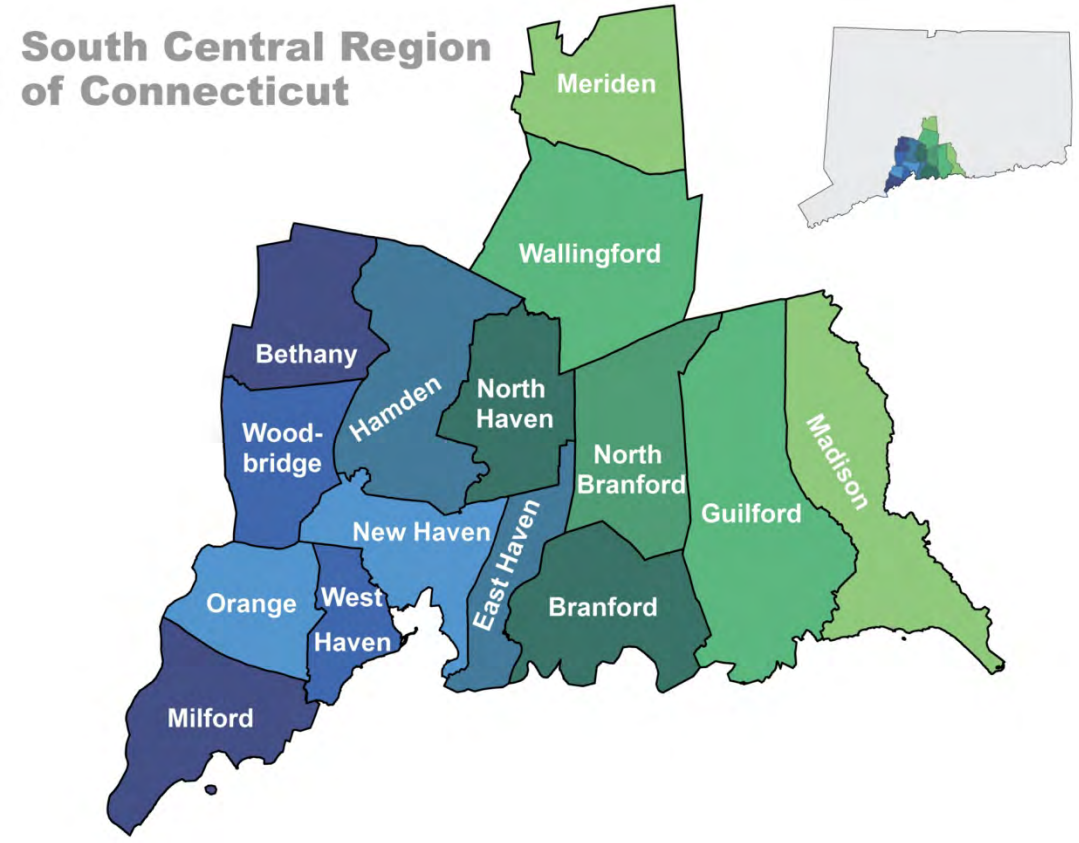
2023 SCRCOG HAZARD MITIGATION PLAN UPDATE

JANUARY 2023



South Central Regional Council of Governments

127 Washington Avenue, 4th Floor West

North Haven, Connecticut 06473

2023 SCRCOG HAZARD MITIGATION PLAN UPDATE

January 2023

South Central Regional Council of Governments

127 Washington Avenue, 4th Floor West

North Haven, Connecticut 06473

Phone: 203-234-7555

https://scrcog.org

Prepared by:

JAMIE CAPLAN CONSULTING LLC
Emergency Management Services

351 Pleasant Street, Suite B # 208 · Northampton, MA 01060
Phone: 413-586-0867 · Fax: 413-727-8282 · www.jamiecaplan.com

Participating Municipalities

Town of Bethany
40 Peck Road
Bethany, Connecticut 06524
203-393-2100
https://www.bethany-ct.com

Town of Branford
1019 Main Street
Branford, Connecticut 06405
203-488-8394
https://www.branford-ct.gov

Town of East Haven
250 Main Street
East Haven, Connecticut 06512
203-468-3212
https://www.townofeasthavenct.org

Town of Guilford
31 Park Street
Guilford, Connecticut 06437
203-453-8001
https://www.guilfordct.gov

Town of Hamden
2750 Dixwell Avenue
Hamden, Connecticut 06518
203-287-7000
https://www.hamden.com

Town of Madison
8 Campus Drive
Madison, Connecticut 06443
203-245-5600
https://www.madisonct.org

City of Meriden
142 East Main Street
Meriden, Connecticut 06450
203-630-4000
https://www.meridenct.gov

City of Milford
70 West River Street
Milford, Connecticut 06460
203-783-3200
https://www.ci.milford.ct.us

City of New Haven
165 Church Street
New Haven, Connecticut 06510
203-946-6379
https://www.newhavenct.gov

Town of North Branford
909 Foxon Road
North Branford, Connecticut 06471
203-484-6010
https://www.townofnorthbranfordct.com

Town of North Haven
18 Church Street
North Haven, Connecticut 06473
203-239-5321
https://www.town.north-haven.ct.us

Town of Orange
617 Orange Center Road
Orange, Connecticut 06477
203-891-4700
https://www.orange-ct.gov

Town of Wallingford
45 South Main Street
Wallingford, Connecticut06492
203-294-2072
https://www.wallingfordct.gov

City of West Haven
355 Main Street
West Haven, Connecticut 06516
203-937-3500
http://www.cityofwesthaven.com

Town of Woodbridge
11 Meetinghouse Lane
Woodbridge, Connecticut 06525
203-389-3400
https://www.woodbridgect.org

Acknowledgements

The South Central Regional Council of Governments would like to thank the following people for supporting the development of this plan.

Advisory Committee

South Central Regional Council of Governments

- Carl Amento, Executive Director
- Rebecca Andreucci, Transportation Planner

Town of Bethany

- Tony Ciarleglio, Road Foreman
- Paula Cofrancesco, First Selectman
- Rich Cogill, Fire Chief
- Lina Viviana Frazer, Land Use Enforcement
- Clark Hurlburt, CERT
- Mike Katzmark, Emergency Management Director
- David Merriam, Lieutenant
- Don Shea, DPW and Facilities
- Stephen Sousa, Fire Marshal

Town of Branford

- Jennifer Acquino, Assistant Town Engineer
- John Hoefferle, Town Engineer
- Kevin Ortiz, Design Engineer

Town of East Haven

- Jonathan Bodwell, Town Engineer
- Matthew Marcarelli, Fire Chief

Town of Guilford

- Kevin Magee, Environmental Planner
- Janice Plaziak, Town Engineer

Town of Hamden

- Eugene Livshits, Town Planner

- Stephen White, Town Engineer

Town of Madison
- John Iennaco, Director of Public Works & Town Engineer
- Erin Mannix, Town Planner

City of Meriden
- Brian Ennis, City Engineer

City of Milford
- Steven Johnson, Assistant Public Works Director
- MaryRose Palumbo, Inland Wetland Agent
- William Richards, Deputy Emergency Management Director

City of New Haven
- Laura E Brown, City Plan Director
- Anne Hartjen, Asst Dir Comp Plan
- Jacob Robison, Senior Project Manager
- Tom Schroeder, Senior Engineer

Town of North Branford
- Victor Benni, Town Engineer

Town of North Haven
- J Andrew Bevilacqua, Town Engineer
- Lynn Sadosky, Public Works Director

Town of Orange
- Tom Borer, Director Emergency Management
- Robert Brinton, Director of Public Works/Town Engineer

Town of Wallingford
- Alison Kapushinski, Town Engineer
- Kevin Paganini, Town Planner

Town of West Haven
- Abdul Quadir, City Engineer

Town of Woodbridge

- Warren Connors, Director of Public Works

Connecticut Institute for Resilience and Climate Adaptation
- John Truscinski, Director of Resilience Planning

Greater New Haven Water Pollution Control Authority
- Isabella Schroeder, Senior Engineer

The Nature Conservancy
- Adam Whelchel, Director of Science

Consulting Team

Jamie Caplan, Principal, Jamie Caplan Consulting LLC
Scott Choquette, Assistant Vice President, Dewberry
David Murphy, Principal, Reslient Land and Water, LLC
Darrin Punchard, Principal, Punchard Consulting LLC
Alexandria Smialiak, PhD Candidate, University of Massachusetts, Amherst
Victoria Vetre, Senior Environmental Planner, Resilient Land and Water, LLC

Adoption Resolutions

CERTIFICATE OF RESOLUTION
TOWN OF BETHANY, CONNECTICUT
A RESOLUTION ADOPTING THE
2023 SCRCOG HAZARD MITIGATION PLAN UPDATE

WHEREAS, the Town of Bethany has historically experienced damage from natural hazards and it continues to be vulnerable to the effects of those hazards profiled in the plan (i.e., flooding, drought, ice jams, hurricanes, severe winter storms, thunderstorms, tornadoes, and wildfires) resulting in loss of property and life and threats to public health and safety; and

WHEREAS, the Town of Bethany has developed and received conditional approval from the Federal Emergency Management Agency (FEMA) for its hazard mitigation plan update entitled **2023 SCRCOG HAZARD MITIGATION PLAN UPDATE** under the requirements of 44 CFR 201.6; and

WHEREAS, public and committee meetings were held throughout the planning process regarding the development and review of the Plan; and

WHEREAS, the Plan specifically addresses hazard mitigation strategies and Plan maintenance procedures for the Town of Bethany; and

WHEREAS, the Plan recommends several hazard mitigation actions/projects that will provide mitigation for specific natural hazards that impact the Town of Bethany, with the effect of reducing vulnerabilities and protecting people and property from loss associated with those hazards; and

WHEREAS, adoption of this Plan will make the Town of Bethany eligible for funding to reduce long term risks of future hazards; now therefore be it

RESOLVED by the Town of Bethany Board of Selectmen:

1. The Plan is hereby adopted as an official Plan of the Town of Bethany;
2. The respective officials identified in the mitigation strategy of the Plan are hereby directed to pursue implementation of the recommended actions assigned to them;
3. Future revisions and Plan maintenance are required by 44 CFR 201.6, and FEMA are hereby adopted as part of the resolution for a period of five (5) years from the date of this resolution; and
4. An annual report on the progress of the implementation elements of the Plan shall be presented to the Select Board by the Public Works Director.

