilities that have been subjected to flooding, for health protection and promotion.	Deferred.	Carry Forward

Active Mitigation Strategies and Actions

The Town proposed to initiate several new mitigation actions for the upcoming five years. Additionally, a number of actions from the previous planning period are being carried forward or replaced with revised actions. These are listed below.

Each of the following actions has been prioritized based on FEMA guidelines, listed from highest to lowest priority, and numbered.

<i>Action #1</i>	
Consider and document the labor resource needs and benefits of participation in the Sustainable CT program.	
Goal	4. Increase the use of natural, “green,” or “soft” hazard mitigation measures, such as open space preservation and green infrastructure.
Category	Natural Resources Protection
Lead	Planning
Cost	\$0 - \$10,000
Funding	Town Operating Budget
Timeframe	01/2019 - 12/2019
Priority	High



Action #2

Require Elevation Certificates for all new development permits in or near floodplains and filing them both in the building department and with land records.

Goal	2. Ensure Municipal Codes and Regulations support hazard mitigation
Category	Property Protection
Lead	Building Department
Cost	\$0 - \$10,000
Funding	Town Operating Budget
Timeframe	07/2019 - 06/2020
Priority	High

Action #3

Develop a prioritized list of flood prone roadways to be upgraded to reduce potential for access being blocked due to flooding.

Goal	5. Improve the resilience of local and regional utilities and infrastructure using strategies including adaptation, hardening, and creating redundancies.
Category	Structural Projects
Lead	Public Works
Cost	\$0 - \$10,000
Funding	Town Operating Budget
Timeframe	07/2019 - 06/2020
Priority	High

Action #4

Assess needs of the new EOC in the facilities management building to determine its resilience to natural hazards, and to identify needs to make it more resilient.

Goal	1. Minimize the impact of natural hazards on physical buildings and infrastructure
Category	Preparedness & Emergency Response
Lead	Emergency Management
Cost	\$10,000 - \$25,000
Funding	Town Operating Budget / DEMHS
Timeframe	07/2019 - 06/2021
Priority	High



Action #5

Conduct outreach to local small businesses with the aim of preventing the accidental release and pollution from chemicals stored and used at their facilities during or following natural hazard events.

Goal	6. Improve public outreach, education, and warning systems
Category	Education & Awareness
Lead	Planning, in coordination with DEEP
Cost	\$0 - \$10,000
Funding	Materials & Resources Provided by CT DEEP
Timeframe	01/2019 - 12/2019
Priority	Medium

Action #6

Coordinate with NEMO and CRCOG to share resources and gain technical support for hazard mitigation actions involving stormwater management and public outreach, which have parallel benefits related to MS4 stormwater permit compliance.

Goal	1. Minimize the impact of natural hazards on physical buildings and infrastructure
Category	Prevention
Lead	Public Works
Cost	\$0 - \$10,000
Funding	Town Operating Budget
Timeframe	01/2020 - 12/2020
Priority	Medium

Action #7

Participate in EMI courses or the seminars and annual conference held by the Connecticut Association of Flood Managers.

Goal	3. Improve institutional awareness and understanding of natural hazard impacts and mitigation within municipal governments and other decision-making bodies
Category	Education & Awareness
Lead	Planning
Cost	\$0 - \$10,000
Funding	Town Operating Budget
Timeframe	07/2019 - 06/2024
Priority	Medium



Action #8

Address easement issues being worked through with regards to a bridge upgrade, and complete construction.

Goal	5. Improve the resilience of local and regional utilities and infrastructure using strategies including adaptation, hardening, and creating redundancies.
Category	Structural Projects
Lead	Public Works
Cost	\$25,000 - \$50,000
Funding	Town Operating Budget / Grants
Timeframe	07/2021 - 06/2023
Priority	Medium

Action #9

Implement an educational system for property owners, including appropriate materials and means for information dissemination. (Include information on importance of properly maintaining private trees).

Goal	6. Improve public outreach, education, and warning systems
Category	Education & Awareness
Lead	Emergency Management
Cost	\$25,000 - \$50,000
Funding	Town Operating Budget / Grants
Timeframe	01/2021 - 12/2023
Priority	Medium

Action #10

Contact the owners of Repetitive Loss Properties and nearby properties at risk to inquire about mitigation undertaken and suggest options for mitigating flooding in those areas. This should be accomplished with a letter directly mailed to each property owner.

Goal	1. Minimize the impact of natural hazards on physical buildings and infrastructure
Category	Property Protection
Lead	Planning
Cost	\$0 - \$10,000
Funding	Town Operating Budget / DEMHS
Timeframe	07/2021 - 06/2022
Priority	Low



Action #11

Complete and add on to identification of private properties served by private wells and/or on-site septic systems located within known flood risk zones.

Goal	3. Improve institutional awareness and understanding of natural hazard impacts and mitigation within municipal governments and other decision-making bodies
Category	Property Protection
Lead	Emergency Management
Cost	\$10,000 - \$25,000
Funding	Town Operating Budget
Timeframe	07/2021 - 06/2023
Priority	Low

Action #12

Coordinate with CT SHPO to conduct historic resource surveys, focusing on areas within natural hazard risk zones (such as flood or wildfire hazard zones and areas near steep slopes), to support identification of vulnerable historic properties and preparation of resiliency plans across the state. This action leverages existing resources and best practices for protection of historic and cultural resources through an ongoing statewide initiative by CT SHPO.

Goal	8. Ensure community character and social equity are addressed in mitigation activities
Category	Property Protection
Lead	Planning, in coordination with SHPO
Cost	\$10,000 - \$25,000
Funding	SHPO
Timeframe	07/2021 - 06/2023
Priority	Low

Action #13

Work with CT DEEP to complete a formal validation of the Repetitive Loss Property list and update the mitigation status of each listed property.

Goal	1. Minimize the impact of natural hazards on physical buildings and infrastructure
Category	Property Protection
Lead	Planning
Cost	\$10,000 - \$25,000
Funding	Town Operating Budget / CT DEEP / DEMHS
Timeframe	07/2021 - 06/2023
Priority	Low



Action #14

Conduct outreach to owners of properties identified as being served by private wells and/or on-site septic systems located within known flood risk zones to educate them about strategies for protecting their properties. Include materials and recommendations for appropriate remediation of private utilities that have been subjected to flooding, for health protection and promotion.

Goal	6. Improve public outreach, education, and warning systems
Category	Education & Awareness
Lead	Emergency Management
Cost	\$10,000 - \$25,000
Funding	Town Operating Budget
Timeframe	01/2021 - 12/2023
Priority	Low












Capitol Region Natural Hazards Mitigation Plan Update




Manchester, Connecticut

Flood Plains, Dams & Critical Facilities




Critical Facilities

-  Fire Station
-  Police Station
-  School
-  Healthcare Facility
-  State Facility
-  Town Facility
-  Waste Water Facility
-  Emergency Center
-  NRHP Buildings/Sites

Dam Hazard Class

-  BB, A, AA OR Unclassified
-  Class B - Significant Hazard
-  Class C - High Hazard

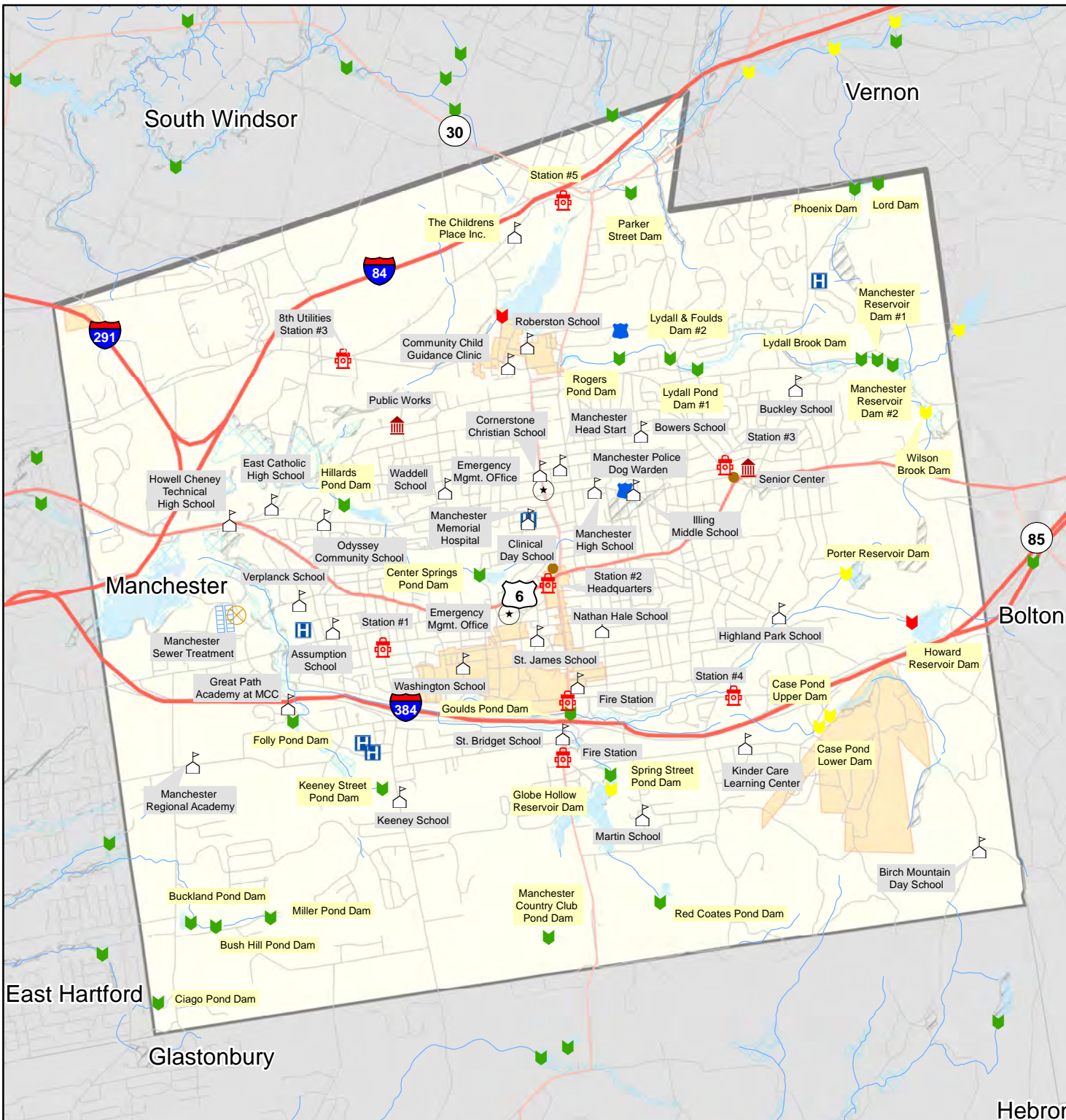
FEMA Flood Hazard Area

-  100 Year Flood Zone
-  500 Year Flood Zone
-  NRHP Districts/Areas

Data Sources: FEMA, National Register of Historic Places, CT DEEP, CRCOG, ESRI



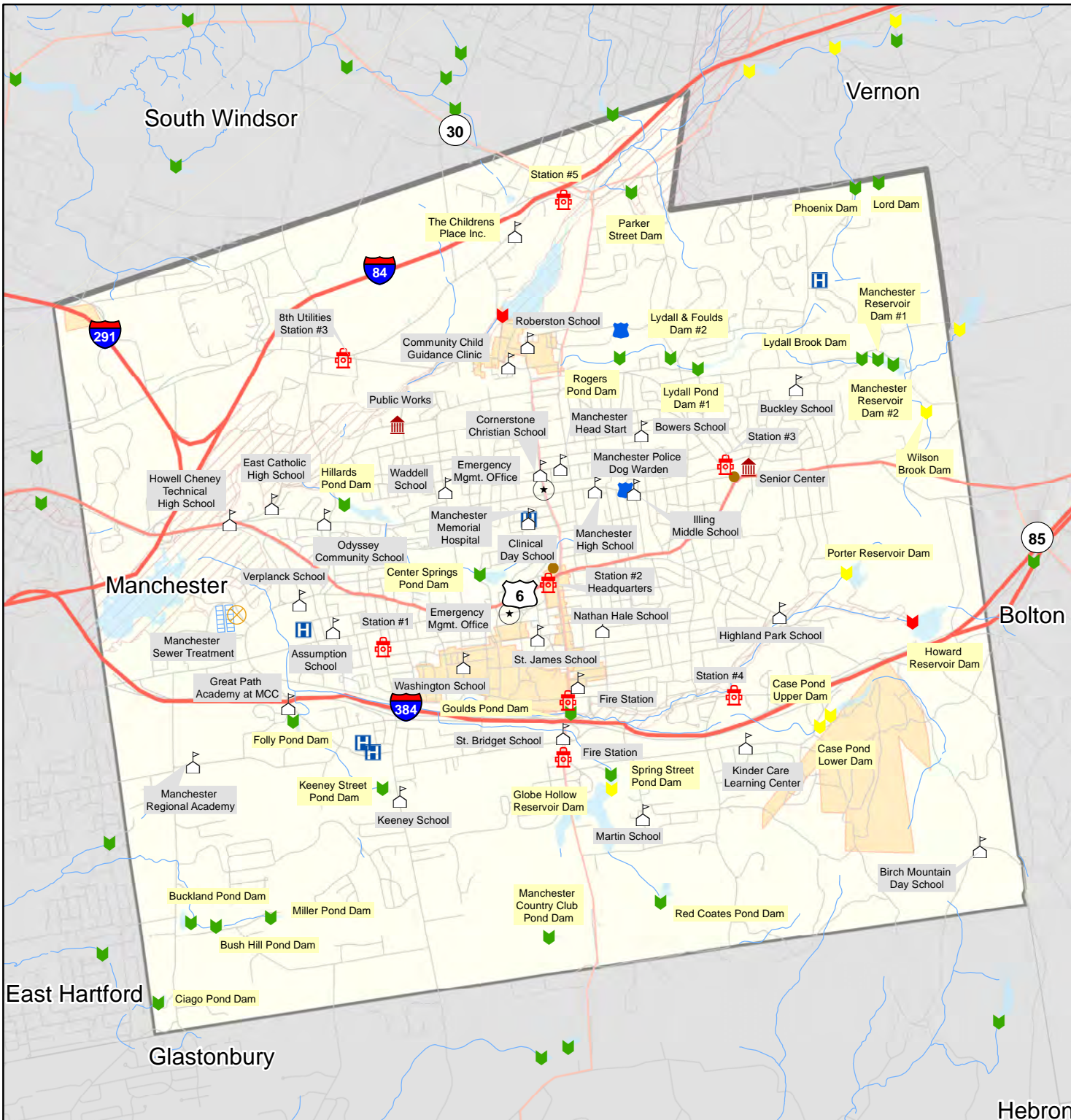
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






Capitol Region Natural Hazards Mitigation Plan Update

Manchester, Connecticut






Dam Breach Inundation Area & Critical Facilities



Critical Facilities

-  Fire Station
-  Police Station
-  School
-  Healthcare Facility
-  State Facility
-  Town Facility
-  Waste Water Facility
-  Emergency Center
-  NRHP Buildings/Sites

Dam Hazard Class

-  BB, A, AA OR Unclassified
-  Class B - Significant Hazard
-  Class C - High Hazard
-  Dam Breach Inundation Areas
-  NRHP Districts/Areas

Data Sources: FEMA, National Register of Historic Places, CT DEEP, CRCOG, ESRI



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20 Mansfield

Community Overview

Mansfield covers 45.7 square miles and has a population of 26,543 (2010 Census). According to the University of Connecticut Center for Land Use Education & Research (UConn CLEAR, 2015) the Town is approximately 64% forested (including deciduous, coniferous, and wetland forest), and is mostly rural with some agriculture. Fourteen percent of Mansfield falls within the UConn CLEAR “developed” category. More information can be found at <https://clear.uconn.edu/>. New residential development is primarily occurring in the vicinity of the University of Connecticut and near Route 6 on the south side of Town.

Water bodies in the Town include: Chapins Pond Dunham Pond, Eagleville Pond, Echo Lake, Hansens Pond, Knowlton Pond, Mansfield Hollow Lake and McLaughlin Pond. Mansfield’s elevation ranges from about 160 feet in the southeast corner of town at the Natchaug River to about 730 feet in the north/northwest section.

Urban densities of population are found in the village of Storrs (home of the main campus of the University of Connecticut) and in southern Mansfield. The number of students living on-campus at the University accounts for 44.3% of the Town’s total population. The largest individual population concentration in town, the University of Connecticut’s Storrs campus had 19,324 undergraduates and 4,306 graduate students enrolled in the Fall 2016 semester. UConn’s housing facilities allow the campus to accommodate over 12,500 students while the university is in session. In 2013 the State announced plans to increase undergraduate enrollment at the Storrs Campus by 5,000 students over ten years; however, enrollment growth has been tempered by budgetary constraints. It is anticipated that as enrollment increases over time, the number of both on and off-campus housing units will grow to meet the new demand. The seasonal increase in population in this area creates an elevated hazard concern. The University’s Police and Fire protection capabilities are comparable to that of a municipality, but given a natural disaster of a large enough scale, the University would require further assistance beyond that which they can provide for themselves. This would likely strain Mansfield’s emergency services, which already have a large geographic area to cover.

Significant new development has been completed or begun on the UConn-Storrs campus since adoption of the former WinCOG’s 2015 Hazard Mitigation Plan Update (“2015 HMP”). None of this new development has occurred in flood or other notable hazard zones. Municipal water service has been extended to the Four-Corners area of Town as part of the community’s efforts to encourage development there, and extension of sewer service is expected to be completed by December 2019. While portions of the Four Corners area are located within the FEMA-mapped special flood hazard area (SFHA) associated with Cedar Swamp Brook, the Town’s Zoning Regulations limit uses in flood zones to agricultural uses, surface parking, and accessory structures – all of which require special permit approval.

Critical Facilities

Critical Facilities throughout the Capitol Region are listed in Appendix B. Critical and important facilities and cultural resources in Mansfield include the Mansfield Fire Department, the UConn Fire Department, a private psychiatric and substance abuse hospital, the resident trooper office, the UConn Police department, nine primary and secondary level schools, six historic districts, historic buildings throughout town, UConn and associated cultural institutions, two elderly concentrations consisting of five housing communities, three retail areas, a public telephone facility, two well fields and associated water treatment facilities, the UConn wastewater treatment plant and reclaimed water plant, UConn’s central utility plant, Holiday Hill camp, a reservoir and water treatment facility owned by Windham, four major manufactured home parks as well as a number of manufactured homes throughout town, numerous apartment buildings that house large populations, several other apartment buildings, and three high hazard/potential loss dams.

Table 20-1: Critical Facilities, Mansfield

Facility	Shelter	Generator
3 Mansfield Fire Department Stations		
University Of Connecticut Fire Department		
Psychiatric and Substance Abuse Hospital		
Resident Trooper Office		
University Of Connecticut Police Department		
Primary and Secondary Schools: 2 Montessori Schools 3 Elementary Schools Middle School High School Reynolds School Natchaug Hospital School		
Historic Resources: Spring Hill District Mansfield Centre District Mansfield Hollow District Gurley Ville District UConn District Mansfield Training School District Old Town Hall Several buildings on UConn Campus Other Buildings Throughout Town		
The University Of Connecticut		
Elderly Concentrations: Mansfield Center For Nursing And Rehabilitation Juniper Hill Elderly Housing Glen Ridge Residential Community Wright’s Way Elderly Housing Jensen’s Rolling Hills Residential Community		
Shopping Areas: Storrs Center East Brook Mall Four Corners Shopping Area		



Facility	Shelter	Generator
Telephone Facility		
Well Fields And Water Treatment Facilities:		
UConn Willimantic River Well Field		
UConn Fenton River Well Field		
UConn Water Storage Facility		
UConn Wastewater Treatment Plant		
UConn Reclaimed Water Plant		
UConn Central Utility Plant		
Holiday Hill Camp		
Reservoir And Water Treatment Facility Owned By Windham		
Major Manufactured Home Parks:		
Jensen's Rolling Hills Residential Community		
Valleyview		
Chaffeeville Road Park		
Burcamp		
Other Manufactured Homes Dispersed Throughout Town		
Large Population Apartment Buildings		
3 High Hazard/Potential Loss Dams		

Capabilities

Hazard mitigation is addressed specifically in Mansfield's Plan of Conservation and Development (POCD). The HMP document itself is cited. POCD actions specifically address natural hazards.

Authorities in the Town of Mansfield who play advisory, supervisory, or direct roles in hazard mitigation for the Town include:

Authorities	Role			Hazard Mitigated
	Advisory	Supervisory	Direct	
Agriculture Committee	X			Drought
Conservation Commission	X			Flooding
Department of Building and Housing Inspection	X		X	All but drought
Department of Public Works	X	X	X	All but drought
Division of Fire and Emergency Services			X	Wildfire
Emergency Management Advisory Council	X			All
Department of Human Services	X		X	All but drought
Office of Emergency Management	X	X	X	All
Office of the Fire Marshal	X		X	Wildfire
Parks & Natural Resources Committee (Previously the Open Space Preservation Committee)	X			Flooding
Planning & Zoning Commission/Inland Wetland Agency	X		X	Flooding
Sustainability Committee	X			Drought & Flood
Town Council		X	X	All
Town Manager		X		All
Department of Planning and Development	X		X	All
Town / University Relations Committee	X			All
Zoning Board of Appeals			X	Flooding
Department of Parks & Recreation	X	X		All



The Town of Mansfield has consistently participated in the National Flood Insurance Program (NFIP) since January 2, 1981. The most recent Flood Insurance Rate Map (FIRM) was published on January 2, 1981. The current Town of Mansfield Flood Insurance Study (FIS) was published July 1980. The original FIS and FIRMs for flooding sources in the Town are based on work completed in March 1978. Many of the local flooding problems are consistent with the floodplains mapped by FEMA.

Mansfield's zoning regulations prohibit construction of new residential or commercial structures within designated flood hazard areas with the exception of agricultural and accessory structures. All proposed structures must meet elevation requirements and strict construction demands. Manufactured (mobile) homes have more stringent requirements. Proposed development in the 1% annual chance flood plain may not alter flood levels. As a result of the limitations imposed by Zoning Regulations no new development has occurred in the floodplain in recent years.

The Town performs monitoring at several bridges that are known to be scour prone (see Challenges section). The Stone Mill Road and Laurel Lane bridges were both replaced between 2011 and 2013, minimizing the potential for damage to those bridges during a flood.

Annual expenses to maintain town-owned dams are incorporated into the annual budget for parks and recreation and public works.

Mansfield follows water conservation orders when they are issued by any of the major utilities in town. UConn enacts significant voluntary and mandatory water conservation measures for its users when drought conditions occur, as referenced in its 2011 Wellfield Management Plan. Several town facilities are connected to the University's water system.

Public fire protection covers a significant percentage of the town's population, though the Fire Department relies on fire ponds and dry hydrants throughout most of the community. Any new public water supply expansion projects include installation of hydrants. The Fire Department maintains ten fire ponds. When a water source is not available near a fire, water is brought to the site by a pumper truck.

The Town provides plowing services through Public Works. The Town also requires locations for snow storage to be considered in the design of parking lots. Eversource, the Town's energy provider, works with the Town's tree warden to remove dangerous trees and branches along power lines. The Town itself has a small line-item in its annual budget to address tree issues on a case-by-case basis. The local electrical utility performed intensive trimming near electrical lines following the severe storms in 2011.

The Town has implemented a reverse 9-1-1 program and notifies the public when a severe storm is approaching. The Town maintains shelter facilities and evaluates the need for supplies



at least annually or following each event. The Town performs debris management through Public Works with the assistance of the local electrical utility when necessary.

New Capabilities

The Town updated its Plan of Conservation and Development in 2015. That plan includes goals, strategies, and actions related to mitigation of natural hazards and is integrated into decision making at multiple levels.

A map modernization effort by FEMA is currently underway for Tolland County, but its full extent, and how much of Mansfield it will cover, is unknown. During development of the East Brook Mall (95 Storrs Road) a portion of Sawmill Brook was moved. FEMA maps are now out of date due to that move, but it is expected that the map modernization effort will address this.

New Low Impact Development (LID) stormwater regulations have been adopted.

Municipal water service has been extended to the Four-Corners area of Town, improving wildfire-response capabilities there. The Town has not found it necessary to require installation of any new cisterns or dry hydrants in the last few years. The Fire Department purchased a water tanker in early summer 2015 at a cost of approximately \$475,000.

The Town has an EAP for the dam at Bicentennial Pond.

Challenges

Challenges Overview

Falling trees and limbs during winter storms, and to a lesser degree from high wind events, are Mansfield's greatest hazards, along with the power outages they cause. An EF0 tornado touched down in Mansfield on October 2, causing some damage. Invasive species, in particular the Emerald Ash Borer, are causing major damage to the Town's trees, exacerbating treefall issues.

Sources of flooding in Mansfield (as noted in the FIS) include Natchaug River, Willimantic River, Mount Hope River, Conantville Brook, Fenton River, Fishers Brook, Eagleville Brook, Cedar Swamp Brook, Nelson Brook and Sawmill Brook. Areas of particular concern include one home on Laurel Lane that becomes isolated during times of high water levels, five homes on Thornbush Road that are isolated or inundated by the Willimantic River approximately once every five years during times of high water, and an area of Bassett Bridge Road in the vicinity of the State boat launch that is closed during times of high water. This latter area is a flood control area managed by the US Army Corps of Engineers and is designed to be flooded, however, traffic is disrupted during these times. Town staff identify Thornbush Road as the most at-risk of flooding area in Town. Inundation of the railroad that runs along the western town line is both an economic concern and, at times, a hazardous material concern.



Mansfield also has six “scour bridges.” The bridges located on Old Turnpike Road, Stonemill Road and Gurleyville Road all cross the Fenton River, while the bridge located on Laurel Lane crosses the Mount Hope River.

The overall risk to Mansfield from dam failure is considered to be low. The failure of any of the three dams in Town classified as significant hazard (Class B), or the three dams classified as high hazard (Class C) could cause serious damage. The Class C dams are the Eagleville Lake, Mansfield Hollow, and Willimantic Reservoir Dams. McLaughlin Pond Dam (Class B) has the potential to damage an important travel route (State Route 89) near Mount Hope, and is a concern for the Town; CT DEEP is currently pursuing action on this dam. Town staff indicate that there has not been any damage to municipal and private structures and infrastructure due to dam failure in recent memory.

The overall risk of Mansfield to drought is considered to be low. Mansfield Fire Department reports that all 10 fire ponds have become unusable at one time or another due to a combination of maintenance issues (sedimentation) and drought conditions. Several residential wells have been re-drilled over the past few years due to running dry, although it was reportedly not conclusive that these events were due to drought.

Only 5% of the town is protected by public fire protection. The Town of Mansfield reports that it does not experience wildfires often. In 2013, 16 wildfires burned approximately five acres total. In 2012, 17 wildfires burned approximately six acres total. In 2011, six burned approximately eight acres total. The Town reports that no wildfires have occurred since 2013.

In addition to historical trends, Mansfield is concerned with the potential impacts of climate change on hazard vulnerability, particularly with regard to severe storms, droughts and wildfire potential.

Hazard Losses

The economic losses faced by the community from natural hazards can be estimated by reviewing historic, and modeling future, loss figures. Loss estimates are summarized below.

Historic FEMA Payments

FEMA reimburses communities for hazard losses through programs including Public Assistance (PA) and the National Flood Insurance Program (NFIP). Combining PA and private flood insurance payments can give an estimate for total losses to a community.

According to FEMA, Mansfield has two severe repetitive loss (SRL) properties and two additional repetitive loss (RL) properties. All of the properties are listed as residential. One of these properties is listed as mitigated. According to the Town, this property was elevated through a severe repetitive loss grant. The two SRL properties and the two RL properties are all located in the 1% annual chance floodplain of the Willimantic River. The two SRL properties have reported 22 losses with an average payment of \$20,300 per loss. The two RL properties have reported seven losses with an average payment of \$6,500 per loss. The total payments to



SRL and RL properties for the 29 losses totals \$492,086. In total, the NFIP has paid \$678,775 to properties in Mansfield as a result of 38 flood loss claims.

Total PA reimbursements to the community were as follows:

- Flood Events: \$59,848 (\$3,150 annually)
- Hurricane Events: \$199,711 (\$10,511 annually)
- Winter Storm Events: \$2,183,372 (\$114,914 annually)

These are summarized in the tables below.

Table 20-2: Flood Event PA Reimbursements, Mansfield

Incident	Oct 2005
Declaration	12/16/2005
Disaster No.	1619
Entity	FEMA PA Reimbursement
State	\$3,859
Municipal	\$55,989
Nonprofit	\$0
Total	\$59,848
Annualized	\$3,150

Table 20-3: Hurricane Wind Event PA Reimbursements, Mansfield

Incident	Aug - Sep 2011 (T.S. Irene)	Oct - Nov 2012 (Storm Sandy)
Declaration	9/2/2011	10/30/2012
Disaster #	4023	4087
Entity	FEMA PA Reimbursement	
State	\$12,106	\$13,365
Municipal	\$99,983	\$74,257
Nonprofit	\$0	\$0
Total	\$112,089	\$87,622
Annualized	\$5,899	\$4,612



Table 20-4: Winter Storm PA Reimbursements, Mansfield

Incident	Mar 2003	Dec 2003	Jan 2005	Feb 2006	Jan 2011	Oct 2011	Feb 2013	Jan 2015
Declaration	3/11/03	1/15/04	2/17/05	5/2/06	3/3/11	11/17/11	3/21/13	4/8/15
Disaster #	3176	3192	3200	3266	1958	4046	4106	4213
Entity	FEMA PA Reimbursement							
State	\$26,950	\$27,877	\$42,495	\$38,094	\$48,126	\$30,377	\$47,917	\$79,975
Municipal	\$21,402	\$30,501	\$30,378	\$26,250	\$41,629	\$88,135	\$67,095	\$102,464
Nonprofit	\$125,204	\$87,962	\$176,336	\$113,829	\$301,810	\$0	\$0	\$628,567
Total	\$173,556	\$146,340	\$249,209	\$178,172	\$391,564	\$118,512	\$115,012	\$811,006
Annualized	\$9,135	\$7,702	\$13,116	\$9,377	\$20,609	\$6,237	\$6,053	\$42,685

National Centers for Environmental Information Losses

The table below summarizes events in the National Centers for Environmental Information (NCEI) severe storm database that were specifically noted as having impacted the community since 2012.

Table 20-5: NCEI Database Losses since 2012, Mansfield

Date	Event	Property Damage
6/22/2012	Thunderstorm Wind	\$0
8/15/2012	Lightning	\$0
9/18/2012	Thunderstorm Wind	\$5,000
7/10/2013	Tornado	\$17,000
7/27/2014	Hail	\$5,000
7/27/2014	Hail	\$10,000
8/25/2015	Flood	\$0
6/27/2017	Hail	\$0
Total Thunderstorm		\$37,000
Total Flood		\$0

The NCEI database also reports one loss of life caused by lightning during the 8/15/2012 event.

Losses under other event categories (such as drought, high wind, flooding, and winter storms) were not specifically noted as impacting this community, though they did impact Tolland County and nearby towns. NCEI losses are reported in Section II of this Plan.

HAZUS-MH Losses

CRCOG used FEMA’s Hazus-MH model to analyze the risks that the community might face from flooding, hurricanes, and earthquakes. The model estimates economic losses to the town due to damage to buildings and building contents, as well as other economic disruptions. Both residential and commercial structures are addressed. Losses from different hazards are summarized below.



Table 20-6: Estimated Damages to Mansfield from a 1% Annual-Chance Flood

Loss Type	2018 Results
Households Displaced	135
People Needing Shelter	92
Buildings at Least Moderately Damaged	0
Economic Losses	
Residential Building & Content Losses	\$11,312,361
Other Building & Content Losses	\$18,543,474
Total Building & Content Loss	\$29,855,835
Total Business Interruption Losses	\$669,311
TOTAL	\$30,525,146

Table 20-7: Estimated Damages to Mansfield from a 1% Annual-Chance Hurricane

Loss Type	2018 Results (1% track)
Buildings at Least Moderately Damaged	1
Buildings Completely Damaged	0
Total Debris Generated (tons)	19,261
Truckloads (at 25 tons/truck) of building debris	770
Economic Losses	
Residential Building & Content Losses	\$14,919,039
Other Building & Content Losses	\$400,044
Total Building & Content Loss	\$15,319,083
Total Business Interruption Losses	\$578,158
TOTAL LOSSES	\$15,897,241

Losses were calculated from a modeled probabilistic earthquake (1% annual-chance of occurrence), as well as for four specific scenarios with epicenters around Connecticut.

Table 20-8: Estimated Damages to Mansfield from a Probabilistic Earthquake

Loss Type	2018 Results
Wage Loss	\$2,796
Rent Loss	\$4,589
Relocation Loss	\$4,925
Income Loss	\$2,060
Inventory Loss	\$96
Total Business Disruption	\$14,466
Structural Loss	\$13,802
Non-Structural Loss	\$38,651
Total Building Loss	\$52,453
Total Content Loss	\$12,480
TOTAL LOSSES	\$79,399



Table 20-9: Estimated Damages to Mansfield from Modeled Earthquake Scenarios

Epicenter Location	Magnitude	Estimated Total Losses
East Haddam	6.4	\$675,079.93
Haddam	5.7	\$87,234.50
Portland	5.7	\$101,439.03
Stamford	5.7	\$6,692.15

Other Hazard Costs

The Town estimates the cost to dredge and increase capacity of an individual fire pond to withstand drought conditions to range between \$2,000 to over \$10,000 depending on site-specific conditions. Town officials also note that economic losses due to a drought can be significant in Mansfield given the amount of agricultural land; this includes a local dairy farm and bottling plant that would be significantly impacted by a drought.

Town staff report that wildfires cost the Mansfield Fire Department approximately \$2,000 per acre affected in terms of personnel, apparatus, and equipment.

The Town of Mansfield reports that the cost to respond to a downed branches incident could be several thousand dollars depending on the scale of the event. The Town of Mansfield reports that the cost to respond to the July 10, 2013 EF-1 tornado was \$11,900.

Average Annualized Losses

Average Annualized Loss (AAL) figures are useful tools for comparison of the risks faced from different hazards with different likelihoods of occurring in a given time period. AAL estimates were prepared for the community based on the methodologies discussed in Section II of the Multi-Jurisdictional HMP. Dam failure, drought, tornado, and wildfire losses were sourced from the 2014 Connecticut Natural Hazard Mitigation Plan Update, with dam failure data supplemented by the National Performance of Dams Program and the Connecticut Department of Energy & Environmental Protection. Earthquake and hurricane losses were calculated in HAZUS-MH. Losses for flooding came from NFIP claims, for winter storms from Public Assistance Reimbursements, and for thunderstorms from the NCEI database. These are presented in the table below in dollars per year. Note that Hurricanes and Tropical Storms represent the largest share of total annualized losses.

Table 20-10: Average Annualized Losses, Mansfield

Dam Failure	Drought	Earthquakes	Flooding	Hurricanes and Tropical Storms	Severe Winter Storms	Thunderstorms	Tornadoes	Wildfires	Total
\$1,631	\$0	\$79,399	\$21,012	\$1,798,723	\$114,914	\$9,662	\$7,713	\$5,852	\$2,038,908



Losses Summary

A review of the above loss estimates demonstrates that the Town of Mansfield has experienced significant expenses as a result of natural hazards, and is at risk for additional losses if some of the less-frequent events were to occur. These actual and potential losses justify hazard mitigation actions to reduce losses in the future.

Mitigation Strategies and Actions

Noted Hazard Mitigation Needs

During the course of this Plan development, multiple hazard mitigation needs of Mansfield were noted, including:

- Mansfield is interested in micro-grids for critical facilities around Town Hall
- The Town’s budget for tree maintenance has not increased since the previous Plan, and Town personnel cite a lack of funding as impairing its urban forestry efforts.
- The Town is concerned about the state of the McLaughlin Pond dam and the risk it poses to State Route 89.

Status of Previous Mitigation Strategies and Actions

The Town of Mansfield reviewed the mitigation actions proposed in the 2015 HMP and determined the status of each. That information is included in the table below.

Table 20-11: Status of Previous Mitigation Strategies and Actions, Mansfield

Action #	Action	Notes	Status
GOAL: TO REDUCE THE LOSS OF LIFE AND PROPERTY AND ECONOMIC CONSEQUENCES AS A RESULT OF NATURAL DISASTERS.			
Objective 1: To reduce the likelihood of flooding by improving existing natural and artificial drainage systems.			
1.1	Develop a list of quick-filling catch basins with low silt capacity for placement on a priority list for monitoring and more frequent cleaning.	Town no longer uses sand due to MS4 regulations, so catch-basin clogging is no longer a significant issue.	Drop
1.2	Purchase or rehabilitate Vac-all equipment for silt removal. (2013 Cost Estimate: \$150,000)	Equipment purchased with the Town of Coventry, is shared between the two towns.	Complete
1.3	Adopt new regulations requiring greater use of Green Infrastructure and Low Impact Development (LID) stormwater management practices.	Completed and adopted	Complete
1.4	Incorporate LID stormwater management practices into town projects as funding allows.	Yes, now done regularly following adoption of regulations noted above.	Capability
Objective 2: To reduce the likelihood of flooding by improving road, bridge and dam conditions.			
2.1	Improve north side of Bassetts Bridge Road west of the bridge crossing the Naubesatuck Lake; this section of road is frequently washed out in high water events. (2013 Cost Estimate: \$250,000)	Not yet completed due to limited funds.	Carry Forward



Action #	Action	Notes	Status
2.2	Prepare Emergency Operations Plans (EOPs) for Town-owned and maintained dams.	Action currently underway: Town is updating EOPs for Town-owned dams to EAPs, is also looking at private dams.	Carry Forward
2.3	Implement recommendations resulting from inspections of Town-owned dams.	Delayed until EAPs complete.	Carry Forward
2.4	Encourage owners of private dams to develop EOPs and share with Town.	This action is currently underway.	Carry Forward with Revisions
2.5	Encourage owners of private dams to implement recommendations resulting from dam inspections.	This action is currently underway.	Carry Forward with Revisions
2.6	Advocate for federal and state agencies to allow dam repair as eligible grant activity for properties acquired by the Town for open space purposes.	Town no longer pursued acquisition of open space that includes a dam due to liability. Town does not feel it is productive to advocate for this change at this time.	Drop
Objective 3: To reduce the likelihood of flooding, evaluate property prone to flooding.			
3.1	Consider acquiring property on Laurel Lane that is isolated during flooding events.	An undersized bridge has been upsized to alleviate the flood problem at this site and isolation is no longer a problem.	Drop
3.2	Continue to monitor and work with property owners of five homes on Thornbush Road for possibilities to eliminate risk, including potential use of FEMA grants (these homes are in the flood zone and at times become inundated during high water events).	Town explored FEMA grants but found none were available. One mobile home in the floodway was removed, but property is still privately-owned and the structure may be replaced. There are three additional mobile homes in the floodway.	Carry Forward with Revisions
3.3	Monitor and evaluate areas on Higgins Highway (Route 31) that have flooded during large events for possible mitigation actions.	No significant flooding has occurred in these areas since the previous HMP.	Carry Forward
3.4	Continue to update zoning regulations for flood hazard areas to reflect best practices.	Work is continuing on amendments to existing regulations. Carry forward within "Zoning Clean-Up" action.	Carry Forward with Revisions
Objective 4: Reduce the amount of debris from severe storms through preventative tree maintenance.			
4.1	Develop public education programming with regard to tree planting and maintenance on private property.	Program not yet started due to budget and staff limitations.	Carry Forward
4.2	Update regulations to encourage use of native species and reflect best practices in hazard mitigation.	Action in progress as part of regulation amendments listed above. Carry forward within "Zoning Clean-Up" action.	Carry Forward with Revisions
4.3	Continue to require underground installation of new utility lines in new subdivisions and encourage property owners to work with utility companies to explore possibilities for undergrounding existing lines.	Town continues to implement this action. Property owners are also doing this on their own, motivated by past outages.	Capability



Action #	Action	Notes	Status
Objective 5: Expand activities related to emergency preparedness and improve natural hazard response capabilities.			
5.1	Ensure that the emergency shelters have adequate supplies to respond to natural emergencies.	Emergency shelters are regularly restocked. This is a capability	Capability
5.2	Continue to work with state and local partners for regional shelter planning and emergency response.	This is performed as part of the Town's standard operations. This is a capability	Capability
5.3	Acquire and install generators at critical local facilities (2013 Cost Estimate: \$125,000 for two facilities).	Generators have been installed at all critical facilities.	Complete
5.4	Improve and expand the Town's GIS system to assist town personnel in the event of an emergency of natural disaster. (Estimated Annual Cost: \$50,000)	Fire Department has mapped all dry hydrants, but additional work is needed.	Carry Forward
5.5	Continue to improve communication technologies and efficiencies between the Emergency Operations Center (EOC) and other services including the University of Connecticut	This is an ongoing effort. This is a capability	Capability
5.6	Use various communication technologies including social media, town website, government access channel and standard media to educate and inform the public on how to prepare and respond to hazards and emergencies and to encourage them to be prepared to help others in need.	This is part of the Town's standard operations. This is a capability	Capability
5.7	Maintain working relationships with utility companies to coordinate planning, response and recovery efforts.	This is performed as part of the Town's standard operations. This is a capability	Capability
5.8	Make available literature on natural disasters and preparedness at Town Hall and the Library	Not yet complete due to staff and budget limitations.	Carry Forward
5.9	Make available information on natural disasters and preparedness on the Town's website with links to state and federal resources.	Not yet complete due to staff and budget limitations.	Carry Forward
5.10	Consider creation of microgrids that can be disconnected from the main power grid that utilize renewable energy sources such as for the Town Hall, Community Center, and E.O. Smith High School which are important for storm recovery and shelter operations	Town is interested in creating a microgrid that encompasses critical facilities near Town Hall, including the Town Offices, Public Works garage, and the Library	Carry Forward with Revisions
Objective 6: Whenever practical, incorporate natural hazard mitigation strategies into existing town projects and programs.			
6.1	Monitor best practices with regard to sustainable and resilient design and incorporate into town projects when feasible.	This is a capability, as the Town considers best practices as it regularly updates its regulations. New LID standards adopted for stormwater management.	Capability



Action #	Action	Notes	Status
Objective 7: To reduce the likelihood of wildfire hazards by improving water availability and managing combustible materials.			
7.1	Identify places in need, throughout town, and add alternative water sources. (2013 Estimated Cost: \$4,000/dry hydrant)	Municipal water service has been extended since the previous Plan. Town staff believe current alternative water sources are sufficient. Future actions should be to conduct a study to identify potential wildfire-fighting needs.	Carry Forward with Revisions
7.2	Encourage developers to install water sources for fire protection and explore potential for a water source ordinance.	No new cisterns or dry hydrants have been installed since the previous Plan. Town does and will continue to encourage installation of fire protection through education and collaboration with developers. This is a capability. Additionally carry forward "water source ordinance" within "Zoning Clean-Up" action.	Carry Forward with Revisions
7.3	Educate property owners on vegetation clearing techniques that will reduce water runoff and reduce the amount of combustible fuel.	Not yet complete due to staff and budget limitations.	Carry Forward with Revisions
Objective 8: To minimize the impacts of droughts.			
8.1	Develop a public education program encouraging water conservation.	Not yet complete due to staff and budget limitations. UConn has a water usage alert system; Town should consider piggy backing.	Carry Forward with Revisions
8.2	Adopt water use restrictions during drought periods for public water supply customers based on stream flow conditions.	Not yet complete due to staff and budget limitations.	Carry Forward
Objective 9: To minimize the impacts of major winter storms.			
9.1	Develop communication strategy to better inform public of parking restrictions during snow events.	Town completed this action but the communication strategy requires an update. Facebook, website, and Code-Red Reverse 911 should be used.	Carry Forward with Revisions
9.2	Establish protocols for evaluation of snow loads on Town buildings.	Not yet complete due to staff and budget limitations.	Carry Forward
9.3	Consider snow storage needs when updating street design specifications	Not yet complete due to staff and budget limitations. Carry forward within "Zoning Clean-Up" action.	Carry Forward with Revisions

Active Mitigation Strategies and Actions

The Town proposed to initiate several new mitigation actions for the upcoming five years. Additionally, a number of actions from the previous planning period are being carried forward or replaced with revised actions. These are listed below.

Each of the following actions has been prioritized based on FEMA guidelines, listed from highest to lowest priority, and numbered.



Action #1

Encourage owners of private dams to develop EAPs and share with Town.

Goal	3. Improve institutional awareness and understanding of natural hazard impacts and mitigation within municipal governments and other decision-making bodies
Category	Preparedness & Emergency Response
Lead	Emergency Management
Cost	\$0 - \$10,000
Funding	Town Operating Budget
Timeframe	01/2019 - 12/2019
Priority	High

Action #2

Encourage owners of private dams to implement recommendations resulting from dam inspections.

Goal	3. Improve institutional awareness and understanding of natural hazard impacts and mitigation within municipal governments and other decision-making bodies
Category	Preparedness & Emergency Response
Lead	Emergency Management
Cost	\$0 - \$10,000
Funding	Town Operating Budget
Timeframe	01/2019 - 12/2019
Priority	High

Action #3

Establish protocols for evaluation of snow loads on Town buildings.

Goal	1. Minimize the impact of natural hazards on physical buildings and infrastructure
Category	Preparedness & Emergency Response
Lead	Public Works
Cost	\$0 - \$10,000
Funding	Town Operating Budget
Timeframe	01/2019 - 12/2019
Priority	High



Action #4

Complete zoning regulation "clean up" to reflect hazard mitigation best practices. Address issues including potential cistern & dry hydrant requirements in new subdivisions, use of native species, and snow storage needs for streets.

Goal	2. Ensure Municipal Codes and Regulations support hazard mitigation
Category	Prevention
Lead	Planning
Cost	\$10,000 - \$25,000
Funding	Town Operating Budget
Timeframe	01/2019 - 12/2020
Priority	High

Action #5

Evaluate areas on Higgins Highway (Route 31) that have flooded during large events for possible mitigation actions.

Goal	1. Minimize the impact of natural hazards on physical buildings and infrastructure
Category	Prevention
Lead	Public Works
Cost	\$25,000 - \$50,000
Funding	Town Operating Budget / Grants / DEMHS
Timeframe	01/2020 - 12/2020
Priority	High

Action #6

Implement recommendations resulting from inspections of Town-owned dams.

Goal	5. Improve the resilience of local and regional utilities and infrastructure using strategies including adaptation, hardening, and creating redundancies.
Category	Structural Projects
Lead	Public Works
Cost	More than \$100,000
Funding	Grants / CT DEEP
Timeframe	07/2022 - 06/2023
Priority	High



Action #7

Improve north side of Bassetts Bridge Road west of the bridge crossing the Naubesatuck Lake; this section of road is frequently washed out in high water events. (2013 Cost Estimate: \$250,000).

Goal	5. Improve the resilience of local and regional utilities and infrastructure using strategies including adaptation, hardening, and creating redundancies.
Category	Structural Projects
Lead	Public Works
Cost	More than \$100,000
Funding	Grants
Timeframe	07/2022 - 06/2023
Priority	High

Action #8

Conduct outreach to local small businesses with the aim of preventing the accidental release and pollution from chemicals stored and used at their facilities during or following natural hazard events.

Goal	6. Improve public outreach, education, and warning systems
Category	Education & Awareness
Lead	Planning, in coordination with DEEP
Cost	\$0 - \$10,000
Funding	Materials & Resources Provided by CT DEEP
Timeframe	01/2019 - 12/2019
Priority	Medium

Action #9

Coordinate with NEMO and CRCOG to share resources and gain technical support for hazard mitigation actions involving stormwater management and public outreach, which have parallel benefits related to MS4 stormwater permit compliance.

Goal	1. Minimize the impact of natural hazards on physical buildings and infrastructure
Category	Prevention
Lead	Public Works
Cost	\$0 - \$10,000
Funding	Town Operating Budget
Timeframe	01/2020 - 12/2020
Priority	Medium



Action #10

Make available information on natural disasters and preparedness on the Town's website with links to state and federal resources.

Goal	6. Improve public outreach, education, and warning systems
Category	Education & Awareness
Lead	Emergency Management
Cost	\$0 - \$10,000
Funding	Town Operating Budget
Timeframe	01/2020 - 12/2020
Priority	Medium

Action #11

Make available literature on natural disasters and preparedness at Town Hall and the Library.

Goal	6. Improve public outreach, education, and warning systems
Category	Education & Awareness
Lead	Emergency Management
Cost	\$0 - \$10,000
Funding	Town Operating Budget
Timeframe	01/2020 - 12/2020
Priority	Medium

Action #12

Participate in EMI courses or the seminars and annual conference held by the Connecticut Association of Flood Managers.

Goal	3. Improve institutional awareness and understanding of natural hazard impacts and mitigation within municipal governments and other decision-making bodies
Category	Education & Awareness
Lead	Planning
Cost	\$0 - \$10,000
Funding	Town Operating Budget
Timeframe	07/2019 - 06/2024
Priority	Medium



Action #13

Conduct outreach efforts to educate and train residents on individual actions they can take to prepare for, survive, and recover from disaster events.

Goal	6. Improve public outreach, education, and warning systems
Category	Education & Awareness
Lead	Emergency Management
Cost	\$10,000 - \$25,000
Funding	Town Operating Budget
Timeframe	07/2020 - 06/2022
Priority	Medium

Action #14

Install an emergency generator at the Public Library.

Goal	7. Improve the emergency response capabilities of the region and its communities
Category	Preparedness & Emergency Response
Lead	Emergency Management
Cost	\$10,000 - \$25,000
Funding	Town Operating Budget / DEMHS
Timeframe	07/2020 - 06/2022
Priority	Medium

Action #15

Develop a list of best practices with regard to sustainable and resilient design to be incorporated into town projects when feasible.

Goal	1. Minimize the impact of natural hazards on physical buildings and infrastructure
Category	Prevention
Lead	Planning
Cost	\$10,000 - \$25,000
Funding	Town Operating Budget
Timeframe	01/2020 - 12/2022
Priority	Medium

Action #16

Develop communication strategy to better inform public of parking restrictions during snow events. Use Facebook, Website and Code Red Reverse 911.

Goal	6. Improve public outreach, education, and warning systems
Category	Preparedness & Emergency Response
Lead	Emergency Management
Cost	\$10,000 - \$25,000
Funding	Town Operating Budget
Timeframe	01/2020 - 12/2022
Priority	Medium



Action #17

Conduct a wildfire vulnerability and needs assessment to guide construction of additional dry hydrants and/or cisterns.

Goal	4. Increase the use of natural, "green," or "soft" hazard mitigation measures, such as open space preservation and green infrastructure.
Category	Prevention
Lead	Fire Department
Cost	\$25,000 - \$50,000
Funding	Town Operating Budget / Grants / CT DEEP
Timeframe	07/2021 - 06/2023
Priority	Medium

Action #18

Complete preparation of EAPs for Town-owned and maintained dams, as well as private ones where applicable.

Goal	7. Improve the emergency response capabilities of the region and its communities
Category	Preparedness & Emergency Response
Lead	Emergency Management
Cost	\$50,000 - \$100,000
Funding	Town Operating Budget / Grants
Timeframe	01/2023 - 12/2024
Priority	Medium

Action #19

Contact the owners of Repetitive Loss Properties and nearby properties at risk to inquire about mitigation undertaken and suggest options for mitigating flooding in those areas. This should be accomplished with a letter directly mailed to each property owner.

Goal	1. Minimize the impact of natural hazards on physical buildings and infrastructure
Category	Property Protection
Lead	Planning
Cost	\$0 - \$10,000
Funding	Town Operating Budget / DEMHS
Timeframe	07/2021 - 06/2022
Priority	Low



Action #20

Monitor catch basins to determine whether switch away from sand has had an impact on basin filling.

Goal	4. Increase the use of natural, "green," or "soft" hazard mitigation measures, such as open space preservation and green infrastructure.
Category	Prevention
Lead	Public Works
Cost	\$0 - \$10,000
Funding	Town Operating Budget
Timeframe	07/2021 - 06/2022
Priority	Low

Action #21

Seek Certification within the Sustainable CT program and make progress with the hazard mitigation goals associated with SustainableCT certified actions.

Goal	4. Increase the use of natural, "green," or "soft" hazard mitigation measures, such as open space preservation and green infrastructure.
Category	Natural Resources Protection
Lead	Planning
Cost	\$0 - \$10,000
Funding	Town Operating Budget
Timeframe	07/2021 - 06/2022
Priority	Low

Action #22

Work with CT DEEP to complete a formal validation of the Repetitive Loss Property list and update the mitigation status of each listed property.

Goal	1. Minimize the impact of natural hazards on physical buildings and infrastructure
Category	Property Protection
Lead	Planning
Cost	\$10,000 - \$25,000
Funding	Town Operating Budget / CT DEEP / DEMHS
Timeframe	07/2021 - 06/2023
Priority	Low



Action #23

Develop public education programming with regards to tree planting and maintenance on private property.

Goal	6. Improve public outreach, education, and warning systems
Category	Education & Awareness
Lead	Public Works
Cost	\$10,000 - \$25,000
Funding	Town Operating Budget / Grants
Timeframe	07/2021 - 06/2023
Priority	Low

Action #24

Coordinate with CT SHPO to conduct historic resource surveys, focusing on areas within natural hazard risk zones (such as flood or wildfire hazard zones and areas near steep slopes), to support identification of vulnerable historic properties and preparation of resiliency plans across the state. This action leverages existing resources and best practices for protection of historic and cultural resources through an ongoing statewide initiative by CT SHPO.

Goal	8. Ensure community character and social equity are addressed in mitigation activities
Category	Property Protection
Lead	Planning, in coordination with SHPO
Cost	\$10,000 - \$25,000
Funding	SHPO
Timeframe	07/2021 - 06/2023
Priority	Low

Action #25

Develop a public education program encouraging water conservation that utilizes UConn water usage alerts.

Goal	6. Improve public outreach, education, and warning systems
Category	Education & Awareness
Lead	Public Works
Cost	\$10,000 - \$25,000
Funding	Town Operating Budget / Grants
Timeframe	01/2021 - 12/2023
Priority	Low



Action #26

Educate property owners on vegetation clearing techniques that will reduce water runoff and reduce the amount of combustible fuel.

Goal	6. Improve public outreach, education, and warning systems
Category	Education & Awareness
Lead	Public Works
Cost	\$10,000 - \$25,000
Funding	Town Operating Budget
Timeframe	01/2021 - 12/2023
Priority	Low

Action #27

Explore the feasibility of developing a microgrid that encompasses some or all of the following: Town Hall, Community Center, E.O. Smith High School, Library, Town Garage.

Goal	5. Improve the resilience of local and regional utilities and infrastructure using strategies including adaptation, hardening, and creating redundancies.
Category	Structural Projects
Lead	Public Works
Cost	\$25,000 - \$50,000
Funding	Grants / CT DEEP
Timeframe	07/2023 - 06/2024
Priority	Low

Action #28

Improve and expand the Town's GIS system to assist town personnel in the event of an emergency of natural disaster.

Goal	7. Improve the emergency response capabilities of the region and its communities
Category	Preparedness & Emergency Response
Lead	Planning
Cost	\$50,000 - \$100,000
Funding	Town Operating Budget / Grants
Timeframe	01/2024 - 12/2024
Priority	Low














Capitol Region Natural Hazards Mitigation Plan Update




Mansfield, Connecticut

Flood Plains, Dams & Critical Facilities




Critical Facilities

-  Fire Station
-  Police Station
-  School
-  Healthcare Facility
-  State Facility
-  Town Facility
-  Waste Water Facility
-  Emergency Center
-  NRHP Buildings/Sites

Dam Hazard Class

-  BB, A, AA OR Unclassified
-  Class B - Significant Hazard
-  Class C - High Hazard

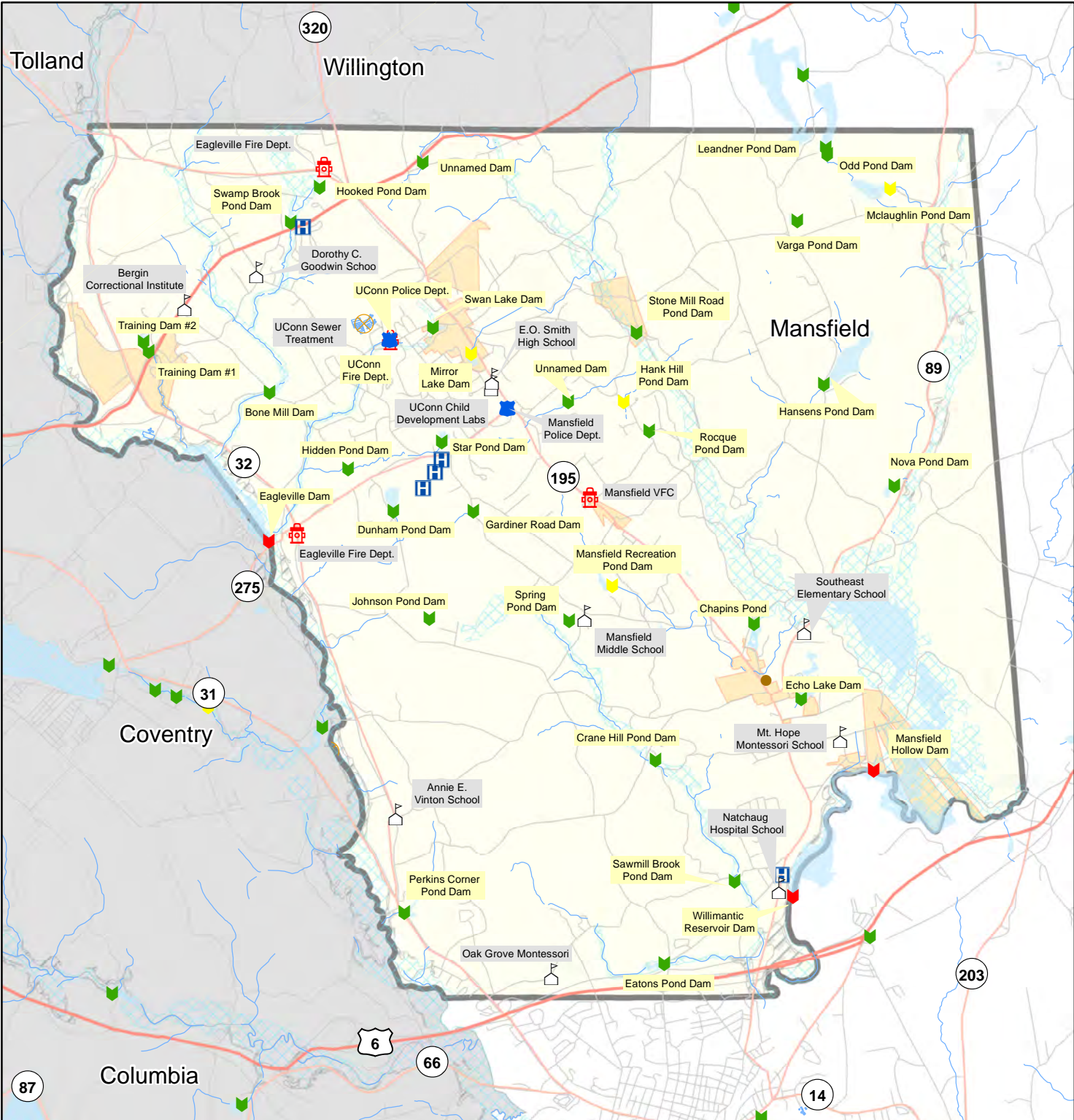
FEMA Flood Hazard Area

-  100 Year Flood Zone
-  500 Year Flood Zone
-  NRHP Districts/Areas

Data Sources: FEMA, National Register of Historic Places, CT DEEP, CRCOG, ESRI



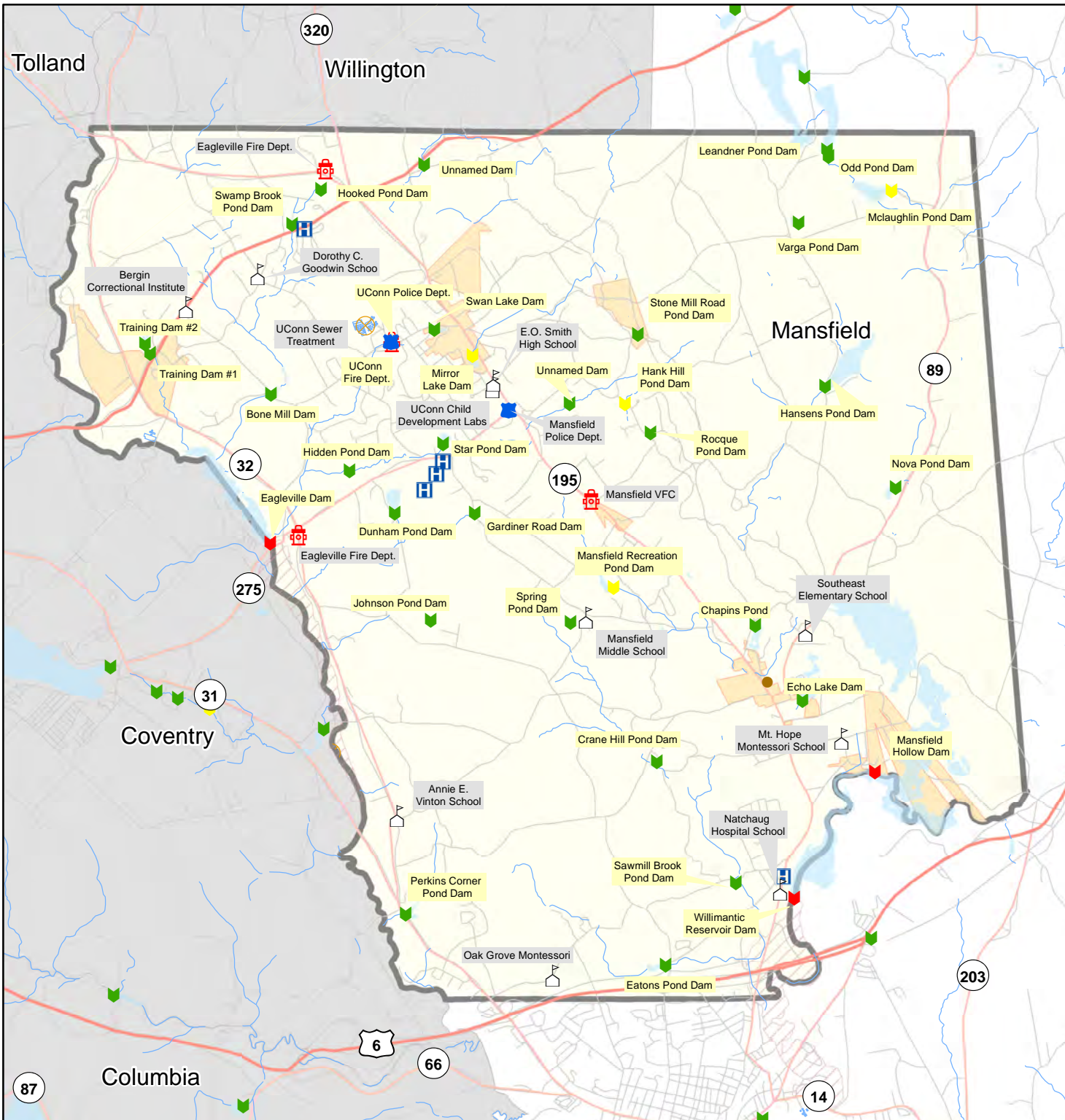
99 Realty Drive Cheshire, CT 06410
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






Capitol Region Natural Hazards Mitigation Plan Update

Mansfield, Connecticut






Dam Breach Inundation Area & Critical Facilities



Critical Facilities

-  Fire Station
-  Police Station
-  School
-  Healthcare Facility
-  State Facility
-  Town Facility
-  Waste Water Facility
-  Emergency Center
-  NRHP Buildings/Sites

Dam Hazard Class

-  BB, A, AA OR Unclassified
-  Class B - Significant Hazard
-  Class C - High Hazard
-  Dam Breach Inundation Areas
-  NRHP Districts/Areas

Data Sources: FEMA, National Register of Historic Places, CT DEEP, CRCOG, ESRI



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21 Marlborough

Community Overview

Marlborough is a rural community in Hartford County covering a land area of 23.3 square miles and with an estimated population of 6,410. Elevation ranges from about 160 to 800 feet. The Town is located in the Salmon River Watershed. The Blackledge River, Dickinson Creek, and Fawn and Lyman Brooks are the principal watercourses in Marlborough. The 83 acre spring fed Lake Terramuggus is located in the center of Town. State routes 2 and 66 intersect in Town. As a chiefly residential community, local businesses are the predominant industry. According to the Town’s Plan of Conservation and Development, one-third of Marlborough’s land area is protected forest land. Continued protection of the Town’s natural resources is a focus of the Town’s Plan.

There has been no significant development or changes in population trends since adoption of the 2014-2019 Capitol Region Natural Hazards Mitigation Plan Update (“2014 HMP”). Minor developments and improvements have not taken place in the floodplain or other notable hazard areas.

Critical Facilities

Critical Facilities throughout the Capitol Region are listed in Appendix B. In Marlborough these include the Town hall and Fire House #2.

Table 21-1: Critical Facilities, Marlborough

Facility	Shelter	Generator
Town Hall		X
Fire House #2		

A new generator was installed in the Town Hall since the 2014 HMP. Marlborough is currently evaluating Fire House #2 as a potential emergency shelter site.

Marlborough currently uses Hebron’s RHAM High School and Regional Health Districts as regional shelters

Capabilities

Hazard mitigation is incorporated into Marlborough’s Plan of Conservation and Development (POCD). POCD actions specifically address natural hazards, including flood, wildfire, and erosion. Marlborough has Low Impact Development (LID) regulations designed to help minimize stormwater runoff. It is implementing new MS4 stormwater requirements.

There are about one dozen dry-hydrants throughout Town. Only the Town Center is served by public water, but no fire hydrants are included.

The Town's local budget for tree maintenance is \$10,000 per year. Due to devastation of Gypsy Moths and recent severe wind events on the white oak trees, Marlborough anticipates spending \$100,000 in tree removal during 2018 and 2019. The Town and Eversource collaborate regularly and effectively on tree maintenance.

New Capabilities

A culvert on an unnamed brook under South main Street has been upgraded since the 2014 HMP. Marlborough has also submitted permits for replacement of twin 48-inch diameter corrugated metal culverts on Finley Hill Road at Flat Brook with twin 7- by 5-foot precast concrete box culverts. The project was approved by DEEP, is in progress, and is expected to be completed by October 15, 2018.

Two bridges in Town are being improved, with new construction under design; these are Jones Hollow Bridge, over the Blackledge River, and South Main Street Bridge, over the Fawn Brook. Construction is slated for 2020-2022. The bridge decks of the North Main Street Bridge have recently been replaced.

The Marlborough Fire Department recently upgraded its brush-response vehicle.

Marlborough has hired a new Emergency Management Director (EMD) and Deputy EMD. The Deputy EMD is responsible for developing a local Community Emergency Response Team (CERT). Both the EMD and Deputy EMD are attending a CT DEMHS sponsored CERT trainer course in September 2018. Marlborough is currently served by a regional CERT team covering Hebron, Andover, and Marlborough; this team includes Marlborough residents.

Challenges

Challenges Overview

Storm damage to trees resulting in road blockages, power outages and debris accumulation is a concern for the town.

Because the Town has large tracts of forested land, wildfire is another concern; however the Town does not experience wildfires often.

Hazard Losses

The economic losses faced by Marlborough from natural hazards can be estimated by reviewing historic, and modeling future, loss figures. Loss estimates are summarized below.

Historic FEMA Payments

FEMA reimburses communities for hazard losses through programs including Public Assistance (PA) and the National Flood Insurance Program (NFIP). Combining PA and private flood insurance payments can give an estimate for total losses to a community.



The NFIP has paid eight property damage claims in Marlborough totaling \$46,648 to-date. The NFIP paid a total of \$6,401 on two claims for one repetitive loss (RL) property to-date.

Total PA reimbursements to the community were as follows:

- Flood Events: \$35,037 (\$1,844 annually)
- Hurricane Events: \$36,629 (\$1,928 annually)
- Winter Storm Events: \$334,631 (\$17,612 annually)

These are summarized in the tables below.

Table 21-2: Flood Event PA Reimbursements, Marlborough

Incident	Sep 1999	Oct 2005
Declaration	9/23/1999	12/16/2005
Disaster No.	1302	1619
Entity	FEMA PA Reimbursement	
State	\$6,640	\$28,398
Municipal	\$0	\$0
Nonprofit	\$0	\$0
Total	\$6,640	\$28,398
Annualized	\$349	\$1,495

Table 21-3: Hurricane Wind Event PA Reimbursements, Marlborough

Incident	Aug - Sep 2011 (T.S. Irene)
Declaration	9/2/2011
Disaster #	4023
Entity	FEMA PA Reimbursement
State	\$5,242
Municipal	\$31,387
Nonprofit	\$0
Total	\$36,629
Annualized	\$1,928



Table 21-4: Winter Storm PA Reimbursements, Marlborough

Incident	Mar 2003	Dec 2003	Jan 2005	Feb 2006	Jan 2011	Oct 2011	Feb 2013
Declaration	3/11/03	1/15/04	2/17/05	5/2/06	3/3/11	11/17/11	3/21/13
Disaster #	3176	3192	3200	3266	1958	4046	4106
Entity	FEMA PA Reimbursement						
State	\$5,553	\$4,978	\$7,257	\$7,971	\$7,152	\$11,959	\$15,807
Municipal	\$18,695	\$15,939	\$31,659	\$23,675	\$50,075	\$78,429	\$55,483
Nonprofit	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Total	\$24,248	\$20,916	\$38,916	\$31,646	\$57,227	\$90,388	\$71,290
Annualized	\$1,276	\$1,101	\$2,048	\$1,666	\$3,012	\$4,757	\$3,752

National Centers for Environmental Information Losses

The National Centers for Environmental Information (NCEI) severe storm database was reviewed to identify events that had impacted Marlborough. No events in that database were specifically noted as having impacted the Town since 2012, though they did impact Hartford County and nearby towns. NCEI losses are reported in Section II of this Plan.

HAZUS-MH Losses

CRCOG used FEMA’s Hazus-MH model to analyze the risks that the Town of Marlborough might face from flooding, hurricanes, and earthquakes. The model estimates economic losses to the town due to damage to buildings and building contents, as well as other economic disruptions. Both residential and commercial structures are addressed. Losses from different hazards are summarized below. Where available, estimates from the previous and current versions of the HMP are provided side-by-side; differences between the two may have been caused by a combination of the following:

- Changes in methodology: such as hazard zone mapping
- Changes in data: such as population and property values
- Changes in the model: this HMP utilized Hazus-MH version 4.0 rather than 2.1
- Other factors: inherent in a complex software like Hazus-MH

More details are available in the Multi-Jurisdictional HMP. Ultimately, changes in the loss estimates reflect the reality that small differences in hazard event features can have a significant impact on losses incurred.



Table 21-5: Estimated Damages to Marlborough from a 1% Annual-Chance Flood

Loss Type	2014 Results	2018 Results
Households Displaced	57	102
People Needing Shelter	30	91
Buildings at Least Moderately Damaged	2	0
Residential Building & Content Losses		
Residential Building & Content Losses	\$3,450,000	\$6,019,027
Other Building & Content Losses	\$1,720,000	\$3,438,757
Total Building & Content Loss	\$5,170,000	\$9,457,784
Total Business Interruption Losses	\$0.00	\$112,827
TOTAL	\$5,170,000	\$9,570,610

Table 21-6: Estimated Damages to Marlborough from a 1% Annual-Chance Hurricane

Loss Type	2014 Results (1938 event)	2018 Results (1% track)
Buildings at Least Moderately Damaged	228	1
Buildings Completely Damaged	13	0
Total Debris Generated (tons)	45,503	8,450
Truckloads (at 25 tons/truck) of building debris	90	338
Economic Losses		
Residential Building & Content Losses	\$24,955,000	\$2,837,693
Other Building & Content Losses	\$2,213,000	\$124,158
Total Building & Content Loss	\$27,168,000	\$2,961,851
Total Business Interruption Losses	\$2,489,000	\$170,657
TOTAL	\$29,657,000	\$3,132,508

Losses were calculated from a modeled probabilistic earthquake (1% annual-chance of occurrence), as well as for four specific scenarios with epicenters around Connecticut.

Table 21-7: Estimated Damages to Marlborough from a Probabilistic Earthquake

Loss Type	2018 Results
Wage Loss	\$864
Rent Loss	\$587
Relocation Loss	\$1,064
Income Loss	\$619
Inventory Loss	\$50
Total Business Disruption	\$3,184
Structural Loss	\$2,294
Non-Structural Loss	\$8,342
Total Building Loss	\$10,637
Total Content Loss	\$3,340
TOTAL LOSSES	\$17,160



Table 21-8: Estimated Damages to Marlborough from Modeled Earthquake Scenarios

Epicenter Location	Magnitude	Estimated Total Losses
East Haddam	6.4	\$423,483.86
Haddam	5.7	\$187,285.25
Portland	5.7	\$295,011.88
Stamford	5.7	\$1,594.55

Average Annualized Losses

Average Annualized Loss (AAL) figures are useful tools for comparison of the risks faced from different hazards with different likelihoods of occurring in a given time period. AAL estimates were prepared for Marlborough based on the methodologies discussed in Section II of the Multi-Jurisdictional HMP. Dam failure, drought, tornado, and wildfire losses were sourced from the 2014 Connecticut Natural Hazard Mitigation Plan Update, with dam failure data supplemented by the National Performance of Dams Program and the Connecticut Department of Energy & Environmental Protection. Earthquake and hurricane losses were calculated in HAZUS-MH. Losses for flooding came from NFIP claims, for winter storms from Public Assistance Reimbursements, and for thunderstorms from the NCEI database. These are presented in the table below in dollars per year. Note that Hurricanes and Tropical Storms represent the largest share of total annualized losses.

Table 21-9: Average Annualized Losses, Marlborough

Dam Failure	Drought	Earthquakes	Flooding	Hurricanes and Tropical Storms	Severe Winter Storms	Thunderstorms	Tornadoes	Wildfires	Total
\$11	\$0	\$17,160	\$3,072	\$401,458	\$17,612	\$851	\$93,959	\$4,340	\$538,462

Losses Summary

A review of the above loss estimates demonstrates that the community has experienced significant expenses as a result of natural hazards, and is at risk for additional losses if some of the less-frequent events were to occur. These actual and potential losses justify hazard mitigation actions to reduce losses in the future.

Mitigation Strategies and Actions

Status of Previous Mitigation Strategies and Actions

The Town of Marlborough reviewed the mitigation actions proposed in the 2014 HMP and determined the status of each. That information is included in the table below.



Table 21-10: Status of Previous Mitigation Strategies and Actions, Marlborough

Action #	Action	Notes	Status
GOAL: ENSURE CAPACITY OF TOWN TO REMOVE SNOW			
Objective 1: Maintain an adequate fleet of trucks and equipment, and staff.			
1.1	Fund and perform routine maintenance on and replacement of public works fleet.	One more truck was replaced in 2018. This is a capability	Completed
1.2	Fund adequate staff and private labor.	Staff levels have not increased since the previous HMP.	Carry Forward with Revisions
GOAL: REDUCE POWER OUTAGES AND ENSURE SAFETY OF PROPERTY AND LIFE AS A RESULT OF NATURAL HAZARDS			
Objective 1: Establish effective tree maintenance program for town right-of-way.			
1.1	Fund and institute routine maintenance of trees in town right-of-way either through town staff or private contractor.	Funding remains at \$10K per year; this is a capability.	Capability
1.2	Investigate opportunities for cost savings through sharing tree maintenance services with neighboring communities through CROG service sharing initiatives or otherwise.	Marlborough now has an arrangement to share a bucket truck with Hebron. The Town will participate in other opportunities as they arise.	Capability
1.3	Monitor utility right-of-way maintenance.	Eversource has not kept up with this activity and the Town will coordinate with them to re-up the effort.	Carry Forward with Revisions
Objective 2: Ensure access to power for residents in emergency situations.			
2.1	Pursue opportunities, through CREPC and otherwise, to obtain a generator for the Town Hall Emergency Operations Center.	This has been completed.	Completed
2.2	Educate residents on emergency preparedness and services available in the event of an emergency through town website, print media and other means.	Action has not yet been completed due to staffing limitations. Town has hired a new Emergency Management Director who will continue this activity.	Carry Forward
GOAL: EXPAND CAPACITY OF THE COMMUNITY TO DEAL WITH NATURAL DISASTERS			
Objective 1: Develop programs to educate and involve residents.			
1.1	Establish a local CERT team.	The Town now has a new Deputy EMD responsible for CERT Development.	Carry Forward
1.2	Expand citizen volunteers available to manage the town shelter.	This will be completed with the establishment of a local CERT team.	Drop
1.3	Expand citizen registration in Marlborough Alerts/Everbridge Program	Marlborough uses the Chatham sponsored Everbridge system before and during weather emergencies and encourages citizens to add their cell phone numbers to the system.	Capability
Objective 2: Undertake studies and analyses to assess risks.			
2.1	Prepare a forest fire suppression study.	This action has not yet been completed due to staff and funding limitations.	Carry Forward.

Active Mitigation Strategies and Actions

The Town proposed to initiate several new mitigation actions for the upcoming five years. Additionally, a number of actions from the previous planning period are being carried forward or replaced with revised actions. These are listed below.



Each of the following actions has been prioritized based on FEMA guidelines, listed from highest to lowest priority, and numbered.

Action #1

Enter the Sustainable CT program through Registration and review actions that can be undertaken to pursue Certification. Make progress with the actions related to hazard mitigation.

Goal	4. Increase the use of natural, “green,” or “soft” hazard mitigation measures, such as open space preservation and green infrastructure.
Category	Natural Resources Protection
Lead	Planning
Cost	\$0 - \$10,000
Funding	Town Operating Budget
Timeframe	01/2019 - 12/2019
Priority	High

Action #2

Develop prioritized list of needed culvert and bridge replacements and upgrades and apply for funding to pursue that work.

Goal	5. Improve the resilience of local and regional utilities and infrastructure using strategies including adaptation, hardening, and creating redundancies.
Category	Structural Projects
Lead	Public Works
Cost	\$10,000 - \$25,000
Funding	Town Operating Budget
Timeframe	07/2019 - 06/2021
Priority	High

Action #3

Replace one Public Works truck.

Goal	7. Improve the emergency response capabilities of the region and its communities
Category	Preparedness & Emergency Response
Lead	Public Works
Cost	More than \$100,000
Funding	Grants
Timeframe	07/2022 - 06/2023
Priority	High



Action #4

Conduct outreach to local small businesses with the aim of preventing the accidental release and pollution from chemicals stored and used at their facilities during or following natural hazard events.

Goal	6. Improve public outreach, education, and warning systems
Category	Education & Awareness
Lead	Planning, in coordination with DEEP
Cost	\$0 - \$10,000
Funding	Materials & Resources Provided by CT DEEP
Timeframe	01/2019 - 12/2019
Priority	Medium

Action #5

Coordinate with NEMO and CRCOG to share resources and gain technical support for hazard mitigation actions involving stormwater management and public outreach, which have parallel benefits related to MS4 stormwater permit compliance.

Goal	1. Minimize the impact of natural hazards on physical buildings and infrastructure
Category	Prevention
Lead	Public Works
Cost	\$0 - \$10,000
Funding	Town Operating Budget
Timeframe	01/2020 - 12/2020
Priority	Medium

Action #6

Participate in EMI courses or the seminars and annual conference held by the Connecticut Association of Flood Managers.

Goal	3. Improve institutional awareness and understanding of natural hazard impacts and mitigation within municipal governments and other decision-making bodies
Category	Education & Awareness
Lead	Planning
Cost	\$0 - \$10,000
Funding	Town Operating Budget
Timeframe	07/2019 - 06/2024
Priority	Medium



Action #7

Review the LID Manual developed by the Northwest Hills Council of Governments and determine whether LID can be incorporated locally to increase rural resiliency.

Goal	1. Minimize the impact of natural hazards on physical buildings and infrastructure
Category	Prevention
Lead	Planning
Cost	\$10,000 - \$25,000
Funding	Town Operating Budget
Timeframe	07/2021 - 06/2022
Priority	Medium

Action #8

Increase Public Works staff numbers.

Goal	7. Improve the emergency response capabilities of the region and its communities
Category	Preparedness & Emergency Response
Lead	Public Works
Cost	\$50,000 - \$100,000
Funding	0
Timeframe	07/2023 - 06/2024
Priority	Medium

Action #9

Contact the owners of Repetitive Loss Properties and nearby properties at risk to inquire about mitigation undertaken and suggest options for mitigating flooding in those areas. This should be accomplished with a letter directly mailed to each property owner.

Goal	1. Minimize the impact of natural hazards on physical buildings and infrastructure
Category	Property Protection
Lead	Planning
Cost	\$0 - \$10,000
Funding	Town Operating Budget / DEMHS
Timeframe	07/2021 - 06/2022
Priority	Low



Action #10

Coordinate with CT SHPO to conduct historic resource surveys to support identification of vulnerable historic properties and preparation of resiliency plans across the state. This action leverages existing resources and best practices for protection of historic and cultural resources through an ongoing statewide initiative by CT SHPO.

Goal	8. Ensure community character and social equity are addressed in mitigation activities
Category	Property Protection
Lead	Planning, in coordination with SHPO
Cost	\$10,000 - \$25,000
Funding	SHPO
Timeframe	07/2021 - 06/2023
Priority	Low

Action #11

Prepare a forest fire suppression study.

Goal	7. Improve the emergency response capabilities of the region and its communities
Category	Preparedness & Emergency Response
Lead	Fire Department
Cost	\$25,000 - \$50,000
Funding	Grants / CT DEEP
Timeframe	07/2023 - 06/2024
Priority	Low












Capitol Region Natural Hazards Mitigation Plan Update




Marlborough, Connecticut

Flood Plains, Dams & Critical Facilities




Critical Facilities

-  Fire Station
-  Police Station
-  School
-  Healthcare Facility
-  State Facility
-  Town Facility
-  Waste Water Facility
-  Emergency Center
-  NRHP Buildings/Sites

Dam Hazard Class

-  BB, A, AA OR Unclassified
-  Class B - Significant Hazard
-  Class C - High Hazard

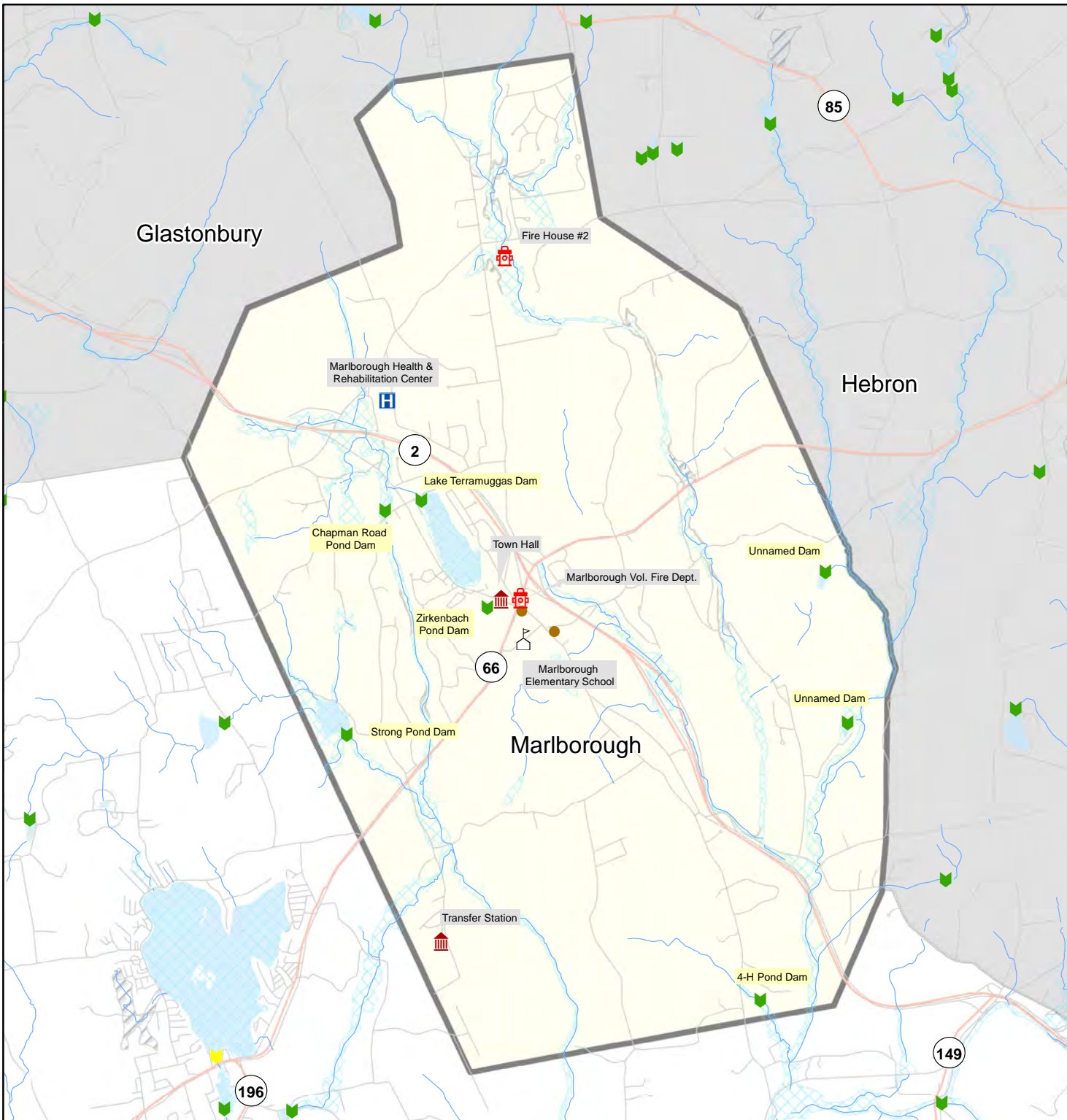
FEMA Flood Hazard Area

-  100 Year Flood Zone
-  500 Year Flood Zone
-  NRHP Districts/Areas

Data Sources: FEMA, National Register of Historic Places, CT DEEP, CRCOG, ESRI



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22 New Britain

Community Overview

The City of New Britain encompasses 13.3 square miles of land area and is home to 73,206 residents as of the 2010 census, a population density of 5,504 people per square mile.