In accordance with the authority vested in the Town of Bethany Board of Selectmen, they thereby adopt the **2023 SCRCOG HAZARD MITIGATION PLAN UPDATE**.

Adopted by a vote of ___ in favor, ___ against, and ___ abstaining on _____(date).

_____

Paula Cofrancesco, First Selectman

IN WITNESS THEREOF, the undersigned has affixed her/his signature and the corporate seal of the Town of Bethany.

_____

William L. Brinton, Town Clerk

CERTIFICATE OF RESOLUTION
TOWN OF BRANFORD, CONNECTICUT
A RESOLUTION ADOPTING THE
2023 SCRCOG HAZARD MITIGATION PLAN UPDATE

WHEREAS, the Town of Branford has historically experienced damage from natural hazards and it continues to be vulnerable to the effects of those hazards profiled in the plan (i.e., flooding, drought, ice jams, hurricanes, severe winter storms, thunderstorms, tornadoes, and wildfires) resulting in loss of property and life and threats to public health and safety; and

WHEREAS, the Town of Branford has developed and received conditional approval from the Federal Emergency Management Agency (FEMA) for its hazard mitigation plan update entitled **2023 SCRCOG HAZARD MITIGATION PLAN UPDATE** under the requirements of 44 CFR 201.6; and

WHEREAS, public and committee meetings were held throughout the planning process regarding the development and review of the Plan; and

WHEREAS, the Plan specifically addresses hazard mitigation strategies and Plan maintenance procedures for the Town of Branford; and

WHEREAS, the Plan recommends several hazard mitigation actions/projects that will provide mitigation for specific natural hazards that impact the Town of Branford, with the effect of reducing vulnerabilities and protecting people and property from loss associated with those hazards; and

WHEREAS, adoption of this Plan will make the Town of Branford eligible for funding to reduce long term risks of future hazards; now therefore be it

RESOLVED by the Town of Branford Board of Selectmen:

1. The Plan is hereby adopted as an official Plan of the Town of Branford;
2. The respective officials identified in the mitigation strategy of the Plan are hereby directed to pursue implementation of the recommended actions assigned to them;
3. Future revisions and Plan maintenance are required by 44 CFR 201.6, and FEMA are hereby adopted as part of the resolution for a period of five (5) years from the date of this resolution; and
4. In accordance with the authority vested in the Town of Branford Board of Selectmen, they thereby adopt the **2023 SCRCOG HAZARD MITIGATION PLAN UPDATE**.

Adopted by a vote of ___ in favor, ___ against, and ___ abstaining on _____(date).

_____

James B. Cosgrove, First Selectman

IN WITNESS THEREOF, the undersigned has affixed her/his signature and the corporate seal of the Town of Branford.

_____

Lisa E. Arpin, CMC, Town Clerk

CERTIFICATE OF RESOLUTION
TOWN OF EAST HAVEN, CONNECTICUT
A RESOLUTION ADOPTING THE
2023 SCRCOG HAZARD MITIGATION PLAN UPDATE

WHEREAS, the Town of East Haven has historically experienced damage from natural hazards and it continues to be vulnerable to the effects of those hazards profiled in the plan (i.e., flooding, drought, ice jams, hurricanes, severe winter storms, thunderstorms, tornadoes, and wildfires) resulting in loss of property and life and threats to public health and safety; and

WHEREAS, the Town of East Haven has developed and received conditional approval from the Federal Emergency Management Agency (FEMA) for its hazard mitigation plan update entitled **S2023 SCRCOG HAZARD MITIGATION PLAN UPDATE** under the requirements of 44 CFR 201.6; and

WHEREAS, public and committee meetings were held throughout the planning process regarding the development and review of the Plan; and

WHEREAS, the Plan specifically addresses hazard mitigation strategies and Plan maintenance procedures for the Town of East Haven; and

WHEREAS, the Plan recommends several hazard mitigation actions/projects that will provide mitigation for specific natural hazards that impact the Town of East Haven, with the effect of reducing vulnerabilities and protecting people and property from loss associated with those hazards; and

WHEREAS, adoption of this Plan will make the Town of East Haven eligible for funding to reduce long term risks of future hazards; now therefore be it

RESOLVED by the Town of East Haven Board of Selectmen:

1. The Plan is hereby adopted as an official Plan of the Town of East Haven;
2. The respective officials identified in the mitigation strategy of the Plan are hereby directed to pursue implementation of the recommended actions assigned to them;
3. Future revisions and Plan maintenance are required by 44 CFR 201.6, and FEMA are hereby adopted as part of the resolution for a period of five (5) years from the date of this resolution; and
4. An annual report on the progress of the implementation elements of the Plan shall be presented to the Select Board by the Public Works Director.

In accordance with the authority vested in the Town of East Haven Board of Selectmen, they thereby adopt the **S2023 SCRCOG HAZARD MITIGATION PLAN UPDATE**.

Adopted by a vote of ___ in favor, ___ against, and ___ abstaining on _____(date).

_____

Mayor Joseph A. Carfora

IN WITNESS THEREOF, the undersigned has affixed her/his signature and the corporate seal of the Town of East Haven.

_____

Lisa Balter, Town Clerk

CERTIFICATE OF RESOLUTION
TOWN OF GUILFORD, CONNECTICUT
A RESOLUTION ADOPTING THE
2023 SCRCOG HAZARD MITIGATION PLAN UPDATE

WHEREAS, the Town of Guilford has historically experienced damage from natural hazards and it continues to be vulnerable to the effects of those hazards profiled in the plan (i.e., flooding, drought, ice jams, hurricanes, severe winter storms, thunderstorms, tornadoes, and wildfires) resulting in loss of property and life and threats to public health and safety; and

WHEREAS, the Town of Guilford has developed and received conditional approval from the Federal Emergency Management Agency (FEMA) for its hazard mitigation plan update entitled **2023 SCRCOG HAZARD MITIGATION PLAN UPDATE** under the requirements of 44 CFR 201.6; and

WHEREAS, public and committee meetings were held throughout the planning process regarding the development and review of the Plan; and

WHEREAS, the Plan specifically addresses hazard mitigation strategies and Plan maintenance procedures for the Town of Guilford; and

WHEREAS, the Plan recommends several hazard mitigation actions/projects that will provide mitigation for specific natural hazards that impact the Town of Guilford, with the effect of reducing vulnerabilities and protecting people and property from loss associated with those hazards; and

WHEREAS, adoption of this Plan will make the Town of Guilford eligible for funding to reduce long term risks of future hazards; now therefore be it

RESOLVED by the Town of Guilford Board of Selectmen:

1. The Plan is hereby adopted as an official Plan of the Town of Guilford;
2. The respective officials identified in the mitigation strategy of the Plan are hereby directed to pursue implementation of the recommended actions assigned to them;
3. Future revisions and Plan maintenance are required by 44 CFR 201.6, and FEMA are hereby adopted as part of the resolution for a period of five (5) years from the date of this resolution; and
4. An annual report on the progress of the implementation elements of the Plan shall be presented to the Select Board by the Public Works Director.

In accordance with the authority vested in the Town of Guilford Board of Selectmen, they thereby adopt the **2023 SCRCOG HAZARD MITIGATION PLAN UPDATE**.

Adopted by a vote of ___ in favor, ___ against, and ___ abstaining on _____(date).

_____

Matthew T. Hoey III, First Selectman

IN WITNESS THEREOF, the undersigned has affixed her/his signature and the corporate seal of the Town of Guilford.

_____

Anna Dwyer, Town Clerk

CERTIFICATE OF RESOLUTION
TOWN OF HAMDEN, CONNECTICUT
A RESOLUTION ADOPTING THE
2023 SCRCOG HAZARD MITIGATION PLAN UPDATE

WHEREAS, the Town of Hamden has historically experienced damage from natural hazards and it continues to be vulnerable to the effects of those hazards profiled in the plan (i.e., flooding, drought, ice jams, hurricanes, severe winter storms, thunderstorms, tornadoes, and wildfires) resulting in loss of property and life and threats to public health and safety; and

WHEREAS, the Town of Hamden has developed and received conditional approval from the Federal Emergency Management Agency (FEMA) for its hazard mitigation plan update entitled **2023 SCRCOG HAZARD MITIGATION PLAN UPDATE** under the requirements of 44 CFR 201.6; and

WHEREAS, public and committee meetings were held throughout the planning process regarding the development and review of the Plan; and

WHEREAS, the Plan specifically addresses hazard mitigation strategies and Plan maintenance procedures for the Town of Hamden; and

WHEREAS, the Plan recommends several hazard mitigation actions/projects that will provide mitigation for specific natural hazards that impact the Town of Hamden, with the effect of reducing vulnerabilities and protecting people and property from loss associated with those hazards; and

WHEREAS, adoption of this Plan will make the Town of Hamden eligible for funding to reduce long term risks of future hazards; now therefore be it

RESOLVED by the Town of Hamden Legislative Council:

1. The Plan is hereby adopted as an official Plan of the Town of Hamden;
2. The respective officials identified in the mitigation strategy of the Plan are hereby directed to pursue implementation of the recommended actions assigned to them;
3. Future revisions and Plan maintenance are required by 44 CFR 201.6, and FEMA are hereby adopted as part of the resolution for a period of five (5) years from the date of this resolution; and
4. An annual report on the progress of the implementation elements of the Plan shall be presented to the Legislative Council by the Town Engineer and Town Planner.

In accordance with the authority vested in the Town of Hamden Legislative Council, they thereby adopt the **2023 SCRCOG HAZARD MITIGATION PLAN UPDATE**.

Adopted by a vote of ___ in favor, ___ against, and ___ abstaining on _____(date).

Sue Gruen, Town Attorney **Mayor Lauren Garrett**

_____

Dominique Baez, President of Legislative Council

IN WITNESS THEREOF, the undersigned has affixed her/his signature and the corporate seal of the Town of Hamden.

_____

Kim Renta, Legislative Council Administrator

CERTIFICATE OF RESOLUTION
TOWN OF MADISON, CONNECTICUT
A RESOLUTION ADOPTING THE
2023 SCRCOG HAZARD MITIGATION PLAN UPDATE

WHEREAS, the Town of Madison has historically experienced damage from natural hazards and it continues to be vulnerable to the effects of those hazards profiled in the plan (i.e., flooding, drought, ice jams, hurricanes, severe winter storms, thunderstorms, tornadoes, and wildfires) resulting in loss of property and life and threats to public health and safety; and

WHEREAS, the Town of Madison has developed and received conditional approval from the Federal Emergency Management Agency (FEMA) for its hazard mitigation plan update entitled **2023 SCRCOG HAZARD MITIGATION PLAN UPDATE** under the requirements of 44 CFR 201.6; and

WHEREAS, public and committee meetings were held throughout the planning process regarding the development and review of the Plan; and

WHEREAS, the Plan specifically addresses hazard mitigation strategies and Plan maintenance procedures for the Town of Madison; and

WHEREAS, the Plan recommends several hazard mitigation actions/projects that will provide mitigation for specific natural hazards that impact the Town of Madison, with the effect of reducing vulnerabilities and protecting people and property from loss associated with those hazards; and

WHEREAS, adoption of this Plan will make the Town of Madison eligible for funding to reduce long term risks of future hazards; now therefore be it

RESOLVED by the Town of Madison Board of Selectmen:

1. The Plan is hereby adopted as an official Plan of the Town of Madison;
2. The respective officials identified in the mitigation strategy of the Plan are hereby directed to pursue implementation of the recommended actions assigned to them;
3. Future revisions and Plan maintenance are required by 44 CFR 201.6, and FEMA are hereby adopted as part of the resolution for a period of five (5) years from the date of this resolution; and
4. An annual report on the progress of the implementation elements of the Plan shall be presented to the Select Board by the Public Works Director.

In accordance with the authority vested in the Town of Madison Board of Selectmen, they thereby adopt the **2023 SCRCOG HAZARD MITIGATION PLAN UPDATE**.

Adopted by a vote of ___ in favor, ___ against, and ___ abstaining on _____(date).

_____

Peggy Lyons, First Selectwoman

IN WITNESS THEREOF, the undersigned has affixed her/his signature and the corporate seal of the Town of Madison.

_____

Nancy J. Martucci CCTC, CMC, Town Clerk

CERTIFICATE OF RESOLUTION
CITY OF MERIDEN, CONNECTICUT
A RESOLUTION ADOPTING THE
2023 SCRCOG HAZARD MITIGATION PLAN UPDATE

WHEREAS, the City of Meriden has historically experienced damage from natural hazards and it continues to be vulnerable to the effects of those hazards profiled in the plan (i.e., flooding, drought, ice jams, hurricanes, severe winter storms, thunderstorms, tornadoes, and wildfires) resulting in loss of property and life and threats to public health and safety; and

WHEREAS, the City of Meriden has developed and received conditional approval from the Federal Emergency Management Agency (FEMA) for its hazard mitigation plan update entitled **2023 SCRCOG HAZARD MITIGATION PLAN UPDATE** under the requirements of 44 CFR 201.6; and

WHEREAS, public and committee meetings were held throughout the planning process regarding the development and review of the Plan; and

WHEREAS, the Plan specifically addresses hazard mitigation strategies and Plan maintenance procedures for the City of Meriden; and

WHEREAS, the Plan recommends several hazard mitigation actions/projects that will provide mitigation for specific natural hazards that impact the City of Meriden, with the effect of reducing vulnerabilities and protecting people and property from loss associated with those hazards; and

WHEREAS, adoption of this Plan will make the City of Meriden eligible for funding to reduce long term risks of future hazards; now therefore be it

RESOLVED by the City of Meriden City Council:

1. The Plan is hereby adopted as an official Plan of the City of Meriden;
2. The respective officials identified in the mitigation strategy of the Plan are hereby directed to pursue implementation of the recommended actions assigned to them;
3. Future revisions and Plan maintenance are required by 44 CFR 201.6, and FEMA are hereby adopted as part of the resolution for a period of five (5) years from the date of this resolution; and
4. An annual report on the progress of the implementation elements of the Plan shall be presented to the Select Board by the Public Works Director.

In accordance with the authority vested in the City of Meriden City Council, they thereby adopt the **2023 SCRCOG HAZARD MITIGATION PLAN UPDATE**.

Adopted by a vote of ___ in favor, ___ against, and ___ abstaining on _____(date).

Timothy Coon, City Manager **Mayor Kevin Scarpati**

IN WITNESS THEREOF, the undersigned has affixed her/his signature and the corporate seal of the City of Meriden.

_____

Denise Grandy, City Clerk

CERTIFICATE OF RESOLUTION

CITY OF MILFORD, CONNECTICUT

A RESOLUTION ADOPTING THE

2023 SCRCOG HAZARD MITIGATION PLAN UPDATE

WHEREAS, the City of Milford has historically experienced damage from natural hazards and it continues to be vulnerable to the effects of those hazards profiled in the plan (i.e., flooding, drought, ice jams, hurricanes, severe winter storms, thunderstorms, tornadoes, and wildfires) resulting in loss of property and life and threats to public health and safety; and

WHEREAS, the City of Milford has developed and received conditional approval from the Federal Emergency Management Agency (FEMA) for its hazard mitigation plan update entitled **2023 SCRCOG HAZARD MITIGATION PLAN UPDATE** under the requirements of 44 CFR 201.6; and

WHEREAS, public and committee meetings were held throughout the planning process regarding the development and review of the Plan; and

WHEREAS, the Plan specifically addresses hazard mitigation strategies and Plan maintenance procedures for the City of Milford; and

WHEREAS, the Plan recommends several hazard mitigation actions/projects that will provide mitigation for specific natural hazards that impact the City of Milford, with the effect of reducing vulnerabilities and protecting people and property from loss associated with those hazards; and

WHEREAS, adoption of this Plan will make the City of Milford eligible for funding to reduce long term risks of future hazards; now therefore be it

RESOLVED by the City of Milford Board of Alderman:

1. The Plan is hereby adopted as an official Plan of the City of Milford;

2. The respective officials identified in the mitigation strategy of the Plan are hereby directed to pursue implementation of the recommended actions assigned to them;

3. Future revisions and Plan maintenance are required by 44 CFR 201.6, and FEMA are hereby adopted as part of the resolution for a period of five (5) years from the date of this resolution; and

4. An annual report on the progress of the implementation elements of the Plan shall be presented to the Select Board by the Public Works Director.

In accordance with the authority vested in the City of Milford Board of Aldermen, they thereby adopt the **2023 SCRCOG HAZARD MITIGATION PLAN UPDATE**.

Adopted by a vote of ___ in favor, ___ against, and ___ abstaining on _____(date).

Philip J. Vetro, Chairman **Mayor Benjamin G. Blake**

IN WITNESS THEREOF, the undersigned has affixed her/his signature and the corporate seal of the City of Milford.

_____

Karen Fortunati, City Clerk

CERTIFICATE OF RESOLUTION
CITY OF NEW HAVEN, CONNECTICUT
A RESOLUTION ADOPTING THE
2023 SCRCOG HAZARD MITIGATION PLAN UPDATE

WHEREAS, the City of New Haven has historically experienced damage from natural hazards and it continues to be vulnerable to the effects of those hazards profiled in the plan (i.e., flooding, drought, hurricanes, severe winter storms, thunderstorms, and tornadoes) resulting in loss of property and life and threats to public health and safety; and

WHEREAS, the City of New Haven has developed and received conditional approval from the Federal Emergency Management Agency (FEMA) for its hazard mitigation plan update entitled **2023 SCRCOG HAZARD MITIGATION PLAN UPDATE** under the requirements of 44 CFR 201.6; and

WHEREAS, public and committee meetings were held throughout the planning process regarding the development and review of the Plan; and

WHEREAS, the Plan specifically addresses hazard mitigation strategies and Plan maintenance procedures for the City of New Haven; and

WHEREAS, the Plan recommends several hazard mitigation actions/projects that will provide mitigation for specific natural hazards that impact the City of New Haven, with the effect of reducing vulnerabilities and protecting people and property from loss associated with those hazards; and

WHEREAS, adoption of this Plan will make the City of New Haven eligible for funding to reduce long term risks of future hazards; now therefore be it

RESOLVED by the City of New Haven Board of Alders:

1. The Plan is hereby adopted as an official Plan of the City of New Haven;
2. The respective officials identified in the mitigation strategy of the Plan are hereby directed to pursue implementation of the recommended actions assigned to them;
3. Future revisions and Plan maintenance are required by 44 CFR 201.6, and FEMA are hereby adopted as part of the resolution for a period of five (5) years from the date of this resolution; and

4. An annual report on the progress of the implementation elements of the Plan shall be presented to the Board by the Public Works Director.

In accordance with the authority vested in the City of New Haven Board of Alders, they thereby adopt the **2023 SCRCOG HAZARD MITIGATION PLAN UPDATE**.

Adopted by a vote of ___ in favor, ___ against, and ___ abstaining on _____(date).

_____

_____

Tyisha Walker-Myers, President **Mayor Justin Elicker**

IN WITNESS THEREOF, the undersigned has affixed her/his signature and the corporate seal of the City of New Haven.