Elevation in New Britain ranges from approximately 60 to 430 feet. The central and northern sections of the City drain to the Park River, the western portion drains to the Quinnipiac River, and the southern portion drains to the Mattabeset River. Significant waterways other include the Quinnipiac River, Bass Brook, Piper Brook, Willow Brook, and Webster Brook.

New Britain is located at the junction of Interstate 84, Route 72, and Route 9. Its major businesses and industries include health care, State government, city government (including schools), and manufacturing. An active segment of the Hartford, Providence and Fishkill Railroad is operated by Pan Am Southern for freight between New Britain and Waterbury. CTfastrak, a regional Bus Rapid Transit System, has stations in New Britain.

The City is relatively built-out, with most recent commercial and industrial development occurring on properties that have previously been developed (either infill or redevelopment). One exception is the Costco that was recently built adjacent to Target on Route 71 on property that was formerly part of the Stanley Golf Course. Another exception is the Pinnacle Business Park; approximately 16 acres remain available for development. With only about 3% of its land remaining vacant, New Britain has focused on preservation of designated open spaces, encouraging low impact development, transportation oriented development, and neighborhood revitalization. Although nearly 1,500 new dwelling units could be built in the city under existing zoning, this level of development is unlikely to occur. Similarly, although there is the potential for 2.9 million square feet of additional commercial and industrial development under existing zoning, this level of development is unlikely to occur.

Critical Facilities

Critical Facilities throughout the Capitol Region are listed in Appendix B. In New Britain these include the Police Department (EOC), City Hall (Backup EOC), six Fire Stations, High School, EMS facility, and sewage pumping stations.

All critical facilities in the city have generators. The majority of these generators are relatively dated, including the generators on the following list:

- Two of the Fire Stations have generators that are more than 45 years old, two have generators that are 30 years old, two have generators that are between 10 and 30 years old, and the two newest fire station generators are both around 10 years.
- The Police Department generator is relatively new, but the EMS generator is closer to 10 years in age.

A new fuel cell has been installed at the High School, creating a local microgrid that is independent of Eversource Power and not vulnerable to regional power outages. The High School now has sufficient backup power capabilities to serve as an emergency shelter and the City is in the process of outfitting it as such. It is expected that the High School will become the City's primary shelter within the next five years.

Capabilities

New Britain has many emergency operation procedures in place to respond to the effects of natural hazards. In addition to maintaining an Emergency Operations Plan (updated annually) and an Emergency Operations Center, the City maintains shelters, has identified warming and charging stations, and has identified a variety of resources to assist with natural hazard event response. The City also maintains a training program for its emergency personnel. The City makes regular use of the statewide CT Alerts emergency notification system when residents need to be informed about a hazard event. The City has recently revamped its website and intends to add more information about preparedness and mitigation in the coming years. The City utilizes a radio system that allows for intra-department communication. The New Britain Fire Department also provides fire prevention training in school each year. Hazard mitigation is incorporated into the community's Plan of Conservation and Development (POCD). POCD actions specifically address natural hazards.

New Britain continually coordinates with Charter Oak State College and Central Connecticut State University regarding emergency procedures. Both schools have sheltering facilities that are utilized (primarily for their students) during emergencies.

City regulations limit any activities on floodplains that would increase flood heights and velocities or reduce or alter naturally occurring floodplains and catchment areas. The New Britain Flood and Erosion Control ordinance generally requires all new construction to locate its lowest floor at least two feet above Base Flood Elevation. All new culvert and bridge construction is designed using the most recent NRCC rainfall return periods in accordance with December 2014 CT DOT guidance.

New Britain pays close attention to its most vulnerable citizens, including people living under the poverty line, people with limited or no English proficiency, minorities, and people who are dependent on transit.

Removal of the ice and snow for city-owned roads is handled by a combination of city staff and contractors; the City handles debris removal. The City pre-treats hilly streets with salt before a big storm. The City has set plowing routes that are tweaked regularly; snow routes were updated in the last two years to focus on the two major arterial routes (north and south primaries) and other minor internal routes. The City has an informal program to review snow accumulation on city-owned roofs each winter, with clearing occurring when depths are sufficiently deep or wet.



The Greater New Britain Chamber of Commerce recommends that businesses prepare backup systems and have procedures for reaching out to their employees if they cannot access their place of work. After recent storms, many businesses have sought to become entirely self-sufficient so they do not need to rely on anyone else to get them up and running; many have purchased their own plows and backup generators. Following the recent storms, Eversource has increased their outreach to businesses as well as to the City.

Tree maintenance occurs on a daily basis. The Tree Warden is in charge of municipal trimming, has a full tree crew, and hires contractors for larger jobs. Much of the trimming near power lines is conducted by Eversource. City staff are currently working on a tree ordinance that, among other goals, will limit the amount of pruning Eversource performs. Staff have observed Eversource trimming trees “from sky to ground” in a method that is damaging the trees.

The City maintains mutual aid agreements with all surrounding communities for fire protection. The City does not maintain any dry hydrants or cisterns; public water system is available in nearly the entire city and is generally relied upon to provide fire protection. Tanker trucks are used when water is not immediately available. If necessary, the City can draft water from surface water sources. Section 8-36 of the municipal code bans open burning without a permit except for the use of outdoor wood-burning stoves. Three Open Burning Officials have been certified by the Connecticut DEEP Open Burning Program and oversee the local permit program.

The City of New Britain owns one Class C (high hazard) and one Class B (significant hazard) dam. Many lower-hazard dams in the City are City-owned, and the Water Department owns several water supply dams outside of city limits. The Water Department will drawdown the water level behind its dams in anticipation of a heavy rainfall event if necessary. The City has copies of Emergency Action Plans (EAPs) prepared for other dams whose failure could affect New Britain; this information is maintained by the Emergency Management Director.

New Capabilities

Since adoption of the 2016-2021 Hazard Mitigation Plan for the Former Central Connecticut Region (“2016 HMP”), FEMA added a new Quinnipiac River flood zone and the City officially adopted this zone in April 2017.

A study of the West Canal has identified two potential solutions to nuisance flooding alongside that feature, which primarily is sourced from groundwater. The first is to relocate a pipeline feeding the canal, and the second is to line the canal with a geo-textile fabric to stop any flow that may be coming from the canal and exacerbating the groundwater flooding. The former option is estimated to cost \$700,000 and the latter around \$200,000.

The City has replaced road drainage systems as part of road re-construction. Improvements undertaken in recent years include Hart Street from Corban Avenue to Lynwood Street, and Broad Street from Horace to Burritt Street. Both of these systems were old and undersized, as are several other stormwater drainage systems in the City. The City has put in bonding



requests to fund upsizing of sanitary sewers in the area of Allen Street and Stewart street, but has yet to receive sufficient funds.

A new fuel cell has been installed at the High School, moving it towards designation as an emergency shelter.

New Britain previously had a Community Emergency Response Team (CERT) that assisted city personnel, supported emergency response functions, staffed the emergency shelter, and engaged with the community about disaster preparedness; however the CERT has been dissolved due to a lack of training capacity.

The City is in the process of instituting a vehicle tracking program which will allow emergency managers to track response vehicles in the field and be able to accurately plot downed trees, fires, and plowing conditions. This system will assist with data tracking and archiving information for future retrieval.

The City has implemented a SeeClickFix program to track resident complaints. The City also has a dispatch area where complaints are received and then dispatched to various agencies such as public works, utility division, and engineering.

Challenges

Challenges Overview

The top three natural hazards that present a high risk to New Britain include winter storms and tropical storms/hurricanes.

Webster Brook, Bass Brook, and the Quinnipiac River all produce minor flooding at times, while Willow Brook and West Canal can create more frequent and severe flooding problems. Areas of the city in or adjacent to flood zones tend to be heavily populated. Willow Brook in the southern section of the city generally causes the most severe flood damage; overflow from the brook floods a neighborhood where 60-80 properties are affected, as well as the New Britain stadium. The City has performed several projects along Willow Brook related to flood conveyance and bank protection. City staff indicate that there are not any good engineering solutions to the flooding along Willow Brook, and flooding is primarily caused by the volume of storm drainage. In general, repetitive loss properties are only affected during the very large rain events. Drainage is reportedly adequate for the typical smaller rain events.

West Canal is another source of frequent flooding in the city, although it is undocumented on FEMA's Flood Insurance Rate Maps (FIRMs) due to its high elevation. The West Canal directs water to Shuttle Meadow Reservoir. It is an open channel which includes a piped section. Homeowners have occasionally been affected by flooding when the canal overtops, and have observed water apparently leaking from the canal onto their properties. A study was performed showing that most of this apparent leakage was in-fact coming from groundwater.



The 1992 storm caused the canal (built in 1908) to breach; flooding washed out nearby streets and inundated homes.

Allen Street is an area outside of the floodplain that regularly floods due to undersized storm drains with design issues. Temporary sidewalks are in place. John Downing Drive near Newington is another flood-risk zone.

Drainage infrastructure and water and sewer lines throughout the City are in need of major upgrades. The majority of the infrastructure was constructed in or around 1872 and was not designed to support the level of development the city has seen. Undersized pipes result in flooding, sewer backups, system leaks, and other problems.

Areas typically prone to wind damage are Walnut Hill and Stanley Golf Course.

New Britain does not typically experience wildfires as the city is extensively developed. Less developed areas in New Britain highest risk for a wildfire, particularly the open lands near Interstate 84 and undeveloped lands in the southwestern corner of the city near Shuttle Meadow Reservoir.

Two Class C (high hazard) dams lie within the city boundaries. These include the Shuttle Meadow Reservoir dam and the dam at Stanley Quarter Park.

Hazard Losses

The economic losses faced by the community from natural hazards can be estimated by reviewing historic, and modeling future, loss figures. Loss estimates are summarized below.

Historic FEMA Payments

FEMA reimburses communities for hazard losses through programs including Public Assistance (PA) and the National Flood Insurance Program (NFIP). Combining PA and private flood insurance payments can give an estimate for total losses to a community.

A total of \$424,247.91 has been paid out to NFIP-insured properties for 103 total losses through August 2017. New Britain has 14 repetitive loss (RL) properties which have made 35 claims to the NFIP totaling \$264,340.

Total PA reimbursements to the community were as follows:

- Flood Events: \$273,706 (\$14,406 annually)
- Hurricane Events: \$85,991 (\$4,526 annually)
- Winter Storm Events: \$3,544,880 (\$186,573 annually)

These are summarized in the tables below.



Table 22-1: Flood Event PA Reimbursements, New Britain

Incident	Sep 1999	Oct 2005
Declaration	9/23/1999	12/16/2005
Disaster No.	1302	1619
Entity	FEMA PA Reimbursement	
State	\$9,738	\$32,239
Municipal	\$39,164	\$113,517
Nonprofit	\$0	\$79,048
Total	\$48,902	\$224,804
Annualized	\$2,574	\$11,832

Table 22-2: Hurricane Wind Event PA Reimbursements, New Britain

Incident	Aug - Sep 2011 (T.S. Irene)
Declaration	9/2/2011
Disaster #	4023
Entity	FEMA PA Reimbursement
State	\$10,877
Municipal	\$75,114
Nonprofit	\$0
Total	\$85,991
Annualized	\$4,526

Table 22-3: Winter Storm PA Reimbursements, New Britain

Incident	Mar 2003	Dec 2003	Jan 2005	Feb 2006	Jan 2011	Oct 2011	Feb 2013
Declaration	3/11/03	1/15/04	2/17/05	5/2/06	3/3/11	11/17/11	3/21/13
Disaster #	3176	3192	3200	3266	1958	4046	4106
Entity	FEMA PA Reimbursement						
State	\$63,474	\$56,902	\$75,760	\$91,118	\$221,132	\$53,739	\$462,827
Municipal	\$100,831	\$70,414	\$146,393	\$126,627	\$169,593	\$747,356	\$412,598
Nonprofit	\$0	\$49,383	\$84,098	\$127,236	\$30,872	\$440,835	\$13,695
Total	\$164,305	\$176,698	\$306,251	\$344,981	\$421,596	\$1,241,930	\$889,120
Annualized	\$8,648	\$9,300	\$16,118	\$18,157	\$22,189	\$65,365	\$46,796

National Centers for Environmental Information Losses

The table below summarizes events in the National Centers for Environmental Information (NCEI) severe storm database that were specifically noted as having impacted the community since 2012.



Table 22-4: NCEI Database Losses since 2012, New Britain

Date	Event	Property Damage
7/18/2012	Lightning Hail	\$10,000 \$0
7/18/2012	Flood	\$10,000
8/5/2012	Flood	\$0
9/8/2012	Thunderstorm Wind	\$5,000
9/18/2012	Flood	\$0
9/2/2013	Flood	\$5,000
7/3/2014	Thunderstorm Wind	\$12,000
2/25/2016	Thunderstorm Wind	\$2,000
7/18/2016	Thunderstorm Wind	\$5,000
7/22/2016	Thunderstorm Wind	\$30,000
6/27/2017	Hail	\$0
Total Thunderstorm		\$64,000
Total Flood		\$15,000

NCEI losses under other event categories (such as drought, high wind, flooding, and winter storms) were not specifically noted as impacting this community, though they did impact Hartford County and nearby towns. NCEI losses are reported in Section II of this Plan.

HAZUS-MH Losses

CRCOG used FEMA’s Hazus-MH model to analyze the risks that the community might face from flooding, hurricanes, and earthquakes. The model estimates economic losses to the City due to damage to buildings and building contents, as well as other economic disruptions. Both residential and commercial structures are addressed. Losses from different hazards are summarized below. Where available, estimates from the previous and current versions of the HMP are provided side-by-side; differences between the two may have been caused by a combination of the following:

- Changes in methodology: such as hazard zone mapping
- Changes in data: such as population and property values
- Changes in the model: this HMP utilized Hazus-MH version 4.0 rather than 2.1
- Other factors: inherent in a complex software like Hazus-MH

More details are available in the Multi-Jurisdictional HMP. Ultimately, changes in the loss estimates reflect the reality that small differences in hazard event features can have a significant impact on losses incurred.



Table 22-5: Estimated Damages to New Britain from a 1% Annual-Chance Flood

Loss Type	2014 Results	2018 Results
Households Displaced	1,027	500
People Needing Shelter	2,419	826
Buildings at Least Moderately Damaged	73	0
Economic Losses		
Residential Building & Content Losses	\$29,830,000	\$18,343,005
Other Building & Content Losses	\$64,440,000	\$14,132,951
Total Building & Content Loss	\$94,270,000	\$32,475,956
Total Business Interruption Losses	\$440,000	\$1,111,270
TOTAL	\$94,700,000	\$33,587,225

Table 22-6: Estimated Damages to New Britain from a 1% Annual-Chance Hurricane

Loss Type	2014 Results (1938 event)	2018 Results (1% track)
Buildings at Least Moderately Damaged	7,271	3
Buildings Completely Damaged	61	0
Total Debris Generated	333,729	3049
Truckloads (at 25 tons/truck) of building debris	13,349	122
Economic Losses		
Residential Building & Content Losses	\$229,324,530	\$12,875,703
Other Building & Content Losses	\$51,927,310	\$530,353
Total Building & Content Loss	\$281,251,840	\$13,406,056
Total Business Interruption Losses	\$6,174,330	\$877,755
TOTAL LOSSES	\$287,426,170	\$14,283,811

Losses were calculated from a modeled probabilistic earthquake (1% annual-chance of occurrence), as well as for four specific scenarios with epicenters around Connecticut.

Table 22-7: Estimated Damages to New Britain from a Probabilistic Earthquake

Loss Type	2018 Results
Wage Loss	\$9,442
Rent Loss	\$10,517
Relocation Loss	\$14,018
Income Loss	\$6,377
Inventory Loss	\$1,153
Total Business Disruption	\$41,506
Structural Loss	\$27,969
Non-Structural Loss	\$91,826
Total Building Loss	\$119,795
Total Content Loss	\$34,334
TOTAL LOSSES	\$195,635



Table 22-8: Estimated Damages to New Britain from Modeled Earthquake Scenarios

Epicenter Location	Magnitude	Estimated Total Losses
East Haddam	6.4	\$1,288,631.63
Haddam	5.7	\$403,505.70
Portland	5.7	\$2,122,621.09
Stamford	5.7	\$23,460.95

Other Hazard Costs

A storm from June 1992 caused widespread damage in the city totaling approximately \$650,000.

Following the breach of the West Canal during the 1992 storm, the City paid out \$30,000 in damages to homeowners who were not eligible for reimbursements under the NFIP.

Average Annualized Losses

Average Annualized Loss (AAL) figures are useful tools for comparison of the risks faced from different hazards with different likelihoods of occurring in a given time period. AAL estimates were prepared for New Britain based on the methodologies discussed in Section II of the Multi-Jurisdictional HMP. Dam failure, drought, tornado, and wildfire losses were sourced from the 2014 Connecticut Natural Hazard Mitigation Plan Update, with dam failure data supplemented by the National Performance of Dams Program and the Connecticut Department of Energy & Environmental Protection. Earthquake and hurricane losses were calculated in HAZUS-MH. Losses for flooding came from NFIP claims, for winter storms from Public Assistance Reimbursements, and for thunderstorms from the NCEI database. These are presented in the table below in thousands of dollars per year. Note that Hurricanes and Tropical Storms represent the largest share of total annualized losses.

Table 22-9: Average Annualized Losses, New Britain

Dam Failure	Drought	Earthquakes	Flooding	Hurricanes and Tropical Storms	Severe Winter Storms	Thunderstorms	Tornadoes	Wildfires	Total
\$131	\$0	\$195,635	\$25,570	\$4,589,178	\$186,573	\$9,723	\$1,074,069	\$2,489	\$6,083,367

Losses Summary

A review of the above loss estimates demonstrates that the City of New Britain has experienced significant expenses as a result of natural hazards, and is at risk for additional losses if some of the less-frequent events were to occur. These actual and potential losses justify hazard mitigation actions to reduce losses in the future.



Mitigation Strategies and Actions

Noted Hazard Mitigation Needs

During the course of this Plan development, multiple hazard mitigation needs of New Britain were noted. These are discussed here.

- The City would like to upgrade the generator to allow for the High School to act as a regional shelter with a capacity of 1000 people. While the city has sufficient shelter supplies at present, it would like more and would need more to stock a regional shelter. The City recognizes that most residents choose to shelter in place if possible, and recommends they stock three days of supplies.
- The City would like a new portable generator to provide backup to a 30-year old portable unit used to power the sewage pumping station. A permanent generator at this location would be preferred.
- There is a need for additional tree warden training.
- There is a need for additional and improved snow removal equipment, specifically more street plows, snow blowers, and heavy duty trucks. The Fire Department does not have four wheel drive equipment.
- Upsizing of sanitary sewers in the area of Allen Street and Stewart street is necessary, if funding can be obtained.
- A permanent generator at the Steele Street pump station would help maintain fire protection during power outages. An engineering consultant has already been consulted on this project.
- New Britain has a prioritized list of stormwater projects. The Town will pursue these projects in priority order. The top ten of these are as follows:
 1. Poplar Street at Sefton Drive
 2. Wells Street at Sefton Drive
 3. Barbour Road at #50
 4. Huber Street at Stanley
 5. Blake Road hollow
 6. Blake Road at McClintock Street
 7. Black Road east of Farmington Avenue
 8. Eddy Glover Boulevard at #358
 9. Allen Street between Lawlor and Tremont at the First National store
 10. Farmington avenue at #213, south of Biruta Street

Status of Previous Mitigation Strategies and Actions

The City of New Britain reviewed the mitigation actions proposed in the 2016 HMP and determined the status of each. That information is included in the table below.



Table 22-10: Status of Previous Mitigation Strategies and Actions, New Britain

Action #	Action	Notes	Status
GOAL: REDUCE LOSSES OF LIFE AND PROPERTY, AND MINIMIZE ECONOMIC CONSEQUENCES OF NATURAL HAZARDS			
Objective 1: Improve Municipal Response Capabilities			
1.1	Acquire generators to provide reliable backup power for critical facilities. The City has identified several backup generator needs. Two fire stations have generators greater than 45 years old, two others are 30 years old, and two others are more than 10 years old. The City would also like a new portable generator to provide backup to an existing 30-year old portable generator that is used to power the sewer pumping station during outages. Alternatively, a permanent generator for the sewer pumping station is desired.	Fire station is in the process of replacing generators with grant funding, two are scheduled for replacement next year, and one has no funding in place yet. Also, there are two others that have generators over 10 years old. Water Department has plans to add new generators. City needs portable generator for sewer pump station.	Carry Forward with Revisions
1.2	Upgrade generator at High School and outfit facility to act as regional shelter. The City wishes to upgrade the generator at the High School to be able to power more than a minimal part of the building. The High School would then be able to be used as a regional shelter that could house up to 1,000 people during and following disasters. Additional shelter supplies will be needed to outfit the shelter to that scale.	High school has a fuel cell that was funded through CT Green Bank that was obtained last year. No need of a generator.	Completed
1.3	Incorporate updated hazard mitigation information into community plan updates. Hazard mitigation information will be incorporated into future plan updates such as the POCD.	Continue action. POCD last updated in 2010. This action may be undertaken within the next update to the POCD (i.e., 2020).	Carry Forward
Objective 2: Enable residents to better help themselves through preparedness education			
2.1	Develop and distribute pamphlet about preparedness for residents and post on City website. The City wishes to prepare an emergency preparedness pamphlet for all residents in three languages (English, Polish, and Spanish).	No work done to date due to staffing and budget limitations.	Carry Forward
2.2	Add information about preparedness, mitigation, and City capabilities to the City website. The City is in the process of increasing the amount of information on its website. The website will be updated to include sections discussing preparedness for and mitigation of natural hazard impacts.	No work done to date due to staffing and budget limitations.	Carry Forward
2.3	Encourage sign-ups for the CT Alerts emergency notification system. The City uses CT Alerts to provide a city-wide emergency notification system. Targeted mailings may be used to encourage signups in particularly vulnerable areas, such as special flood hazard areas and dam failure inundation areas.	Links and information available on City website. Targeted mailings not carried out to date.	Carry Forward with Revisions



Action #	Action	Notes	Status
Objective 3: Upgrade aging infrastructure to improve City's capacity to deal with inundation			
3.1	Enact flooding mitigation measures identified by the City consultant related to the West Canal. The City Water Department has a consultant studying flooding along the canal, which the Water Department believes are related to a high water table. The City should enact any reasonable flood mitigation measures that are identified by the consultant.	<p>Consultant has completed study, and determined that, while some water flooding properties comes from the canal, the majority comes from base flow or groundwater.</p> <p>A number of mitigation options have been explored. Relocation by 2,500 feet of a pipeline that feeds the canal is estimated to cost \$700,000. Lining the canal with a geo-textile fabric to mitigate flow from the canal is estimated to cost \$150-200 thousand.</p>	Carry Forward with Revisions
3.2	Perform targeted upgrades of aging and undersized drainage infrastructure throughout the city. The majority of infrastructure in the city was installed in or around 1872 and is undersized. The City plans to identify the most important systems to upgrade and begin devoting funding to the work.	The City performs these upgrades as part of its standard operations. This is a capability.	Capability
3.3	Encourage the City of Hartford to perform repairs to Batterson Park Pond Dike. Batterson Park Pond Dike was listed as being in "Poor" condition on the 2013 Connecticut DEEP dam summary list. City officials will contact the City and Connecticut DEEP to encourage repairs to reduce the likelihood of failure.	City feels that Hartford and CT DEEP are aware of the Batterson Park Dike condition and are capable of addressing issues. Action no longer necessary.	Drop
Objective 4: Align planning policies with affected areas			
4.1	Incorporate natural hazard mitigation planning into the 2020 POCD update. The New Britain POCD will be updated for 2020-2030 in a few years. The City intends to incorporate elements of natural hazard mitigation into the plan update.	Redundant with Action 1.3. Drop	Drop
4.2	Incorporate updated hazard mitigation information into community plan updates. Hazard mitigation information will be incorporated into future plan updates of other planning documents.	Redundant with Action 1.3. Drop	Drop



Action #	Action	Notes	Status
4.3	Participate in the statewide Water Utility Coordinating Committee process. The Connecticut DPH is preparing a Coordinated Water Supply Plan for the entire state beginning in 2016. The City Water Department will participate to address drought-related public water supply needs throughout the community.	New Britain is participating in WUCC process as a member of the Central WUCC. Drought concerns include changing rainfall patterns with more rainfall occurring in spot events and more time between rainfall events, resulting in drier soils, lower groundwater tables, and potential impacts to groundwater safe yield. Monthly WUCC meetings ended in June 2018 and return to an irregular schedule. This is a capability.	Capability
4.4	Ensure local officials have most updated version of the Connecticut Drought Management Plan. The Connecticut Drought Management Plan is periodically updated. Local officials, land use commissions, health departments, fire departments, and local water utilities should all be made aware of updates to this plan.	Current Drought Plan is still from 2003, update is still in development. City will make local officials aware of the newest plan when it is released.	Capability
Objective 5: Mitigate impacts to properties in the National Flood Insurance Program			
5.1	Work with RLP owners to mitigate RLPs upon property owner's request. Repetitive loss properties in New Britain are typically only damaged during severe flood events. 14 repetitive loss properties are located in New Britain that have experienced 35 flood losses. Mitigation could include acquisition/demolition, elevation, floodproofing, or other techniques.	City will work with property owners if approached. This is a capability. Current RL data indicates 9 RL properties.	Capability
5.2	Update the local floodplain management ordinance to meet current model ordinance requirements. The City of New Britain last updated this ordinance in 2008. Since that time, FEMA and the Connecticut DEEP have revised the model ordinance.	Ordinance was updated in April 2017, Quinnipiac River Watershed was the latest addition in flood zones. Green regulations are also in place as part of 2008 municipal standards for construction, which are referenced in DEEP's Stormwater Manual. Consultants working with the City on regulations relating to MS4 permit to ensure compliance with the permit requirements.	Completed



Action #	Action	Notes	Status
5.3	Work with property owners to mitigate flood damages when grant funding is available. 60-80 buildings are considered floodprone along Willow Brook as well as in other parts of the city. The City will work with property owners to perform localized or neighborhood mitigation actions upon property owner request when grant funding is available. Mitigation could include acquisition/demolition, elevation, floodproofing, or other techniques.	Remove action. Fifteen years ago cleared all trash, re-excavated channels in Hollow Brook, modified the spillway, etc. No major flooding issues since then.	Drop

Active Mitigation Strategies and Actions

The City proposed to initiate several new mitigation actions for the upcoming five years. Additionally, a number of actions from the previous planning period are being carried forward or replaced with revised actions. These are listed below.

Each of the following actions has been prioritized based on FEMA guidelines, listed from highest to lowest priority, and numbered.

<i>Action #1</i>	
Enter the Sustainable CT program through Registration and review actions that can be undertaken to pursue Certification. Make progress with the actions related to hazard mitigation.	
Goal	4. Increase the use of natural, “green,” or “soft” hazard mitigation measures, such as open space preservation and green infrastructure.
Category	Natural Resources Protection
Lead	Planning
Cost	\$0 - \$10,000
Funding	Town Operating Budget
Timeframe	01/2019 - 12/2019
Priority	High

<i>Action #2</i>	
Acquire a permanent generator at the Steele Street Pump Station to maintain fire protection in that area.	
Goal	5. Improve the resilience of local and regional utilities and infrastructure using strategies including adaptation, hardening, and creating redundancies.
Category	Preparedness & Emergency Response
Lead	Emergency Management
Cost	\$10,000 - \$25,000
Funding	Town Operating Budget / DEMHS
Timeframe	01/2019 - 12/2020
Priority	High



Action #3

Address the section of Willow Brook bank near the soccer fields that is washed out.

Goal	1. Minimize the impact of natural hazards on physical buildings and infrastructure
Category	Structural Projects
Lead	Public Works
Cost	\$50,000 - \$100,000
Funding	Town Operating Budget / Grants
Timeframe	07/2021 - 06/2022
Priority	High

Action #4

Address damaged retaining walls along the brook at Stanley Quarter Park.

Goal	1. Minimize the impact of natural hazards on physical buildings and infrastructure
Category	Structural Projects
Lead	Public Works
Cost	\$50,000 - \$100,000
Funding	Town Operating Budget / Grants
Timeframe	07/2021 - 06/2022
Priority	High

Action #5

Implement dam repairs at Stanley Quarter Park.

Goal	1. Minimize the impact of natural hazards on physical buildings and infrastructure
Category	Structural Projects
Lead	Public Works
Cost	\$50,000 - \$100,000
Funding	Grants
Timeframe	07/2021 - 06/2022
Priority	High



Action #6

Upsize storm drains in Allen street to increase capacity. Designs are in place, implementation is grant dependent.

Goal	1. Minimize the impact of natural hazards on physical buildings and infrastructure
Category	Structural Projects
Lead	Public Works
Cost	More than \$100,000
Funding	Grants
Timeframe	07/2022 - 06/2023
Priority	High

Action #7

Conduct outreach to local small businesses with the aim of preventing the accidental release and pollution from chemicals stored and used at their facilities during or following natural hazard events.

Goal	6. Improve public outreach, education, and warning systems
Category	Education & Awareness
Lead	Planning, in coordination with DEEP
Cost	\$0 - \$10,000
Funding	Materials & Resources Provided by CT DEEP
Timeframe	01/2019 - 12/2019
Priority	Medium

Action #8

Develop a prioritized list of needed acquisitions, upgrades, and maintenance of critical facility generators.

Goal	7. Improve the emergency response capabilities of the region and its communities
Category	Preparedness & Emergency Response
Lead	Emergency Management
Cost	\$0 - \$10,000
Funding	Town Operating Budget
Timeframe	01/2020 - 12/2020
Priority	Medium



Action #9

Coordinate with NEMO and CRCOG to share resources and gain technical support for hazard mitigation actions involving stormwater management and public outreach, which have parallel benefits related to MS4 stormwater permit compliance.

Goal	1. Minimize the impact of natural hazards on physical buildings and infrastructure
Category	Prevention
Lead	Public Works
Cost	\$0 - \$10,000
Funding	Town Operating Budget
Timeframe	01/2020 - 12/2020
Priority	Medium

Action #10

Participate in EMI courses or the seminars and annual conference held by the Connecticut Association of Flood Managers.

Goal	3. Improve institutional awareness and understanding of natural hazard impacts and mitigation within municipal governments and other decision-making bodies
Category	Education & Awareness
Lead	Planning
Cost	\$0 - \$10,000
Funding	Town Operating Budget
Timeframe	07/2019 - 06/2024
Priority	Medium

Action #11

Incorporate natural hazard mitigation planning into the 2020 POCD update.

Goal	2. Ensure Municipal Codes and Regulations support hazard mitigation
Category	Prevention
Lead	Planning
Cost	\$10,000 - \$25,000
Funding	Town Operating Budget / Grants
Timeframe	01/2019 - 06/2020
Priority	Medium



Action #12

Implement plan to line west canal with geo-textile fabric to mitigate flooding from that source. Monitor the effectiveness of this measure and determine whether additional studies need to be performed to address flooding from groundwater.

Goal	1. Minimize the impact of natural hazards on physical buildings and infrastructure
Category	Structural Projects
Lead	Public Works
Cost	More than \$100,000
Funding	Grants
Timeframe	07/2022 - 06/2024
Priority	Medium

Action #13

Acquire a portable generator for sewer pumping stations.

Goal	5. Improve the resilience of local and regional utilities and infrastructure using strategies including adaptation, hardening, and creating redundancies.
Category	Preparedness & Emergency Response
Lead	Emergency Management
Cost	More than \$100,000
Funding	Town Operating Budget / DEMHS
Timeframe	01/2022 - 12/2024
Priority	Medium

Action #14

Contact the owners of Repetitive Loss Properties and nearby properties at risk to inquire about mitigation undertaken and suggest options for mitigating flooding in those areas. This should be accomplished with a letter directly mailed to each property owner.

Goal	1. Minimize the impact of natural hazards on physical buildings and infrastructure
Category	Property Protection
Lead	Planning
Cost	\$0 - \$10,000
Funding	Town Operating Budget / DEMHS
Timeframe	07/2021 - 06/2022
Priority	Low



Action #15

Add information about preparedness, mitigation, and City capabilities to the City website.

Goal	6. Improve public outreach, education, and warning systems
Category	Education & Awareness
Lead	Emergency Management
Cost	\$0 - \$10,000
Funding	Town Operating Budget
Timeframe	01/2021 - 12/2022
Priority	Low

Action #16

Develop an emergency preparedness pamphlet for residents in English, Polish, and Spanish, distribute to residents, and post on City website.

Goal	6. Improve public outreach, education, and warning systems
Category	Education & Awareness
Lead	Emergency Management
Cost	\$0 - \$10,000
Funding	Town Operating Budget
Timeframe	01/2021 - 12/2022
Priority	Low

Action #17

Coordinate with CT SHPO to conduct outreach to historic property owners to educate them on methods of retrofitting their properties to be more hazard-resilient while maintaining historic character.

Goal	8. Ensure community character and social equity are addressed in mitigation activities
Category	Education & Awareness
Lead	Planning, in coordination with SHPO
Cost	\$0 - \$10,000
Funding	SHPO
Timeframe	01/2021 - 12/2022
Priority	Low



Action #18

Identify and send the City Tree Warden to relevant training opportunities. Contact the UConn Extension for assistance.

Goal	3. Improve institutional awareness and understanding of natural hazard impacts and mitigation within municipal governments and other decision-making bodies
Category	Prevention
Lead	Public Works
Cost	\$0 - \$10,000
Funding	Town Operating Budget
Timeframe	07/2021 - 06/2022
Priority	Low

Action #19

Work with CT DEEP to complete a formal validation of the Repetitive Loss Property list and update the mitigation status of each listed property.

Goal	1. Minimize the impact of natural hazards on physical buildings and infrastructure
Category	Property Protection
Lead	Planning
Cost	\$10,000 - \$25,000
Funding	Town Operating Budget / CT DEEP / DEMHS
Timeframe	07/2021 - 06/2023
Priority	Low

Action #20

Coordinate with CT SHPO to conduct historic resource surveys, focusing on areas within natural hazard risk zones (such as flood or wildfire hazard zones and areas near steep slopes), to support identification of vulnerable historic properties and preparation of resiliency plans across the state. This action leverages existing resources and best practices for protection of historic and cultural resources through an ongoing statewide initiative by CT SHPO.

Goal	8. Ensure community character and social equity are addressed in mitigation activities
Category	Property Protection
Lead	Planning, in coordination with SHPO
Cost	\$10,000 - \$25,000
Funding	SHPO
Timeframe	07/2021 - 06/2023
Priority	Low



Action #21

Use targeted mailings to particularly vulnerable areas, such as special flood hazard areas and dam failure inundation areas, to encourage signups for the CT Alerts emergency notification system.

Goal	6. Improve public outreach, education, and warning systems
Category	Education & Awareness
Lead	Emergency Management
Cost	\$10,000 - \$25,000
Funding	Town Operating Budget
Timeframe	01/2021 - 12/2023
Priority	Low

Action #22

Dredge pond at Stanley Quarter Park.

Goal	4. Increase the use of natural, "green," or "soft" hazard mitigation measures, such as open space preservation and green infrastructure.
Category	Prevention
Lead	Public Works
Cost	\$25,000 - \$50,000
Funding	Grants
Timeframe	01/2023 - 12/2024
Priority	Low
















Capitol Region Natural Hazards Mitigation Plan Update



New Britain, Connecticut

Flood Plains, Dams & Critical Facilities



Critical Facilities

-  Emergency Center
-  Fire Station
-  Healthcare Facility
-  Police Station
-  Public Infrastructure
-  School
-  State Facility
-  Town Facility
-  Waste Water Facility
-  NRHP Buildings/Sites
-  NRHP Districts/Areas

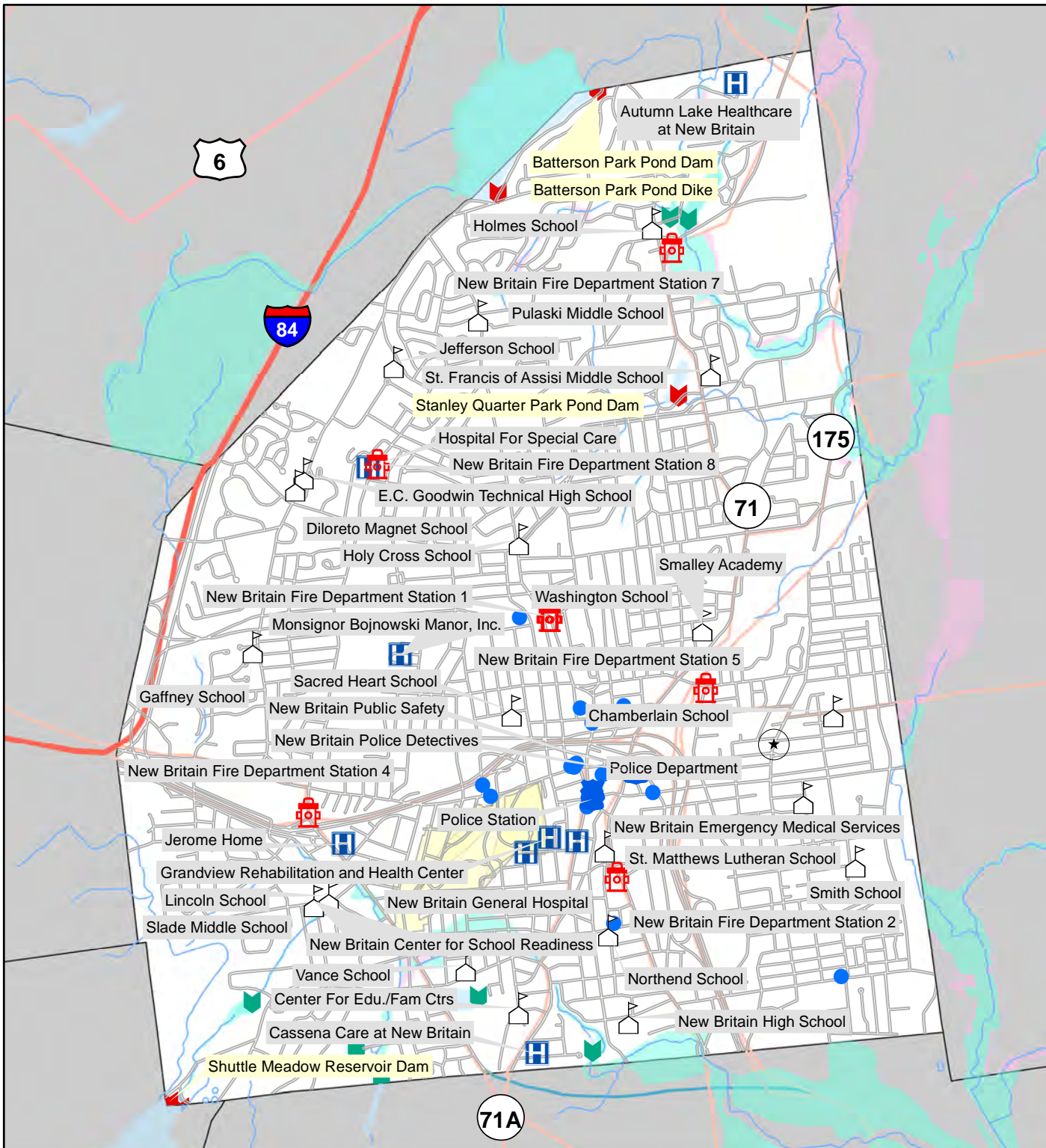
Dam Hazard Class

-  A, AA, BB or Unclassified
-  Class C- High Hazard

FEMA Flood Hazard Area

-  100 Year Flood Zone
-  500 Year Flood Zone

Data Sources: FEMA, National Register of Historic Places, CT DEEP, CRCOG, ESRI













**Capitol Region Natural Hazards
Mitigation Plan Update**

New Britain, Connecticut


Dam Breach Inundation Areas
& Critical Facilities


Critical Facilities

-  Emergency Center
-  Fire Station
-  Healthcare Facility
-  Police Station
-  Public Infrastructure
-  School
-  State Facility
-  Town Facility
-  Waste Water Facility
-  NRHP Buildings/Sites

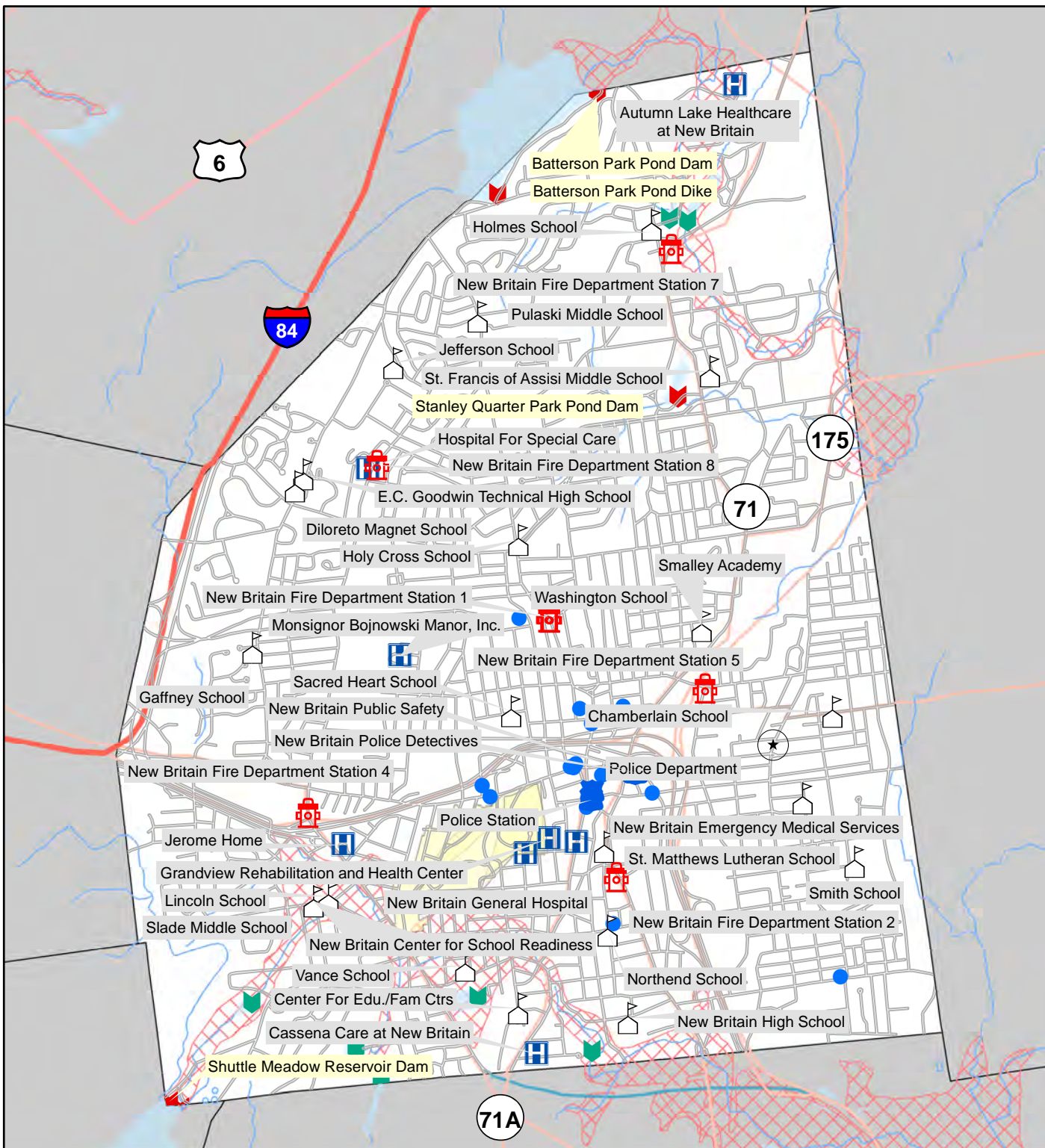
 NRHP Districts/Areas

Dam Hazard Class

 A, AA, BB or Unclassified

 Class C- High Hazard

 Dam Breach Inundation Areas



Data Sources: FEMA, National Register of Historic Places, CT DEEP, CRCOG, ESRI





23 Newington

Community Overview

Newington is a fully suburban town with a population of about 30,562 encompassing 13.2 square miles and ranging in elevation from 40 to 350 feet above sea level. The northern section of Newington lies in the Park River Watershed, while the southern section is within the Mattabesset River watershed. Principal watercourses in Town include the Mill, Piper, Rockhole and Webster Brooks. Many state highways run through Newington, including the limited access Route 9 and the Berlin Turnpike (Routes 5/15). *CTfastrak*, a regional Bus Rapid Transit System, has stations in Newington, and it is expected that in the near future the Hartford Line commuter rail will add a stop in Town.

Major industries in Newington include manufacturing of airplane parts, dyes, gauges, tools, and plumbing supplies. There is significant retail space along the Berlin Turnpike. The Town houses the Veterans Administration Connecticut Healthcare System's Primary Care Facility, the Connecticut Department of Transportation, and the Connecticut International Skating Center. Major residential complexes include Newington Ridge, Waverley Drive, and Woodland Estates. Elderly housing campuses include Cedar Village, Kelliher Park, Millbrook Village, and New Meadow Village.

Critical Facilities

Critical Facilities throughout the Capitol Region are listed in Appendix B. In Newington these include the Fire House, Newington High School, the Senior Center, Kellogg Middle School, Wallace Middle School, Police Headquarters (EOC), and the Police Training Facility (Backup EOC).

Table 23-1: Critical Facilities, Newington

Facility	Shelter	Generator
Newington High School	Primary	X
Senior Center	Secondary, Pets	X
Kellogg Middle School	Backup	
Wallace Middle School	Backup	
Police Headquarters (EOC)		X
Police Training Facility (Backup EOC)		

Capabilities

Hazard mitigation is incorporated into Newington's Plan of Conservation and Development (POCD). POCD actions specifically address natural hazards.

Newington has an Emergency Management Team, as well as a Community Emergency Response Team (CERT). FEMA Emergency Management Performance Grant (EMPG) funds have been used to support those teams, as well as other local emergency management efforts.

The Town generally does not permit any new structures in the 1-percent annual-chance flood zone. A local radio station has recently been granted a permit to construct a non-occupied utility building in a flood zone; this is not expected to increase vulnerability. Flooding complaints are tracked through the Highways Department and Engineering Department. Newington last updated its floodplain regulations in 2008.

The Natural Resources Conservation Service (NRCS), under contract by Newington, conducted a study in 2004 of flooding and flood reduction alternatives for the Stamm Road area. The existing FEMA FIS did not factor in the impacts of railroad embankment failure, which occurs relatively frequently; therefore, further study was needed. The NRCS study recommends removing the railroad spur line culvert, replacing existing culverts along the rail line with box culverts sized to the 100-year flow level, and installing various flood proofing measures for eight buildings on Stamm Road and Liberty Street. The Town has approached Amtrak to discuss this study, but Amtrak has not agreed to implement the recommendations.

Newington maps evacuation routes and updates them on an ongoing basis. These routes are not posted to the public. The Town has a suite of plowing routes to guide road clearing efforts following winter storms. The DPW is responsible for road clearing, while the Parks Department takes care of sidewalks in front of town buildings and fire houses.

New developments in Newington are required to install utilities below ground. Redevelopment projects greater than 30- to 40-percent of a parcel value often trigger utility retrofit requirements. The Town developed a Low Impact Development (LID) and Stormwater Manual in 2013; the Town's Zoning Regulations require LID for non-residential development. The Tree Warden is responsible for clearing downed trees; the Town reports that the budget for this is sufficient.

The Newington Fire Department has 110 volunteer members, with 28 on call at all times. The department has good response times, as well as mutual aid agreements with neighboring communities. Most of the Town is served by public water, and therefore hydrants are available to fight any brush fires that may break out.

The town utilizes the Everbridge Notification System, providing the ability to send emergency alerts to all residents, as well as to target selected areas.

All municipal buildings, as well as health care and assisted living facilities, have standby power.

New Capabilities

The Amtrak and CTfastrak railroad and busway bridge has been replaced in the last five years. A bridge over Piper Brook was also replaced. The fact that Amtrak did not agree to the recommendations proposed within the NRCS study has created a setback with regards to lowering risk in the Stamm Road area. The Town has adopted new regulations regarding stormwater infiltration measures, and has installed a trash rack at Main Street and Dowd Street to help prevent debris from disrupting drainage.



The Town has purchased a snow blower and a loader to assist with snow clearing efforts. The Town has also obtained a new salt shed on Milk Lane that has the capacity to hold 2,000 tons of salt. Following the 2011 winter storms, standby power generators were installed at municipal buildings, as well as health care and assisted living facilities.

Challenges

Challenges Overview

Flooding is a major concern for Newington. The Stamm Road area, which encompasses an industrial area and the Amtrak rail line, frequently experiences flooding; a study of flood reduction alternatives for the area is described in the “Capabilities” section, above. The intersection of Main Street and Dowd Street is also a primary area of concern for flooding; Mill Brook runs below this intersection and floods during heavy rain events. Minor flooding continues to be a problem at Main Street and Harding Avenue. A culvert on New Britain Avenue near the rail line is a problem. Generally, areas around Mill Brook are prone to flooding. The Town receives around ten complaints a year, including flooding caused by downed trees and beaver activity.

The Town is also concerned with hurricanes and severe storms. Downed trees and wires are among the most significant impacts of storms. Sequin Street, Fredrick Street, and Pheasant Run Street have each been closed due to downed trees.

While the municipal water system makes firefighting water available throughout Town, two low pressure areas exist due to high elevation; these are on Lamp Lighter Lane and Webster Street. Hydrants exist at these locations, but the low pressure could affect firefighting capacity.

Hazard Losses

The economic losses faced by the community from natural hazards can be estimated by reviewing historic, and modeling future, loss figures. Loss estimates are summarized below.

Historic FEMA Payments

FEMA reimburses communities for hazard losses through programs including Public Assistance (PA) and the National Flood Insurance Program (NFIP). Combining PA and private flood insurance payments can give an estimate for total losses to a community.

The NFIP has paid 45 property damage claims in Newington totaling \$664,971 to-date. There have been 17 Repetitive Loss (RL) Property claims on five properties totaling \$643,555.

Total PA reimbursements to the community were as follows:

- Flood Events: \$11,911 (\$627 annually)
- Hurricane Events: \$150,708 (\$7,932 annually)
- Winter Storm Events: \$2,911,344 (\$153,229 annually)



These are summarized in the tables below.

Table 23-2: Flood Event PA Reimbursements, Newington

Incident	Sep 1999	Oct 2005
Declaration	9/23/1999	12/16/2005
Disaster No.	1302	1619
Entity	FEMA PA Reimbursement	
State	\$1,418	\$1,758
Municipal	\$8,736	\$0
Nonprofit	\$0	\$0
Total	\$10,154	\$1,758
Annualized	\$534	\$93

Table 23-3: Hurricane Wind Event PA Reimbursements, Newington

Incident	Aug - Sep 2011 (T.S. Irene)
Declaration	9/2/2011
Disaster #	4023
Entity	FEMA PA Reimbursement
State	\$9,767
Municipal	\$140,942
Nonprofit	\$0
Total	\$150,708
Annualized	\$7,932

Table 23-4: Winter Storm PA Reimbursements, Newington

Incident	Mar 2003	Dec 2003	Jan 2005	Feb 2006	Jan 2011	Oct 2011	Feb 2013
Declaration	3/11/03	1/15/04	2/17/05	5/2/06	3/3/11	11/17/11	3/21/13
Disaster #	3176	3192	3200	3266	1958	4046	4106
Entity	FEMA PA Reimbursement						
State	\$26,499	\$23,755	\$31,340	\$38,040	\$42,641	\$64,143	\$81,298
Municipal	\$61,491	\$73,895	\$98,116	\$73,578	\$65,804	\$1,975,848	\$249,436
Nonprofit	\$0	\$0	\$0	\$0	\$2,330	\$0	\$3,129
Total	\$87,990	\$97,651	\$129,456	\$111,618	\$110,775	\$2,039,990	\$333,863
Annualized	\$4,631	\$5,140	\$6,813	\$5,875	\$5,830	\$107,368	\$17,572

National Centers for Environmental Information Losses

The table below summarizes events in the National Centers for Environmental Information (NCEI) severe storm database that were specifically noted as having impacted the community since 2012.



Table 23-5: NCEI Database Losses since 2012, Newington

Date	Event	Property Damage
6/18/2013	Hail	\$0
7/22/2016	Thunderstorm Wind	\$75,000
10/25/2017	Flood	\$0
1/13/2018	Flood	\$0
Total Thunderstorm		\$75,000
Total Flood		\$0

NCEI losses under other event categories (such as drought, high wind, flooding, and winter storms) were not specifically noted as impacting this community, though they did impact Hartford County and nearby towns. NCEI losses are reported in Section II of this Plan.

HAZUS-MH Losses

CRCOG used FEMA’s Hazus-MH model to analyze the risks that the community might face from flooding, hurricanes, and earthquakes. The model estimates economic losses to the City due to damage to buildings and building contents, as well as other economic disruptions. Both residential and commercial structures are addressed. Losses from different hazards are summarized below. Where available, estimates from the previous and current versions of the HMP are provided side-by-side; differences between the two may have been caused by a combination of the following:

- Changes in methodology: such as hazard zone mapping
- Changes in data: such as population and property values
- Changes in the model: this HMP utilized Hazus-MH version 4.0 rather than 2.1
- Other factors: inherent in a complex software like Hazus-MH

More details are available in the Multi-Jurisdictional HMP. Ultimately, changes in the loss estimates reflect the reality that small differences in hazard event features can have a significant impact on losses incurred.

Table 23-6: Estimated Damages to Newington from a 1% Annual-Chance Flood

Loss Type	2014 Results	2018 Results
Households Displaced	144	318
People Needing Shelter	283	534
Buildings at Least Moderately Damaged	23	0
Economic Losses		
Residential Building & Content Losses	\$4,690,000	\$16,810,204
Other Building & Content Losses	\$8,930,000	\$25,866,265
Total Building & Content Loss	\$13,620,000	\$42,676,470
Total Business Interruption Losses	\$70,000	\$1,188,814
TOTAL	\$15,730,000	\$43,865,284



Table 23-7: Estimated Damages to Newington from a 1% Annual-Chance Hurricane

Loss Type	2014 Results (1938 event)	2018 Results (1% track)
Buildings at Least Moderately Damaged	1,340	3
Buildings Completely Damaged	90	0
Total Debris Generated	30,900 tons	2802
Truckloads (at 25 tons/truck) of building debris	616	112
Economic Losses		
Residential Building & Content Losses	\$119,715,000	\$14,018,816
Other Building & Content Losses	\$30,630,000	\$442,769
Total Building & Content Loss	\$150,345,000	\$14,461,585
Total Business Interruption Losses	\$18,415,000	\$270,170
TOTAL LOSSES	\$168,800,000	\$14,731,755

Losses were calculated from a modeled probabilistic earthquake (1% annual-chance of occurrence), as well as for four specific scenarios with epicenters around Connecticut.

Table 23-8: Estimated Damages to Newington from a Probabilistic Earthquake

Loss Type	2018 Results
Wage Loss	\$6,613
Rent Loss	\$4,532
Relocation Loss	\$7,281
Income Loss	\$5,705
Inventory Loss	\$858
Total Business Disruption	\$24,988
Structural Loss	\$15,132
Non-Structural Loss	\$48,838
Total Building Loss	\$63,970
Total Content Loss	\$20,577
TOTAL LOSSES	\$109,535

Table 23-9: Estimated Damages to Newington from Modeled Earthquake Scenarios

Epicenter Location	Magnitude	Estimated Total Losses
East Haddam	6.4	\$822,895.80
Haddam	5.7	\$287,748.42
Portland	5.7	\$1,715,376.20
Stamford	5.7	\$11,936.70

Average Annualized Losses

Average Annualized Loss (AAL) figures are useful tools for comparison of the risks faced from different hazards with different likelihoods of occurring in a given time period. AAL estimates were prepared for New Britain based on the methodologies discussed in Section II of the Multi-Jurisdictional HMP. Dam failure, drought, tornado, and wildfire losses were sourced from the 2014 Connecticut Natural Hazard Mitigation Plan Update, with dam failure data supplemented by the National Performance of Dams Program and the Connecticut Department of Energy &



Environmental Protection. Earthquake and hurricane losses were calculated in HAZUS-MH. Losses for flooding came from NFIP claims, for winter storms from Public Assistance Reimbursements, and for thunderstorms from the NCEI database. These are presented in the table below in dollars per year. Note that Hurricanes and Tropical Storms represent the largest share of total annualized losses.

Table 23-10: Average Annualized Losses, Newington

Dam Failure	Drought	Earthquakes	Flooding	Hurricanes and Tropical Storms	Severe Winter Storms	Thunderstorms	Tornadoes	Wildfires	Total
\$55	\$0	\$109,535	\$18,126	\$1,915,888	\$153,229	\$4,059	\$448,402	\$2,442	\$2,651,735

Losses Summary

A review of the above loss estimates demonstrates that the Town of Newington has experienced significant expenses as a result of natural hazards, and is at risk for additional losses if some of the less-frequent events were to occur. These actual and potential losses justify hazard mitigation actions to reduce losses in the future.

Mitigation Strategies and Actions

Noted Hazard Mitigation Needs

During the course of this Plan development, multiple hazard mitigation needs of Newington were noted. These are discussed here.

- Implementation of the 2014 NRCS flood reduction recommendations for the Stamm Road area is a top priority for the Town due in large part to planned activity in this area, including the CT *fastrak* (Hartford-New Britain Busway), The Harford Line (New Haven-Springfield commuter rail service) and plans for the Central CT State University campus. Implementation of the NRCS recommendations will require the cooperation of multiple agencies (Town, State, and Federal), other regulating authorities and neighboring towns, as well as from Amtrak, as rail service would have to be suspended while tracks are removed and replaced. Unfortunately, Amtrak has not agreed to these recommendations at this time, halting progress on this action.
- After its evacuation routes are updated, Newington may post them to the Town website.
- The Town is interesting in developing a backup EOC.



Status of Previous Mitigation Strategies and Actions

The Town of Newington reviewed the mitigation actions proposed in the 2014-2019 Capitol Region Natural Hazards Mitigation Plan Update (2014 HMP) and determined the status of each. That information is included in the table below.

Table 23-11: Status of Previous Mitigation Strategies and Actions, Newington

Action #	Action	Notes	Status
GOAL: REDUCE THE LOSS OF LIFE AND PROPERTY AND ECONOMIC CONSEQUENCES AS A RESULT OF FLOODING, HIGH WINDS AND SEVERE WINTER STORMS			
Objective 1: Reduce the likelihood of flooding by improving existing natural and artificial drainage systems.			
1.1	Coordinate with Central CT State University, Amtrak, CT Department of Transportation and Northeast Utilities to implement recommendations of the NRCS study of Piper Brook/Stamm Road area and/or explore other alternatives (design initiatives) to ameliorate the flooding.	Problem persists but Amtrak is not agreeable to incorporate upgrades. They may have cleaned or maintained culverts during recent rail work.	Drop
1.2	Ensure that Amtrak properly maintains existing drainage system around rail bed.	This is an established practice.	Capability
1.3	Ensure Town properly maintains its drainage facilities near Stamm Road/Piper Brook complex.	This is an established practice by the Town (Capability). However, the Town cannot maintain Piper Brook to the extent requested by DEEP. Access is challenging in many locations, as well.	Carry Forward with Revisions
1.4	Notify Wilbur Smith, who is conducting the New Haven-Springfield commuter rail study, of town's flooding and rail safety concerns, and of NRCS study's recommendations.	No change done based on NRCS recommendations. Amtrak not responding well.	Completed
1.5	Reduce the likelihood of flooding by improving existing natural and artificial drainage systems.	In 2013 the Town established a "Low Impact Development and Stormwater Manual" and in 2014, adopted zoning regulations that require LID for new substantial developments. The Town feels this will address drainage issues.	Completed
1.6	Continue to support Metropolitan District Commission efforts to disconnect residential tie-ins to the sewer system. MDC will provide public outreach updates by informational sheets (i.e. flyers) and community meetings.	Town supports MDC efforts; this is a capability. MDC does testing on streets and notifies town but not sure if they do community engagement.	Capability
Objective 2: Improve the ability of public works to prepare and respond to severe winter storms and other natural emergencies.			
2.1	Plan and implement enhanced salt road treatment technology, including storage facility construction.	Town obtained a salt shed that was built in the past ten years at 281 Milk Lane. It has capability to hold 2,000 tons of salt.	Completed
2.2	Continue to support CT DOT in state road treatment.	Town supports CT DOT; this is a capability. CTDOT does not have man power to address secondary roads.	Capability



Action #	Action	Notes	Status
Objective 3: Improve the ability of public works and parks and recreation to prepare and respond to hurricanes/high wind events.			
3.1	Develop and implement street and public tree maintenance plan.	New tree type policy, trees to be put in private homes than right of way. This has been done since last two years although not officially adopted policy. New tree maintenance measures are in place.	Completed
Objective 4: Ensure ability of municipal departments to respond to emergencies resulting from natural hazards.			
4.1	Continue training through Local Emergency Planning Committee	This committee meets quarterly and participates in statewide Governor's exercises and also holds local drills. This is a capability.	Capability
4.2	[Construct an] Emergency Operations Center (EOC)	Completed, housed in Police Headquarters. Town has identified Police Training Facility as a backup EOC and is working on acquiring a generator and communications equipment.	Completed

Active Mitigation Strategies and Actions

The Town proposed to initiate several new mitigation actions for the upcoming five years. Additionally, a number of actions from the previous planning period are being carried forward or replaced with revised actions. These are listed below.

Each of the following actions has been prioritized based on FEMA guidelines, listed from highest to lowest priority, and numbered.

Action #1	
Enter the Sustainable CT program through Registration and review actions that can be undertaken to pursue Certification. Make progress with the actions related to hazard mitigation.	
Goal	4. Increase the use of natural, "green," or "soft" hazard mitigation measures, such as open space preservation and green infrastructure.
Category	Natural Resources Protection
Lead	Planning
Cost	\$0 - \$10,000
Funding	Town Operating Budget
Timeframe	01/2019 - 12/2019
Priority	High



Action #2

Explore possibility of increasing annual budgets for waterway maintenance, snow removal, and tree maintenance.

Goal	7. Improve the emergency response capabilities of the region and its communities
Category	Prevention
Lead	Public Works
Cost	\$0 - \$10,000
Funding	Town Operating Budget
Timeframe	07/2019 - 06/2024
Priority	High

Action #3

Identify cost-effective ways to mitigate or reduce flooding in the Stamm Road area, which includes repetitive loss properties, especially those that do not require working with Amtrak.

Goal	1. Minimize the impact of natural hazards on physical buildings and infrastructure
Category	Property Protection
Lead	Planning
Cost	\$10,000 - \$25,000
Funding	CT DEEP / DEMHS
Timeframe	07/2019 - 06/2021
Priority	High

Action #4

Equip the Backup EOC (Police Training Facility) with a generator and communication equipment

Goal	7. Improve the emergency response capabilities of the region and its communities
Category	Preparedness & Emergency Response
Lead	Emergency Management
Cost	\$50,000 - \$100,000
Funding	Town Operating Budget / Grants
Timeframe	07/2021 - 06/2022
Priority	High



Action #5

Conduct outreach to local small businesses with the aim of preventing the accidental release and pollution from chemicals stored and used at their facilities during or following natural hazard events.

Goal	6. Improve public outreach, education, and warning systems
Category	Education & Awareness
Lead	Planning, in coordination with DEEP
Cost	\$0 - \$10,000
Funding	Materials & Resources Provided by CT DEEP
Timeframe	01/2019 - 12/2019
Priority	Medium

Action #6

Coordinate with NEMO and CRCOG to share resources and gain technical support for hazard mitigation actions involving stormwater management and public outreach, which have parallel benefits related to MS4 stormwater permit compliance.

Goal	1. Minimize the impact of natural hazards on physical buildings and infrastructure
Category	Prevention
Lead	Public Works
Cost	\$0 - \$10,000
Funding	Town Operating Budget
Timeframe	01/2020 - 12/2020
Priority	Medium

Action #7

Participate in EMI courses or the seminars and annual conference held by the Connecticut Association of Flood Managers.

Goal	3. Improve institutional awareness and understanding of natural hazard impacts and mitigation within municipal governments and other decision-making bodies
Category	Education & Awareness
Lead	Planning
Cost	\$0 - \$10,000
Funding	Town Operating Budget
Timeframe	07/2019 - 06/2024
Priority	Medium



Action #8

Perform an assessment of assets located in flood-prone areas.

Goal	1. Minimize the impact of natural hazards on physical buildings and infrastructure
Category	Prevention
Lead	Engineering
Cost	\$10,000 - \$25,000
Funding	Town Operating Budget / Grants / DEMHS
Timeframe	07/2020 - 06/2022
Priority	Medium

Action #9

Work with MDC to identify potential hazard mitigation actions for MDC facilities, and list those actions in the next HMP Update.

Goal	5. Improve the resilience of local and regional utilities and infrastructure using strategies including adaptation, hardening, and creating redundancies.
Category	Property Protection
Lead	Public Works
Cost	\$10,000 - \$25,000
Funding	Town Operating Budget / DEMHS
Timeframe	07/2020 - 06/2022
Priority	Medium

Action #10

Equip backup shelters (Kellog and Wallace Middle Schools) with emergency generators

Goal	7. Improve the emergency response capabilities of the region and its communities
Category	Preparedness & Emergency Response
Lead	Emergency Management
Cost	More than \$100,000
Funding	Town Operating Budget / Grants
Timeframe	07/2022 - 06/2024
Priority	Medium



Action #11

Upgrade equipment related to waterway maintenance, snow removal, and tree maintenance. Include, specifically, adding the purchase of a large-tree bucket-truck for the Parks and Grounds Department to the Town's long-range plans.

Goal	7. Improve the emergency response capabilities of the region and its communities
Category	Prevention
Lead	Public Works / Parks & Grounds
Cost	More than \$100,000
Funding	Grants
Timeframe	07/2022 - 06/2024
Priority	Medium

Action #12

Pursue opportunities to bury utilities in appropriate locations and scenarios, such as during a road reconstruction.

Goal	5. Improve the resilience of local and regional utilities and infrastructure using strategies including adaptation, hardening, and creating redundancies.
Category	Prevention
Lead	Public Works
Cost	More than \$100,000
Funding	Grants
Timeframe	07/2022 - 06/2024
Priority	Medium

Action #13

Coordinate with CT SHPO to conduct historic resource surveys, focusing on areas within natural hazard risk zones (such as flood or wildfire hazard zones and areas near steep slopes), to support identification of vulnerable historic properties and preparation of resiliency plans across the state. This action leverages existing resources and best practices for protection of historic and cultural resources through an ongoing statewide initiative by CT SHPO.

Goal	8. Ensure community character and social equity are addressed in mitigation activities
Category	Property Protection
Lead	Planning, in coordination with SHPO
Cost	\$10,000 - \$25,000
Funding	SHPO
Timeframe	07/2021 - 06/2023
Priority	Low














Capitol Region Natural Hazards Mitigation Plan Update




Newington, Connecticut

Flood Plains, Dams & Critical Facilities




Critical Facilities

-  Fire Station
-  Police Station
-  School
-  Healthcare Facility
-  State Facility
-  Town Facility
-  Waste Water Facility
-  Emergency Center
-  NRHP Buildings/Sites

Dam Hazard Class

-  BB, A, AA OR Unclassified
-  Class B - Significant Hazard
-  Class C - High Hazard

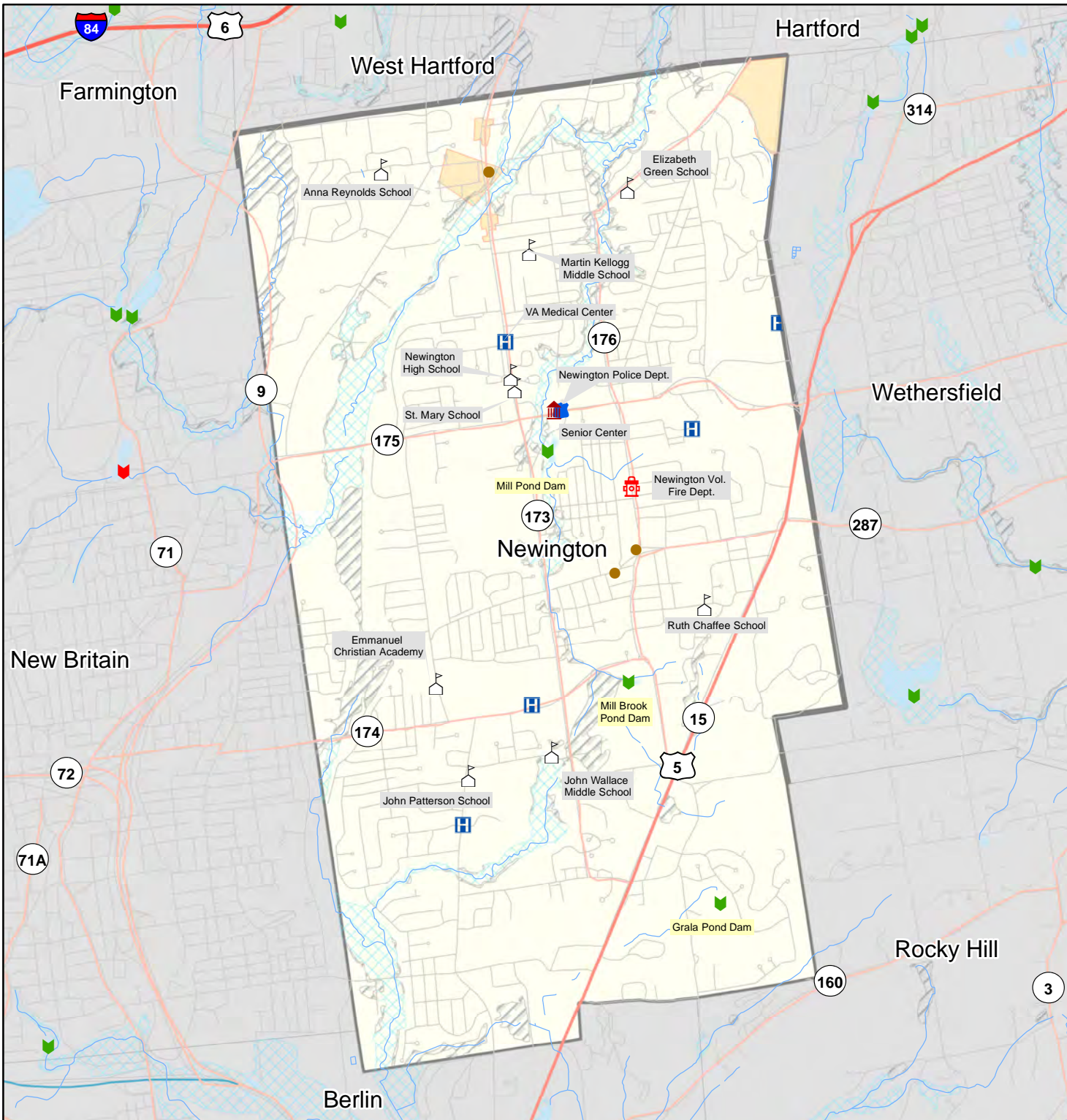
FEMA Flood Hazard Area

-  100 Year Flood Zone
-  500 Year Flood Zone
-  NRHP Districts/Areas

Data Sources: FEMA, National Register of Historic Places, CT DEEP, CRCOG, ESRI



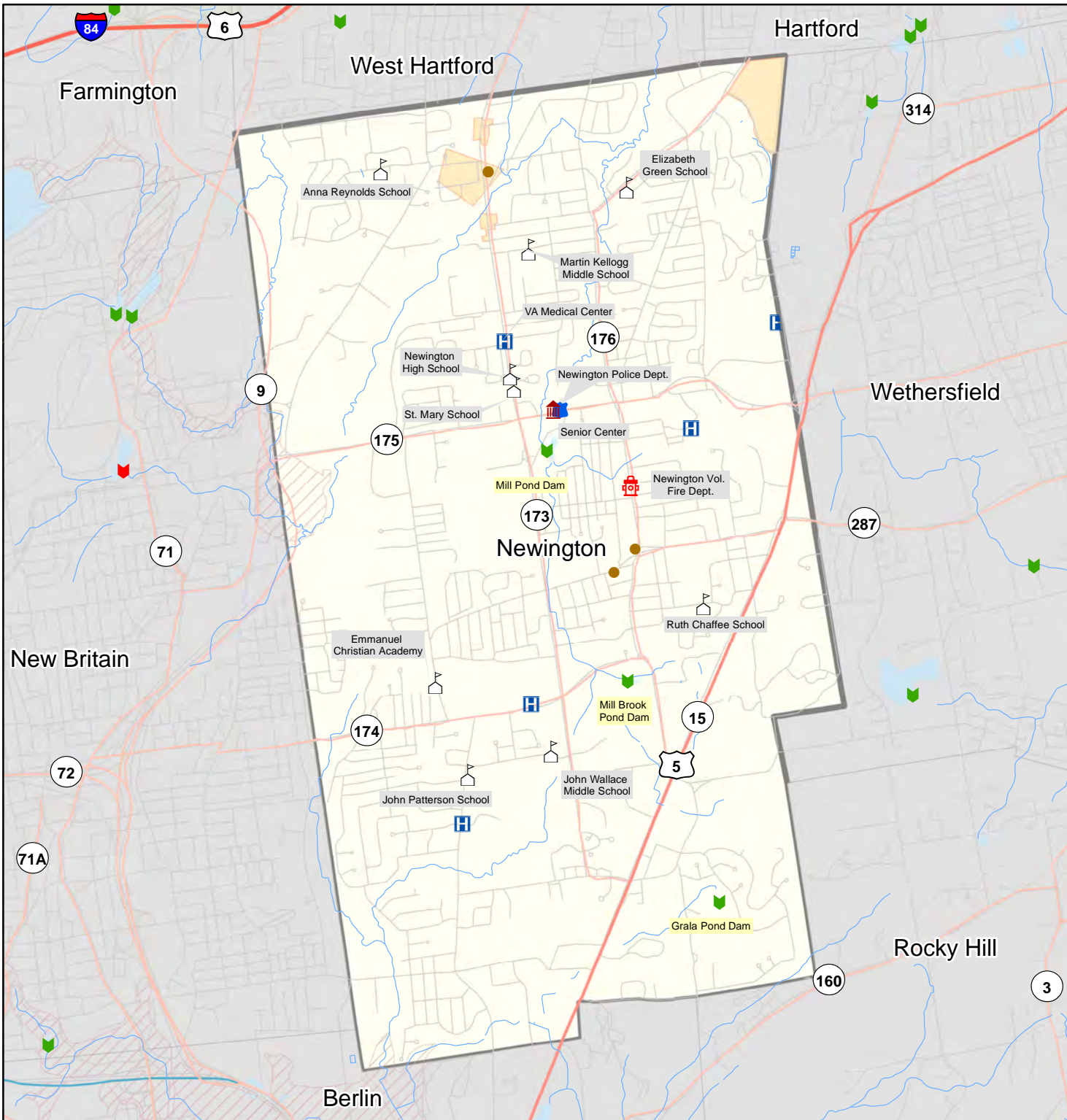
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Capitol Region Natural Hazards Mitigation Plan Update

Newington, Connecticut




Dam Breach Inundation Area & Critical Facilities




Critical Facilities

-  Fire Station
-  Police Station
-  School
-  Healthcare Facility
-  State Facility
-  Town Facility
-  Waste Water Facility
-  Emergency Center
-  NRHP Buildings/Sites

Dam Hazard Class

-  BB, A, AA OR Unclassified
-  Class B - Significant Hazard
-  Class C - High Hazard

 Dam Breach Inundation Areas

 NRHP Districts/Areas

Data Sources: FEMA, National Register of Historic Places, CT DEEP, CRCOG, ESRI



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24 Plainville

Community Overview

Plainville encompasses 9.7 square miles of land and is home to 17,716 residents (2010 census); a population density of 1,826 people per square mile. Plainville has suburban and rural areas as well as urban elements. Development is concentrated in the west-central region of Town. New residential development has continued slowly in recent years, and redevelopment of commercial and industrial properties has also occurred. Approximately 120 acres are available for industrial development, and approximately 1,000 acres are available for residential development; much of this is constrained by shallow bedrock such that the actual acreage may be less.

Elevation ranges from 170 to 660 feet. Most of the land drains to the Quinnipiac River or the Pequabuck River; small portions of the northeast corner and southeast corners of town drain to Bass Brook and Willow Brook, respectively. Another notable stream in Plainville is Trout Brook.

Major transportation routes through Town include Interstate 84 and Routes 72, 10, 177, and 372. The town lies at the intersection of two freight rail lines, one running north from New Haven and the other running east-west between Waterbury and New Britain. Plainville is home to Robertson Airport, owned by the Town. Major businesses and industries include manufacturing, construction, retail trade, and health care and social assistance. Plainville has two industrial parks: Strawberry Fields and Farmington Valley Corporate.

Critical Facilities

Critical Facilities throughout the Capitol Region are listed in Appendix B. In Plainville these include the Fire Department, Police Department (EOC), Municipal Center/Town Hall, Senior Center, Water Pollution Control facility, Belle Marie Assisted Living, Public Works Department, Plainville Senior High School (regional emergency shelter), Plainville Buildings and Grounds Department, three Senior Housing facilities, the Wheeler Elementary School, the Wheeler Clinic / Northwest Village School, an Apple Rehab long-term care facility, the Middle School of Plainville, Toffolon School, Linden Street School, Great Beginnings, Great Beginnings II, Plainville Public Library, Congregational Church / Plainville Early Learning Center, and ten pumping stations.

Table 24-1: Critical Facilities, Plainville

Facility	Shelter	Generator
Fire Department		X
Police Department (EOC)		
Municipal Center/Town Hall		Limited
Senior Center	Backup	Limited
Water Pollution Control Facility		X
Belle Marie Assisted Living		
Public Works Department		

Facility	Shelter	Generator
Plainville Senior High School	X	X
Plainville Buildings and Grounds		
3 Senior Housing		
Wheeler Elementary School		X
Wheeler Clinic / Northwest Village School		
Apple Rehab Long-term Care Facility		
Middle School of Plainville		X
Toffolon School		X
Linden Street School		
Great Beginnings		
Great Beginnings II		
Plainville Public Library		
Congregational Church / Plainville Early Learning Center		
10 wastewater pumping stations		X

The High School is the community’s primary shelter and acts as a regional shelter. It has a sufficient emergency generator. The Senior Center is a backup shelter but has limited backup power capabilities. The Town acquires shelter supplies whenever possible, and all shelters have been recently restocked with cots and blankets.

The wastewater treatment plant and pumping stations have backup power, as does the Fire Department. The Municipal Center has a generator that can only power part of the building. Town staff desire to upgrade the Municipal Center generator to be able to run all necessary computers and servers during an extended power outage. Wheeler Elementary School is currently undergoing a renovation that includes installation of an updated emergency generator and steam heating system.

The Police Station and EOC, and Municipal Center, are located very near the 0.2% annual chance floodplain. The Fire Station lies within the 0.2% annual chance floodplain.

Capabilities

Plainville maintains an Emergency Operations Plan, Emergency Operations Center, shelters, and warming/charging stations. The Town maintains a training program for its emergency personnel. The Town utilizes the statewide CT Alerts emergency notification system when residents need to be informed about a hazard event, and may also utilize local media, and notices left at at-risk houses when needed. The Town posts extensive hazard preparedness information on its website and has pamphlets available at the Municipal Center, the Public Library, and the Senior Center. Hazard mitigation is incorporated into the community’s Plan of Conservation and Development (POCD). POCD actions specifically address natural hazards.

The wastewater treatment plant has preparation, response, and recovery procedures in place in case of flooding, tropical storms and hurricanes, earthquakes, and other natural hazards. Sandbags are available for emergency flood protection. No major hazard mitigation projects are planned for the site.



Plainville has very strong floodplain regulations that prohibit any residential or commercial land use, or any use requiring a “substantial investment in structure or permanent equipment that could be damaged by flooding,” to occur in the floodplain. Basic agricultural and recreational uses are permitted, as well as several industrial uses with restrictions.

The Town’s 2009 Plan of Conservation and Development (POCD, 2009) emphasizes conservation of its limited open space and recommends a management plan to protect open space and land conservation beyond the 182 acres (only 2.9% of the Town of Plainville’s total land area) already designated. Over 34 additional acres within the floodplain and floodway are subject of a purchase and sales agreement; the Town hopes to close on these properties by October 2018.

The Town adopted a Low-Impact Development ordinance in 2010 and developed a manual in 2011 that details a technical framework of methods of stormwater management that can lead to improvements in stormwater quality as well as a reduction in stormwater runoff.

All new bridge and culvert construction is designed using the most recent Northeast Regional Climate Center (NRCC) rainfall return periods in accordance with December 2014 CT DOT guidance. The Town has not evaluated existing culverts in the community based on the new rainfall return periods. Drainage and flooding complaints are routed to either the Fire Department or Public Works.

Removal of the ice and snow for Plainville’s town-owned roads is handled by town workers and contractors; the town handles debris removal. Plowing routes prioritize access to critical facilities. Most tree trimming near power lines is conducted by Eversource Energy. The Town’s Superintendent of Roadways is also the Tree Warden. The Town removes dead or dangerous trees on Town property after consulting an arborist. The Town does not typically cut trees on private property. The tree maintenance budget is part of the roadway budget and is considered sufficient at this time.

Subdivision regulations require utilities in new residential developments to be installed underground, except in areas at risk of flooding; only about 10% of all utilities in town are buried at this point.

Plainville maintains mutual aid agreements with all surrounding communities for fire protection. The Town does not have any dry hydrants or cisterns, but hydrants served by public water supply exist throughout Town. Open Burning Regulations (adopted November 6, 2006) require applicants to apply to the local Open Burning Official for approval a minimum of 48 hours prior to the proposed burn. The Town has one Open Burning Official certified by the Connecticut DEEP.