_____

Michael B. Smart, City Clerk

CERTIFICATE OF RESOLUTION
TOWN OF NORTH BRANFORD, CONNECTICUT
A RESOLUTION ADOPTING THE
2023 SCRCOG HAZARD MITIGATION PLAN UPDATE

WHEREAS, the Town of North Branford has historically experienced damage from natural hazards and it continues to be vulnerable to the effects of those hazards profiled in the plan (i.e., flooding, drought, ice jams, hurricanes, severe winter storms, thunderstorms, tornadoes, and wildfires) resulting in loss of property and life and threats to public health and safety; and

WHEREAS, the Town of North Branford has developed and received conditional approval from the Federal Emergency Management Agency (FEMA) for its hazard mitigation plan update entitled **2023 SCRCOG HAZARD MITIGATION PLAN UPDATE** under the requirements of 44 CFR 201.6; and

WHEREAS, public and committee meetings were held throughout the planning process regarding the development and review of the Plan; and

WHEREAS, the Plan specifically addresses hazard mitigation strategies and Plan maintenance procedures for the Town of North Branford; and

WHEREAS, the Plan recommends several hazard mitigation actions/projects that will provide mitigation for specific natural hazards that impact the Town of North Branford, with the effect of reducing vulnerabilities and protecting people and property from loss associated with those hazards; and

WHEREAS, adoption of this Plan will make the Town of North Branford eligible for funding to reduce long term risks of future hazards; now therefore be it

RESOLVED by the Town of North Branford Town Council:

1. The Plan is hereby adopted as an official Plan of the Town of North Branford;

2. The respective officials identified in the mitigation strategy of the Plan are hereby directed to pursue implementation of the recommended actions assigned to them;

3. Future revisions and Plan maintenance are required by 44 CFR 201.6, and FEMA are hereby adopted as part of the resolution for a period of five (5) years from the date of this resolution; and

4. An annual report on the progress of the implementation elements of the Plan shall be presented to the Select Board by the Public Works Director.

In accordance with the authority vested in the Town of North Branford Town Council, they thereby adopt the **2023 SCRCOG HAZARD MITIGATION PLAN UPDATE**.

Adopted by a vote of ___ in favor, ___ against, and ___ abstaining on _____(date).

Michael Downes, Town Manager **Mayor Jeffrey Macmillen**

_____

Deputy Mayor Tom Zampano

IN WITNESS THEREOF, the undersigned has affixed her/his signature and the corporate seal of the Town of North Branford.

_____

Lisa A. Valenti, Town Clerk

CERTIFICATE OF RESOLUTION
TOWN OF NORTH HAVEN, CONNECTICUT
A RESOLUTION ADOPTING THE
2023 SCRCOG HAZARD MITIGATION PLAN UPDATE

WHEREAS, the Town of North Haven has historically experienced damage from natural hazards and it continues to be vulnerable to the effects of those hazards profiled in the plan (i.e., flooding, drought, ice jams, hurricanes, severe winter storms, thunderstorms, tornadoes, and wildfires) resulting in loss of property and life and threats to public health and safety; and

WHEREAS, the Town of North Haven has developed and received conditional approval from the Federal Emergency Management Agency (FEMA) for its hazard mitigation plan update entitled **2023 SCRCOG HAZARD MITIGATION PLAN UPDATE** under the requirements of 44 CFR 201.6; and

WHEREAS, public and committee meetings were held throughout the planning process regarding the development and review of the Plan; and

WHEREAS, the Plan specifically addresses hazard mitigation strategies and Plan maintenance procedures for the Town of North Haven; and

WHEREAS, the Plan recommends several hazard mitigation actions/projects that will provide mitigation for specific natural hazards that impact the Town of North Haven, with the effect of reducing vulnerabilities and protecting people and property from loss associated with those hazards; and

WHEREAS, adoption of this Plan will make the Town of North Haven eligible for funding to reduce long term risks of future hazards; now therefore be it

RESOLVED by the Town of North Haven Board of Selectmen:

1. The Plan is hereby adopted as an official Plan of the Town of North Haven;

2. The respective officials identified in the mitigation strategy of the Plan are hereby directed to pursue implementation of the recommended actions assigned to them;

3. Future revisions and Plan maintenance are required by 44 CFR 201.6, and FEMA are hereby adopted as part of the resolution for a period of five (5) years from the date of this resolution; and

4. An annual report on the progress of the implementation elements of the Plan shall be presented to the Select Board by the Public Works Director.

In accordance with the authority vested in the Town of North Haven Board of Selectmen, they thereby adopt the **2023 SCRCOG HAZARD MITIGATION PLAN UPDATE**.

Adopted by a vote of ___ in favor, ___ against, and ___ abstaining on _____(date).

_____

Michael J. Freda, First Selectman

IN WITNESS THEREOF, the undersigned has affixed her/his signature and the corporate seal of the Town of North Haven.

_____

J. Stacey Yarbrough, Town Clerk

CERTIFICATE OF RESOLUTION
TOWN OF ORANGE, CONNECTICUT
A RESOLUTION ADOPTING THE
2023 SCRCOG HAZARD MITIGATION PLAN UPDATE

WHEREAS, the Town of Orange has historically experienced damage from natural hazards and it continues to be vulnerable to the effects of those hazards profiled in the plan (i.e., flooding, drought, ice jams, hurricanes, severe winter storms, thunderstorms, tornadoes, and wildfires) resulting in loss of property and life and threats to public health and safety; and

WHEREAS, the Town of Orange has developed and received conditional approval from the Federal Emergency Management Agency (FEMA) for its hazard mitigation plan update entitled **2023 SCRCOG HAZARD MITIGATION PLAN UPDATE** under the requirements of 44 CFR 201.6; and

WHEREAS, public and committee meetings were held throughout the planning process regarding the development and review of the Plan; and

WHEREAS, the Plan specifically addresses hazard mitigation strategies and Plan maintenance procedures for the Town of Orange; and

WHEREAS, the Plan recommends several hazard mitigation actions/projects that will provide mitigation for specific natural hazards that impact the Town of Orange, with the effect of reducing vulnerabilities and protecting people and property from loss associated with those hazards; and

WHEREAS, adoption of this Plan will make the Town of Orange eligible for funding to reduce long term risks of future hazards; now therefore be it

RESOLVED by the Town of Orange Board of Selectmen:

1. The Plan is hereby adopted as an official Plan of the Town of Orange;

2. The respective officials identified in the mitigation strategy of the Plan are hereby directed to pursue implementation of the recommended actions assigned to them;

3. Future revisions and Plan maintenance are required by 44 CFR 201.6, and FEMA are hereby adopted as part of the resolution for a period of five (5) years from the date of this resolution; and

4. An annual report on the progress of the implementation elements of the Plan shall be presented to the Select Board by the Public Works Director.

In accordance with the authority vested in the Town of Orange Board of Selectmen, they thereby adopt the **2023 SCRCOG HAZARD MITIGATION PLAN UPDATE**.

Adopted by a vote of ___ in favor, ___ against, and ___ abstaining on _____(date).

_____

James Zeoli, First Selectman

IN WITNESS THEREOF, the undersigned has affixed her/his signature and the corporate seal of the Town of Orange.

_____

Mary Shaw, Town Clerk

CERTIFICATE OF RESOLUTION
TOWN OF WALLINGFORD, CONNECTICUT
A RESOLUTION ADOPTING THE
2023 SCRCOG HAZARD MITIGATION PLAN UPDATE

WHEREAS, the Town of Wallingford has historically experienced damage from natural hazards and it continues to be vulnerable to the effects of those hazards profiled in the plan (i.e., flooding, drought, ice jams, hurricanes, severe winter storms, thunderstorms, tornadoes, and wildfires) resulting in loss of property and life and threats to public health and safety; and

WHEREAS, the Town of Wallingford has developed and received conditional approval from the Federal Emergency Management Agency (FEMA) for its hazard mitigation plan update entitled **2023 SCRCOG HAZARD MITIGATION PLAN UPDATE** under the requirements of 44 CFR 201.6; and

WHEREAS, public and committee meetings were held throughout the planning process regarding the development and review of the Plan; and

WHEREAS, the Plan specifically addresses hazard mitigation strategies and Plan maintenance procedures for the Town of Wallingford; and

WHEREAS, the Plan recommends several hazard mitigation actions/projects that will provide mitigation for specific natural hazards that impact the Town of Wallingford, with the effect of reducing vulnerabilities and protecting people and property from loss associated with those hazards; and

WHEREAS, adoption of this Plan will make the Town of Wallingford eligible for funding to reduce long term risks of future hazards; now therefore be it

RESOLVED by the Town of Wallingford Town Council:

1. The Plan is hereby adopted as an official Plan of the Town of Wallingford;

2. The respective officials identified in the mitigation strategy of the Plan are hereby directed to pursue implementation of the recommended actions assigned to them;

3. Future revisions and Plan maintenance are required by 44 CFR 201.6, and FEMA are hereby adopted as part of the resolution for a period of five (5) years from the date of this resolution; and

4. An annual report on the progress of the implementation elements of the Plan shall be presented to the Select Board by the Public Works Director.

In accordance with the authority vested in the Town of Wallingford Town Council, they thereby adopt the **2023 SCRCOG HAZARD MITIGATION PLAN UPDATE**.

Adopted by a vote of ___ in favor, ___ against, and ___ abstaining on _____(date).

_____

Vincent Cervoni, Chairman

IN WITNESS THEREOF, the undersigned has affixed her/his signature and the corporate seal of the Town of Wallingford.

_____

Deborah McKiernan, Town Clerk

CERTIFICATE OF RESOLUTION
CITY OF WEST HAVEN, CONNECTICUT
A RESOLUTION ADOPTING THE
2023 SCRCOG HAZARD MITIGATION PLAN UPDATE

WHEREAS, the City of West Haven has historically experienced damage from natural hazards and it continues to be vulnerable to the effects of those hazards profiled in the plan (i.e., flooding, drought, ice jams, hurricanes, severe winter storms, thunderstorms, tornadoes, and wildfires) resulting in loss of property and life and threats to public health and safety; and

WHEREAS, the City of West Haven has developed and received conditional approval from the Federal Emergency Management Agency (FEMA) for its hazard mitigation plan update entitled **2023 SCRCOG HAZARD MITIGATION PLAN UPDATE** under the requirements of 44 CFR 201.6; and

WHEREAS, public and committee meetings were held throughout the planning process regarding the development and review of the Plan; and

WHEREAS, the Plan specifically addresses hazard mitigation strategies and Plan maintenance procedures for the City of West Haven; and

WHEREAS, the Plan recommends several hazard mitigation actions/projects that will provide mitigation for specific natural hazards that impact the City of West Haven, with the effect of reducing vulnerabilities and protecting people and property from loss associated with those hazards; and

WHEREAS, adoption of this Plan will make the City of West Haven eligible for funding to reduce long term risks of future hazards; now therefore be it

RESOLVED by the City of West Haven City Council:

1. The Plan is hereby adopted as an official Plan of the City of West Haven;

2. The respective officials identified in the mitigation strategy of the Plan are hereby directed to pursue implementation of the recommended actions assigned to them;

3. Future revisions and Plan maintenance are required by 44 CFR 201.6, and FEMA are hereby adopted as part of the resolution for a period of five (5) years from the date of this resolution; and

4. An annual report on the progress of the implementation elements of the Plan shall be presented to the Select Board by the Public Works Director.

In accordance with the authority vested in the City of West Haven City Council, they thereby adopt the **2023 SCRCOG HAZARD MITIGATION PLAN UPDATE**.

Adopted by a vote of ___ in favor, ___ against, and ___ abstaining on _____(date).

Peter V. Massaro, Chairman **Mayor Nancy R. Rossi**

IN WITNESS THEREOF, the undersigned has affixed her/his signature and the corporate seal of the City of West Haven.

_____

Patricia C. Horvath, City Clerk

CERTIFICATE OF RESOLUTION
TOWN OF WOODBRIDGE, CONNECTICUT
A RESOLUTION ADOPTING THE
2023 SCRCOG HAZARD MITIGATION PLAN UPDATE

WHEREAS, the Town of Woodbridge has historically experienced damage from natural hazards and it continues to be vulnerable to the effects of those hazards profiled in the plan (i.e., flooding, drought, ice jams, hurricanes, severe winter storms, thunderstorms, tornadoes, and wildfires) resulting in loss of property and life and threats to public health and safety; and

WHEREAS, the Town of Woodbridge has developed and received conditional approval from the Federal Emergency Management Agency (FEMA) for its hazard mitigation plan update entitled **2023 SCRCOG HAZARD MITIGATION PLAN UPDATE** under the requirements of 44 CFR 201.6; and

WHEREAS, public and committee meetings were held throughout the planning process regarding the development and review of the Plan; and

WHEREAS, the Plan specifically addresses hazard mitigation strategies and Plan maintenance procedures for the Town of Woodbridge; and

WHEREAS, the Plan recommends several hazard mitigation actions/projects that will provide mitigation for specific natural hazards that impact the Town of Woodbridge, with the effect of reducing vulnerabilities and protecting people and property from loss associated with those hazards; and

WHEREAS, adoption of this Plan will make the Town of Woodbridge eligible for funding to reduce long term risks of future hazards; now therefore be it

RESOLVED by the Town of Woodbridge Board of Selectmen:

1. The Plan is hereby adopted as an official Plan of the Town of Woodbridge;

2. The respective officials identified in the mitigation strategy of the Plan are hereby directed to pursue implementation of the recommended actions assigned to them;

3. Future revisions and Plan maintenance are required by 44 CFR 201.6, and FEMA are hereby adopted as part of the resolution for a period of five (5) years from the date of this resolution; and

4. An annual report on the progress of the implementation elements of the Plan shall be presented to the Select Board by the Public Works Director.

In accordance with the authority vested in the Town of Woodbridge Board of Selectmen, they thereby adopt the **2023 SCRCOG HAZARD MITIGATION PLAN UPDATE**.

Adopted by a vote of ___ in favor, ___ against, and ___ abstaining on _____(date).

_____

Beth Heller, First Selectman

IN WITNESS THEREOF, the undersigned has affixed her/his signature and the corporate seal of the Town of Woodbridge.

_____

Stephanie Ciarleglio, Town Clerk

Record of Changes

This 2023 SCRCOG Hazard Mitigation Plan Update will be reviewed and approved on a biannual basis by the Advisory Committee and following any major disasters. All updates and revisions to the plan will be tracked and recorded in the following table. This process will ensure the most recent version of the plan is disseminated and implemented throughout the region.

Table 1. Summary of Changes.

Date of Change	Entered By	Summary of Changes

Table of Contents

Table of Figures

Table of Tables

Chapter 1. Introduction and Assurances

Hazard mitigation planning reduces loss of life and property by minimizing the impact of disasters. It begins with state, tribal, and local governments identifying natural disaster risks and vulnerabilities that are common in their area. After identifying these risks, they develop long-term strategies for protecting people and property from similar events. Mitigation plans are key to breaking the cycle of disaster damage and reconstruction.

The Federal Emergency Management Agency (FEMA) defines hazard mitigation per the Code of Federal Regulations (CFR) 44 Section 201.2 as "any sustained action taken to reduce or eliminate the long-term risk to human life and property from hazards."

"The purpose of mitigation planning is to identify policies and actions that can be implemented over the long term to reduce risk and future losses. Mitigation plans form the foundation for a community's long-term strategy to reduce disaster losses and break the cycle of disaster damage, reconstruction, and repeated damage. The planning process is as important as the plan itself. It creates a framework for risk-based decision making to reduce damages to lives, property, and the economy from future disasters."[1]

"Disaster Mitigation Act (DMA) 2000 (Public Law 106-390)[2] provides the legal basis for FEMA mitigation planning requirements for State, local and Indian Tribal governments as a condition of mitigation grant assistance. DMA 2000 amended the Robert T. Stafford Disaster Relief and Emergency Assistance Act by repealing the previous mitigation planning provisions and replacing them with a new set of requirements that emphasize the need for State, local, and Indian Tribal entities to closely coordinate mitigation planning and implementation efforts."[3]

The South Central Regional Council of Governments (SCRCOG) was awarded a FEMA Hazard Mitigation Planning grant administered by the Connecticut Department of Emergency Services and Public Protection to develop an update to the region's Multi-Jurisdiction Hazard Mitigation Plan. The original hazard mitigation plan included ten municipalities, four were added to the 2018 update, and Meriden was added to this update. The title of this version of the plan was changed to 2023 SCRCOG Mitigation Plan Update. SCRCOG hired a consulting team led by Jamie Caplan Consulting, LLC (JCC) with support from Punchard Consulting LLC, Resilient Land and Water LLC, and Dewberry to develop the Plan.

The significance of the 2023 SCRCOG Hazard Mitigation Plan Update is that it provides the Region with a comprehensive mitigation strategy for prioritizing projects, programs and activities that will save lives

[1] Multi-Hazard Mitigation Planning. (2014). Federal Emergency Management Agency. Retrieved January 2014 from http://www.fema.gov/multi-hazard-mitigation-planning
[2] Disaster Mitigation Act of 2000, Pub. L. 106-390, as amended
[3] Disaster Mitigation Act of 2000. (2014). Federal Emergency Management Agency. Retrieved January 2014 from http://www.fema.gov/media-library/assets/documents/4596?id=1935

and reduce losses from impacts of natural disasters. Participating in a multi-jurisdiction plan was a way for the fifteen municipalities to achieve economies of scale. This Plan defines responsibilities and analyzes local capacities and capabilities to manage mitigation projects. It also fulfills FEMA's requirement for a mitigation planning process that first, ensures federal assistance to these fifteen South Central Connecticut municipalities and second, allows the local governments to compete for millions of dollars of mitigation project assistance annually. This 2023 SCRCOG Hazard Mitigation Plan Update defines risk and vulnerability in a systematic manner and analyzes the vulnerability of critical structures with respect to mapped known natural hazard areas. It also provides a framework for informed decision-making regarding prioritization of mitigation projects that will ensure both the protection of life and property and cost-effective use of taxpayer's funds.

SCRCOG staff led the planning process, which eased the burden of each municipality having to assume all the planning work. They will assume this leadership role for future updates of the 2023 SCRCOG Hazard Mitigation Plan Update. FEMA requires that the municipalities update this Plan every five years to remain eligible for non-emergency public assistance from FEMA in the form of grants.

1.1 Purpose

The significance of the 2023 SCRCOG Hazard Mitigation Plan Update is that it provides the Region with a comprehensive mitigation strategy for prioritizing projects, programs and activities that will save lives and reduce losses from impacts of natural disasters. The mitigation plan includes a comprehensive examination of all natural hazards affecting the area and provides a framework for informed decision-making regarding the selection of cost-effective mitigation actions. Participating in a multi-jurisdiction plan was a way for the fifteen municipalities to achieve economies of scale. This Plan defines responsibilities and analyzes local capacities and capabilities to manage mitigation projects. It also fulfills FEMA's requirement for a mitigation planning process that first, ensures federal assistance to these ten South Central Connecticut municipalities and second, allows the local governments to compete for millions of dollars of mitigation project assistance annually.

FEMA supports local mitigation planning to achieve the following:

- Foster partnerships among all levels of government.
- Develop and strengthen non-governmental and private partnerships.
- Promote more disaster-resilient and sustainable communities.
- Reduce the costs associated with disaster response and recovery by promoting mitigation activities.[4]

This 2023 SCRCOG Mitigation Plan Update defines risk and vulnerability in a systematic manner and analyzes the vulnerability of critical structures with respect to mapped known natural hazard areas. It

[4] Federal Emergency Management Agency. (April 19, 2022). Local Mitigation Planning Policy Guide, p.3.

also provides a framework for informed decision-making regarding prioritization of mitigation projects that will ensure both the protection of life and property and cost-effective use of taxpayer's funds.