The Town primarily relies on regional and statewide measures for mitigating the impacts of drought, such as the Connecticut Drought Management Plan. The local water company (Valley Water Systems) maintains an Emergency Contingency Plan that outlines drought response



procedures. The company can implement water use restrictions during a drought, though this has not occurred over the last 30 years. Valley Water Systems is a member of the Water Utility Coordinating Committee (although the Town of Plainville is not).

The Town does not currently have copies of EAPs for dams whose failure could affect the community. The Town participates in dam failure training exercises for the MDC dams. The risk due to failure of the remaining dams is believed to be relatively minor.

New Capabilities

Plainville adopted updated floodplain regulations in March, 2018.

The recently completed Pequabuck River Flooding Study was commissioned by Plainville in partnership with Bristol and Plymouth and made possible by a \$200,000 grant from the Economic Development Administration. The study included major revisions to the hydrology and hydraulics originally used to generate the special flood hazard area for the river and identified measures to reduce the impact of flooding. Specific recommendations from the study have been incorporated into the Hazard Mitigation Plan (HMP). Plainville has not used the results of the study to apply to FEMA for map revisions.

FEMA has recently completed updated mapping of Quinnipiac River flood zones; this has led to changes in the flood risk status of over 50 properties. The Town has worked with affected members of the community and with banks to help them interpret changes and understand the impacts.

Thirteen properties at risk of flooding on Robert Street Extension and Forestville Avenue have been acquired and demolished since adoption of the 2016-2021 Hazard Mitigation Plan for the Former Central Connecticut Region ("2016 HMP"), bringing the total number to 26 since 2011. Two residential homes and one structure, owned by the Town, remains.

The Town POCD will be updated within the next couple of years; an RFP to complete the update was posted in 2018.

The Town has improved its GIS capabilities to assist with emergency response and preparedness.

Plainville Planning Office undertook a Town-wide awareness effort following the most recent update of the FEMA Flood Insurance Rate Maps.

Challenges

Challenges Overview

The top three natural hazards that present a high risk to Plainville are flooding, winter storms, and tropical storms/hurricanes.



A number of structures are within the Pequabuck River floodplain in the downtown area, particularly in the vicinity of Robert Street Extension, the wastewater treatment facility, West Main Street, Forestville Avenue (Route 372), Cronk Road, and Norton Place Extension. The wastewater treatment facility is subject to flooding under extreme conditions; it is a gravity-operated plant built in the 1940s. There is concern that a major flood event on the Pequabuck River could wash out an essential bridge, isolating one side of Plainville from the other.

The Quinnipiac River floods frequently as well. Flooding due to insufficient drainage is a problem in some areas near the Quinnipiac; even slight flooding of the Quinnipiac can cause backups in the sewer and storm water systems.

The primary problem from tropical storms and hurricanes is downed trees that interrupt power supply and hinder egress through neighborhoods. Secondary impacts are generally caused by heavy rainfall accompanying the storm. Tornadoes and thunderstorms are typically less damaging than tropical storms or hurricanes but cause similar problems.

Wildfires in Plainville are very rare. They have typically occurred along the ridgelines near the edge of Plainville along former logging cuts. The greatest areas of concern are those that do not have public water service and have limited access; these are located near Bradley Mountain on the southeast side of Plainville, and the northeast corner of town from the ridgeline with Pinnacle Rock east to Interstate 84. One- to two-acre fires have occurred near Pinnacle Rock.

Approximately 10 dams could affect the Town of Plainville with their failure. Two class C dams are located in Town; although several other Class C dams are located upstream in Bristol and Plymouth, the failure of these dams are not expected to cause inundation that would significantly affect Plainville. The two Class C dams in Plainville are listed in the table below.

Table 24-2: Summary of Dams Whose Failure Could Significantly Impact Plainville.

Dam Name	Hazard Class	Dam Use	Dam Condition	Owner	Downstream Watercourse
Hogback (Goodwin) Dam	C	Hydropower	Satisfactory	Metropolitan District Commission	West Branch Farmington River
Saville Dam (Barkhamsted Reservoir)	C	Water Supply	Good	Metropolitan District Commission	East Branch Farmington River

Municipal officials note that numerous dams in the CT DEEP geospatial database appear to be inaccurately located or no longer in existence. The Fleetwood Arms Dam impoundment has been filled and retains a limited amount of water in wetlands adjacent to the channel. Hamlin Pond dam is located about a quarter mile downstream of where the CT DEEP map places it. The Norton Park Dam was previously associated with a swimming pond located within Norton



Park; the pond has been replaced with a modern swimming pool that is no longer connected to the stream, and that dam no longer exists¹.

Hazard Losses

The economic losses faced by Plainville from natural hazards can be estimated by reviewing historic, and modeling future, loss figures. Loss estimates are summarized below.

Historic FEMA Payments

FEMA reimburses communities for hazard losses through programs including Public Assistance (PA) and the National Flood Insurance Program (NFIP). Combining PA and private flood insurance payments can give an estimate for total losses to a community.

The NFIP has paid 81 property damage claims in the community as of August 2017, totaling \$991,751. Plainville has 23 RL property claims to date from seven RL properties totaling \$319,075.

Total PA reimbursements to the community were as follows:

- Flood Events: \$41,427 (\$2,180 annually)
- Hurricane Events: \$45,520 (\$2,396 annually)
- Winter Storm Events: \$1,046,532 (\$55,081 annually)

These are summarized in the tables below.

Table 24-3: Flood Event PA Reimbursements, Plainville

Incident	Sep 1999	Oct 2005
Declaration	9/23/1999	12/16/2005
Disaster No.	1302	1619
Entity	FEMA PA Reimbursement	
State	\$822	\$1,019
Municipal	\$39,586	\$0
Nonprofit	\$0	\$0
Total	\$40,408	\$1,019
Annualized	\$2,127	\$54

¹¹ It is possible the dam mapped by CT DEEP was associated with another historical impoundment located a quarter mile south of the mapped location. This pond still exists but no dam structure remains.



Table 24-4: Hurricane Wind Event PA Reimbursements, Plainville

Incident	Aug - Sep 2011 (T.S. Irene)
Declaration	9/2/2011
Disaster #	4023
Entity	FEMA PA Reimbursement
State	\$779
Municipal	\$44,741
Nonprofit	\$0
Total	\$45,520
Annualized	\$2,396

Table 24-5: Winter Storm PA Reimbursements, Plainville

Incident	Mar 2003	Dec 2003	Jan 2005	Feb 2006	Jan 2011	Oct 2011	Feb 2013
Declaration	3/11/03	1/15/04	2/17/05	5/2/06	3/3/11	11/17/11	3/21/13
Disaster #	3176	3192	3200	3266	1958	4046	4106
Entity	FEMA PA Reimbursement						
State	\$15,361	\$13,770	\$18,167	\$22,051	\$19,212	\$7,923	\$37,337
Municipal	\$47,475	\$36,883	\$57,399	\$67,252	\$61,031	\$495,400	\$139,330
Nonprofit	\$0	\$0	\$0	\$0	\$3,376	\$3,001	\$1,565
Total	\$62,836	\$50,654	\$75,566	\$89,302	\$83,619	\$506,324	\$178,231
Annualized	\$3,307	\$2,666	\$3,977	\$4,700	\$4,401	\$26,649	\$9,381

National Centers for Environmental Information Losses

The National Centers for Environmental Information (NCEI) severe storm database was reviewed for hazards that have impacted Plainville. No hazards were specifically noted as having impacted the community since 2012, though they did impact Hartford County and nearby towns. NCEI losses are reported in Section II of this Plan.

HAZUS-MH Losses

CRCOG used FEMA’s Hazus-MH model to analyze the risks that the community might face from flooding, hurricanes, and earthquakes. The model estimates economic losses due to damage to buildings and building contents, as well as other economic disruptions. Both residential and commercial structures are addressed. Losses from different hazards are summarized below. Where available, estimates from the previous and current versions of the HMP are provided side-by-side; differences between the two may have been caused by a combination of the following:

- Changes in methodology: such as hazard zone mapping
- Changes in data: such as population and property values
- Changes in the model: this HMP utilized Hazus-MH version 4.0 rather than 2.1
- Other factors: inherent in a complex software like Hazus-MH



Table 24-6: Estimated Damages to Plainville from a 1% Annual-Chance Flood

Loss Type	2014 Results	2018 Results
Households Displaced	667	267
People Needing Shelter	1,297	352
Buildings at Least Moderately Damaged	61	0
Economic Losses		
Residential Building & Content Losses	\$34,290,000	\$15,482,185
Other Building & Content Losses	\$59,870,000	\$27,398,361
Total Building & Content Loss	\$94,160,000	\$42,880,546
Total Business Interruption Losses	\$480,000	\$1,888,879
TOTAL	\$94,640,000	\$44,769,425

Table 24-7: Estimated Damages to Plainville from a 1% Annual-Chance Hurricane

Loss Type	2014 Results (1938 event)	2018 Results (1% track)
Buildings at Least Moderately Damaged	2,497	1
Buildings Completely Damaged	27	0
Total Debris Generated	171,080	787
Truckloads (at 25 tons/truck) of building debris	6,843	31
Economic Losses		
Residential Building & Content Losses	\$54,967,720	\$3,290,629
Other Building & Content Losses	\$17,106,210	\$111,815
Total Building & Content Loss	\$72,073,930	\$3,402,444
Total Business Interruption Losses	\$2,320,940	\$17,946
TOTAL LOSSES	\$74,394,870	\$3,420,390

Losses were calculated from a modeled probabilistic earthquake (1% annual-chance of occurrence), as well as for four specific scenarios with epicenters around Connecticut.

Table 24-8: Estimated Damages to Plainville from a Probabilistic Earthquake

Loss Type	2018 Results
Wage Loss	\$3,490
Rent Loss	\$2,830
Relocation Loss	\$4,549
Income Loss	\$2,656
Inventory Loss	\$488
Total Business Disruption	\$14,015
Structural Loss	\$8,853
Non-Structural Loss	\$28,242
Total Building Loss	\$37,095
Total Content Loss	\$11,787
TOTAL LOSSES	\$62,897



Table 24-9: Estimated Damages to Plainville from Modeled Earthquake Scenarios

Epicenter Location	Magnitude	Estimated Total Losses
East Haddam	6.4	\$294,368.89
Haddam	5.7	\$80,314.36
Portland	5.7	\$310,017.82
Stamford	5.7	\$7,986.35

More details are available in the Multi-Jurisdictional HMP. Ultimately, changes in the loss estimates reflect the reality that small differences in hazard event features can have a significant impact on losses incurred.

Other Hazard Costs

The table below considers the impact of Severe Winter Storms on the Town of Plainville based on Winter Storm Alfred in late October 2011. Debris removal was the biggest impact, with the total municipal cost to clean up after the storm totaling nearly a half-million dollars.

Table 24-10: October 2011 Severe Winter Storm Losses for Plainville.

Impact	Estimated Losses
Number of Electrical Customers Served (2013)	9,328
Maximum Outages During Severe Winter Storm (2011)	9,278
Maximum Outages Percentage of Customers (2011)	99.46%
Number of Businesses Experiencing Outages	>100
Total Lost Wages (Daily)	\$2,012.09
Average Lost Wages (Weekly)	\$48,775.00
Miles of Local Roads Plowed by Town of Plainville	84.36
Municipal Cost (Plowing, Road Treatment, Debris Removal)	\$495,400.17

Source: Eversource, CCRPA Internal Analysis

Average Annualized Losses

Average Annualized Loss (AAL) figures are useful tools for comparison of the risks faced from different hazards with different likelihoods of occurring in a given time period. AAL estimates were prepared for each natural hazard which may impact the community based on the methodologies discussed in Section II of the Multi-Jurisdictional HMP. Dam failure, drought, tornado, and wildfire losses were sourced from the 2014 Connecticut Natural Hazard Mitigation Plan Update, with dam failure data supplemented by the National Performance of Dams Program and the Connecticut Department of Energy & Environmental Protection. Earthquake and hurricane losses were calculated in HAZUS-MH. Losses for flooding came from NFIP claims, for winter storms from Public Assistance Reimbursements, and for thunderstorms from the NCEI database. These are presented in the table below in dollars per year. Note that Hurricanes and Tropical Storms represent the largest share of total annualized losses.



Table 24-11: Average Annualized Losses, Plainville

Dam Failure	Drought	Earthquakes	Flooding	Hurricanes and Tropical Storms	Severe Winter Storms	Thunderstorms	Tornadoes	Wildfires	Total
\$32	\$0	\$62,897	\$28,279	\$1,110,590	\$55,081	\$2,353	\$259,927	\$1,805	\$1,520,963

Losses Summary

A review of the above loss estimates demonstrates that the Town of Plainville has experienced significant expenses as a result of natural hazards, and is at risk for additional losses if some of the less-frequent events were to occur. These actual and potential losses justify hazard mitigation actions to reduce losses in the future.

Mitigation Strategies and Actions

Noted Hazard Mitigation Needs

Over the course of Plan development, multiple hazard mitigation needs were noted.

- Although buildings repeatedly flood, the damage and the repairs do not meet substantial damage/substantial improvement thresholds, necessary flood mitigation improvements are not made, and the homes continue to be at risk. Lowering the substantial damage/substantial improvement threshold might help but is not believed to be politically achievable at this time.
- The Town would like to consider adopting an underground utility requirement for industrial subdivisions.
- There is concern about potential washout of an essential bridge on the Pequabuck River. The cost of setting up satellite emergency response facilities or elevating the bridge may be prohibitive, so the Town is interested in pursuing agreements with neighboring communities to respond in case of isolation.
- The Town is interested in upgrading its EOC equipment, potentially in a new building.
- Municipal staff recognize a need for more public awareness efforts.
- Plainville staff want to ensure that existing contacts with utility representatives are maintained.

Status of Previous Mitigation Strategies and Actions

The Town of Plainville reviewed the mitigation actions proposed in the 2016 HMP and determined the status of each. That information is included in the table below.



Table 24-12: Status of Previous Mitigation Strategies and Actions, Plainville

Action #	Action	Notes	Status
GOAL: REDUCE LOSSES OF LIFE AND PROPERTY, AND MINIMIZE ECONOMIC CONSEQUENCES OF NATURAL HAZARDS			
Objective 1: Update and formalize existing plans			
1.1	Adopt requirements to address the consequence of development on hillsides and steep slopes. The 2009 POCD recommends adoption of requirements to address the consequence of development in these areas, including the adoption of a two-foot contour mapping requirement to be included on the site plan for all development proposals.	No new development has occurred on significant hillsides or steep slopes. Ridgeline protection regulations already exist. The Town expects to adopt regulations promoting conservation subdivisions in R-40 areas with no sanitary sewer service, which often exist in steep-sloped areas.	Carry Forward with Revisions
1.2	Develop a watershed compact with other Pequabuck River communities. Town staff wish to develop low-impact design standards that will be adopted by each community in the watershed and enforced by inter-municipal agreement.	Pequabuck River watershed study has been completed, recommends flood mitigation actions including LID, and is available to all communities in the watershed. LID design standards have been developed and adopted by Plainfield. Other communities implement at their own discretion	Completed
1.3	Adopt a regulation requiring the installation of cisterns or dry hydrants. Although most of Plainville has public water service, fire protection in outlying areas is limited. The proposed regulation would require the installation of cisterns or dry hydrants as part of new developments where public water service will not be provided.	This action has been explored but not yet implemented as the need and authority was not agreed upon.	Carry Forward
1.4	Incorporate updated hazard mitigation information into community plan updates. Hazard mitigation information will be incorporated into future plan updates of other planning documents.	No new community plan updates have occurred since the previous HMP was adopted. Information from this Plan will be incorporated into the POCD update that will occur around 2019.	Carry Forward with Revisions
1.5	Participate in the statewide Water Utility Coordinating Committee process. The Connecticut DPH is preparing a Coordinated Water Supply Plan for the entire state beginning in 2016. The Town will participate as a non-member (or provide comments to Valley Water Systems) to encourage that drought-related public water supply needs are met throughout the community.	This action is currently underway, and is a capability.	Capability



Action #	Action	Notes	Status
1.6	Ensure local officials have most updated version of the Connecticut Drought Management Plan. The Connecticut Drought Management Plan is periodically updated. Local officials, land use commissions, health departments, fire departments, and local water utilities should all be made aware of updates to this plan.	Current Drought Management Plan is still from 2003. Local officials will be made aware of updates as they occur.	Capability
Objective 2: Increase Town capacity to plan for and simulate hazard impacts			
2.1	Improve GIS capacity to assist in emergency planning and response. The Town has GIS capacity but this capacity has not yet been fully implemented for emergency planning and response. Certain Town staff should be trained in basic GIS use, in more advanced techniques such as the use of HAZUS-MH, and attend FEMA trainings on the use of GIS in emergency planning.	Sanitary sewer, storm sewer, and fire hydrants are mapped. GIS is used on mobile tablets to locate fire hydrants. The Town has limited staff time to perform more updates but continued work on this action is desired.	Carry Forward with Revisions
2.2	Create a Community Emergency Response Team. A Community Emergency Response Team (CERT) is composed of trained volunteers who can assist in disaster preparedness and response, including staffing of emergency shelters and performing education and outreach to the public.	Town has had difficulty organizing volunteers, but will continue efforts.	Carry Forward
2.3	Develop a Pequabuck River flood response plan for dams. Several dams in the Pequabuck River watershed have spillways which can be controlled by gates. A coordinated plan to mitigate peak flows could allow for reduced flooding damage in downstream communities. Plainville would work with upstream communities and dam owners to prepare this plan for reducing downstream flooding.	Dam owners have taken steps to promote dam safety, and CT DEEP has changed its dam safety regulations. Plainville is still interested in pursuing this action.	Carry Forward with Revisions
2.4	Encourage sign-ups for the CT Alerts emergency notification system. The Town uses CT Alerts to provide a town-wide emergency notification system. Targeted mailings may be used to encourage signups in particularly vulnerable areas, such as special flood hazard areas and dam failure inundation areas.	Town uses the Everbridge Reverse 9-1-1 system and encourages sign-ups through its website. Facebook is also used for emergency alerts. Town does not feel targeted mailings are necessary at this time.	Completed
Objective 3: Improve critical infrastructure and ensure access to critical facilities			
3.1	Upgrade the generator at the Town Hall to provide full backup power to the building. The current generator at the Town Hall can only power part of the building. Many computers and servers remain inoperable during power outages.	Generator has not yet been upgraded due to funding limitations.	Carry Forward



Action #	Action	Notes	Status
3.2	Pursue structural floodproofing and elevating the walls of the open tanks at the wastewater treatment plant. The Pequabuck River Study determined that a ring levee around the plant was not feasible, but smaller-scale projects should be considered. Floodproofing part of the facility could prevent damage to interior equipment, and raising the walls of the open tanks could prevent sewage from mixing with floodwaters.	Action has not yet been taken due to funding limitations and lack of clarity about preferred flood mitigation measures. Actions will be changed to reflect the need for a study to identify and prioritize mitigation actions.	Carry Forward with Revisions
Objective 4: Enable residents to better help themselves through preparedness education			
4.1	Evaluate the effects of climate change and how to assess hazards that change over time. The Town wishes to perform a study to evaluate the effects of climate change which will assess the effects of natural hazards as they may change over time.	This action has not yet been pursued due to limited staffing and funding, and the need to pursue other priorities.	Carry Forward with Revisions
Objective 5: Mitigate impacts to properties in the National Flood Insurance Program			
5.1	Update the local floodplain management ordinance to meet or exceed current model ordinance requirements. The Town of Plainville has a strong floodplain management ordinance, but recent revisions to the NFIP have triggered national and state revisions to the model floodplain management ordinance.	Update completed by Technical Services in 2017 and adopted by the Town Council.	Completed
5.2	Survey and then acquire or elevate residential properties in the floodplain. The Town will complete or update elevation certificates for residential structures at risk of flooding and work with property owners to develop grant applications for acquisition or elevation. This activity will focus first on repetitive loss properties and then on other floodprone properties. Alternatively, the information could be used for property owners to pursue LOMAs which could potentially reduce the cost of flood insurance for this residents. If sufficient contiguous parcels are acquired, the area could be made into a municipal park.	Town has acquired and demolished 13 additional at-risk properties since the previous HMP. Town does not complete elevation certificates for privately-owned properties. Town keeps LOMAs on record.	Completed
5.3	Implement a floodproofing technical assistance program. The Town will coordinate an outreach program to commercial and industrial property owners and assist with developing benefit-cost analyses and FEMA grant applications to obtain dry floodproofing if possible. This activity will focus first on repetitive loss properties and then on other floodprone properties.	The Town does not have the experience or expertise to complete this action.	Carry Forward with Revisions



Action #	Action	Notes	Status
5.4	Remove sediment from the Pequabuck River channel to lower flood elevations. The Town will pursue removal of approximately 4,000 cubic yards of sediment upstream of the railroad crossing and west of Neal Court to reduce flood elevations in the area. This will remove nine buildings from the 1% annual chance floodplain and reduce the flood risk to an additional four buildings. A significant permitting effort may be required.	Town has not pursued this action due to funding and staff limitations. Replace with "Characterize the degree to which removal of sediment from the Pequabuck River channel will lower flood elevations. If determined to be feasible and prudent, the Town may pursue removal of approximately 4,000 cubic yards of sediment upstream of the railroad crossing and west of Neal Court. A significant permitting effort would be required."	Carry Forward with Revisions

Active Mitigation Strategies and Actions

The Town proposed to initiate several new mitigation actions for the upcoming five years. Additionally, a number of actions from the previous planning period are being carried forward or replaced with revised actions. These are listed below.

Each of the following actions has been prioritized based on FEMA guidelines, listed from highest to lowest priority, and numbered.

Action #1	
Encourage residents to register for emergency alerts to their cell phones through the Everbridge Reverse 911 system. Include links and information on the Town website and Facebook page.	
Goal	6. Improve public outreach, education, and warning systems
Category	Education & Awareness
Lead	Emergency Management
Cost	\$0 - \$10,000
Funding	Town Operating Budget
Timeframe	01/2019 - 12/2019
Priority	High

Action #2	
Enter the Sustainable CT program through Registration and review actions that can be undertaken to pursue Certification. Make progress with the actions related to hazard mitigation.	
Goal	4. Increase the use of natural, "green," or "soft" hazard mitigation measures, such as open space preservation and green infrastructure.
Category	Natural Resources Protection
Lead	Planning
Cost	\$0 - \$10,000
Funding	Town Operating Budget
Timeframe	01/2019 - 12/2019
Priority	High



Action #3

Work with upstream communities, dam owners, and CT DEEP to develop a coordinated plan to mitigate peak flows from dam releases on the Pequabuck River.

Goal	1. Minimize the impact of natural hazards on physical buildings and infrastructure
Category	Prevention
Lead	Emergency Management
Cost	\$0 - \$10,000
Funding	Town Operating Budget
Timeframe	07/2019 - 06/2020
Priority	High

Action #4

Designate a Town floodplain administrator.

Goal	3. Improve institutional awareness and understanding of natural hazard impacts and mitigation within municipal governments and other decision-making bodies
Category	Prevention
Lead	Administration
Cost	\$0 - \$10,000
Funding	Town Operating Budget
Timeframe	07/2019 - 06/2020
Priority	High

Action #5

Pursue permitting to remove sediment from the Pequabuck River channel upstream of the railroad crossing and west of Neal Court.

Goal	4. Increase the use of natural, "green," or "soft" hazard mitigation measures, such as open space preservation and green infrastructure.
Category	Natural Resources Protection
Lead	Public Works
Cost	\$10,000 - \$25,000
Funding	Town Operating Budget
Timeframe	01/2019 - 12/2020
Priority	High



Action #6

Incorporate new Hazard Mitigation priorities, based on this Plan, in the 2019/2020 update to the POCD.

Goal	2. Ensure Municipal Codes and Regulations support hazard mitigation
Category	Prevention
Lead	Planning
Cost	\$10,000 - \$25,000
Funding	Town Operating Budget / Grants
Timeframe	07/2019 - 12/2020
Priority	High

Action #7

Upgrade the generator at the Town Hall to provide full backup power to the building.

Goal	5. Improve the resilience of local and regional utilities and infrastructure using strategies including adaptation, hardening, and creating redundancies.
Category	Structural Projects
Lead	Emergency Management
Cost	\$10,000 - \$25,000
Funding	Town Operating Budget / DEMHS
Timeframe	07/2019 - 06/2021
Priority	High

Action #8

Identify unusable properties on which it would be appropriate to create detention ponds.

Goal	4. Increase the use of natural, "green," or "soft" hazard mitigation measures, such as open space preservation and green infrastructure.
Category	Prevention
Lead	Planning
Cost	\$10,000 - \$25,000
Funding	Town Operating Budget / Grants
Timeframe	07/2019 - 06/2021
Priority	High



Action #9

Provide for periodic survey of waterways to remove obstructions.

Goal	1. Minimize the impact of natural hazards on physical buildings and infrastructure
Category	Prevention
Lead	Public Works
Cost	\$10,000 - \$25,000
Funding	Town Operating Budget
Timeframe	07/2019 - 06/2021
Priority	High

Action #10

Acquire emergency generators for the Police and Fire Departments.

Goal	7. Improve the emergency response capabilities of the region and its communities
Category	Preparedness & Emergency Response
Lead	Emergency Management
Cost	\$10,000 - \$25,000
Funding	Town Operating Budget / DEMHS
Timeframe	07/2019 - 06/2021
Priority	High

Action #11

Adopt stormwater retention regulations.

Goal	2. Ensure Municipal Codes and Regulations support hazard mitigation
Category	Prevention
Lead	Planning
Cost	\$25,000 - \$50,000
Funding	Town Operating Budget
Timeframe	07/2020 - 06/2021
Priority	High

Action #12

Complete renovation of Wheeler Elementary School with a generator and steam heat.

Goal	7. Improve the emergency response capabilities of the region and its communities
Category	Structural Projects
Lead	Public Works
Cost	More than \$100,000
Funding	Town Operating Budget / Grants / DEMHS
Timeframe	07/2022 - 06/2023
Priority	High



Action #13

Purchase a tanker for the fire department to bring water to underserved areas on outskirts of town.

Goal	7. Improve the emergency response capabilities of the region and its communities
Category	Preparedness & Emergency Response
Lead	Fire Department
Cost	More than \$100,000
Funding	Grants
Timeframe	01/2022 - 12/2023
Priority	High

Action #14

Conduct outreach to local small businesses with the aim of preventing the accidental release and pollution from chemicals stored and used at their facilities during or following natural hazard events.

Goal	6. Improve public outreach, education, and warning systems
Category	Education & Awareness
Lead	Planning, in coordination with DEEP
Cost	\$0 - \$10,000
Funding	Materials & Resources Provided by CT DEEP
Timeframe	01/2019 - 12/2019
Priority	Medium

Action #15

Adopt regulations to promote conservation subdivisions in R-40 residential areas with no sanitary sewer service.

Goal	2. Ensure Municipal Codes and Regulations support hazard mitigation
Category	Prevention
Lead	Planning
Cost	\$0 - \$10,000
Funding	Town Operating Budget
Timeframe	01/2020 - 12/2020
Priority	Medium



Action #16

Assign a municipal staff-member to be a utility liaison responsible for maintaining contact with utility representatives.

Goal	5. Improve the resilience of local and regional utilities and infrastructure using strategies including adaptation, hardening, and creating redundancies.
Category	Preparedness & Emergency Response
Lead	Emergency Management
Cost	\$0 - \$10,000
Funding	Town Operating Budget
Timeframe	01/2020 - 12/2020
Priority	Medium

Action #17

Coordinate with NEMO and CRCOG to share resources and gain technical support for hazard mitigation actions involving stormwater management and public outreach, which have parallel benefits related to MS4 stormwater permit compliance.

Goal	1. Minimize the impact of natural hazards on physical buildings and infrastructure
Category	Prevention
Lead	Public Works
Cost	\$0 - \$10,000
Funding	Town Operating Budget
Timeframe	01/2020 - 12/2020
Priority	Medium

Action #18

Identify specific potential uses for GIS in emergency planning and pursue development of those capabilities.

Goal	3. Improve institutional awareness and understanding of natural hazard impacts and mitigation within municipal governments and other decision-making bodies
Category	Preparedness & Emergency Response
Lead	Planning
Cost	\$0 - \$10,000
Funding	Town Operating Budget
Timeframe	07/2020 - 06/2021
Priority	Medium



Action #19

Work with internet providers to help ensure internet remains available after storm events.

Goal	7. Improve the emergency response capabilities of the region and its communities
Category	Preparedness & Emergency Response
Lead	Emergency Management
Cost	\$0 - \$10,000
Funding	Town Operating Budget
Timeframe	07/2020 - 06/2021
Priority	Medium

Action #20

Participate in EMI courses or the seminars and annual conference held by the Connecticut Association of Flood Managers.

Goal	3. Improve institutional awareness and understanding of natural hazard impacts and mitigation within municipal governments and other decision-making bodies
Category	Education & Awareness
Lead	Planning
Cost	\$0 - \$10,000
Funding	Town Operating Budget
Timeframe	07/2019 - 06/2024
Priority	Medium

Action #21

Create lists of local resources for residents and business owners and supply that information prior to forecast hazard events.

Goal	7. Improve the emergency response capabilities of the region and its communities
Category	Preparedness & Emergency Response
Lead	Emergency Management
Cost	\$10,000 - \$25,000
Funding	Town Operating Budget
Timeframe	07/2020 - 06/2022
Priority	Medium



Action #22

Initiate a study to evaluate the effects of climate change on natural hazards in Plainville.

Goal	1. Minimize the impact of natural hazards on physical buildings and infrastructure
Category	Prevention
Lead	Planning
Cost	\$10,000 - \$25,000
Funding	Town Operating Budget / Grants
Timeframe	07/2020 - 06/2022
Priority	Medium

Action #23

Create an informational pamphlet to provide to potential floodplain developers about regulations and codes, and their reasons, relevant to developing in floodplain.

Goal	6. Improve public outreach, education, and warning systems
Category	Education & Awareness
Lead	Planning
Cost	\$10,000 - \$25,000
Funding	Town Operating Budget / Grants
Timeframe	07/2020 - 06/2022
Priority	Medium

Action #24

Create a Plainville Community Emergency Response Team (CERT).

Goal	7. Improve the emergency response capabilities of the region and its communities
Category	Preparedness & Emergency Response
Lead	Emergency Management
Cost	\$10,000 - \$25,000
Funding	Town Operating Budget / Grants / DEMHS
Timeframe	01/2020 - 12/2022
Priority	Medium

Action #25

Adopt a regulation requiring installation of cisterns or dry hydrants in new developments where public water service will not be provided.

Goal	1. Minimize the impact of natural hazards on physical buildings and infrastructure
Category	Prevention
Lead	Planning
Cost	\$10,000 - \$25,000
Funding	Town Operating Budget
Timeframe	07/2020 - 06/2022
Priority	Medium



Action #26

Expand emergency communication and notification methods to a variety of media, including radio, television, social media, and the Town Website.

Goal	6. Improve public outreach, education, and warning systems
Category	Preparedness & Emergency Response
Lead	Emergency Management
Cost	\$25,000 - \$50,000
Funding	Town Operating Budget / Grants / DEMHS
Timeframe	07/2021 - 06/2023
Priority	Medium

Action #27

Delete the floodplain overlay zone from zoning regulations and replace with an "open space preservation" overlay zone that can be applied to areas outside flood zones to limit development.

Goal	2. Ensure Municipal Codes and Regulations support hazard mitigation
Category	Prevention
Lead	Planning
Cost	\$25,000 - \$50,000
Funding	Town Operating Budget / CT DEEP
Timeframe	07/2021 - 06/2023
Priority	Medium

Action #28

Perform an assessment of in-stream structures (such as small dams) to identify and prioritize those that can be removed.

Goal	4. Increase the use of natural, "green," or "soft" hazard mitigation measures, such as open space preservation and green infrastructure.
Category	Prevention
Lead	Public Works
Cost	\$25,000 - \$50,000
Funding	Town Operating Budget / Grants / CT DEEP
Timeframe	07/2021 - 06/2023
Priority	Medium



Action #29

Develop a plan for making the wastewater treatment plant more resilient to flooding. The Pequabuck River Study determined that small-scale floodproofing projects should be considered; this plan should determine which such measures should be implemented. (Examples include structural floodproofing and elevation of the walls of the open tanks).

Goal	5. Improve the resilience of local and regional utilities and infrastructure using strategies including adaptation, hardening, and creating redundancies.
Category	Structural Projects
Lead	Public Works
Cost	\$50,000 - \$100,000
Funding	Grants
Timeframe	07/2023 - 06/2024
Priority	Medium

Action #30

Perform a town-wide drainage study to identify and prioritize culverts that need to be upsized.

Goal	5. Improve the resilience of local and regional utilities and infrastructure using strategies including adaptation, hardening, and creating redundancies.
Category	Structural Projects
Lead	Public Works
Cost	\$50,000 - \$100,000
Funding	Grants
Timeframe	07/2023 - 06/2024
Priority	Medium

Action #31

Construct a new EOC.

Goal	7. Improve the emergency response capabilities of the region and its communities
Category	Structural Projects
Lead	Emergency Management
Cost	More than \$100,000
Funding	Grants / DEMHS
Timeframe	07/2022 - 06/2024
Priority	Medium



Action #32

Reconstruct the Woodford Avenue Bridge over the Quinnipiac River at a higher elevation to allow larger flows and debris to pass through unimpeded.

Goal	1. Minimize the impact of natural hazards on physical buildings and infrastructure
Category	Structural Projects
Lead	Public Works
Cost	More than \$100,000
Funding	Grants
Timeframe	07/2022 - 06/2024
Priority	Medium

Action #33

Contact the owners of Repetitive Loss Properties and nearby properties at risk to inquire about mitigation undertaken and suggest options for mitigating flooding in those areas, including property acquisition. This should be accomplished with a letter directly mailed to each property owner.

Goal	1. Minimize the impact of natural hazards on physical buildings and infrastructure
Category	Property Protection
Lead	Planning
Cost	\$0 - \$10,000
Funding	Town Operating Budget / DEMHS
Timeframe	07/2021 - 06/2022
Priority	Low

Action #34

Have Town staff attend a FEMA or State training in basic GIS use, and/or in the use of GIS in emergency planning.

Goal	3. Improve institutional awareness and understanding of natural hazard impacts and mitigation within municipal governments and other decision-making bodies
Category	Education & Awareness
Lead	Planning
Cost	\$0 - \$10,000
Funding	Town Operating Budget
Timeframe	07/2021 - 06/2022
Priority	Low



Action #35

Develop formal agreements with neighboring communities to provide emergency assistance in case bridges are washed out by flooding and areas become isolated.

Goal	7. Improve the emergency response capabilities of the region and its communities
Category	Preparedness & Emergency Response
Lead	Emergency Management
Cost	\$0 - \$10,000
Funding	Town Operating Budget
Timeframe	01/2021 - 12/2022
Priority	Low

Action #36

Work with CT DEEP to complete a formal validation of the Repetitive Loss Property list and update the mitigation status of each listed property.

Goal	1. Minimize the impact of natural hazards on physical buildings and infrastructure
Category	Property Protection
Lead	Planning
Cost	\$10,000 - \$25,000
Funding	Town Operating Budget / CT DEEP / DEMHS
Timeframe	07/2021 - 06/2023
Priority	Low

Action #37

Coordinate with CT SHPO to conduct historic resource surveys, focusing on areas within natural hazard risk zones (such as flood or wildfire hazard zones and areas near steep slopes), to support identification of vulnerable historic properties and preparation of resiliency plans across the state. This action leverages existing resources and best practices for protection of historic and cultural resources through an ongoing statewide initiative by CT SHPO.

Goal	8. Ensure community character and social equity are addressed in mitigation activities
Category	Property Protection
Lead	Planning, in coordination with SHPO
Cost	\$10,000 - \$25,000
Funding	SHPO
Timeframe	07/2021 - 06/2023
Priority	Low



Action #38

Develop a set of informational resources to which commercial and industrial property owners interested in floodproofing can be directed. Have hard copies of the resources available at Town Hall and electronic links on the Town website.

Goal	6. Improve public outreach, education, and warning systems
Category	Education & Awareness
Lead	Planning
Cost	\$10,000 - \$25,000
Funding	Town Operating Budget / Grants
Timeframe	01/2021 - 12/2023
Priority	Low












Capitol Region Natural Hazards Mitigation Plan Update




Plainville, Connecticut

Flood Plains, Dams & Critical Facilities




Critical Facilities

-  Fire Station
-  Police Station
-  School
-  Healthcare Facility
-  State Facility
-  Town Facility
-  Waste Water Facility
-  Emergency Center
-  NRHP Buildings/Sites

Dam Hazard Class

-  BB, A, AA OR Unclassified
-  Class B - Significant Hazard
-  Class C - High Hazard

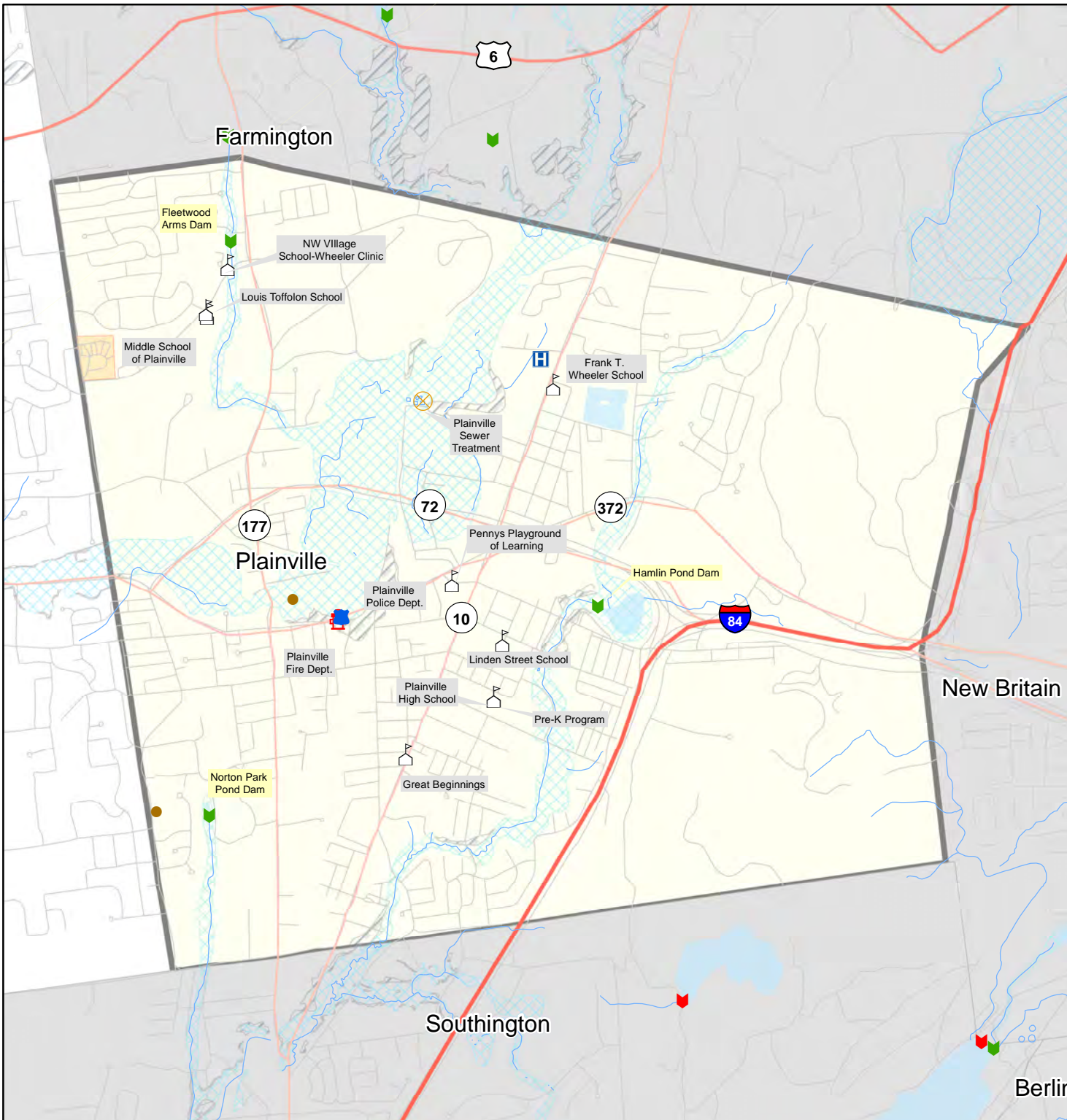
FEMA Flood Hazard Area

-  100 Year Flood Zone
-  500 Year Flood Zone
-  NRHP Districts/Areas

Data Sources: FEMA, National Register of Historic Places, CT DEEP, CRCOG, ESRI



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








Capitol Region Natural Hazards Mitigation Plan Update






Plainville, Connecticut

Dam Breach Inundation Area & Critical Facilities

Critical Facilities

-  Fire Station
-  Police Station
-  School
-  Healthcare Facility
-  State Facility
-  Town Facility
-  Waste Water Facility
-  Emergency Center
-  NRHP Buildings/Sites

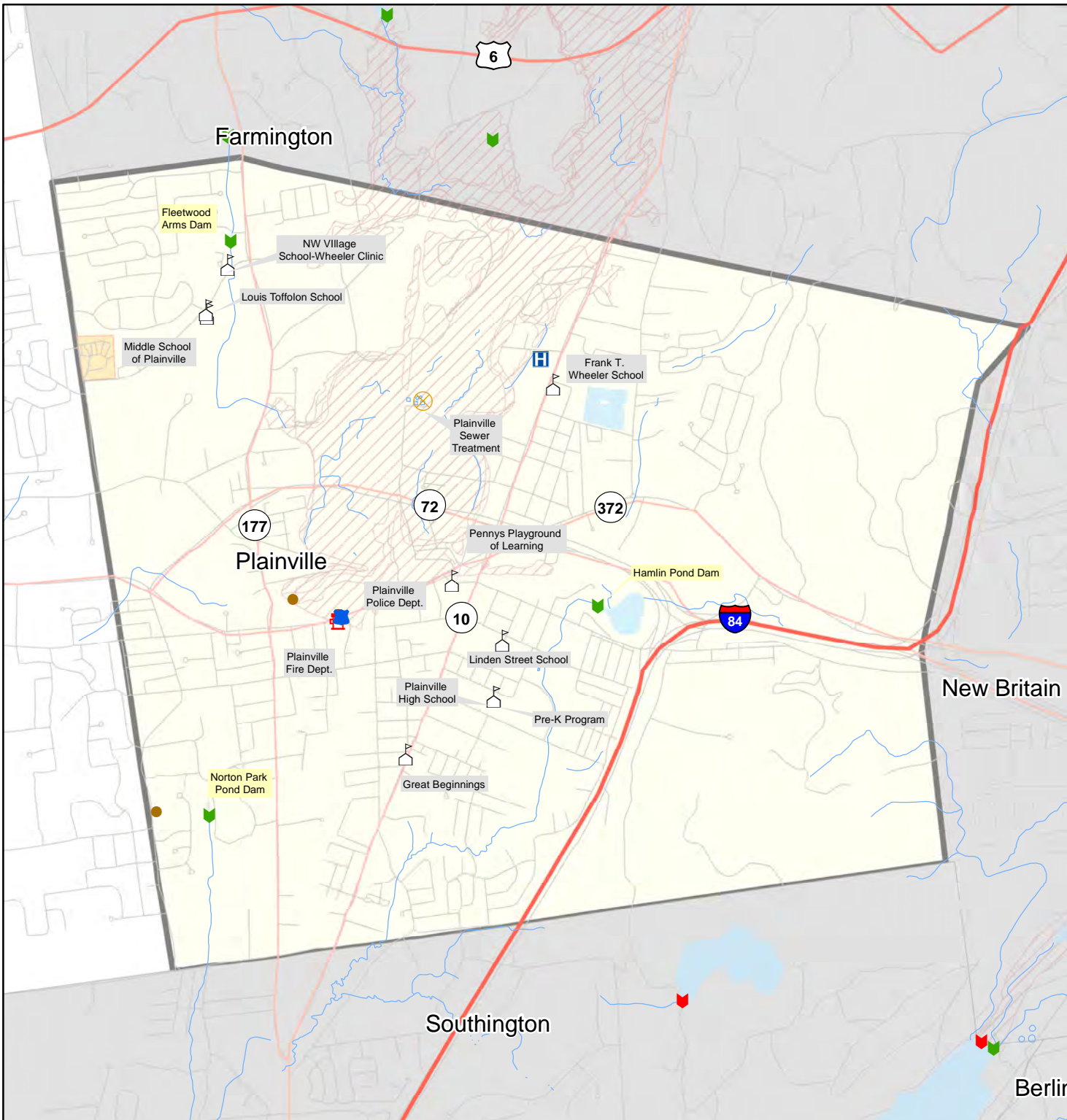
Dam Hazard Class

-  BB, A, AA OR Unclassified
-  Class B - Significant Hazard
-  Class C - High Hazard
-  Dam Breach Inundation Areas
-  NRHP Districts/Areas

Data Sources: FEMA, National Register of Historic Places, CT DEEP, CRCOG, ESRI



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25 Rocky Hill

Community Overview

Rocky Hill covers 13.9 square miles with a population of 19,703 (2010 Census). Elevation ranges from 30 feet to 400 feet. Land drains primarily to the Connecticut River Watershed, though the southwest portion of Town drains to the Mattabeset River. Major watercourses include the Connecticut River and Dividend, Goff, Hog, and Saw Mill Brooks. Principal transportation routes include Interstate 91 and State Routes 99, 3, 160 and 400. An active freight rail line, owned by Providence-Worcester Railroad, runs north-south along the Connecticut River. Paralleling the rail line is the Buckeye Jet Fuel line which runs from New Haven to Bradley International Airport. The State Veterans Home and Hospital and Dinosaur State Park are among approximately a dozen State agencies located in Town. Rocky Hill’s major industries include professional, scientific and technical services, finance and insurance, warehouse/ distribution, health care and construction.

An economic assessment study completed in 2011, projects an additional 1,838,000 square feet of new development potential. Population has recently increased slightly along the Route 3 corridor.

Critical Facilities

Critical Facilities throughout the Capitol Region are listed in Appendix B. A number of those in Rocky Hill include the Police Station (Emergency Operations Center), Town Hall/Community Center, Public Library (back-up shelter and warming/cooling center), three volunteer fire stations, the High School (primary shelter), and West Hill School.

Table 25-1: Critical Facilities, Rocky Hill

Facility	Shelter	Generator
Police Department (EOC)		X
Public Library	Backup	X
3 Volunteer Fire Stations		
Town Hall / Community Center		X
High School	Primary	X
West Hill School		
CT State Health Lab		
CNG natural gas storage facility		
MDC H2O Storage facility		
Algonquin Gas line		
VA Home & Hospital		X
Waste Water Pollution Control		X
Buckeye Fuel Line		

Capabilities

Hazard mitigation is incorporated into Rocky Hill’s Plan of Conservation and Development (POCD). POCD actions specifically address natural hazards.

The Town does not permit any new structures in flood zones, and in 2008 updated the Town Code Chapter 141, Flood Damage Prevention, in accordance with NFIP minimum standards.

Rocky Hill emergency response personnel are highly skilled and experienced in emergency response. Emergency response personnel and the Town of Rocky Hill highway employees are crossed trained in snow removal and emergency response for multiple and pre-disaster events.

Rocky Hill is 100% covered by hydrants on public water, operated by Metropolitan District Commission (MDC). There is a Town Ordinance requiring residents to clear snow from hydrants in front of their properties, as well as public notification reminders to do this. Mutual aid agreements with neighboring communities are in place for fire, police, and emergency response assistance.

The Town, in cooperation with the local power utility, has designated Century Hills Apartments as a first priority for power restoration due to a high concentration of apartments; the second priority is senior/over-55-adult housing developments.

Rocky Hill collects debris and has a designated area for debris disposal. The DPW has a budget of 25- to 30-thousand dollars per year to maintain trees, which has been sufficient.

New Capabilities

The Town changed the location of the primary shelter to the high school in 2016; the building had undergone upgrades including a new generator, cafeteria, and auditorium. This facility can accommodate up to 2,000 people.

Recent bridge and culvert replacements include the Old Main Street Bridge on Golfbrook, which was structurally deficient, and the Frank Street culvert over Sawmill Brook, where two metal pipes were rotten.

Rocky Hill has adopted new MS4 stormwater runoff regulations, which is expected to lead to lowered peak flood flows, in addition to creating water quality benefits.

Challenges

Challenges Overview

The top three natural hazards that impact Rocky Hill are floods, hurricanes and tropical storms, and winter storms.

The MDC wastewater treatment facility located in the northeast corner of Town is in the Connecticut River flood plain and at risk from a 1%-annual chance flood event. Ferry Landing Park and parts of meadow Road become inaccessible during many spring flood events. Access to some of the buildings during some flood stage events is not possible.



When the Mattabesset River in Berlin floods, Saw Mill Brook also floods and renders the extreme western portion of France Street, the residences located there, and the Town of Berlin inaccessible. Additional areas of concern are Beach Road and Main Street (CT RT 99) near the former Ames property. Beach Road is susceptible to periodic flooding isolating homes north of Little Brook. State drainage structures located on Main Street (CT 99) are under-sized, causing periodic localized flooding.

Snow removal from State roadways is insufficient or delayed, complicating municipal snow removal at intersections of Town and State roadways, and hindering emergency response. Maintaining access to the Town’s fire hydrants is always an issue during heavy snow events.

Heavy snow and high winds bring the risk of power failures. A primary concern is to maintain power at the Police Station/EOC, the Town Community Center/Town Hall (shelter) and the Library (backup shelter). The generators for the Police Station and the Library are in need of up-grading.

Hazard Losses

The economic losses faced by Rocky Hill from natural hazards can be estimated by reviewing historic, and modeling future, loss figures. Loss estimates are summarized below.

Historic FEMA Payments

FEMA reimburses communities for hazard losses through programs including Public Assistance (PA) and the National Flood Insurance Program (NFIP). Combining PA and private flood insurance payments can give an estimate for total losses to a community.

The NFIP has paid 11 property damage claims in Rocky Hill totaling \$111,493 to-date. There have been three Repetitive Loss (RL) Property claims totaling over \$43,427 filed on a single property.

Total PA reimbursements to the community were as follows:

- Flood Events: \$26,096 (\$1,373 annually)
- Hurricane Events: \$399,947 (\$21,050 annually)
- Winter Storm Events: \$1,569,736 (\$82,618 annually)

These are summarized in the tables below.



Table 25-2: Flood Event PA Reimbursements, Rocky Hill

Incident	Sep 1999	Oct 2005
Declaration	9/23/1999	12/16/2005
Disaster No.	1302	1619
Entity	FEMA PA Reimbursement	
State	\$914	\$1,133
Municipal	\$0	\$24,048
Nonprofit	\$0	\$0
Total	\$914	\$25,182
Annualized	\$48	\$1,325

Table 25-3: Hurricane Wind Event PA Reimbursements, Rocky Hill

Incident	Aug - Sep 2011 (T.S. Irene)	Oct - Nov 2012 (Storm Sandy)
Declaration	9/2/2011	10/30/2012
Disaster #	4023	4087
Entity	FEMA PA Reimbursement	
State	\$81,736	\$61,141
Municipal	\$257,069	\$0
Nonprofit	\$0	\$0
Total	\$338,806	\$61,141
Annualized	\$17,832	\$3,218

Table 25-4: Winter Storm PA Reimbursements, Rocky Hill

Incident	Mar 2003	Dec 2003	Jan 2005	Feb 2006	Jan 2011	Oct 2011	Feb 2013
Declaration	3/11/03	1/15/04	2/17/05	5/2/06	3/3/11	11/17/11	3/21/13
Disaster #	3176	3192	3200	3266	1958	4046	4106
Entity	FEMA PA Reimbursement						
State	\$29,946	\$26,100	\$33,443	\$30,037	\$26,980	\$168,755	\$97,075
Municipal	\$38,368	\$57,158	\$59,814	\$75,450	\$113,168	\$690,663	\$119,073
Nonprofit	\$0	\$0	\$0	\$0	\$1,516	\$0	\$2,192
Total	\$68,314	\$83,258	\$93,257	\$105,486	\$141,664	\$859,417	\$218,340
Annualized	\$3,595	\$4,382	\$4,908	\$5,552	\$7,456	\$45,232	\$11,492

National Centers for Environmental Information Losses

The National Centers for Environmental Information (NCEI) severe storm database was reviewed for hazards that have impacted Rocky Hill. No hazards were specifically noted as having impacted the community since 2012, though they did impact Hartford County and nearby towns. NCEI losses are reported in Section II of this Plan.



HAZUS-MH Losses

CRCOG used FEMA’s Hazus-MH model to analyze the risks that the community might face from flooding, hurricanes, and earthquakes. The model estimates economic losses due to damage to buildings and building contents, as well as other economic disruptions. Both residential and commercial structures are addressed. Losses from different hazards are summarized below. Where available, estimates from the previous and current versions of the HMP are provided side-by-side; differences between the two may have been caused by a combination of the following:

- Changes in methodology: such as hazard zone mapping
- Changes in data: such as population and property values
- Changes in the model: this HMP utilized Hazus-MH version 4.0 rather than 2.1
- Other factors: inherent in a complex software like Hazus-MH

More details are available in the Multi-Jurisdictional HMP. Ultimately, changes in the loss estimates reflect the reality that small differences in hazard event features can have a significant impact on losses incurred.

Table 25-5: Estimated Damages to Rocky Hill from a 1% Annual-Chance Flood

Loss Type	2014 Results	2018 Results
Households Displaced	24	52
People Needing Shelter	27	35
Buildings at Least Moderately Damaged	1	0
Economic Losses		
Residential Building & Content Losses	\$1,840,000	\$2,926,688
Other Building & Content Losses	\$2,900,000	\$5,974,531
Total Building & Content Loss	\$4,740,000	\$8,901,219
Total Business Interruption Losses	\$0.00	\$238,720
TOTAL	\$4,740,000	\$9,139,939

Table 25-6: Estimated Damages to Rocky Hill from a 1% Annual-Chance Hurricane

Loss Type	2014 Results (1938 event)	2018 Results (1% track)
Buildings at Least Moderately Damaged	827	1
Buildings Completely Damaged	47	0
Total Debris Generated	28,622 tons	3115
Truckloads (at 25 tons/truck) of building debris	463	125
Economic Losses		
Residential Building & Content Losses	\$80,688,000	\$8,826,070
Other Building & Content Losses	\$21,190,000	\$475,915
Total Building & Content Loss	\$101,878,000	\$9,301,985
Total Business Interruption Losses	\$13,307,000	\$453,600
TOTAL LOSSES	\$115,185,000	\$9,755,585



Losses were calculated from a modeled probabilistic earthquake (1% annual-chance of occurrence), as well as for four specific scenarios with epicenters around Connecticut.

Table 25-7: Estimated Damages to Rocky Hill from a Probabilistic Earthquake

Loss Type	2018 Results
Wage Loss	\$3,766
Rent Loss	\$3,525
Relocation Loss	\$5,082
Income Loss	\$2,960
Inventory Loss	\$486
Total Business Disruption	\$15,819
Structural Loss	\$11,030
Non-Structural Loss	\$35,085
Total Building Loss	\$46,115
Total Content Loss	\$14,209
TOTAL LOSSES	\$76,143

Table 25-8: Estimated Damages to Rocky Hill from Modeled Earthquake Scenarios

Epicenter Location	Magnitude	Estimated Total Losses
East Haddam	6.4	\$907,521.16
Haddam	5.7	\$393,859.55
Portland	5.7	\$2,148,894.55
Stamford	5.7	\$8,078.75

Average Annualized Losses

Average Annualized Loss (AAL) figures are useful tools for comparison of the risks faced from different hazards with different likelihoods of occurring in a given time period. AAL estimates were prepared for each natural hazard which may impact the community based on the methodologies discussed in Section II of the Multi-Jurisdictional HMP. Dam failure, drought, tornado, and wildfire losses were sourced from the 2014 Connecticut Natural Hazard Mitigation Plan Update, with dam failure data supplemented by the National Performance of Dams Program and the Connecticut Department of Energy & Environmental Protection. Earthquake and hurricane losses were calculated in HAZUS-MH. Losses for flooding came from NFIP claims, for winter storms from Public Assistance Reimbursements, and for thunderstorms from the NCEI database. These are presented in the table below in dollars per year. Note that Hurricanes and Tropical Storms represent the largest share of total annualized losses.

Table 25-9: Average Annualized Losses, Rocky Hill

Dam Failure	Drought	Earthquakes	Flooding	Hurricanes and Tropical Storms	Severe Winter Storms	Thunderstorms	Tornadoes	Wildfires	Total
\$35	\$0	\$76,143	\$4,308	\$1,235,529	\$82,618	\$2,618	\$289,168	\$2,500	\$1,692,917



Losses Summary

A review of the above loss estimates demonstrates that the Town of Rocky Hill has experienced significant expenses as a result of natural hazards, and is at risk for additional losses if some of the less-frequent events were to occur. These actual and potential losses justify hazard mitigation actions to reduce losses in the future.

Mitigation Strategies and Actions

Status of Previous Mitigation Strategies and Actions

The Town of Rocky Hill reviewed the mitigation actions proposed in the 2014-2019 Capitol Region Natural Hazards Mitigation Plan Update and determined the status of each. That information is included in the table below.

Table 25-10: Status of Previous Mitigation Strategies and Actions, Rocky Hill

Action #	Action	Notes	Status
GOAL: REDUCE THE RISK OF LOSS OF LIFE AND PROPERTY AS A RESULT OF FLOODING, WINTER STORMS AND HURRICANES/TROPICAL STORMS.			
Objective 1: Improve the ability of the Town to provide emergency sheltering for at least 5,000 residents.			
1.1	Supply new generators and appropriate fuel for The EOC/Police Station, the Library, the High School and West Hill School to be used as emergency shelters.	FEMA grant money was not approved for the application that was submitted. Generator at the police station was tested in June 2016 and it has adequate capacity. The High School generator was updated in 2016 and funded with town and state money. Town Hall does have a generator now.	Completed
1.2	Prepare plans to identify a potential site for a warehouse facility for storage of emergency sheltering resources as State/Federal funding becomes available.	Facilities identified in updated Emergency Action Plan in 2016.	Completed
1.3	Continue to replenish sheltering supplies (cots, water, food, etc.) as expiration dates warrant.	Ongoing action. This is a capability.	Completed
1.4	Seek funding sources for purchase of shelter supplies	Funding sources have not been identified, but Town has supply replenishment in its budget and will apply for more significant funding on a case-by-case basis. This action is not considered necessary.	Drop
1.5	Ensure and supply transportation access to emergency shelters.	Town staff use town buses and mini-buses for seniors. This is a capability.	Completed
Objective 2: Provide access for police, fire and other emergency response personnel to the roadway system, to fire hydrants and to sidewalks in a timely manner during and after storm events.			
2.1	Work with the State DOT towards better coordination and quicker State response to clear State Roads	This is an ongoing process and a capability.	Capability
2.2	Acquire specialized snow removal equipment	Upgraded dump trucks, snow plows, and new pickup trucks are now available.	Completed



Action #	Action	Notes	Status
2.3	Continue enforcement of fire hydrant and sidewalk clearing ordinance	This is an ongoing process and a capability.	Capability
Objective 3: Restore power loss due to storm events in an expeditious manner and to targeted priority areas through improved emergency response coordination with utility companies.			
3.1	Continue to work with and improve coordination with utility companies to provide first order power restoration to Century Hills, senior housing, age restricted developments and assisted living developments.	Added generators in senior housing. All other work is on-going and a capability.	Completed
3.2	Hold meetings on a regular basis to plan and coordinate natural hazard mitigation and coordinated disaster response.	On-going effort. Town staff meet internally to discuss hazard mitigation and disaster response. Eversource has their representatives participate in town meetings during substantial storms. This is a capability.	Capability
Objective 4: Reduce the likelihood of flooding by improving existing natural and artificial drainage systems.			
4.1	Improve the drainage on Beach Road by installing a box culvert raising the road above the flood elevation. Currently periodic flooding occurs isolating the homes north of the Little Brook.	Not yet complete due to lack of resources. Town will seek funding from State local bridge program.	Carry Forward
4.2	Improve the end of France Street to provide a two lane road meeting current design standards. Outer France Street becomes impassable during times of flooding due to flood waters over the road from the Sawmill Brook in Rocky Hill and Mattabesset River in Berlin. Rocky Hill residents have no access to or from the west and are forced to use a one lane road with limited visibility.	This problem impacts people on outer France Street and Berlin. It is not feasible for the town to implement any solutions right now due to budget constraints. An emergency access currently exists for Rocky Hill residents. This may be an issue to be addressed by the Town of Berlin.	Drop
4.3	Continue municipal education and fine program to disconnect residential sump pumps from sewage system.	A study was done by MDC 3-4 years ago to detect illegal tie-ins into the sewer system and that has been taken care of. This is now a capability.	Capability
4.4	Continue to support MDC's Clean Water project	Work started in 2014 and is on-going. Town is doing pipelines and updating water treatment plant in Rocky Hill. This is a capability.	Capability
Objective 5: Implement flood mitigation measures to protect the MDC wastewater treatment facility located in the northeast corner of Town.			
5.1	Work with the MDC towards implementation of flood protection measures.	On-going. Work started in 2015. The Town will continue to work with MDC. This is a capability.	Capability
Objective 6: Mitigate flood loss/damage during flood events within the Connecticut River flood plain.			
6.1	Continue with advanced notification and education of impacted property owners.	Town has reverse 911 system and also posts notices on Town webpage to sign up for alerts.	Capability



Action #	Action	Notes	Status
6.2	Continue implementation and enforcement of the Town's Flood Damage Prevention Ordinance and the Flood Overlay District Zoning Regulation.	POCD updated in 2015 and zoning updated in 2017. On-going capability.	Capability
6.3	Acquire targeted properties as State/Federal funding becomes available	45 Meadow Road property was purchased last year and demolished recently this year. It will be a park. It's in a floodplain. Town is planning to acquire 47 Meadow Road. Acquisition of flood-prone properties is an ongoing effort and a capability.	Completed
Objective 7: Improve emergency response coordination with utility companies and the Towns of Berlin, Newington, Wethersfield and Cromwell.			
7.1	Hold meetings on a regular basis to plan and coordinate natural hazard mitigation and coordinated disaster response.	This is part of the Town's standard operations. This is a capability.	Capability

Active Mitigation Strategies and Actions

The Town proposed to initiate several new mitigation actions for the upcoming five years. Additionally, a number of actions from the previous planning period are being carried forward or replaced with revised actions. These are listed below.

Each of the following actions has been prioritized based on FEMA guidelines, listed from highest to lowest priority, and numbered.

Action #1	
Apply for funding through the State local bridge program to install a box culvert on Beach Road and raising the road above the 1% annual-chance flood elevation.	
Goal	5. Improve the resilience of local and regional utilities and infrastructure using strategies including adaptation, hardening, and creating redundancies.
Category	Structural Projects
Lead	Public Works
Cost	More than \$100,000
Funding	Grants
Timeframe	07/2022 - 06/2023
Priority	High



Action #2

Conduct outreach to local small businesses with the aim of preventing the accidental release and pollution from chemicals stored and used at their facilities during or following natural hazard events.

Goal	6. Improve public outreach, education, and warning systems
Category	Education & Awareness
Lead	Planning, in coordination with DEEP
Cost	\$0 - \$10,000
Funding	Materials & Resources Provided by CT DEEP
Timeframe	01/2019 - 12/2019
Priority	Medium

Action #3

Coordinate with NEMO and CRCOG to share resources and gain technical support for hazard mitigation actions involving stormwater management and public outreach, which have parallel benefits related to MS4 stormwater permit compliance.

Goal	1. Minimize the impact of natural hazards on physical buildings and infrastructure
Category	Prevention
Lead	Public Works
Cost	\$0 - \$10,000
Funding	Town Operating Budget
Timeframe	01/2020 - 12/2020
Priority	Medium

Action #4

Participate in EMI courses or the seminars and annual conference held by the Connecticut Association of Flood Managers.

Goal	3. Improve institutional awareness and understanding of natural hazard impacts and mitigation within municipal governments and other decision-making bodies
Category	Education & Awareness
Lead	Planning
Cost	\$0 - \$10,000
Funding	Town Operating Budget
Timeframe	07/2019 - 06/2024
Priority	Medium



Action #5

Work with MDC to identify potential hazard mitigation actions for MDC facilities, and list those actions in the next HMP Update.

Goal	5. Improve the resilience of local and regional utilities and infrastructure using strategies including adaptation, hardening, and creating redundancies.
Category	Property Protection
Lead	Public Works
Cost	\$10,000 - \$25,000
Funding	Town Operating Budget / DEMHS
Timeframe	07/2020 - 06/2022
Priority	Medium

Action #6

Contact the owners of Repetitive Loss Properties and nearby properties at risk to inquire about mitigation undertaken and suggest options for mitigating flooding in those areas. This should be accomplished with a letter directly mailed to each property owner.

Goal	1. Minimize the impact of natural hazards on physical buildings and infrastructure
Category	Property Protection
Lead	Planning
Cost	\$0 - \$10,000
Funding	Town Operating Budget / DEMHS
Timeframe	07/2021 - 06/2022
Priority	Low

Action #7

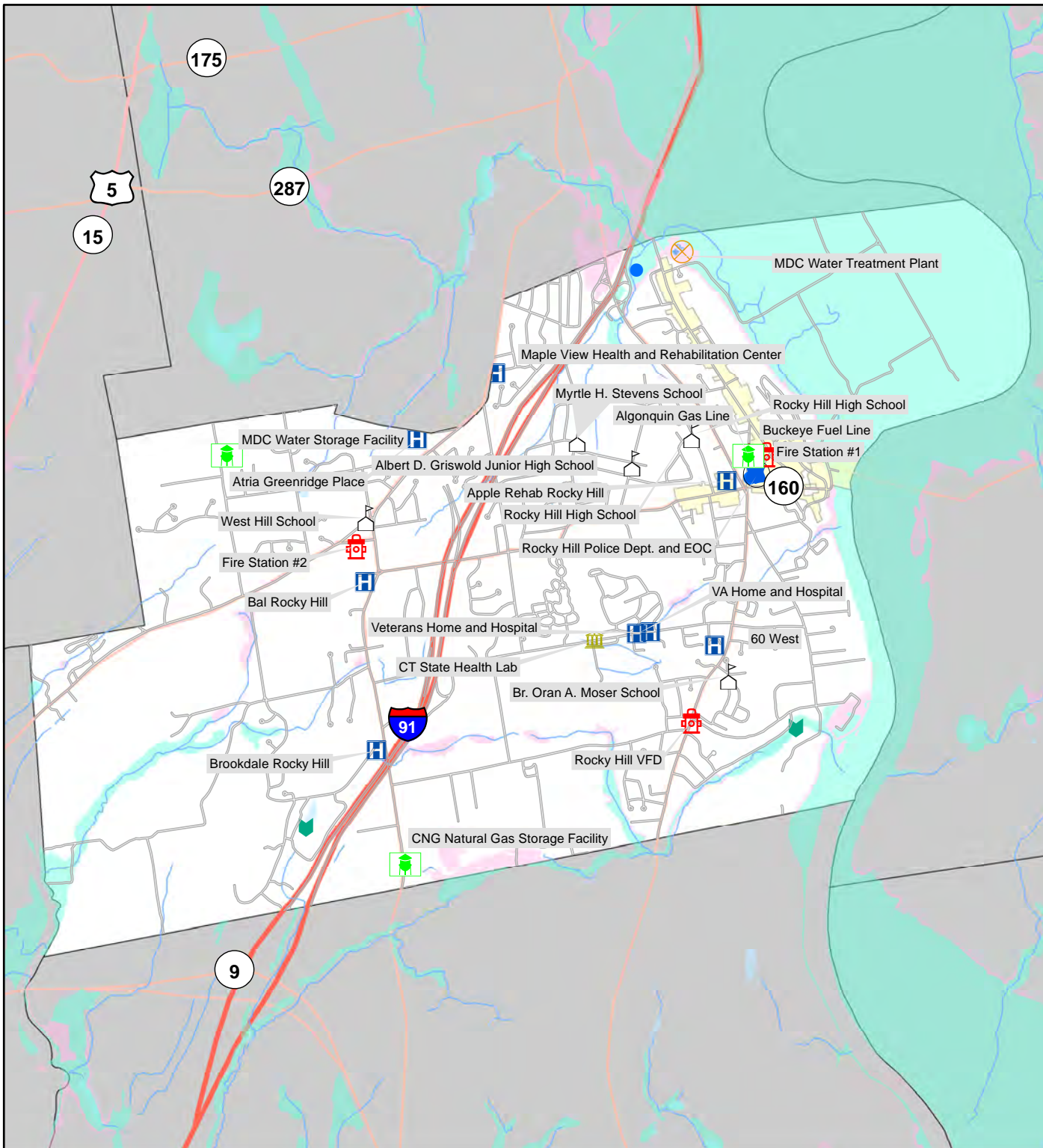
Coordinate with CT SHPO to conduct historic resource surveys, focusing on areas within natural hazard risk zones (such as flood or wildfire hazard zones and areas near steep slopes), to support identification of vulnerable historic properties and preparation of resiliency plans across the state. This action leverages existing resources and best practices for protection of historic and cultural resources through an ongoing statewide initiative by CT SHPO.

Goal	8. Ensure community character and social equity are addressed in mitigation activities
Category	Property Protection
Lead	Planning, in coordination with SHPO
Cost	\$10,000 - \$25,000
Funding	SHPO
Timeframe	07/2021 - 06/2023
Priority	Low














Capitol Region Natural Hazards Mitigation Plan Update


Rocky Hill, Connecticut Flood Plains, Dams & Critical Facilities





Critical Facilities

-  Emergency Center
-  Fire Station
-  Healthcare Facility
-  Police Station
-  Public Infrastructure
-  School
-  State Facility
-  Town Facility
-  Waste Water Facility
-  NRHP Buildings/Sites
-  NRHP Districts/Areas

Dam Hazard Class

-  A, AA, BB or Unclassified

FEMA Flood Hazard Area

-  100 Year Flood Zone
-  500 Year Flood Zone

Data Sources: FEMA, National Register of Historic Places, CT DEEP, CRCOG, ESRI





26 Simsbury

Community Overview

Simsbury is a suburban community of about 23,600 encompassing 33.9 square miles. Elevation ranges from about 150 to 500 feet above sea level. Most of Simsbury contributes to the Farmington River Watershed, although a very small portion in the southeast drains to the Park River. Watercourses in town include the Farmington River and Bissell, Grimes, Hop, King Philip, Nod, Minister, Munnisunk, Owens, Saxton, Second, and Still Brooks. Principal industries include agriculture, insurance offices, non-electric blast initiation systems, polypropylene fiber manufacturing, and safety and detonating fuse making. The main transportation routes are north-south state routes 10/202 and 167, and east-west state routes 185, 309 and 315.

Apartment construction has increased sharply in recent years, with approximately 1,200 new units constructed since 2014 and around 2,000 more expected in the next few years.

Critical Facilities

Critical Facilities throughout the Capitol Region are listed in Appendix B. In Simsbury these include the Simsbury High School (primary emergency shelter), the Tariffville Elementary School (secondary shelter and the only shelter available to Tariffville if Route 315 is closed and Tariffville is isolated), the Squadron Line School (secondary shelter), the Public Works Campus and the Public Library, in addition to the town's emergency response facilities. The Water Pollution Control Facility (WPCF) is located within a FEMA Special Flood Hazard Area (SFHA) and therefore at risk from a 1-percent annual-chance flood event; it is protected from such events by a flood-control dike.

Table 26-1: Critical Facilities, Simsbury

Facility	Shelter	Generator
Simsbury High School	Primary	Two
Tariffville Elementary School	Secondary	X
Squadron Line School	Secondary	X
Public Works Campus		
Library		Hook-up Available
Water Pollution Control Facility	No	X

Capabilities

Hazard mitigation is incorporated into Simsbury's Plan of Conservation and Development (POCD). The HMP document itself is cited. POCD actions specifically address natural hazards.

Simsbury has been pro-active in preserving open space in the floodplain and assuring that new developments are not placed in floodplains or wetlands. None of the new residential units noted previously were, or will be, constructed in the floodplain. The Town carefully reviews renovation/reconstruction plans for homes in repetitive loss areas to ensure that flood proofing is accomplished and that utilities are located above the 1-percent annual-chance flood level.

Zoning regulations require that new construction and substantial improvement be built with two feet of freeboard above the FEMA-defined 1-percent annual-chance flood elevation. This is a higher standard than that required by FEMA. The Town adopted updated floodplain regulations as part of a Zoning Regulations update that was made effective on April 30, 2018.

The Town regularly performs culvert and bridge replacement and upgrade work.

The Town utilizes the Everbridge notification system to warn owners of homes with repetitive losses of impending storm events. The Social Services Department maintains a listing of special needs populations so that notification and contact can be made in hazard events.

The Town coordinates with the power supplier Eversource to address dangerous trees. Though loss of power is a significant concern, electrical transmission to the town center itself comes from two different directions, creating a redundancy that lowers the risk of complete power loss. Many Town facilities have emergency generators or standby power, including Simsbury High School, Tariffville Elementary School, Squadron Line School, Virginia Connelly senior housing facility, and some mobile phone towers.

Simsbury maintains and adds dry hydrants and cisterns as funding allows, but does not feel its water supply is currently sufficient (see below). The Fire Department has the appropriate equipment to fight wildfires at this time.

New Capabilities

Since adoption of the 2014-2019 Capitol Region Natural Hazards Mitigation Plan Update (“2014 HMP”), Tariffville Elementary School and the Squadron Line School have been officially designated as emergency shelters, increasing the town’s capacity to house displaced residents and providing a local sheltering option in case of isolation of the Tariffville area.

The Virginia Connelly senior housing facility recently acquired a new generator. The public library is currently being fitted to be able to have a portable generator hooked up and provide power; it does not have a dedicated generator at this point. Coordination with Eversource has improved. Despite these improvements, the Town believes that following a temporary improvement following the storms of 2011, power disruption response capabilities have decreased recently.

Since 2014, multiple culverts have been upgraded, including structures located on:

- Great Pond Road, in vicinity of 142 Great Pond Road
- Westledge Road (multiple structures)
- Firetown Road at Bissell Brook

A culvert on Riverside Road, west of the intersection of Riverside Road and East Weatogue Street, was upgraded and a backflow-prevention gate installed to provide flood protection. A culvert to the east, however, has not been upgraded.



Dry hydrants and cisterns have been added in the last few years.

The Town acquired 1 Old Bridge Road, a repetitive loss property, in 2014.

Challenges

Challenges Overview

Flooding is a significant challenge for Simsbury. In the Riverside Road area, buildings are directly at risk of flooding, but the more significant concern are electric utility connection points, meters, and circuit breakers. During floods, the Town is forced to cut power before water contacts those points, leaving property owners unable to operate sump pumps to remove rain, stormwater, or groundwater that enters their basements. These homes then experience basement damage even if floodwaters don't rise high enough to impact the structures directly.

There are many important roads that have been overtopped by flood waters, hindering travel by emergency vehicles and access to the emergency shelter. During Hurricane Irene and Superstorm Sandy certain critical access roads were blocked: route 185 was closed at East Weatogue Street, severing a major east/west transportation artery; route 315 was closed, isolating the Tariffville Village area and preventing those residents access to the Town emergency shelter; Town Forest Road flooding blocked access/egress to the Town Public Works Campus; and Riverside Road flooding blocked emergency vehicle access to the neighborhood from the Town Center, as well as access to the Emergency Shelter for neighborhood residents. Municipal officials reported that another flash flood event overwhelmed existing drainage within the State right-of-way on Route 189 and closed the intersection of Route 189 and Elm Street; this limited access to Tariffville from Bloomfield.

Municipal staff report wildfire as a concern in town. Recent droughts and insect damage to trees have increased the risk, and the distribution of dry hydrants, cisterns, and fire roads is not considered to be sufficient. McLean Game Refuge and the ridgeline are particular areas of concern. The Fire Department reports the typical wildfire to be less than one acre in size, with large fires reaching six to seven acres.

Snow storms have been found to be the most costly events, with widespread community impacts.

Hazard Losses

The economic losses faced by the community from natural hazards can be estimated by reviewing historic, and modeling future, loss figures. Loss estimates are summarized below.

Historic FEMA Payments

FEMA reimburses communities for hazard losses through programs including Public Assistance (PA) and the National Flood Insurance Program (NFIP). Combining PA and private flood insurance payments can give an estimate for total losses to a community.



The Town has several areas of repetitive losses involving at least 11 properties and resulting in claims of \$389,198. Overall, the National Flood Insurance Program (NFIP) has paid 100 claims in Simsbury totaling \$532,670 to-date.

Total PA reimbursements to the community were as follows:

- Flood Events: \$41,107 (\$2,164 annually)
- Hurricane Events: \$135,837 (\$7,149 annually)
- Winter Storm Events: \$4,275,857 (\$225,045 annually)

These are summarized in the tables below.

Table 26-2: Flood Event PA Reimbursements, Simsbury

Incident	Sep 1999	Oct 2005
Declaration	9/23/1999	12/16/2005
Disaster No.	1302	1619
Entity	FEMA PA Reimbursement	
State	\$1,090	\$1,352
Municipal	\$0	\$38,664
Nonprofit	\$0	\$0
Total	\$1,090	\$40,016
Annualized	\$57	\$2,106

Table 26-3: Hurricane Wind Event PA Reimbursements, Simsbury

Incident	Aug - Sep 2011 (T.S. Irene)	Oct - Nov 2012 (Storm Sandy)
Declaration	9/2/2011	10/30/2012
Disaster #	4023	4087
Entity	FEMA PA Reimbursement	
State	\$1,034	\$0
Municipal	\$133,949	\$0
Nonprofit	\$0	\$854
Total	\$134,983	\$854
Annualized	\$7,104	\$45



Table 26-4: Winter Storm PA Reimbursements, Simsbury

Incident	Mar 2003	Dec 2003	Jan 2005	Feb 2006	Jan 2011	Oct 2011	Feb 2013
Declaration	3/11/03	1/15/04	2/17/05	5/2/06	3/3/11	11/17/11	3/21/13
Disaster #	3176	3192	3200	3266	1958	4046	4106
Entity	FEMA PA Reimbursement						
State	\$20,385	\$18,275	\$24,110	\$29,264	\$25,497	\$10,515	\$49,550
Municipal	\$43,894	\$66,623	\$54,525	\$43,867	\$75,635	\$3,665,491	\$133,414
Nonprofit	\$0	\$0	\$0	\$0	\$1,210	\$8,385	\$5,218
Total	\$64,279	\$84,898	\$78,634	\$73,131	\$102,342	\$3,684,391	\$188,182
Annualized	\$3,383	\$4,468	\$4,139	\$3,849	\$5,386	\$193,915	\$9,904

National Centers for Environmental Information Losses

The table below summarizes events in the National Centers for Environmental Information (NCEI) severe storm database that were specifically noted as having impacted the community since 2012.

Table 26-5: NCEI Database Losses since 2012, Simsbury

Date	Event	Property Damage
8/5/2012	Thunderstorm Wind	\$5,000
9/13/2015	Thunderstorm Wind	\$3,000
6/30/2017	Thunderstorm Wind	\$15,000
Total		\$23,000

NCEI losses under other event categories (such as drought, high wind, flooding, and winter storms) were not specifically noted as impacting this community, though they did impact Hartford County and nearby towns. NCEI losses are reported in Section II of this Plan.

HAZUS-MH Losses

CRCOG used FEMA’s Hazus-MH model to analyze the risks that the community might face from flooding, hurricanes, and earthquakes. The model estimates economic losses to the town due to damage to buildings and building contents, as well as other economic disruptions. Both residential and commercial structures are addressed. Losses from different hazards are summarized below. Where available, estimates from the previous and current versions of the HMP are provided side-by-side; differences between the two may have been caused by a combination of the following:

- Changes in methodology: such as hazard zone mapping
- Changes in data: such as population and property values
- Changes in the model: this HMP utilized Hazus-MH version 4.0 rather than 2.1
- Other factors: inherent in a complex software like Hazus-MH



More details are available in the Multi-Jurisdictional HMP. Ultimately, changes in the loss estimates reflect the reality that small differences in hazard event features can have a significant impact on losses incurred.

Table 26-6: Estimated Damages to Simsbury from a 1% Annual-Chance Flood

Loss Type	2014 Results	2018 Results
Households Displaced	347	281
People Needing Shelter	604	314
Buildings at Least Moderately Damaged	135	0
Economic Losses		
Residential Building & Content Losses	\$50,940,000	\$26,558,296
Other Building & Content Losses	\$50,880,000	\$21,071,488
Total Building & Content Loss	\$101,820,000	\$47,629,783
Total Business Interruption Losses	\$330,000	\$749,528
TOTAL	\$102,150,000	\$48,379,311

Table 26-7: Estimated Damages to Simsbury from a 1% Annual-Chance Hurricane

Loss Type	2014 Results (1938 event)	2018 Results (1% track)
Buildings at Least Moderately Damaged	512	1
Buildings Completely Damaged	21	0
Total Debris Generated	44,301 tons	3679
Truckloads (at 25 tons/truck) of building debris	259	147
Economic Losses		
Residential Building & Content Losses	\$74,170,000	\$9,074,003
Other Building & Content Losses	\$7,550,000	\$127,735
Total Building & Content Loss	\$81,720,000	\$9,201,738
Total Business Interruption Losses	\$7,070,000	\$16,537
TOTAL LOSSES	\$88,800,000	\$9,218,275

Losses were calculated from a modeled probabilistic earthquake (1% annual-chance of occurrence), as well as for four specific scenarios with epicenters around Connecticut.

Table 26-8: Estimated Damages to Simsbury from a Probabilistic Earthquake

Loss Type	2018 Results
Wage Loss	\$3,072
Rent Loss	\$2,559
Relocation Loss	\$4,966
Income Loss	\$2,789
Inventory Loss	\$134
Total Business Disruption	\$13,520
Structural Loss	\$9,665
Non-Structural Loss	\$32,282
Total Building Loss	\$41,948
Total Content Loss	\$12,161



Loss Type	2018 Results
TOTAL LOSSES	\$67,629

Table 26-9: Estimated Damages to Simsbury from Modeled Earthquake Scenarios

Epicenter Location	Magnitude	Estimated Total Losses
East Haddam	6.4	\$153,971.70
Haddam	5.7	\$40,692.00
Portland	5.7	\$103,360.22
Stamford	5.7	\$7,815.00

Other Hazard Costs

A typical wildfire costs the Fire Department around \$1,500 (per event).

The Town reports that a typical thunderstorm costs about \$5,000 in cleanup.

The Town estimates that a typical winter storm costs about \$40,000 in cleanup and \$2,000 in emergency response by the Fire Department.

Average Annualized Losses

Average Annualized Loss (AAL) figures are useful tools for comparison of the risks faced from different hazards with different likelihoods of occurring in a given time period. AAL estimates were prepared for each natural hazard which may impact Simsbury based on the methodologies discussed in Section II of the Multi-Jurisdictional HMP. Dam failure, drought, tornado, and wildfire losses were sourced from the 2014 Connecticut Natural Hazard Mitigation Plan Update, with dam failure data supplemented by the National Performance of Dams Program and the Connecticut Department of Energy & Environmental Protection. Earthquake and hurricane losses were calculated in HAZUS-MH. Losses for flooding came from NFIP claims, for winter storms from Public Assistance Reimbursements, and for thunderstorms from the NCEI database. These are presented in the table below in dollars per year. Note that Hurricanes and Tropical Storms represent the largest share of total annualized losses.

Table 26-10: Average Annualized Losses, Simsbury

Dam Failure	Drought	Earthquakes	Flooding	Hurricanes and Tropical Storms	Severe Winter Storms	Thunderstorms	Tornadoes	Wildfires	Total
\$42	\$0	\$67,629	\$16,181	\$1,473,871	\$225,045	\$3,123	\$344,950	\$6,305	\$2,137,146

Losses Summary

A review of the above loss estimates demonstrates that the Town of Simsbury has experienced significant expenses as a result of natural hazards, and is at risk for additional losses if some of



the less-frequent events were to occur. These actual and potential losses justify hazard mitigation actions to reduce losses in the future.