1.2 Authority

The SCRCOG Board and each of the fifteen municipalities participating have adopted this 2023 Hazard Mitigation Plan Update. The adoption notices are included prior to this introduction. The Plan was developed in accordance with current state and federal regulations governing hazard mitigation plans. The contractors, SCRCOG staff and the Advisory Committee used FEMA's Local Mitigation Planning Handbook, March 2013, and the Local Mitigation Plan Review Guide, October 2011, and Demonstrating Good Practices Within Local Hazard Mitigation, Region 1, Boston, MA April 2017 as references for this plan.

SCRCOG and each of the 15 municipalities will continue to comply with all applicable Federal laws and regulations during the periods for which it receives grant funding, in compliance with 44 CFR 201.6. It will amend its plan whenever necessary to reflect changes in Town, State or Federal laws and regulations, as required in 44 CFR 201.6.

1.3 South Central Regional Council of Governments

The South Central Region of Connecticut is an economically diverse region of fifteen municipalities with a total population of approximately 570,000. The Region extends from the City of Milford on the west to the Town of Madison on the east, and to the City of Meriden to the north with the City of New Haven centrally located on the coast of the Long Island Sound. The Region is home to Yale University and Yale-New Haven Hospital (recognized as an international leader in medical care and research), as well as a number of other major educational and health care institutions.

The South Central Regional Council of Governments (SCRCOG) brings together local governments to coordinate transportation planning, regional land use and environmental planning, and municipal services programs on a regional basis. SCRCOG provides a forum to foster communication and collaboration among its member municipalities in identifying and addressing these and other regional issues.

1.4 Plan Development

The purpose of the 2023 SCRCOG Hazard Mitigation Plan Update is to provide the region with a comprehensive examination of all natural hazards affecting the region and to provide a framework for informed decision-making regarding the selection of cost-effective mitigation actions. These mitigation actions, when implemented, will reduce the region's risk and vulnerability from natural hazards. The Plan also documents the mitigation planning process that is required by the DMA 2000.

This Plan is the result of a collaborative effort between many stakeholders representing the region, including SCRCOG staff, the governments of the fifteen participating municipalities and stakeholders. Throughout the development of the Plan, the Advisory Committee, a formal committee with at least one representative from each of the participating municipalities, provided leadership. The Advisory Committee reviewed mitigation goals, reviewed research regarding natural hazard risk and vulnerability assessments and identified and prioritized mitigation actions. They also prepared a mitigation implementation strategy with recommendations designed to save lives and reduce losses from future disasters caused by natural hazards.

1.4.1 Goal Statements

C3. Does the Plan include goals to reduce/avoid long-term vulnerabilities to the identified hazards? (Requirement §201.6(c)(3)(i))

The mission of the 2023 SCRCOG Hazard Mitigation Plan is to: Reduce or eliminate risk to people and property from natural hazards and climate change.

The theme throughout the planning process was municipalities are individual entities with specific characteristics/risks that need to be addressed.

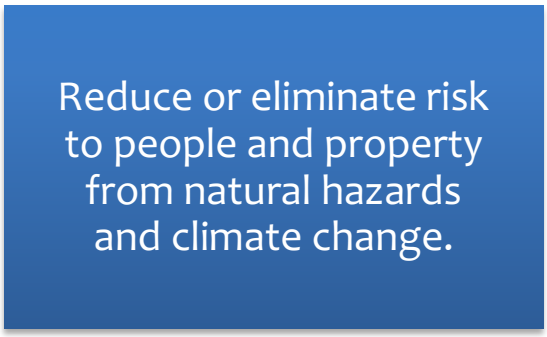


Figure 1. Mission Statement.

With this theme in mind, the planning process included the development of a Public Outreach Strategy, four Advisory Committee meetings, fifteen municipality meetings and two Public Workshops. Significant effort was made throughout the planning process to capture the specific risks and mitigation actions for each municipality as well as to examine the region.

The Advisory Committee identified the following twelve hazards to profile:

1. Coastal Erosion
2. Dam Failure
3. Drought
4. Earthquake
5. Extreme Temperatures
6. Flood
7. Hurricane/Tropical Storm
8. Sea Level Rise
9. Severe Thunderstorm
10. Severe Winter Storm/Nor'easter
11. Tornado
12. Wildland Fire

Following the hazard identification, a risk analysis was conducted to determine vulnerability for each participating municipality. Included in the risk analysis were community assets, vulnerable assets, potential impacts, loss estimates and problem statements. This approach enabled the theme of

"municipalities are individual entities with specific risks" to be examined. The problem statements at the end of each municipality's risk analysis bridged the gap to capabilities and mitigation actions by identifying hazards and geographic areas of concern as well as vulnerable community assets. The Advisory Committee developed five goal categories and associated goal statements for the region as well, shown in Table 2.

Goal Categories	Mitigation Plan Goals
Community Planning	Reduce the impact of natural hazards by integrating natural hazard mitigation policies and practices into local community planning.
Flood Hazards	Minimize flood hazards in the region by maintaining continued compliance with the National Flood Insurance Program, adopting higher regulatory standards for new floodplain development, and implementing flood mitigation projects for existing flood prone structures.
Trees	Support proper care of healthy, native trees across the region to increase their resilience to natural hazards including severe storms, flooding, erosion, and extreme heat. Limit the impact of fallen and other hazardous trees by collaborating with utility companies and property owners to cut limbs and remove trees that pose threats to buildings, infrastructure, and utility lifelines.
Regional Collaboration	Build capacity for natural hazard mitigation and climate adaptation at the local level through regional collaboration.
Public Awareness and Preparedness	Increase public awareness and preparedness for natural hazards by implementing community-based public education programs across the region.

Table 2. Goal Statements.

After the regional goals were developed, SCRCOG staff and each municipality developed their own mitigation actions. The Advisory Committee then came together to develop an implementation and plan maintenance process.

1.4.2 Guiding Principles

The Advisory Committee adhered to the following guiding principles in the plan's development.[5]

- Plan and invest for the future.
- Collaborate and engage early.
- Integrate community planning.

[5] Federal Emergency Management Agency. (April 19, 2022). Local Mitigation Planning Policy Guide, p.13.

1.5 Changes Since the Previous Plan

This section details some of the changes incorporated into this plan based on development, status of mitigation actions, and current municipal priorities. Details regarding critical facilities and land use may be found in Chapter 4: Hazard Profiles and Chapter 5: Risk Analysis. Details regarding land use and capabilities may be found in Chapter 6: Capability Assessment. This plan serves as a total revision and update to the 2018 South Central Region Multi-Jurisdiction Hazard Mitigation Plan Update.

Note: This section does NOT document all the changes since the previous plan. Each chapter, and the Annexes mention additional changes.

1.5.1 Changes in Development

D1. Was the plan revised to reflect changes in development? (Requirement §201.6(d)(3))

The plan was revised to reflect changes in development as described throughout the plan. The critical facility list for the region and for each municipality was amended to reflect the current priorities of each municipality. This included removing defunct facilities and adding new ones. During the municipality specific meetings, changes in development were discussed. The region has experienced residential development and re-development with some communities, such as Hamden, seeing large new housing development. Municipalities report that they anticipate seeing current trends continue. The table below identifies key development changes as reported by each municipality. Additional details are included throughout this document and in the Municipality Annexes.

Table 3. Changes in Development.

Municipality	Changes in Development
Bethany	• Very little development. • Have improved Town Hall and added a generator there. Many homeowners have also added generators to reduce the impact of power outages.
Branford	• Reported a significant amount of Transit Oriented Development some of which is in the floodplain. This may cause an increase in risk. However, overall, the new development and redevelopment are Branford is not increasing risk to natural hazards. The redevelopment in Branford offers significant opportunities for flood mitigation incorporation, and new development is an opportunity to build per flood damage prevention regulations and the State Building Code. • Community House was redeveloped with additional dry flood proofing. • Linden Avenue Fire Station wet floodproofed.

Municipality	Changes in Development
	• Reported that Planning and Zoning rely on the FEMA regulations and maps which do not accurately reflect current or future conditions.
East Haven	• Raised sewer pump stations and added generators to them which decreases their risk to natural hazards.
Guilford	• Reported a significant amount of coastal redevelopment, some of it in the floodplain. The coastal redevelopment is not increasing risk because building codes, and flood mitigation strategies are incorporated into development. • Increase in generators for municipality buildings and private homes.
Hamden	• Hamden has a new Tree Ordinance which will protect trees reducing risk to hazards such as extreme heat and drought. • Hamden replaced the pump station on Mill River and built a new Emergency Operations Center and Fire House. • Quinnipiac University has three new buildings. • Town has a new housing development for approximately 1,100 people. The need for housing continues to increase. • Overall, development and redevelopment in Hamden have not increased risk to natural hazards. In fact, this development has presented an opportunity for the Town to utilize State Building Codes, the flood damage prevention regulations, and other flood mitigation opportunities.
Madison	• Seen lots of redevelopment and reconstruction of FEMA compliant homes. Some cluster style residential developments or redevelopments include properties being removed from the flood zone. • Madison has seen a decrease in the flood risk based on moving homes out of the flood zone. Madison uses the opportunities presented by new development to incorporate flood mitigation through flood damage prevention regulations and the State Building Code.
Meriden	• Installed generators at water treatment facilities and fixed the Amtrack Bridge culvert. • Some development but none in the floodplain. • Hazard events have proven that Meriden Green, a 14-acre flood control park and economic development project, works to prevent flooding.
Milford	• They have seen an increase in apartments and retail establishments. • Microgrid is up and running to support City buildings. • Struggling with the Connecticut Building Code that is not sufficient for Milford.

Municipality	Changes in Development
	• Milford has not seen an increase in risk due to redevelopment or new development.
New Haven	• The Greater New Haven Water Pollution Control Authority made resiliency upgrades to four of their facilities. • Lots of residential building in New Haven including development of playgrounds. This has resulted in an increase in risk due to the replacement of soil with tar, and the loss of trees. This is an increase in risk to extreme heat and drought. • The City has decreased their level of risk by moving to electrification for many buildings. This is a decrease in the level of risk associated with power outages, a result of multiple natural hazards, by providing the buildings with more resilient power systems, such as microgrids and solar power.
North Branford	• Development consistent with regional trends. • Currently building a new high school and police station that will include an Emergency Operations Center. • They did not report increased or decreased risk due to development.
North Haven	• Reported that Planning and Zoning regulations as they relate to stormwater need to be updated to reduce risk. • They do report that the FEMA flood maps are consistent with the flooding they experience. • Reported that North Haven is booming; and building permits brought in $1.7 million dollars in 2022. Amazon is adding to their distribution center. • Lots of multi-use buildings with residential on top and businesses on the bottom. A new overlay zone has allowed for some of this mixed-use building. • The building in North Haven is not increasing risk overall. In fact it is presenting an opportunity to mitigate risk through flood damage prevention regulations, and the State Building Code.
Orange	• Very few single family homes built. • Huge increase in commercial development, including a new FedEx building, an assisted living facility, and an ink factory. Will see continued influx of large scale building projects. These projects do squeeze the waterways and the Planning Department is looking for ways to mitigate this. The increase in risk presented by this “squeeze of waterways,” is projected but not experienced yet. The Town anticipates that this may present an increase in risk if not mitigated and they are working on systems to prevent that increase through planning regulations.

Municipality	Changes in Development
	• Orange has approved high density residential development on several lots and may approve 88 condominiums on Route 1.
Wallingford	• Wallingford is working hard to write regulations that allow for continued development while lessening the impact of development. They changed 45 pages of regulations in 2021. • There has been industrial development in the watershed protection area, and some new warehouses built on empty land. This development is expected to continue. • Risk has not increased in Wallingford, due to the regulation updates. Wallingford is actively regulating building to prevent a risk increase.
West Haven	• Built a new High School above the 500-year flood level but still in the flood zone. • Have not experienced much development but do plan some for the future.
Woodbridge	• Experienced very little development. • Have not seen a change in their level of risk due to development.

1.5.2 Local Mitigation Efforts

D2. Was the plan revised to reflect progress in local mitigation efforts? (Requirement §201.6(d)(3))

The Mitigation Strategy chapter details previously identified actions for SCRCOG and their status in 2023. Mitigation actions previously identified for each municipality are detailed in their Municipality Annex. All the actions are listed as completed, partially completed/in progress, or delayed. A description of the status is given. The Advisory Committee used this information to determine if actions should be considered capabilities of the municipality or if they should move forward as mitigation actions in this new plan. The current mitigation action list represents present and future needs for each municipality.

1.5.3 Changes in Priorities

D3. Was the plan revised to reflect changes in priorities? (Requirement §201.6(d)(3))

Priorities have not shifted significantly in the region since the previous plan was developed. Flooding, and trees remain significant mitigation priorities. Concern over wind hazards has increased, while concern for tree disease has slightly decreased. The Covid-19 pandemic raised the concern for infectious disease and forced the planning process to be strictly digital.

While the previous plan considered climate change and resilience, this plan names climate change in the updated mission statement: Reduce or eliminate risk to people and property from natural hazards and climate change.

SCRCOG's commitment to the mitigation plan remains consistent. Each of the municipalities in the region remain committed to maintaining this plan and, for the first time, all fifteen municipalities in the SCRCOG region participated in the plan. Meriden joined the planning process this year.

The goals of the plan continue to reflect the priorities of the region's municipalities to expand community planning, mitigate flood risk, protect, and manage trees, collaborate within the region, and expand public awareness and preparedness.

The Connecticut Institute for Resilience & Climate Adaptation (CIRCA) was engaged in this plan update. The Advisory Committee actively supports regional collaboration and climate adaptation. CIRCA participated in Advisory Committee meetings. Beyond sharing their expertise, they have identified projects for several municipalities in the SCRCOG region. These projects are included in the Municipal Annexes. Collaborating with CIRCA demonstrates how this plan has integrated with other planning mechanisms in the region.

1.5.4 FEMA Opportunities for Improvement from 2018

The FEMA Plan Review Tool from 2018 included seven recommendations for the plan's improvement. Each of these was considered during the development of this plan and included as possible.

1. Provide more detail about what public and stakeholder feedback was received and how it was incorporated into the plan. Documenting feedback will be useful for evaluating the plan during future updates.
2. The levels of probability of hazards occurring (highly likely, likely, occasional, highly unlikely) are quantified, but not until the conclusion of the hazard identification and risk assessment chapter (Ch. 4). Consider adding this information to the beginning of the chapter or providing the percent probability for each hazard.
3. Identify dams in upstream communities that may pose a risk to neighborhoods and assets.
4. Consider including and profiling technological and human caused hazards for a more comprehensive, all-hazards, risk assessment.
5. The plan lists other plans into which mitigation is already/can be incorporated. Add details including the responsible party or department and the timeframe they must follow.
6. The development section could benefit from a clearer explanation of how recent, current, and planned development has or has not impacted each community's risk and vulnerability.

7. Including a discussion of lessons learned about implementing mitigation actions would strengthen the plan, as would a short narrative on some "success stories" about their implementation.

1.6 Plan Summary

Below is a summary of the Hazard Mitigation Plan chapters including the appendices and individual municipality annexes. For this version of the plan, the risk assessment was divided into two chapters, Chapter 4. Hazard Profiles, and Chapter 5. Risk Analysis. The other significant change is the addition of municipality annexes. These were developed in response to the need for each municipality to have a reference of their own. The body of the plan now includes regional information, and the municipal specific information is included in the annexes. The FEMA guidelines and requirements for each portion of this Plan are included in their respective chapters. The planning process closely adhered to FEMA guidelines and to the intent of these guidelines.

Chapter 2: Regional Profile
The previous plan included a Planning Area Profile. For this plan, a regional profile is listed here and each Annex includes a Municipality Profile. The profiles describe the demographics, geography, climate, transportation, and land use of the region. This chapter describes the characteristics of the region.

Chapter 3: Planning Process
The Planning Process chapter documents the methods and approach of the hazard mitigation planning process. The chapter summarizes the Advisory Committee meetings, the public workshops, and the public outreach activities. This chapter guides a reader through the process of generating this Plan and reflects the open and inclusive public involvement process.

Chapter 4: Hazard Profiles
Previous versions of the plan included a Risk Assessment chapter that had three main sections: hazard identification, hazard analysis and risk analysis. For this plan, two chapters were created. The first, Hazard Profiles, the second, Risk Analysis. This chapter is regional in nature. Any information specific to a municipality is in their Annex. In addition, the Problem Statements previously in this chapter, were moved to the Annexes.

Chapter 5: Risk Analysis
The primary objective of the risk analysis is to quantify exposure and potential loss estimates for each hazard. In so doing, participating municipalities better understand their unique risks to identified hazards and potential problem areas, which aids in evaluating and prioritizing mitigation actions. Best available data, including geographic information systems (GIS) and Hazus-MH, were used for this analysis.

Chapter 6: Capability Assessment

The Capability Assessment looks at each municipality's ability to mitigate risk prior to and post-disaster. This chapter aims to answer two questions:

- Does the plan document each municipality's existing authorities, policies, programs and resources, and its ability to expand on and improve these existing policies and programs?[6]
- Does the Plan address each municipality's participation in the National Flood Insurance Program (NFIP) and continued compliance with NFIP requirements, as appropriate?[7]

The combination of the information contained in the Risk Analysis and the Capability Assessment leads to development of the Mitigation Strategy.

Chapter 7: Mitigation Strategy

This chapter provides a blueprint for reducing losses identified in the Hazard Profiles and Risk Analysis chapters. The chapter presents the overall hazard mitigation goals and then mitigation actions for SCRCOG. Each municipality has mitigation actions included in their Annex.

Chapter 8: Plan Implementation and Maintenance

The Plan Implementation and Maintenance chapter establishes a system and mechanism for periodically monitoring, evaluating, and updating the 2023 SCRCOG Mitigation Plan Update. It also details continued public engagement.

Appendices

The Appendices include documentation regarding the planning process, such as Advisory Committee meeting participants, public outreach flyers, and Public Participation Survey results. In addition, resources such as the Project Fact Sheet are available. The HAZUS-MH results are included under separate cover due to their size.

Hazus-MH Reports

Attached under separate cover.

Annexes

Each participating municipality has an Annex. These include municipal specific information and are designed to exist as stand-alone references. Each Annex includes the following sections:

- Municipality Profile
- Risk Analysis
- Capability Assessment
- Mitigation Actions

[6] 44 CFR 201.6(c)(3)
[7] 44 CFR 201.6(c)(3)(ii)

Chapter 2. Regional Profile

The South Central Region is one of nine Council of Governments in the State of Connecticut. Located within New Haven County in Southern Connecticut, the South Central Region is comprised of the following fifteen municipalities: Bethany, Branford, East Haven, Guilford, Hamden, Madison, Meriden, Milford, New Haven, North Branford, North Haven, Orange, Wallingford, West Haven, and Woodbridge. These fifteen municipalities make up the South Central Regional Council of Governments (SCRCOG). SCRCOG brings together local governments to coordinate land use and transportation on a regional basis.

The South Central Region of Connecticut is bordered to the east by the Lower Connecticut River Valley, Metropolitan to the west, and Naugatuck Valley to the north.[8] New Haven lies at the center of SCRCOG, which is about 40 miles southwest of Hartford, CT and 80 miles from New York, NY. The region lies against the Long Island Sound, with Long Island 50 miles from New Haven by ferry. Geographically, the region is bordered by forest and agriculture with most of the neighboring population lying north of New Haven and along the coastline. This region is part of the New York – New Haven – Springfield transportation corridor that mainly follows Interstate 95 and Interstate 91.[9] Such proximity to New York and Boston, alongside the presence of educational institutions, biotech and health industries, arts and culture, a regional park and port, airport, and accessible coastline allows the area to serve as one of the major destinations in the northeast.[10]

This 2023 SCRCOG Mitigation Plan Update covers all fifteen SCRCOG municipalities (referred to as the "planning area"). This region is part of the Department of Emergency Management and Homeland Security's Region 2, a thirty-town area.