Mitigation Strategies and Actions

Noted Hazard Mitigation Needs

During Plan development, multiple hazard mitigation needs of Simsbury were noted.

- Mitigation of some frequent road flooding, such as that on Route 185 and Riverside Road, may be accomplished by raising road elevations above the 1-percent annual-chance flood level. Municipal staff believe that elevation of Grant Pond Road is possible within the next five years. Access improvements on Town Forest Road can be accomplished, but at a large expense. Work involves raising the road above the 1-percent annual-chance flood level and replacing two large culverts and associated drainage. The environmental and cost implications of raising Route 315, on the other hand, led to the establishment of a secondary emergency shelter site at the Tariffville Elementary School.
- The Town may partner with homeowners to apply for mitigation funds for elevations and buyouts; some homeowners are known to be interested in such assistance. Floodplain regulations may be strengthened by revising the definition of substantial damage and substantial improvement (SD/SI); currently SD/SI is rarely triggered.
- To address the issue of downed trees damaging overhead utilities, a comprehensive, a fully funded and utility-coordinated tree trimming/removal program is urgently needed. Additionally, Simsbury is interested in burying utilities to reduce disruptions.
- Simsbury would like to fund additional dry hydrants and cisterns, as well as fire road cuts through forested areas. McLean Game Refuge and the ridgeline in particular would be aided by these efforts.
- Upgrading and improving the culvert on Riverside Road, west of East Weatogue Street and east of the upgraded culvert with a backflow-prevention gate, will help address isolation issues that occur during flood events.
- Historical failures of the bank along the western shoulder of Riverside Road were addressed by the installation of gabion baskets. Over time, slump and erosion has been observed. A more long-term solution should be pursued.
- Culverts along Route 189 at the intersection of Elm Street need to be upgraded to prevent flooding and road closures during larger storm events.
- The Water Pollution Control Facility (WPCF) is located within a FEMA SFHA, and is surrounded by an earthen dike. During larger storm events, flood waters have reached within feet of the top elevation of the berm. The dike should be investigated to determine whether improvements are needed to better protect the facility.

Status of Previous Mitigation Strategies and Actions

The Town of Simsbury reviewed the mitigation actions proposed in the 2014 HMP and determined the status of each. That information is included in the table below.



Table 26-11: Status of Previous Mitigation Strategies and Actions, Simsbury

Action #	Action	Notes	Status
GOAL: REDUCE THE POTENTIAL FOR LOSS OF LIFE AND PROPERTY AS A RESULT OF FLOODING			
Objective 1: Incorporate natural hazard mitigation strategies into new/existing projects.			
1.1	Continue to implement regulations prohibiting net flow increase from new development.	Zoning regulations were being updated at the time of updated HMP development. Municipal Staff will work with State NFIP coordinator to ensure consistency with federal guidelines. This is a capability	Capability
1.2	Implement recommended regulations that result from study of impervious coverage in various areas of town.	Town intends to codify stormwater design guidelines into regulations, and is currently working on incorporating guidelines and recommendations into zoning, subdivision, and highway regulations.	Carry Forward with Revisions
Objective 2: Correct undersized drainage systems in repetitively flooded areas			
2.1	Upgrade culverts associated with Bissell Brook on Fire Town Road.	Upgrades have been completed, however a more substantial replacement of both culverts with bridges is planned as part of the Town's Bridge Improvement Program.	Completed
2.2	Upgrade culverts associated with Stratton Brook on Town Forest and Stratton Brook Roads.	The Town did not have resources for this. It remains on the CIP because the associated roads are used to access the highway garage.	Carry Forward
Objective 3: Ensure the protection of private properties at greatest risk.			
3.1	Explore participation in the Community Rating System.	The Town remains interested in CRS.	Carry Forward with Revisions
3.2	Pursue acquisition of parcels with potential for development along or within 100-year floodplain to preserve as open space.	The Town does not allow new development in flood zones and therefore does not need to pursue acquisition of parcels within those zones at risk of flooding. The Town remains concerned with development near flood zones that could worsen flooding for other properties. This action is removed and replaced with an updated action.	Drop
GOAL: REDUCE THE POTENTIAL FOR LOSS OF LIFE AND PROPERTY AS A RESULT OF WINTER STORMS			
Objective 1: Continue to trim/remove hazard trees.			
1.1	Maintain relationship with CL&P - currently CL&P serves on local public safety committee.	CL&P has been acquired by Eversource. Town reports a good relationship. This is a capability.	Capability
1.2	Continue local tree maintenance work.	This is part of the Town's standard operations. This is a capability.	Capability
1.3	Maintain informal agreements with local contractors for emergency debris removal work	The Town now has formal contractual agreements in place.	Completed
Objective 2: Provide planning and equipment for traffic rerouting			
2.1	Purchase mechanical signs.	This action has been completed	Completed
2.2	Maintain mutual aid agreements with neighboring communities.	Mutual aid agreements are maintained. This is a capability.	Capability



Action #	Action	Notes	Status
Objective 3: Minimize risks vulnerable to populations as a result of power failure.			
3.1	Maintain special needs population list.	This is an established practice. This is a capability.	Capability
3.2	Work with convalescent and day care centers to plan for evacuations.	This is an established practice. This is a capability.	Capability
3.3	Work with CREPC to obtain funding to purchase generators for shelters.	Several acquired in the last few years	Completed
3.4	Equip a secondary shelter at Tariffville School.	This is a secondary shelter overall, but the primary shelter for Tariffville if the village is cut off by flooding.	Completed
GOAL: REDUCE THE POTENTIAL FOR LOSS OF LIFE AND PROPERTY AS A RESULT OF WIND			
Objective 1: Continue to trim/remove hazard trees.			
1.1	Maintain relationship with CL&P - currently CL&P serves on local public safety committee.	This is a repeated action	Drop
1.2	Continue local tree maintenance work.	This is a repeated action	Drop
1.3	Maintain informal agreements with local contractors for emergency debris removal work	This is a repeated action	Drop
Objective 2: Provide planning and equipment for traffic rerouting.			
2.1	Purchase mechanical signs.	This is a repeated action	Drop
2.2	Maintain mutual aid agreements with neighboring communities.	This is a repeated action	Drop
Objective 3: Coordinate back-up communications.			
3.1	Continue to implement upgrades to fire, police and town-wide communications systems.	The Fire Department is upgrading this equipment now. Additional actions may be taken depending on whether the State opts into FirstNet.	Capability
GOAL: IMPROVE ACCESS DURING FLOOD EVENTS			
Objective 1: Raise road elevations to assure access			
1.1	Raise Riverside Road near Drake Hill Bridge	Significant progress was made. A modeling study was completed but the need for a Conditional Letter of Map Revision (CLOMR) precludes additional action at this time.	Carry Forward with Revisions
1.2	Raise Route 185 near East Weatogue Street	Progress was not made. The Town focused on Riverside Road instead.	Carry Forward
Objective 2: Co-ordinate efforts with Connecticut DOT			
2.1	Coordinate with Connecticut DOT for Route 185 work.	This is inherent in action 1.2, as Route 185 is under State jurisdiction.	Drop

Active Mitigation Strategies and Actions

The Town proposed to initiate several new mitigation actions for the upcoming five years. Additionally, a number of actions from the previous planning period are being carried forward or replaced with revised actions. These are listed below.

Each of the following actions has been prioritized based on FEMA guidelines, listed from highest to lowest priority, and numbered.



Action #1

For the area of Riverside Road near Drake Hill Bridge, monitor for opportunities to justify the CLOMR/LOMR process and environmental permitting, as part of efforts to raise the road.

Goal	9. Minimize the economic impact of hazard damages
Category	Prevention
Lead	Public Works, Engineering
Cost	\$0 - \$10,000
Funding	Town Operating Budget / Grants / Bonding
Timeframe	01/2019 - 12/2019
Priority	High

Action #2

Update flood damage prevention regulations to address Increased Cost of Compliance, allowing residents to access those funds.

Goal	2. Ensure Municipal Codes and Regulations support hazard mitigation
Category	Prevention
Lead	Planning
Cost	\$0 - \$10,000
Funding	Town Operating Budget
Timeframe	01/2019 - 12/2019
Priority	High

Action #3

Enter the Sustainable CT program through Registration and review actions that can be undertaken to pursue Certification. Make progress with the actions related to hazard mitigation.

Goal	4. Increase the use of natural, "green," or "soft" hazard mitigation measures, such as open space preservation and green infrastructure.
Category	Natural Resources Protection
Lead	Planning
Cost	\$0 - \$10,000
Funding	Town Operating Budget
Timeframe	01/2019 - 12/2019
Priority	High



Action #4

Codify storm water design guidelines derived from the study of impervious cover into zoning, subdivision, and highway regulations.

Goal	2. Ensure Municipal Codes and Regulations support hazard mitigation
Category	Prevention
Lead	Planning
Cost	\$10,000 - \$25,000
Funding	Town Operating Budget / Grants
Timeframe	07/2019 - 06/2021
Priority	High

Action #5

For the area of Riverside Road near Drake Hill Bridge, address the riverbank, as the road is at risk of slumping due to erosion.

Goal	1. Minimize the impact of natural hazards on physical buildings and infrastructure
Category	Structural Projects
Lead	Public Works, Engineering, Planning
Cost	\$50,000 - \$100,000
Funding	Grants / Bonding
Timeframe	07/2021 - 06/2022
Priority	High

Action #6

Upgrade Culverts on Riverside Road, West of the Riverside Road and East Weatogue Street Intersection

Goal	1. Minimize the impact of natural hazards on physical buildings and infrastructure
Category	Structural Projects
Lead	Public Works, Engineering
Cost	\$50,000 - \$100,000
Funding	Grants / Capital Improvement Funds / Bonding
Timeframe	07/2021 - 06/2022
Priority	High



Action #7

Coordinate with CTDOT to Upgrade Culverts along Route 189 at the Intersection of Elm Street

Goal	5. Improve the resilience of local and regional utilities and infrastructure using strategies including adaptation, hardening, and creating redundancies.
Category	Structural Projects
Lead	Public Works, Engineering
Cost	\$50,000 - \$100,000
Funding	Grants / Bonding
Timeframe	07/2021 - 06/2022
Priority	High

Action #8

Conduct outreach to local small businesses with the aim of preventing the accidental release and pollution from chemicals stored and used at their facilities during or following natural hazard events.

Goal	6. Improve public outreach, education, and warning systems
Category	Education & Awareness
Lead	Planning, in coordination with DEEP
Cost	\$0 - \$10,000
Funding	Materials & Resources Provided by CT DEEP
Timeframe	01/2019 - 12/2019
Priority	Medium

Action #9

Coordinate with NEMO and CRCOG to share resources and gain technical support for hazard mitigation actions involving stormwater management and public outreach, which have parallel benefits related to MS4 stormwater permit compliance.

Goal	1. Minimize the impact of natural hazards on physical buildings and infrastructure
Category	Prevention
Lead	Public Works
Cost	\$0 - \$10,000
Funding	Town Operating Budget
Timeframe	01/2020 - 12/2020
Priority	Medium



Action #10

Complete an analysis of costs and benefits of joining the FEMA Community Rating System.

Goal	9. Minimize the economic impact of hazard damages
Category	Prevention
Lead	Planning, Administration
Cost	\$0 - \$10,000
Funding	Town Operating Budget
Timeframe	01/2020 - 12/2020
Priority	Medium

Action #11

Participate in EMI courses or the seminars and annual conference held by the Connecticut Association of Flood Managers.

Goal	3. Improve institutional awareness and understanding of natural hazard impacts and mitigation within municipal governments and other decision-making bodies
Category	Education & Awareness
Lead	Planning
Cost	\$0 - \$10,000
Funding	Town Operating Budget
Timeframe	07/2019 - 06/2024
Priority	Medium

Action #12

Initiate design and grant application work for elevation of Route 315.

Goal	1. Minimize the impact of natural hazards on physical buildings and infrastructure
Category	Structural Projects
Lead	Public Works, Engineering
Cost	\$10,000 - \$25,000
Funding	Town Operating Budget
Timeframe	07/2020 - 06/2022
Priority	Medium



Action #13

Complete a study exploring the feasibility and effectiveness of raising both Route 185 and East Weatogue Street in the area where they intersect.

Goal	1. Minimize the impact of natural hazards on physical buildings and infrastructure
Category	Structural Projects
Lead	Public Works
Cost	\$10,000 - \$25,000
Funding	Town Operating Budget / Grants
Timeframe	07/2020 - 06/2022
Priority	Medium

Action #14

Conduct a wildfire vulnerability and needs assessment to guide construction of fire roads through larger open space parcels and of additional dry hydrants and/or cisterns.

Goal	3. Improve institutional awareness and understanding of natural hazard impacts and mitigation within municipal governments and other decision-making bodies
Category	Prevention
Lead	Emergency Management
Cost	\$25,000 - \$50,000
Funding	Town Operating Budget / Grants / CT DEEP
Timeframe	07/2021 - 06/2023
Priority	Medium

Action #15

Upgrade culverts associated with Stratton Brook on Town Forest and Stratton Brook Roads

Goal	5. Improve the resilience of local and regional utilities and infrastructure using strategies including adaptation, hardening, and creating redundancies.
Category	Structural Projects
Lead	Public Works
Cost	\$25,000 - \$50,000
Funding	Town Operating Budget / Grants
Timeframe	07/2021 - 06/2023
Priority	Medium



Action #16

Evaluate the Dike around the Water Pollution Control Facility to determine whether improvements are necessary.

Goal	1. Minimize the impact of natural hazards on physical buildings and infrastructure
Category	Structural Projects
Lead	Public Works, Engineering, WPCA, Planning
Cost	\$25,000 - \$50,000
Funding	Capital Non-Recurring Funds
Timeframe	07/2021 - 06/2023
Priority	Medium

Action #17

Construct additional dry hydrants and/or cisterns in wildfire-prone areas not served by public water.

Goal	7. Improve the emergency response capabilities of the region and its communities
Category	Preparedness & Emergency Response
Lead	Emergency Management
Cost	\$50,000 - \$100,000
Funding	Grants / CT DEEP
Timeframe	07/2023 - 06/2024
Priority	Medium

Action #18

Complete replacement with bridges of culverts associated with Bissell Brook on Firetown Road.

Goal	5. Improve the resilience of local and regional utilities and infrastructure using strategies including adaptation, hardening, and creating redundancies.
Category	Structural Projects
Lead	Public Works, Engineering
Cost	\$50,000 - \$100,000
Funding	Grants / Bonding / Capital Improvement Funds
Timeframe	07/2023 - 06/2024
Priority	Medium



Action #19

Acquire parcels with development potential that could worsen flood risk if developed, and preserve as open space.

Goal	1. Minimize the impact of natural hazards on physical buildings and infrastructure
Category	Property Protection
Lead	Planning, Administration
Cost	More than \$100,000
Funding	Grants / CT DEEP
Timeframe	07/2022 - 06/2024
Priority	Medium

Action #20

Work with homeowners and Eversource to floodproof or elevate power grid features (connection points, meters, and circuit breakers) in the Riverside Road area so that power can remain on during flood events.

Goal	1. Minimize the impact of natural hazards on physical buildings and infrastructure
Category	Property Protection
Lead	Public Works
Cost	More than \$100,000
Funding	Town Operating Budget / Grants
Timeframe	07/2022 - 06/2024
Priority	Medium

Action #21

Approve a new Drought Ordinance.

Goal	2. Ensure Municipal Codes and Regulations support hazard mitigation
Category	Prevention
Lead	Planning
Cost	\$0 - \$10,000
Funding	Town Operating Budget
Timeframe	01/2021 - 12/2022
Priority	Low



Action #22

Coordinate with CT SHPO to conduct outreach to historic property owners to educate them on methods of retrofitting their properties to be more hazard-resilient while maintaining historic character.

Goal	8. Ensure community character and social equity are addressed in mitigation activities
Category	Education & Awareness
Lead	Planning, in coordination with SHPO
Cost	\$0 - \$10,000
Funding	SHPO
Timeframe	01/2021 - 12/2022
Priority	Low

Action #23

Contact the owners of Repetitive Loss Properties and nearby properties at risk to inquire about mitigation undertaken and suggest options for mitigating flooding in those areas. This should be accomplished with a letter directly mailed to each property owner.

Goal	1. Minimize the impact of natural hazards on physical buildings and infrastructure
Category	Education & Awareness
Lead	Planning
Cost	\$0 - \$10,000
Funding	Town Operating Budget / DEMHS
Timeframe	01/2021 - 12/2022
Priority	Low

Action #24

Work with CT DEEP to complete a formal validation of the Repetitive Loss Property list and update the mitigation status of each listed property.

Goal	1. Minimize the impact of natural hazards on physical buildings and infrastructure
Category	Property Protection
Lead	Planning
Cost	\$10,000 - \$25,000
Funding	Town Operating Budget / CT DEEP / DEMHS
Timeframe	07/2021 - 06/2023
Priority	Low



Action #25

Assess tree maintenance practices to identify opportunities for improvement.

Goal	4. Increase the use of natural, "green," or "soft" hazard mitigation measures, such as open space preservation and green infrastructure.
Category	Natural Resources Protection
Lead	Public Works
Cost	\$10,000 - \$25,000
Funding	Town Operating Budget
Timeframe	07/2021 - 06/2023
Priority	Low

Action #26

Coordinate with CT SHPO to conduct historic resource surveys, focusing on areas within natural hazard risk zones (such as flood or wildfire hazard zones and areas near steep slopes), to support identification of vulnerable historic properties and preparation of resiliency plans across the state. This action leverages existing resources and best practices for protection of historic and cultural resources through an ongoing statewide initiative by CT SHPO.

Goal	8. Ensure community character and social equity are addressed in mitigation activities
Category	Property Protection
Lead	Planning, in coordination with SHPO
Cost	\$10,000 - \$25,000
Funding	SHPO
Timeframe	07/2021 - 06/2023
Priority	Low

Action #27

Evaluate the costs and benefits of constructing a fuel cell at the Simsbury High School

Goal	7. Improve the emergency response capabilities of the region and its communities
Category	Preparedness & Emergency Response
Lead	Public Works, Emergency Management, Engineering, Board of Education
Cost	\$25,000 - \$50,000
Funding	Grants / Bonding
Timeframe	07/2023 - 06/2024
Priority	Low














Capitol Region Natural Hazards Mitigation Plan Update




Simsbury, Connecticut

Flood Plains, Dams & Critical Facilities




Critical Facilities

-  Fire Station
-  Police Station
-  School
-  Healthcare Facility
-  State Facility
-  Town Facility
-  Waste Water Facility
-  Emergency Center
-  NRHP Buildings/Sites

Dam Hazard Class

-  BB, A, AA OR Unclassified
-  Class B - Significant Hazard
-  Class C - High Hazard

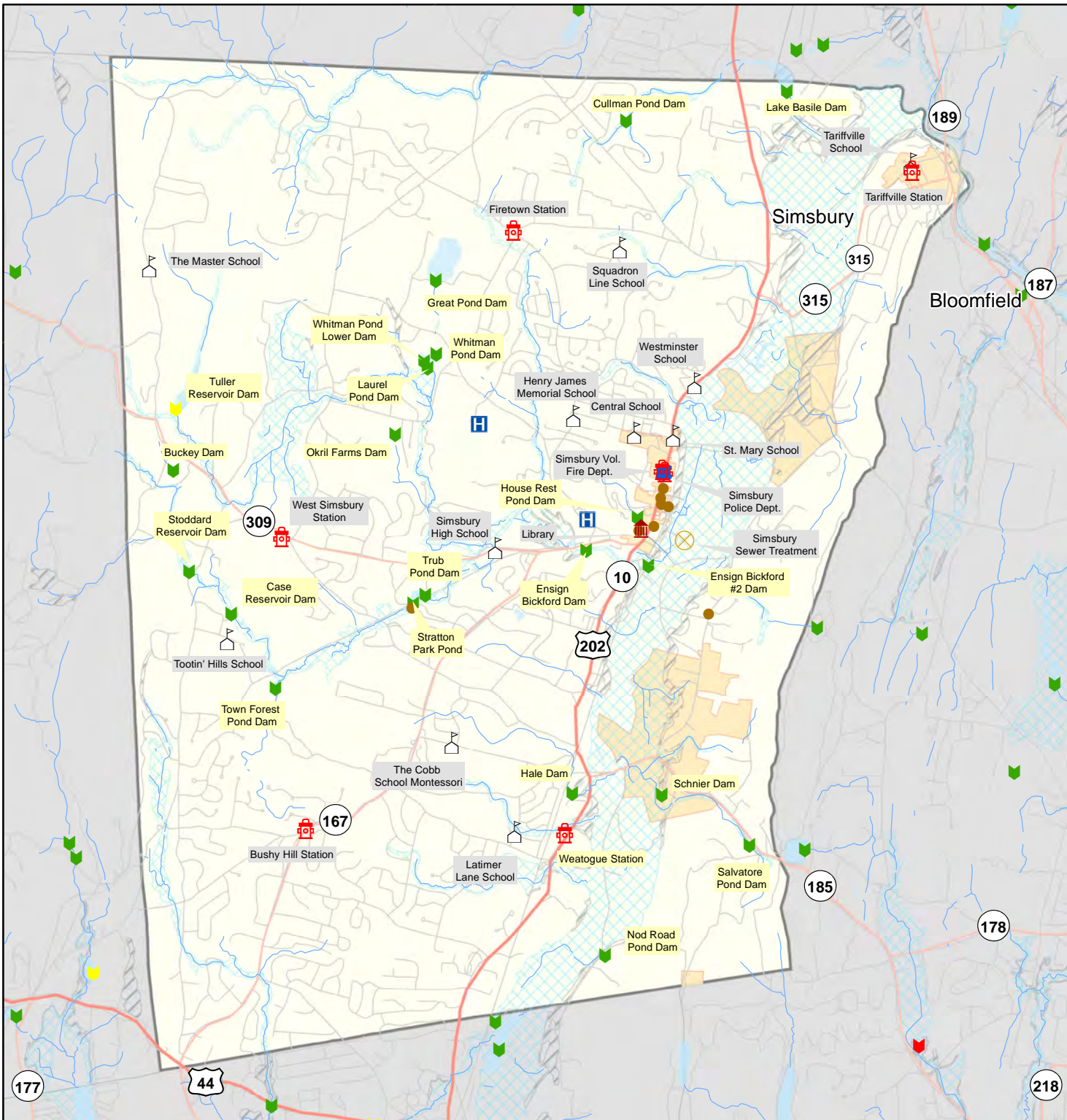
FEMA Flood Hazard Area

-  100 Year Flood Zone
-  500 Year Flood Zone
-  NRHP Districts/Areas

Data Sources: FEMA, National Register of Historic Places, CT DEEP, CRCOG, ESRI



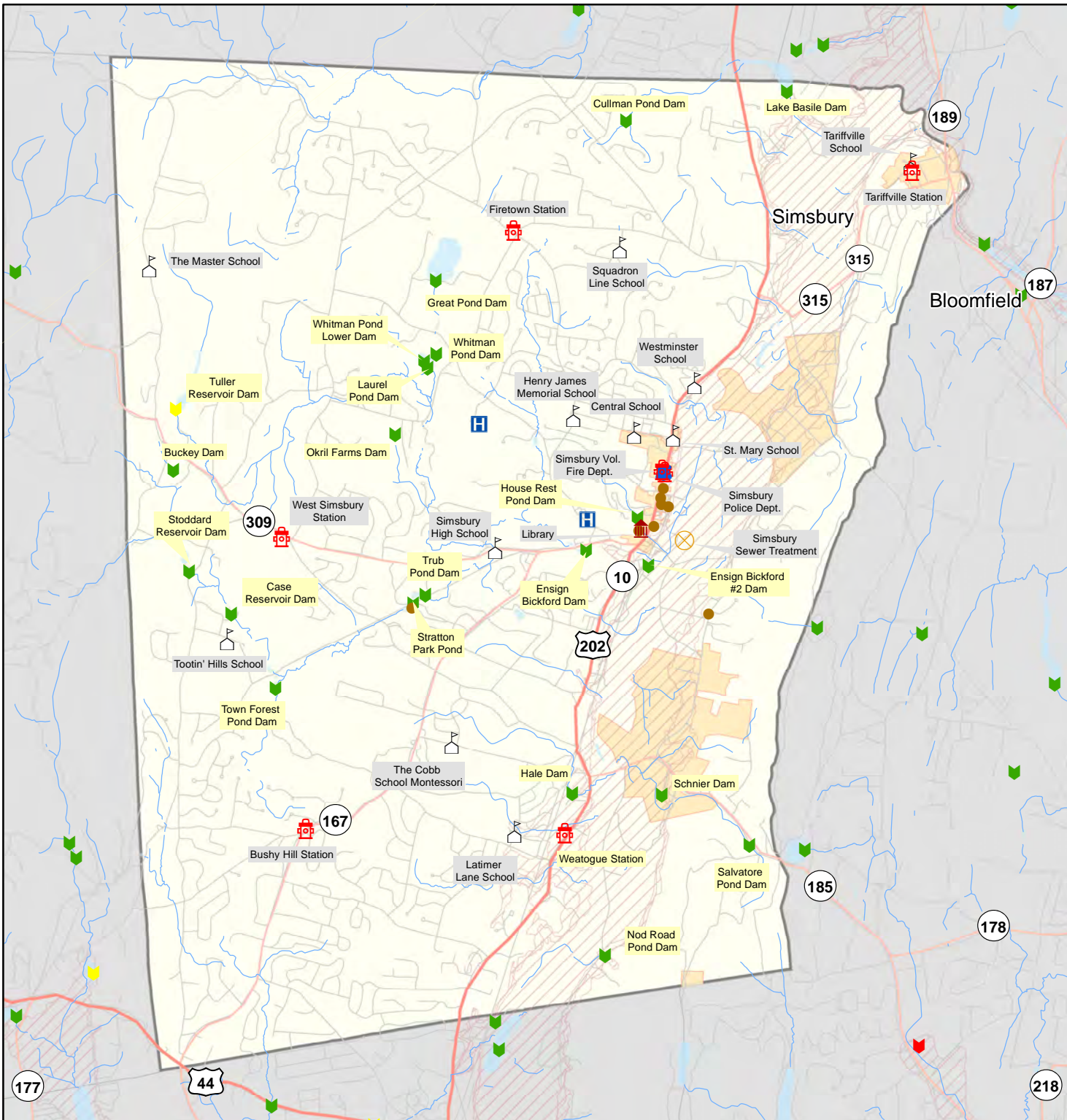
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






Capitol Region Natural Hazards Mitigation Plan Update

Simsbury, Connecticut






Dam Breach Inundation Area & Critical Facilities



Critical Facilities

-  Fire Station
-  Police Station
-  School
-  Healthcare Facility
-  State Facility
-  Town Facility
-  Waste Water Facility
-  Emergency Center
-  NRHP Buildings/Sites

Dam Hazard Class

-  BB, A, AA OR Unclassified
-  Class B - Significant Hazard
-  Class C - High Hazard
-  Dam Breach Inundation Areas
-  NRHP Districts/Areas

Data Sources: FEMA, National Register of Historic Places, CT DEEP, CRCOG, ESRI



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27 Somers

Community Overview

The rural town of Somers has a population of over 11,400, and covers a land area of 28.3 square miles. Elevation ranges from about 250 feet on the western side of town to over 900 feet in the hills on the eastern side. Somers lies in the Scantic River Watershed. Its major watercourses include the Scantic River and Abbey, Gillette, Gulf, Shady, Thrasher, Watchaug and Wrights Brooks, and Woods Stream. The main transportation routes through Town are north-south state routes 83 and 186, and east-west route 190. Somers hosts the State of Connecticut’s Osborn and Northern Correctional Facilities. Principal industries are agriculture and diversified industry. The largest employers are the state penitentiaries and Growers Direct, which has over 70 acres of greenhouses in town. Somers is also home to several tobacco farms, a handful of retail establishments, and a large horse farm. Somers also contains Sonny’s Place, an amusement park and concert venue, and portions of the Shenipsit State Forest.

The population in Somers has remained fairly static since adoption of the 2014-2019 Capitol Region Natural Hazards Mitigation Plan Update (“2014 HMP”), and there has been limited new building or development. The Town notes that its population is aging, and the number of calls for first responders has been increasing. Most of the town’s properties are on private water wells and utilize private septic systems. The Town has only 4.5 miles of public sewer infrastructure which drains to a small septic system.

Critical Facilities

Critical Facilities throughout the Capitol Region are listed in Appendix B. In Somers these include the Somers Firehouse, Public Works, Police Station, Kibbe Fuller Community Center, Senior Center, Somers High School, Mabelle B. Avery Middle School, Somers Elementary School, Sewer Plant, Town Hall, Woodcrest Senior Housing, multiple group homes, the Library, Speech Academy, three large State Penitentiaries, Geissler’s Supermarket, two gas stations, and Soapstone Mountain.

Table 27-1: Critical Facilities, Somers

Facility	Shelter	Generator
Firehouse		Yes
Public Works		Partial
Police Station		Yes
Kibbe Fuller Community Center (EOC)		Yes
Senior Center		
Somers High School	X	Yes
Mabelle B. Avery Middle School		Minimal
Somers Elementary School		Minimal
Sewer Plant		Yes
Town Hall		
Woodcrest Senior Housing		Minimal

Facility	Shelter	Generator
Group Homes (multiple)		
Library		
Speech Academy		
3 Large State Penitentiaries		Yes
Johnson Memorial Hospital in Stafford		Yes
Geissler's Supermarket		Yes
2 gas stations		
Soapstone Mountain		

The Kibbe Fuller Community Center is the Town EOC. The Town shelter is the Somers High School.

The three large state penitentiaries, run by the state, have altogether about 3,000 prisoners and 300 staff on duty. They have their own water treatment plant, but Somers Fire and EMS respond to prison needs.

An important State and Federal communications tower is located on the peak of Soapstone Mountain and is considered by the Town to be a major critical facility. The facility is located within a State park, but the road is maintained by the Town. It is not normally cleared in the winter, but is plowed by the Town in cases of emergency.

There is no hospital in Somers, but Johnson Memorial Hospital, just over the border in Stafford, is the primary hospital used by residents, and the Town considers it a critical facility.

Capabilities

Hazard mitigation is incorporated into the Somers Plan of Conservation and Development (POCD). The HMP document itself is cited. POCD actions specifically address natural hazards.

No new development or demolition in floodplains has occurred since 2008. A map modernization effort by FEMA is currently underway for Tolland County, but its full extent, and how much of Somers it will cover, is unknown.

The Somers DPW has the capacity to remove tree debris, and contracts out tree trimming and removal. Additionally, the Town has reported a positive relationship with the regional electricity provider, Eversource.

Somers has one solar farm, and is planning to add one more; additionally, many Town buildings (including the Police and Fire Departments, the Elementary School, and the DPW building) have solar panels on their roofs. There is some potential for development of microgrid systems utilizing these power sources.

Somers participates in a Town and County Fire Service Pact, which includes 25 agencies and covers both fire and EMS services.



The Town has a robust GIS system to assist with planning, and has a Community Emergency Response Team (CERT).

Challenges

Challenges Overview

The primary concern of Somers officials is tree damage and power outages. Following Winter Storm Alfred in October, 2011, power outages and tree debris were widespread. The Town is specifically concerned about increasing treefall problems caused by the diminishing health of its tree stock due to pests such as gypsy moths, emerald ash borer, and longhorn beetles. The Town also struggles with effective snow removal from the large flat roofs of the Town's school.

Flooding is another major concern for the Town of Somers. Areas prone to flooding include Gulf Road, Battle Street, Hamden Road, Mountain Road, Stebbins Road at Florida Road, King Road, Four Bridges Road, and Durkee Road. The two sources of flooding for these roads are Scantic River and Gillettes Brook.

Another site of flooding concern is at the former Somersville Mill on the Scantic River. On June 1, 2012, the mill burned down and building materials were deposited into the River. The mill site spans the river, is located in the floodplain and restricts flow in the river. The bricks which were deposited in the watercourse as a result of the fire further restrict the Scantic River flow. The Town has acquired the site and made progress on removing the debris and remediating environmental and flooding hazards here.

Hazard Losses

The economic losses faced by Somers from natural hazards can be estimated by reviewing historic, and modeling future, loss figures. Loss estimates are summarized below.

Historic FEMA Payments

FEMA reimburses communities for hazard losses through programs including Public Assistance (PA) and the National Flood Insurance Program (NFIP). Combining PA and private flood insurance payments can give an estimate for total losses to a community.

The NFIP has paid ten property damage claims in Somers totaling \$243,412 to-date. However, there have been no Repetitive Loss (RL) Property claims in Somers to-date.

Total PA reimbursements to the community were as follows:

- Flood Events: \$132,585 (\$6,978 annually)
- Hurricane Events: \$79,522 (\$4,185 annually)
- Winter Storm Events: \$1,757,835 (\$92,518 annually)

These are summarized in the tables below.



Table 27-2: Flood Event PA Reimbursements, Somers

Incident	Oct 2005
Declaration	12/16/2005
Disaster No.	1619
Entity	FEMA PA Reimbursement
State	\$1,664
Municipal	\$130,921
Nonprofit	\$0
Total	\$132,585
Annualized	\$6,978

Table 27-3: Hurricane Wind Event PA Reimbursements, Somers

Incident	Aug - Sep 2011 (T.S. Irene)	Oct - Nov 2012 (Storm Sandy)
Declaration	9/2/2011	10/30/2012
Disaster #	4023	4087
Entity	FEMA PA Reimbursement	
State	\$7,533	\$6,427
Municipal	\$35,555	\$30,007
Nonprofit	\$0	\$0
Total	\$43,088	\$36,434
Annualized	\$2,268	\$1,918

Table 27-4: Winter Storm PA Reimbursements, Somers

Incident	Mar 2003	Dec 2003	Jan 2005	Feb 2006	Jan 2011	Oct 2011	Feb 2013	Jan 2015
Declaration	3/11/03	1/15/04	2/17/05	5/2/06	3/3/11	11/17/11	3/21/13	4/8/15
Disaster #	3176	3192	3200	3266	1958	4046	4106	4213
Entity	FEMA PA Reimbursement							
State	\$11,620	\$12,019	\$22,484	\$19,286	\$25,064	\$35,724	\$21,293	\$45,216
Municipal	\$23,830	\$32,888	\$26,605	\$21,748	\$52,949	\$1,281,810	\$48,025	\$77,274
Nonprofit	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Total	\$35,449	\$44,907	\$49,089	\$41,034	\$78,013	\$1,317,534	\$69,318	\$122,490
Annualized	\$1,866	\$2,364	\$2,584	\$2,160	\$4,106	\$69,344	\$3,648	\$6,447

National Centers for Environmental Information Losses

The table below summarizes events in the National Centers for Environmental Information (NCEI) severe storm database that were specifically noted as having impacted the community since 2012.



Table 27-5: NCEI Database Losses since 2012, Somers

Date	Event	Property Damage
7/27/2014	Thunderstorm Wind Hail	\$10,000 \$0
7/28/2014	Thunderstorm Wind	\$10,000
Total		\$20,000

NCEI losses under other event categories (such as drought, high wind, flooding, and winter storms) were not specifically noted as impacting this community, though they did impact Tolland County and nearby towns. NCEI losses are reported in Section II of this Plan.

HAZUS-MH Losses

CRCOG used FEMA’s Hazus-MH model to analyze the risks that the community might face from flooding, hurricanes, and earthquakes. The model estimates economic losses due to damage to buildings and building contents, as well as other economic disruptions. Both residential and commercial structures are addressed. Losses from different hazards are summarized below. Where available, estimates from the previous and current versions of the HMP are provided side-by-side; differences between the two may have been caused by a combination of the following:

- Changes in methodology: such as hazard zone mapping
- Changes in data: such as population and property values
- Changes in the model: this HMP utilized Hazus-MH version 4.0 rather than 2.1
- Other factors: inherent in a complex software like Hazus-MH

More details are available in the Multi-Jurisdictional HMP. Ultimately, changes in the loss estimates reflect the reality that small differences in hazard event features can have a significant impact on losses incurred.

Table 27-6: Estimated Damages to Somers from a 1% Annual-Chance Flood

Loss Type	2014 Results	2018 Results
Households Displaced	157	139
People Needing Shelter	145	46
Buildings at Least Moderately Damaged	10	0
Residential Building & Content Losses	\$4,920,000	\$4,909,894
Other Building & Content Losses	\$7,770,000	\$4,810,995
Total Building & Content Loss	\$12,690,000	\$9,720,889
Total Business Interruption Losses	\$120,000	\$220,000
TOTAL	\$12,790,000	\$9,940,889



Table 27-7: Estimated Damages to Somers from a 1% Annual-Chance Hurricane

Loss Type	2014 Results (1938 event)	2018 Results (1% track)
Buildings at Least Moderately Damaged	301	1
Buildings Completely Damaged	20	1
Total Debris Generated	42,316 tons	9939
Truckloads (at 25 tons/truck) of building debris	126	398
Economic Losses		
Residential Building & Content Losses	\$30,160,000	\$7,053,044
Other Building & Content Losses	\$4,420,000	\$210,569
Total Building & Content Loss	\$34,580,000	\$7,263,613
Total Business Interruption Losses	\$3,630,000	\$194,981
TOTAL LOSSES	\$38,200,000	\$7,458,594

Losses were calculated from a modeled probabilistic earthquake (1% annual-chance of occurrence), as well as for four specific scenarios with epicenters around Connecticut.

Table 27-8: Estimated Damages to Somers from a Probabilistic Earthquake

Loss Type	2018 Results
Wage Loss	\$1,129
Rent Loss	\$803
Relocation Loss	\$1,600
Income Loss	\$839
Inventory Loss	\$89
Total Business Disruption	\$4,460
Structural Loss	\$3,658
Non-Structural Loss	\$11,492
Total Building Loss	\$15,151
Total Content Loss	\$4,336
TOTAL LOSSES	\$23,947

Table 27-9: Estimated Damages to Somers from Modeled Earthquake Scenarios

Epicenter Location	Magnitude	Estimated Total Losses
East Haddam	6.4	\$50,308.34
Haddam	5.7	\$9,817.67
Portland	5.7	\$18,248.26
Stamford	5.7	\$1,978.36

Average Annualized Losses

Average Annualized Loss (AAL) figures are useful tools for comparison of the risks faced from different hazards with different likelihoods of occurring in a given time period. AAL estimates were prepared for each natural hazard which may impact the community based on the methodologies discussed in Section II of the Multi-Jurisdictional HMP. Dam failure, drought, tornado, and wildfire losses were sourced from the 2014 Connecticut Natural Hazard Mitigation Plan Update, with dam failure data supplemented by the National Performance of Dams



Program and the Connecticut Department of Energy & Environmental Protection. Earthquake and hurricane losses were calculated in HAZUS-MH. Losses for flooding came from NFIP claims, for winter storms from Public Assistance Reimbursements, and for thunderstorms from the NCEI database. These are presented in the table below in dollars per year. Note that Hurricanes and Tropical Storms represent the largest share of total annualized losses.

Table 27-10: Average Annualized Losses, Somers

Dam Failure	Drought	Earthquakes	Flooding	Hurricanes and Tropical Storms	Severe Winter Storms	Thunderstorms	Tornadoes	Wildfires	Total
\$703	\$0	\$23,947	\$13,384	\$775,518	\$92,518	\$4,166	\$3,326	\$3,723	\$917,284

Losses Summary

A review of the above loss estimates demonstrates that the Town of Somers has experienced significant expenses as a result of natural hazards, and is at risk for additional losses if some of the less-frequent events were to occur. These actual and potential losses justify hazard mitigation actions to reduce losses in the future.

Mitigation Strategies and Actions

Noted Hazard Mitigation Needs

Over the course of Plan development, multiple hazard mitigation needs were noted.

- Providing back-up power and sufficient sheltering capabilities during prolonged outages is a concern. The Town has discussed providing a secondary shelter/warming center that would both increase shelter capacity and allow classes to resume at the High School while meeting residents’ needs at another location. The Senior Center has been considered for this purpose and could also serve as a backup polling place in the event of a power outage.
- A roof-clearing plan to guide future snow removal efforts from school roofs may be beneficial.
- Somers is interested in the expansion of natural gas infrastructure in Town, especially with the goal of converting generators to run on natural gas.
- The Town would benefit from a Public Safety Complex that housed fire, police and an EOC; currently the EOC is too far away and the fire and police stations are inadequate in capacity.
- Backup generators are needed for the Town Hall, Public Works, and Senior Center. The Senior Center could serve as a warming center and shelter and is close to Woodcrest Senior Housing



Status of Previous Mitigation Strategies and Actions

The Town of Somers reviewed the mitigation actions proposed in the 2014 HMP and determined the status of each. That information is included in the table below.

Table 27-11: Status of Previous Mitigation Strategies and Actions, Somers

Action #	Action	Notes	Status
GOAL: REDUCE THE LOSS OF LIFE AND PROPERTY AND ECONOMIC CONSEQUENCES AS A RESULT OF NATURAL DISASTERS.			
Objective 1: Reduce the likelihood of flooding.			
1.1	Implement the recommendations of the Somers Floodplain Management Study.	Town needs to hire a consultant to prioritize culvert improvements. Obtain ACOE & DEEP permits.	Carry Forward with Revisions
1.2	Continue to use the Floodplain Management Studies as a resource in determining the potential impacts of proposed development and town projects to be included in the Capital Improvements Program.	This is an established practice. This is a capability.	Capability
1.3	Work with the DEEP to improve the Camp Road dam.	Dam not yet improved, and cooperation with DEEP has been minimal due to staffing limitations.	Carry Forward
1.4	Improve drainage system through continued replacement and maintenance of older culverts.	Town replaces and maintains older culverts but wishes to prioritize these efforts. New action listed below. Town also has a list of catch basins and cleans on a 4-year cycle. That is a capability. Town wishes to have a specific action to improve Battle Street drainage.	Carry Forward with Revisions
1.5	Investigate participation in FEMA's Community Rating System program.	Town decided not to pursue participation during the previous planning period.	Carry Forward with Revisions
Objective 2: Reduce the likelihood of damage from wind and severe storms.			
2.1	Continue preventive tree maintenance.	Town maintains tree trimming inventory and hires private contractors to trim. Done an average of three times per month.	Capability
2.2	Acquire emergency generators at Town Hall and Senior Center to ensure continuity of government and provide additional sheltering capacity.	Generators not yet acquired due to funding limitations. Town has identified Senior Center as a preferred site for a secondary shelter.	Carry Forward with Revisions
2.3	Educate residents on having a personal family disaster safety plan and emergency supply kit.	This is an established practice but needs website and social media. Some training completed at Senior Center. Advertisements through Facebook and Town Website.	Carry Forward with Revisions
2.4	Encourage new developments housing special needs populations to include generators for sheltering on site.	Town intends to review ordinance proposals to require generators for such new developments.	Carry Forward with Revisions
Objective 3: Reduce the likelihood of damage from forest fires.			
3.1	Continue installation of dry hydrants and cisterns in needed areas of Town.	Installed 2 hydrants, in need of one more.	Carry Forward



Active Mitigation Strategies and Actions

The Town proposed to initiate several new mitigation actions for the upcoming five years. Additionally, a number of actions from the previous planning period are being carried forward or replaced with revised actions. These are listed below.

Each of the following actions has been prioritized based on FEMA guidelines, listed from highest to lowest priority, and numbered.

Action #1	
Enter the Sustainable CT program through Registration and review actions that can be undertaken to pursue Certification. Make progress with the actions related to hazard mitigation.	
Goal	4. Increase the use of natural, "green," or "soft" hazard mitigation measures, such as open space preservation and green infrastructure.
Category	Natural Resources Protection
Lead	Planning
Cost	\$0 - \$10,000
Funding	Town Operating Budget
Timeframe	01/2019 - 12/2019
Priority	High

Action #2	
Install one additional needed dry hydrant.	
Goal	7. Improve the emergency response capabilities of the region and its communities
Category	Preparedness & Emergency Response
Lead	Fire Department
Cost	\$0 - \$10,000
Funding	Town Operating Budget / CT DEEP
Timeframe	07/2019 - 06/2020
Priority	High

Action #3	
Acquire generators for Town Hall, Public Works, and Senior Center.	
Goal	7. Improve the emergency response capabilities of the region and its communities
Category	Preparedness & Emergency Response
Lead	Emergency Management
Cost	\$10,000 - \$25,000
Funding	Town Operating Budget / DEMHS
Timeframe	01/2019 - 12/2020
Priority	High



Action #4

Hire a consultant to assist with implementation of the Somers Floodplain Management Study by prioritizing culvert improvements and obtaining necessary permits.

Goal	5. Improve the resilience of local and regional utilities and infrastructure using strategies including adaptation, hardening, and creating redundancies.
Category	Structural Projects
Lead	Public Works
Cost	\$50,000 - \$100,000
Funding	Grants
Timeframe	07/2021 - 06/2022
Priority	High

Action #5

Improve drainage system on Brattle Street.

Goal	5. Improve the resilience of local and regional utilities and infrastructure using strategies including adaptation, hardening, and creating redundancies.
Category	Structural Projects
Lead	Public Works
Cost	More than \$100,000
Funding	Grants
Timeframe	07/2022 - 06/2023
Priority	High

Action #6

Conduct outreach to local small businesses with the aim of preventing the accidental release and pollution from chemicals stored and used at their facilities during or following natural hazard events.

Goal	6. Improve public outreach, education, and warning systems
Category	Education & Awareness
Lead	Planning, in coordination with DEEP
Cost	\$0 - \$10,000
Funding	Materials & Resources Provided by CT DEEP
Timeframe	01/2019 - 12/2019
Priority	Medium



Action #7

Include in permitting requirements a review of potential impacts, based on the FMS, of proposed development and town projects.

Goal	2. Ensure Municipal Codes and Regulations support hazard mitigation
Category	Prevention
Lead	Planning
Cost	\$0 - \$10,000
Funding	Town Operating Budget
Timeframe	01/2020 - 12/2020
Priority	Medium

Action #8

Educate residents on personal disaster safety and supply kits, through the Town website and social media.

Goal	6. Improve public outreach, education, and warning systems
Category	Education & Awareness
Lead	Emergency Management
Cost	\$0 - \$10,000
Funding	Town Operating Budget
Timeframe	01/2020 - 12/2020
Priority	Medium

Action #9

Establish an ordinance requiring generators for new special needs housing developments.

Goal	2. Ensure Municipal Codes and Regulations support hazard mitigation
Category	Preparedness & Emergency Response
Lead	Planning
Cost	\$0 - \$10,000
Funding	Town Operating Budget
Timeframe	01/2020 - 12/2020
Priority	Medium



Action #10

Coordinate with NEMO and CROG to share resources and gain technical support for hazard mitigation actions involving stormwater management and public outreach, which have parallel benefits related to MS4 stormwater permit compliance.

Goal	1. Minimize the impact of natural hazards on physical buildings and infrastructure
Category	Prevention
Lead	Public Works
Cost	\$0 - \$10,000
Funding	Town Operating Budget
Timeframe	01/2020 - 12/2020
Priority	Medium

Action #11

Make information about available assistance for property acquisition or relocation available at Town Hall and on the Town website.

Goal	6. Improve public outreach, education, and warning systems
Category	Education & Awareness
Lead	Planning
Cost	\$0 - \$10,000
Funding	Town Operating Budget
Timeframe	07/2020 - 06/2021
Priority	Medium

Action #12

Participate in EMI courses or the seminars and annual conference held by the Connecticut Association of Flood Managers.

Goal	3. Improve institutional awareness and understanding of natural hazard impacts and mitigation within municipal governments and other decision-making bodies
Category	Education & Awareness
Lead	Planning
Cost	\$0 - \$10,000
Funding	Town Operating Budget
Timeframe	07/2019 - 06/2024
Priority	Medium



Action #13

Conduct an outreach campaign informing residents of the Community Emergency Response Team (CERT) and encouraging public participation.

Goal	6. Improve public outreach, education, and warning systems
Category	Education & Awareness
Lead	Emergency Management
Cost	\$10,000 - \$25,000
Funding	Town Operating Budget / DEMHS
Timeframe	07/2020 - 06/2022
Priority	Medium

Action #14

Expand emergency communication and notification methods to a variety of media, including radio, television, social media, and the Town Website.

Goal	6. Improve public outreach, education, and warning systems
Category	Preparedness & Emergency Response
Lead	Emergency Management
Cost	\$25,000 - \$50,000
Funding	Town Operating Budget / Grants / DEMHS
Timeframe	07/2021 - 06/2023
Priority	Medium

Action #15

Designate a secondary shelter (most likely the Senior Center, if sufficient backup generators are installed)

Goal	7. Improve the emergency response capabilities of the region and its communities
Category	Preparedness & Emergency Response
Lead	Emergency Management
Cost	\$0 - \$10,000
Funding	Town Operating Budget
Timeframe	01/2021 - 12/2022
Priority	Low



Action #16

Work with CT DEEP to improve the Camp Road dam.

Goal	1. Minimize the impact of natural hazards on physical buildings and infrastructure
Category	Structural Projects
Lead	Public Works
Cost	\$0 - \$10,000
Funding	Town Operating Budget / CT DEEP
Timeframe	07/2021 - 06/2022
Priority	Low

Action #17

Complete an analysis of costs and benefits of joining the FEMA Community Rating System.

Goal	9. Minimize the economic impact of hazard damages
Category	Property Protection
Lead	Planning
Cost	\$0 - \$10,000
Funding	Town Operating Budget
Timeframe	07/2021 - 06/2022
Priority	Low

Action #18

Coordinate with CT SHPO to conduct historic resource surveys, focusing on areas within natural hazard risk zones (such as flood or wildfire hazard zones and areas near steep slopes), to support identification of vulnerable historic properties and preparation of resiliency plans across the state. This action leverages existing resources and best practices for protection of historic and cultural resources through an ongoing statewide initiative by CT SHPO.

Goal	8. Ensure community character and social equity are addressed in mitigation activities
Category	Property Protection
Lead	Planning, in coordination with SHPO
Cost	\$10,000 - \$25,000
Funding	SHPO
Timeframe	07/2021 - 06/2023
Priority	Low












Capitol Region Natural Hazards Mitigation Plan Update




Somers, Connecticut

Flood Plains, Dams & Critical Facilities




Critical Facilities

-  Fire Station
-  Police Station
-  School
-  Healthcare Facility
-  State Facility
-  Town Facility
-  Waste Water Facility
-  Emergency Center
-  NRHP Buildings/Sites

Dam Hazard Class

-  BB, A, AA OR Unclassified
-  Class B - Significant Hazard
-  Class C - High Hazard

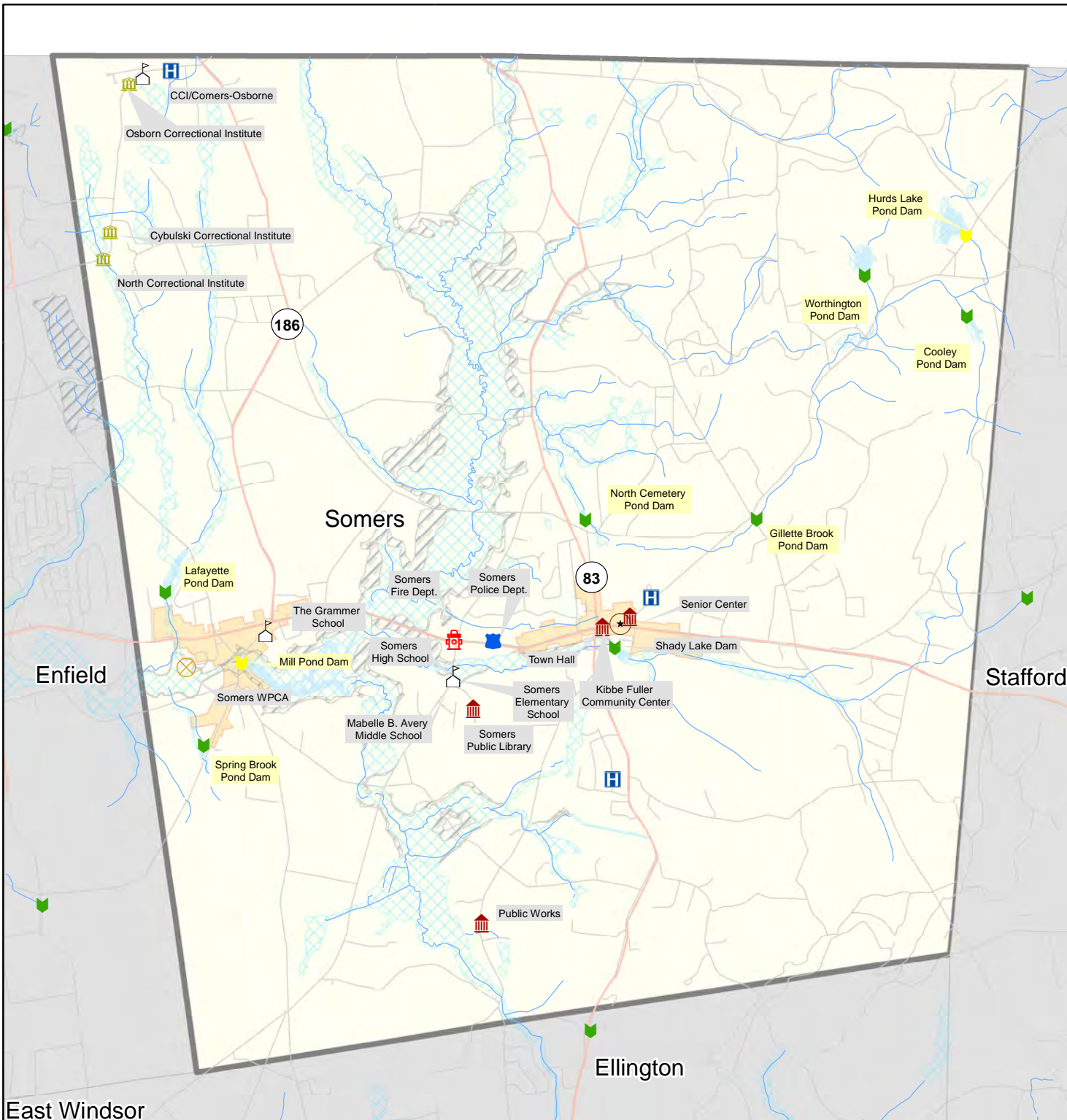
FEMA Flood Hazard Area

-  100 Year Flood Zone
-  500 Year Flood Zone
-  NRHP Districts/Areas

Data Sources: FEMA, National Register of Historic Places, CT DEEP, CRCOG, ESRI



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East Windsor





28 South Windsor

Community Overview

South Windsor is a suburban community that encompasses roughly 28.5 square miles with a population of about 26,900. The Town drains into three main watercourses: the mainstem of the Connecticut River in the west, the Scantic River in the north, and the Hockanum River to the east. Other major watercourses include the Podunk and Scantic Rivers and Averys, Bancroft, Dry, Newberry and Waples Brooks. Interstate 291 travels through the southwestern corner of Town; other major transportation routes include state routes 5, 30, 74 and 194. Principal industries include food distribution, fuel cell power plants, and machine and equipment design and manufacture. South Windsor also has significant retail development in the southeast corner of town, around the Buckland Hills regional mall and the Shops at Evergreen Walk.

Since the adoption of the 2014-2019 Capitol Region Natural Hazards Mitigation Plan Update (“2014 HMP”), there has been no new development, and most construction has consisted of redevelopment and renovations of retail and commercial properties. This work has not increased the Town’s exposure to risk.

Critical Facilities

Critical Facilities throughout the Capitol Region are listed in Appendix B. In South Windsor these include Recreation / Public Buildings Maintenance Headquarters, the High School (primary shelter), Capitol Region Education Council School, Town Hall, Police Department, Library, Town Garage, and Emergency Operations Center (EOC).

Table 28-1: Critical Facilities, South Windsor

Facility	Shelter	Generator
Recreation / Public Buildings Maintenance Headquarters		X
High School	Primary	X
Capitol Region Education Council School		X
Town Hall		X
Police Department		X
Fire Department		X
EOC		X
Library		
Town Garage		X

In 2016 the Town completed renovations on a state-of-the art EOC that can continue operations through most natural hazards (including up to Category 3 Hurricane). The facility has high-speed fiber-optic communication connections to all critical Town offices.

The Town has aggressively pursued installation of emergency generators for critical facilities. Generators have been funded as capital projects. A generator was added to the high school (primary shelter) and Wapping Elementary School since the 2014 HMP.

Capabilities

Hazard mitigation is addressed specifically in South Windsor’s Plan of Conservation and Development (POCD). The HMP document itself is cited. POCD actions specifically address natural hazards.

The Town of South Windsor, through its Flood Plain Regulations (Sec. 5.2 of the Zoning Regulations, revisions adopted in September 2008) prohibits the construction of structures designed for human habitation within flood zones and specifies construction standards that take into account flooding effects on structures.

South Windsor follows State guidelines to require retention or detention basins built on new developments.

The Town maintains trees along roadways and on Town property. Public Works clears snow from municipal roads using GPS-equipped vehicles, and hires private contractors when extra help is needed. The Town keeps records of winter storm costs every year and uses those to inform future efforts.

New Capabilities

The Town’s EOP has recently been updated beyond the annual review and maintenance.

The EOC has recently been renovated. All critical data centers in the EOC and the Police Department have redundancies and system back-ups.

Public Works has created a smartphone app called “Connect South Windsor” (powered by PublicStuff.com) that is used to report and track drainage issues, downed trees and power lines, public complaints, etc.

Since the 2014 HMP, three bridges and culverts have been upgraded, and numerous other drainage improvement projects have been implemented. The Town’s GIS system has been enhanced, including through mapping and digitizing of stormwater features such as outfalls.

South Windsor has improved its tree maintenance capabilities. The Town has two tree wardens: one for roadways and another for Town property. The tree wardens work closely with Eversource to coordinate trimming efforts. The annual tree maintenance budget has been increased and the Town feels it is sufficient. South Windsor has a very robust debris management plan that was updated, with new staging and storage sites identified, in 2014.

South Windsor was awarded the Bronze Certification level within the SustainableCT program in October 2018.



Challenges

Challenges Overview

Flooding and severe storms are the primary natural hazards of concern of the Town of South Windsor. Flooding has generally localized impacts while severe storms are more likely to have town wide impacts. Severe storms can result in prolonged power outages, disruptions to communications and transportation, and debris management issues.

As of the previous HMP, there were located in FEMA A or AE zones 32 houses, 17 barns, 5 garages, 3 gazebos, 68 sheds, 11 trailers, a wastewater treatment plant, and 2 pump stations. These counts have not changed significantly. The Town is also aware of two houses on Ferry Lane and two on Main Street that have been damaged more than once by floods; although it does not appear these structures are insured under the National Flood Insurance Program. Since 2008, there has been no construction or demolition in the floodplains.

A wind event in October of 2017 left over 600 homes without power. There were communication issues between the Town and Eversource that hindered recovery.

Forest- and wildland fires are not considered to be a significant concern by the Town; because it is mostly built-out, there are few locations where such a fire could burn. The majority (80-90%) of South Windsor is on public water with hydrants; no additional fire suppression needs are known.

There are 4 dams in town that are owned and maintained by DEEP; none poses a significant threat to the community.

Hazard Losses

The economic losses faced by South Windsor from natural hazards can be estimated by reviewing historic, and modeling future, loss figures. Loss estimates are summarized below.

Historic FEMA Payments

FEMA reimburses communities for hazard losses through programs including Public Assistance (PA) and the National Flood Insurance Program (NFIP). Combining PA and private flood insurance payments can give an estimate for total losses to a community.

The NFIP has paid 20 property damage claims in South Windsor totaling \$151,997 to-date. South Windsor has two Repetitive Loss (RL) Properties which have filed a total of eight claims for a combined total of \$82,255.

Total PA reimbursements to the community were as follows:

- Flood Events: \$40,751 (\$2,145 annually)
- Hurricane Events: \$154,250 (\$8,118 annually)



- Winter Storm Events: \$7,751,129 (\$407,954 annually)

These are summarized in the tables below.

Table 28-2: Flood Event PA Reimbursements, South Windsor

Incident	Sep 1999	Oct 2005
Declaration	9/23/1999	12/16/2005
Disaster No.	1302	1619
Entity	FEMA PA Reimbursement	
State	\$1,192	\$1,479
Municipal	\$6,767	\$31,313
Nonprofit	\$0	\$0
Total	\$7,959	\$32,792
Annualized	\$419	\$1,726

Table 28-3: Hurricane Wind Event PA Reimbursements, South Windsor

Incident	Aug - Sep 2011 (T.S. Irene)
Declaration	9/2/2011
Disaster #	4023
Entity	FEMA PA Reimbursement
State	\$1,131
Municipal	\$153,120
Nonprofit	\$0
Total	\$154,250
Annualized	\$8,118

Table 28-4: Winter Storm PA Reimbursements, South Windsor

Incident	Mar 2003	Dec 2003	Jan 2005	Feb 2006	Jan 2011	Oct 2011	Feb 2013
Declaration	3/11/03	1/15/04	2/17/05	5/2/06	3/3/11	11/17/11	3/21/13
Disaster #	3176	3192	3200	3266	1958	4046	4106
Entity	FEMA PA Reimbursement						
State	\$22,291	\$19,983	\$26,364	\$32,000	\$27,881	\$11,498	\$54,182
Municipal	\$54,034	\$73,815	\$86,004	\$77,622	\$99,059	\$6,861,786	\$275,371
Nonprofit	\$0	\$0	\$0	\$0	\$0	\$29,239	\$0
Total	\$76,326	\$93,798	\$112,368	\$109,622	\$126,939	\$6,902,523	\$329,553
Annualized	\$4,017	\$4,937	\$5,914	\$5,770	\$6,681	\$363,291	\$17,345



National Centers for Environmental Information Losses

The table below summarizes events in the National Centers for Environmental Information (NCEI) severe storm database that were specifically noted as having impacted the community since 2012.

Table 28-5: NCEI Database Losses since 2012, South Windsor

Date	Event	Property Damage
8/5/2012	Thunderstorm Wind	\$10,000
9/18/2012	Thunderstorm Wind	\$5,000
5/21/2013	Hail	\$0
6/17/2013	Thunderstorm Wind	\$10,000
2/25/2016	Thunderstorm Wind	\$30,000
8/13/2016	Thunderstorm Wind	\$1,000
Total		\$56,000

NCEI losses under other event categories (such as drought, high wind, flooding, and winter storms) were not specifically noted as impacting this community, though they did impact Hartford County and nearby towns. NCEI losses are reported in Section II of this Plan.

HAZUS-MH Losses

CRCOG used FEMA’s Hazus-MH model to analyze the risks that the community might face from flooding, hurricanes, and earthquakes. The model estimates economic losses due to damage to buildings and building contents, as well as other economic disruptions. Both residential and commercial structures are addressed. Losses from different hazards are summarized below. Where available, estimates from the previous and current versions of the HMP are provided side-by-side; differences between the two may have been caused by a combination of the following:

- Changes in methodology: such as hazard zone mapping
- Changes in data: such as population and property values
- Changes in the model: this HMP utilized Hazus-MH version 4.0 rather than 2.1
- Other factors: inherent in a complex software like Hazus-MH

More details are available in the Multi-Jurisdictional HMP. Ultimately, changes in the loss estimates reflect the reality that small differences in hazard event features can have a significant impact on losses incurred.



Table 28-6: Estimated Damages to South Windsor from a 1% Annual-Chance Flood

Loss Type	2014 Results	2018 Results
Households Displaced	289	294
People Needing Shelter	542	488
Buildings at Least Moderately Damaged	48	59
Economic Losses		
Residential Building & Content Losses	\$16,370,000	\$36,206,779
Other Building & Content Losses	\$16,800,000	\$29,860,558
Total Building & Content Loss	\$33,170,000	\$66,067,336
Total Business Interruption Losses	\$80,000	\$1,423,543
TOTAL	\$33,240,000	\$67,490,879

Table 28-7: Estimated Damages to South Windsor from a 1% Annual-Chance Hurricane

Loss Type	2014 Results (1938 event)	2018 Results (1% track)
Buildings at Least Moderately Damaged	1,009	6
Buildings Completely Damaged	71	0
Total Debris Generated	45,147 tons	10085
Truckloads (at 25 tons/truck) of building debris	455	403
Economic Losses		
Residential Building & Content Losses	\$90,700,000	\$20,227,449
Other Building & Content Losses	\$26,600,000	\$968,224
Total Building & Content Loss	\$117,300,000	\$21,195,673
Total Business Interruption Losses	\$14,100,000	\$652,777
TOTAL LOSSES	\$131,400,000	\$21,848,450

Losses were calculated from a modeled probabilistic earthquake (1% annual-chance of occurrence), as well as for four specific scenarios with epicenters around Connecticut.

Table 28-8: Estimated Damages to South Windsor from a Probabilistic Earthquake

Loss Type	2018 Results
Wage Loss	\$3,905
Rent Loss	\$3,116
Relocation Loss	\$6,114
Income Loss	\$2,905
Inventory Loss	\$740
Total Business Disruption	\$16,780
Structural Loss	\$13,160
Non-Structural Loss	\$39,524
Total Building Loss	\$52,683
Total Content Loss	\$17,113
TOTAL LOSSES	\$86,576



Table 28-9: Estimated Damages to South Windsor from Modeled Earthquake Scenarios

Epicenter Location	Magnitude	Estimated Total Losses
East Haddam	6.4	\$529,340.67
Haddam	5.7	\$107,192.70
Portland	5.7	\$315,663.94
Stamford	5.7	\$8,070.02

Other Hazard Costs

Town officials report that South Windsor sustained over \$8 million in damages following a large winter storm in 2015.

Average Annualized Losses

Average Annualized Loss (AAL) figures are useful tools for comparison of the risks faced from different hazards with different likelihoods of occurring in a given time period. AAL estimates were prepared for each natural hazard which may impact the community based on the methodologies discussed in Section II of the Multi-Jurisdictional HMP. Dam failure, drought, tornado, and wildfire losses were sourced from the 2014 Connecticut Natural Hazard Mitigation Plan Update, with dam failure data supplemented by the National Performance of Dams Program and the Connecticut Department of Energy & Environmental Protection. Earthquake and hurricane losses were calculated in HAZUS-MH. Losses for flooding came from NFIP claims, for winter storms from Public Assistance Reimbursements, and for thunderstorms from the NCEI database. These are presented in the table below in dollars per year. Note that Hurricanes and Tropical Storms represent the largest share of total annualized losses.

Table 28-10: Average Annualized Losses, South Windsor

Dam Failure	Drought	Earthquakes	Flooding	Hurricanes and Tropical Storms	Severe Winter Storms	Thunderstorms	Tornadoes	Wildfires	Total
\$46	\$0	\$127,885	\$6,145	\$1,611,660	\$407,954	\$3,414	\$377,199	\$5,216	\$2,539,519

Losses Summary

A review of the above loss estimates demonstrates that the Town of South Windsor has experienced significant expenses as a result of natural hazards, and is at risk for additional losses if some of the less-frequent events were to occur. These actual and potential losses justify hazard mitigation actions to reduce losses in the future.

Mitigation Strategies and Actions

Status of Previous Mitigation Strategies and Actions

The Town of South Windsor reviewed the mitigation actions proposed in the 2014 HMP and determined the status of each. That information is included in the table below.



Table 28-11: Status of Previous Mitigation Strategies and Actions, South Windsor

Action #	Action	Notes	Status
GOAL: MINIMIZE LOSS OF LIFE AND PROPERTY AND ECONOMIC DISRUPTION RESULTING FROM NATURAL DISASTERS.			
Objective 1: Ensure dams and detention basins are in good repair.			
1.1	Assess and make recommendations on public and private structures including, but not limited to, Avery Heights dam, dam at Lake St., dam at Veteran's Park off Parkview Dr., and Dzen's dam.	Town has initiated discussion with some dam owners but has not yet made more progress than that.	Carry Forward with Revisions
1.2	Prioritize recommended measures and work with property owners to implement.	Town has initiated discussion with some dam owners but has not yet made more progress than that.	Carry Forward with Revisions
Objective 2: Improve communication capabilities to inform resident population.			
2.1	Continue effort to require new employees to sign on to Everbridge System.	This is a capability. Additionally, upgrades have been made during this planning cycle.	Capability
2.2	Harden equipment for potential solar activity.	Created bins/cages for radios at EOC and have successfully conducted pulse testing.	Completed
Objective 3: Ensure the protection of private properties at greatest risk.			
3.1	Investigate participating in FEMA's Community Rating System.	Since last plan, FEMA Region I has visited the Town to discuss CRS. A presentation was given to the Town Council, but this action is still undergoing review and consideration.	Carry Forward
GOAL: REDUCE TIME REQUIRED TO RESTORE COMMERCIAL POWER.			
Objective 1: Improve tree limb maintenance to reduce number/area of power outages.			
1.1	Continue to contract out tree maintenance work, and to work with CL&P to maintain right-of-ways.	Program has been ongoing, and the problem has largely been mitigated through annual capital budget.	Capability
1.2	Improve coordination with State DOT for emergency staging and management for debris, snow, and all other emergencies.	Completed - this is now all part of the new debris management plan.	Completed
1.3	Work with CRCOG and State DEEP to establish a regional debris management site.	Location established at Barton Property.	Completed
1.4	Establish a local debris processing site at Barton Property	Action completed, per the above status update.	Completed
Objective 2: Improve communication and coordination with electric utility.			
2.1	Continue to meet with CL&P representatives to address problems including the implementation of a lock out/tag out system.	Good momentum with this task. After a few years of no major events communication is again slipping. Need to re-visit in terms of a newer strategy.	Carry Forward with Revisions
2.2	Continue regional efforts to improve communications with CL&P and to address problems including implementation of a lockout/tag out system.	Duplicative with above.	Drop



Action #	Action	Notes	Status
GOAL: MINIMIZE LOSSES TO EXISTING AND FUTURE STRUCTURES FROM SEVERE WEATHER.			
Objective 1: Use land use regulations to reduce risk.			
1.1	Continue to enforce regulations requiring the dedication of open space in new developments.	Town maintains an open space plan, and bonds have historically been source of funding for acquiring new open space.	Carry Forward with Revisions
1.2	Continue to enforce wetlands regulations.	This is part of the Town's standard operations. This is a capability	Capability
Objective 2: Review and improve enforcement of building codes.			
2.1	Ensure that privately owned and installed generators are installed correctly.	Action needs to be revisited with potential emphasis on gas stations and other privately-owned critical facilities.	Carry Forward with Revisions
2.2	Will consider whether in the future there is a need to adopt a regulation that requires senior housing developments to install some kind of generator to power at least a communal space.	Still deferred, but Town wants to keep. Special needs and elderly populations have now been listed and mapped, so there was some progress.	Carry Forward with Revisions
Objective 3: Improve communication with property owners on measures they can take to reduce their losses from severe weather.			
3.1	Use municipal website, Facebook, Twitter, Everbridge, You-Tube, and all other available means of social media to educate residents on emergency preparedness.	Information is available through some of these sources but the Town wants to improve these capabilities.	Carry Forward
3.2	Continue to maintain special needs population list.	This is an established practice. This is a capability	Capability
3.3	Support replacement of equipment	This action is too general to be considered useful and is dropped.	Drop
3.4	Provide generators for Town shelters, Town Garage, Town Hall, and Police Department	This has been completed.	Completed
3.5	Purchase cots, food supplies, and other equipment for emergency operations.	250 additional cots, bedding, and MREs have been added.	Completed
3.6	Produce GIS mapping of critical town facilities.	Done. Add new strategy to maintain GIS staffing in engineering so this and other items remain up to date.	Carry Forward with Revisions
3.7	Establish MOU with local food distributors and special emergency response equipment suppliers for emergency services.	Done through school system food services.	Completed
3.8	Schedule quarterly reviews of GIS layers (data sets) and Town Emergency Operations Plan.	Existing capability / ongoing activity.	Capability

Active Mitigation Strategies and Actions

The Town proposed to initiate several new mitigation actions for the upcoming five years. Additionally, a number of actions from the previous planning period are being carried forward or replaced with revised actions. These are listed below.

Each of the following actions has been prioritized based on FEMA guidelines, listed from highest to lowest priority, and numbered.



Action #1

Acquire generator for Wapping Elementary School to make progress towards creation of an emergency shelter in that space.

Goal	7. Improve the emergency response capabilities of the region and its communities
Category	Preparedness & Emergency Response
Lead	Emergency Management
Cost	\$10,000 - \$25,000
Funding	Town Operating Budget / DEMHS
Timeframe	01/2019 - 12/2020
Priority	High

Action #2

Develop a plan to ensure residents have access to important medications after storm events when roads and pharmacies are closed.

Goal	7. Improve the emergency response capabilities of the region and its communities
Category	Preparedness & Emergency Response
Lead	Emergency Management
Cost	\$10,000 - \$25,000
Funding	Town Operating Budget / Grants
Timeframe	07/2019 - 06/2021
Priority	High

Action #3

Update Open Space Plan in 2020.

Goal	4. Increase the use of natural, "green," or "soft" hazard mitigation measures, such as open space preservation and green infrastructure.
Category	Natural Resources Protection
Lead	Planning
Cost	\$50,000 - \$100,000
Funding	Grants
Timeframe	07/2021 - 06/2022
Priority	High



Action #4

Perform dam assessment of public and private structures including, but not limited to, Avery Heights dam, dam at Lake St., dam at Veteran's Park off Parkview Dr., and Dzen's dam.

Goal	5. Improve the resilience of local and regional utilities and infrastructure using strategies including adaptation, hardening, and creating redundancies.
Category	Preparedness & Emergency Response
Lead	Public Works
Cost	More than \$100,000
Funding	Grants
Timeframe	07/2022 - 06/2023
Priority	High

Action #5

Conduct outreach to local small businesses with the aim of preventing the accidental release and pollution from chemicals stored and used at their facilities during or following natural hazard events.

Goal	6. Improve public outreach, education, and warning systems
Category	Education & Awareness
Lead	Planning, in coordination with DEEP
Cost	\$0 - \$10,000
Funding	Materials & Resources Provided by CT DEEP
Timeframe	01/2019 - 12/2019
Priority	Medium

Action #6

Complete an analysis of costs and benefits of joining the FEMA Community Rating System. Get information from participating Towns, solicit input from residents and from experts, and request assistance from CRCOG.

Goal	1. Minimize the impact of natural hazards on physical buildings and infrastructure
Category	Prevention
Lead	Planning
Cost	\$0 - \$10,000
Funding	Town Operating Budget
Timeframe	01/2020 - 12/2020
Priority	Medium



Action #7

Assign a municipal staff-member to be a utility liaison responsible for maintaining contact with utility representatives.

Goal	5. Improve the resilience of local and regional utilities and infrastructure using strategies including adaptation, hardening, and creating redundancies.
Category	Preparedness & Emergency Response
Lead	Emergency Management
Cost	\$0 - \$10,000
Funding	Town Operating Budget
Timeframe	01/2020 - 12/2020
Priority	Medium

Action #8

Coordinate with NEMO and CRCOG to share resources and gain technical support for hazard mitigation actions involving stormwater management and public outreach, which have parallel benefits related to MS4 stormwater permit compliance.

Goal	1. Minimize the impact of natural hazards on physical buildings and infrastructure
Category	Prevention
Lead	Public Works
Cost	\$0 - \$10,000
Funding	Town Operating Budget
Timeframe	01/2020 - 12/2020
Priority	Medium

Action #9

Participate in EMI courses or the seminars and annual conference held by the Connecticut Association of Flood Managers.

Goal	3. Improve institutional awareness and understanding of natural hazard impacts and mitigation within municipal governments and other decision-making bodies
Category	Education & Awareness
Lead	Planning
Cost	\$0 - \$10,000
Funding	Town Operating Budget
Timeframe	07/2019 - 06/2024
Priority	Medium



Action #10

Work with MDC to identify potential hazard mitigation actions for MDC facilities, and list those actions in the next HMP Update.

Goal	5. Improve the resilience of local and regional utilities and infrastructure using strategies including adaptation, hardening, and creating redundancies.
Category	Property Protection
Lead	Public Works
Cost	\$10,000 - \$25,000
Funding	Town Operating Budget / DEMHS
Timeframe	07/2020 - 06/2022
Priority	Medium

Action #11

Determine additional updates to town GIS data and capabilities needed to assist with hazard mitigation. Pursue those updates.

Goal	3. Improve institutional awareness and understanding of natural hazard impacts and mitigation within municipal governments and other decision-making bodies
Category	Prevention
Lead	Planning
Cost	\$25,000 - \$50,000
Funding	Town Operating Budget / Grants
Timeframe	07/2021 - 06/2023
Priority	Medium

Action #12

Develop and prioritize recommended actions based on dam assessment, and work with property owners to implement.

Goal	5. Improve the resilience of local and regional utilities and infrastructure using strategies including adaptation, hardening, and creating redundancies.
Category	Structural Projects
Lead	Public Works
Cost	More than \$100,000
Funding	Town Operating Budget / Grants
Timeframe	07/2022 - 06/2024
Priority	Medium



Action #13

Contact the owners of Repetitive Loss Properties and nearby properties at risk to inquire about mitigation undertaken and suggest options for mitigating flooding in those areas. This should be accomplished with a letter directly mailed to each property owner.

Goal	1. Minimize the impact of natural hazards on physical buildings and infrastructure
Category	Property Protection
Lead	Planning
Cost	\$0 - \$10,000
Funding	Town Operating Budget / DEMHS
Timeframe	07/2021 - 06/2022
Priority	Low

Action #14

Improve use of municipal website and social media to educate residents on emergency preparedness.

Goal	6. Improve public outreach, education, and warning systems
Category	Education & Awareness
Lead	Emergency Management
Cost	\$0 - \$10,000
Funding	Town Operating Budget
Timeframe	07/2021 - 06/2022
Priority	Low

Action #15

Work with CT DEEP to complete a formal validation of the Repetitive Loss Property list and update the mitigation status of each listed property.

Goal	1. Minimize the impact of natural hazards on physical buildings and infrastructure
Category	Property Protection
Lead	Planning
Cost	\$10,000 - \$25,000
Funding	Town Operating Budget / CT DEEP / DEMHS
Timeframe	07/2021 - 06/2023
Priority	Low



Action #16

Work with senior housing developments to have them each install emergency generators to power at least a communal space. If this is unsuccessful, consider adoption of regulation.

Goal	7. Improve the emergency response capabilities of the region and its communities
Category	Preparedness & Emergency Response
Lead	Emergency Management
Cost	\$10,000 - \$25,000
Funding	Town Operating Budget / DEMHS
Timeframe	07/2021 - 06/2023
Priority	Low

Action #17

Coordinate with CT SHPO to conduct historic resource surveys, focusing on areas within natural hazard risk zones (such as flood or wildfire hazard zones and areas near steep slopes), to support identification of vulnerable historic properties and preparation of resiliency plans across the state. This action leverages existing resources and best practices for protection of historic and cultural resources through an ongoing statewide initiative by CT SHPO.

Goal	8. Ensure community character and social equity are addressed in mitigation activities
Category	Property Protection
Lead	Planning, in coordination with SHPO
Cost	\$10,000 - \$25,000
Funding	SHPO
Timeframe	07/2021 - 06/2023
Priority	Low

Action #18

Reach out to local gas stations to encourage and offer assistance with private emergency generator installation.

Goal	7. Improve the emergency response capabilities of the region and its communities
Category	Preparedness & Emergency Response
Lead	Emergency Management
Cost	\$10,000 - \$25,000
Funding	Town Operating Budget
Timeframe	01/2021 - 12/2023
Priority	Low



Action #19

Conduct outreach and education program to provide technical assistance to private owners of generators to ensure they are installed correctly.

Goal	6. Improve public outreach, education, and warning systems
Category	Education & Awareness
Lead	Emergency Management
Cost	\$10,000 - \$25,000
Funding	Town Operating Budget
Timeframe	01/2021 - 12/2023
Priority	Low

Action #20

Install an emergency generator at the Public Library.











Goal	7. Improve the emergency response capabilities of the region and its communities
Category	Preparedness & Emergency Response
Lead	Public Works
Cost	\$10,000 - \$25,000
Funding	Town Operating Budget
Timeframe	07/2021 - 06/2023
Priority	Low



Capitol Region Natural Hazards Mitigation Plan Update




South Windsor, Connecticut Flood Plains, Dams & Critical Facilities

Critical Facilities



-  Emergency Center
-  Fire Station
-  Healthcare Facility
-  Police Station
-  Public Infrastructure
-  School
-  State Facility
-  Town Facility
-  Waste Water Facility
-  NRHP Buildings/Sites

 NRHP Districts/Areas

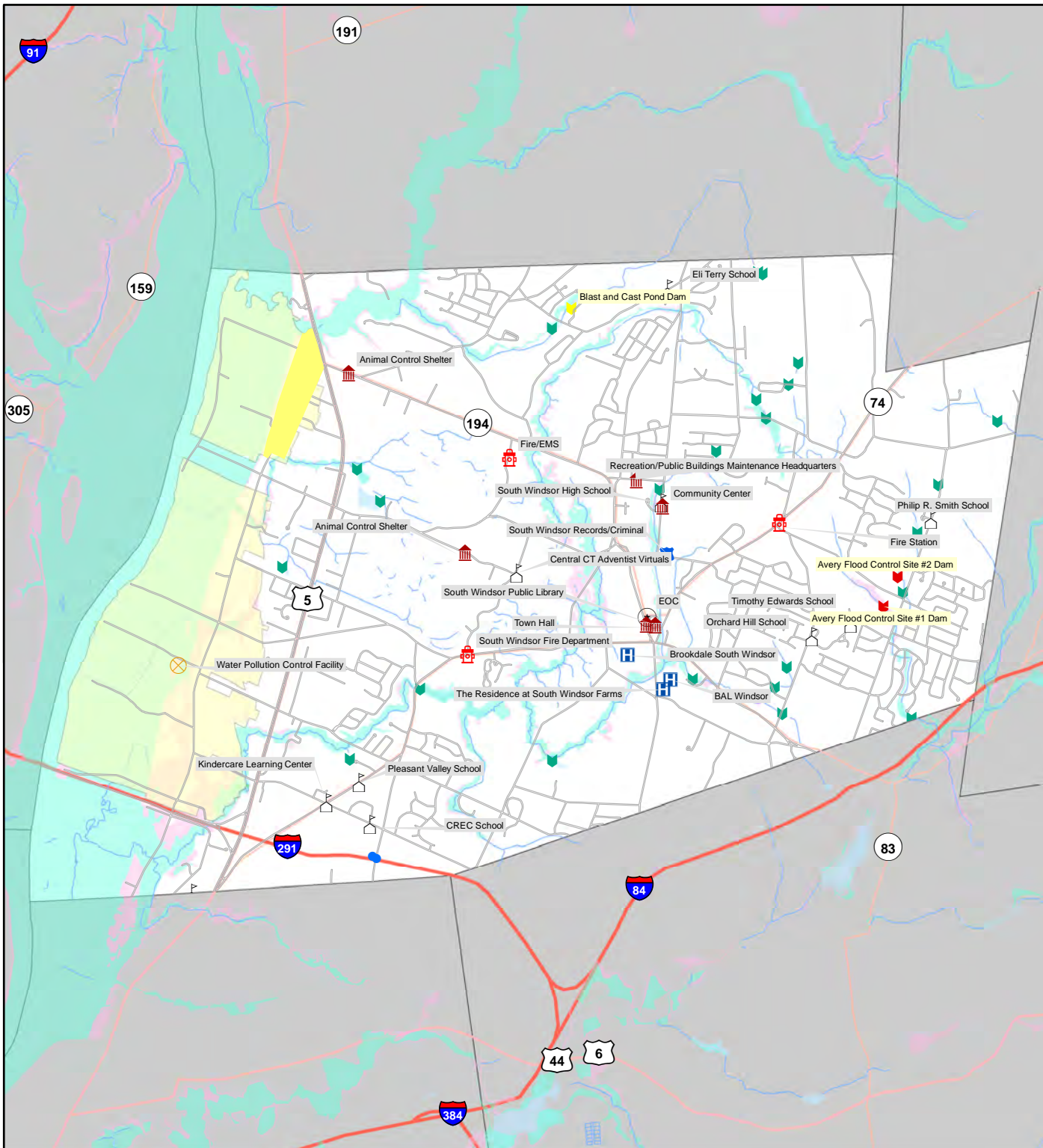
Dam Hazard Class

-  A, AA, BB or Unclassified
-  Class B-Significant Hazard
-  Class C- High Hazard

FEMA Flood Hazard Area

-  100 Year Flood Zone
-  500 Year Flood Zone

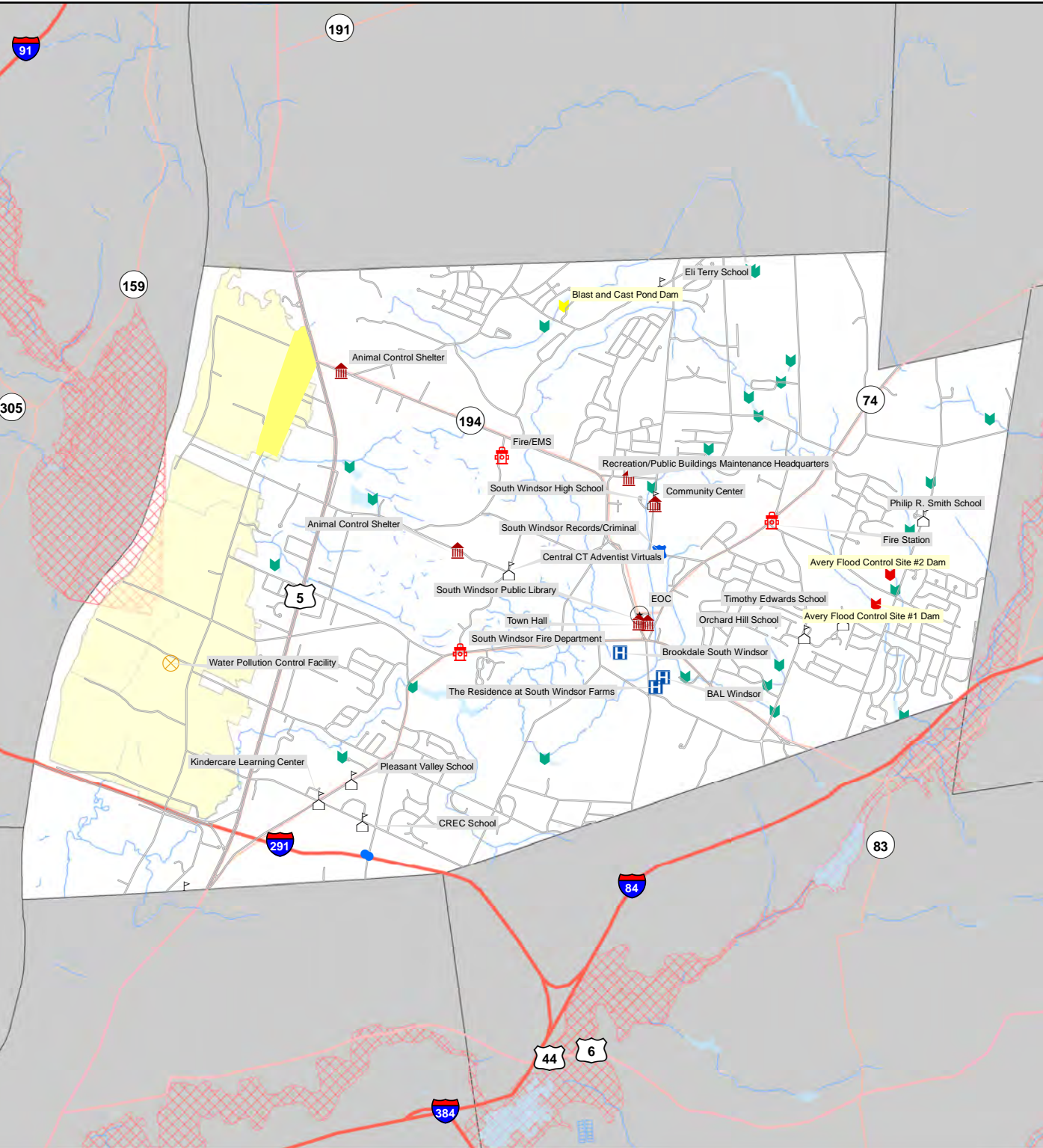
Data Sources: FEMA, National Register of Historic Places, CT DEEP, CROCOG, ESRI



**Capitol Region Natural Hazards
Mitigation Plan Update**

South Windsor, Connecticut

Dam Breach Inundation Area
& Critical Facilities



Critical Facilities

- Emergency Center
- Fire Station
- Healthcare Facility
- Police Station
- Public Infrastructure
- School
- State Facility
- Town Facility
- Waste Water Facility
- NRHP Buildings/Sites
- NRHP Districts/Areas

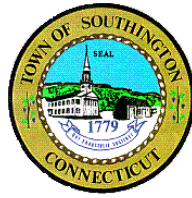
Dam Hazard Class

- A, AA, BB or Unclassified
- Class B-Significant Hazard
- Class C- High Hazard
- Dam Breach Inundation Areas

Data Sources: FEMA, National Register of Historic Places, CT DEEP, CRCOG, ESRI



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29 Southington

Community Overview

The Town of Southington is a suburban community that covers 35.9 square miles of land and has a population of 43,069 (2010 census), giving it a population density of 1,200 people per square mile. Elevation ranges from approximately 110 feet to 930 feet. The majority of Town drains to the Quinnipiac River, although the eastern edge of town drains to the Mattabesset River in Berlin. Aside from the Quinnipiac River, other major streams in Southington include Cussgutter Brook, Eightmile River, Roaring Brook, Hamlin Brook, and Misery Brook.

While historically an agricultural community, Southington now has large industrial and commercial districts and a revitalized downtown. Southington also has several designated historic districts. Interstate Highways 84 and 691 pass through Town; other major transportation routes include Routes 10, 120, 177, 229, 322, and 364. The Town is part of the CT*Fastrak* bus rapid transit system providing bus services to Hartford and Waterbury. Major businesses and industries include retail, accommodation and food services, health care and social assistance, and manufacturing. Recent commercial and industrial development has been a mix of new development and redevelopment and infill, with redevelopment occurring downtown. Residential development has continued throughout Town.

Critical Facilities

Critical Facilities throughout the Capitol Region are listed in Appendix B. In Southington these include the Fire Stations, Police Department (Emergency Operations Center), Water Department, Water Pollution Control Facility, Municipal Center, Calendar House (Senior Center), JFK Middle School, and DePaolo Middle School.

Table 29-1: Critical Facilities, Southington

Facility	Shelter	Generator
Fire Department Headquarters	Primary	Yes
Fire Stations		Yes
Police Department (EOC)		Yes
Water Department		Partial
Water Pollution Control Facility		Partial
Municipal Center		
Calendar House (Senior Center)	Yes (uncertified)	Yes
JFK Middle School	Secondary	Yes
DePaolo Middle School	Secondary	Yes

The Fire Headquarters is the Town’s primary shelter, and recently installed a new generator. Southington is currently continuing ongoing renovations to the Calendar House (Senior Center). The facility functions as an emergency shelter and has a generator, but is not Red-Cross certified. It is possible that following renovations the facility will be able to be certified. The

two secondary shelters are the JFK Middle School and the DePaolo Middle School; each has had new generators installed since adoption of the 2016-2021 Hazard Mitigation Plan for the Former Central Connecticut Region (“2016 HMP”).

The Town is interested in relocating the EOC to the Fire Department Headquarters, which has more available space and equipment.

Capabilities

Southington plans and documents relevant to hazard mitigation include:

- **Plan of Conservation & Development, 2016:** Promotes infrastructure improvements and open space preservation. Describes flood hazards and elements of a river corridor.
- **Municipal Building Codes, 2003:** follows CT State Building Code and IBC 2003.
- **Inland Wetlands and Watercourses Regulations, 2013**
- **Zoning Regulations, 2017:** Flood Damage Prevention Regulations apply to all SFHA identified in the FIS. Buildings must be elevated two feet above BFE in residential, or one foot if non-residential. Mandates zero increase in runoff in flood plain areas.
- **Subdivision Regulations, 2005:** Require minimizing risk of flood damage and designing drainage to reduce flood exposure.
- **Emergency Operations Plan, 2014-2015**

Southington has inventoried all shelters and warming/charging stations, developed a shelter plan to guide response activities, and invests in shelter supplies twice a year. The Health Department maintains a list of vulnerable populations and assists with evacuations as needed.

The Town provides training for its emergency personnel and participates in DEMHS Region 3 regional emergency planning. Southington has also maintained a Community Emergency Response Team (CERT) since 2015. CERT volunteers train in disaster preparedness and response, and assist during emergencies. The CERT staffs the emergency shelter when it is activated and educate the community about disaster preparedness. They have an online emergency preparation and response resource library.

The Everbridge emergency notification system has been implemented town-wide. The Town developed a household preparedness pamphlet and posted it on its website, and hands it out at a variety of events. The Town also provides preparedness training in local schools using the FEMA Student Training in Emergency Preparedness (STEP) program.

Southington has participated in the National Flood Insurance Program (NFIP) since 1981 and intends to continue participation. No major buildings/structures are located in floodplains, and the Town generally discourages building in floodplains. The Planning and Engineering Departments perform enforcement and outreach regarding floodplain activities. Outreach typically occurs on a case-by-case basis.



When heavy rain is predicted, the Town will divert traffic from roads at risk of flooding. The Town has an annual inspection and maintenance schedule for its bridges and culverts.

Drainage and flooding complaints are typically sent to the Engineering or Highway Departments. The Fire Department has six pumps it uses to assist with basement pump outs when needed.

Public Works consistently undertakes bridge replacement projects. New designs use the most recent Northeast Regional Climate Center (NRCC) rainfall return periods in accordance with December 2014 CT DOT guidance. The Town has not evaluated existing culverts based on the new rainfall return periods.

The Town's Open Space and Land Acquisition Committee cites "water quality / resource protection" and "flood control" as two of its rationales for acquisitions. The Town owns an open space parcel at 1 Hightower Road that equals 13,610 cubic yards of flood storage space. The Town sells the flood storage to developers who need to conduct mitigation activities. This storage attenuates peak flows caused by the increase in impermeable surfaces with development that occurs in the watershed. The area has space for future expansion.

Removal of ice and snow for town-owned roads is handled by town workers and contractors, and is reportedly very effective. The Town handles debris removal. Snow drifts are mitigated through additional plowing efforts, while icing is mitigated through the use of additional road treatment. The Town has an informal program to review snow accumulation on town-owned roofs each winter, with clearing occurring when depths are sufficiently deep or wet.

Southington does not have specific policies for requiring burial of utilities, though it is generally encouraged during site plan review. Nearly all recent development has buried utilities.

Town departments have sufficient supplies for the next major storm event. Several chainsaws and a wood chipper are available for cleanup activities. A chipping and trimming contractor is on-call large jobs. Tree complaints are directed to the Town Engineer. The Town performs tree maintenance for town properties and rights-of-way; the tree maintenance budget has increased from \$19,000 a year in 2015 to \$38,000 a year in 2018, in line with actions from the 2016 HMP. Much of the trimming near power lines is conducted by Eversource Energy.

The Fire Department maintains mutual aid agreements with all surrounding communities. Most of Southington has public water service, and tankers are used to shuttle firefighting water into outlying areas. There is one dry hydrant at Crescent Lake; the hydrant is undersized and embedded in the dam such that upgrading it would be difficult. A variety of all-terrain vehicles assist with fighting wildfires. The Town has two certified Open Burning Officials.



The Town Water Department maintains an Emergency Contingency Plan that outlines response procedures for droughts. The Department is a member of the regional Water Utility Coordinating Committee. Yield tests of new wells is required in certain areas.

Southington owns six dams including one Class C (high hazard) and one Class B (significant hazard), all in good condition. Inspections are performed in accordance with DEEP regulations. The Emergency Action Plans (EAPs) for Town dams will be revised in accordance with DEEP guidance. Several other high hazard dams are owned by the New Britain Water Department, but it is believed that the failure of these dams would not have a significant impact in Southington. The Town has copies of EAPs prepared for other dams whose failure could affect Southington; this information is maintained by the Emergency Management Director.

New Capabilities

Southington updated its Flood Damage Prevention Regulations in 2017.

In 2015, the West Queen Street bridge was replaced, and Old Mountain Road bridge was replaced with a culvert, using money from the state local bridge program. The West Center Street Bridge deck repair is expected to be completed within 2018. A bridge on Interstate-84 was completed by Connecticut DOT since the 2016 HMP.

Southington recently excavated an area within a floodplain on Farmstead Street to provide additional flood storage, but the project does not appear to have resolved the issue.

A low hazard, two-foot high run-of-the-river dam on the Quinnipiac River has been removed in the vicinity of the bowling alley on Route 10. This may provide a minimal flood benefit to nearby properties.

Challenges

Challenges Overview

The top three natural hazards that present a high risk to Southington are flooding, winter storms, and tropical storms/hurricanes.

Southington experiences recurrent flooding throughout Town, with localized flooding at known locations 4-5 times per year. The town is relatively flat, so floodwaters tend to recede slowly. West Main Street, Woodruff Street, Curtiss Street, North Main Street, Pratt Street, River Street, and Shweky Lane in the Plantsville area along the Quinnipiac are hard-hit by flooding. This area has an undersized drainage system with outlets near the level of the River; when the river rises, backwater conditions inhibit drainage. The Town has identified areas of recurrent flooding along other sections of Route 10, Mill Street, and Curtiss Street. The lower section of Eden Avenue and the intersection of Main and South Main Street, experience flooding due to poor drainage. Another site of concern is Grove and Main Street Church. A channel running across private land near Woodruff Street is undersized.



Drainage problems are sometimes created due to property modifications; developments originally approved with drainage mitigation measures are sold to a new owner who eliminates them. The Town does not have jurisdiction over private drainage systems.

During winter storms ice and snow make roads impassable and down tree limbs, disrupting utility service. People can become stranded in their homes, potentially without heat or power. Higher elevations may be at a greater risk. Following Winter Storm Alfred in late October 2011, power was lost for nine days to most customers, with some power not restored for two weeks. Many restaurants did not have backup power and there was significant spoilage.

A few areas, such as those near large fields, are prone to drifting snow. Following the January 2013 blizzard, snow removal was the primary financial impact. Two commercial roofs were reported collapsed due to this event. No significant impacts due to icing have been observed in recent years. Ice jam flooding tends to be localized. Areas on the east side of Town near the reservoir, and open areas with higher elevation, generally have icing during winters.

Following Tropical Storm Irene in 2011, power was lost for approximately one day in Southington, although some residents lost power for up to five days. A maximum of 3,854 customers were without power. Damages during Tropical Storm Sandy were relatively minimal.

Southington has not experienced any wildfires in the last few years. The greatest areas of concern are those that do not have public water service along the eastern and western ridgelines. These areas are believed to be at high risk of a fire as the forest floor is littered with debris from previous major storms. Access can be difficult in these areas.

More than 20 dams could affect the Town of Southington with their failure, and five Class C (high hazard) dams lie within the Town boundaries. This is summarized in the table below. Potential losses downstream of Class C dams could be catastrophic, while potential losses downstream of Class B (significant hazard) dams could be significant.



Table 29-2: Summary of Dams Whose Failure Could Significantly Impact Southington

Dam Name	Hazard Class	Dam Use	Dam Condition	Owner	Downstream Watercourse
New Britain (Wolcott) Reservoir Dam	C	Water Supply	Satisfactory	City of New Britain	Roaring Brook
New Britain (Wolcott) Reservoir Dike	C	Water Supply	Not Rated	City of New Britain	Roaring Brook
Plainville Reservoir Dam	C	Water Supply	Not Rated	Southington Water Department	Tributary to Patton Brook
Southington Reservoir #1 Dam	B	Water Supply	Not Rated	Town of Southington	Humiston & Thompson Brook
Southington Reservoir #3 Dam	C	Water Supply	Fair	Town of Southington	Humiston Brook
Spring Lake Dam	C	Recreation	Not Rated	Private	Quinnipiac River
Wasel Reservoir Dike	C	Water Supply	Satisfactory	City of New Britain	Mattabassett River

The privately-owned Spring Lake Dam is a high hazard (Class C) dam that has a maintenance issue that has been identified by DEEP. DEEP and the dam owner are reportedly working to address the issue. A 100-home subdivision and other development is located close to the dam immediately downstream in the likely inundation area near Woodruff Road and Marcy Drive.

Hazard Losses

The economic losses faced by the community from natural hazards can be estimated by reviewing historic, and modeling future, loss figures. Loss estimates are summarized below.

Historic FEMA Payments

FEMA reimburses communities for hazard losses through programs including Public Assistance (PA) and the National Flood Insurance Program (NFIP). Combining PA and private flood insurance payments can give an estimate for total losses to a community.

The NFIP has paid 86 property damage claims in Southington totaling \$770,413.60 to date; 30 of those payments have been repetitive loss (RL) property damage claims on 10 properties, totaling \$541,025.91.

Total PA reimbursements to the community were as follows:

- Flood Events: \$4,475 (\$236 annually)
- Hurricane Events: \$196,584 (\$10,347 annually)
- Winter Storm Events: \$2,420,907 (\$127,416 annually)

These are summarized in the tables below.



Table 29-3: Flood Event PA Reimbursements, Southington

Incident	Sep 1999	Oct 2005
Declaration	9/23/1999	12/16/2005
Disaster No.	1302	1619
Entity	FEMA PA Reimbursement	
State	\$1,998	\$2,477
Municipal	\$0	\$0
Nonprofit	\$0	\$0
Total	\$1,998	\$2,477
Annualized	\$105	\$130

Table 29-4: Hurricane Wind Event PA Reimbursements, Southington

Incident	Aug - Sep 2011 (T.S. Irene)
Declaration	9/2/2011
Disaster #	4023
Entity	FEMA PA Reimbursement
State	\$2,655
Municipal	\$193,929
Nonprofit	\$0
Total	\$196,584
Annualized	\$10,347

Table 29-5: Winter Storm PA Reimbursements, Southington

Incident	Mar 2003	Dec 2003	Jan 2005	Feb 2006	Jan 2011	Oct 2011	Feb 2013
Declaration	3/11/03	1/15/04	2/17/05	5/2/06	3/3/11	11/17/11	3/21/13
Disaster #	3176	3192	3200	3266	1958	4046	4106
Entity	FEMA PA Reimbursement						
State	\$37,343	\$33,477	\$44,166	\$53,607	\$46,707	\$24,123	\$95,494
Municipal	\$126,691	\$145,186	\$163,592	\$159,505	\$120,185	\$1,046,690	\$293,352
Nonprofit	\$0	\$0	\$0	\$0	\$1,165	\$0	\$29,622
Total	\$164,035	\$178,663	\$207,758	\$213,112	\$168,057	\$1,070,813	\$418,469
Annualized	\$8,633	\$9,403	\$10,935	\$11,216	\$8,845	\$56,359	\$22,025

National Centers for Environmental Information Losses

The table below summarizes events in the National Centers for Environmental Information (NCEI) severe storm database that were specifically noted as having impacted the community since 2012.



Table 29-6: NCEI Database Losses since 2012, Southington

Date	Event	Property Damage
10/8/2014	Thunderstorm Wind	\$10,000
6/23/2015	Thunderstorm Wind	\$40,000
8/13/2016	Thunderstorm Wind	\$5,000
Total		\$55,000

NCEI losses under other event categories (such as drought, high wind, flooding, and winter storms) were not specifically noted as impacting this community, though they did impact Hartford County and nearby towns. NCEI losses are reported in Section II of this Plan.

HAZUS-MH Losses

CRCOG used FEMA’s Hazus-MH model to analyze the risks that the community might face from flooding, hurricanes, and earthquakes. The model estimates economic losses to the town due to damage to buildings and building contents, as well as other economic disruptions. Both residential and commercial structures are addressed. Losses from different hazards are summarized below. Where available, estimates from the previous and current versions of the HMP are provided side-by-side; differences between the two may have been caused by a combination of the following:

- Changes in methodology: such as hazard zone mapping
- Changes in data: such as population and property values
- Changes in the model: this HMP utilized Hazus-MH version 4.0 rather than 2.1
- Other factors: inherent in a complex software like Hazus-MH

More details are available in the Multi-Jurisdictional HMP. Ultimately, changes in the loss estimates reflect the reality that small differences in hazard event features can have a significant impact on losses incurred.

Table 29-7: Estimated Damages to Southington from a 1% Annual-Chance Flood

Loss Type	2014 Results	2018 Results
Households Displaced	289	469
People Needing Shelter	542	632
Buildings at Least Moderately Damaged	48	0
Economic Losses		
Residential Building & Content Losses	\$16,370,000	\$20,201,183
Other Building & Content Losses	\$16,800,000	\$42,154,536
Total Building & Content Loss	\$33,170,000	\$62,355,719
Total Business Interruption Losses	\$80,000	\$2,511,753
TOTAL	\$33,240,000	\$64,867,473



Table 29-8: Estimated Damages to Southington from a 1% Annual-Chance Hurricane

Loss Type	2014 Results (1938 event)	2018 Results (1% track)
Buildings at Least Moderately Damaged	5,096	1
Buildings Completely Damaged	59	0
Total Debris Generated	522,484	1,238
Truckloads (at 25 tons/truck) of building debris	20,899	50
Economic Losses		
Residential Building & Content Losses	\$115,541,930	\$6,543,762
Other Building & Content Losses	\$24,559,920	\$146,542
Total Building & Content Loss	\$140,101,850	\$6,690,304
Total Business Interruption Losses	\$4,201,560	\$18,450
TOTAL LOSSES	\$144,303,410	\$6,708,754

Losses were calculated from a modeled probabilistic earthquake (1% annual-chance of occurrence), as well as for four specific scenarios with epicenters around Connecticut.

Table 29-9: Estimated Damages to Southington from a Probabilistic Earthquake

Loss Type	2018 Results
Wage Loss	\$6,407
Rent Loss	\$4,811
Relocation Loss	\$9,069
Income Loss	\$4,804
Inventory Loss	\$790
Total Business Disruption	\$25,881
Structural Loss	\$18,278
Non-Structural Loss	\$59,200
Total Building Loss	\$77,478
Total Content Loss	\$24,526
TOTAL LOSSES	\$127,885

Table 29-10: Estimated Damages to Southington from Modeled Earthquake Scenarios

Epicenter Location	Magnitude	Estimated Total Losses
East Haddam	6.4	\$611,679.49
Haddam	5.7	\$185,041.55
Portland	5.7	\$563,378.10
Stamford	5.7	\$17,869.67

Other Hazard Costs

The following table reflects the Town’s annual tree maintenance budget for the last several years. While not directly a loss estimate, these figures give an estimate of the annual cost the Town faces to prevent trees from falling or dropping limbs during hazard events.



Year	Annual Tree Budget
2015	\$19,000
2016	\$23,000
2017	\$38,000
2018	\$38,000

The table below considers the impact of Severe Winter Storms on the Town of Southington based on Winter Storm Alfred in late October 2011. The biggest impact was the power outage, although debris removal was the biggest financial impact.

Impact of Severe Winter Storm	Estimated Losses from a Severe Winter Storm Comparable to Winter Storm Alfred (October 2011)
Number of Electrical Customers Served (2013)	19,422
Maximum Outages During Severe Winter Storm (2011)	13,457
Maximum Outages Percentage of Customers (2011)	69.29%
Number of Businesses Experiencing Outages	15
Total Lost Wages (Daily)	\$2,331.62
Average Lost Wages (Weekly)	\$39,730.00
Miles of Local Roads Plowed by Town of Southington	226.61
Municipal Cost (Plowing, Road Treatment, debris cleanup)	\$1,046,690.17

Source: Eversource, CCRPA Internal Analysis

Average Annualized Losses

Average Annualized Loss (AAL) figures are useful tools for comparison of the risks faced from different hazards with different likelihoods of occurring in a given time period. AAL estimates were prepared for each natural hazard which may impact Southington based on the methodologies discussed in Section II of the Multi-Jurisdictional HMP. Dam failure, drought, tornado, and wildfire losses were sourced from the 2014 Connecticut Natural Hazard Mitigation Plan Update, with dam failure data supplemented by the National Performance of Dams Program and the Connecticut Department of Energy & Environmental Protection. Earthquake and hurricane losses were calculated in HAZUS-MH. Losses for flooding came from NFIP claims, for winter storms from Public Assistance Reimbursements, and for thunderstorms from the NCEI database. These are presented in the table below in dollars per year. Note that Hurricanes and Tropical Storms represent the largest share of total annualized losses.

Table 29-11: Average Annualized Losses, Southington

Dam Failure	Drought	Earthquakes	Flooding	Hurricanes and Tropical Storms	Severe Winter Storms	Thunderstorms	Tornadoes	Wildfires	Total
\$77	\$0	\$86,576	\$20,510	\$2,699,933	\$127,416	\$5,720	\$631,903	\$6,675	\$3,758,810



Losses Summary

A review of the above loss estimates demonstrates that the Town of Southington has experienced significant expenses as a result of natural hazards, and is at risk for additional losses if some of the less-frequent events were to occur. These actual and potential losses justify hazard mitigation actions to reduce losses in the future.

Mitigation Strategies and Actions

Noted Hazard Mitigation Needs

During Plan development, multiple hazard mitigation needs of Southington were noted.

- The Town wishes to update its Emergency Operations Plan to include procedures specific to the liquid propane plant at the north end of Town.
- Improvements in local communications still need to occur, such as the purchase of satellite phones for certain departments to ensure emergency communications can be maintained during extensive outages.
- An enclosed trailer to store and move an existing portable generator owned by the Town is needed. Southington is interested in participating in a regional generator sharing program that would be able to provide generators on loan to support local businesses.
- The Town wishes to formalize the requirement for underground utilities. The requirement would not apply for areas where it is not feasible such as those with shallow ledge. The Town would like to relocate power lines in Plantsville and downtown Southington underground.
- Outreach to businesses is needed about generator installation and safety.
- Many winding and narrow roads in Southington could be widened as these pose risks to egress during storms.
- Specific areas in need of tree trimming include Pleasant Street between the High School and Middle School, Woodruff Street to Berlin Avenue, Meriden Avenue (Route 120) to South End Road, and Flanders Road.
- Town staff have indicated that new dry hydrants would be useful near Crescent Lake and on the east side of town near West Ridge.
- The Town wishes to relocate the EOC from the Police Department to the Fire Department Headquarters.

Status of Previous Mitigation Strategies and Actions

The Town of Southington reviewed the mitigation actions proposed in the 2016 HMP and determined the status of each. That information is included in the table below.



Table 29-12: Status of Previous Mitigation Strategies and Actions, Southington

Action #	Action	Notes	Status
GOAL: REDUCE LOSSES OF LIFE AND PROPERTY, AND MINIMIZE ECONOMIC CONSEQUENCES OF NATURAL HAZARDS			
Objective 1: Increase capacity to shelter large numbers of people in the case of an emergency			
1.1	Complete renovations of the Calendar House for use as the primary shelter. The Town is renovating this facility to be the Town’s primary shelter. A generator upgrade is required as part of the renovations. The existing generator at the Calendar House will be moved to the Town Hall.	Calendar House renovations are currently underway and scheduled to be completed by the end of 2018. This action item is considered complete.	Completed
2.1	Acquire emergency generators for critical facilities. The Town has identified several generator needs in addition to the Calendar House above. The Municipal Center houses many Town functions and needs a generator. Another identified need is to acquire an enclosed trailer to house and move an existing portable generator owned by the Town.	Town applied for grant money through CT DEHMS, which was approved. Town obtained a 15KW generator in 2018. Although town obtained an enclosed trailer through EMPG money, it did not meet the desired specifications. Staff currently looking to modify a highway truck. Town still needs a generator and additional equipment such as a transfer switch for the municipal center and town hall.	Carry Forward with Revisions
Objective 2: Improve capacity to deal with hazards by investing in necessary equipment & training			
2.2	Increase capacity of the drainage system in Plantsville. Grant funding is necessary to perform this work as it will be a multi-million dollar project to replace the drainage systems. In addition, the solution may not work for more severe flood events.	Discontinue action. Town has no control over this land. It is State and private property.	Drop
2.3	Update Town Emergency Operations Plan to include procedures specific to the liquid propane plant. A liquid propane plant lies on the north end of town. The Town wishes to update its Emergency Operations Plan to include procedures specific to this facility.	Emergency Operations Plan (EOP) updated in 2015-2016 but did not include this action item. EOP currently being amended to include this.	Carry Forward
2.4	Purchase equipment to ensure emergency communications between Town departments. The Town wishes to acquire satellite phones to ensure communication can be maintained with the Health Department and other departments during extended power outages.	Discontinue action. Acquiring satellite phones would be cost prohibitive for the Town and is not considered necessary.	Drop
2.5	Participate in a regional generator sharing program. The Town wishes to partner with other communities to participate in a regional generator sharing program. This would provide a pool of generators that could be shared between communities during extended outages to support local businesses.	Town has not successfully created any such partnerships, and does not feel it has the capacity to take the lead on such a project. It will pursue participation if a regional generator sharing program is initiated.	Drop



Action #	Action	Notes	Status
2.6	Install a new dry hydrant at Crescent Lake. The existing dry hydrant is undersized and in a poor location. The Town wishes to install a larger dry hydrant in a more accessible area such as near the dock.	This could not be implemented in the past five years due to funding constraints.	Carry Forward
Objective 3: Improve citizen notification, awareness, and response time			
3.1	Formalize the requirement for underground utilities in new developments. The Town wishes for a formal requirement for underground utilities except in those areas where it is not feasible. Separate requirements may be needed for subdivisions vs. individual properties. Strengthen subdivision regulations.	This could not be implemented due to other priorities within the past five years. Change priority to Medium.	Carry Forward with Revisions
3.2	Conduct outreach to businesses regarding generator safety and wiring needs. The Town will perform outreach to businesses regarding how generators work and pre-wiring requirements such that generators can be safely used during extended power outages.	Businesses are now required to obtain a permit to do wiring. Outreach could not be conducted as planned due to staff shortage.	Carry Forward
3.3	Widen narrow streets near intersections where bottlenecks could occur. The Town will review existing narrow streets to determine where widening could occur and add such areas to the capital project list if possible.	Town performs road improvements as needed. This action is not considered necessary.	Drop
3.4	Increase tree maintenance budget to allow for additional trimming along Town roads. The Town will work to increase the tree maintenance budget in order to allow trimming along Town-owned roads to occur. Such trimming would only occur opposite power lines or along roads with buried utilities.	Tree budget was nearly doubled over last two years. Staff does not anticipate any more increases to this budget in the near future.	Completed
3.5	Review outlying areas for potential wildfire risk. The Town will review outlying parcels for potential fire risk by considering debris accumulation and access issues in these areas. Potential strategies and actions could also be developed to address higher risk areas.	There have been no significant fires in West Ridge since 1999; the risk is minor for brush fires. The Town does not feel additional assessment it necessary at this time.	Drop
3.6	Update Emergency Action Plans for Town-owned dams. The Town will update the Emergency Action Plans for its dams to meet the recently revised DEEP guidance.	Discontinue action. CT DEEP removed a dam near bowling alley for promoting recreational access. This is not town-owned.	Drop
3.7	Incorporate updated hazard mitigation information into community plan updates. Hazard mitigation information will be incorporated into future plan updates of the POCD and other planning documents.	POCD was recently updated and adopted in spring 2016. It has a section addressing utility needs and concerns. Future POCD update will be done in 8 years.	Completed



Action #	Action	Notes	Status
3.8	Encourage sign-ups for the Everbridge emergency notification system. The Town recently contracted with Everbridge to provide a town-wide emergency notification system. Targeted mailings may be used to encourage signups in particularly vulnerable areas, such as special flood hazard areas and dam failure inundation areas.	On-going. Town does it through the town website and through town meetings. This is a capability	Capability
3.9	Encourage the owner of Spring Lake Dam and the Connecticut DEEP to complete repairs. The Town will encourage the owner of Spring Lake Dam and the Connecticut DEEP to ensure repairs and maintenance of the dam are being performed properly.	The Town has not held any conversations with the Spring Lake Dam owner or the CT DEEP, but they also have not received complaints from that area. CT DEEP is responsible for ensuring dam owners are performing proper repair and maintenance and the Town is confident in their ability.	Drop
3.10	Participate in the statewide Water Utility Coordinating Committee process. The Connecticut DPH is preparing a Coordinated Water Supply Plan for the entire state beginning in 2016. The Town Water Department will participate to ensure that drought-related public water supply needs are met throughout the community.	Southington falls within the Central WUCC and is participating in the process. Drought concerns include changing rainfall patterns with more rainfall occurring in spot events and more time between rainfall events, resulting in drier soils, lower groundwater tables, and potential impacts to groundwater safe yield	Completed
3.11	Ensure local officials have most updated version of the Connecticut Drought Management Plan. The Connecticut Drought Management Plan is periodically updated. Local officials, land use commissions, health departments, fire departments, and local water utilities should all be made aware of updates to this plan.	Current Drought Plan is still from 2003, update is still in development. Town will ensure officials have access to the most updated version when it is adopted	Capability
Objective 4: Mitigate impacts to properties in the National Flood Insurance Program			
4.1	Work with private property owners to mitigate channel constrictions that exacerbate flooding. Streams run across private property in many areas of town and the Town cannot maintain channels in these areas directly. The Town will work with private property owners to remove constrictions and/or widen channels to mitigate exacerbation of flooding conditions.	Continue action. Town staff sent letters out to areas at risk or areas from where complaints were received.	Carry Forward
4.2	Clear trees and other blockages along the Quinnipiac River. A significant amount of woody debris reportedly clogs the Quinnipiac River, exacerbating flood conditions. The Town will investigate and clear woody debris from the channel bed and river banks to prevent blockages.	This was done in 2017 by volunteers for putting kayaks in the river. This is done periodically by volunteers or the Town and is considered a capability.	Capability



Action #	Action	Notes	Status
4.3	Evaluate costs and benefits of joining FEMA Community Rating System and enter program if justified. Participation in the CRS can reduce the cost of flood insurance for residents and businesses. The lowest level of participation in the program will reduce the cost of insurance by 5%. This would require municipal staff time or outside help to initially set up.	There are not many vulnerable properties in Southington that would benefit from this program. Therefore, not feasible to undertake this action.	Drop
4.4	Update the local floodplain management ordinance to meet current model ordinance requirements. The Town of Southington last updated this ordinance in 2008. Since that time, FEMA and the Connecticut DEEP have revised the model ordinance.	Ordinances updated in 2017 to comply with FEMA requirements.	Completed
4.5	Work with RLP owners to mitigate RLPs upon property owner request. Repetitive loss properties in Southington are typically only damaged during severe flood events. Ten repetitive loss properties are located in Southington that have experienced 30 flood losses. Mitigation could include acquisition/demolition, elevation, floodproofing, or other techniques.	Town will assist owners upon request; lead department is now Wetlands Officer. This is a capability. There are now nine repetitive loss properties in Southington.	Capability

Active Mitigation Strategies and Actions

The Town proposed to initiate several new mitigation actions for the upcoming five years. Additionally, a number of actions from the previous planning period are being carried forward or replaced with revised actions. These are listed below.

Each of the following actions has been prioritized based on FEMA guidelines, listed from highest to lowest priority, and numbered.

Action #1	
Consider and document the labor resource needs and benefits of participation in the Sustainable CT program.	
Goal	4. Increase the use of natural, "green," or "soft" hazard mitigation measures, such as open space preservation and green infrastructure.
Category	Natural Resources Protection
Lead	Planning
Cost	\$0 - \$10,000
Funding	Town Operating Budget
Timeframe	01/2019 - 12/2019
Priority	High



Action #2

Include procedures specific to the liquid propane plant in the Town's Emergency Operations Plan

Goal	7. Improve the emergency response capabilities of the region and its communities
Category	Preparedness & Emergency Response
Lead	Planning
Cost	\$0 - \$10,000
Funding	Town Operating Budget
Timeframe	07/2019 - 06/2020
Priority	High

Action #3

Purchase new generator for the municipal center.

Goal	7. Improve the emergency response capabilities of the region and its communities
Category	Preparedness & Emergency Response
Lead	Emergency Management
Cost	\$10,000 - \$25,000
Funding	Town Operating Budget / DEMHS
Timeframe	01/2019 - 12/2020
Priority	High

Action #4

Construct dry hydrants and cisterns on the east side of town and near West Ridge

Goal	7. Improve the emergency response capabilities of the region and its communities
Category	Preparedness & Emergency Response
Lead	Fire Department
Cost	\$25,000 - \$50,000
Funding	CT DEEP
Timeframe	07/2020 - 06/2021
Priority	High

Action #5

Conduct outreach to local small businesses with the aim of preventing the accidental release and pollution from chemicals stored and used at their facilities during or following natural hazard events.

Goal	6. Improve public outreach, education, and warning systems
Category	Education & Awareness
Lead	Planning, in coordination with DEEP
Cost	\$0 - \$10,000
Funding	Materials & Resources Provided by CT DEEP
Timeframe	01/2019 - 12/2019
Priority	Medium



Action #6

Coordinate with NEMO and CRCOG to share resources and gain technical support for hazard mitigation actions involving stormwater management and public outreach, which have parallel benefits related to MS4 stormwater permit compliance.

Goal	1. Minimize the impact of natural hazards on physical buildings and infrastructure
Category	Prevention
Lead	Public Works
Cost	\$0 - \$10,000
Funding	Town Operating Budget
Timeframe	01/2020 - 12/2020
Priority	Medium

Action #7

Participate in EMI courses or the seminars and annual conference held by the Connecticut Association of Flood Managers.

Goal	3. Improve institutional awareness and understanding of natural hazard impacts and mitigation within municipal governments and other decision-making bodies
Category	Education & Awareness
Lead	Planning
Cost	\$0 - \$10,000
Funding	Town Operating Budget
Timeframe	07/2019 - 06/2024
Priority	Medium

Action #8

Create and adopt Low Impact Development (LID) regulations.

Goal	2. Ensure Municipal Codes and Regulations support hazard mitigation
Category	Prevention
Lead	Planning
Cost	\$10,000 - \$25,000
Funding	Town Operating Budget / Grants
Timeframe	01/2020 - 12/2022
Priority	Medium



Action #9

Require installation of underground utilities in all new developments, when feasible, through the Subdivision Regulations.

Goal	2. Ensure Municipal Codes and Regulations support hazard mitigation
Category	Prevention
Lead	Planning
Cost	\$10,000 - \$25,000
Funding	Town Operating Budget
Timeframe	07/2020 - 06/2022
Priority	Medium

Action #10

Work with groceries and gas stations to assist them with installation of emergency generators so they can reopen quickly following hazard events.

Goal	7. Improve the emergency response capabilities of the region and its communities
Category	Preparedness & Emergency Response
Lead	Emergency Management
Cost	\$25,000 - \$50,000
Funding	Town Operating Budget
Timeframe	07/2021 - 06/2023
Priority	Medium

Action #11

Purchase new equipment for snow removal.

Goal	7. Improve the emergency response capabilities of the region and its communities
Category	Preparedness & Emergency Response
Lead	Public Works
Cost	\$50,000 - \$100,000
Funding	Grants
Timeframe	01/2023 - 12/2024
Priority	Medium



Action #12

Contact the owners of Repetitive Loss Properties and nearby properties at risk to inquire about mitigation undertaken and suggest options for mitigating flooding in those areas. This should be accomplished with a letter directly mailed to each property owner.

Goal	1. Minimize the impact of natural hazards on physical buildings and infrastructure
Category	Property Protection
Lead	Planning
Cost	\$0 - \$10,000
Funding	Town Operating Budget / DEMHS
Timeframe	07/2021 - 06/2022
Priority	Low

Action #13

Coordinate with CT SHPO to conduct outreach to historic property owners to educate them on methods of retrofitting their properties to be more hazard-resilient while maintaining historic character.

Goal	8. Ensure community character and social equity are addressed in mitigation activities
Category	Education & Awareness
Lead	Planning, in coordination with SHPO
Cost	\$0 - \$10,000
Funding	SHPO
Timeframe	01/2021 - 12/2022
Priority	Low

Action #14

Coordinate with CT SHPO to conduct historic resource surveys, focusing on areas within natural hazard risk zones (such as flood or wildfire hazard zones and areas near steep slopes), to support identification of vulnerable historic properties and preparation of resiliency plans across the state. This action leverages existing resources and best practices for protection of historic and cultural resources through an ongoing statewide initiative by CT SHPO.

Goal	8. Ensure community character and social equity are addressed in mitigation activities
Category	Property Protection
Lead	Planning, in coordination with SHPO
Cost	\$10,000 - \$25,000
Funding	SHPO
Timeframe	07/2021 - 06/2023
Priority	Low



Action #15

Work with CT DEEP to complete a formal validation of the Repetitive Loss Property list and update the mitigation status of each listed property.

Goal	1. Minimize the impact of natural hazards on physical buildings and infrastructure
Category	Property Protection
Lead	Planning
Cost	\$10,000 - \$25,000
Funding	Town Operating Budget / CT DEEP / DEMHS
Timeframe	07/2021 - 06/2023
Priority	Low

Action #16

Work with property owners to remove constrictions and/or widen channels on private property to mitigate exacerbation of flooding conditions.

Goal	6. Improve public outreach, education, and warning systems
Category	Education & Awareness
Lead	Public Works
Cost	\$25,000 - \$50,000
Funding	Town Operating Budget
Timeframe	07/2023 - 06/2024
Priority	Low

Action #17

Relocate EOC to Fire Department and convert the current EOC at the Police Station into a backup EOC.

Goal	7. Improve the emergency response capabilities of the region and its communities
Category	Structural Projects
Lead	Emergency Management
Cost	More than \$100,000
Funding	Town Operating Budget / Grants / DEMHS
Timeframe	07/2023 - 06/2024
Priority	Low













**Capitol Region Natural Hazards
Mitigation Plan Update**




Southington, Connecticut

Flood Plains, Dams
& Critical Facilities



Critical Facilities

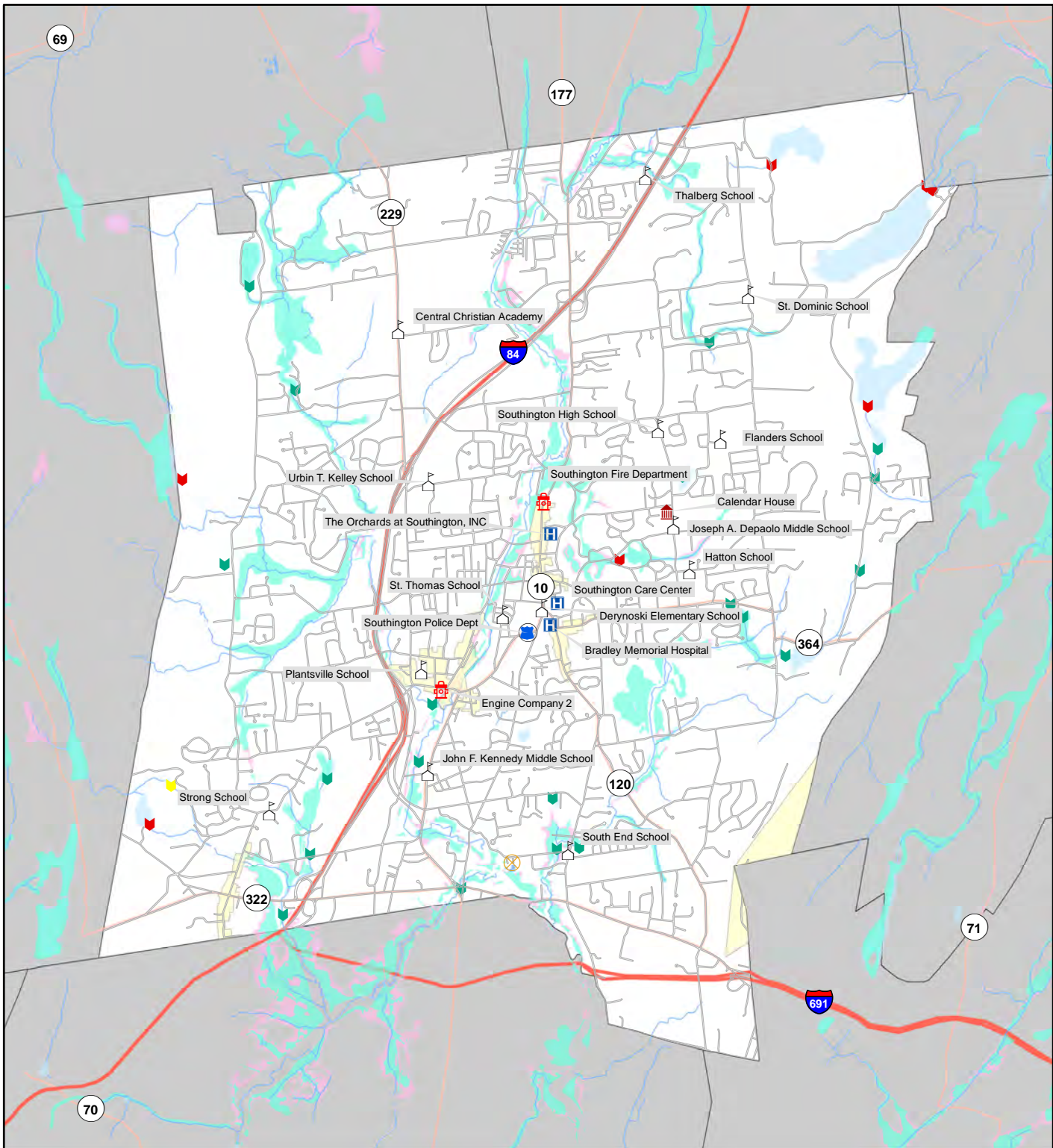
-  Emergency Center
-  Fire Station
-  Healthcare Facility
-  Police Station
-  Public Infrastructure
-  School
-  State Facility
-  Town Facility
-  Waste Water Facility
-  NRHP Districts/Areas

Dam Hazard Class

-  A, AA, BB or Unclassified
-  Class B-Significant Hazard
-  Class C- High Hazard

FEMA Flood Hazard Area

-  100 Year Flood Zone
-  500 Year Flood Zone



Data Sources: FEMA, National Register of Historic Places, CT DEEP, CRCOG, ESRI












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**Capitol Region Natural Hazards
Mitigation Plan Update**

Southington, Connecticut





Dam Breach Inundation Area & Critical Facilities

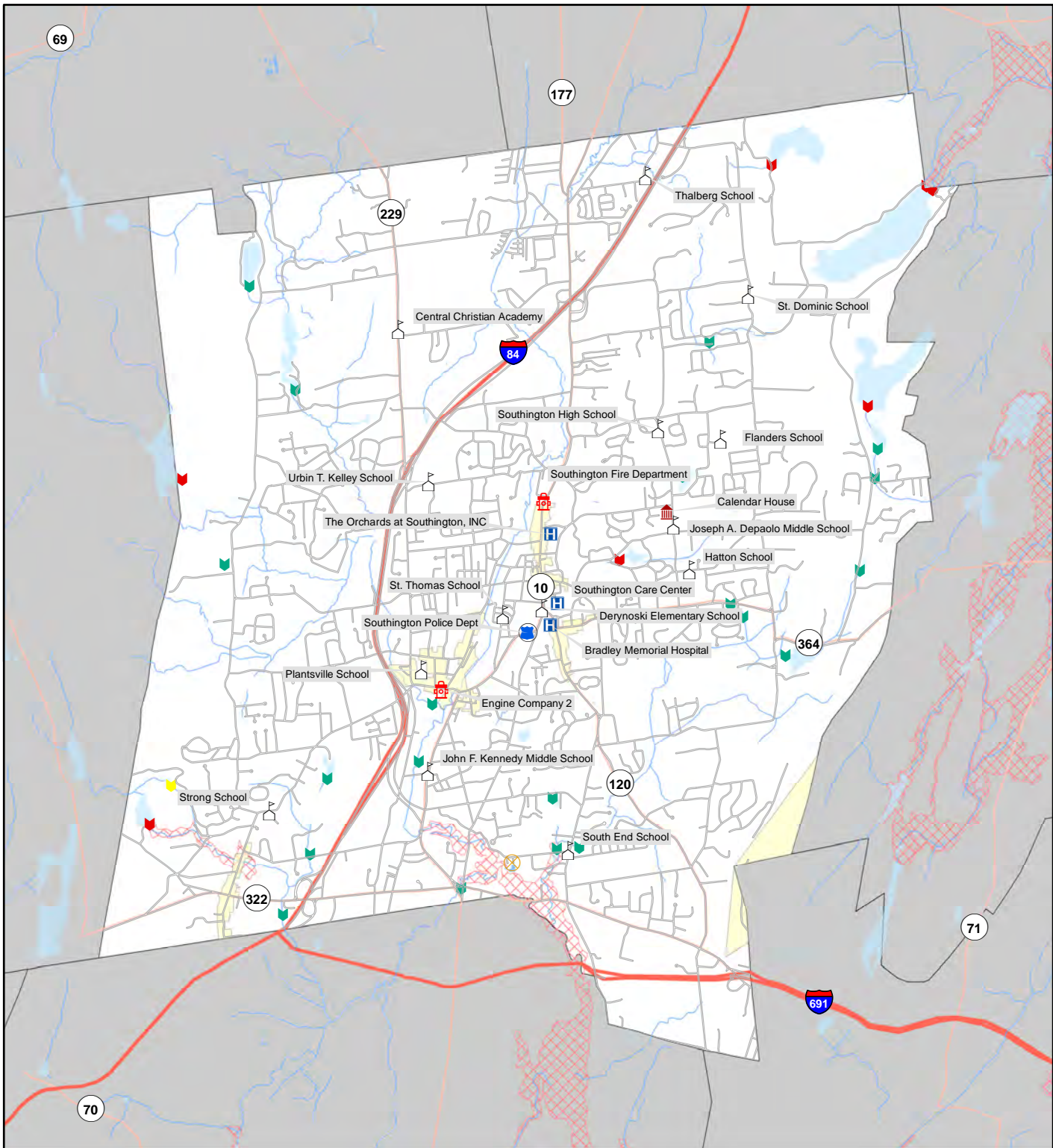
Critical Facilities

-  Emergency Center
-  Fire Station
-  Healthcare Facility
-  Police Station
-  Public Infrastructure
-  School
-  State Facility
-  Town Facility
-  Waste Water Facility

 NRHP Districts/Areas

Dam Hazard Class

-  A, AA, BB or Unclassified
-  Class B-Significant Hazard
-  Class C- High Hazard
-  Dam Breach Inundation Areas



Data Sources: FEMA, National Register of Historic Places, CT DEEP, CRCOG, ESRI



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30 Stafford

Community Overview

Stafford is a rural community of approximately 12,000 residents covering approximately 58 square miles in the Willimantic River Valley between almost parallel ranges of hills. The Town of Stafford is comprised of the borough of Stafford Springs, the village of Staffordville, the hamlet of Orcuttville, the village and historic district of Stafford Hollow, the village of Hydeville and West Stafford. Stafford’s main industry is manufacturing of woolen products, printed circuits, filters, metal bushings and bearings, precision medical devices, fly rod components, and nameplates and labels. Other important industries are nursery and horticultural products, health care services, seasonal camping, motor sports, and recreation. TTM Industries’ three locations (Industrial Park Road, Upper Road, and Old Monson Road), 3M Inc. (located on River Road) and Willington Name Plate (located on Middle River Drive) all utilize various hazardous materials which are reported to the Local Emergency Planning Committee (LEPC). TTM's facility on Upper Road is located within 500 yards of the Staffordville School and plans exist to address this specific hazard both at the facility, the school, and the Staffordville Fire Department.

There are approximately 5,000 housing units in Stafford. Most are single family homes and typically of wood frame construction. There are also three campgrounds that attract a seasonal population of approximately 2,000. Sun Valley on Old Springfield Road has a seasonal population of approximately 900; Mineral Springs on Leonard Road houses approximately 100 and Roaring Brook on South Road serves approximately 1,000. Little new development has occurred since the adoption of the 2014-2019 Capitol Region Natural Hazards Mitigation Plan Update (“2014 HMP”); most construction has been renovations or alterations to existing structures and has generally occurred outside of hazard zones.

Critical Facilities

Critical Facilities throughout the Capitol Region are listed in Appendix B. A number of those in Stafford are listed here.

Table 30-1: Critical Facilities, Stafford

Facility	Shelter	Generator
Johnson Memorial Hospital		
Evergreen Health Care Center		
Fire Department (EOC)		
Resident State Trooper Office		
Staffordville School		
Stafford Middle School		
Wastewater Treatment Plant		

Johnson Memorial Hospital, located on Route 190 in Stafford, serves the medical needs of populations in northern Hartford, Tolland and Windham counties. Evergreen Health Care

Center is a long-term care facility also located at this site. Both facilities have disaster plans in place that are shared with the local Emergency Management Director and the Fire Department.

The Emergency Operations Center (EOC) is located in the Fire Department.

Capabilities

Hazard mitigation is incorporated into Stafford's Plan of Conservation and Development (POCD). POCD actions specifically address natural hazards, specifically dam failure and flood control. Stafford has incorporated Floodplain Regulations into its Zoning Regulations, and has not permitted any new construction in the 100 Year flood plain since 2008. In 2010, the Town revised its Inland Wetlands and Watercourses Regulations to be in accordance with the State model regulations. New developments are required to construct flood storage capacity on site.

The Town has four mobile generators stored in the main fire station. Stafford does not have any local emergency shelters.

Approximately 35% of Stafford is on public water with pressurized hydrants; eastern Stafford has nine dry-hydrants to provide firefighting water. The Town has tanker trucks to deliver water to other locations.

New Capabilities

Stafford has identified an alternative site to construct a new fire station, which will replace the existing one that is located in a flood zone. This site is "shovel ready" but construction is delayed while funding is secured.

Many flood mitigation projects at the Wastewater Treatment Plant (WWTP) have been implemented, and it is now mostly protected. Additional elevation and pump installations, the final piece of a larger WWTP flood mitigation effort, are currently underway.

The Town has developed plans for upgrading the storm drainage infrastructure off of Furnace Avenue and High Street. The Town is working to secure funding to implement the plan.

Stafford has switched to using a salt mix for road pre-treatment ahead of winter storm events. In addition to helping to protect motorists during such events, this mix means almost no sand is used on the roads and therefore stormwater infrastructure is clogged by sand sedimentation less frequently.

A map modernization effort by FEMA is currently underway for Tolland County, but its full extent, and how much of Stafford it will cover, is unknown.



Challenges

Challenges Overview

The primary natural hazard for Stafford is riverine flooding or possible failure of one of the fifty-seven dams in Town or in upstream communities. Most flood damage has been caused by the Middle River and Furnace Brook and their tributaries. Severe damage has historically occurred at the Stafford Water Pollution Control Facility due to flooding of the Willimantic River. Other at-risk areas include Rt. 32 south of the town as well as numerous smaller town roads. Storm drainage infrastructure off of Furnace Avenue and High Street is undersized. The main fire station is in a flood zone, and the spillway at the mill upstream of the station is breached and in need of cleaning. The railroad tracks near the fire station are also impacted by flood events; the railroad bridge can become clogged, backing up water to the fire station. The Resident State Trooper station also floods regularly due to storm drainage issues. Staffordville School is occasionally isolated by floodwaters that inundate the surrounding roads. An ultraviolet wastewater disinfection system, associated with the WWTP, has been damaged by flooding in the past.

CT DEEP has classified eight of the fifty-seven dams in or upstream of Stafford as High Hazard (Class C). Five of the High Hazard dams are owned and maintained by the State. The remaining three are privately owned: the Staffordville Reservoir Dam, the Warren Pond Dam, and the Riverside Pond Dam. There are six Significant Hazard (Class B) dams. Of these six, the State Connecticut owns the Bradway Reservoir Dam #4; all other Class B dams are privately owned. There are eleven privately owned and one municipally owned category BB (Moderate Hazard) dams. All seventeen category A and AA dams are privately owned. Fourteen dams have no hazard or owner designation. Seven of these dams lie in sequence, creating a risk of cascading failure and potentially high damage to the downtown area. This issue is ranked among the most concerning to Stafford officials.

Stafford is heavily wooded. Power outages and road blockages following storms are a concern as are blockages along fire roads which could hamper wildfire fighting efforts. There are many issues with the Town's growing elderly population during power outages associated with the need for medical equipment.

The Town currently has a bridge closed near the main fire station downtown, severely impacting response capabilities.

Wildfire is a concern at the solar farm at the Town Landfill; there is not a lot of water in that area and access is a challenge. Additionally, the top of Leventhal Run at the Stafford Middle School needs access created to the back of the school from Quinn Street to provide an access road for fire suppression.

Stafford is concerned about crumbling foundations of its building stock, and the compounding effect that will have on losses during a hazard event.



Hazard Losses

The economic losses faced by the community from natural hazards can be estimated by reviewing historic, and modeling future, loss figures. Loss estimates are summarized below.

Historic FEMA Payments

FEMA reimburses communities for hazard losses through programs including Public Assistance (PA) and the National Flood Insurance Program (NFIP). Combining PA and private flood insurance payments can give an estimate for total losses to a community.

The NFIP has paid 32 property damage claims in Stafford (including Stafford Springs) totaling \$403,411 to-date. However, there have been no Repetitive Loss (RL) Property claims in Stafford or Stafford Springs to-date.

Total PA reimbursements to the community were as follows:

- Flood Events: \$223,473 (\$11,762 annually)
- Hurricane Events: \$54,540 (\$2,871 annually)
- Winter Storm Events: \$610,742 (\$32,144 annually)

These are summarized in the tables below.

Table 30-2: Flood Event PA Reimbursements, Stafford

Incident	Oct 2005
Declaration	12/16/2005
Disaster No.	1619
Entity	FEMA PA Reimbursement
State	\$1,758
Municipal	\$221,716
Nonprofit	\$0
Total	\$223,473
Annualized	\$11,762



Table 30-3: Hurricane Wind Event PA Reimbursements, Stafford

Incident	Aug - Sep 2011 (T.S. Irene)	Oct - Nov 2012 (Storm Sandy)
Declaration	9/2/2011	10/30/2012
Disaster #	4023	4087
Entity	FEMA PA Reimbursement	
State	\$778	\$3,637
Municipal	\$24,715	\$20,696
Nonprofit	\$4,714	\$0
Total	\$30,207	\$24,333
Annualized	\$1,590	\$1,281

Table 30-4: Winter Storm PA Reimbursements, Stafford

Incident	Mar 2003	Dec 2003	Jan 2005	Feb 2006	Jan 2011	Oct 2011	Feb 2013	Jan 2015
Declaration	3/11/03	1/15/04	2/17/05	5/2/06	3/3/11	11/17/11	3/21/13	4/8/15
Disaster #	3176	3192	3200	3266	1958	4046	4106	4213
Entity	FEMA PA Reimbursement							
State	\$12,272	\$12,694	\$18,143	\$16,516	\$20,663	\$3,165	\$17,209	\$33,303
Municipal	\$25,430	\$39,234	\$45,310	\$33,337	\$58,390	\$115,652	\$72,400	\$68,100
Nonprofit	\$0	\$0	\$0	\$0	\$18,923	\$0	\$0	\$0
Total	\$37,702	\$51,928	\$63,453	\$49,853	\$97,977	\$118,817	\$89,609	\$101,403
Annualized	\$1,984	\$2,733	\$3,340	\$2,624	\$5,157	\$6,254	\$4,716	\$5,337

National Centers for Environmental Information Losses

The table below summarizes events in the National Centers for Environmental Information (NCEI) severe storm database that were specifically noted as having impacted the community since 2012.

Table 30-5: NCEI Database Losses since 2012, Stafford

Date	Event	Property Damage
7/28/2012	Flood	\$25,000
8/10/2012	Flood	\$0
8/7/2014	Hail	\$0
2/25/2016	Thunderstorm Wind	\$10,000
7/22/2016	Thunderstorm Wind	\$15,000
Total Thunderstorm		\$25,000
Total Flood		\$25,000

NCEI losses under other event categories (such as drought, high wind, flooding, and winter storms) were not specifically noted as impacting this community, though they did impact Tolland County and nearby towns. NCEI losses are reported in Section II of this Plan.



HAZUS-MH Losses

CRCOG used FEMA’s Hazus-MH model to analyze the risks that the community might face from flooding, hurricanes, and earthquakes. The model estimates economic losses due to damage to buildings and building contents, as well as other economic disruptions. Both residential and commercial structures are addressed. Losses from different hazards are summarized below. Where available, estimates from the previous and current versions of the HMP are provided side-by-side; differences between the two may have been caused by a combination of the following:

- Changes in methodology: such as hazard zone mapping
- Changes in data: such as population and property values
- Changes in the model: this HMP utilized Hazus-MH version 4.0 rather than 2.1
- Other factors: inherent in a complex software like Hazus-MH

More details are available in the Multi-Jurisdictional HMP. Ultimately, changes in the loss estimates reflect the reality that small differences in hazard event features can have a significant impact on losses incurred.

Table 30-6: Estimated Damages to Stafford from a 1% Annual-Chance Flood

Loss Type	2014 Results	2018 Results
Households Displaced	240	266
People Needing Shelter	298	233
Buildings at Least Moderately Damaged	27	0
Residential Building & Content Losses	\$16,320,000	\$17,572,160
Other Building & Content Losses	\$34,100,000	\$39,310,558
Total Building & Content Loss	\$50,420,000	\$56,882,718
Total Business Interruption Losses	\$200,000	\$2,476,404
TOTAL	\$50,620,000	\$59,359,122

Table 30-7: Estimated Damages to Stafford from a 1% Annual-Chance Hurricane

Loss Type	2014 Results (1938 event)	2018 Results (1% track)
Buildings at Least Moderately Damaged	419	1
Buildings Completely Damaged	17	0
Total Debris Generated	153,186 tons	25876
Truckloads (at 25 tons/truck) of building debris	190	1035
Economic Losses		
Residential Building & Content Losses	\$42,118,000	\$9,958,488
Other Building & Content Losses	\$8,101,000	\$296,989
Total Building & Content Loss	\$50,219,000	\$10,255,477
Total Business Interruption Losses	\$4,903,000	\$279,242
TOTAL LOSSES	\$55,122,000	\$10,534,719



Losses were calculated from a modeled probabilistic earthquake (1% annual-chance of occurrence), as well as for four specific scenarios with epicenters around Connecticut.

Table 30-8: Estimated Damages to Stafford from a Probabilistic Earthquake

Loss Type	2018 Results
Wage Loss	\$1,714
Rent Loss	\$1,098
Relocation Loss	\$2,096
Income Loss	\$1,047
Inventory Loss	\$245
Total Business Disruption	\$6,201
Structural Loss	\$4,266
Non-Structural Loss	\$13,964
Total Building Loss	\$18,230
Total Content Loss	\$5,653
TOTAL LOSSES	\$30,084

Table 30-9: Estimated Damages to Stafford from Modeled Earthquake Scenarios

Epicenter Location	Magnitude	Estimated Total Losses
East Haddam	6.4	\$68,957.26
Haddam	5.7	\$11,470.59
Portland	5.7	\$17,916.72
Stamford	5.7	\$2,095.68

Other Hazard Costs

Six floods between 1900 and 1980 caused damage of more than half a million dollars each. The 1955 flood resulting from Hurricane Diane caused an estimated 1.3 million dollars in damage.

The most severe historical damage caused by dam failure occurred in the spring of 1877 and cost the community approximately \$400,000 in damage, the loss of two lives, and long-term economic hardship for businesses in its path.

Average Annualized Losses

Average Annualized Loss (AAL) figures are useful tools for comparison of the risks faced from different hazards with different likelihoods of occurring in a given time period. AAL estimates were prepared for each natural hazard which may impact the community based on the methodologies discussed in Section II of the Multi-Jurisdictional HMP. Dam failure, drought, tornado, and wildfire losses were sourced from the 2014 Connecticut Natural Hazard Mitigation Plan Update, with dam failure data supplemented by the National Performance of Dams Program and the Connecticut Department of Energy & Environmental Protection. Earthquake and hurricane losses were calculated in HAZUS-MH. Losses for flooding came from NFIP claims, for winter storms from Public Assistance Reimbursements, and for thunderstorms from the NCEI database. These are presented in the table below in dollars per year. Note that Hurricanes and Tropical Storms represent the largest share of total annualized losses.



Table 30-10: Average Annualized Losses, Stafford

Dam Failure	Drought	Earthquakes	Flooding	Hurricanes and Tropical Storms	Severe Winter Storms	Thunderstorms	Tornadoes	Wildfires	Total
\$753	\$0	\$30,084	\$22,378	\$819,092	\$32,144	\$4,400	\$3,512	\$7,616	\$919,970

Losses Summary

A review of the above loss estimates demonstrates that the Town of Stafford has experienced significant expenses as a result of natural hazards, and is at risk for additional losses if some of the less-frequent events were to occur. These actual and potential losses justify hazard mitigation actions to reduce losses in the future.

Mitigation Strategies and Actions

Noted Hazard Mitigation Needs

During the course of this Plan development, multiple hazard mitigation needs of Stafford were noted, including addressing undersized bridges and mitigating flooding at the fire station.

- The Fire Department needs to be relocated out of the flood zone.
- The EOC is in need of substantial renovations or replacement. It should also be relocated out of the flood zone.
- Access to the Staffordville School during flood events needs to be addressed.
- The Town is interested in adding language to its regulations to encourage Low Impact Development (LID) and limit impervious surfaces.
- Additional generators or other solutions to the dangerous impacts that power outages have on the elderly community are needed.

Status of Previous Mitigation Strategies and Actions

The Town of Stafford reviewed the mitigation actions proposed in the 2014 HMP and determined the status of each. That information is included in the table below.

Table 30-11: Status of Previous Mitigation Strategies and Actions, Stafford

Action #	Action	Notes	Status
GOAL: REDUCE PROPERTY DAMAGE DUE TO UNSAFE CONDITIONS RESULTING FROM WINTER STORMS.			
Objective 1: Improve snow removal equipment and techniques.			
1.4	Pursue increased funding for equipment and labor.	This action is no longer deemed necessary	Drop
1.5	Continue to pursue opportunities for service and equipment sharing with neighboring communities through CRCOG's service sharing initiative and otherwise.	This is an ongoing initiative identified in the Town's POCD and other documents.	Capability



Action #	Action	Notes	Status
1.6	Improve Public Works personnel contracts to ensure adequate staffing for storm situations.	The Town has reviewed its personnel contracts and identified an item for revision: The Town wishes to revise the union contract language to allow them to hire subcontractors during surge conditions.	Carry Forward with Revisions
Objective 2: Remove and prevent impediments to snow removal operations.			
2.1	Educate private snow-removal contractors and residents on not obstructing roads and the right-of-way.	The Town has performed this education well, but wants to add an action to make this an annual effort, and to list specific outreach methods (including the use of social media).	Carry Forward with Revisions
2.2	Enforce existing ordinance prohibiting roadway obstructions.	This is part of the Town's standard operations. This is a capability.	Capability
Objective 3: Educate public on hazardous conditions during storm events - promote safe driving techniques.			
3.1	Continue to issue press releases and advisories.	This is done, but the Town wants to expand this to include other social media.	Carry Forward with Revisions
GOAL: IMPLEMENT GUIDELINES AND REGULATIONS TO REDUCE EXPOSURE TO PROPERTY DAMAGE AND LOSS OF LIFE AS A RESULT OF FLOODING.			
Objective 1: Restrict development of buffer areas in flood prone zones and promote best development practices for minimizing environmental impacts.			
1.1	Continue to work to maintain zoning, subdivision and wetlands regulations current with best practices.	Town reviews and updates regulations: this is a capability. The Town adopted subdivision regulations encouraging Low Impact Development in Fall 2017; Zoning regulations don't currently cover LID. Revise action to add LID requirements to zoning.	Carry Forward with Revisions
1.3	Complete and implement stormwater management plan.	Rather than developing a new plan, the Town wants to incorporate improved stormwater management practices directly into subdivision and zoning regulations. This will be accomplished through incorporation of LID into Zoning (as noted above). This action is redundant.	Drop
Objective 2: Maintain waterways, drainage and other structures in critical flood areas.			
2.1	Address priority bridge, culvert and other drainage projects identified in Capital Improvement Plan (CIP).	CIPs are specific to department and include hazard mitigation actions. The Town has hired an engineering firm to help with prioritization.	Completed / Capability
2.2	Work with DEEP to continue to monitor critical dams.	There have been inspections. Used to be a dam committee, but it was disbanded. Ownership of 55 dams is varied; 8 are owned by town. CT Water is a player - many of the higher hazard dams are corporate or association owned. New Action – Need to take action to breach Hydville Dam, currently owned by an estate.	Carry Forward with Revisions
2.3	Develop action plan, time table and budget to repair dams.	UConn is currently doing a dam breach analysis (cascading catastrophic failure). Public Works has just converted an EAP for Staffordville dam and is doing inspections for New City dam (owned by City). Seeking funding to address issues.	Carry Forward with Revisions



Action #	Action	Notes	Status
Objective 3: Ensure traffic safety during flood events.			
3.1	Improve communications with neighboring communities on road closures and detour routing.	Done as part of Tolland County dispatch (happens by routine).	Capability
3.2	Educate police personnel on detour routing protocols to ensure alternative routes can accommodate trucks.	Most police are local now. Replace with revised action to educate Town staff on detour protocol and purchase more signs. Police are trained, but additional training and equipment should be sought.	Carry Forward with Revisions
GOAL: REDUCE PERSONAL PROPERTY DAMAGE AND POWER FAILURES CAUSED BY HIGH WINDS.			
Objective 1: Aggressively work with utility companies to identify high risk areas and promote tree trimming.			
Objective 2: Relocate high density utility facilities underground.			
2.1	Create a long-range plan for undergrounding existing facilities.	Main street (190 and 32) is the focus of this action. No progress to date. Should be considered when street is rebuilt (including roundabout), expected to occur in 2020.	Carry Forward with Revisions
2.2	Pursue opportunities to relocate wires where they are vulnerable: areas of repetitive power failure.	Already had a massive tree trimming initiative, so no longer needed.	Drop

Active Mitigation Strategies and Actions

The Town proposed to initiate several new mitigation actions for the upcoming five years. Additionally, a number of actions from the previous planning period are being carried forward or replaced with revised actions. These are listed below.

Each of the following actions has been prioritized based on FEMA guidelines, listed from highest to lowest priority, and numbered.

Action #1	
Enter the Sustainable CT program through Registration and review actions that can be undertaken to pursue Certification. Make progress with the actions related to hazard mitigation.	
Goal	4. Increase the use of natural, "green," or "soft" hazard mitigation measures, such as open space preservation and green infrastructure.
Category	Natural Resources Protection
Lead	Planning
Cost	\$0 - \$10,000
Funding	Town Operating Budget
Timeframe	01/2019 - 12/2019
Priority	High



Action #2

Expand hazard warning, advisory, and outreach efforts to social media.

Goal	6. Improve public outreach, education, and warning systems
Category	Preparedness & Emergency Response
Lead	Emergency Management
Cost	\$0 - \$10,000
Funding	Town Operating Budget
Timeframe	07/2019 - 06/2020
Priority	High

Action #3

Establish an annual education program for private snow-removal contractors and residents on not obstructing roads and the right-of-way.

Goal	6. Improve public outreach, education, and warning systems
Category	Preparedness & Emergency Response
Lead	Public Works
Cost	\$10,000 - \$25,000
Funding	Town Operating Budget
Timeframe	07/2019 - 06/2024
Priority	High

Action #4

Initiate efforts to breach the Hydeville Dam. Coordinate with CT DEEP.

Goal	1. Minimize the impact of natural hazards on physical buildings and infrastructure
Category	Structural Projects
Lead	Public Works
Cost	\$25,000 - \$50,000
Funding	Town Operating Budget / Grants / CT DEEP
Timeframe	07/2020 - 06/2021
Priority	High

Action #5

Perform a study to identify preferred actions to take to provide sufficient egress and access to and from the main fire station downtown, addressing the issues created by the undermined bridge.

Goal	7. Improve the emergency response capabilities of the region and its communities
Category	Preparedness & Emergency Response
Lead	Emergency Management
Cost	\$25,000 - \$50,000
Funding	Town Operating Budget
Timeframe	07/2020 - 06/2021
Priority	High



Action #6

Conduct outreach to local small businesses with the aim of preventing the accidental release and pollution from chemicals stored and used at their facilities during or following natural hazard events.

Goal	6. Improve public outreach, education, and warning systems
Category	Education & Awareness
Lead	Planning, in coordination with DEEP
Cost	\$0 - \$10,000
Funding	Materials & Resources Provided by CT DEEP
Timeframe	01/2019 - 12/2019
Priority	Medium

Action #7

Participate in EMI courses or the seminars and annual conference held by the Connecticut Association of Flood Managers.

Goal	3. Improve institutional awareness and understanding of natural hazard impacts and mitigation within municipal governments and other decision-making bodies
Category	Education & Awareness
Lead	Planning
Cost	\$0 - \$10,000
Funding	Town Operating Budget
Timeframe	07/2019 - 06/2024
Priority	Medium

Action #8

Revise Public Works personnel contracts to allow for the hiring of subcontractors during surge conditions.

Goal	7. Improve the emergency response capabilities of the region and its communities
Category	Preparedness & Emergency Response
Lead	Board of Selectmen
Cost	\$0 - \$10,000
Funding	Town Operating Budget
Timeframe	07/2020 - 06/2021
Priority	Medium



Action #9

Educate Town staff on detour protocols, and purchase more detour signage and traffic routing equipment.

Goal	7. Improve the emergency response capabilities of the region and its communities
Category	Preparedness & Emergency Response
Lead	Public Works
Cost	\$0 - \$10,000
Funding	Town Operating Budget
Timeframe	07/2020 - 06/2021
Priority	Medium

Action #10

Add language encouraging Low Impact Development and limiting impervious surfaces to the Zoning Regulations

Goal	4. Increase the use of natural, "green," or "soft" hazard mitigation measures, such as open space preservation and green infrastructure.
Category	Prevention
Lead	Planning
Cost	\$10,000 - \$25,000
Funding	Town Operating Budget
Timeframe	07/2020 - 06/2022
Priority	Medium

Action #11

Explore possible sites on which to relocate the main fire station out of the floodplain.

Goal	7. Improve the emergency response capabilities of the region and its communities
Category	Preparedness & Emergency Response
Lead	Emergency Management
Cost	\$10,000 - \$25,000
Funding	Town Operating Budget
Timeframe	07/2020 - 06/2022
Priority	Medium



Action #12

Repair Staffordville and New City dams.

Goal	1. Minimize the impact of natural hazards on physical buildings and infrastructure
Category	Structural Projects
Lead	Public Works
Cost	\$50,000 - \$100,000
Funding	Grants / CT DEEP
Timeframe	07/2023 - 06/2024
Priority	Medium

Action #13

Coordinate with CT SHPO to conduct historic resource surveys, focusing on areas within natural hazard risk zones (such as flood or wildfire hazard zones and areas near steep slopes), to support identification of vulnerable historic properties and preparation of resiliency plans across the state. This action leverages existing resources and best practices for protection of historic and cultural resources through an ongoing statewide initiative by CT SHPO.

Goal	8. Ensure community character and social equity are addressed in mitigation activities
Category	Property Protection
Lead	Planning, in coordination with SHPO
Cost	\$10,000 - \$25,000
Funding	SHPO
Timeframe	07/2021 - 06/2023
Priority	Low

Action #14

Relocate utilities along Main Street underground during expected road and roundabout rebuild in 2020.

Goal	5. Improve the resilience of local and regional utilities and infrastructure using strategies including adaptation, hardening, and creating redundancies.
Category	Structural Projects
Lead	Public Works
Cost	\$50,000 - \$100,000
Funding	Town Operating Budget / Grants
Timeframe	07/2023 - 06/2024
Priority	Low












Capitol Region Natural Hazards Mitigation Plan Update




Stafford, Connecticut

Flood Plains, Dams & Critical Facilities




Critical Facilities

-  Fire Station
-  Police Station
-  School
-  Healthcare Facility
-  State Facility
-  Town Facility
-  Waste Water Facility
-  Emergency Center
-  NRHP Buildings/Sites

Dam Hazard Class

-  BB, A, AA OR Unclassified
-  Class B - Significant Hazard
-  Class C - High Hazard

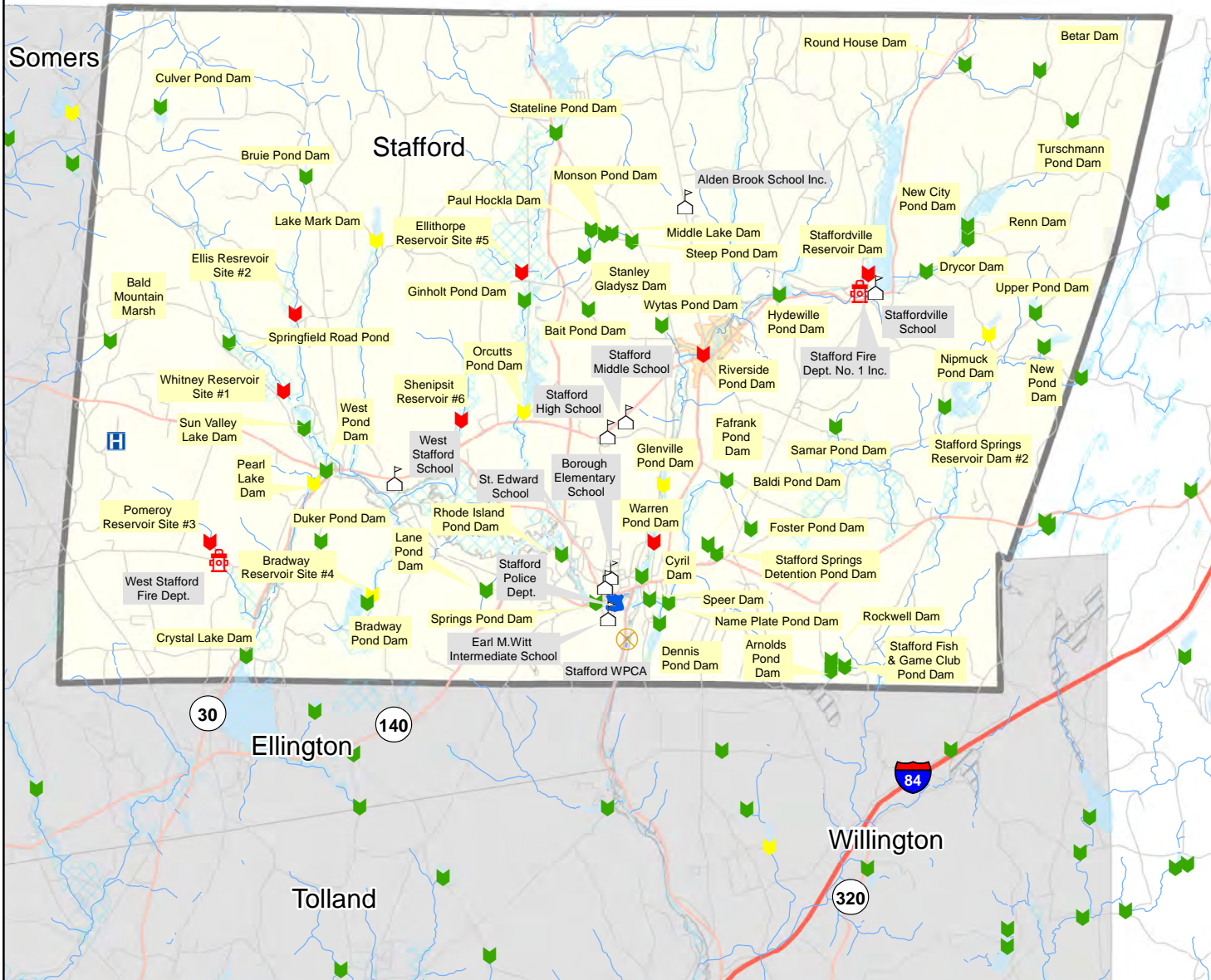
FEMA Flood Hazard Area

-  100 Year Flood Zone
-  500 Year Flood Zone
-  NRHP Districts/Areas

Data Sources: FEMA, National Register of Historic Places, CT DEEP, CRCOG, ESRI



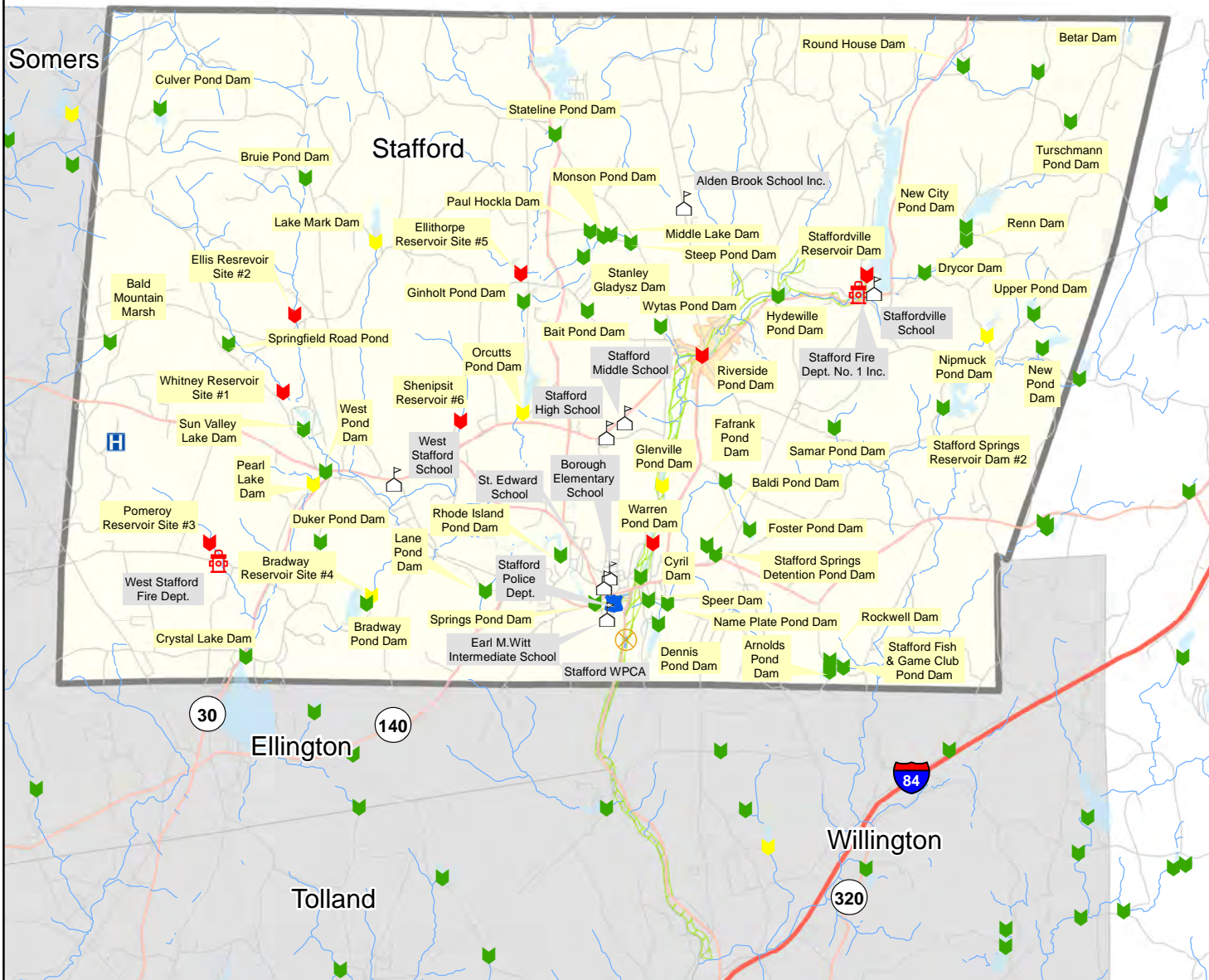
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






Capitol Region Natural Hazards Mitigation Plan Update

Stafford, Connecticut






Dam Breach Inundation Area & Critical Facilities



Critical Facilities

-  Fire Station
-  Police Station
-  School
-  Healthcare Facility
-  State Facility
-  Town Facility
-  Waste Water Facility
-  Emergency Center
-  NRHP Buildings/Sites

Dam Hazard Class

-  BB, A, AA OR Unclassified
-  Class B - Significant Hazard
-  Class C - High Hazard
-  Dam Breach Inundation Areas
-  NRHP Districts/Areas

Data Sources: FEMA, National Register of Historic Places, CT DEEP, CRCOG, ESRI



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31 Suffield

Community Overview

Suffield is a rural encompassing about 42.2 square miles with a population of about 15,735. Suffield's terrain rises from an elevation of 22 feet above sea level at the Connecticut River to its highest point of 691 feet above sea level on West Suffield Mountain. Suffield's land area contributes to three watersheds: the Farmington River Watershed to the west, the Stony Brook Watershed centrally and the mainstem of the Connecticut River Watershed to the east. The Connecticut River runs the length of the eastern boundary of Town. Other major watercourses include Clay, Deep, Fourmile, Mountain Brook, Muddy, Philo, Rawlins and Stony Brooks. State routes 75, 168, 187 and 190 provide major transportation routes through town.

Approximately 40% of the Town is served by public water; Connecticut Water serves the east side of Town, Aquarian serves the west, and the rest of the Town is on wells. The east side of Town has a sewer system, and the rest of Town uses septic systems. Historically, sewer pumping stations would be installed in developments larger than 25-30 homes, and individual grinder pumps would not generally be permitted. This has changed in recent years, and now pressurized sewer systems with grinder units are installed in every new home that cannot reach the sewer system by gravity flow. This change is expected to open the way for new residential development.

Agriculture, manufacture of ice cream, industrial gases, and small tools, and warehousing are the principal industries. The largest employers are MacDougall-Walker Prison, C&S Wholesale Grocers, HP Hood, Windsor Marketing Group, Praxair, and Suffield Village. Part of Bradley International Airport and the entire North Central Connecticut Correctional facility are located in Suffield. Town officials report that Suffield's population is increasing, with many families moving into the area and increasing the number of students in Suffield schools.

Critical Facilities

Critical Facilities throughout the Capitol Region are listed in Appendix B. In Suffield these include Town Hall, four fire stations, a highway department garage and fuel center, an ambulance building that also serves as the Town's EOC, the 230 Mountain Road building that the Town rents for some administrative space, the Police Department, the Senior Center, the Wastewater Treatment Plant and 20 pumping stations, Suffield High School and Middle School, two Elementary Schools, the private Suffield Academy, three senior housing facilities, the MacDougall-Walker Correctional Facility, and a number of historic sites.

Table 31-1: Critical Facilities, Suffield

Facility	Shelter	Generator
Town Hall		Yes
4 Fire Stations		Yes
Highway Garage & Fuel Center		Yes
Ambulance Building (EOC)		Yes
230 Mountain Road (1/3 of building rented by Town for offices: DPW, Engineering, Finance, Selectman, IT, Zoning, HR)		
Police Department		Yes
Senior Center	Warming Center	Yes
WWTP		Yes
20 Pumping Stations		Yes
Suffield High School	Primary	Yes
Suffield Middle School	Secondary	Yes
2 Elementary Schools		Yes
Suffield Academy (private, residential)		Yes
Suffield By the River (Assisted Living)		Yes
Suffield House (Nursing Home)		Yes
Bridge Street Elderly Housing (3 buildings)		
McDougall-Walker Correctional Facility		Unknown

The Town Hall is currently in the process of being renovated, and multiple departments are temporarily working out of rented space in the 230 Mountain Road building. While those departments are located in that building, it is considered a critical facility.

The MacDougall-Walker Correctional Facility is a state facility housing around 2,800 prisoners. The Town responds to fires at the site on a delay, once the facility has been secured; Town EMS also respond, reporting about 100 incidents a year.

Suffield contains many historic sites important to its community character, including the King House museum, the Hatheway House, First Baptist Church, Hilltop Farm, and Babb’s Roller Skating Rink.

Capabilities

Hazard mitigation is incorporated, to some degree, into Suffield’s Plan of Conservation and Development (POCD). POCD actions specifically address natural hazards.

There has not been any construction or demolition in floodplains or other vulnerable areas of Suffield since 2008. In 2008, the Town added Section V.K. Flood Damage Prevention to the Zoning Regulations.

The Town has designated a vacant area on Firestone Drive as an emergency debris storage area, and dumps snow there as needed.

Power lines are installed underground in new subdivisions. Routine tree maintenance is performed by Town personnel, with contractors brought in as necessary. Dead trees along the



bank of Stony Brook upstream of the Remington Street bridge are removed by the Town to prevent the structure from being clogged by fallen tree debris.

Suffield staff are proud of their road maintenance capabilities; with a team of eight employees they are able to clear 80 miles of road during snow events, and always plow ahead of first responders to clear the way to emergencies.

Suffield maintains memorandums of agreement at multiple levels (state, regional, municipal) that include all surrounding towns except for Agawam.

New Capabilities

The Town has contracted Asplundh Tree Company to perform significant tree trimming in recent years, decreasing the risk to the power grid and roads.

Suffield plans to replace a culvert at Bridge Street and Thrall Street with a larger culvert to remedy a drainage-related flood issue. The Town has also received a grant (with 20% municipal match) to replace the Remington Street Bridge to address clogging of the existing 4-box-culvert structure; it is expected this will be completed by 2020.

A flooding issue on Phelps Road has been corrected since the adoption of the 2014-2019 Capitol Region Natural Hazards Mitigation Plan Update (“2014 HMP”). The Town has also added curbs and sub-drains to 50 miles of roadway.

Challenges

Challenges Overview

Suffield has approximately 5,469 housing units, 27 of which are located in flood hazard zones. There are another 31 non-residential structures located in flood hazard zones. There are a few areas throughout Town prone to street flooding during heavy storm events. Flood issues are tracked in all developed areas, and problematic locations are addressed when possible. Ensuring proper maintenance of drainage structures is a challenge due to decreased staffing and budget levels. Maintaining accessibility throughout Town during storms can be a challenge given the streams, steep slopes, and narrow roads in some areas.

Areas at particular risk of flooding include Prospect Street and Hail Street. Quarry Road at the border of Suffield and Granby may become impassible due to flooding; though this occurs on the Granby side of the border, it affects the ability of Suffield residents to travel on that road. The four box-culverts that make up the Remington Street Bridge are susceptible to being clogged by debris. Another flood-related vulnerability exists at the Boston Neck Dam; this privately-owned structure overtopped in 2005 and continues to be at risk.

Certain areas in the more rural West Suffield are more vulnerable to power outages because of the large number of trees near the roads; though tree damage has not historically been severe, it is a main concern for the Town. Main Street, a road maintained by the State, is known to



have particularly old trees. Town officials report that the annual road maintenance budget is not sufficient.

Approximately 60% of the Town is not served by public water, and thus is not protected by hydrants. Town officials are concerned that the high level of leaf and tree litter in its open spaces make it at risk of a brush fire.

Hazard Losses

The economic losses faced by the community from natural hazards can be estimated by reviewing historic, and modeling future, loss figures. Loss estimates are summarized below.

Historic FEMA Payments

FEMA reimburses communities for hazard losses through programs including Public Assistance (PA) and the National Flood Insurance Program (NFIP). Combining PA and private flood insurance payments can give an estimate for total losses to a community.

The NFIP has paid five property damage claims in Suffield totaling \$5,734 to-date. Suffield has no Repetitive Loss (RL) Property claims to-date.

Total PA reimbursements to the community were as follows:

- Flood Events: \$12,882 (\$678 annually)
- Hurricane Events: \$34,136 (\$1,797 annually)
- Winter Storm Events: \$1,961,458 (\$103,235 annually)

These are summarized in the tables below.

Table 31-2: Flood Event PA Reimbursements, Suffield

Incident	Sep 1999	Oct 2005
Declaration	9/23/1999	12/16/2005
Disaster No.	1302	1619
Entity	FEMA PA Reimbursement	
State	\$730	\$905
Municipal	\$0	\$11,247
Nonprofit	\$0	\$0
Total	\$730	\$12,152
Annualized	\$38	\$640



Table 31-3: Hurricane Wind Event PA Reimbursements, Suffield

Incident	Aug - Sep 2011 (T.S. Irene)
Declaration	9/2/2011
Disaster #	4023
Entity	FEMA PA Reimbursement
State	\$7,488
Municipal	\$26,648
Nonprofit	\$0
Total	\$34,136
Annualized	\$1,797

Table 31-4: Winter Storm PA Reimbursements, Suffield

Incident	Mar 2003	Dec 2003	Jan 2005	Feb 2006	Jan 2011	Oct 2011	Feb 2013
Declaration	3/11/03	1/15/04	2/17/05	5/2/06	3/3/11	11/17/11	3/21/13
Disaster #	3176	3192	3200	3266	1958	4046	4106
Entity	FEMA PA Reimbursement						
State	\$13,643	\$12,231	\$21,442	\$24,450	\$22,171	\$88,856	\$43,993
Municipal	\$31,650	\$48,072	\$55,313	\$41,052	\$48,872	\$1,411,547	\$98,166
Nonprofit	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Total	\$45,293	\$60,302	\$76,755	\$65,503	\$71,043	\$1,500,403	\$142,159
Annualized	\$2,384	\$3,174	\$4,040	\$3,448	\$3,739	\$78,969	\$7,482

National Centers for Environmental Information Losses

The table below summarizes events in the National Centers for Environmental Information (NCEI) severe storm database that were specifically noted as having impacted the community since 2012.

Table 31-5: NCEI Database Losses since 2012, Suffield

Date	Event	Property Damage
5/29/2013	Thunderstorm Wind	\$10,000
7/9/2014	Thunderstorm Wind	\$3,000
7/12/2017	Hail	\$0
Total		\$13,000

NCEI losses under other event categories (such as drought, high wind, flooding, and winter storms) were not specifically noted as impacting this community, though they did impact Hartford County and nearby towns. NCEI losses are reported in Section II of this Plan.



HAZUS-MH Losses

CRCOG used FEMA’s Hazus-MH model to analyze the risks that the community might face from flooding, hurricanes, and earthquakes. The model estimates economic losses due to damage to buildings and building contents, as well as other economic disruptions. Both residential and commercial structures are addressed. Losses from different hazards are summarized below. Where available, estimates from the previous and current versions of the HMP are provided side-by-side; differences between the two may have been caused by a combination of the following:

- Changes in methodology: such as hazard zone mapping
- Changes in data: such as population and property values
- Changes in the model: this HMP utilized Hazus-MH version 4.0 rather than 2.1
- Other factors: inherent in a complex software like Hazus-MH

More details are available in the Multi-Jurisdictional HMP. Ultimately, changes in the loss estimates reflect the reality that small differences in hazard event features can have a significant impact on losses incurred.

Table 31-6: Estimated Damages to Suffield from a 1% Annual-Chance Flood

Loss Type	2014 Results	2018 Results
Households Displaced	258	81
People Needing Shelter	291	50
Buildings at Least Moderately Damaged	12	0
Economic Losses		
Residential Building & Content Losses	\$14,600,000	\$7,029,659
Other Building & Content Losses	\$9,400,000	\$3,609,024
Total Building & Content Loss	\$24,000,000	\$10,638,683
Total Business Interruption Losses	\$40,000	\$93,989
TOTAL	\$24,030,000	\$10,732,672

Table 31-7: Estimated Damages to Suffield from a 1% Annual-Chance Hurricane

Loss Type	2014 Results (1938 event)	2018 Results (1% track)
Buildings at Least Moderately Damaged	465	1
Buildings Completely Damaged	32	1
Total Debris Generated	49,404 tons	8970
Truckloads (at 25 tons/truck) of building debris	206	359
Economic Losses		
Residential Building & Content Losses	\$44,700,000	\$8,286,840
Other Building & Content Losses	\$5,800,000	\$224,533
Total Building & Content Loss	\$50,500,000	\$8,511,373
Total Business Interruption Losses	\$5,900,000	\$280,219
TOTAL LOSSES	\$56,400,000	\$8,791,592



Losses were calculated from a modeled probabilistic earthquake (1% annual-chance of occurrence), as well as for four specific scenarios with epicenters around Connecticut.

Table 31-8: Estimated Damages to Suffield from a Probabilistic Earthquake

Loss Type	2018 Results
Wage Loss	\$1,545
Rent Loss	\$1,446
Relocation Loss	\$2,517
Income Loss	\$1,054
Inventory Loss	\$148
Total Business Disruption	\$6,711
Structural Loss	\$5,723
Non-Structural Loss	\$18,095
Total Building Loss	\$23,348
Total Content Loss	\$6,550
TOTAL LOSSES	\$36,593

Table 31-9: Estimated Damages to Suffield from Modeled Earthquake Scenarios

Epicenter Location	Magnitude	Estimated Total Losses
East Haddam	6.4	\$67,997.22
Haddam	5.7	\$15,017.52
Portland	5.7	\$33,803.24
Stamford	5.7	\$3,584.57

Average Annualized Losses

Average Annualized Loss (AAL) figures are useful tools for comparison of the risks faced from different hazards with different likelihoods of occurring in a given time period. AAL estimates were prepared for each natural hazard which may impact Suffield based on the methodologies discussed in Section II of the Multi-Jurisdictional HMP. Dam failure, drought, tornado, and wildfire losses were sourced from the 2014 Connecticut Natural Hazard Mitigation Plan Update, with dam failure data supplemented by the National Performance of Dams Program and the Connecticut Department of Energy & Environmental Protection. Earthquake and hurricane losses were calculated in HAZUS-MH. Losses for flooding came from NFIP claims, for winter storms from Public Assistance Reimbursements, and for thunderstorms from the NCEI database. These are presented in the table below in dollars per year. Note that Hurricanes and Tropical Storms represent the largest share of total annualized losses.

Table 31-10: Average Annualized Losses, Suffield

Dam Failure	Drought	Earthquakes	Flooding	Hurricanes and Tropical Storms	Severe Winter Storms	Thunderstorms	Tornadoes	Wildfires	Total
\$28	\$0	\$36,593	\$829	\$986,404	\$103,235	\$2,090	\$230,862	\$7,855	\$1,367,896



Losses Summary

A review of the above loss estimates demonstrates that the Town of Suffield has experienced significant expenses as a result of natural hazards, and is at risk for additional losses if some of the less-frequent events were to occur. These actual and potential losses justify hazard mitigation actions to reduce losses in the future.

Mitigation Strategies and Actions

Noted Hazard Mitigation Needs

During the course of this Plan development, hazard mitigation needs of Suffield were noted, including upgrading the Fire House and Town Garage facilities to be sufficiently large to house each departments.

Status of Previous Mitigation Strategies and Actions

The Town of Suffield reviewed the mitigation actions proposed in the 2014 HMP and determined the status of each. That information is included in the table below.

Table 31-11: Status of Previous Mitigation Strategies and Actions, Suffield

Action #	Action	Notes	Status
GOAL: PROTECT LIFE AND PROPERTY AND MINIMIZE ECONOMIC LOSSES FROM WINTER STORMS.			
Objective 1: Improve the ability of public works and residents to prepare and respond to severe weather.			
1.1	Conduct periodic educational outreach to residents on storm readiness and property maintenance issues.	Town has recurring session at the Senior Center, and 5th grade school program. Wish to also put information in the Observer.	Carry Forward with Revisions
Objective 2: Reduce the amount of debris and loss of power from severe winter storms through preventative tree maintenance.			
2.1	Secure contractual tree removal services and equipment prior to storm response and cleanup.	This has been completed.	Completed
GOAL: PROTECT LIFE AND PROPERTY AND MINIMIZE ROAD BLOCKAGES FROM FLOODING.			
Objective 1: Reduce the likelihood of flooding by improving existing natural and artificial drainage systems.			
1.1	Amend zoning regulations to require low impact development techniques in new development.	Town encourages good building practices through POCD, but does not feel that new zoning laws are feasible at this time.	Drop
1.2	Preemptively clean debris out of select drainage structures before and during heavy storm events.	Town performs this action when possible. Susan Lane & Diane Lane have been identified as sites that need to be monitored.	Carry Forward with Revisions
Objective 2: Reduce flood threats to existing properties.			
2.1	Encourage property owners to refrain from dumping debris into stream channels and drainage culverts.	Town has not yet pursued this action due to staffing limitations. Intends to perform outreach efforts to encourage the practice.	Carry Forward with Revisions
2.2	Conduct a study to identify the worst areas of surface flooding and develop methods to alleviate the problem areas.	Action not yet complete due to staff and funding limitations.	Carry Forward



Action #	Action	Notes	Status
Objective 3: Improve maintenance of waterways and structures.			
3.1	Develop inspection program for culverts and other stormwater management structures.	Create a new list and have inspection annually. Clear annually, according to MS4 requirements.	Completed
GOAL: PROTECT LIFE AND PROPERTY AND MINIMIZE ELECTRICAL DISRUPTIONS FROM TORNADO/HIGH WINDS.			
Objective 1: Reduce the amount of debris and loss of power from severe storms through preventative tree maintenance.			
1.1	Secure contractual tree removal services and equipment prior to storm response and cleanup.	This is performed on an ongoing basis. This is a capability.	Capability

Active Mitigation Strategies and Actions

The Town proposed to initiate several new mitigation actions for the upcoming five years. Additionally, a number of actions from the previous planning period are being carried forward or replaced with revised actions. These are listed below.

Each of the following actions has been prioritized based on FEMA guidelines, listed from highest to lowest priority, and numbered.

Action #1	
Develop a list of flood prone areas and share that list with police and fire.	
Goal	7. Improve the emergency response capabilities of the region and its communities
Category	Preparedness & Emergency Response
Lead	Emergency Management
Cost	\$0 - \$10,000
Funding	Town Operating Budget
Timeframe	01/2019 - 12/2019
Priority	High

Action #2	
Enter the Sustainable CT program through Registration and review actions that can be undertaken to pursue Certification. Make progress with the actions related to hazard mitigation.	
Goal	4. Increase the use of natural, "green," or "soft" hazard mitigation measures, such as open space preservation and green infrastructure.
Category	Natural Resources Protection
Lead	Planning
Cost	\$0 - \$10,000
Funding	Town Operating Budget
Timeframe	01/2019 - 12/2019
Priority	High



Action #3

Preemptively clean debris out of select drainage structures before and during heavy storm events, particularly on Susan & Diane Lanes.

Goal	5. Improve the resilience of local and regional utilities and infrastructure using strategies including adaptation, hardening, and creating redundancies.
Category	Prevention
Lead	Public Works
Cost	\$10,000 - \$25,000
Funding	Town Operating Budget
Timeframe	01/2019 - 12/2020
Priority	High

Action #4

Conduct outreach to local small businesses with the aim of preventing the accidental release and pollution from chemicals stored and used at their facilities during or following natural hazard events.

Goal	6. Improve public outreach, education, and warning systems
Category	Education & Awareness
Lead	Planning, in coordination with DEEP
Cost	\$0 - \$10,000
Funding	Materials & Resources Provided by CT DEEP
Timeframe	01/2019 - 12/2019
Priority	Medium

Action #5

Coordinate with NEMO and CRCOG to share resources and gain technical support for hazard mitigation actions involving stormwater management and public outreach, which have parallel benefits related to MS4 stormwater permit compliance.

Goal	1. Minimize the impact of natural hazards on physical buildings and infrastructure
Category	Prevention
Lead	Public Works
Cost	\$0 - \$10,000
Funding	Town Operating Budget
Timeframe	01/2020 - 12/2020
Priority	Medium



Action #6

Participate in EMI courses or the seminars and annual conference held by the Connecticut Association of Flood Managers.

Goal	3. Improve institutional awareness and understanding of natural hazard impacts and mitigation within municipal governments and other decision-making bodies
Category	Education & Awareness
Lead	Planning
Cost	\$0 - \$10,000
Funding	Town Operating Budget
Timeframe	07/2019 - 06/2024
Priority	Medium

Action #7

Conduct at least one annual hazard education and outreach campaign to residents using the Town website, Facebook pages, mailers, and information stationed at Town buildings.

Goal	6. Improve public outreach, education, and warning systems
Category	Education & Awareness
Lead	Emergency Management
Cost	\$10,000 - \$25,000
Funding	Town Operating Budget
Timeframe	07/2019 - 06/2024
Priority	Medium

Action #8

Conduct a study to identify the worst areas of surface flooding and develop methods to alleviate the problem areas.

Goal	1. Minimize the impact of natural hazards on physical buildings and infrastructure
Category	Prevention
Lead	Public Works
Cost	\$25,000 - \$50,000
Funding	Town Operating Budget / Grants / DEMHS
Timeframe	07/2021 - 06/2023
Priority	Medium



Action #9

Encourage low impact development techniques in new development in accordance with the POCD.

Goal	2. Ensure Municipal Codes and Regulations support hazard mitigation
Category	Prevention
Lead	Planning
Cost	\$0 - \$10,000
Funding	Town Operating Budget
Timeframe	01/2021 - 12/2022
Priority	Low

Action #10

Encourage property owners to refrain from dumping debris into stream channels and drainage culverts.

Goal	6. Improve public outreach, education, and warning systems
Category	Education & Awareness
Lead	Public Works
Cost	\$0 - \$10,000
Funding	Town Operating Budget
Timeframe	01/2021 - 12/2022
Priority	Low

Action #11

Coordinate with CT SHPO to conduct historic resource surveys, focusing on areas within natural hazard risk zones (such as flood or wildfire hazard zones and areas near steep slopes), to support identification of vulnerable historic properties and preparation of resiliency plans across the state. This action leverages existing resources and best practices for protection of historic and cultural resources through an ongoing statewide initiative by CT SHPO.

Goal	8. Ensure community character and social equity are addressed in mitigation activities
Category	Property Protection
Lead	Planning, in coordination with SHPO
Cost	\$10,000 - \$25,000
Funding	SHPO
Timeframe	07/2021 - 06/2023
Priority	Low












Capitol Region Natural Hazards Mitigation Plan Update




Suffield, Connecticut

Flood Plains, Dams & Critical Facilities




Critical Facilities

-  Fire Station
-  Police Station
-  School
-  Healthcare Facility
-  State Facility
-  Town Facility
-  Waste Water Facility
-  Emergency Center
-  NRHP Buildings/Sites

Dam Hazard Class

-  BB, A, AA OR Unclassified
-  Class B - Significant Hazard
-  Class C - High Hazard

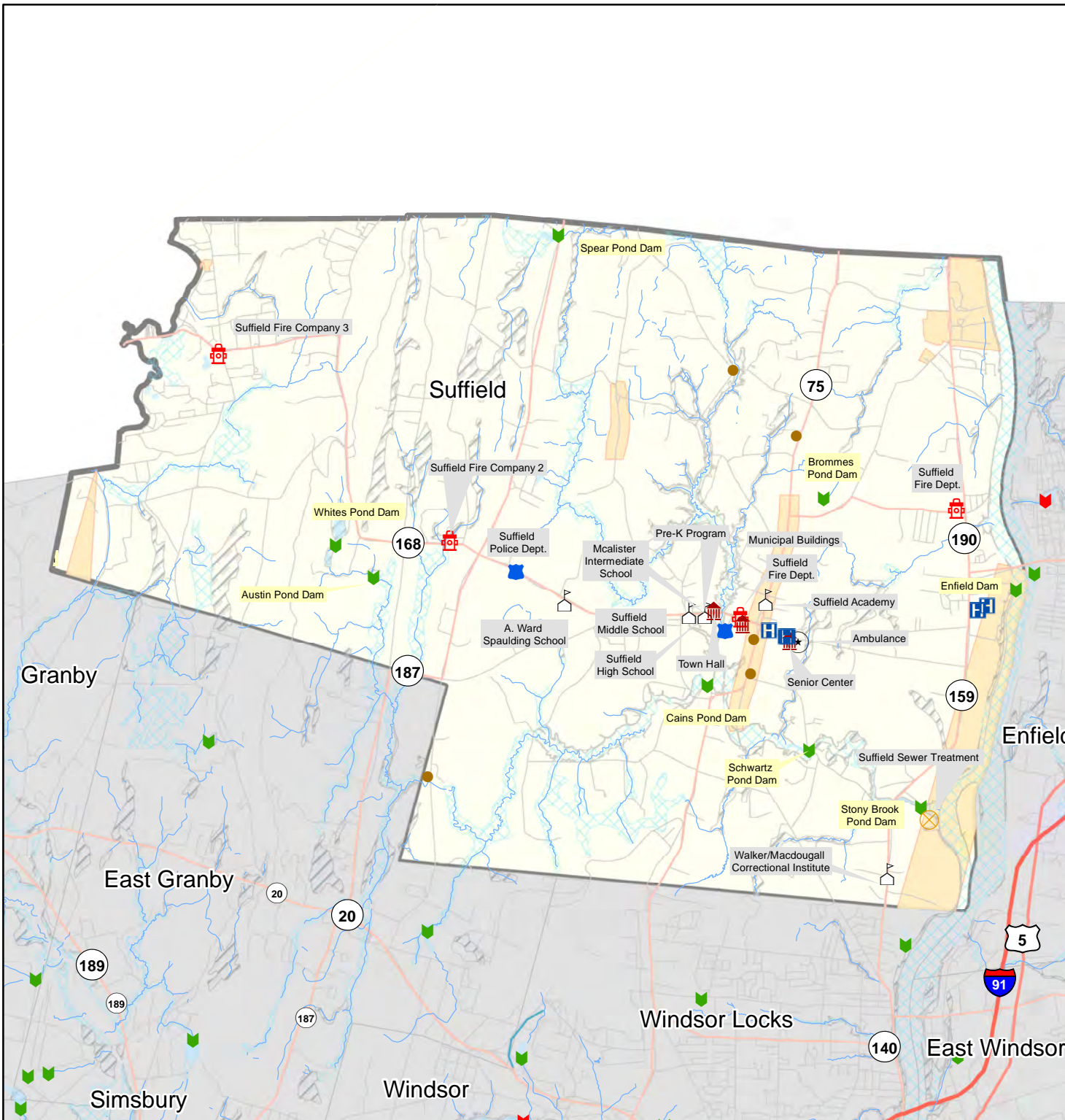
FEMA Flood Hazard Area

-  100 Year Flood Zone
-  500 Year Flood Zone
-  NRHP Districts/Areas

Data Sources: FEMA, National Register of Historic Places, CT DEEP, CRCOG, ESRI



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32 Tolland

Community Overview

Tolland is a rural community with a land area of 39.7 square miles and an estimated population of 15,100 according to the 2010 Census. Elevation ranges from about 500 to over 1,000 feet above sea level. Its land area contributes primarily to the Willimantic River Watershed to the east, but also to the Hockanum River Watershed to the west. The Willimantic River forms the eastern boundary of Tolland, and numerous smaller watercourses flow through town, including Browns, Chapin Meadow, Charter, Clark, Clough, Green, Grover, Labonte, Polk, Spice, Sucker, and West Brooks, as well as the Skungamaug River. Main transportation routes include Interstate 84 and routes 30, 74 and 195. Principal industry in Tolland includes manufacturing and professional services.

Since adoption of the 2014-2019 Capitol Region Natural Hazards Mitigation Plan Update (“2014 HMP”), construction has begun to convert a former school into 37 units of elderly housing. Other new development has generally not been in the floodplains or other notable hazard areas.

Critical Facilities

Critical Facilities throughout the Capitol Region are listed in Appendix B. In Tolland these include the Town Hall (in which the Resident State Trooper Office is located), Senior Center (a shelter), Tolland High School (shelter), Birch Grove (shelter), the Tolland Fire Training Center (EOC), State Police Barracks, the Tolland County Mutual Aid Fire Service Inc. (a regional emergency dispatch center), the Woodlake at Tolland Nursing and Rehabilitation Center, Old Post Village and Winding River elderly housing complexes, one age-restricted development, group homes, and multiple communication towers.

Table 32-1: Critical Facilities, Tolland

Facility	Shelter	Generator
Tolland Town Hall (Resident State Trooper Office)		
Tolland Senior Center	X	X
Tolland High School	X	X
Birch Grove Primary School	X	Partial
Tolland Fire Training Center (EOC)		X
State Police Barracks		X
Tolland County Mutual Aid Fire Service Inc.		X
Woodlake at Tolland Nursing & Rehabilitation Center		X
Old Post Village Elderly Housing		Partial
Winding River Elderly Housing		X
Group Homes		
Communication Towers		X

Since the 2014 HMP the High School generator was rewired in order to be properly hooked up. Birch Grove has a program in place to ensure emergency generators are replaced over time.

Tolland does not currently have sufficient sheltering capacity; its shelters can house less than 7% of the Town's population.

A new highway garage and pump station are currently under construction and will be added to the critical facilities list upon completion.

Capabilities

Hazard mitigation is incorporated into Tolland's Plan of Conservation and Development (POCD). POCD actions specifically address natural hazards, specifically flooding and drought.

The Town has not permitted any new construction in hazard prone areas since 2008.

The DPW maintains a list of bridges and culverts that needs attention. It prioritizes efforts based on the list.

Tolland has a limited dry-hydrant program to make sure firefighting water is available throughout Town. Public water with hydrants covers a small portion of Tolland.

Tree maintenance in Tolland is addressed in large part by Eversource. Tolland has a small annual budget for tree trimming on a case-by-case basis. The Town maintains a contract with a tree company for tree removal, as needed.

New Capabilities

Tolland has added fiber-optic cables and back up capabilities for electronic assets, improving its communication capabilities.

The Town has expanded its GIS capabilities. It now has agricultural mapping data that help provide information useful for drought planning.

Tolland has adopted Low Impact Development (LID) regulations, though enforcing maintenance can be a challenge.

A map modernization effort by FEMA is currently underway for Tolland County, but its full extent, and how much of Tolland it will cover, is unknown.

CT DOT and DEEP have replaced the Route 74 bridge at South River Road.

Challenges

Challenges Overview

Poor-drainage flooding caused by rapid rainfall is a primary concern for the Town. Inundation of flood zones by flooded waterways is a lesser concern due to the relatively small amount of land that falls within those flood zones.



Flooding occurs on Weigold Road, Gehring Road, the east end of Torry Road, the west end of Old Post Road, the north end of South River Road, the west end of Slater Road, Route 74 at Skungamaug Road, and some sections of Tolland's Industrial park. Del-Aire Campground is a private campground on the north end of Shenipsit Lake Road that is also at risk of flooding. Tolland has several areas of unimproved roads with varying elevations that often become washed out and need repairs following large storms. The Willimantic River has been known to flood over its banks during storms. The flooding that occurred in 2005 nearly washed out the Route 74 bridge at South River Road. Gages Brook and portions of the Industrial Park are in the 1-percent annual-chance flood zone, raising water quality concerns.

Tolland is working to meet the new MS4 stormwater requirements and ensure proper maintenance. Stormwater utility maintenance is a priority for the Town.

Tolland has a large amount of open space and brush fires are a concern.

Extreme snow loads and extreme temperatures experienced since the 2014 HMP are amplifiers of the effects of other natural hazards.

Other areas of concern are the elderly population in Town.

Hazard Losses

The economic losses faced by Tolland from natural hazards can be estimated by reviewing historic, and modeling future, loss figures. Loss estimates are summarized below.

Historic FEMA Payments

FEMA reimburses communities for hazard losses through programs including Public Assistance (PA) and the National Flood Insurance Program (NFIP). Combining PA and private flood insurance payments can give an estimate for total losses to a community.

The NFIP has paid 10 property damage claims in Tolland totaling \$9,289.54 to-date; none have been Repetitive Loss (RL) Property claims.

Total PA reimbursements to the community were as follows:

- Flood Events: \$106,944 (\$5,629 annually)
- Hurricane Events: \$390,433 (\$20,549 annually)
- Winter Storm Events: \$2,681,671 (\$141,141 annually)

These are summarized in the tables below.



Table 32-2: Flood Event PA Reimbursements, Tolland

Incident	Oct 2005
Declaration	12/16/2005
Disaster No.	1619
Entity	FEMA PA Reimbursement
State	\$14,266
Municipal	\$92,678
Nonprofit	\$0
Total	\$106,944
Annualized	\$5,629

Table 32-3: Hurricane Wind Event PA Reimbursements, Tolland

Incident	Aug - Sep 2011 (T.S. Irene)	Oct - Nov 2012 (Storm Sandy)
Declaration	9/2/2011	10/30/2012
Disaster #	4023	4087
Entity	FEMA PA Reimbursement	
State	\$56,469	\$40,083
Municipal	\$138,849	\$155,033
Nonprofit	\$0	\$0
Total	\$195,317	\$195,116
Annualized	\$10,280	\$10,269

Table 32-4: Winter Storm PA Reimbursements, Tolland

Incident	Mar 2003	Dec 2003	Jan 2005	Feb 2006	Jan 2011	Oct 2011	Feb 2013	Jan 2015
Declaration	3/11/03	1/15/04	2/17/05	5/2/06	3/3/11	11/17/11	3/21/13	4/8/15
Disaster #	3176	3192	3200	3266	1958	4046	4106	4213
Entity	FEMA PA Reimbursement							
State	\$15,283	\$18,784	\$30,398	\$27,235	\$38,304	\$867,957	\$65,760	\$153,394
Municipal	\$51,365	\$67,109	\$72,501	\$61,900	\$93,127	\$823,147	\$173,999	\$121,409
Nonprofit	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Total	\$66,648	\$85,893	\$102,899	\$89,135	\$131,430	\$1,691,105	\$239,759	\$274,803
Annualized	\$3,508	\$4,521	\$5,416	\$4,691	\$6,917	\$89,006	\$12,619	\$14,463

National Centers for Environmental Information Losses

The table below summarizes events in the National Centers for Environmental Information (NCEI) severe storm database that were specifically noted as having impacted the community since 2012.



Table 32-5: NCEI Database Losses since 2012, Tolland

Date	Event	Property Damage
6/22/2012	Thunderstorm Wind	\$40,000
7/18/2012	Hail	\$0
9/8/2012	Thunderstorm Wind	\$5,000
9/18/2012	Thunderstorm Wind	\$10,000
6/25/2013	Thunderstorm Wind	\$5,000
7/10/2013	Thunderstorm Wind	\$25,000
8/4/2013	Thunderstorm Wind	\$2,500
11/1/2013	Thunderstorm Wind	\$5,000
7/3/2014	Thunderstorm Wind	\$10,000
7/27/2014	Hail	\$50,000
2/25/2016	Thunderstorm Wind	\$10,000
2/25/2016	Thunderstorm Wind	\$5,000
7/22/2016	Thunderstorm Wind	\$30,000
8/11/2016	Thunderstorm Wind	\$5,000
4/6/2017	Lightning	\$2,500
Total		\$205,000

NCEI losses under other event categories (such as drought, high wind, flooding, and winter storms) were not specifically noted as impacting this community, though they did impact Tolland County and nearby towns. NCEI losses are reported in Section II of this Plan.

HAZUS-MH Losses

CRCOG used FEMA’s Hazus-MH model to analyze the risks that the community might face from flooding, hurricanes, and earthquakes. The model estimates economic losses due to damage to buildings and building contents, as well as other economic disruptions. Both residential and commercial structures are addressed. Losses from different hazards are summarized below. Where available, estimates from the previous and current versions of the HMP are provided side-by-side; differences between the two may have been caused by a combination of the following:

- Changes in methodology: such as hazard zone mapping
- Changes in data: such as population and property values
- Changes in the model: this HMP utilized Hazus-MH version 4.0 rather than 2.1
- Other factors: inherent in a complex software like Hazus-MH

More details are available in the Multi-Jurisdictional HMP. Ultimately, changes in the loss estimates reflect the reality that small differences in hazard event features can have a significant impact on losses incurred.



Table 32-6: Estimated Damages to Tolland from a 1% Annual-Chance Flood

Loss Type	2014 Results	2018 Results
Households Displaced	135	105
People Needing Shelter	160	122
Buildings at Least Moderately Damaged	11	0
Economic Losses		
Residential Building & Content Losses	\$8,930,000	\$5,659,988
Other Building & Content Losses	\$4,350,000	\$3,291,478
Total Building & Content Loss	\$13,280,000	\$8,951,466
Total Business Interruption Losses	\$120,000	\$266,211
TOTAL	\$13,400,000	\$9,217,677

Table 32-7: Estimated Damages to Tolland from a 1% Annual-Chance Hurricane

Loss Type	2014 Results (1938 event)	2018 Results (1% track)
Buildings at Least Moderately Damaged	402	6
Buildings Completely Damaged	20	0
Total Debris Generated	69,111 tons	18461
Truckloads (at 25 tons/truck) of building debris	170	738
Economic Losses		
Residential Building & Content Losses	\$45,440,000	\$17,139,426
Other Building & Content Losses	\$5,240,000	\$288,132
Total Building & Content Loss	\$50,680,000	\$17,427,558
Total Business Interruption Losses	\$4,910,000	\$403,508
TOTAL LOSSES	\$55,600,000	\$17,831,066

Losses were calculated from a modeled probabilistic earthquake (1% annual-chance of occurrence), as well as for four specific scenarios with epicenters around Connecticut.

Table 32-8: Estimated Damages to Tolland from a Probabilistic Earthquake

Loss Type	2018 Results
Wage Loss	\$1,310
Rent Loss	\$1,184
Relocation Loss	\$2,269
Income Loss	\$1,011
Inventory Loss	\$91
Total Business Disruption	\$5,864
Structural Loss	\$4,875
Non-Structural Loss	\$17,170
Total Building Loss	\$22,045
Total Content Loss	\$6,508
TOTAL LOSSES	\$34,417



Table 32-9: Estimated Damages to Tolland from Modeled Earthquake Scenarios

Epicenter Location	Magnitude	Estimated Total Losses
East Haddam	6.4	\$159,450.70
Haddam	5.7	\$29,283.32
Portland	5.7	\$47,764.79
Stamford	5.7	\$2,966.21

Average Annualized Losses

Average Annualized Loss (AAL) figures are useful tools for comparison of the risks faced from different hazards with different likelihoods of occurring in a given time period. AAL estimates were prepared for each natural hazard that may impact the community based on the methodologies discussed in Section II of the Multi-Jurisdictional HMP. Dam failure, drought, tornado, and wildfire losses were sourced from the 2014 Connecticut Natural Hazard Mitigation Plan Update, with dam failure data supplemented by the National Performance of Dams Program and the Connecticut Department of Energy & Environmental Protection. Earthquake and hurricane losses were calculated in HAZUS-MH. Losses for flooding came from NFIP claims, for winter storms from Public Assistance Reimbursements, and for thunderstorms from the NCEI database. These are presented in the table below in dollars per year. Note that Hurricanes and Tropical Storms represent the largest share of total annualized losses.

Table 32-10: : Average Annualized Losses, Tolland

Dam Failure	Drought	Earthquakes	Flooding	Hurricanes and Tropical Storms	Severe Winter Storms	Thunderstorms	Tornadoes	Wildfires	Total
\$925	\$0	\$34,417	\$5,873	\$1,020,020	\$141,141	\$5,479	\$4,374	\$5,200	\$1,217,429

Losses Summary

A review of the above loss estimates demonstrates that the Town of Tolland has experienced significant expenses as a result of natural hazards and is at risk for additional losses if some of the less-frequent events were to occur. These actual and potential losses justify hazard mitigation actions to reduce losses in the future.

Mitigation Strategies and Actions

Noted Hazard Mitigation Needs

Over the course of Plan development, multiple hazard mitigation needs were noted.

- The Town must explore options for increasing its sheltering capacity and storage of emergency supplies.



- Tolland is interested in developing a new EOC with improved features; the South Windsor EOC was specifically cited as a good model.
- An upgrade of culverts under Route 195 near the Big-Y supermarket is high on the DPW list of priorities.
- The Town wishes to review and improve its dry-hydrant program to ensure its hydrant replacement and maintenance efforts are sufficient.
- Tolland is interested in enhancing its tree-trimming program, potentially by adopting UConn’s “Stormwise” forest vegetation management program.
- Tolland is interested in implementing the USDA “right tree right place” when planting new trees.
- Crumbling building foundations are a significant and widespread problem in Tolland and exacerbate the effects of natural hazards.

Status of Previous Mitigation Strategies and Actions

The Town of Tolland reviewed the mitigation actions proposed in the 2014 HMP and determined the status of each. That information is included in the table below.

Table 32-11: Status of Previous Mitigation Strategies and Actions, Tolland

Action #	Action	Notes	Status
GOAL: IDENTIFY AREAS AND MEASURES THAT WOULD BENEFIT FROM HAZARD MITIGATION PLANNING (WIND).			
Objective 1: Reduce conflicts between existing and utility wires and trees.			
1.1	Maintain agreements with private contractors for emergency tree service work.	This is part of the Town’s standard operations. This is a capability	Capability
Objective 2: Provide back-up power for all critical facilities/infrastructure.			
2.1	Secure funding for generator acquisition.	Action completed.	Completed
Objective 3: Ensure safe and adequate means for traveling throughout town.			
3.1	Purchase additional signs, barricades and related supplies for road closures and alternate-route marking.	This is performed as part of the Town’s standard emergency preparedness and response activities.	Capability
3.2	Continue good communications with public safety officials in adjacent communities.	This is part of the Town’s standard operations. This is a capability	Capability
GOAL: IDENTIFY AREAS AND MEASURES THAT WOULD BENEFIT FROM HAZARD MITIGATION PLANNING (FLOOD).			
Objective 1: Improve reliability of access to Fire Station 340.			
1.1	Analyze and make recommendations to improve Gehring Road crossing of Spice Brook.	This has not yet been completed due to staffing and budget limitations.	Carry Forward
1.2	Implement recommendations of above study.	This action is delayed until completion of that listed above.	Carry Forward
Objective 2: Improve drainage in Industrial Park.			
2.1	Analyze and make recommendations to improve natural and artificial drainage in Industrial Park and Gages Brook.	DPW recently cleaned out two key culverts in Industrial Park, which should help address flow problems. The Town wishes to keep the action.	Carry Forward
2.2	Implement recommendations of above study. (Because this is expected to be a long term, multi-year project, for the 2014-2019 Plan period, the action to be taken is to develop a scope of work for the recommended improvements.)	This action is delayed until completion of that listed above.	Carry Forward with Revisions



Action #	Action	Notes	Status
Objective 3: Ensure safety of Depot/South River Road Bridge over the Willimantic River.			
3.1	Monitor CT DOT studies of Willimantic River.	This is an ongoing effort. This is a capability	Capability
3.2	Inspect and evaluate the center pier and make recommendations for its improvement and/or maintenance.	Action completed.	Completed
3.3	Implement recommendations of above analysis. (Because this is expected to be a long term, multi-year project, for the 2014-2019 Plan period, the action to be taken is to develop a scope of work for the recommended improvements.)	This action has not yet been completed due to funding limitations. Town is working on identifying funding sources.	Carry Forward
Objective 4: Prevent increased flooding as a result of future development.			
4.1	Implement Low Impact Development regulations.	This has been completed.	Completed
4.2	Educate commissioners, developers and the community on Low Impact Development.	The Town has initiated an education program and expects to provide some training for developers and local engineers within the 2018-2019 fiscal year. Carry forward to completion.	Carry Forward
4.3	Continue erosion and sedimentation control enforcement.	This is part of the Town's standard operations. This is a capability	Capability
Objective 5: Ensure protection of private property.			
5.1	Raise awareness in the community of the National Flood Insurance Program.	Consider new strategy to link on EM page with annual updates on multiple pages, add e-mail blasts.	Carry Forward with Revisions
5.2	Identify private bridges that may need repair and reach out to owners to determine best means of evaluating and implementing necessary upgrades. Because this is expected to be a long term, multi-year project, for the 2014-2019 Plan period, the action to be taken is to develop a scope of work for the project.	This action has not yet been completed due to funding and staffing limitations.	Carry Forward
GOAL: REDUCE IDENTIFY AREAS AND MEASURES THAT WOULD BENEFIT FROM HAZARD MITIGATION PLANNING (STORMS).			
Objective 1: Develop network/measures to evacuate citizens to shelters.			
1.1	Develop and maintain list of special needs populations.	This action has been completed, but needs another update; 37 new vulnerable population units will soon be added.	Carry Forward with Revisions
1.2	Use town website to communicate emergency planning information to residents.	This action has been completed, but the Town wishes to also include e-notifications on the website.	Carry Forward with Revisions
GOAL: IDENTIFY AREAS AND MEASURES THAT WOULD BENEFIT FROM HAZARD MITIGATION PLANNING (FOREST FIRES).			
Objective 1: Reduce potential losses as a result of fires.			
1.1	Develop a system for servicing/dredging fire ponds and dry hydrants periodically.	Town has pursued this action but has not yet found a funding source.	Carry Forward

Active Mitigation Strategies and Actions

The Town proposed to initiate several new mitigation actions for the upcoming five years. Additionally, a number of actions from the previous planning period are being carried forward or replaced with revised actions. These are listed below.



Each of the following actions has been prioritized based on FEMA guidelines, listed from highest to lowest priority, and numbered.

Action #1

Develop a list of private contractors that can be utilized for emergency tree service work.

Goal	7. Improve the emergency response capabilities of the region and its communities
Category	Preparedness & Emergency Response
Lead	Public Works
Cost	\$0 - \$10,000
Funding	Town Operating Budget
Timeframe	01/2019 - 12/2019
Priority	High

Action #2

Develop a system for servicing/dredging fire ponds and dry hydrants periodically.

Goal	7. Improve the emergency response capabilities of the region and its communities
Category	Prevention
Lead	Fire Department
Cost	\$0 - \$10,000
Funding	Town Operating Budget
Timeframe	01/2019 - 12/2019
Priority	High

Action #3

Update list of special needs populations to include 37 new units and any other new additions to the population.

Goal	7. Improve the emergency response capabilities of the region and its communities
Category	Preparedness & Emergency Response
Lead	Emergency Management
Cost	\$0 - \$10,000
Funding	Town Operating Budget
Timeframe	01/2019 - 12/2019
Priority	High



Action #4

Develop a plan to increase municipal sheltering capacity to meet 7% requirement.

Goal	7. Improve the emergency response capabilities of the region and its communities
Category	Preparedness & Emergency Response
Lead	Emergency Management
Cost	\$10,000 - \$25,000
Funding	Town Operating Budget / Grants
Timeframe	07/2019 - 06/2021
Priority	High

Action #5

Hire engineer to repair or replace center pier on Willimantic River.

Goal	1. Minimize the impact of natural hazards on physical buildings and infrastructure
Category	Structural Projects
Lead	Public Works
Cost	More than \$100,000
Funding	Grants
Timeframe	07/2022 - 06/2023
Priority	High

Action #6

Conduct outreach to local small businesses with the aim of preventing the accidental release and pollution from chemicals stored and used at their facilities during or following natural hazard events.

Goal	6. Improve public outreach, education, and warning systems
Category	Education & Awareness
Lead	Planning, in coordination with DEEP
Cost	\$0 - \$10,000
Funding	Materials & Resources Provided by CT DEEP
Timeframe	07/2019 - 06/2022
Priority	Medium

Action #7

Coordinate with NEMO and CRCOG to share resources and gain technical support for hazard mitigation actions involving stormwater management and public outreach, which have parallel benefits related to MS4 stormwater permit compliance.

Goal	1. Minimize the impact of natural hazards on physical buildings and infrastructure
Category	Prevention
Lead	Public Works & Planning
Cost	\$0 - \$10,000
Funding	Town Operating Budget
Timeframe	01/2020 - 12/2020
Priority	Medium



Action #8

Update bridge and culvert sizing requirements to allow for passage of larger storm events: utilize the Cornell NRCC Extreme Rainfall figures found at <http://precip.eas.cornell.edu/>.

Goal	2. Ensure Municipal Codes and Regulations support hazard mitigation
Category	Prevention
Lead	Public Works
Cost	\$0 - \$10,000
Funding	Town Operating Budget
Timeframe	01/2020 - 12/2020
Priority	Medium

Action #9

Add a link to the Emergency Management page on the Town Website with information about the National Flood Insurance Program.

Goal	6. Improve public outreach, education, and warning systems
Category	Education & Awareness
Lead	Emergency Management
Cost	\$0 - \$10,000
Funding	Town Operating Budget
Timeframe	01/2020 - 12/2020
Priority	Medium

Action #10

Participate in EMI courses or the seminars and annual conference held by the Connecticut Association of Flood Managers.

Goal	3. Improve institutional awareness and understanding of natural hazard impacts and mitigation within municipal governments and other decision-making bodies
Category	Education & Awareness
Lead	Planning
Cost	\$0 - \$10,000
Funding	Town Operating Budget
Timeframe	07/2019 - 06/2024
Priority	Medium



Action #11

Conduct annual outreach campaign to educate residents on signing up for emergency alerts, building and maintaining disaster plans and kits, and improving their disaster readiness. Include notifications on the Town website.

Goal	6. Improve public outreach, education, and warning systems
Category	Education & Awareness
Lead	Emergency Management
Cost	\$10,000 - \$25,000
Funding	Town Operating Budget
Timeframe	07/2019 - 06/2024
Priority	Medium

Action #12

Analyze and make recommendations to improve Gehring Road crossing of Spice Brook.

Goal	5. Improve the resilience of local and regional utilities and infrastructure using strategies including adaptation, hardening, and creating redundancies.
Category	Structural Projects
Lead	Public Works
Cost	\$25,000 - \$50,000
Funding	Town Operating Budget / Grants
Timeframe	07/2021 - 06/2023
Priority	Medium

Action #13

Analyze and make recommendations to improve natural and artificial drainage in Industrial Park and Gages Brook.

Goal	1. Minimize the impact of natural hazards on physical buildings and infrastructure
Category	Structural Projects
Lead	Public Works & Planning
Cost	\$25,000 - \$50,000
Funding	Town Operating Budget / Grants / CT DEEP
Timeframe	07/2021 - 06/2023
Priority	Medium



Action #14

Implement recommendations to improve Gehring Road crossing of Spice Brook.

Goal	5. Improve the resilience of local and regional utilities and infrastructure using strategies including adaptation, hardening, and creating redundancies.
Category	Structural Projects
Lead	Public Works
Cost	More than \$100,000
Funding	Grants
Timeframe	07/2022 - 06/2024
Priority	Medium

Action #15

Send out email blasts with information about the National Flood Insurance Program.

Goal	6. Improve public outreach, education, and warning systems
Category	Education & Awareness
Lead	Emergency Management
Cost	\$0 - \$10,000
Funding	Town Operating Budget
Timeframe	01/2021 - 12/2022
Priority	Low

Action #16

Educate commissioners, developers and the community on Low Impact Development requirements on an ongoing basis.

Goal	3. Improve institutional awareness and understanding of natural hazard impacts and mitigation within municipal governments and other decision-making bodies
Category	Education & Awareness
Lead	Planning
Cost	\$0 - \$10,000
Funding	Town Operating Budget
Timeframe	07/2019 - 06/2024
Priority	Low



Action #17

Seek Certification within the Sustainable CT program and make progress with the hazard mitigation goals associated with SustainableCT certified actions.

Goal	4. Increase the use of natural, “green,” or “soft” hazard mitigation measures, such as open space preservation and green infrastructure.
Category	Natural Resources Protection
Lead	Planning
Cost	\$0 - \$10,000
Funding	Town Operating Budget
Timeframe	07/2021 - 06/2022
Priority	Low

Action #18

Coordinate with CT SHPO to conduct historic resource surveys to support identification of vulnerable historic properties and preparation of resiliency plans across the state. This action leverages existing resources and best practices for protection of historic and cultural resources through an ongoing statewide initiative by CT SHPO.

Goal	8. Ensure community character and social equity are addressed in mitigation activities
Category	Property Protection
Lead	Planning, in coordination with SHPO
Cost	\$10,000 - \$25,000
Funding	SHPO
Timeframe	07/2021 - 06/2023
Priority	Low

Action #19

Develop a scope of work for making recommended improvements, developed as a separate action, to the Industrial Park and Gages Brook.

Goal	1. Minimize the impact of natural hazards on physical buildings and infrastructure
Category	Structural Projects
Lead	Public Works
Cost	\$10,000 - \$25,000
Funding	Town Operating Budget
Timeframe	07/2021 - 06/2023
Priority	Low



Action #20

Explore creation of a new EOC with improved capabilities and technologies

Goal	7. Improve the emergency response capabilities of the region and its communities
Category	Preparedness & Emergency Response
Lead	Emergency Management
Cost	\$10,000 - \$25,000
Funding	Town Operating Budget
Timeframe	07/2021 - 06/2023
Priority	low

Action #21

Identify private bridges that may need repair, and reach out to owners to determine best means of evaluating and implementing necessary upgrades. Because this is expected to be a long term, multi-year project, for the current Plan period, the action to be taken is to develop a scope of work for the project.











Goal	5. Improve the resilience of local and regional utilities and infrastructure using strategies including adaptation, hardening, and creating redundancies.
Category	Structural Projects
Lead	Public Works
Cost	\$25,000 - \$50,000
Funding	Town Operating Budget / Grants
Timeframe	07/2023 - 06/2024
Priority	Low



Capitol Region Natural Hazards Mitigation Plan Update



Tolland, Connecticut Flood Plains, Dams & Critical Facilities

Critical Facilities



-  Emergency Center
-  Fire Station
-  Healthcare Facility
-  Police Station
-  Public Infrastructure
-  School
-  State Facility
-  Town Facility
-  Waste Water Facility
-  NRHP Buildings/Sites

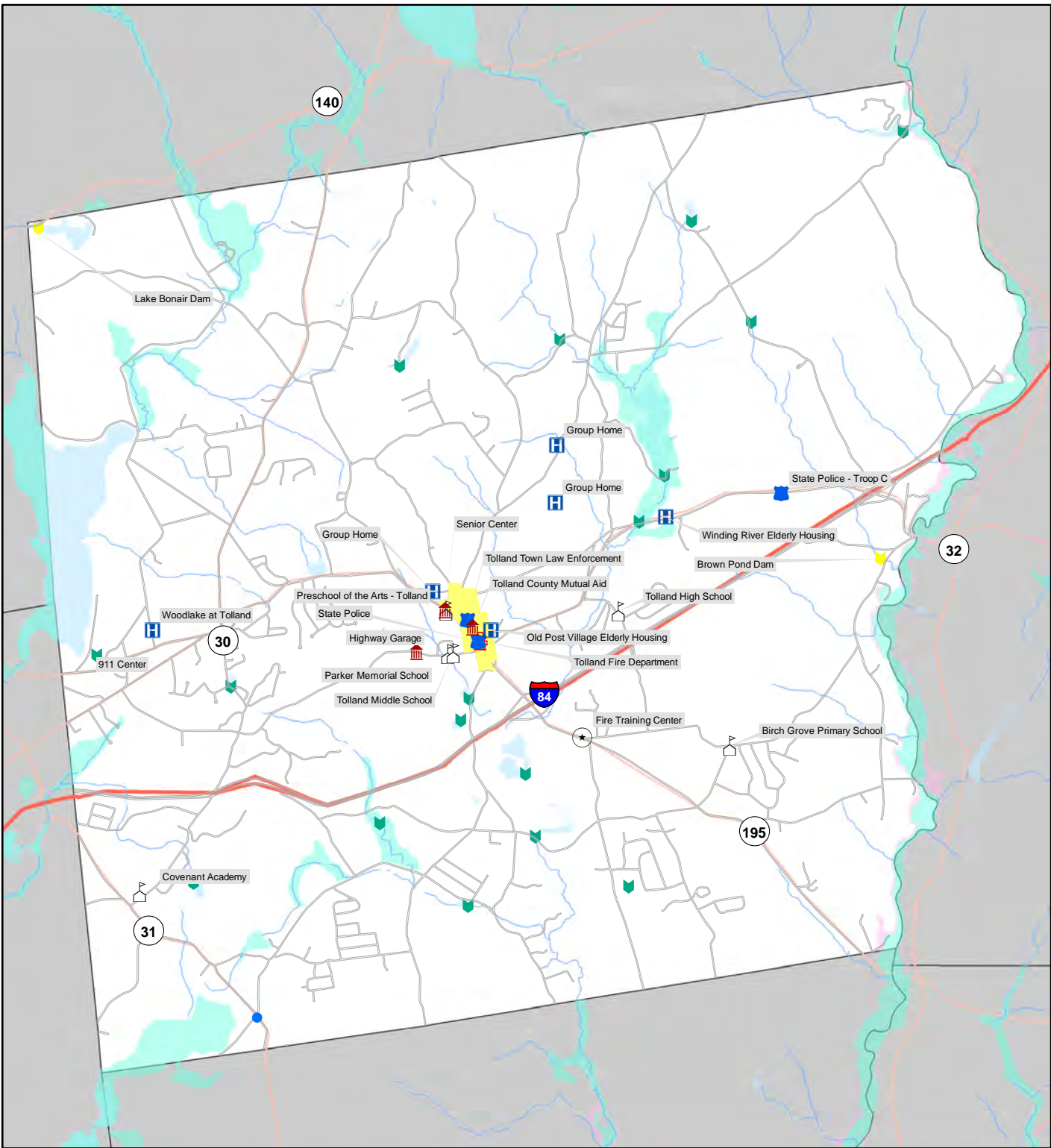
 NRHP Districts/Areas

Dam Hazard Class

-  A, AA, BB or Unclassified
-  Class B-Significant Hazard

FEMA Flood Hazard Area

-  100 Year Flood Zone
-  500 Year Flood Zone



Data Sources: FEMA, National Register of Historic Places, CT DEEP, CRCOG, ESRI



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33 Vernon

Community Overview

The Town of Vernon is a fully suburban community that encompasses 18.4 square miles of land and has a population of approximately 29,622. Elevation ranges from about 150 feet in the west to over 800 feet in the east. Vernon's lies primarily within the Hockanum River Watershed, however, the southeastern corner of town drains to the Willimantic River. Major watercourses include the Hockanum and Tankerhoosen Rivers, as well as Clarks and Railroad Brooks. Vernon is bisected by Interstate 84 which travels east-west. Other major thoroughfares include state routes 30, 31, 74 and 83. Strong business sectors include retail, professional, medical, commercial-industrial, and agricultural and horticultural enterprises.

Most recent development in Vernon has consisted of redevelopment and renovation projects; these include redevelopment at the Amerbelle Mill Complex and the Talcottville Mill, conversion of the former Roosevelt Mill to lofts, and reconstruction of a Connecticut Water Company (CWC) reservoir pumping station at Shenipsit Road.

Critical Facilities

Critical Facilities throughout the Capitol Region are listed in Appendix B. In Vernon these include the Bolton Road Senior Center, Town Hall Annex, Parks and Recreation Facility at Henry Park.

Table 33-1: Critical Facilities, Vernon

Facility	Shelter	Generator
Bolton Road Senior Center		
Town Hall Annex		X
Parks and Recreation Facility		X
Primary Shelter		Partial

The Bolton Road Senior Center is in the process of acquiring a backup generator. The Town Hall Annex and Parks and Recreation facility are each in the process of upgrading their generators.

The Vernon's primary emergency shelter has a generator capable of powering most of the building; this is a regional shelter that provides mass care and qualifies for American Red Cross approval.

A Yankee Gas pumping station, a facility previously identified as critical, has been removed.

Capabilities

Hazard mitigation is incorporated, to some degree, as a specific element in Vernon's Plan of Conservation and Development (POCD). POCD actions specifically address natural hazards. In 2013, the Town incorporated low impact development (LID) requirements into its Zoning

Regulations to aid in reducing its vulnerability to flooding. The Town has not permitted any new development in the flood plain since 2008.

Vernon has a tree warden and conducts tree maintenance annually, along with Eversource.

New Capabilities

Since adoption of the 2014-2019 Capitol Region Natural Hazards Mitigation Plan Update (“2014 HMP”), Vernon has built redundancy into its IT systems.

The redevelopment project at Amerbelle Mille Complex included removal of an onsite dam, which is believed to have alleviated flooding problems on the site. The Talcottville Mill redevelopment included a bank stabilization project.

Vernon has continued to expand its public water system, and the majority of the Town is now on public water with hydrants. The Connecticut Water Company (CWC) recently added hydrants on South Street, High Street, and Merline Road.

The Town has actively worked to address tree maintenance issues in recent years. The Town owns a bucket truck and a 72-foot four-by-four lift truck. Since the 2014 HMP, the Town purchased a grappling hook for debris cleanup.

A map modernization effort by FEMA is currently underway for Tolland County, but its full extent, and how much of Vernon it will cover, is unknown.

Challenges

Challenges Overview

Flooding, hurricane winds, and winter storms are the top hazards of concern for Vernon. Drought is the lowest hazard of concern. The Hockanum River and Tankerhoosen River are the primary sources of flood problems.

The Bolton Lake area does not have public water.

There are four to five dams in Town; none of which are a major concern.

Vernon is concerned about widespread crumbling foundation issues, and the potential they pose for amplification of natural hazard effects.

Hazard Losses

The economic losses faced by Vernon from natural hazards can be estimated by reviewing historic, and modeling future, loss figures. Loss estimates are summarized below.



Historic FEMA Payments

FEMA reimburses communities for hazard losses through programs including Public Assistance (PA) and the National Flood Insurance Program (NFIP). Combining PA and private flood insurance payments can give an estimate for total losses to a community.

The National Flood Insurance Program (NFIP) has paid 28 claims in Vernon totaling \$149,475 to-date. Vernon has eleven Repetitive Loss (RL) Property claims to-date on four properties with payments totaling \$92,732.

Total PA reimbursements to the community were as follows:

- Flood Events: \$45,653 (\$2,403 annually)
- Hurricane Events: \$215,495 (\$11,342 annually)
- Winter Storm Events: \$4,923,688 (\$259,141 annually)

These are summarized in the tables below.

Table 33-2: Flood Event PA Reimbursements, Vernon

Incident	Oct 2005
Declaration	12/16/2005
Disaster No.	1619
Entity	FEMA PA Reimbursement
State	\$4,243
Municipal	\$41,410
Nonprofit	\$0
Total	\$45,653
Annualized	\$2,403

Table 33-3: Hurricane Wind Event PA Reimbursements, Vernon

Incident	Aug - Sep 2011 (T.S. Irene)	Oct - Nov 2012 (Storm Sandy)
Declaration	9/2/2011	10/30/2012
Disaster #	4023	4087
Entity	FEMA PA Reimbursement	
State	\$9,818	\$17,333
Municipal	\$142,079	\$46,265
Nonprofit	\$0	\$0
Total	\$151,897	\$63,598
Annualized	\$7,995	\$3,347



Table 33-4: Winter Storm PA Reimbursements, Vernon

Incident	Mar 2003	Dec 2003	Jan 2005	Feb 2006	Jan 2011	Oct 2011	Feb 2013	Jan 2015
Declaration	3/11/03	1/15/04	2/17/05	5/2/06	3/3/11	11/17/11	3/21/13	4/8/15
Disaster #	3176	3192	3200	3266	1958	4046	4106	4213
Entity	FEMA PA Reimbursement							
State	\$29,627	\$30,645	\$43,799	\$39,871	\$66,486	\$52,819	\$49,627	\$97,103
Municipal	\$53,795	\$74,438	\$76,982	\$97,580	\$110,587	\$3,828,275	\$153,713	\$96,841
Nonprofit	\$0	\$0	\$0	\$0	\$2,007	\$19,493	\$0	\$0
Total	\$83,421	\$105,083	\$120,781	\$137,451	\$179,079	\$3,900,588	\$203,340	\$193,944
Annualized	\$4,391	\$5,531	\$6,357	\$7,234	\$9,425	\$205,294	\$10,702	\$10,208

National Centers for Environmental Information Losses

The table below summarizes events in the National Centers for Environmental Information (NCEI) severe storm database that were specifically noted as having impacted the community since 2012.

Table 33-5: NCEI Database Losses since 2012, Vernon

Date	Event	Property Damage
6/22/2012	Hail	\$0
7/1/2012	Thunderstorm Wind	\$10,000
8/10/2012	Thunderstorm Wind	\$15,000
8/10/2012	Thunderstorm Wind	\$1,000
9/18/2012	Thunderstorm Wind	\$5,000
7/27/2014	Hail	\$0
8/13/2016	Thunderstorm Wind	\$40,000
Total		\$71,000

NCEI losses under other event categories (such as drought, high wind, flooding, and winter storms) were not specifically noted as impacting this community, though they did impact Tolland County and nearby towns. NCEI losses are reported in Section II of this Plan.

HAZUS-MH Losses

CRCOG used FEMA’s Hazus-MH model to analyze the risks that the community might face from flooding, hurricanes, and earthquakes. The model estimates economic losses due to damage to buildings and building contents, as well as other economic disruptions. Both residential and commercial structures are addressed. Losses from different hazards are summarized below. Where available, estimates from the previous and current versions of the HMP are provided side-by-side; differences between the two may have been caused by a combination of the following:

- Changes in methodology: such as hazard zone mapping
- Changes in data: such as population and property values



- Changes in the model: this HMP utilized Hazus-MH version 4.0 rather than 2.1
- Other factors: inherent in a complex software like Hazus-MH

More details are available in the Multi-Jurisdictional HMP. Ultimately, changes in the loss estimates reflect the reality that small differences in hazard event features can have a significant impact on losses incurred.

Table 33-6: Estimated Damages to Vernon from a 1% Annual-Chance Flood

Loss Type	2014 Results	2018 Results
Households Displaced	336	392
People Needing Shelter	805	699
Buildings at Least Moderately Damaged	76	0
Economic Losses		
Residential Building & Content Losses	\$21,920,000	\$28,484,918
Other Building & Content Losses	\$28,230,000	\$86,429,604
Total Building & Content Loss	\$50,150,000	\$114,914,522
Total Business Interruption Losses	\$310,000	\$6,384,597
TOTAL	\$50,460,000	\$121,299,119

Table 33-7: Estimated Damages to Vernon from a 1% Annual-Chance Hurricane

Loss Type	2014 Results (1938 event)	2018 Results (1% track)
Buildings at Least Moderately Damaged	1,182	2
Buildings Completely Damaged	56	1
Total Debris Generated	40,650 tons	8585
Truckloads (at 25 tons/truck) of building debris	608	343
Economic Losses		
Residential Building & Content Losses	\$107,500,000	\$23,197,210
Other Building & Content Losses	\$16,700,000	\$823,566
Total Building & Content Loss	\$124,200,000	\$24,020,776
Total Business Interruption Losses	\$15,700,000	\$1,467,375
TOTAL LOSSES	\$139,900,000	\$25,488,151

Losses were calculated from a modeled probabilistic earthquake (1% annual-chance of occurrence), as well as for four specific scenarios with epicenters around Connecticut.



Table 33-8: Estimated Damages to Vernon from a Probabilistic Earthquake

Loss Type	2018 Results
Wage Loss	\$4,620
Rent Loss	\$4,047
Relocation Loss	\$5,861
Income Loss	\$3,269
Inventory Loss	\$286
Total Business Disruption	\$18,082
Structural Loss	\$11,147
Non-Structural Loss	\$38,412
Total Building Loss	\$49,559
Total Content Loss	\$13,903
TOTAL LOSSES	\$81,543

Table 33-9: Estimated Damages to Vernon from Modeled Earthquake Scenarios

Epicerter Location	Magnitude	Estimated Total Losses
East Haddam	6.4	\$489,448.19
Haddam	5.7	\$93,968.27
Portland	5.7	\$195,319.84
Stamford	5.7	\$7,427.23

Average Annualized Losses

Average Annualized Loss (AAL) figures are useful tools for comparison of the risks faced from different hazards with different likelihoods of occurring in a given time period. AAL estimates were prepared for each natural hazard that may impact the community based on the methodologies discussed in Section II of the Multi-Jurisdictional HMP. Dam failure, drought, tornado, and wildfire losses were sourced from the 2014 Connecticut Natural Hazard Mitigation Plan Update, with dam failure data supplemented by the National Performance of Dams Program and the Connecticut Department of Energy & Environmental Protection. Earthquake and hurricane losses were calculated in HAZUS-MH. Losses for flooding came from NFIP claims, for winter storms from Public Assistance Reimbursements, and for thunderstorms from the NCEI database. These are presented in the table below in dollars per year. Note that Hurricanes and Tropical Storms represent the largest share of total annualized losses.

Table 33-10: Average Annualized Losses, Vernon

Dam Failure	Drought	Earthquakes	Flooding	Hurricanes and Tropical Storms	Severe Winter Storms	Thunderstorms	Tornadoes	Wildfires	Total
\$1,793	\$0	\$81,543	\$6,336	\$1,977,355	\$259,141	\$10,621	\$8,479	\$2,323	\$2,347,593



Losses Summary

A review of the above loss estimates demonstrates that the community has experienced significant expenses as a result of natural hazards and is at risk for additional losses if some of the less-frequent events were to occur. These actual and potential losses justify hazard mitigation actions to reduce losses in the future.

Mitigation Strategies and Actions

Noted Hazard Mitigation Needs

Over the course of Plan development, specific hazard mitigation needs were noted.

- Crumbling building foundations are a significant and widespread problem in Vernon and exacerbate the effects of natural hazards.

Status of Previous Mitigation Strategies and Actions

The Town of Vernon reviewed the mitigation actions proposed in the 2014 HMP and determined the status of each. That information is included in the table below.

Table 33-11: Status of Previous Mitigation Strategies and Actions, Vernon

Action #	Action	Notes	Status
GOAL: PRESERVATION OF LIFE AND PROPERTY.			
Objective 1: Improve snow removal equipment at public works.			
1.1	Incorporate needs in Capital Improvement Plan and pursue opportunities to upgrade equipment.	This is an ongoing effort.	Capability
Objective 2: Provide police/fire/EMS with dedicated 4-wheel drive vehicles.			
2.1	Pursue opportunities to obtain vehicles - through grants, surplus military equipment, etc.	This is an ongoing effort.	Capability
Objective 3: Provide public works with mobile generator to power shelters.			
3.1	Work with CREPC to identify grant programs for purchasing portable generators and modifying buildings for hook-up.	Town continues to pursue funding to upgrade the generators of the Town Hall Annex and Parks & Recreation Facility. Have not yet been successful.	Carry Forward with Revisions
Objective 4: Ensure emergency preparedness of residents and businesses.			
4.1	Conduct periodic educational outreach to residents on storm readiness and property maintenance issues.	Ongoing effort. This is a capability.	Capability
4.2	Conduct periodic outreach to private medical-care facilities and apartment complexes to encourage installation of generators.	Established practice. This is a capability.	Capability
4.3	Complete the requirements to join FEMA's Community Rating System to reduce flood insurance premiums for residents.	The Town wishes first to evaluate the costs and benefits of joining CRS.	Carry Forward with Revisions
GOAL: IMPLEMENT PREVENTATIVE PROGRAMS TO MITIGATE STORM DAMAGE.			
Objective 1: Purchase and implement GIS mapping program.			



Action #	Action	Notes	Status
1.1	Continue planning to implement GIS for use by all town departments, including emergency services.	Ongoing effort. This is a capability.	Capability
Objective 2: Maintain adequate manpower and equipment for preventative tree program and assessment.			
2.1	Investigate CROCOG service sharing initiative for opportunities to share equipment used in tree maintenance.	Vernon shares equipment with neighboring Towns, and has also acquired its own equipment.	Completed
Objective 3: Make improvements to town Emergency Operations Center and communications facility.			
3.1	Acquire telephones, computer server and back-up, mobile hand-held radios and enable wireless connections.	This action has been completed.	Completed
Objective 4: Obtain weather and water level monitoring and alerting systems.			
4.1	Acquire weather monitoring system that provides real-time data and alerts to inform critical decision making for emergency preparedness and response operations.	This action is not necessary, as the Town utilizes National Weather Service alerts.	Drop
4.2	Acquire water level monitoring system that provides real-time data and alerts to inform critical decision making for emergency preparedness and response operations. Because this is expected to be a long term, multi-year project, for the 2014-2019 Plan period, the action to be taken is to review available systems and grant funding options.	This action has not yet been completed due to funding limitations.	Carry Forward
GOAL: IMPLEMENT DRAINAGE IN FLOOD ZONES.			
Objective 1: Conduct study of existing drainage problem areas for improvements.			
1.1	Study improvements to Franklin Road to alleviate road flooding issues. (The Town made claims for FEMA assistance in repair costs following the October 2005 flood). Because this is expected to be a long term, multi-year project, for the 2014-2019 Plan period, the action to be taken is to develop a scope of work and Request for Proposal (RFP) for the study.	This action has not yet been completed due to funding limitations.	Carry Forward
1.2	Study improvements to Manchester Flats area - Route 83, Welles and Main Streets. (During the October 2005 flood, a motel on Rt. 83 became inaccessible, isolating guests.) Because this is expected to be a long term, multi-year project, for the 2014-2019 Plan period, the action to be taken is to develop a scope of work and Request for Proposal (RFP) for the study.	This action has not yet been completed due to funding limitations.	Carry Forward
1.3	Study improvements along Frederick Road. (Residents in area currently carry flood insurance and have utilized town sandbags during high water events.) Because this is expected to be a long term, multi-year project, for the 2014-2019 Plan period, the action to be taken is to develop a scope of work and Request for Proposal (RFP) for the study.	This action has not yet been completed due to funding limitations.	Carry Forward
Objective 2: Upgrade or repair identified problem areas.			
2.1	Upon completion of above studies, prioritize and implement recommended improvements. Because this is expected to be a long term, multi-year project, for the 2014-2019 Plan period, the action to be taken is to develop a prioritized list of projects.	This action falls outside of the 5 year planning period for this plan. Drop until studies are complete.	Drop
Objective 3: Obtain public notification system.			



Action #	Action	Notes	Status
3.1	Improve public notification system.	Town uses CTAlerts.	Capability

Active Mitigation Strategies and Actions

The Town proposed to initiate several new mitigation actions for the upcoming five years. Additionally, a number of actions from the previous planning period are being carried forward or replaced with revised actions. These are listed below.

Each of the following actions has been prioritized based on FEMA guidelines, listed from highest to lowest priority, and numbered.

<i>Action #1</i>	
Enter the Sustainable CT program through Registration and review actions that can be undertaken to pursue Certification. Make progress with the actions related to hazard mitigation.	
Goal	4. Increase the use of natural, "green," or "soft" hazard mitigation measures, such as open space preservation and green infrastructure.
Category	Natural Resources Protection
Lead	Planning
Cost	\$0 - \$10,000
Funding	Town Operating Budget
Timeframe	01/2019 - 12/2019
Priority	High

<i>Action #2</i>	
Develop a scope of work and a request for proposals to study improvements to the Manchester Flats area, around Route 83 and Welles and Main Streets, to alleviate flooding issues.	
Goal	1. Minimize the impact of natural hazards on physical buildings and infrastructure
Category	Structural Projects
Lead	Public Works
Cost	\$0 - \$10,000
Funding	Town Operating Budget
Timeframe	07/2019 - 06/2020
Priority	High



Action #3

Develop a scope of work and a request for proposals to study improvements to Frederick Road to alleviate flooding issues.

Goal	1. Minimize the impact of natural hazards on physical buildings and infrastructure
Category	Structural Projects
Lead	Public Works
Cost	\$0 - \$10,000
Funding	Town Operating Budget
Timeframe	07/2019 - 06/2020
Priority	High

Action #4

Complete upgrades to the generators at the Town Hall Annex and Parks & Recreation Facility

Goal	7. Improve the emergency response capabilities of the region and its communities
Category	Preparedness & Emergency Response
Lead	Emergency Management
Cost	\$25,000 - \$50,000
Funding	Town Operating Budget / Grants
Timeframe	07/2020 - 06/2021
Priority	High

Action #5

Conduct outreach to local small businesses with the aim of preventing the accidental release and pollution from chemicals stored and used at their facilities during or following natural hazard events.

Goal	6. Improve public outreach, education, and warning systems
Category	Education & Awareness
Lead	Planning, in coordination with DEEP
Cost	\$0 - \$10,000
Funding	Materials & Resources Provided by CT DEEP
Timeframe	01/2019 - 12/2019
Priority	Medium



Action #6

Coordinate with NEMO and CRCOG to share resources and gain technical support for hazard mitigation actions involving stormwater management and public outreach, which have parallel benefits related to MS4 stormwater permit compliance.

Goal	1. Minimize the impact of natural hazards on physical buildings and infrastructure
Category	Prevention
Lead	Public Works
Cost	\$0 - \$10,000
Funding	Town Operating Budget
Timeframe	01/2020 - 12/2020
Priority	Medium

Action #7

Participate in EMI courses or the seminars and annual conference held by the Connecticut Association of Flood Managers.

Goal	3. Improve institutional awareness and understanding of natural hazard impacts and mitigation within municipal governments and other decision-making bodies
Category	Education & Awareness
Lead	Planning
Cost	\$0 - \$10,000
Funding	Town Operating Budget
Timeframe	07/2019 - 06/2024
Priority	Medium

Action #8

Review water level monitoring systems that can provide real-time data and alerts to inform critical decision making to identify those appropriate for the Town. Explore grant funding options.

Goal	7. Improve the emergency response capabilities of the region and its communities
Category	Preparedness & Emergency Response
Lead	Emergency Management
Cost	\$0 - \$10,000
Funding	Town Operating Budget
Timeframe	07/2020 - 06/2021
Priority	Medium



Action #9

Contact the owners of Repetitive Loss Properties and nearby properties at risk to inquire about mitigation undertaken and suggest options for mitigating flooding in those areas. This should be accomplished with a letter directly mailed to each property owner.

Goal	1. Minimize the impact of natural hazards on physical buildings and infrastructure
Category	Property Protection
Lead	Planning
Cost	\$0 - \$10,000
Funding	Town Operating Budget / DEMHS
Timeframe	07/2021 - 06/2022
Priority	Low

Action #10

Evaluate the costs and benefits of joining the FEMA Community Rating System.

Goal	9. Minimize the economic impact of hazard damages
Category	Property Protection
Lead	Emergency Management
Cost	\$0 - \$10,000
Funding	Town Operating Budget
Timeframe	07/2021 - 06/2022
Priority	Low

Action #11

Coordinate with CT SHPO to conduct historic resource surveys, focusing on areas within natural hazard risk zones (such as flood or wildfire hazard zones and areas near steep slopes), to support identification of vulnerable historic properties and preparation of resiliency plans across the state. This action leverages existing resources and best practices for protection of historic and cultural resources through an ongoing statewide initiative by CT SHPO.

Goal	8. Ensure community character and social equity are addressed in mitigation activities
Category	Property Protection
Lead	Planning, in coordination with SHPO
Cost	\$10,000 - \$25,000
Funding	SHPO
Timeframe	07/2021 - 06/2023
Priority	Low



Action #12

Work with CT DEEP to complete a formal validation of the Repetitive Loss Property list and update the mitigation status of each listed property.

Goal	1. Minimize the impact of natural hazards on physical buildings and infrastructure
Category	Property Protection
Lead	Planning
Cost	\$10,000 - \$25,000
Funding	Town Operating Budget / CT DEEP / DEMHS
Timeframe	07/2021 - 06/2023
Priority	Low

Action #13

Pursue grants to purchase portable generators and modify buildings for hook-up.

Goal	7. Improve the emergency response capabilities of the region and its communities
Category	Preparedness & Emergency Response
Lead	Emergency Management
Cost	\$50,000 - \$100,000
Funding	Grants
Timeframe	07/2023 - 06/2024
Priority	Low














Capitol Region Natural Hazards Mitigation Plan Update




Vernon, Connecticut

Flood Plains, Dams & Critical Facilities




Critical Facilities

-  Fire Station
-  Police Station
-  School
-  Healthcare Facility
-  State Facility
-  Town Facility
-  Waste Water Facility
-  Emergency Center
-  NRHP Buildings/Sites

Dam Hazard Class

-  BB, A, AA OR Unclassified
-  Class B - Significant Hazard
-  Class C - High Hazard

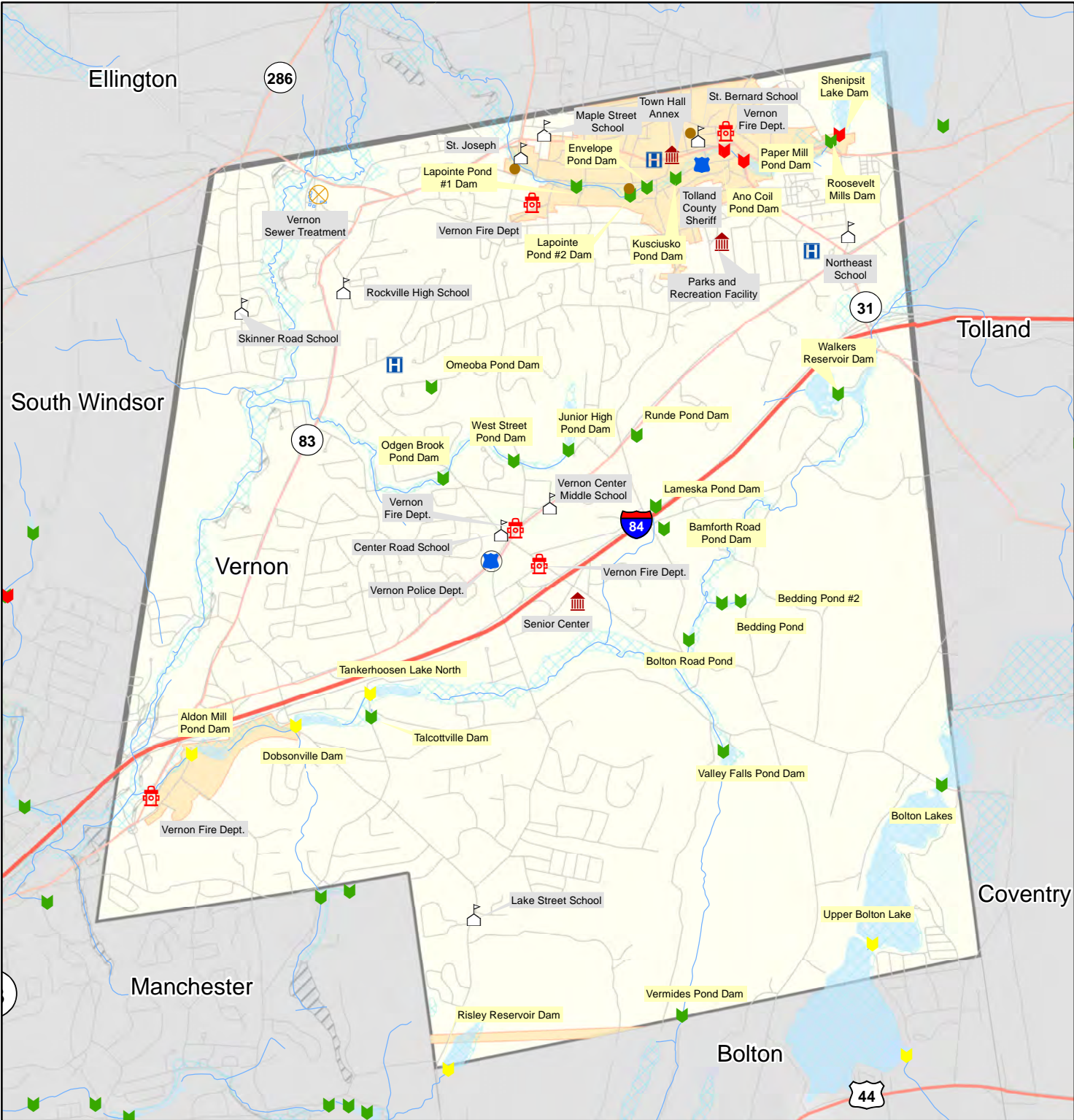
FEMA Flood Hazard Area

-  100 Year Flood Zone
-  500 Year Flood Zone
-  NRHP Districts/Areas

Data Sources: FEMA, National Register of Historic Places, CT DEEP, CRCOG, ESRI



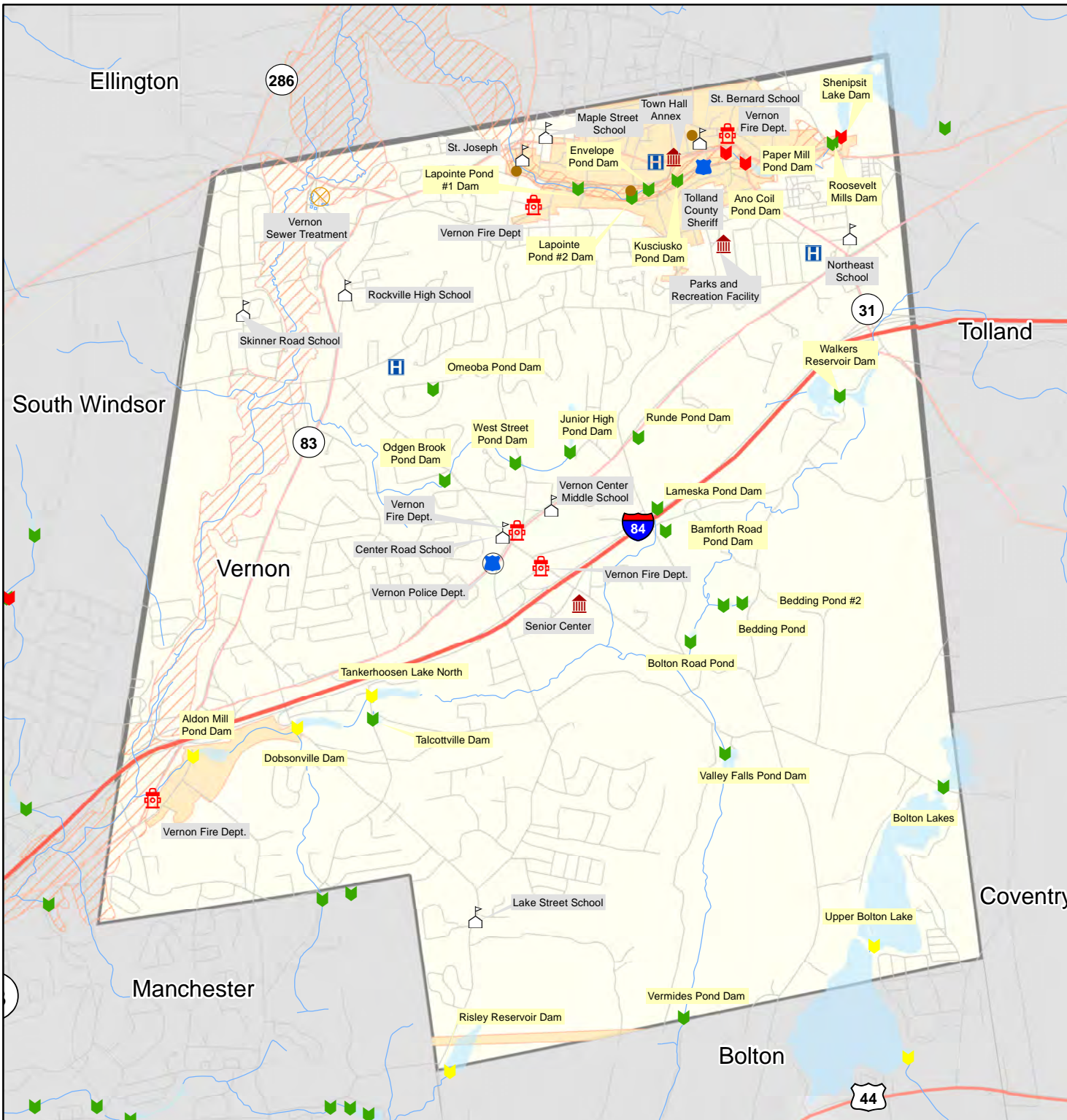
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






Capitol Region Natural Hazards Mitigation Plan Update

Vernon, Connecticut






Dam Breach Inundation Area & Critical Facilities



Critical Facilities

-  Fire Station
-  Police Station
-  School
-  Healthcare Facility
-  State Facility
-  Town Facility
-  Waste Water Facility
-  Emergency Center
-  NRHP Buildings/Sites

Dam Hazard Class

-  BB, A, AA OR Unclassified
-  Class B - Significant Hazard
-  Class C - High Hazard
-  Dam Breach Inundation Areas
-  NRHP Districts/Areas

Data Sources: FEMA, National Register of Historic Places, CT DEEP, CRCOG, ESRI



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34 West Hartford

Community Overview

West Hartford is a fully suburbanized community that encompasses a land area of 22 square miles with a population of approximately 63,300. Major transportation routes through Town include Interstate 84, State Routes 4, 44, 71, 173, 185, 189 and 218. CTfastrak, a regional Bus Rapid Transit System, has stations in West Hartford, and it is expected that in the near future the Hartford Line commuter rail will add a stop in Town.

West Hartford is within the Park River Watershed, and contains several reservoirs that supply the Metropolitan District Commission's system. Major watercourses in town include Meadow, Piper, Rockledge, Trout, and Tumbledown Brooks, and the North Branch of the Park River.

About 21% of the Town's non-agricultural employment is in manufacturing. The Town has several large established commercial districts. New Park Avenue continues to be an area of potential redevelopment; a new apartment complex constructed on that road adjacent to Trout Brook received state funding and therefore is elevated above the 0.2% annual-chance flood elevation. Potential for additional development remains at the intersection of Park Road and Prospect Avenue, at the site of an old convent. This site is close to a stream that crosses into Hartford.

The Town hosts the University of Hartford, St. Joseph College and the American School for the Deaf. In August of 2017, the University of Connecticut relocated operations from its West Hartford Campus to downtown Hartford, leaving behind a 58-acre property that is currently for sale. The Town had considered acquisition of the property, but has instead decided to allow it to be sold on the public market. It is unknown what kind of redevelopment will occur here. Part of the campus is in a Special Flood Hazard Area (SFHA).

Critical Facilities

Critical Facilities throughout the Capitol Region are listed in Appendix B. In West Hartford these include the Elmwood Community Center (a shelter) and two public high schools (also shelters), the Police Department, Fire Department, and Public Works Department. The Police Department is the EOC and the Public Works in the backup EOC. The high schools do not have permanent generators, but do have connective capabilities for portable generators. This is also the case for the Town Hall. The Fire Department provides EMS-related services.

Table 34-1: Critical Facilities, West Hartford

Facility	Shelter	Generator
Elmwood Community Center	X	Yes
2 High Schools	X	Portable
Town Hall		Portable
Police Department (EOC)		Yes
Public Works		Yes
Fire Department		Yes

Capabilities

Hazard mitigation is addressed specifically in West Hartford’s Plan of Conservation and Development (POCD). POCD actions specifically address natural hazards.

The Town has experienced significant flooding events in the past and has worked to mitigate the problem over the course of many years. West Hartford participates in the FEMA Community Rating System (CRS), and therefore has many flood-mitigation capabilities and programs in place. The Town is currently a Class-8 CRS community.

The Town of West Hartford undertook significant structural mitigation projects in the early 1980s, including rechanneling the Trout Brook to remove 238 houses from the floodplain. Additional work has been completed in recent years.

In 2001, the Town adopted a Repetitive Flood Loss Plan, and has consistently worked to implement the action plan contained within. Recent flood-mitigation work on Trout Brook is expected to help mitigate flooding at RLP sites. The Town periodically ensures that repetitive flood loss property owners have adequate information for retro-fitting flood-prone structures. The Town also holds regular meetings with residents to provide technical advice on flood protection and flood preparedness. In 2008, in order to remain eligible for participation in the National Flood Insurance Program, the Town revised its floodplain ordinance using adopting language that meets or exceeds federal or state requirements. The revised ordinance improves the Town’s ability to restrict new development in flood prone areas, and requires buildings in the floodplain be elevated or floodproofed to at least one foot above the base flood elevation (freeboard).

Very little development occurs in flood zones. Since 2008, the Town’s Inland Wetlands and Watercourses Commission has approved some regulated activities in areas either identified as floodplain or wetlands. Most of these approvals were for work in regulated inland wetlands areas outside of the floodplain, or for minor structural renovations and site improvements in regulated areas, in accordance with the Town’s flood hazard reduction and resource compensation standards. No new structures have been approved in the special flood hazard area. Permitted activities did not result in increased vulnerabilities to flooding and in some cases reduced the community’s flood risk. For example, permitted activities included structural stormwater drainage improvements, stream bank stabilization and removal of sediment and debris in floodplain and wetlands that help mitigate flood risks.



West Hartford works closely with the regional energy provider, Eversource, to mitigate power outages caused by natural hazards.

New Capabilities

West Hartford hopes to ascend to CRS Class 7 at some point in the future. The CRS re-certification process was underway at the time this HMP was being developed.

Additional mitigation work on Trout Brook, including tree and debris removal, has been completed since adoption of the 2014-2019 Capitol Region Natural Hazards Mitigation Plan Update (“2014 HMP”). A North Branch Trout Brook Study was recently completed by Milone & MacBroom Inc. A shack at the Buena Vista Golf Course that was located within a FEMA floodway has been replaced by a new structure outside the floodplain.

The West Hartford Public Works has acquired new snow-removal equipment since adoption of the 2014 HMP, improving its ability to clear streets following storms.

West Hartford was awarded the Bronze Certification level within the SustainableCT program in October 2018.

Challenges

Challenges Overview

Flooding continues to be a major concern for the Town. The recently completed North Branch Trout Brook study showed flood problems related to an undersized culvert. Erosion is also a concern; Trout Brook in the Montclair and Fox Meadow area is experiencing channel sedimentation and bank erosion, affecting riverside properties.

Some of the flooding issues in West Hartford result from sanitary sewer service back-ups. The Metropolitan District Commission owns and operates the sewer system in West Hartford. The Clean Water Project should alleviate overflow problems in this area.

Hurricanes and severe winter storms can also create significant impacts to the Town and its residents and businesses. Winter storms in 2015 significantly impacted the Town; one concern with regards to snow events is a lack of space to store snow removed from roads.

Thunderstorms and associated high winds are also a concern. Microbursts have caused considerable damage in nearby towns in the past, including Wethersfield and in the Elmwood section of Town in 2009. West Hartford also feels that its lack of access to real-time data and reporting during power outages is a hindrance to its mitigation capabilities.

Relatively significant droughts in recent years have increased concern about that risk. Aquarion Water Company installed a temporary pipeline to bring water to areas suffering from low supplies during the drought conditions of 2017. MDC rarely transfers water to New Britain during droughts.



Hazard Losses

The economic losses faced by the community from natural hazards can be estimated by reviewing historic, and modeling future, loss figures. Loss estimates are summarized below.

Historic FEMA Payments

FEMA reimburses communities for hazard losses through programs including Public Assistance (PA) and the National Flood Insurance Program (NFIP). Combining PA and private flood insurance payments can give an estimate for total losses to a community.

The NFIP has paid 322 property damage claims in West Hartford totaling \$1,182,879 to-date. The NFIP has paid out has 89 Repetitive Loss (RL) Property claims on 33 properties in West Hartford to-date. These claims have totaled \$677,684.

Total PA reimbursements to the community were as follows:

- Flood Events: \$136,024 (\$7,159 annually)
- Hurricane Events: \$185,498 (\$9,763 annually)
- Winter Storm Events: \$12,723,234 (\$669,644 annually)

These are summarized in the tables below.

Table 34-2: Flood Event PA Reimbursements, West Hartford

Incident	Sep 1999	Oct 2005
Declaration	9/23/1999	12/16/2005
Disaster No.	1302	1619
Entity	FEMA PA Reimbursement	
State	\$2,934	\$3,639
Municipal	\$0	\$63,486
Nonprofit	\$0	\$65,965
Total	\$2,934	\$133,089
Annualized	\$154	\$7,005

Table 34-3: Hurricane Wind Event PA Reimbursements, West Hartford

Incident	Aug - Sep 2011 (T.S. Irene)
Declaration	9/2/2011
Disaster #	4023
Entity	FEMA PA Reimbursement
State	\$17,543
Municipal	\$111,036
Nonprofit	\$56,919
Total	\$185,498
Annualized	\$9,763

Table 34-4: Winter Storm PA Reimbursements, West Hartford

Incident	Mar 2003	Dec 2003	Jan 2005	Feb 2006	Jan 2011	Oct 2011	Feb 2013
Declaration	3/11/03	1/15/04	2/17/05	5/2/06	3/3/11	11/17/11	3/21/13
Disaster #	3176	3192	3200	3266	1958	4046	4106
Entity	FEMA PA Reimbursement						
State	\$54,857	\$49,177	\$64,879	\$78,749	\$68,612	\$68,473	\$171,108
Municipal	\$158,434	\$140,607	\$169,639	\$224,514	\$224,753	\$10,424,232	\$301,081
Nonprofit	\$23,597	\$19,383	\$27,505	\$13,280	\$28,637	\$329,758	\$81,959
Total	\$236,889	\$209,168	\$262,022	\$316,543	\$322,002	\$10,822,463	\$554,148
Annualized	\$12,468	\$11,009	\$13,791	\$16,660	\$16,947	\$569,603	\$29,166

National Centers for Environmental Information Losses

The table below summarizes events in the National Centers for Environmental Information (NCEI) severe storm database that were specifically noted as having impacted the community since 2012.

Table 34-5: NCEI Database Losses since 2012, West Hartford

Date	Event	Property Damage
6/27/2017	Hail	\$0
6/30/2017	Flood	\$0
Total Thunderstorm		\$0
Total Flood		\$0

NCEI losses under other event categories (such as drought, high wind, flooding, and winter storms) were not specifically noted as impacting this community, though they did impact Hartford County and nearby towns. NCEI losses are reported in Section II of this Plan.



HAZUS-MH Losses

CRCOG used FEMA’s Hazus-MH model to analyze the risks that the community might face from flooding, hurricanes, and earthquakes. The model estimates economic losses to the town due to damage to buildings and building contents, as well as other economic disruptions. Both residential and commercial structures are addressed. Losses from different hazards are summarized below. Where available, estimates from the previous and current versions of the HMP are provided side-by-side; differences between the two may have been caused by a combination of the following:

- Changes in methodology: such as hazard zone mapping
- Changes in data: such as population and property values
- Changes in the model: this HMP utilized Hazus-MH version 4.0 rather than 2.1
- Other factors: inherent in a complex software like Hazus-MH

More details are available in the Multi-Jurisdictional HMP. Ultimately, changes in the loss estimates reflect the reality that small differences in hazard event features can have a significant impact on losses incurred.

Table 34-6: Estimated Damages to West Hartford from a 1% Annual-Chance Flood

Loss Type	2014 Results	2018 Results
Households Displaced	893	642
People Needing Shelter	2,004	960
Buildings at Least Moderately Damaged	140	0
Economic Losses		
Residential Building & Content Losses	\$49,140,000	\$31,963,050
Other Building & Content Losses	\$80,830,000	\$53,374,375
Total Building & Content Loss	\$129,970,000	\$85,337,424
Total Business Interruption Losses	\$740,000	\$3,788,079
TOTAL	\$130,710,000	\$89,125,503

Table 34-7: Estimated Damages to West Hartford from a 1% Annual-Chance Hurricane

Loss Type	2014 Results (1938 event)	2018 Results (1% track)
Buildings at Least Moderately Damaged	2,358	1
Buildings Completely Damaged	138	0
Total Debris Generated	56,362 tons	4483
Truckloads (at 25 tons/truck) of building debris	1,271	179
Economic Losses		
Residential Building & Content Losses	\$265,371,000	\$29,987,193
Other Building & Content Losses	\$53,553,000	\$979,569
Total Building & Content Loss	\$318,924,000	\$30,966,762
Total Business Interruption Losses	\$36,402,000	\$1,070,053
TOTAL LOSSES	\$355,325,000	\$32,036,815



Losses were calculated from a modeled probabilistic earthquake (1% annual-chance of occurrence), as well as for four specific scenarios with epicenters around Connecticut.

Table 34-8: Estimated Damages to West Hartford from a Probabilistic Earthquake

Loss Type	2018 Results
Wage Loss	\$13,881
Rent Loss	\$9,387
Relocation Loss	\$16,186
Income Loss	\$9,127
Inventory Loss	\$1,060
Total Business Disruption	\$49,641
Structural Loss	\$30,775
Non-Structural Loss	\$100,510
Total Building Loss	\$131,285
Total Content Loss	\$40,440
TOTAL LOSSES	\$221,366

Table 34-9: Estimated Damages to West Hartford from Modeled Earthquake Scenarios

Epicenter Location	Magnitude	Estimated Total Losses
East Haddam	6.4	\$1,242,110.43
Haddam	5.7	\$306,809.27
Portland	5.7	\$1,408,734.87
Stamford	5.7	\$24,302.51

Average Annualized Losses

Average Annualized Loss (AAL) figures are useful tools for comparison of the risks faced from different hazards with different likelihoods of occurring in a given time period. AAL estimates were prepared for the community based on the methodologies discussed in Section II of the Multi-Jurisdictional HMP. Dam failure, drought, tornado, and wildfire losses were sourced from the 2014 Connecticut Natural Hazard Mitigation Plan Update, with dam failure data supplemented by the National Performance of Dams Program and the Connecticut Department of Energy & Environmental Protection. Earthquake and hurricane losses were calculated in HAZUS-MH. Losses for flooding came from NFIP claims, for winter storms from Public Assistance Reimbursements, and for thunderstorms from the NCEI database. These are presented in the table below in dollars per year. Note that Hurricanes and Tropical Storms represent the largest share of total annualized losses.

Table 34-10: Average Annualized Losses, West Hartford

Dam Failure	Drought	Earthquakes	Flooding	Hurricanes and Tropical Storms	Severe Winter Storms	Thunderstorms	Tornadoes	Wildfires	Total
\$113	\$0	\$221,366	\$38,288	\$3,966,180	\$669,644	\$8,403	\$928,260	\$4,059	\$5,836,312



Losses Summary

A review of the above loss estimates demonstrates that the Town of West Hartford has experienced significant expenses as a result of natural hazards, and is at risk for additional losses if some of the less-frequent events were to occur. These actual and potential losses justify hazard mitigation actions to reduce losses in the future.

Mitigation Strategies and Actions

Noted Hazard Mitigation Needs

During Plan development, specific hazard mitigation needs of West Hartford were noted.

- Microgrids may be of interest to the Town, especially at the Town Hall and Police Department.
- Locations for snow storage and disposal must be identified.
- West Hartford has explored the use of drought-resistant vegetation in landscaping that can reduce water use during droughts. With the MS4 implementation underway, it is expected that more low-impact development (LID) ideas, including drought-resistant planting, will be employed. The Town may also develop wells to irrigate some fields, which would remove those sites from the MDC treated water supply. This is consistent with the State Water Plan's recommendation to use Class B water sources for non-potable uses.

Status of Previous Mitigation Strategies and Actions

The Town of West Hartford reviewed the mitigation actions proposed in the 2014 HMP and determined the status of each. That information is included in the table below.



Table 34-11: Status of Previous Mitigation Strategies and Actions, West Hartford

Action #	Action	Notes	Status
GOAL: MINIMIZE LOSS OF LIFE AND PROPERTY FROM NATURAL HAZARDS			
Objective 1: Continue to implement Repetitive Flood Loss Plan.			
1.1	Reduce risk to flood-prone structures.	<p>Town consistently implements the Repetitive Flood Loss Plan’s action plan. The Town periodically ensures that repetitive flood loss property owners have adequate information for retro-fitting flood-prone structures and holds regular meetings with residents to provide technical advice on flood protection and flood preparedness. In addition, the Town has a stormwater management program that includes repair and replacement of storm sewers as part of street reconstruction or resurfacing projects. Storm sewers are also replaced or improved as a result of flooding complaints or roadway failures. Considerable progress, but the action is too broad to measure.</p>	Capability
GOAL: MINIMIZE LOSS TO CRITICAL INFRASTRUCTURE AND REDUCE LOSS OF LIFE, PROPERTY AND ECONOMIC CONSEQUENCES AS A RESULT OF NATURAL DISASTERS.			
Objective 2: Improve the ability of town to provide emergency sheltering for at least 6,000 residents.			
2.1	Install generators at all primary and tertiary shelters and designated alternate care sites.	Generators can be quickly connected at Elmwood Community Center and the two high schools (all shelters) and the Town Hall. DPW and PD both have fixed-in-place generators (the EOC and backup EOC). Additional generators may be needed.	Carry Forward with Revisions
2.2	Increase sheltering supplies (cots, water, food, etc.).	Progress has been made in partnership with the American Red Cross. Carry Forward to Completion.	Carry Forward
2.3	Ensure and supply transportation access to emergency shelters.	Progress has not been made on this action due to lack of resources.	Carry Forward
2.4	Ensure ability of the town to safely shelter in place, and when necessary, evacuate residents and visitors.	Progress has not been made on this action due to lack of resources.	Carry Forward
2.5	Establish pet sheltering alternatives.	Progress has not been made on this action due to lack of resources.	Carry Forward
Objective 3: Reinforce, renovate and upgrade existing critical town facilities and support facilities.			
3.1	Implement needed improvements to the Emergency Operations Center to withstand high wind and other natural and manmade disasters.	Progress has not been made on this action due to lack of resources.	Carry Forward
3.2	Upgrade and enhance operational equipment in Emergency Operations Center including radio communications, satellite communications and visual display media.	This action has been completed	Completed



Action #	Action	Notes	Status
3.3	Identify and establish a secondary Emergency Operations Center.	Public Works is the backup EOC with an emergency generator.	Completed
3.4	Work with local fuel stations to ensure adequate emergency generating equipment for emergency response vehicles.	Town wishes to construct a municipal fueling facility so they don't have to rely on private facilities.	Drop
Objective 4: Increase training for hazard response to town employees, volunteers and emergency services personnel.			
4.1	Provide Incident Command training to all personnel for position and function.	Progress has not been made on this action due to lack of resources.	Carry Forward
4.2	Provide shelter management training to all personnel for position and function.	Progress has not been made on this action due to lack of resources.	Carry Forward
4.3	Provide specific incident action plan development training to positions and functions of EOC representatives.	Progress has not been made on this action due to lack of resources.	Carry Forward

Active Mitigation Strategies and Actions

The Town proposed to initiate several new mitigation actions for the upcoming five years. Additionally, a number of actions from the previous planning period are being carried forward or replaced with revised actions. These are listed below.

Each of the following actions has been prioritized based on FEMA guidelines, listed from highest to lowest priority, and numbered.

Action #1	
Develop a prioritized list of emergency generator acquisition, upgrade, or maintenance needs.	
Goal	7. Improve the emergency response capabilities of the region and its communities
Category	Preparedness & Emergency Response
Lead	Emergency Management
Cost	\$0 - \$10,000
Funding	Town Operating Budget
Timeframe	01/2019 - 12/2019
Priority	High

Action #2	
Incorporate Low Impact Development requirements into the Subdivision and Zoning Regulations.	
Goal	2. Ensure Municipal Codes and Regulations support hazard mitigation
Category	Prevention
Lead	Planning
Cost	\$0 - \$10,000
Funding	Town Operating Budget
Timeframe	01/2019 - 12/2019
Priority	High



Action #3

Establish pet sheltering alternatives.

Goal	7. Improve the emergency response capabilities of the region and its communities
Category	Preparedness & Emergency Response
Lead	Emergency Management
Cost	\$10,000 - \$25,000
Funding	Town Operating Budget / Grants
Timeframe	01/2019 - 12/2020
Priority	High

Action #4

Increase the ability of residents and visitors to safely shelter in place and when necessary, evacuate to safer locations, through education, trainings, and warnings.

Goal	7. Improve the emergency response capabilities of the region and its communities
Category	Preparedness & Emergency Response
Lead	Emergency Management
Cost	\$10,000 - \$25,000
Funding	Town Operating Budget / Grants / DEMHS
Timeframe	01/2019 - 12/2020
Priority	High

Action #5

Improve transportation access for residents and visitors to emergency shelters.

Goal	7. Improve the emergency response capabilities of the region and its communities
Category	Preparedness & Emergency Response
Lead	Emergency Management
Cost	\$10,000 - \$25,000
Funding	Town Operating Budget / Grants / DEMHS
Timeframe	01/2019 - 12/2020
Priority	High

Action #6

Determine sheltering supplies needs and increase supplies if needed (cots, water, food, etc.).

Goal	7. Improve the emergency response capabilities of the region and its communities
Category	Preparedness & Emergency Response
Lead	Emergency Management
Cost	\$25,000 - \$50,000
Funding	Town Operating Budget / Grants / DEMHS
Timeframe	07/2020 - 06/2021
Priority	High



Action #7

Complete the North Branch Trout Brook flood study.

Goal	3. Improve institutional awareness and understanding of natural hazard impacts and mitigation within municipal governments and other decision-making bodies
Category	Prevention
Lead	Public Works
Cost	\$50,000 - \$100,000
Funding	Grants
Timeframe	07/2021 - 06/2022
Priority	High

Action #8

Implement needed improvements to the Emergency Operations Center to withstand high wind and other natural and manmade disasters.

Goal	1. Minimize the impact of natural hazards on physical buildings and infrastructure
Category	Property Protection
Lead	Emergency Management
Cost	More than \$100,000
Funding	Grants / DEMHS
Timeframe	07/2022 - 06/2023
Priority	High

Action #9

Conduct outreach to local small businesses with the aim of preventing the accidental release and pollution from chemicals stored and used at their facilities during or following natural hazard events.

Goal	6. Improve public outreach, education, and warning systems
Category	Education & Awareness
Lead	Planning, in coordination with DEEP
Cost	\$0 - \$10,000
Funding	Materials & Resources Provided by CT DEEP
Timeframe	01/2019 - 12/2019
Priority	Medium



Action #10

Define a set of actions to be taken by the Town to increase its Community Rating System rating by at least one tier.

Goal	9. Minimize the economic impact of hazard damages
Category	Prevention
Lead	Planning
Cost	\$0 - \$10,000
Funding	Town Operating Budget
Timeframe	01/2020 - 12/2020
Priority	Medium

Action #11

Coordinate with NEMO and CRCOG to share resources and gain technical support for hazard mitigation actions involving stormwater management and public outreach, which have parallel benefits related to MS4 stormwater permit compliance.

Goal	1. Minimize the impact of natural hazards on physical buildings and infrastructure
Category	Prevention
Lead	Public Works
Cost	\$0 - \$10,000
Funding	Town Operating Budget
Timeframe	01/2020 - 12/2020
Priority	Medium

Action #12

Participate in EMI courses or the seminars and annual conference held by the Connecticut Association of Flood Managers.

Goal	3. Improve institutional awareness and understanding of natural hazard impacts and mitigation within municipal governments and other decision-making bodies
Category	Education & Awareness
Lead	Planning
Cost	\$0 - \$10,000
Funding	Town Operating Budget
Timeframe	07/2019 - 06/2024
Priority	Medium



Action #13

Work with MDC to identify potential hazard mitigation actions for MDC facilities, and list those actions in the next HMP Update.

Goal	5. Improve the resilience of local and regional utilities and infrastructure using strategies including adaptation, hardening, and creating redundancies.
Category	Property Protection
Lead	Public Works
Cost	\$10,000 - \$25,000
Funding	Town Operating Budget / DEMHS
Timeframe	07/2020 - 06/2022
Priority	Medium

Action #14

Develop a list of local resources, including non-profits, volunteers, and gas-stations and grocery stores with emergency generators, to distribute to residents prior to forecast hazard events.

Goal	7. Improve the emergency response capabilities of the region and its communities
Category	Preparedness & Emergency Response
Lead	Emergency Management
Cost	\$10,000 - \$25,000
Funding	Town Operating Budget
Timeframe	07/2020 - 06/2022
Priority	Medium

Action #15

Provide specific incident action plan development training to positions and functions of EOC representatives.

Goal	7. Improve the emergency response capabilities of the region and its communities
Category	Preparedness & Emergency Response
Lead	Emergency Management
Cost	\$10,000 - \$25,000
Funding	Town Operating Budget / Grants / DEMHS
Timeframe	07/2020 - 06/2022
Priority	Medium



Action #16

Provide Incident Command training to all personnel for position and function.

Goal	7. Improve the emergency response capabilities of the region and its communities
Category	Preparedness & Emergency Response
Lead	Emergency Management
Cost	\$10,000 - \$25,000
Funding	Town Operating Budget / Grants / DEMHS
Timeframe	01/2020 - 12/2022
Priority	Medium

Action #17

Provide shelter management training to all personnel for position and function.

Goal	7. Improve the emergency response capabilities of the region and its communities
Category	Preparedness & Emergency Response
Lead	Emergency Management
Cost	\$10,000 - \$25,000
Funding	Town Operating Budget / Grants / DEMHS
Timeframe	01/2020 - 12/2022
Priority	Medium

Action #18

Explore feasibility and cost/benefit balance of developing a microgrid for the Town Hall and Police Department.

Goal	5. Improve the resilience of local and regional utilities and infrastructure using strategies including adaptation, hardening, and creating redundancies.
Category	Prevention
Lead	Public Works
Cost	\$10,000 - \$25,000
Funding	Town Operating Budget / Grants / CT DEEP
Timeframe	01/2020 - 12/2022
Priority	Medium

Action #19

Construct a new fueling facility for municipal vehicles.

Goal	7. Improve the emergency response capabilities of the region and its communities
Category	Preparedness & Emergency Response
Lead	Public Works
Cost	More than \$100,000
Funding	Grants
Timeframe	07/2022 - 06/2024
Priority	Medium



Action #20

Contact the owners of Repetitive Loss Properties and nearby properties at risk to inquire about mitigation undertaken and suggest options for mitigating flooding in those areas. This should be accomplished with a letter directly mailed to each property owner.

Goal	1. Minimize the impact of natural hazards on physical buildings and infrastructure
Category	Property Protection
Lead	Planning
Cost	\$0 - \$10,000
Funding	Town Operating Budget / DEMHS
Timeframe	07/2021 - 06/2022
Priority	Low

Action #21

Coordinate with CT SHPO to conduct outreach to historic property owners to educate them on methods of retrofitting their properties to be more hazard-resilient while maintaining historic character.

Goal	8. Ensure community character and social equity are addressed in mitigation activities
Category	Education & Awareness
Lead	Planning, in coordination with SHPO
Cost	\$0 - \$10,000
Funding	SHPO
Timeframe	01/2021 - 12/2022
Priority	Low

Action #22

Make progress with the hazard mitigation goals associated with SustainableCT certified actions.

Goal	4. Increase the use of natural, "green," or "soft" hazard mitigation measures, such as open space preservation and green infrastructure.
Category	Natural Resources Protection
Lead	Planning
Cost	\$0 - \$10,000
Funding	Town Operating Budget
Timeframe	07/2021 - 06/2022
Priority	Low



Action #23

Work with CT DEEP to complete a formal validation of the Repetitive Loss Property list and update the mitigation status of each listed property.

Goal	1. Minimize the impact of natural hazards on physical buildings and infrastructure
Category	Property Protection
Lead	Planning
Cost	\$10,000 - \$25,000
Funding	Town Operating Budget / CT DEEP / DEMHS
Timeframe	07/2021 - 06/2023
Priority	Low

Action #24

Coordinate with CT SHPO to conduct historic resource surveys, focusing on areas within natural hazard risk zones (such as flood or wildfire hazard zones and areas near steep slopes), to support identification of vulnerable historic properties and preparation of resiliency plans across the state. This action leverages existing resources and best practices for protection of historic and cultural resources through an ongoing statewide initiative by CT SHPO.

Goal	8. Ensure community character and social equity are addressed in mitigation activities
Category	Property Protection
Lead	Planning, in coordination with SHPO
Cost	\$10,000 - \$25,000
Funding	SHPO
Timeframe	07/2021 - 06/2023
Priority	Low

Action #25

Send property owners along streams a mailer with information about ordinances against, and dangers of, dumping and placing obstructions into streams.

Goal	6. Improve public outreach, education, and warning systems
Category	Education & Awareness
Lead	Planning
Cost	\$10,000 - \$25,000
Funding	Town Operating Budget
Timeframe	01/2021 - 12/2023
Priority	Low



Action #26

Perform a Repetitive Loss Area Analysis (RLAA).

Goal	3. Improve institutional awareness and understanding of natural hazard impacts and mitigation within municipal governments and other decision-making bodies
Category	Prevention
Lead	Planning
Cost	\$50,000 - \$100,000
Funding	Town Operating Budget / Grants / DEMHS
Timeframe	07/2023 - 06/2024
Priority	Low

Action #27

Replace undersized and/or degraded culverts on Trout Brook.

Goal	1. Minimize the impact of natural hazards on physical buildings and infrastructure
Category	Structural Projects
Lead	Public Works
Cost	More than \$100,000
Funding	Grants
Timeframe	07/2023 - 06/2024
Priority	Low

Action #28

Stabilize unstable streambanks along Trout Brook.

Goal	1. Minimize the impact of natural hazards on physical buildings and infrastructure
Category	Structural Projects
Lead	Public Works
Cost	More than \$100,000
Funding	Grants
Timeframe	07/2023 - 06/2024
Priority	Low

Action #29

Replace the Fern Street Bridge over Trout Brook to ensure continued operation during future emergency events.

Goal	1. Minimize the impact of natural hazards on physical buildings and infrastructure
Category	Structural Projects
Lead	Public Works
Cost	More than \$100,000
Funding	Grants
Timeframe	07/2023 - 06/2024
Priority	Low












Capitol Region Natural Hazards Mitigation Plan Update




West Hartford, Connecticut

Flood Plains, Dams & Critical Facilities




Critical Facilities

-  Fire Station
-  Police Station
-  School
-  Healthcare Facility
-  State Facility
-  Town Facility
-  Waste Water Facility
-  Emergency Center
-  NRHP Buildings/Sites

Dam Hazard Class

-  BB, A, AA OR Unclassified
-  Class B - Significant Hazard
-  Class C - High Hazard

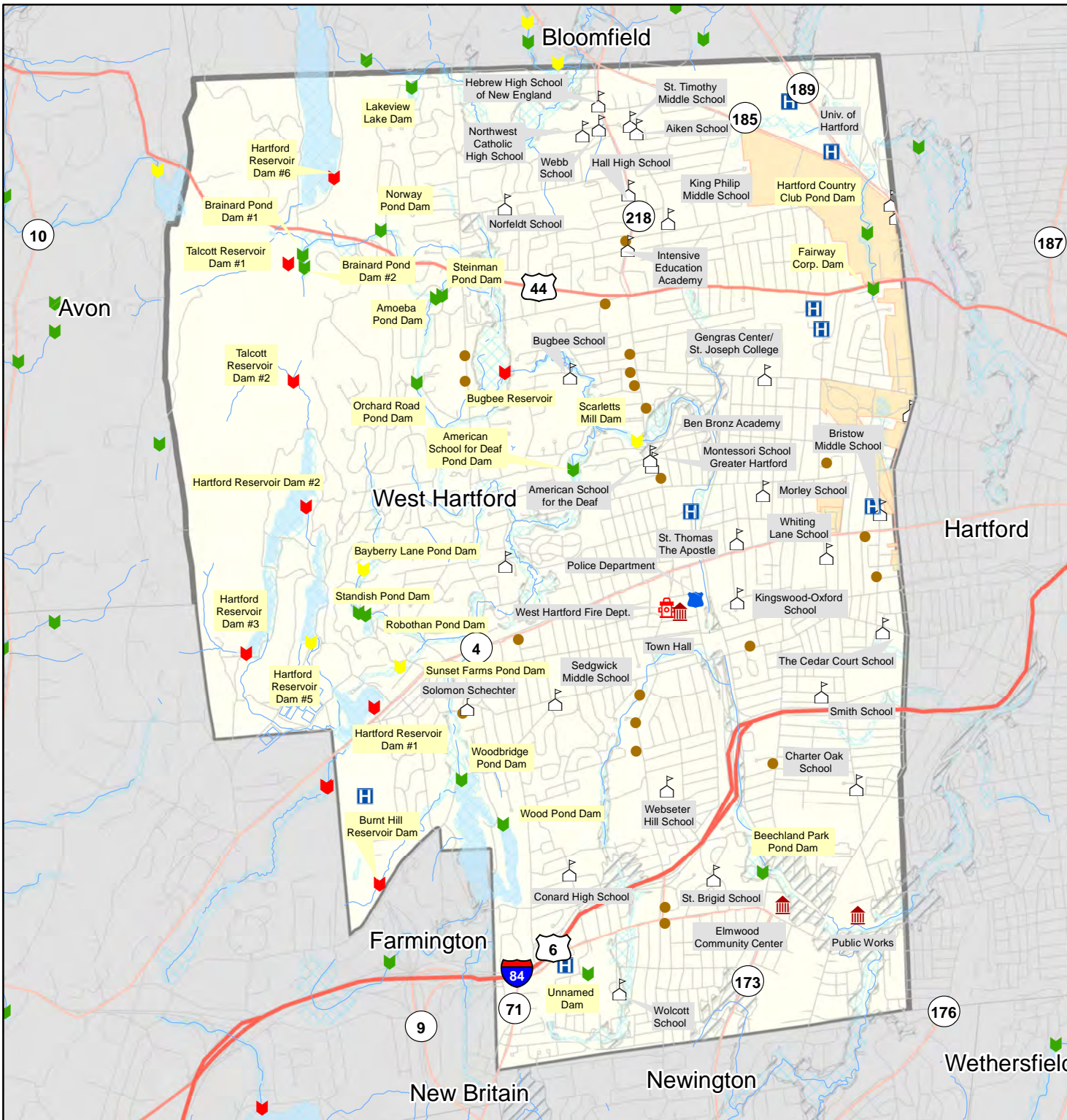
FEMA Flood Hazard Area

-  100 Year Flood Zone
-  500 Year Flood Zone
-  NRHP Districts/Areas

Data Sources: FEMA, National Register of Historic Places, CT DEEP, CRCOG, ESRI



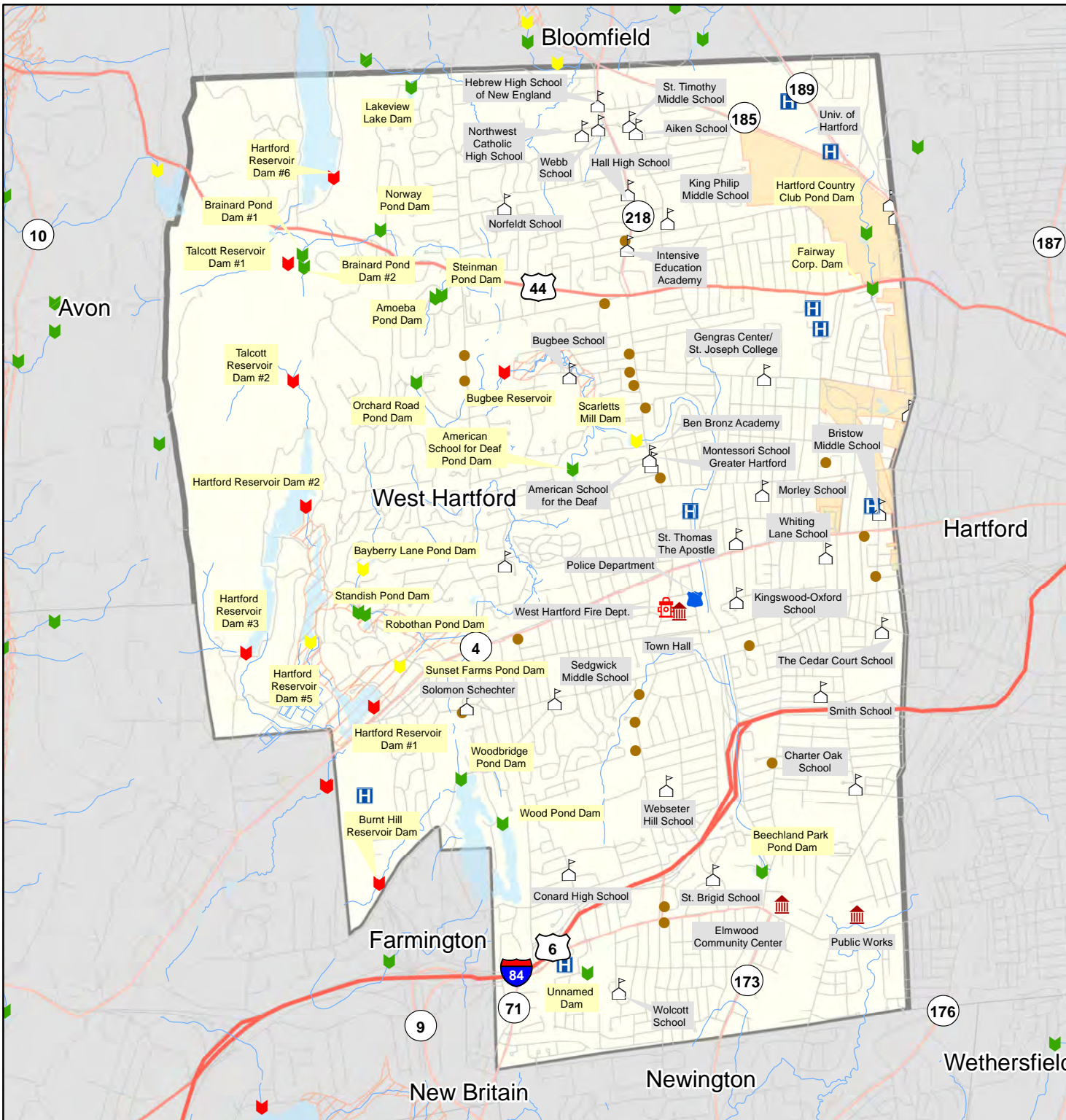
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






Capitol Region Natural Hazards Mitigation Plan Update

West Hartford, Connecticut






Dam Breach Inundation Area & Critical Facilities



Critical Facilities

-  Fire Station
-  Police Station
-  School
-  Healthcare Facility
-  State Facility
-  Town Facility
-  Waste Water Facility
-  Emergency Center
-  NRHP Buildings/Sites

Dam Hazard Class

-  BB, A, AA OR Unclassified
-  Class B - Significant Hazard
-  Class C - High Hazard
-  Dam Breach Inundation Areas
-  NRHP Districts/Areas

Data Sources: FEMA, National Register of Historic Places, CT DEEP, CRCOG, ESRI



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35 Wethersfield

Community Overview

Wethersfield encompasses a land area of 12.4 square miles and has a population around 26,668 (2010 Census). Wethersfield’s land area falls primarily in the Connecticut River mainstem Watershed, although the northeast corner lies in the Park River Watershed. The Connecticut River flows along the eastern boundary. Other watercourses include Beaver, Folly, Two Stone, Collier and Goff Brooks. Major transportation routes in Town include Interstate 91 and State routes 3, 5/15, 99, 175, 287, and 314. Principal industries include professional offices, retail, restaurants, Kell-Strom, printing, medical offices, and State offices including the Departments of Corrections, Labor, and Motor Vehicles, and the Connecticut Judicial Branch. A Capitol Region Education Council (CREC) School has recently been constructed on what was previously the Northeast Utilities Headquarters.

Critical Facilities

Critical Facilities throughout the Capitol Region are listed in Appendix B. In Wethersfield these include the Town Hall, High School, Community Center, three Fire Stations, a volunteer ambulance facility, the Nature Center, the Public Works building, a fueling station, and the new CREC School. The Emergency Operations Center (EOC) is housed in the Town Hall.

Table 35-1: Critical Facilities, Wethersfield

Facility	Shelter	Generator
Town Hall (EOC)		X
Community Center	Primary	X
High School	Secondary	X
CREC School		
3 Fire Stations		X
Nature Center	Animal	X
Volunteer Ambulance		X
Public Works		X
Fueling Station		X

Since adoption of the 2014-2019 Capitol Region Natural Hazards Mitigation Plan Update (“2014 HMP”), a generator has been installed at the High School, which has been designated as the Town’s secondary shelter. The Community Center is the primary shelter, and the Nature Center houses an emergency animal shelter.

Capabilities

Hazard mitigation is incorporated, to some degree, into Wethersfield’s Plan of Conservation and Development (POCD). POCD actions specifically address natural hazards.

Since the 2014 HMP, the High School has been designated as a secondary shelter and the Nature Center has been fitted with an emergency animal shelter. The Town’s shelters are

considered to be adequate. FEMA mitigation grant funds were used to acquire eight generators for critical facilities, including the three fire stations and the volunteer ambulance facility. The generator at the Public Works is elevated above the BFE, and the fueling station was upgraded in 2017.

Much of the area of Wethersfield at risk of flooding is within the Connecticut River floodplain and is zoned for agricultural use (Zone AG). The AG Zone limits uses to those associated with farming, open space, and municipal recreation; a limited number of other uses are allowed by special permit only. The Town has completed several drainage improvements to address localized flooding and continues to address problems, primarily through the annually-reviewed capital improvements program. Since 2008, the Town has not permitted any new homes within the 1-percent annual-chance floodplain. Applications for construction of minor improvements have been permitted contingent on no loss of flood storage. The Town Engineer is the Town's Floodplain Manager.

Wethersfield works closely with the energy provider Eversource to mitigate power outages caused by natural hazards. The Town's Tree Warden is responsible for tree maintenance and trimming, and reports to the Physical Services department. Wethersfield shares a tree truck with two other towns.

Wethersfield uses salt, not sand, for winter road maintenance. The Town watches buildings carefully during heavy snow events to ensure their roofs do not collapse. Tremco roofing is used on Town Buildings to mitigate snow and wind damage.

New Capabilities

In 2016 the Town provided FEMA with comments about areas that appear to be inaccurate on flood maps; the Town is waiting for FEMA to determine whether a Letter of Map Revision (LOMR) is warranted.

Wethersfield is in the process of implementing new MS4 stormwater management guidelines; the Town believes this will result in increased green infrastructure, reduced flood risks, and increased outreach and education about flood risks, particularly online. The MDC water company is conducting projects to reduce Combined Sewer Overflow (CSO) to Goff Brook; this work is expected to have secondary flood mitigation impacts.

The Cloverdale Pond dam was recently rehabilitated, with the spillway capacity improved. This may limit flooding of the Town's property and has lowered the risk of dam failure. The consultant GZA has completed inspections of the eight other Town-owned dams and the Town will use that information to guide future dam-hazard mitigation actions. State Bond funds have been requested to address maintenance and repair needs at Bell Pond Dam.

CT DOT has recently installed standpipes along I-91 for fire protection, at the Town's request.



Challenges

Challenges Overview

Flooding and winter storms are thought to be the most significant hazards facing Wethersfield. Thirty percent of the Town lies within 1-percent annual-chance floodplains associated with watercourses such as Folly, Beaver, Cemetery and Goff Brooks, and the Connecticut River.

The Public Works facility is located within the Connecticut River SFHA and much of it is below the BFE. The facility is somewhat constricted by I-91 and other developed areas and its hazard-event response capabilities are hindered by limited space. Additionally, the salt shed is in need of an upgrade and is vulnerable to flooding.

The Bell Pond Dam needs maintenance and repair. State Bond funds have been requested to address this.

Thunderstorms and associated high winds are a concern for the Town. A tornado in 2009 continues to be a notable storm in the Town. The Town's shared Tree-Truck allows the Town to remove trees and debris, but because of its shared nature is not always available when needed.

Ice storms continue to be a concern for the Town, though they have not experienced one in a number of years. The Town does not have sufficient space for storage of cleared snow after major storms. The greatest costs to the Town from winter storms tend to be personnel and salt/deicing material.

Hazard Losses

The economic losses faced by the community from natural hazards can be estimated by reviewing historic, and modeling future, loss figures. Loss estimates are summarized below.

Historic FEMA Payments

FEMA reimburses communities for hazard losses through programs including Public Assistance (PA) and the National Flood Insurance Program (NFIP). Combining PA and private flood insurance payments can give an estimate for total losses to a community.

The NFIP has paid 69 property damage claims in Wethersfield totaling \$350,144 to-date. Also, 11 Repetitive Loss (RL) Property claims on five properties in Wethersfield have been paid to-date totaling \$32,531.

Total PA reimbursements to the community were as follows:

- Flood Events: \$37,374 (\$1,967 annually)
- Hurricane Events: \$225,979 (\$11,894 annually)
- Winter Storm Events: \$2,510,561 (\$132,135 annually)



These are summarized in the tables below.

Table 35-2: Flood Event PA Reimbursements, Wethersfield

Incident	Sep 1999	Oct 2005
Declaration	9/23/1999	12/16/2005
Disaster No.	1302	1619
Entity	FEMA PA Reimbursement	
State	\$1,237	\$1,534
Municipal	\$0	\$34,603
Nonprofit	\$0	\$0
Total	\$1,237	\$36,137
Annualized	\$65	\$1,902

Table 35-3: Hurricane Wind Event PA Reimbursements, Wethersfield

Incident	Aug - Sep 2011 (T.S. Irene)	Oct - Nov 2012 (Storm Sandy)
Declaration	9/2/2011	10/30/2012
Disaster #	4023	4087
Entity	FEMA PA Reimbursement	
State	\$62,779	\$7,702
Municipal	\$154,643	\$0
Nonprofit	\$0	\$854
Total	\$217,423	\$8,556
Annualized	\$11,443	\$450

Table 35-4: Winter Storm PA Reimbursements, Wethersfield

Incident	Mar 2003	Dec 2003	Jan 2005	Feb 2006	Jan 2011	Oct 2011	Feb 2013
Declaration	3/11/03	1/15/04	2/17/05	5/2/06	3/3/11	11/17/11	3/21/13
Disaster #	3176	3192	3200	3266	1958	4046	4106
Entity	FEMA PA Reimbursement						
State	\$23,123	\$20,729	\$32,653	\$38,058	\$46,615	\$197,341	\$181,476
Municipal	\$58,486	\$86,299	\$96,720	\$108,843	\$118,492	\$1,208,687	\$269,383
Nonprofit	\$0	\$0	\$0	\$0	\$10,866	\$11,097	\$1,696
Total	\$81,609	\$107,028	\$129,373	\$146,901	\$175,972	\$1,417,125	\$452,554
Annualized	\$4,295	\$5,633	\$6,809	\$7,732	\$9,262	\$74,586	\$23,819

National Centers for Environmental Information Losses

The table below summarizes events in the National Centers for Environmental Information (NCEI) severe storm database that were specifically noted as having impacted the community since 2012.



Table 35-5: NCEI Database Losses since 2012, Wethersfield

Date	Event	Property Damage
7/18/2016	Thunderstorm Wind	\$15,000
10/24/2017	Strong Wind	\$1,500
Total		\$16,500

NCEI losses under other event categories (such as drought, high wind, flooding, and winter storms) were not specifically noted as impacting this community, though they did impact Hartford County and nearby towns. NCEI losses are reported in Section II of this Plan.

HAZUS-MH Losses

CRCOG used FEMA’s Hazus-MH model to analyze the risks that the community might face from flooding, hurricanes, and earthquakes. The model estimates economic losses to the City due to damage to buildings and building contents, as well as other economic disruptions. Both residential and commercial structures are addressed. Losses from different hazards are summarized below. Where available, estimates from the previous and current versions of the HMP are provided side-by-side; differences between the two may have been caused by a combination of the following:

- Changes in methodology: such as hazard zone mapping
- Changes in data: such as population and property values
- Changes in the model: this HMP utilized Hazus-MH version 4.0 rather than 2.1
- Other factors: inherent in a complex software like Hazus-MH

More details are available in the Multi-Jurisdictional HMP. Ultimately, changes in the loss estimates reflect the reality that small differences in hazard event features can have a significant impact on losses incurred.

Table 35-6: Estimated Damages to Wethersfield from a 1% Annual-Chance Flood

Loss Type	2014 Results	2018 Results
Households Displaced	238	670
People Needing Shelter	518	1242
Buildings at Least Moderately Damaged	7	10
Economic Losses		
Residential Building & Content Losses	\$7,280,000	\$42,064,909
Other Building & Content Losses	\$13,560,000	\$50,094,666
Total Building & Content Loss	\$20,840,000	\$92,159,575
Total Business Interruption Losses	\$120,000	\$1,654,263
TOTAL	\$20,960,000	\$93,813,838



Table 35-7: Estimated Damages to Wethersfield from a 1% Annual-Chance Hurricane

Loss Type	2014 Results (1938 event)	2018 Results (1% track)
Buildings at Least Moderately Damaged	1,280	1
Buildings Completely Damaged	95	0
Total Debris Generated	30,500 tons	4047
Truckloads (at 25 tons/truck) of building debris	582	162
Economic Losses		
Residential Building & Content Losses	\$121,653,000	\$15,874,088
Other Building & Content Losses	\$15,500,000	\$444,831
Total Building & Content Loss	\$137,153,000	\$16,318,919
Total Business Interruption Losses	\$16,680,000	\$561,478
TOTAL LOSSES	\$154,000,000	\$16,880,397

Losses were calculated from a modeled probabilistic earthquake (1% annual-chance of occurrence), as well as for four specific scenarios with epicenters around Connecticut.

Table 35-8: Estimated Damages to Wethersfield from a Probabilistic Earthquake

Loss Type	2018 Results
Wage Loss	\$3,791
Rent Loss	\$3,151
Relocation Loss	\$5,580
Income Loss	\$2,806
Inventory Loss	\$176
Total Business Disruption	\$15,504
Structural Loss	\$10,237
Non-Structural Loss	\$35,338
Total Building Loss	\$45,575
Total Content Loss	\$13,923
TOTAL LOSSES	\$75,002

Table 35-9: Estimated Damages to Wethersfield from Modeled Earthquake Scenarios

Epicenter Location	Magnitude	Estimated Total Losses
East Haddam	6.4	\$616,803.35
Haddam	5.7	\$231,536.63
Portland	5.7	\$1,392,290.60
Stamford	5.7	\$8,038.82

Average Annualized Losses

Average Annualized Loss (AAL) figures are useful tools for comparison of the risks faced from different hazards with different likelihoods of occurring in a given time period. AAL estimates were prepared for New Britain based on the methodologies discussed in Section II of the Multi-Jurisdictional HMP. Dam failure, drought, tornado, and wildfire losses were sourced from the 2014 Connecticut Natural Hazard Mitigation Plan Update, with dam failure data supplemented by the National Performance of Dams Program and the Connecticut Department of Energy &



Environmental Protection. Earthquake and hurricane losses were calculated in HAZUS-MH. Losses for flooding came from NFIP claims, for winter storms from Public Assistance Reimbursements, and for thunderstorms from the NCEI database. These are presented in the table below in dollars per year. Note that Hurricanes and Tropical Storms represent the largest share of total annualized losses.

Table 35-10: Average Annualized Losses, Wethersfield

Dam Failure	Drought	Earthquakes	Flooding	Hurricanes and Tropical Storms	Severe Winter Storms	Thunderstorms	Tornadoes	Wildfires	Total
\$48	\$0	\$75,002	\$11,181	\$1,671,778	\$132,135	\$3,542	\$391,269	\$2,288	\$2,287,243

Losses Summary

A review of the above loss estimates demonstrates that the Town of Wethersfield has experienced significant expenses as a result of natural hazards, and is at risk for additional losses if some of the less-frequent events were to occur. These actual and potential losses justify hazard mitigation actions to reduce losses in the future.

Mitigation Strategies and Actions

Noted Hazard Mitigation Needs

During development of this plan, specific hazard mitigation needs of Wethersfield were noted.

- The Town would like to expand its public works facility to improve response capabilities, to replace the existing salt shed with an upgraded and flood-proofed structure, and ultimately to relocate the entire facility.
- The Town wishes to identify an area for snow storage.

Status of Previous Mitigation Strategies and Actions

The Town of Wethersfield reviewed the mitigation actions proposed in the 2014 HMP and determined the status of each. That information is included in the table below.

Table 35-11: Status of Previous Mitigation Strategies and Actions, Wethersfield

Action #	Action	Notes	Status
GOAL: REDUCE LOSS OF LIFE, PROPERTY DAMAGE AND ECONOMIC CONSEQUENCES AS A RESULT OF WINTER STORMS			
Objective 1: Improve the ability of public works to prepare and respond to severe weather.			
1.1	Replace/enlarge sand/salt storage facility.	Limited progress; town has been pursuing FEMA funds. Last contact with DEMHS was fall 2017. Facility is in the CT River flood zone. A lack of damage figures has impeded ability to do BCA and apply to FEMA.	Carry Forward with Revisions



Action #	Action	Notes	Status
1.2	Expand capacity for public works trucks and equipment storage. Because this is expected to be a long term, multi-year project, for the 2014-2019 Plan period, the action to be taken is to develop a scope of work for this project.	A scope of work has been developed; however the facility is landlocked and space is limited, so the town hasn't been able to make additional progress.	Carry Forward with Revisions
1.3	Consider relocation of public works facility out of flood hazard area. Because this is expected to be a long term, multi-year project, for the 2014-2019 Plan period, the action to be taken is to develop a scope of work for this project.	No progress has been made due to limited resources.	Carry Forward
GOAL: MINIMIZE DAMAGE CAUSED BY HIGH WINDS			
Objective 1: Improve preventive tree maintenance in local right-of-way and on town properties.			
1.1	Conduct a tree inventory. (This is expected to be a long term multi-year project).	Eversource worked with the town over a few years to complete this. This is now a capability.	Capability
1.2	Formulate maintenance plan based on inventory and integrate it into Public Works operating budget.	The tree warden is responsible for developing tree maintenance plan, and is within Public Works	Completed
Objective 2: Minimize power outages and related impacts.			
2.1	Determine areas in Town with frequent outages.	Eversource worked with the town over a few years to complete this.	Completed
2.2	Work with Connecticut Light & Power for aggressive tree pruning program	Eversource worked with the town over a few years to complete this. This is now a capability.	Capability
2.3	Work with Connecticut Light & Power to relocate distribution underground in repetitive outage areas, or harden facilities remaining overhead. This is expected to be a long term multi-year project.	There is limited interest in this now. Prevention and maintenance has been preferred.	Drop
2.4	Consider full time emergency power generators at all MDC sewage pump stations.	MDC can deploy generators to pumping stations and use quick-connects. Permanent generators are not needed.	Drop
2.5	Consider full time emergency power generators at fuel tank distribution terminals. This is expected to be a long term multi-year project.	The generator at physical services is capable of sustaining fuel distribution during an outage.	Completed
2.6	Consider full time emergency power generators at all private cell service providers and at all shelters and back up shelters.	The Town has received 8 generators with FEMA funds that are installed at shelters. Mobile Phone Towers are not under Town jurisdiction.	Completed



Action #	Action	Notes	Status
GOAL: REDUCE LOSS OF LIFE, PROPERTY DAMAGE AND ECONOMIC CONSEQUENCES AS A RESULT OF FLOODING			
Objective 1: Implement remaining recommended measures from 1995 town-wide watershed management study and other priority drainage and infrastructure projects.			
1.1	Pursue opportunities to implement further dredging and drainage projects through the capital improvement program and any other available funding sources.	Dredging and drainage projects are listed in the CIP as needed. One such project is the Cloverdale Pond dam rehabilitation, which has been completed. This is a capability. Specific actions to be included in the CIP will be listed in this update.	Capability
1.2	Improve natural and artificial drainage areas that affect road flooding.	Additional progress is desired. This general action is dropped and replaced with specific actions.	Drop
1.3	Investigate making improvements to channel and underground conduit of Folly Brook with Army Corps of Engineers. Because this is expected to be a long term, multi-year project, for the 2014-2019 Plan period, the action to be taken is to develop a scope of work for the project.	No progress from the Town due to limited resources. MDC has conducted projects that affect Folly Brook in the vicinity of Hartford Avenue & Silas Dean, where the spillway from Hartford is located. Town no longer feels this action is necessary.	Drop
1.4	Develop plan for relocating public works equipment in the event of flooding of Town Garage. Because this is expected to be a long term, multi-year project, for the 2014-2019 Plan period, the action to be taken is to develop a scope of work for the project.	No available land has been identified. Combine with other Public Works capacity expansion and relocation actions listed above.	Drop
Objective 2: Ensure safety of residents and businesses in all areas of Wethersfield during flood events.			
2.1	Educate residents on new flood zone maps via website, public access portals.	Outreach related to new flood maps is done. Some additional progress has been made. New MS4 requirements will result in additional information posted to the web site	Completed
2.2	Explore participation in FEMA's Community Rating System program to reduce flood insurance premiums for residents.	Limited progress has been made on this action. Carry forward revised action.	Carry Forward with Revisions
2.3	Ensure that any future development within town Agricultural (AG) zone will not increase the risk of flooding and is built to withstand flooding.	The Town's regulations accomplish this goal. This is a capability	Capability
2.4	Actively participate in and monitor planning and implementation of MDC's Clean Water Project.	This is an established practice. This is a capability	Capability
2.5	Evaluate impact of flooding on Historic District significant buildings and provide protective measures.	Progress has not been made due to lack of resources and expertise. Town will incorporate specific actions from the CT SHPO historic resources resiliency planning project.	Carry Forward with Revisions



Action #	Action	Notes	Status
2.6	Investigate and train with City Hartford on operation of levee flood gates.	Wethersfield does not have a role in this process.	Drop

Active Mitigation Strategies and Actions

The Town proposed to initiate several new mitigation actions for the upcoming five years. Additionally, a number of actions from the previous planning period are being carried forward or replaced with revised actions. These are listed below.

Each of the following actions has been prioritized based on FEMA guidelines, listed from highest to lowest priority, and numbered.

<i>Action #1</i>	
Identify strategies for making expansion of capacity for public works trucks and equipment storage more achievable.	
Goal	7. Improve the emergency response capabilities of the region and its communities
Category	Preparedness & Emergency Response
Lead	Public Works
Cost	\$0 - \$10,000
Funding	Town Operating Budget
Timeframe	01/2019 - 12/2019
Priority	High

<i>Action #2</i>	
Identify strategies for making replacement or enlargement of sand/salt storage facility more achievable. Track damages to sand/salt storage facility so that a BCA can be completed.	
Goal	7. Improve the emergency response capabilities of the region and its communities
Category	Preparedness & Emergency Response
Lead	Public Works
Cost	\$0 - \$10,000
Funding	Town Operating Budget
Timeframe	01/2019 - 12/2019
Priority	High



Action #3

Develop a long-range plan for expansion of the Public Works building capacity and relocation outside of flood zone.

Goal	1. Minimize the impact of natural hazards on physical buildings and infrastructure
Category	Property Protection
Lead	Public Works
Cost	\$10,000 - \$25,000
Funding	Town Operating Budget / Grants
Timeframe	07/2019 - 06/2021
Priority	High

Action #4

Repair washout around the east abutment for Jenson Dam at 45 Highland Street.

Goal	1. Minimize the impact of natural hazards on physical buildings and infrastructure
Category	Structural Projects
Lead	Public Works
Cost	\$50,000 - \$100,000
Funding	Grants
Timeframe	07/2021 - 06/2022
Priority	High

Action #5

Add a double catch basin at 222 Ridge Road to address road flooding, which overflows and floods downstream homes in Ridge Crest Place (requires CCTV inspection first).

Goal	1. Minimize the impact of natural hazards on physical buildings and infrastructure
Category	Structural Projects
Lead	Public Works
Cost	More than \$100,000
Funding	Grants
Timeframe	07/2022 - 06/2023
Priority	High



Action #6

Perform the necessary repairs to the spillway at Wintergreen Woods.

Goal	1. Minimize the impact of natural hazards on physical buildings and infrastructure
Category	Structural Projects
Lead	Public Works
Cost	More than \$100,000
Funding	Grants
Timeframe	07/2022 - 06/2023
Priority	High

Action #7

Reconstruct the earthen berm at Spring Street Skate Pond Dam, perform emergency spillway and outlet improvements (compare to Dam Inspection Report).

Goal	1. Minimize the impact of natural hazards on physical buildings and infrastructure
Category	Structural Projects
Lead	Public Works
Cost	More than \$100,000
Funding	Grants
Timeframe	07/2022 - 06/2023
Priority	High

Action #8

Conduct outreach to local small businesses with the aim of preventing the accidental release and pollution from chemicals stored and used at their facilities during or following natural hazard events.

Goal	6. Improve public outreach, education, and warning systems
Category	Education & Awareness
Lead	Planning, in coordination with DEEP
Cost	\$0 - \$10,000
Funding	Materials & Resources Provided by CT DEEP
Timeframe	01/2019 - 12/2019
Priority	Medium



Action #9

Coordinate with NEMO and CRCOG to share resources and gain technical support for hazard mitigation actions involving stormwater management and public outreach, which have parallel benefits related to MS4 stormwater permit compliance.

Goal	1. Minimize the impact of natural hazards on physical buildings and infrastructure
Category	Prevention
Lead	Public Works
Cost	\$0 - \$10,000
Funding	Town Operating Budget
Timeframe	01/2020 - 12/2020
Priority	Medium

Action #10

Participate in EMI courses or the seminars and annual conference held by the Connecticut Association of Flood Managers.

Goal	3. Improve institutional awareness and understanding of natural hazard impacts and mitigation within municipal governments and other decision-making bodies
Category	Education & Awareness
Lead	Planning
Cost	\$0 - \$10,000
Funding	Town Operating Budget
Timeframe	07/2019 - 06/2024
Priority	Medium

Action #11

Work with MDC to identify potential hazard mitigation actions for MDC facilities, and list those actions in the next HMP Update.

Goal	5. Improve the resilience of local and regional utilities and infrastructure using strategies including adaptation, hardening, and creating redundancies.
Category	Property Protection
Lead	Public Works
Cost	\$10,000 - \$25,000
Funding	Town Operating Budget / DEMHS
Timeframe	07/2020 - 06/2022
Priority	Medium



Action #12

Complete an analysis of costs and benefits of joining the FEMA Community Rating System. If benefits outweigh the costs, perform outreach to gain public and stakeholder support for joining FEMA CRS.

Goal	9. Minimize the economic impact of hazard damages
Category	Prevention
Lead	Planning
Cost	\$10,000 - \$25,000
Funding	Town Operating Budget / Grants
Timeframe	07/2020 - 06/2022
Priority	Medium

Action #13

Dredge sediment from Griswold Pond to improve the water quality.

Goal	1. Minimize the impact of natural hazards on physical buildings and infrastructure
Category	Prevention
Lead	Public Works
Cost	\$25,000 - \$50,000
Funding	Grants
Timeframe	01/2021 - 12/2023
Priority	Medium

Action #14

Olsen House Ditch improvements: design and construct a 24" RCP to replace an open rip rap ditch and backfill the area to eliminate the need for guiderail.

Goal	1. Minimize the impact of natural hazards on physical buildings and infrastructure
Category	Structural Projects
Lead	Public Works
Cost	\$50,000 - \$100,000
Funding	Grants
Timeframe	07/2023 - 06/2024
Priority	Medium



Action #15

Perform design and permitting for Bell Pond dredging and reconstruction of Bell Pond Dam spillway with miscellaneous improvements to improve water quality and protect downstream properties (Moderate Hazard Class Dam per DEEP).

Goal	1. Minimize the impact of natural hazards on physical buildings and infrastructure
Category	Structural Projects
Lead	Public Works
Cost	\$50,000 - \$100,000
Funding	Grants
Timeframe	07/2023 - 06/2024
Priority	Medium

Action #16

Complete Culvert Replacements listed in the CIP: Carriage Hill Drive, Coppermill Road, Fox Hill Road, Highland Street, and Lantern Lane.

Goal	1. Minimize the impact of natural hazards on physical buildings and infrastructure
Category	Structural Projects
Lead	Public Works
Cost	More than \$100,000
Funding	Grants
Timeframe	07/2022 - 06/2024
Priority	Medium

Action #17

Complete extension of storm drainage (piping & CBs) in Nott St and reconstructing a portion of Heather Drive with new underdrains to address persistent icing problem.

Goal	1. Minimize the impact of natural hazards on physical buildings and infrastructure
Category	Structural Projects
Lead	Public Works
Cost	More than \$100,000
Funding	Grants
Timeframe	07/2022 - 06/2024
Priority	Medium



Action #18

Install 2 CBs and piping at intersection of Timber Trail with Cornish Rd to address issues with flooding homes on Timber Trail.

Goal	1. Minimize the impact of natural hazards on physical buildings and infrastructure
Category	Structural Projects
Lead	Public Works
Cost	More than \$100,000
Funding	Grants
Timeframe	07/2022 - 06/2024
Priority	Medium

Action #19

Contact the owners of Repetitive Loss Properties and nearby properties at risk to inquire about mitigation undertaken and suggest options for mitigating flooding in those areas. This should be accomplished with a letter directly mailed to each property owner.

Goal	1. Minimize the impact of natural hazards on physical buildings and infrastructure
Category	Property Protection
Lead	Planning
Cost	\$0 - \$10,000
Funding	Town Operating Budget / DEMHS
Timeframe	07/2021 - 06/2022
Priority	Low

Action #20

Identify additional space for snow storage and disposal.

Goal	7. Improve the emergency response capabilities of the region and its communities
Category	Preparedness & Emergency Response
Lead	Public Works
Cost	\$0 - \$10,000
Funding	Town Operating Budget
Timeframe	01/2021 - 12/2022
Priority	Low



Action #21

Seek Certification within the Sustainable CT program and make progress with the hazard mitigation goals associated with SustainableCT certified actions.

Goal	4. Increase the use of natural, "green," or "soft" hazard mitigation measures, such as open space preservation and green infrastructure.
Category	Natural Resources Protection
Lead	Planning
Cost	\$0 - \$10,000
Funding	Town Operating Budget
Timeframe	07/2021 - 06/2022
Priority	Low

Action #22

Work with CT DEEP to complete a formal validation of the Repetitive Loss Property list and update the mitigation status of each listed property.

Goal	1. Minimize the impact of natural hazards on physical buildings and infrastructure
Category	Property Protection
Lead	Planning
Cost	\$10,000 - \$25,000
Funding	Town Operating Budget / CT DEEP / DEMHS
Timeframe	07/2021 - 06/2023
Priority	Low

Action #23

Coordinate with CT SHPO to conduct historic resource surveys, focusing on areas within natural hazard risk zones (such as flood or wildfire hazard zones and areas near steep slopes), to support identification of vulnerable historic properties and preparation of resiliency plans across the state. This action leverages existing resources and best practices for protection of historic and cultural resources through an ongoing statewide initiative by CT SHPO.

Goal	8. Ensure community character and social equity are addressed in mitigation activities
Category	Property Protection
Lead	Planning, in coordination with SHPO
Cost	\$10,000 - \$25,000
Funding	SHPO
Timeframe	07/2021 - 06/2023
Priority	Low



Action #24

Install an underdrain on Olney Road behind eastern curb line to protect road base and alleviate flooding.

Goal	1. Minimize the impact of natural hazards on physical buildings and infrastructure
Category	Structural Projects
Lead	Public Works
Cost	\$50,000 - \$100,000
Funding	Grants
Timeframe	07/2023 - 06/2024
Priority	Low

Action #25

Perform actions listed in the 1995 Town Wide Drainage Study as listed in the CIP: Goff Road Detention Pond Construction, Sunset Boulevard, Surrey Drive Swale, Tanglewood construction.

Goal	1. Minimize the impact of natural hazards on physical buildings and infrastructure
Category	Structural Projects
Lead	Public Works
Cost	More than \$100,000
Funding	Grants
Timeframe	07/2023 - 06/2024
Priority	Low












**Capitol Region Natural Hazards
Mitigation Plan Update**




Wethersfield, Connecticut

Flood Plains, Dams
& Critical Facilities




Critical Facilities

-  Fire Station
-  Police Station
-  School
-  Healthcare Facility
-  State Facility
-  Town Facility
-  Waste Water Facility
-  Emergency Center
-  NRHP Buildings/Sites

Dam Hazard Class

-  BB, A, AA OR Unclassified
-  Class B - Significant Hazard
-  Class C - High Hazard

FEMA Flood Hazard Area

-  100 Year Flood Zone
-  500 Year Flood Zone
-  NRHP Districts/Areas

Data Sources: FEMA, National Register of Historic Places, CT DEEP, CRCOG, ESRI



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36 Willington

Community Overview

Willington has a total area of 34.8 square miles and a population of 6,041 persons (2010 Census). Willington also has two seasonal campgrounds, the Moose Meadow Camp Resort and the Wilderness Campground and Resort, that boost its population in the summer.

Willington is approximately 77% forested; large wooded areas include a portion of the Nipmuck and Nye-Holman State Forests. Other land cover in the town includes: developed (10%), agricultural and other grasses (6%), turf and grass (4%), water (2%), barren (2%), non-forested wetlands (<1%), and utility right-of-way (<1%). The approximately 900 acres of the town occupied by water bodies includes Halls Pond, Parizek Pond, Bissonette Pond, Drobney Pond, Wilderness Lake, Ruby Lake, Pelican Pond and many smaller ponds. Willington’s elevations range from about 310 feet in the southwest corner of town on the Willimantic River to about 1010 feet in the northeast corner of town.

A portion of Interstate 84 crosses the town, as well as state Route 44 and Route 7. Willington’s primary commercial areas are located on Phelps Way and near Route I-84. There have been no significant developments in Town since adoption of the former WinCOG’s 2015 Hazard Mitigation Plan Update (“2015 HMP”); exposure to natural hazards has not changed since the 2015 Plan.

Critical Facilities

Critical Facilities throughout the Capitol Region are listed in Appendix B. Critical and important facilities and cultural resources in Willington include two volunteer fire departments, five schools, a hazardous material storage site, an animal clinic, a dog pound, two elderly and special needs housing areas, sixteen apartment buildings, two camps and campgrounds, three churches, a library, two public telephone facilities, two commercially developed areas, an historic district, a Town Office Building, a town garage, a town-owned water facility operation, several privately owned water operations, and five significant hazard dams.

Table 36-1: Critical Facilities, Willington

Facility	Shelter	Generator
Three Fire Stations		
Town Hall		
Town Office Building		
Town Garage		
The Center School		
Hall Memorial School	X	X
Willington Nursery School		
Willington Public Library		
Kids Kingdom		

Facility	Shelter	Generator
Kids Express Learning Center & Daycare		
Mid-NEROH Haz-Mat Recycling Facility		
Willington Transfer Station		
Willington Veterinary Clinic		
Dog Pound		
Two Public Telephone Facilities at CT DOT Rest Areas on I-84		
Phelps Plaza at 11 Phelps Way		
Truck Stop on Ruby Road at Route I-84		
Water Facility Operation at the Senior Housing Complex		
Several Privately Owned Water Operations		
Willington Senior Center & Senior Housing		
Lyon Manor		
Moose Meadow Camp Resort		
Wilderness Lake Campground & Resort		
The Federated Church of Willington		
St. Jude Church		
Willington Baptist Church		
Historic District		
Cedar Ridge Apartments		
Deer Park Apartments		

The generator at Hall Memorial School was replaced recently. Generators are desired at the Public Works Garage and the Town Hall.

Capabilities

Hazard mitigation is incorporated into Willington’s Plan of Conservation and Development (POCD). The HMP document itself is cited. POCD actions specifically address natural hazards.

The Town of Willington has consistently participated in the National Flood Insurance Program (NFIP) since June 15, 1982. The most recent Flood Insurance Rate Map (FIRM) was published on June 15, 1982. The current Town of Willington Flood Insurance Study (FIS) was published on December 15, 1981. Willington’s zoning regulations (August 1, 1996), include a requirement that buildings be elevated or floodproofed to at least one foot above the Base Flood Elevation (BFE). New buildings are constructed to more recent building codes (and generally away from floodplains) and are considered to be less vulnerable to natural hazards than older buildings.

The Town maintains shelters and provides plowing services through Public Works. The Town performs debris management through Public Works with the assistance of the local electrical utility when necessary. Tree maintenance is largely addressed by Eversource, though the Town has a small annual budget for tree trimming on an as-needed basis.

Re-routing plans are in place all along Interstate 84 should a disaster affect any portion of the corridor.



Small cleared areas around homes in wooded areas generally provide enough of a barrier to stop brushfires from reaching them. The Town uses a variety of regulatory, preparedness, and public information programs to mitigate the effect of wildfires, including the Open Burning Program, maintenance of dry hydrants and cisterns, and educational programs on fire safety. Public water with pressurized hydrants cover a small section of South Willington and the Town Hall area. Around 25 dry-hydrants provide firefighting water to other areas of Town. Authorities in the Town of Willington who play advisory, supervisory, or direct roles in hazard mitigation for the Town include:

Authorities	Role			Hazard Mitigated
	Advisory	Supervisory	Direct	
Board of Selectmen		X	X	All
Building Official	X		X	All except drought
Conservation Commission	X			Flooding
Fire Department			X	Wildfire
Emergency Services Efficiency Committee	X			All
Inland Wetlands & Watercourses Commission			X	Flooding
Fire Marshall / Burning Official	X		X	Wildfire
First Selectman		X		All
Land Use Department	X		X	Flooding
Planning and Zoning Commission	X		X	Flooding
Public Works Department	X	X	X	All except drought
Zoning Board of Appeals			X	Flooding

New Capabilities

Willington primarily stores important municipal data on a server at the Town Hall, but has recently moved some of that to the Hall Memorial School server; this site is less susceptible to the impacts of natural hazards and has a backup generator.

The Town has adopted Low Impact Development (LID) regulations within the last five years. Drainage systems on Turnpike Road and Turnpike Road Extension have been replaced and upsized, correcting poor-drainage flooding issues in that area. Additionally the Route 74 Bridge over the Willimantic and the Daleville School Bridge have each been replaced recently.

Willington has changed its winter road treatment material to use far less sand than previously. Pretreatment is now a much larger focus. The buildup of sand in catch basins and other drainage features has been reduced.

A map modernization effort by FEMA is currently underway for Tolland County, but its full extent, and how much of Willington it will cover, is unknown.

Challenges

Challenges Overview

The main sources of flooding in Willington are the Willimantic River and the Fenton River. Moose Meadow Campground is on the west side of the Fenton River and is potentially



vulnerable during flood events. In October 2005 flooding closed several roads including Route 74 on both the Willimantic and Fenton Rivers, Daleville Road at the intersection with Daleville School Road on the Fenton River, Polster Road at Roaring Brook, and Turnpike Road at its intersection with Route 320 at Ruby Brook.

Willington has two “scour bridges” that, by CTDOT standards, may be undermined by soil erosion during certain rainfall or stream flow events. One bridge crosses the Fenton River on Daleville School Road, and the other structure crosses Roaring Brook on Polster Road; the Polster Road bridge has been closed since January 2014 due to structural deterioration, per the Town Engineer.

Increased traffic on major transportation routes is a matter of concern for the town. Of specific concern are state Route 44 and Route 74; there are no re-routing plans for these highways, and a disaster could cause a major disruption in transportation.

The large wooded areas in Town are potential wildfire or brushfire areas. Because of a reduction in maintenance to some of the state forests and private wooded areas in more recent years, fuel build-up in these regions makes them an increasing threat to the town. Homes are scattered within forested areas. Most of Willington is not covered by public water, and therefore the Town has very few pressurized hydrants. Municipal staff report that dry-hydrant coverage, while significant, is insufficient at this time.

There are 37 dams in Willington: twenty-seven are either unclassified or classified as low hazard (Class A), seven are classified as moderate hazard (Class BB), and three are significant hazard (Class B). The three significant hazard dams include Halls Pond Dam (off Route 32), Wasilewski Pond Dam (off Route 74), and Halchek Pond Dam (off Village Hill Road). Except for Halchek Pond Dam, these dams are located either adjacent to or in close proximity to major roadways (either State or local) where bridges and traffic could be disrupted. Halchek Pond Dam, although located well off Village Hill Road, could impact downstream residential areas (such as the subdivision on Pinecrest Road) and road bridge crossings at Village Hill Road and Route 32. The Wilderness Campground has a pond with a significant hazard dam which if it failed during a storm event could impede access.

[Hazard Losses](#)

The economic losses faced by the community from natural hazards can be estimated by reviewing historic, and modeling future, loss figures. Loss estimates are summarized below.

[Historic FEMA Payments](#)

FEMA reimburses communities for hazard losses through programs including Public Assistance (PA) and the National Flood Insurance Program (NFIP). Combining PA and private flood insurance payments can give an estimate for total losses to a community.

The National Flood Insurance Program (NFIP) has paid four claims in Willington totaling \$11,234 to-date. Willington has no Repetitive Loss (RL) Property claims to-date.



Total PA reimbursements to the community were as follows:

- Flood Events: \$111,133 (\$5,849 annually)
- Hurricane Events: \$118,266 (\$6,225 annually)
- Winter Storm Events: \$456,010 (\$24,001 annually)

These are summarized in the tables below.

Table 36-2: Flood Event PA Reimbursements, Willington

Incident	Oct 2005
Declaration	12/16/2005
Disaster No.	1619
Entity	FEMA PA Reimbursement
State	\$878
Municipal	\$110,255
Nonprofit	\$0
Total	\$111,133
Annualized	\$5,849

Table 36-3: Hurricane Wind Event PA Reimbursements, Willington

Incident	Aug - Sep 2011 (T.S. Irene)	Oct - Nov 2012 (Storm Sandy)
Declaration	9/2/2011	10/30/2012
Disaster #	4023	4087
Entity	FEMA PA Reimbursement	
State	\$389	\$1,818
Municipal	\$58,457	\$57,602
Nonprofit	\$0	\$0
Total	\$58,846	\$59,420
Annualized	\$3,097	\$3,127



Table 36-4: Winter Storm PA Reimbursements, Willington

Incident	Mar 2003	Dec 2003	Jan 2005	Feb 2006	Jan 2011	Oct 2011	Feb 2013	Jan 2015
Declaration	3/11/03	1/15/04	2/17/05	5/2/06	3/3/11	11/17/11	3/21/13	4/8/15
Disaster #	3176	3192	3200	3266	1958	4046	4106	4213
Entity	FEMA PA Reimbursement							
State	\$6,134	\$6,345	\$9,068	\$8,255	\$10,327	\$1,582	\$8,601	\$16,645
Municipal	\$16,996	\$26,681	\$23,249	\$24,165	\$29,826	\$190,621	\$49,817	\$27,701
Nonprofit	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Total	\$23,129	\$33,025	\$32,316	\$32,420	\$40,153	\$192,203	\$58,418	\$44,346
Annualized	\$1,217	\$1,738	\$1,701	\$1,706	\$2,113	\$10,116	\$3,075	\$2,334

National Centers for Environmental Information Losses

The table below summarizes events in the National Centers for Environmental Information (NCEI) severe storm database that were specifically noted as having impacted the community since 2012.

Table 36-5: NCEI Database Losses since 2012, Willington

Date	Event	Property Damage
6/25/2013	Thunderstorm Wind	\$5,000
7/27/2014	Thunderstorm Wind	\$5,000
Total		\$10,000

NCEI losses under other event categories (such as drought, high wind, flooding, and winter storms) were not specifically noted as impacting this community, though they did impact Tolland County and nearby towns. NCEI losses are reported in Section II of this Plan.

HAZUS-MH Losses

CRCOG used FEMA’s Hazus-MH model to analyze the risks that the community might face from flooding, hurricanes, and earthquakes. The model estimates economic losses due to damage to buildings and building contents, as well as other economic disruptions. Both residential and commercial structures are addressed. Losses from different hazards are summarized below.



Table 36-6: Estimated Damages to Willington from a 1% Annual-Chance Flood

Loss Type	2018 Results
Households Displaced	47
People Needing Shelter	12
Buildings at Least Moderately Damaged	0
Economic Losses	
Residential Building & Content Losses	\$2,888,659
Other Building & Content Losses	\$1,124,812
Total Building & Content Loss	\$4,013,471
Total Business Interruption Losses	\$28,939
TOTAL	\$4,042,410

Table 36-7: Estimated Damages to Willington from a 1% Annual-Chance Hurricane

Loss Type	2018 Results (1% track)
Buildings at Least Moderately Damaged	1
Buildings Completely Damaged	0
Total Debris Generated	15242
Truckloads (at 25 tons/truck) of building debris	610
Economic Losses	
Residential Building & Content Losses	\$5,275,686
Other Building & Content Losses	\$66,679
Total Building & Content Loss	\$5,342,365
Total Business Interruption Losses	\$170,664
TOTAL LOSSES	\$5,513,029

Losses were calculated from a modeled probabilistic earthquake (1% annual-chance of occurrence), as well as for four specific scenarios with epicenters around Connecticut.

Table 36-8: Estimated Damages to Willington from a Probabilistic Earthquake

Loss Type	2018 Results
Wage Loss	\$334
Rent Loss	\$506
Relocation Loss	\$869
Income Loss	\$280
Inventory Loss	\$44
Total Business Disruption	\$2,033
Structural Loss	\$1,825
Non-Structural Loss	\$6,355
Total Building Loss	\$8,180
Total Content Loss	\$2,250
TOTAL LOSSES	\$12,463



Table 36-9: Estimated Damages to Willington from Modeled Earthquake Scenarios

Epicenter Location	Magnitude	Estimated Total Losses
East Haddam	6.4	\$47,570.92
Haddam	5.7	\$7,473.18
Portland	5.7	\$10,457.85
Stamford	5.7	\$934.60

Average Annualized Losses

Average Annualized Loss (AAL) figures are useful tools for comparison of the risks faced from different hazards with different likelihoods of occurring in a given time period. AAL estimates were prepared for each natural hazard that may impact the community based on the methodologies discussed in Section II of the Multi-Jurisdictional HMP. Dam failure, drought, tornado, and wildfire losses were sourced from the 2014 Connecticut Natural Hazard Mitigation Plan Update, with dam failure data supplemented by the National Performance of Dams Program and the Connecticut Department of Energy & Environmental Protection. Earthquake and hurricane losses were calculated in HAZUS-MH. Losses for flooding came from NFIP claims, for winter storms from Public Assistance Reimbursements, and for thunderstorms from the NCEI database. These are presented in the table below in dollars per year. Note that Hurricanes and Tropical Storms represent the largest share of total annualized losses.

Table 36-10: Average Annualized Losses, Willington

Dam Failure	Drought	Earthquakes	Flooding	Hurricanes and Tropical Storms	Severe Winter Storms	Thunderstorms	Tornadoes	Wildfires	Total
\$371	\$0	\$12,463	\$6,145	\$409,377	\$24,001	\$2,199	\$1,755	\$4,368	\$460,679

Mitigation Strategies and Actions

Noted Hazard Mitigation Needs

Over the course of Plan development, specific hazard mitigation needs were noted.

- The Town wishes to petition FEMA to determine flood elevations for the Roaring Brook flood zone, currently designated as an A-zone. There are several houses on Nipmuck Road along the river that are not mapped as in the floodplain but which the Town has observed to be at risk of flooding.
- Installing emergency generators at the Town Hall and Public Works facility are priorities; in particular for the Town Hall.
- Municipal staff want to develop redundancies for municipal data stored on Town Hall servers, and department-level contingency planning for IT capabilities.
- Willington wishes to begin utilizing updated rainfall data and rainfall data that considers future climate conditions when designing drainage systems, culverts, and bridges. This



new data should be included in all subdivision and public works project designs, to be applied to both private development and municipal projects.

- Crumbling building foundations are a significant and widespread problem in the community and exacerbate the effects of natural hazards.

Status of Previous Mitigation Strategies and Actions

The Town of Willington reviewed the mitigation actions proposed in the 2015 HMP and determined the status of each. That information is included in the table below.

Table 36-11: Status of Previous Mitigation Strategies and Actions, Willington

Action #	Action	Notes	Status
GOAL: TO REDUCE THE LOSS OF LIFE AND PROPERTY AND ECONOMIC CONSEQUENCES AS A RESULT OF NATURAL DISASTERS.			
Objective 1: To reduce the likelihood of flooding by improving existing road conditions.			
1.1	Encourage CTDOT to improve drainage culverts and road grading on Route 320 to prevent periodic flooding and icing at the intersection of Hancock Road, at the culvert crossing of Ruby Pond discharge south of the Truck Stop facility just off I-84, at the culvert just south of the Town bus parking area, at the wetland beaver areas north of Cisar Road and north of Eldredge and Pinney Hill Roads, and at the culvert crossing at the north side of the Cosgrove Road intersection.	Not completed due to staffing limitations. Revise to “report poor-drainage flood issues along Route 320 to CT DOT.”	Carry Forward with Revisions
1.2	Improvement of drainage culverts and installation of drainage facilities along Turnpike and Village Hill Roads to reduce flooding and icing problems.	Partially complete; drainage facilities installed along Turnpike, not in other locations. Carry forward, add installation of drainage facilities along Schofield Road, and combine with action 1.3.	Carry Forward with Revisions
1.3	Install new catch basins and drainage system along Village Hill Road.	Progress not yet made due to funding limitations. Carry forward and combine with action 1.2.	Carry Forward with Revisions
Objective 2: To reduce the likelihood of wildfire hazards.			
2.1	Add dry hydrants or underground cisterns near wildfire susceptible areas of State forest and municipal woodlands within the central portion of the Town.	Have added 4 new dry hydrants using matching funds from CT DEEP forestry division. Would like to add 6 more.	Carry Forward with Revisions



Action #	Action	Notes	Status
2.2	Add dry hydrants in close proximity to new developments.	Willington encourages consideration of underground cisterns for new developments, but has no formalized requirements. Revise action to “Add dry-hydrant or cistern requirements to subdivision regulations. Refer to the Town of Ashford’s regulations for an example.”	Carry Forward with Revisions
Objective 3: To reduce the likelihood of flooding damage by improving bridge and road conditions.			
3.1	Encourage CTDOT to replace and upgrade the capacity of the Route 74 bridge over the Willimantic River, to reduce flood impact during severe storm events to the road and to adjacent dwellings.	Bridge has been upgraded.	Completed
3.2	Replace the Kechkes Road Bridge over the Fenton River on Kechkes Road. This bridge has been placed on the CTDOT high priority list under the local bridge program and is eligible for funding.	Bridge has been replaced.	Completed
Objective 4: To reduce the likelihood of flooding by evaluating property prone to flooding.			
4.1	Examine properties at the intersection of the Willimantic River and Route 74, where flooding occurs severe storm situations.	The road here has been elevated by 4 feet, changing flood conditions at this site.	Completed
Objective 5; Expand activities related to hazard mitigation, emergency preparedness and natural hazard response capabilities.			
5.1	Ensure that the emergency shelters have adequate capability to respond to natural emergencies.	Storage and shower upgrades were made since the last plan. Willington also has regional shelter agreements in place. Hall Memorial School has a generator but no storage, and serves as a shelter. Other schools are used for storage and food preparation.	Completed
5.2	Develop a GIS application to assist town personnel in the event of an emergency or natural disaster, including mitigation plan maps as layers.	Town has designated funding for this project in the 2018-2019 budget. Carry forward to completion.	Carry Forward
5.3	Install generators at critical facilities.	Hall Memorial Shelter generator has been installed. Public Works and Town Hall still need generators.	Carry Forward with Revisions



Action #	Action	Notes	Status
Objective 6: Whenever practical, incorporate natural hazard mitigation strategies into existing town projects.			
6.1	Publish all Town ordinances and regulations on the Town's website, particularly those dealing with hazard mitigation for storms, flood events, and other natural hazards or disasters.	This action has not yet been completed due to staffing limitations.	Carry Forward
Objective 7: Reduce the amount of debris from severe storms through preventative tree management.			
7.1	Procure tree bucket to help remove dead, dying, dangerous or diseased trees.)	Town has decided to rely on contracts with private companies instead. The Town is also exploring regional equipment sharing, but has identified challenges with maintenance and training.	Drop
7.2	Education on planting trees using Eversource Energy literature.	Town has begun to perform such education for municipal projects, but wishes to expand to private residents and contractors. The Town will use the "right tree, right place" model.	Carry Forward with Revisions

Active Mitigation Strategies and Actions

The Town proposed to initiate several new mitigation actions for the upcoming five years. Additionally, a number of actions from the previous planning period are being carried forward or replaced with revised actions. These are listed below.

Each of the following actions has been prioritized based on FEMA guidelines, listed from highest to lowest priority, and numbered.

Action #1	
Enter the Sustainable CT program through Registration and review actions that can be undertaken to pursue Certification. Make progress with the actions related to hazard mitigation.	
Goal	4. Increase the use of natural, "green," or "soft" hazard mitigation measures, such as open space preservation and green infrastructure.
Category	Natural Resources Protection
Lead	Planning
Cost	\$0 - \$10,000
Funding	Town Operating Budget
Timeframe	01/2019 - 12/2019
Priority	High



Action #2

Petition FEMA to conduct a detailed flood study of the Willimantic River near Route 74, where currently it is an unnumbered A zone.

Goal	3. Improve institutional awareness and understanding of natural hazard impacts and mitigation within municipal governments and other decision-making bodies
Category	Prevention
Lead	Emergency Management
Cost	\$0 - \$10,000
Funding	Town Operating Budget
Timeframe	07/2019 - 06/2020
Priority	High

Action #3

Encourage CTDOT to improve drainage culverts and road grading on Route 320 to prevent periodic flooding and icing at the intersection of Hancock Road, at the culvert crossing of Ruby Pond discharge south of the Truck Stop facility just off I-84, at the culvert just south of the Town bus parking area, at the wetland beaver areas north of Cisar Road and north of Eldredge and Pinney Hill Roads, and at the culvert crossing at the north side of the Cosgrove Road intersection.

Goal	5. Improve the resilience of local and regional utilities and infrastructure using strategies including adaptation, hardening, and creating redundancies.
Category	Structural Projects
Lead	Public Works
Cost	\$0 - \$10,000
Funding	Town Operating Budget
Timeframe	07/2019 - 06/2020
Priority	High

Action #4

Install generators at Town Hall and Public Works.

Goal	7. Improve the emergency response capabilities of the region and its communities
Category	Preparedness & Emergency Response
Lead	Emergency Management
Cost	\$10,000 - \$25,000
Funding	Town Operating Budget / DEMHS
Timeframe	07/2019 - 06/2021
Priority	High



Action #5

Perform a town-wide drainage study to identify and prioritize locations requiring increased drainage capacity or other drainage-flooding mitigation measures.

Goal	1. Minimize the impact of natural hazards on physical buildings and infrastructure
Category	Prevention
Lead	Public Works
Cost	\$50,000 - \$100,000
Funding	Grants
Timeframe	07/2021 - 06/2022
Priority	High

Action #6

Improve drainage culverts and install new catch basins and drainage systems along Village Hill Road and Schofield Road to reduce flooding and icing problems.

Goal	5. Improve the resilience of local and regional utilities and infrastructure using strategies including adaptation, hardening, and creating redundancies.
Category	Structural Projects
Lead	Public Works
Cost	More than \$100,000
Funding	Grants
Timeframe	07/2022 - 06/2023
Priority	High

Action #7

Conduct outreach to local small businesses with the aim of preventing the accidental release and pollution from chemicals stored and used at their facilities during or following natural hazard events.

Goal	6. Improve public outreach, education, and warning systems
Category	Education & Awareness
Lead	Planning, in coordination with DEEP
Cost	\$0 - \$10,000
Funding	Materials & Resources Provided by CT DEEP
Timeframe	01/2019 - 12/2019
Priority	Medium



Action #8

Coordinate with NEMO and CRCOG to share resources and gain technical support for hazard mitigation actions involving stormwater management and public outreach, which have parallel benefits related to MS4 stormwater permit compliance.

Goal	1. Minimize the impact of natural hazards on physical buildings and infrastructure
Category	Prevention
Lead	Public Works
Cost	\$0 - \$10,000
Funding	Town Operating Budget
Timeframe	01/2020 - 12/2020
Priority	Medium

Action #9

Add a requirement to subdivision regulations that new developments construct underground cisterns for firefighting.

Goal	2. Ensure Municipal Codes and Regulations support hazard mitigation
Category	Prevention
Lead	Planning
Cost	\$0 - \$10,000
Funding	Town Operating Budget
Timeframe	07/2020 - 06/2021
Priority	Medium

Action #10

Participate in EMI courses or the seminars and annual conference held by the Connecticut Association of Flood Managers.

Goal	3. Improve institutional awareness and understanding of natural hazard impacts and mitigation within municipal governments and other decision-making bodies
Category	Education & Awareness
Lead	Planning
Cost	\$0 - \$10,000
Funding	Town Operating Budget
Timeframe	07/2019 - 06/2024
Priority	Medium



Action #11

Designate and prepare a debris management area.

Goal	7. Improve the emergency response capabilities of the region and its communities
Category	Preparedness & Emergency Response
Lead	Emergency Management
Cost	\$10,000 - \$25,000
Funding	Town Operating Budget / Grants
Timeframe	07/2020 - 06/2022
Priority	Medium

Action #12

Identify or hire a municipal staff member responsible for regularly updating the Town's website and Facebook page with hazard-relevant information.

Goal	6. Improve public outreach, education, and warning systems
Category	Education & Awareness
Lead	Administration
Cost	\$10,000 - \$25,000
Funding	Town Operating Budget
Timeframe	07/2020 - 06/2022
Priority	Medium

Action #13

Review the LID Manual developed by the Northwest Hills Council of Governments and determine whether LID can be incorporated locally to increase rural resiliency.

Goal	1. Minimize the impact of natural hazards on physical buildings and infrastructure
Category	Prevention
Lead	Planning
Cost	\$10,000 - \$25,000
Funding	Town Operating Budget
Timeframe	07/2021 - 06/2022
Priority	Medium



Action #14

Develop a GIS application to assist town personnel in the event of an emergency or natural disaster, including mitigation plan maps as layers.

Goal	7. Improve the emergency response capabilities of the region and its communities
Category	Preparedness & Emergency Response
Lead	Planning
Cost	\$25,000 - \$50,000
Funding	Town Operating Budget / Grants / DEMHS
Timeframe	07/2021 - 06/2023
Priority	Medium

Action #15

Identify specific properties located in FEMA flood zone; including the identification of losses that occurred in 2005, 1995, and 1938.

Goal	1. Minimize the impact of natural hazards on physical buildings and infrastructure
Category	Prevention
Lead	Planning
Cost	\$25,000 - \$50,000
Funding	Town Operating Budget / Grants / DEMHS
Timeframe	07/2021 - 06/2023
Priority	Medium

Action #16

Add 6 additional dry hydrants near wildfire susceptible areas of State forest and municipal woodlands within the central portion of the Town.

Goal	7. Improve the emergency response capabilities of the region and its communities
Category	Preparedness & Emergency Response
Lead	Fire Department
Cost	\$50,000 - \$100,000
Funding	Grants / CT DEEP
Timeframe	01/2023 - 12/2024
Priority	Medium



Action #17

Re-publish all Town ordinances and regulations on Selectmen the Town’s website, particularly those dealing with hazard mitigation for storms, flood events, and other natural hazards or disasters.

Goal	2. Ensure Municipal Codes and Regulations support hazard mitigation
Category	Prevention
Lead	Planning
Cost	\$0 - \$10,000
Funding	Town Operating Budget
Timeframe	01/2021 - 12/2022
Priority	Low

Action #18

Coordinate with CT SHPO to conduct historic resource surveys to support identification of vulnerable historic properties and preparation of resiliency plans across the state. This action leverages existing resources and best practices for protection of historic and cultural resources through an ongoing statewide initiative by CT SHPO.

Goal	8. Ensure community character and social equity are addressed in mitigation activities
Category	Property Protection
Lead	Planning, in coordination with SHPO
Cost	\$10,000 - \$25,000
Funding	SHPO
Timeframe	07/2021 - 06/2023
Priority	Low

Action #19

Use "right tree, right place" model to educate municipal staff, contractors, and the public about planting trees.

Goal	4. Increase the use of natural, "green," or "soft" hazard mitigation measures, such as open space preservation and green infrastructure.
Category	Education & Awareness
Lead	Public Works
Cost	\$10,000 - \$25,000
Funding	Town Operating Budget / Grants
Timeframe	07/2021 - 06/2023
Priority	Low



Action #20

Perform a study of municipal buildings to determine their snow load ratings.

Goal	1. Minimize the impact of natural hazards on physical buildings and infrastructure
Category	Preparedness & Emergency Response
Lead	Public Works
Cost	\$50,000 - \$100,000
Funding	Town Operating Budget / Grants
Timeframe	07/2023 - 06/2024
Priority	Low












Capitol Region Natural Hazards Mitigation Plan Update




Wilmington, Connecticut

Flood Plains, Dams
& Critical Facilities




Critical Facilities

-  Fire Station
-  Police Station
-  School
-  Healthcare Facility
-  State Facility
-  Town Facility
-  Waste Water Facility
-  Emergency Center
-  NRHP Buildings/Sites

Dam Hazard Class

-  BB, A, AA OR Unclassified
-  Class B - Significant Hazard
-  Class C - High Hazard

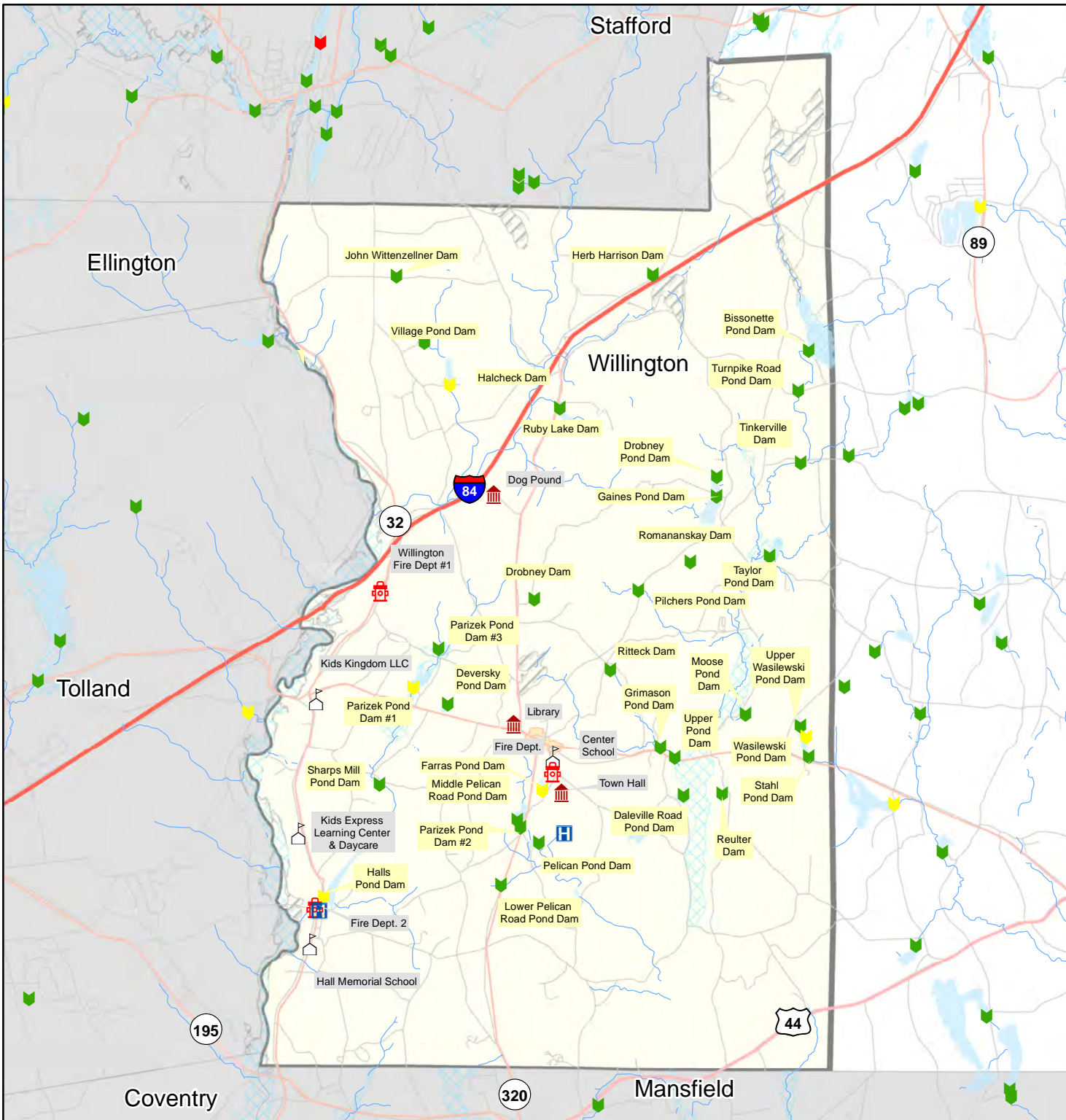
FEMA Flood Hazard Area

-  100 Year Flood Zone
-  500 Year Flood Zone
-  NRHP Districts/Areas

Data Sources: FEMA, National Register of Historic Places, CT DEEP, CRCOG, ESRI



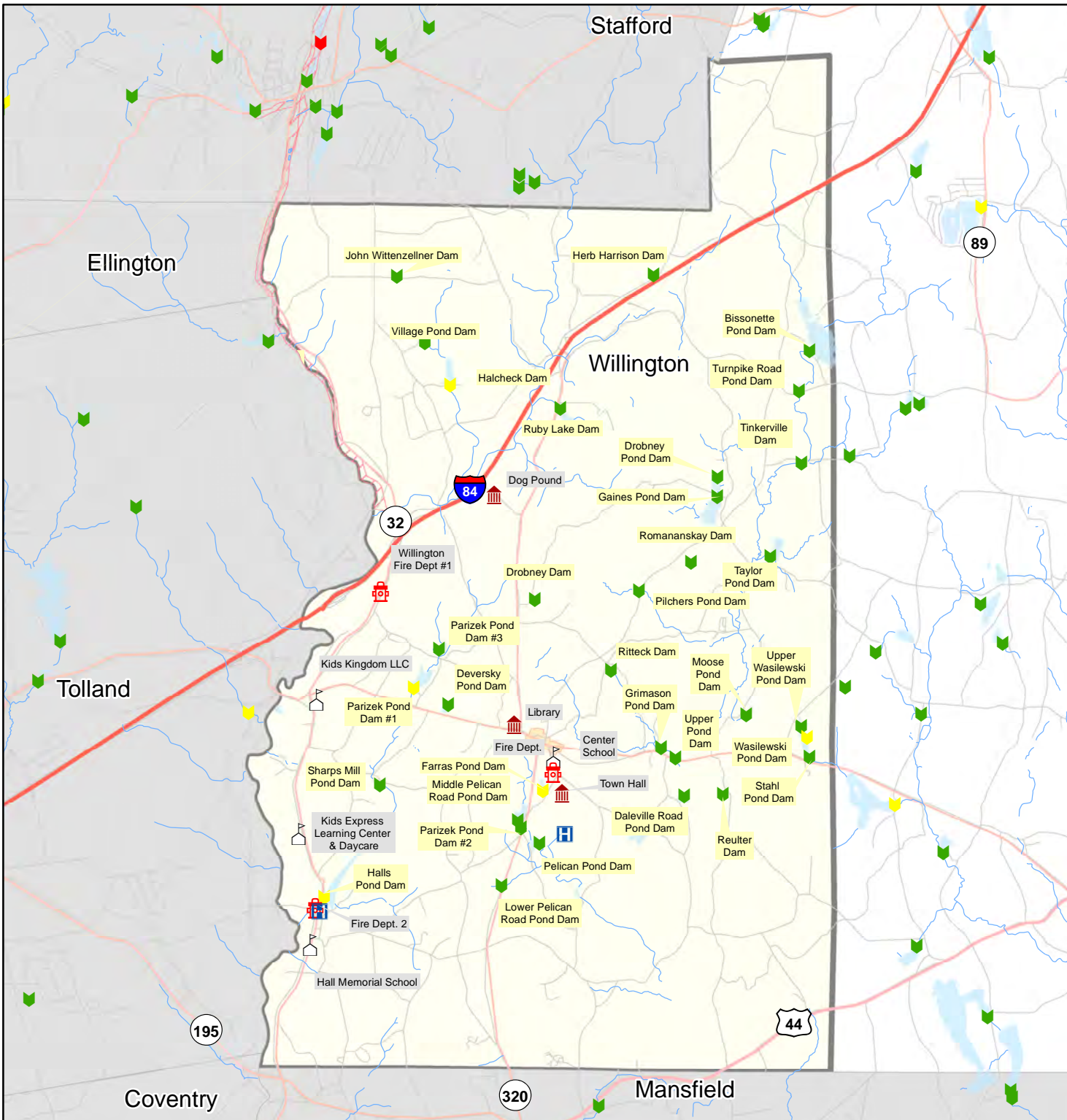
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






Capitol Region Natural Hazards Mitigation Plan Update

Willington, Connecticut




Dam Breach Inundation Area & Critical Facilities




Critical Facilities

-  Fire Station
-  Police Station
-  School
-  Healthcare Facility
-  State Facility
-  Town Facility
-  Waste Water Facility
-  Emergency Center
-  NRHP Buildings/Sites

Dam Hazard Class

-  BB, A, AA OR Unclassified
-  Class B - Significant Hazard
-  Class C - High Hazard

 Dam Breach Inundation Areas

 NRHP Districts/Areas

Data Sources: FEMA, National Register of Historic Places, CT DEEP, CRCOG, ESRI



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37 Windsor

Community Overview

Windsor is a suburban community with a land area of 30 square miles and an estimated population of about 29,044. Elevation ranges from about 32 feet on the eastern side to about 200 feet in the western edge. Windsor primarily lies within the Connecticut River Mainstem Watershed, with its southeast area falling within the Farmington River Watershed. The Town also encompasses several sub-regional drainage basins. The Connecticut River flows the length of the eastern Town boundary. The Farmington River runs from west to east and joins the Connecticut River in Windsor. Other watercourses in Town include Deckers, Meadow, Mill, Phelps, and Rainbow Brooks.

Interstates 91 and 291 run through and intersect in Windsor. In addition, the highway connector between Interstate 91 and Bradley International Airport (Route 20) runs along the northern boundary of Windsor. An active railroad parallels Route 91, running north-south through Windsor. An Amtrak commuter rail line and the Hartford Line commuter rail each stop in the Town. Other major transportation routes through town include state routes 75, 159, 178, 187, 218 and 305.

Windsor is a growing center of employment within the region, and as such, experiences an increase in daytime population. According to the Connecticut Department of Labor, the average annual employment for 2010 was 23,809 jobs. Power generation, aerospace, insurance, computer aided design and manufacturing software development, medical technology, financial services, manufacturing of computer components, electronics, machine tools, adhesives, measuring devices, automotive parts, air movement equipment, and shade-grown tobacco are the principal industries. The largest employers include the new Amazon logistics center, Dollar Tree, Hartford Life, VOYA, GE/Alstom Power, CIGNA, the Town of Windsor, Walgreens, Eversource, Waste Management, and Konica Minolta. The Day Hill Road area has a high concentration of employers, and is planned to grow as an employment and residential center as the mixed-use Great Pond Village is developed. Great Pond Village proposes to add more than 1,000 residential units and a mixture of commercial development including warehousing and distribution facilities. This growth must be factored into disaster planning. Windsor has space available for additional future development.

Critical Facilities

Critical Facilities throughout the Capitol Region are listed in Appendix B. In Windsor these include the Town Hall, Public Safety Complex, Ambulance Facility, five Fire Stations, the DPW facility, a Wastewater Treatment Plant and three pump stations, the train station, the LP Wilson Community Center and Senior Center, one high school, one middle school, four elementary schools, the CREC Academy of Aerospace and Engineering, Loomis Chaffee boarding school, River Street School, Windsor Animal Shelter, and two privately owned Senior Housing facilities.

The Town Hall houses the Emergency Operations Center (EOC) and has an emergency generator. The Public Safety Complex houses both a fire station and the police station. The LP Wilson Community Center and Senior Center (the Center) is the designated emergency shelter. Sheltering equipment is stored onsite at the Center. The Windsor Animal Shelter can be used to shelter animals during an emergency.

Table 37-1: Critical Facilities, Windsor

Facility	Shelter	Generator
Town Hall (EOC)		X
Public Safety Complex		X
Ambulance Facility		X
5 Fire Stations		X
DPW Facility		X
Wastewater Treatment Plant		X
3 Pump Stations		X
Train Station		
LP Wilson Community Center	X	X
High School		Partial
Middle School		
4 Elementary Schools		
Academy of Aerospace & Engineering		X
Loomis Chaffee (boarding school)		X
CREC River Street School		Partial
Windsor Animal Shelter	Animals	X
2 Senior Housing Facilities		X

Capabilities

Hazard mitigation is incorporated into Windsor’s Plan of Conservation and Development (POCD). POCD actions specifically address natural hazards. Since 2008, there have been no changes in land use or housing development in the special flood hazard area or that would affect the Town’s vulnerability to natural hazards.

Windsor uses the Everbridge Reverse 9-1-1 system to alert residents of hazardous conditions.

Improvements were made in both 2007 and 2011 to address the area adjacent to Meadow Brook in the southern end of town. In 2007, the town replaced the culvert beneath the roadway, which improved the hydraulic capacity of the brook in the area. In 2011, slope stabilization work on the upstream banks of the channel was completed to reduce the potential for erosion that could impact the hydraulic capacity of the channel, and help maintain long term functionality of the improvements completed in 2007. Improvements to Batchelder Road, Pleasant Street, and River Street have decreased the risk of isolation during a flood.

Ordinances in place that relate to hazard mitigation include Stormwater Management, Erosion and Sediment Control, and Zoning Regulations that require stormwater management and erosion and sediment control. Regulations also require power lines be buried at new developments.



The Fire Department is completely volunteer, and has a good system in place to recruit and train volunteers. The DPW is responsible for, and fully capable of completing, tree removal. GIS work relevant to hazard mitigation is performed in-house.

New Capabilities

The restrooms and showers at the emergency shelter were upgraded to better meet sheltering needs.

The Fire Department has purchased new self-contained breathing apparatus for all stations.

Windsor was updating the Town website at the time of plan development to include information on emergency preparedness; the website will include instructions on preparing an “emergency kit.”

Challenges

Challenges Overview

Challenges the community faces regarding responding to natural disasters include areas within town that may become inaccessible due to flooding, the need for emergency generators at locations that provide life safety services to parts of the community, and the difficulty of retrieving real time data regarding the status of upstream dams to anticipate flooding impacts.

Areas at risk of flooding include Batchelder Road, Pleasant Street, and River Street.

There are no dry hydrants in Town.

Hazard Losses

The economic losses faced by the community from natural hazards can be estimated by reviewing historic, and modeling future, loss figures. Loss estimates are summarized below.

Historic FEMA Payments

FEMA reimburses communities for hazard losses through programs including Public Assistance (PA) and the National Flood Insurance Program (NFIP). Combining PA and private flood insurance payments can give an estimate for total losses to a community.

The National Flood Insurance Program (NFIP) has paid out 26 claims in Windsor totaling \$90,399.44 to-date. Repetitive losses are also a challenge for the town. Two properties adjacent to Meadow Brook in the southern end of town have been identified as repetitive loss (RL) structures. The NFIP has paid out \$31,638.42 in four claims on these properties.

Total PA reimbursements to the community were as follows:

- Flood Events: \$11,622 (\$612 annually)



- Hurricane Events: \$40,276 (\$2,120 annually)
- Winter Storm Events: \$1,906,450 (\$100,339 annually)

These are summarized in the tables below.

Table 37-2: Flood Event PA Reimbursements, Windsor

Incident	Sep 1999	Oct 2005
Declaration	9/23/1999	12/16/2005
Disaster No.	1302	1619
Entity	FEMA PA Reimbursement	
State	\$1,347	\$1,670
Municipal	\$0	\$8,604
Nonprofit	\$0	\$0
Total	\$1,347	\$10,275
Annualized	\$71	\$541

Table 37-3: Hurricane Wind Event PA Reimbursements, Windsor

Incident	Aug - Sep 2011 (T.S. Irene)
Declaration	9/2/2011
Disaster #	4023
Entity	FEMA PA Reimbursement
State	\$1,277
Municipal	\$38,999
Nonprofit	\$0
Total	\$40,276
Annualized	\$2,120

Table 37-4: Winter Storm PA Reimbursements, Windsor

Incident	Mar 2003	Dec 2003	Jan 2005	Feb 2006	Jan 2011	Oct 2011	Feb 2013
Declaration	3/11/03	1/15/04	2/17/05	5/2/06	3/3/11	11/17/11	3/21/13
Disaster #	3176	3192	3200	3266	1958	4046	4106
Entity	FEMA PA Reimbursement						
State	\$25,183	\$22,576	\$29,783	\$36,151	\$31,497	\$12,989	\$61,211
Municipal	\$43,105	\$65,268	\$76,340	\$82,281	\$118,753	\$1,081,215	\$207,493
Nonprofit	\$7,709	\$0	\$0	\$0	\$4,897	\$0	\$0
Total	\$75,997	\$87,843	\$106,123	\$118,432	\$155,147	\$1,094,204	\$268,704
Annualized	\$4,000	\$4,623	\$5,585	\$6,233	\$8,166	\$57,590	\$14,142



National Centers for Environmental Information Losses

The table below summarizes events in the National Centers for Environmental Information (NCEI) severe storm database that were specifically noted as having impacted the community since 2012.

Table 37-5: NCEI Database Losses since 2012, Windsor

Date	Event	Property Damage
7/1/2013	Tornado	*\$1,700,000
Total		\$1,700,000

* Damages from storm divided between multiple communities

NCEI losses under other event categories (such as drought, high wind, flooding, and winter storms) were not specifically noted as impacting this community, though they did impact Hartford County and nearby towns. NCEI losses are reported in Section II of this Plan.

HAZUS-MH Losses

CRCOG used FEMA’s Hazus-MH model to analyze the risks that the community might face from flooding, hurricanes, and earthquakes. The model estimates economic losses due to damage to buildings and building contents, as well as other economic disruptions. Both residential and commercial structures are addressed. Losses from different hazards are summarized below. Where available, estimates from the previous and current versions of the HMP are provided side-by-side; differences between the two may have been caused by a combination of the following:

- Changes in methodology: such as hazard zone mapping
- Changes in data: such as population and property values
- Changes in the model: this HMP utilized Hazus-MH version 4.0 rather than 2.1
- Other factors: inherent in a complex software like Hazus-MH

More details are available in the Multi-Jurisdictional HMP. Ultimately, changes in the loss estimates reflect the reality that small differences in hazard event features can have a significant impact on losses incurred.



Table 37-6: Estimated Damages to Windsor from a 1% Annual-Chance Flood

Loss Type	2014 Results	2018 Results
Households Displaced	614	469
People Needing Shelter	1,575	847
Buildings at Least Moderately Damaged	292	19
Economic Losses		
Residential Building & Content Losses	\$89,300,000	\$53,714,012
Other Building & Content Losses	\$43,170,000	\$35,092,664
Total Building & Content Loss	\$132,470,000	\$88,806,676
Total Business Interruption Losses	\$240,000	\$1,592,762
TOTAL	\$132,710,000	\$90,399,437

Table 37-7: Estimated Damages to Windsor from a 1% Annual-Chance Hurricane

Loss Type	2014 Results (1938 event)	2018 Results (1% track)
Buildings at Least Moderately Damaged	978	6
Buildings Completely Damaged	59	0
Total Debris Generated	44,721 tons	7968
Truckloads (at 25 tons/truck) of building debris	492	319
Economic Losses		
Residential Building & Content Losses	\$97,120,000	\$19,700,717
Other Building & Content Losses	\$23,750,000	\$712,319
Total Building & Content Loss	\$120,870,000	\$20,413,036
Total Business Interruption Losses	\$14,660,000	\$534,803
TOTAL LOSSES	\$135,530,000	\$20,947,839

Losses were calculated from a modeled probabilistic earthquake (1% annual-chance of occurrence), as well as for four specific scenarios with epicenters around Connecticut.

Table 37-8: Estimated Damages to Windsor from a Probabilistic Earthquake

Loss Type	2018 Results
Wage Loss	\$4,540
Rent Loss	\$4,337
Relocation Loss	\$6,986
Income Loss	\$3,752
Inventory Loss	\$544
Total Business Disruption	\$20,159
Structural Loss	\$14,331
Non-Structural Loss	\$43,065
Total Building Loss	\$57,395
Total Content Loss	\$17,564
TOTAL LOSSES	\$95,119



Table 37-9: Estimated Damages to Windsor from Modeled Earthquake Scenarios

Epicenter Location	Magnitude	Estimated Total Losses
East Haddam	6.4	\$359,252.95
Haddam	5.7	\$82,561.47
Portland	5.7	\$228,901.83
Stamford	5.7	\$9,581.82

Average Annualized Losses

Average Annualized Loss (AAL) figures are useful tools for comparison of the risks faced from different hazards with different likelihoods of occurring in a given time period. AAL estimates were prepared for each natural hazard that may impact the community based on the methodologies discussed in Section II of the Multi-Jurisdictional HMP. Dam failure, drought, tornado, and wildfire losses were sourced from the 2014 Connecticut Natural Hazard Mitigation Plan Update, with dam failure data supplemented by the National Performance of Dams Program and the Connecticut Department of Energy & Environmental Protection. Earthquake and hurricane losses were calculated in HAZUS-MH. Losses for flooding came from NFIP claims, for winter storms from Public Assistance Reimbursements, and for thunderstorms from the NCEI database. These are presented in the table below in dollars per year. Note that Hurricanes and Tropical Storms represent the largest share of total annualized losses.

Table 37-10: Average Annualized Losses, Windsor

Dam Failure	Drought	Earthquakes	Flooding	Hurricanes and Tropical Storms	Severe Winter Storms	Thunderstorms	Tornadoes	Wildfires	Total
\$52	\$0	\$95,119	\$2,991	\$1,820,726	\$100,339	\$3,857	\$426,130	\$5,483	\$2,454,698

Losses Summary

A review of the above loss estimates demonstrates that the Town of Windsor has experienced significant expenses as a result of natural hazards and is at risk for additional losses if some of the less-frequent events were to occur. These actual and potential losses justify hazard mitigation actions to reduce losses in the future.

Mitigation Strategies and Actions

Noted Hazard Mitigation Needs

Over the course of Plan development, specific hazard mitigation needs were noted.

- Windsor is in need of a new communication system for emergency services. The Town intends to replace the current system in 2019 if accepted by the Town Council and voters in the fall of 2018.



Status of Previous Mitigation Strategies and Actions

The Town of Windsor reviewed the mitigation actions proposed in the 2014-2019 Capitol Region Natural Hazards Mitigation Plan Update and determined the status of each. That information is included in the table below.

Table 37-11: Status of Previous Mitigation Strategies and Actions, Windsor

Action #	Action	Notes	Status
GOAL: REDUCE THE IMPACT OF FLOODING ON PROPERTY, TRANSPORTATION AND TOWN INFRASTRUCTURE.			
Objective 1: Review and analyze (Mill, Meadow and Deckers Brooks) watersheds.			
1.1	Map flooding extents from 1984, 2003 and 2005 incidents.	Not completed due to limited resources. Action is combined with action 1.2.	Carry Forward with Revisions
1.2	Prioritize watersheds based on historic negative impact.	Not completed due to limited resources. Action is combined with action 1.1.	Carry Forward with Revisions
1.3	Implement identified improvements.	Action depends on completion of above actions and is outside the planning period of this document.	Drop
Objective 2: Ensure emergency service accessibility through transportation infrastructure improvements.			
2.1	Develop and implement maintenance plan for River Street retaining wall.	Not completed due to limited resources.	Carry Forward
2.2	Identify, prioritize and implement local road improvements.	Town has Pavement Management Program, including inspections.	Capability
2.3	Pursue improvements of state roads with the CT Department of Transportation.	Town feels CT DOT is capable of improving State roads and this action is not necessary	Drop
Objective 3: Reduce flooding impacts through infrastructure enhancements.			
3.1	Increase stormwater retention capacity.	Improvements to Town drainage made yearly, detention basins cleaned annually. Focus on zoning and compliance with MS4.	Capability
3.2	Develop and implement maintenance plan for stormwater facilities.	Inventory of town facilities complete. Need to implement formal maintenance plan and evaluation.	Carry Forward with Revisions
3.3	Support Metropolitan District Commission efforts to prevent flood water infiltration of sewer system.	MDC reaches out to residents and supports their efforts. The Town will continue to work with the MDC on addressing infiltration issues throughout the town.	Carry Forward with Revisions
3.4	Conduct public information campaign on property maintenance with respect to flooding, wind, freezing and other hazards.	No outreach conducted due to limited resources. Need to use websites and social media to educate public.	Carry Forward with Revisions
Objective 4: Ensure adequate flood insurance coverage for residents.			
4.1	Pursue Community Rating System designation from FEMA.	Town has not yet ascertained that this action is cost-beneficial. Replace with new action below.	Carry Forward with Revisions



Active Mitigation Strategies and Actions

The Town proposed to initiate several new mitigation actions for the upcoming five years. Additionally, a number of actions from the previous planning period are being carried forward or replaced with revised actions. These are listed below.

Each of the following actions has been prioritized based on FEMA guidelines, listed from highest to lowest priority, and numbered.

Action #1

Require "Inspection & Maintenance Agreement" recorded on land records for private developments.

Goal	2. Ensure Municipal Codes and Regulations support hazard mitigation
Category	Prevention
Lead	Engineering
Cost	\$0 - \$10,000
Funding	Town Operating Budget
Timeframe	07/2019 - 06/2020
Priority	High

Action #2

Conduct outreach on ongoing maintenance with respect to flooding, wind, freezing and other hazards. Use town web page for information in addition to social media.

Goal	6. Improve public outreach, education, and warning systems
Category	Education & Awareness
Lead	Emergency Management
Cost	\$0 - \$10,000
Funding	Town Operating Budget
Timeframe	07/2019 - 06/2020
Priority	High

Action #3

Replace the Town's emergency services communications system.

Goal	7. Improve the emergency response capabilities of the region and its communities
Category	Preparedness & Emergency Response
Lead	Safety Services
Cost	More than \$100,000
Funding	Town Capital Improvement Budget
Timeframe	07/2022 - 06/2023
Priority	High



Action #4

Identify, prioritize and implement local road improvements on an annual basis.

Goal	5. Improve the resilience of local and regional utilities and infrastructure using strategies including adaptation, hardening, and creating redundancies.
Category	Structural Projects
Lead	Public Works
Cost	\$0 - \$10,000
Funding	Town Operating Budget
Timeframe	07/2019 - 06/2024
Priority	Medium

Action #5

Conduct outreach to local small businesses with the aim of preventing the accidental release and pollution from chemicals stored and used at their facilities during or following natural hazard events.

Goal	6. Improve public outreach, education, and warning systems
Category	Education & Awareness
Lead	Planning, in coordination with DEEP
Cost	\$0 - \$10,000
Funding	Materials & Resources Provided by CT DEEP
Timeframe	07/2019 - 06/2020
Priority	Medium

Action #6

Coordinate with NEMO and CRCOG to share resources and gain technical support for hazard mitigation actions involving stormwater management and public outreach, which have parallel benefits related to MS4 stormwater permit compliance.

Goal	1. Minimize the impact of natural hazards on physical buildings and infrastructure
Category	Prevention
Lead	Public Works
Cost	\$0 - \$10,000
Funding	Town Operating Budget
Timeframe	07/2020 - 06/2021
Priority	Medium



Action #7

Increase sheltering capacity by identifying additional shelter facilities. Consider looking at new shelter at 330 Windsor Ave.

Goal	7. Improve the emergency response capabilities of the region and its communities
Category	Preparedness & Emergency Response
Lead	Emergency Management
Cost	\$0 - \$10,000
Funding	Town Operating Budget
Timeframe	07/2020 - 06/2023
Priority	Medium

Action #8

Increase training for hazard response, e.g. National Incident Management System (NIMS). Include fire, police, EOC and schools.

Goal	7. Improve the emergency response capabilities of the region and its communities
Category	Preparedness & Emergency Response
Lead	Emergency Management
Cost	\$0 - \$10,000
Funding	Town Operating Budget / Grants / DEMHS
Timeframe	07/2020 - 06/2023
Priority	Medium

Action #9

Review and revise, as necessary, zoning regulations to ensure developers maintain stormwater retention capacity in compliance with MS4 zoning requirements.

Goal	2. Ensure Municipal Codes and Regulations support hazard mitigation
Category	Prevention
Lead	Engineering
Cost	\$10,000 - \$25,000
Funding	Town Operating Budget / Grants / CT DEEP
Timeframe	07/2019 - 06/2021
Priority	Medium



Action #10

Work with MDC to identify potential hazard mitigation actions for MDC facilities, and list those actions in the next HMP Update.

Goal	5. Improve the resilience of local and regional utilities and infrastructure using strategies including adaptation, hardening, and creating redundancies.
Category	Property Protection
Lead	Public Works
Cost	\$10,000 - \$25,000
Funding	DEMHS / MDC
Timeframe	07/2020 - 06/2022
Priority	Medium

Action #11

Develop and implement maintenance plan for all identified stormwater facilities.

Goal	5. Improve the resilience of local and regional utilities and infrastructure using strategies including adaptation, hardening, and creating redundancies.
Category	Prevention
Lead	Public Works
Cost	\$50,000 - \$100,000
Funding	Town Operating Budget / Grants
Timeframe	07/2023 - 06/2024
Priority	Medium

Action #12

Identify and develop a secondary emergency operations center.

Goal	7. Improve the emergency response capabilities of the region and its communities
Category	Preparedness & Emergency Response
Lead	Emergency Management
Cost	More than \$100,000
Funding	Grants / DEMHS
Timeframe	07/2021 - 06/2023
Priority	Medium



Action #13

Participate in EMI courses or the seminars and annual conference held by the Connecticut Association of Flood Managers.

Goal	3. Improve institutional awareness and understanding of natural hazard impacts and mitigation within municipal governments and other decision-making bodies
Category	Education & Awareness
Lead	Engineering
Cost	\$0 - \$10,000
Funding	Town Operating Budget
Timeframe	07/2019 - 06/2024
Priority	Low

Action #14

Contact the owners of Repetitive Loss Properties and nearby properties at risk to inquire about mitigation undertaken and suggest options for mitigating flooding in those areas. This should be accomplished with a letter directly mailed to each property owner.

Goal	1. Minimize the impact of natural hazards on physical buildings and infrastructure
Category	Property Protection
Lead	Planning
Cost	\$0 - \$10,000
Funding	Town Operating Budget / DEMHS
Timeframe	07/2021 - 06/2022
Priority	Low

Action #15

Complete an analysis of costs and benefits of joining the FEMA Community Rating System.

Goal	1. Minimize the impact of natural hazards on physical buildings and infrastructure
Category	Prevention
Lead	Planning
Cost	\$0 - \$10,000
Funding	Town Operating Budget
Timeframe	07/2021 - 06/2023
Priority	Low



Action #16

Work with CT DEEP to complete a formal validation of the Repetitive Loss Property list and update the mitigation status of each listed property.

Goal	1. Minimize the impact of natural hazards on physical buildings and infrastructure
Category	Property Protection
Lead	Planning
Cost	\$10,000 - \$25,000
Funding	Town Operating Budget / CT DEEP / DEMHS
Timeframe	07/2021 - 06/2023
Priority	Low

Action #17

Perform a flood risk assessment of the Mill, Meadow, and Deckers Brooks watersheds. Consider flood extents from the 1984, 2003, and 2005 events.

Goal	3. Improve institutional awareness and understanding of natural hazard impacts and mitigation within municipal governments and other decision-making bodies
Category	Property Protection
Lead	Engineering
Cost	\$25,000 - \$50,000
Funding	Grants
Timeframe	07/2023 - 06/2024
Priority	Low

Action #18

Develop and implement maintenance plan for River Street retaining wall.

Goal	5. Improve the resilience of local and regional utilities and infrastructure using strategies including adaptation, hardening, and creating redundancies.
Category	Structural Projects
Lead	Public Works
Cost	\$50,000 - \$100,000
Funding	Town Operating Budget / Grants
Timeframe	07/2023 - 06/2024
Priority	Low













Capitol Region Natural Hazards Mitigation Plan Update

Windsor, Connecticut




Flood Plains, Dams
& Critical Facilities

Critical Facilities



-  Emergency Center
-  Fire Station
-  Healthcare Facility
-  Police Station
-  Public Infrastructure
-  School
-  State Facility
-  Town Facility
-  Waste Water Facility
-  NRHP Buildings/Sites

 NRHP Districts/Areas

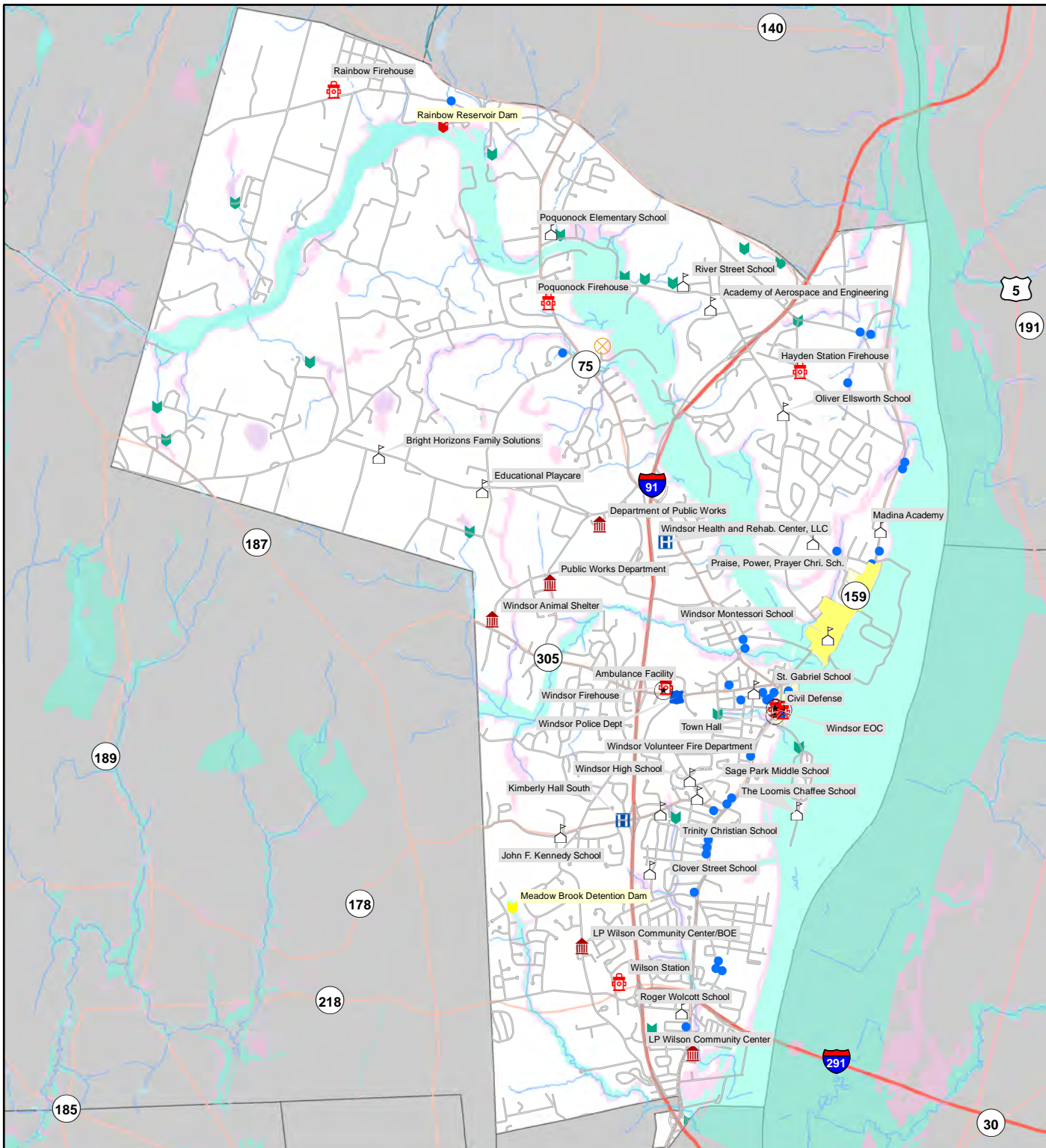
Dam Hazard Class

-  A, AA, BB or Unclassified
-  Class B-Significant Hazard
-  Class C- High Hazard

FEMA Flood Hazard Area

-  100 Year Flood Zone
-  500 Year Flood Zone

Data Sources: FEMA, National Register of Historic Places, CT DEEP, CRCOG, ESRI



Capitol Region Natural Hazards Mitigation Plan Update

Windsor, Connecticut Dam Breach Inundation Area & Critical Facilities

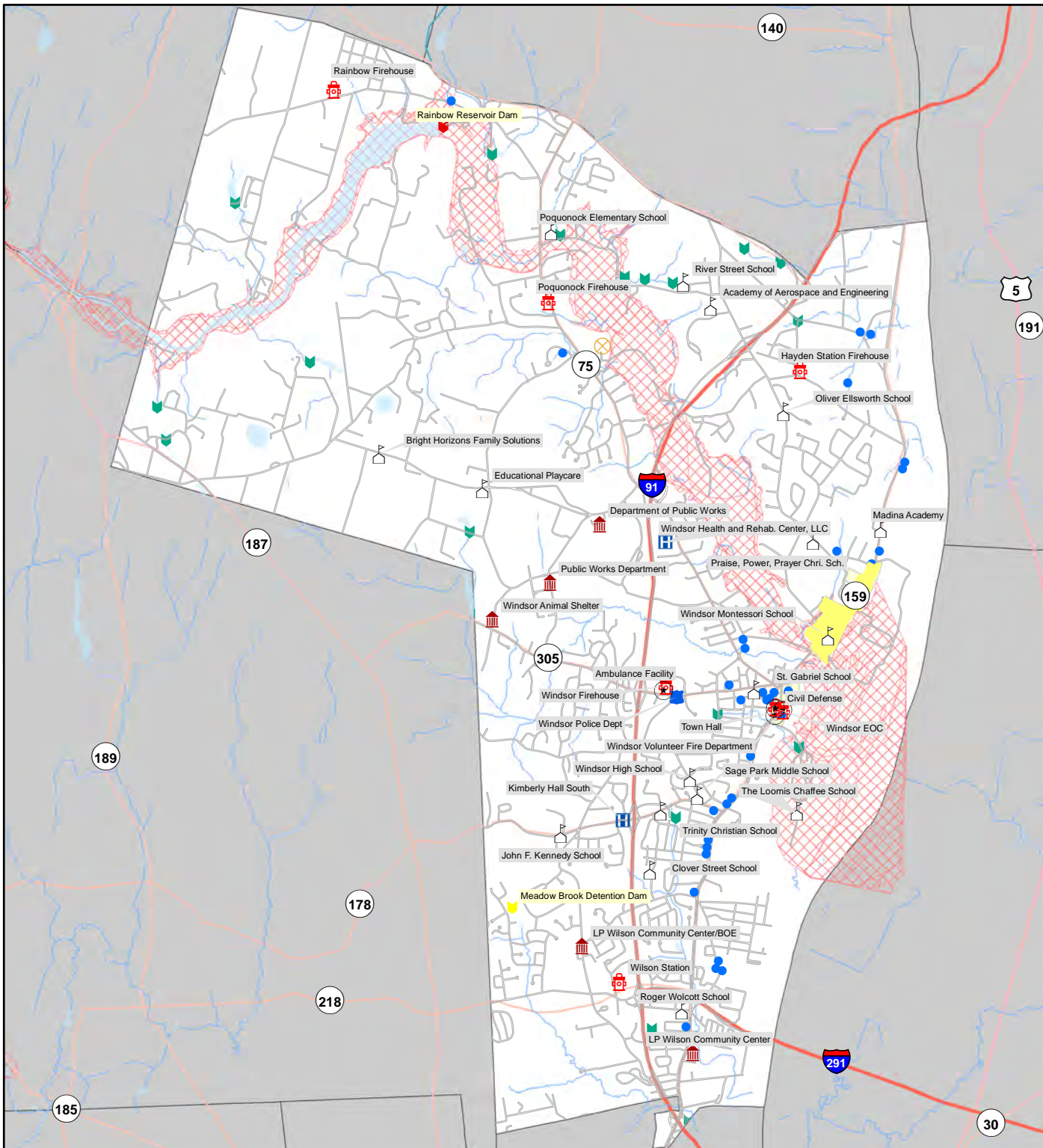
Critical Facilities

- ★ Emergency Center
- 🚒 Fire Station
- 🏥 Healthcare Facility
- 👮 Police Station
- 🏢 Public Infrastructure
- 🎓 School
- 🏛️ State Facility
- 🏠 Town Facility
- 🚰 Waste Water Facility
- NRHP Buildings/Sites

🟡 NRHP Districts/Areas

Dam Hazard Class

- 🟢 A, AA, BB or Unclassified
- 🟡 Class B-Significant Hazard
- 🔴 Class C- High Hazard
- 🔴🔴 Dam Breach Inundation Areas



Data Sources: FEMA, National Register of Historic Places, CT DEEP, CRCOG, ESRI





38 Windsor Locks

Community Overview

Windsor Locks is a fully suburban community that encompasses only nine square miles but has a population of approximately 12,400. The land area of Windsor Locks ranges from about 75 to 150 feet above sea level and contributes to three watersheds: primarily the Connecticut River Mainstem, but also Stony Brook in the northwest and Farmington River in the southwest. The Connecticut River forms the eastern Town boundary. Other watercourses include Adds, Dibble Hollow, Kettle and Waterworks Brooks. Principal industries include food servicing and distribution, manufacture of aerospace products, paper products, electronics and machines. Hamilton Sundstrand is the Town's largest employer.

Major transportation routes through Windsor Locks include Interstate 91 and state routes 75, 140 and 159. In addition, highway 20, the connector between Interstate 91 and Bradley International Airport forms the southern town boundary. An Amtrak commuter rail line and the Hartford Line commuter rail each stop in the Town. The majority of Bradley International Airport, the second largest commercial airport in New England, is located within Windsor Locks, as well as significant numbers of hotels and related travel services. The Town reports that it has 1,600 hotel rooms, and 7 million people a year pass through Bradley International Airport.

Windsor Locks has very little undeveloped land, but continued development and redevelopment is expected. Several new neighborhoods, mostly single-story homes, have been developed in recent years. Montgomery Mill was being converted to apartments as this plan was being developed, and Windsor Locks is expecting a new train station and train stop. Many attempts have been made to develop a 70-acre parcel along Route 20, so far unsuccessfully. An area of open space at South Center Street and Old Common Road has been preserved by the water company.

Critical Facilities

Critical Facilities throughout the Capitol Region are listed in Appendix B. In Windsor Locks these include the Town Hall, Safety Complex (including police and fire), Senior Center, Public Works building, Water Pollution Control Facility (WPCF), six pump stations, the Eversource Substation on South Main Street, Bradley International Airport, a communication tower behind the Safety Complex, a High School, a Middle School, two Elementary Schools, two Senior Housing Complexes, Bickford Health Center, and Stonebrook Village assisted living. The Emergency Operations Center operates out of the Town Hall. The Windsor Locks High School is the primary shelter, and is used by Eversource as a staging area for storm response. The Town Hall and the Senior Center can function as a temporary shelter. The Town is interested in making South Street Elementary School, adjacent to the High School, into a backup shelter.

Table 38-1: Critical Facilities, Windsor Locks

Facility	Shelter	Generator
Town Hall (EOC)	Heating/Cooling Center	Yes
Safety Complex		Yes
Senior Center	Heating/Cooling Center	Yes
Water Pollution Control Facility		Yes
6 Pump Stations		Yes
Bradley International Airport		Yes
Communication Tower at Safety Complex		Yes
High School	Primary	80%
Middle School		
2 Elementary Schools		
2 Senior Housing Complexes		
Bickford Health Center		Yes
Stonebrook Village		Yes

Capabilities

Hazard mitigation is incorporated, to some degree, into the Windsor Locks Plan of Conservation and Development (POCD). POCD actions specifically address natural hazards. No construction has been permitted in flood prone areas since 2008.

Windsor Locks has a local CERT team.

The Town maintains a list of nuisance and high hazard flooding areas.

The Town has commissioned various efforts for the planning and revitalization of Main Street, including relocating the existing train station from the southern part of town to a downtown location, implementing traffic mitigation, and redeveloping Montgomery Mill. Opportunities for mitigation will be considered as planning efforts continue. The Town has also been working with property owners along the Connecticut River to encourage open space preservation, community gardens and other creative low impact uses on their lands.

Eversource maintains and trims trees along powerlines and provides the Town with other tree maintenance assistance. The Town does not trim trees but has the capacity to remove debris from roads.

Windsor Locks has two water tanks for firefighting water; one at the Safety Complex and one on Suffield Street. The Town does not have any dry hydrants, but two will be installed as part of the Montgomery Mill conversion project.

New Capabilities

Windsor Locks has acquired a new generator for the communication tower behind the Safety Complex.

Remediation of contaminants at the Montgomery Mills site has been completed. The building is currently being converted to apartments. Retaining walls have been repaired at the river,



and two areas of ongoing erosion have been stabilized with riprap, as per DEEP recommendations; other areas are stabilized with vegetative cover. A long linear bioswale has been constructed parallel to the river to better manage stormwater and mitigate runoff prior to water entering the river. The lower level of the mill is being used for storage and parking, and additional parking is available north of the property in the event of flooding of the lower parking area. The canal side of the property has been converted to a pedestrian promenade with emergency vehicle access possible. Land adjacent to the redeveloped Montgomery Mill will continue to be passive recreation, and a trailhead has been expanded to provide simple amenities such as benches and bike racks (which are properly anchored against flooding). An emergency management plan for the site has been filed with the Town to be carried out by the developer or property manager along with future residents.

Challenges

Challenges Overview

Flooding, high winds, and severe winter storms are the primary hazard of concern for Windsor Locks. Localized flooding and downed trees resulting in impassable roads continue to be a major worry for emergency response staff in terms of their ability to reach people in need. Several existing commercial and industrial buildings are located in identified hazard areas.

Contaminants have been recorded on the Ahlstrom Nonwovens LLC property; this is located on the Connecticut River and so is considered vulnerable. Other locations where hazardous materials are a concern include the United Technologies building, the train that traverses town with hazardous cargo, Interstate 91 and Route 20, a dedicated aviation fuel pipeline, a matrix of natural gas pipelines, the Co-Generation Plant on the bank of the Connecticut River, and the Fed-Ex and UPS trucking facilities.

Water Pollution Control staff are concerned with access to and shut-down of three locations: Dexter Pump Station, South Main Street Pump Station and the WPCF. Estimates of potential dollar losses to such structures range from \$750,000 to \$1.5-million for the Dexter Pump Station's contents and \$175,000 to \$250,000 for the South Main Street Pump Station's contents. The Public Works building, adjacent to the WPCF, is also located within a floodplain and is at risk of flooding and loss of access. Other areas of flood risk include:

- Center Street in front of the Middle School (this is identified as the biggest flood issue in Town)
- Main Street and Chestnut Street in front of the commons
- Main Street and Elm Street
- South Main Street near Interstate 91
- Reed Avenue and Saddler Street
- Spring Street and West Street
- Bristol Road
- Smalley Road at Spring Street and at North Street



Windsor Locks has experienced three tornadoes, historically. One was an F4. The Town has also experienced microbursts.

The Town has experienced brush fires in wetlands on South Center Streets near Waterworks Brook. The Town does not have any dry hydrants.

Hazard Losses

The economic losses faced by Windsor Locks from natural hazards can be estimated by reviewing historic, and modeling future, loss figures. Loss estimates are summarized below.

Historic FEMA Payments

FEMA reimburses communities for hazard losses through programs including Public Assistance (PA) and the National Flood Insurance Program (NFIP). Combining PA and private flood insurance payments can give an estimate for total losses to a community.

The NFIP has paid 12 property damage claims in Windsor Locks totaling \$174,036 to-date. Windsor Locks has one repetitive loss (RL) property with two claims totaling \$11,878.

Total PA reimbursements to the community were as follows:

- Flood Events: \$90,721 (\$4,775 annually)
- Hurricane Events: \$111,919 (\$5,890 annually)
- Winter Storm Events: \$6,078,189 (\$319,905 annually)

These are summarized in the tables below.

Table 38-2: Flood Event PA Reimbursements, Windsor Locks

Incident	Sep 1999	Oct 2005
Declaration	9/23/1999	12/16/2005
Disaster No.	1302	1619
Entity	FEMA PA Reimbursement	
State	\$580	\$11,906
Municipal	\$31,837	\$46,398
Nonprofit	\$0	\$0
Total	\$32,417	\$58,304
Annualized	\$1,706	\$3,069



Table 38-3: Hurricane Wind Event PA Reimbursements, Windsor Locks

Incident	Aug - Sep 2011 (T.S. Irene)
Declaration	9/2/2011
Disaster #	4023
Entity	FEMA PA Reimbursement
State	\$90,872
Municipal	\$21,047
Nonprofit	\$0
Total	\$111,919
Annualized	\$5,890

Table 38-4: Winter Storm PA Reimbursements, Windsor Locks

Incident	Mar 2003	Dec 2003	Jan 2005	Feb 2006	Jan 2011	Oct 2011	Feb 2013
Declaration	3/11/03	1/15/04	2/17/05	5/2/06	3/3/11	11/17/11	3/21/13
Disaster #	3176	3192	3200	3266	1958	4046	4106
Entity	FEMA PA Reimbursement						
State	\$10,837	\$14,873	\$27,663	\$32,344	\$396,615	\$3,471,375	\$189,467
Municipal	\$29,350	\$37,670	\$42,123	\$39,129	\$58,134	\$1,624,829	\$103,779
Nonprofit	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Total	\$40,187	\$52,543	\$69,786	\$71,473	\$454,749	\$5,096,205	\$293,246
Annualized	\$2,115	\$2,765	\$3,673	\$3,762	\$23,934	\$268,221	\$15,434

National Centers for Environmental Information Losses

The table below summarizes events in the National Centers for Environmental Information (NCEI) severe storm database that were specifically noted as having impacted the community since 2012.

Table 38-5: NCEI Database Losses since 2012, Windsor Locks

Date	Event	Property Damage
7/18/2012	Lightning	\$1,000
8/9/2013	Flash Flood	\$0
9/11/2016	Thunderstorm Wind	\$5,000
7/12/2017	Hail	\$0
Total Thunderstorm		\$6,000
Total Flood		\$0

NCEI losses under other event categories (such as drought, high wind, flooding, and winter storms) were not specifically noted as impacting this community, though they did impact Hartford County and nearby towns. NCEI losses are reported in Section II of this Plan.



HAZUS-MH Losses

CRCOG used FEMA’s Hazus-MH model to analyze the risks that the community might face from flooding, hurricanes, and earthquakes. The model estimates economic losses due to damage to buildings and building contents, as well as other economic disruptions. Both residential and commercial structures are addressed. Losses from different hazards are summarized below. Where available, estimates from the previous and current versions of the HMP are provided side-by-side; differences between the two may have been caused by a combination of the following:

- Changes in methodology: such as hazard zone mapping
- Changes in data: such as population and property values
- Changes in the model: this HMP utilized Hazus-MH version 4.0 rather than 2.1
- Other factors: inherent in a complex software like Hazus-MH

More details are available in the Multi-Jurisdictional HMP. Ultimately, changes in the loss estimates reflect the reality that small differences in hazard event features can have a significant impact on losses incurred.

Table 38-6: Estimated Damages to Windsor Locks from a 1% Annual-Chance Flood

Loss Type	2014 Results	2018 Results
Households Displaced	9	16
People Needing Shelter	10	7
Buildings at Least Moderately Damaged	0	0
Economic Losses		
Residential Building & Content Losses	\$630,000	\$1,797,152
Other Building & Content Losses	\$1,780,000	\$6,463,464
Total Building & Content Loss	\$2,410,000	\$8,260,616
Total Business Interruption Losses	\$10,000	\$485,244
TOTAL	\$2,420,000	\$8,745,860

Table 38-7: Estimated Damages to Windsor Locks from a 1% Annual-Chance Hurricane

Loss Type	2014 Results (1938 event)	2018 Results (1% track)
Buildings at Least Moderately Damaged	479	1
Buildings Completely Damaged	27	0
Total Debris Generated	14,968 tons	2247
Truckloads (at 25 tons/truck) of building debris	227	90
Economic Losses		
Residential Building & Content Losses	\$35,760,000	\$5,812,088
Other Building & Content Losses	\$11,300,000	\$443,015
Total Building & Content Loss	\$47,060,000	\$6,255,103
Total Business Interruption Losses	\$7,210,000	\$382,901
TOTAL LOSSES	\$54,270,000	\$6,638,004



Losses were calculated from a modeled probabilistic earthquake (1% annual-chance of occurrence), as well as for four specific scenarios with epicenters around Connecticut.

Table 38-8: Estimated Damages to Windsor Locks from a Probabilistic Earthquake

Loss Type	2018 Results
Wage Loss	\$2,628
Rent Loss	\$2,189
Relocation Loss	\$3,347
Income Loss	\$2,351
Inventory Loss	\$192
Total Business Disruption	\$10,707
Structural Loss	\$6,303
Non-Structural Loss	\$21,507
Total Building Loss	\$24,943
Total Content Loss	\$7,456
TOTAL LOSSES	\$43,015

Table 38-9: Estimated Damages to Windsor Locks from Modeled Earthquake Scenarios

Epicenter Location	Magnitude	Estimated Total Losses
East Haddam	6.4	\$110,601.56
Haddam	5.7	\$23,972.76
Portland	5.7	\$56,737.58
Stamford	5.7	\$4,107.48

Average Annualized Losses

Average Annualized Loss (AAL) figures are useful tools for comparison of the risks faced from different hazards with different likelihoods of occurring in a given time period. AAL estimates were prepared for each natural hazard which may impact the community based on the methodologies discussed in Section II of the Multi-Jurisdictional HMP. Dam failure, drought, tornado, and wildfire losses were sourced from the 2014 Connecticut Natural Hazard Mitigation Plan Update, with dam failure data supplemented by the National Performance of Dams Program and the Connecticut Department of Energy & Environmental Protection. Earthquake and hurricane losses were calculated in HAZUS-MH. Losses for flooding came from NFIP claims, for winter storms from Public Assistance Reimbursements, and for thunderstorms from the NCEI database. These are presented in the table below in dollars per year. Note that Hurricanes and Tropical Storms represent the largest share of total annualized losses.

Table 38-10: Average Annualized Losses, Windsor Locks

Dam Failure	Drought	Earthquakes	Flooding	Hurricanes and Tropical Storms	Severe Winter Storms	Thunderstorms	Tornadoes	Wildfires	Total
\$22	\$0	\$43,015	\$9,335	\$783,482	\$319,905	\$1,660	\$183,369	\$1,667	\$1,342,484



Losses Summary

A review of the above loss estimates demonstrates that the Town of Windsor Locks has experienced significant expenses as a result of natural hazards, and is at risk for additional losses if some of the less-frequent events were to occur. These actual and potential losses justify hazard mitigation actions to reduce losses in the future.

Mitigation Strategies and Actions

Status of Previous Mitigation Strategies and Actions

The Town of Windsor Locks reviewed the mitigation actions proposed in the 2014-2019 Capitol Region Natural Hazards Mitigation Plan Update and determined the status of each. That information is included in the table below.

Table 38-11: Status of Previous Mitigation Strategies and Actions, Windsor Locks

Action #	Action	Notes	Status
GOAL: REDUCE THE LOSS OF LIFE AND PROPERTY AND THE ECONOMIC CONSEQUENCES THAT RESULT FROM FLOODING, HIGH WINDS, SEVERE WINTER STORMS AND OTHER NATURAL DISASTERS. REDUCE LOSS OF ACCESS AND POWER TO SIGNIFICANT BUILDINGS SUCH AS WATER POLLUTION CONTROL FACILITY, DEXTER PUMP STATION, SOUTH MAIN PUMP STATION, SCHOOLS, SENIOR CENTER, REHAB CENTER, TOWN BUILDINGS USE FOR EMERGENCY PURPOSES. INCREASE RESIDENT AND BUSINESS EMPLOYEE KNOWLEDGE OF WARNING SYSTEMS.			
Objective 1: Reduce future flooding by improving, modifying and/or replacing existing man-made and natural drainage systems.			
1.1	Address drainage issues on Papermill Brook at Center Street/ Whitton Street.	Some work has been done but this is still an issue. A new homeowner was removed from the area.	Carry Forward with Revisions
1.2	Address drainage issues at Chestnut and Main Streets.	Drainage system was cleaned and a trash rack installed. Property owner is not maintaining it.	Carry Forward with Revisions
1.3	Address drainage issues on Kettle Brook at Middle School on Center Street.	Town has performed cleanings of system but needs homeowner to help with maintenance. Future cleanouts will be undertaken on an as needed basis	Carry Forward with Revisions
1.4	Address drainage issues on Industrial Road.	Action not yet completed due to limited resources.	Carry Forward
1.5	Address drainage issues at West and Spring Streets.	Action not yet completed due to limited resources.	Carry Forward
1.6	Address drainage issues in the Smally Road area.	Action not yet completed due to limited resources.	Carry Forward
1.7	Address drainage issues on Bristol Road.	Action not yet completed due to limited resources.	Carry Forward
1.8	Address drainage issues at Dibble Hollow and Bel Air Circle.	Action not yet completed due to limited resources.	Carry Forward
1.9	Address drainage issues at Gaylord and Lowndes Drive.	Action not yet completed due to limited resources.	Carry Forward



Action #	Action	Notes	Status
Objective 2: Educate the property owners and business owners about updated horns and public address system, Everbridge alerts and tones.			
2.1	Work with school system to reach out to students/families to educate public.	Produced brochure for students, need to use Everbridge and Parent Link.	Completed
2.2	Use local advertising opportunities to educate public.	Outreach will be conducted periodically and prior to anticipated major storm events.	Capability
Objective 3: Ensure that new development will not increase flooding threats to existing properties.			
3.1	Review, amend as necessary, and enforce land use regulations.	Flood regulations have become more restrictive. No low impact development regulations.	Carry Forward with Revisions
Objective 4: Ensure continuity of public services during power outages.			
4.1	Provide generators for critical town facilities.	Complete except for South Elementary. Need to add natural gas to public safety complex.	Carry Forward with Revisions

Active Mitigation Strategies and Actions

The Town proposed to initiate several new mitigation actions for the upcoming five years. Additionally, a number of actions from the previous planning period are being carried forward or replaced with revised actions. These are listed below.

Each of the following actions has been prioritized based on FEMA guidelines, listed from highest to lowest priority, and numbered.

Action #1	
Maintain trash rack at Chestnut and Main Streets.	
Goal	5. Improve the resilience of local and regional utilities and infrastructure using strategies including adaptation, hardening, and creating redundancies.
Category	Prevention
Lead	Public Works
Cost	\$0 - \$10,000
Funding	Town Operating Budget
Timeframe	01/2019 - 12/2019
Priority	High



Action #2

Enter the Sustainable CT program through Registration and review actions that can be undertaken to pursue Certification. Make progress with the actions related to hazard mitigation.

Goal	4. Increase the use of natural, "green," or "soft" hazard mitigation measures, such as open space preservation and green infrastructure.
Category	Natural Resources Protection
Lead	Planning
Cost	\$0 - \$10,000
Funding	Town Operating Budget
Timeframe	01/2019 - 12/2019
Priority	High

Action #3

Address plumbing issues at Waterworks Property, particularly exposed and eroded pipe.

Goal	5. Improve the resilience of local and regional utilities and infrastructure using strategies including adaptation, hardening, and creating redundancies.
Category	Structural Projects
Lead	Public Works
Cost	\$10,000 - \$25,000
Funding	Town Operating Budget
Timeframe	07/2019 - 06/2021
Priority	High

Action #4

Develop designs and a cost-estimate for elevation of the fueling tank at the 1 Stanton Road DPW site; tank is currently underground and at-risk of being impacted by flooding.

Goal	5. Improve the resilience of local and regional utilities and infrastructure using strategies including adaptation, hardening, and creating redundancies.
Category	Structural Projects
Lead	Public Works
Cost	\$10,000 - \$25,000
Funding	Town Operating Budget / Grants
Timeframe	07/2019 - 06/2021
Priority	High



Action #5

Conduct outreach to local small businesses with the aim of preventing the accidental release and pollution from chemicals stored and used at their facilities during or following natural hazard events.

Goal	6. Improve public outreach, education, and warning systems
Category	Education & Awareness
Lead	Planning, in coordination with DEEP
Cost	\$0 - \$10,000
Funding	Materials & Resources Provided by CT DEEP
Timeframe	01/2019 - 12/2019
Priority	Medium

Action #6

Coordinate with NEMO and CRCOG to share resources and gain technical support for hazard mitigation actions involving stormwater management and public outreach, which have parallel benefits related to MS4 stormwater permit compliance.

Goal	1. Minimize the impact of natural hazards on physical buildings and infrastructure
Category	Prevention
Lead	Public Works
Cost	\$0 - \$10,000
Funding	Town Operating Budget
Timeframe	01/2020 - 12/2020
Priority	Medium

Action #7

Review land use regulations (other than the recently updated flood regulations) to determine their effectiveness at minimizing natural hazard exposure, and amend as necessary.

Goal	2. Ensure Municipal Codes and Regulations support hazard mitigation
Category	Prevention
Lead	Planning
Cost	\$0 - \$10,000
Funding	Town Operating Budget
Timeframe	07/2020 - 06/2021
Priority	Medium



Action #8

Participate in EMI courses or the seminars and annual conference held by the Connecticut Association of Flood Managers.

Goal	3. Improve institutional awareness and understanding of natural hazard impacts and mitigation within municipal governments and other decision-making bodies
Category	Education & Awareness
Lead	Planning
Cost	\$0 - \$10,000
Funding	Town Operating Budget
Timeframe	07/2019 - 06/2024
Priority	Medium

Action #9

Work with MDC to identify potential hazard mitigation actions for MDC facilities, and list those actions in the next HMP Update.

Goal	5. Improve the resilience of local and regional utilities and infrastructure using strategies including adaptation, hardening, and creating redundancies.
Category	Property Protection
Lead	Public Works
Cost	\$10,000 - \$25,000
Funding	Town Operating Budget / DEMHS
Timeframe	07/2020 - 06/2022
Priority	Medium

Action #10

Develop a list of local resources, including non-profits, volunteers, and gas-stations and grocery stores with emergency generators, to distribute to residents prior to forecast hazard events.

Goal	7. Improve the emergency response capabilities of the region and its communities
Category	Preparedness & Emergency Response
Lead	Emergency Management
Cost	\$10,000 - \$25,000
Funding	Town Operating Budget
Timeframe	07/2020 - 06/2022
Priority	Medium



Action #11

Add generator to South Elementary and add natural gas to Public Safety Complex.

Goal	7. Improve the emergency response capabilities of the region and its communities
Category	Preparedness & Emergency Response
Lead	Emergency Management
Cost	\$10,000 - \$25,000
Funding	Town Operating Budget / DEMHS
Timeframe	01/2020 - 12/2022
Priority	Medium

Action #12

Conduct annual outreach campaign to educate residents on signing up for emergency alerts, building and maintaining disaster plans and kits, and improving their disaster readiness.

Goal	7. Improve the emergency response capabilities of the region and its communities
Category	Education & Awareness
Lead	Emergency Management
Cost	\$10,000 - \$25,000
Funding	Town Operating Budget
Timeframe	07/2019 - 06/2024
Priority	Medium

Action #13

Identify emergency response needs and possible solutions with regards to space, generators, and equipment. Consider ADA compliance, equipment storage, and availability of portable generators.

Goal	7. Improve the emergency response capabilities of the region and its communities
Category	Preparedness & Emergency Response
Lead	Emergency Management
Cost	\$10,000 - \$25,000
Funding	Town Operating Budget
Timeframe	07/2020 - 06/2022
Priority	Medium



Action #14

Address drainage issues on Papermill Brook at Center Street/ Whitton Street.

Goal	5. Improve the resilience of local and regional utilities and infrastructure using strategies including adaptation, hardening, and creating redundancies.
Category	Structural Projects
Lead	Public Works
Cost	More than \$100,000
Funding	Town Operating Budget / Grants / DEMHS
Timeframe	07/2022 - 06/2024
Priority	Medium

Action #15

Address drainage issues on Kettle Brook at Middle School on Center Street in conjunction with homeowner.

Goal	5. Improve the resilience of local and regional utilities and infrastructure using strategies including adaptation, hardening, and creating redundancies.
Category	Structural Projects
Lead	Public Works
Cost	More than \$100,000
Funding	Town Operating Budget / Grants / DEMHS
Timeframe	07/2022 - 06/2024
Priority	Medium

Action #16

Address drainage issues on Industrial Road.

Goal	5. Improve the resilience of local and regional utilities and infrastructure using strategies including adaptation, hardening, and creating redundancies.
Category	Structural Projects
Lead	Public Works
Cost	More than \$100,000
Funding	Town Operating Budget / Grants / DEMHS
Timeframe	07/2022 - 06/2024
Priority	Medium



Action #17

Address drainage issues at West and Spring Streets.

Goal	5. Improve the resilience of local and regional utilities and infrastructure using strategies including adaptation, hardening, and creating redundancies.
Category	Structural Projects
Lead	Public Works
Cost	More than \$100,000
Funding	Town Operating Budget / Grants / DEMHS
Timeframe	07/2022 - 06/2024
Priority	Medium

Action #18

Address drainage issues in the Smally Road area.

Goal	5. Improve the resilience of local and regional utilities and infrastructure using strategies including adaptation, hardening, and creating redundancies.
Category	Structural Projects
Lead	Public Works
Cost	More than \$100,000
Funding	Town Operating Budget / Grants / DEMHS
Timeframe	07/2022 - 06/2024
Priority	Medium

Action #19

Address drainage issues on Bristol Rd.

Goal	5. Improve the resilience of local and regional utilities and infrastructure using strategies including adaptation, hardening, and creating redundancies.
Category	Structural Projects
Lead	Public Works
Cost	More than \$100,000
Funding	Town Operating Budget / Grants / DEMHS
Timeframe	07/2022 - 06/2024
Priority	Medium



Action #20

Address drainage issues at Dibble Hollow & Bel Air Circle.

Goal	5. Improve the resilience of local and regional utilities and infrastructure using strategies including adaptation, hardening, and creating redundancies.
Category	Structural Projects
Lead	Public Works
Cost	More than \$100,000
Funding	Town Operating Budget / Grants / DEMHS
Timeframe	07/2022 - 06/2024
Priority	Medium

Action #21

Address drainage issues at Gaylord and Lowndes Drive

Goal	5. Improve the resilience of local and regional utilities and infrastructure using strategies including adaptation, hardening, and creating redundancies.
Category	Structural Projects
Lead	Public Works
Cost	More than \$100,000
Funding	Town Operating Budget / Grants / DEMHS
Timeframe	07/2022 - 06/2024
Priority	Medium

Action #22

Contact the owners of Repetitive Loss Properties and nearby properties at risk to inquire about mitigation undertaken and suggest options for mitigating flooding in those areas. This should be accomplished with a letter directly mailed to each property owner.

Goal	1. Minimize the impact of natural hazards on physical buildings and infrastructure
Category	Property Protection
Lead	Planning
Cost	\$0 - \$10,000
Funding	Town Operating Budget / DEMHS
Timeframe	07/2021 - 06/2022
Priority	Low



Action #23

Work with school systems to conduct outreach using Everbridge and Parent Link.

Goal	6. Improve public outreach, education, and warning systems
Category	Education & Awareness
Lead	Emergency Management
Cost	\$0 - \$10,000
Funding	Town Operating Budget
Timeframe	01/2021 - 12/2022
Priority	Low

Action #24

Coordinate with CT SHPO to conduct historic resource surveys, focusing on areas within natural hazard risk zones (such as flood or wildfire hazard zones and areas near steep slopes), to support identification of vulnerable historic properties and preparation of resiliency plans across the state. This action leverages existing resources and best practices for protection of historic and cultural resources through an ongoing statewide initiative by CT SHPO.

Goal	8. Ensure community character and social equity are addressed in mitigation activities
Category	Property Protection
Lead	Planning, in coordination with SHPO
Cost	\$10,000 - \$25,000
Funding	SHPO
Timeframe	07/2021 - 06/2023
Priority	Low

Action #25

Conduct natural hazard education outreach at least once annually using social media, occasional mailings, and town events.

Goal	6. Improve public outreach, education, and warning systems
Category	Education & Awareness
Lead	Emergency Management
Cost	\$10,000 - \$25,000
Funding	Town Operating Budget
Timeframe	07/2019 - 06/2024
Priority	Low














Capitol Region Natural Hazards Mitigation Plan Update




Windsor Locks, Connecticut

Flood Plains, Dams & Critical Facilities




Critical Facilities

-  Fire Station
-  Police Station
-  School
-  Healthcare Facility
-  State Facility
-  Town Facility
-  Waste Water Facility
-  Emergency Center
-  NRHP Buildings/Sites

Dam Hazard Class

-  BB, A, AA OR Unclassified
-  Class B - Significant Hazard
-  Class C - High Hazard

FEMA Flood Hazard Area

-  100 Year Flood Zone
-  500 Year Flood Zone
-  NRHP Districts/Areas

Data Sources: FEMA, National Register of Historic Places, CT DEEP, CRCOG, ESRI



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