2.1 People

According to the SCRCOG 2019 estimated demographic data, the total population of the planning area is 567,954 which is a slight decrease from its 2015 population estimate.[11] The region, however, is estimated to grow five percent by 2040 according to the State Data Center. Most of this growth will occur in the region's more urbanized areas, like Hamden, Meriden, New Haven, and West Haven.[12]

Within the planning area, the highest concentration of Non-White populations are located in New Haven and Meriden.[13] In 2019, about 72.0% of the population in the region identified themselves as White, while approximately 14.0% identified themselves as Black or African American. About 17% of the region's population is Hispanic (considering all races) and about 5% identified as Asian. Other smaller

[8] "Welcome to South Central Regional Council of Governments." (2022). South Central Regional Council of Governments.
[9] "The Northeast Corridor." (2017). Northeast Corridor Commission.
[10] "South Central CT Region Plan of Conservation & Development." (2018). South Central Regional Council of Governments. Pg. 9.
[11] "South Central Region, CT: Demographic & Socioeconomic Trends." (2021). South Central Regional Council of Governments. Pg. 7.
[12] "South Central CT Region Plan of Conservation & Development." (2018). South Central Regional Council of Governments. Pg. 19.
[13] "South Central CT Region Plan of Conservation & Development." (2018). South Central Regional Council of Governments. Pg. 19.

percentages included those who identified themselves as American Indian and Alaska Native and Native Hawaiian and Other Pacific Islander at 0.23% and 0.02% respectively.[14] Figure 2 from the SCRCOG Demographic and Socioeconomic Trends document highlights the distribution of the Non-White Population as of 2019.

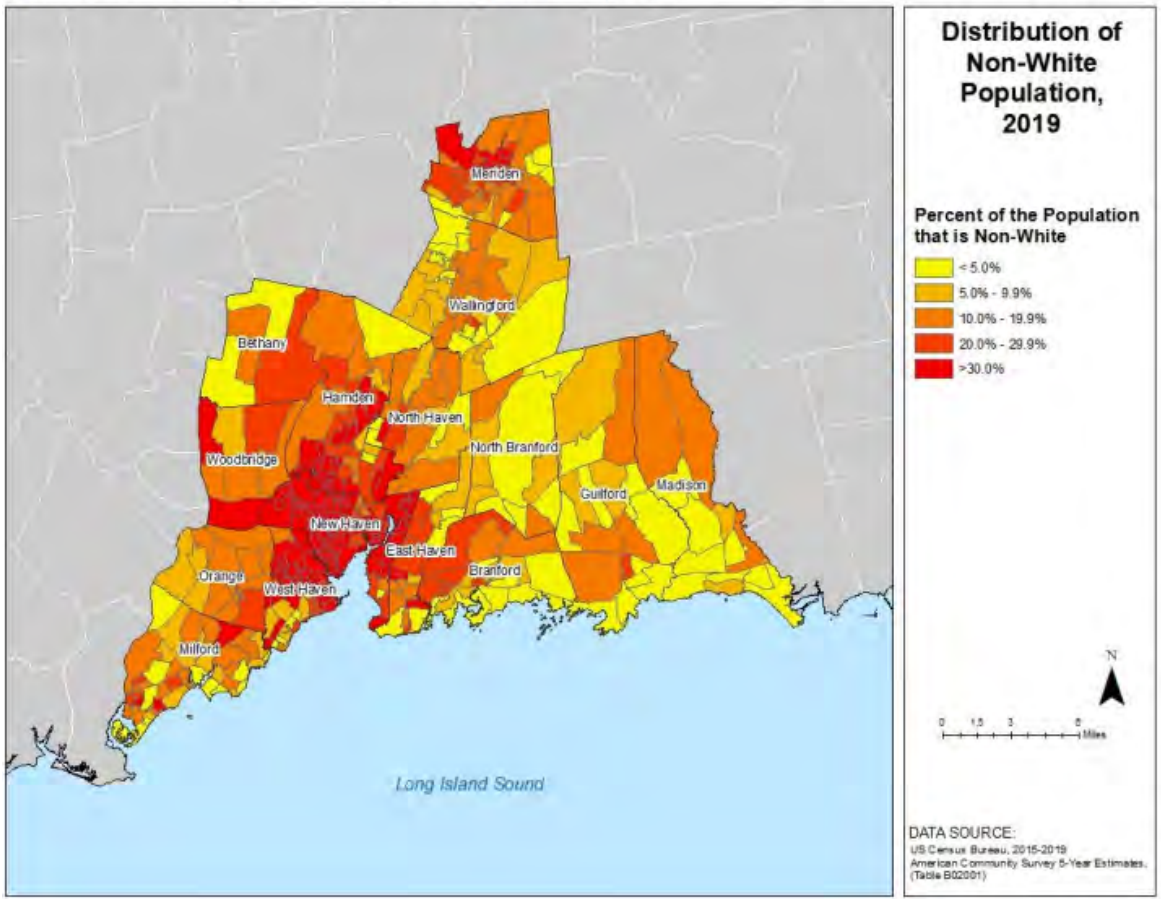


Figure 2. Distribution of Non-White Population by Block Group, 2019 [15]

The South Central Region and the State of Connecticut both experienced slower population growth than the United States in the decades between 1990-2000 and 2000-2010. This trend continues based on calculations from the American Community Survey 5-Year Estimates for 2019. Table 4 below from the South Central Region Demographic and Socioeconomic Trends document shows a breakdown of the region's population by municipality.[16]

[14] "South Central Region, CT: Demographic & Socioeconomic Trends." (2021). South Central Regional Council of Governments. Pg. 10.
[15] "South Central Region, CT: Demographic & Socioeconomic Trends." (2021). South Central Regional Council of Governments.
[16] "South Central Region, CT: Demographic & Socioeconomic Trends." (2021). South Central Regional Council of Governments. Pg. 7.

Table 4. Population By Municipality.[17]

Municipality	Population			
	1990	2000	2010	2019
Bethany	4,608	5,040	5,563	5,513
Branford	27,603	28,683	28,026	28,020
East Haven	26,144	28,189	29,257	28,742
Guilford	19,848	21,398	22,375	22,216
Hamden	52,434	56,913	60,960	60,982
Madison	15,485	17,858	18,269	18,113
Meriden	59,479	58,244	60,868	59,676
Milford	49,938	52,305	52,759	54,328
New Haven	130,474	123,626	129,779	130,331
North Branford	12,996	13,906	14,407	14,191
North Haven	22,247	23,035	24,093	23,722
Orange	12,830	13,233	13,956	13,934
Wallingford	40,822	43,026	45,135	44,596
West Haven	54,021	52,360	55,564	54,763
Woodbridge	7,924	8,983	8,990	8,827
Total	**536,853**	**546,799**	**570,001**	**567,954**

Sources: U.S. Census Bureau, 1990 Census Data Profile 1, Census 2000 Data Profile 1, 2010 U.S. Census Demographic Profile Data (Table DP-1), 2015-2019 American Community Survey 5-Year Estimates (Table B01003)

As depicted in Figure 3, the population density varies by municipality but is concentrated around New Haven and along major transportation corridors.

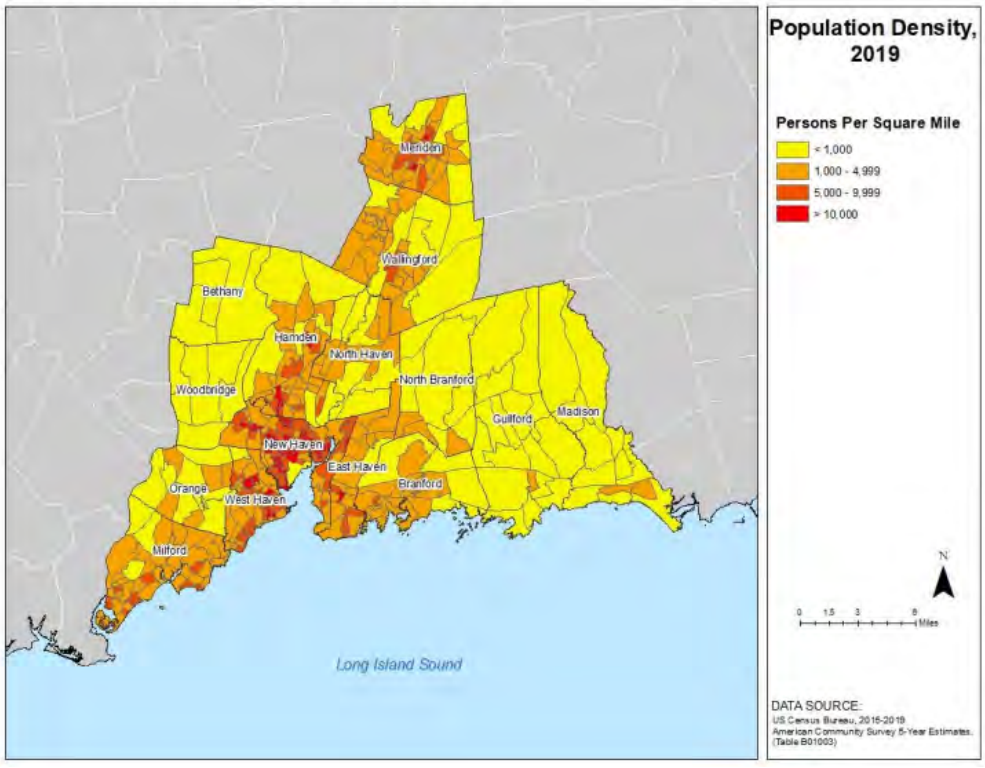


Figure 3. Population Density by Census Block Group, 2019.[18]

[17] "South Central Region, CT: Demographic & Socioeconomic Trends." (2021). South Central Regional Council of Governments.
[18] "South Central Region, CT: Demographic & Socioeconomic Trends." (2021). South Central Regional Council of Governments.

As compared to the State, the South Central Region has a similar distribution of population by age, where the ages of 20-24, 25-29, and 55-59 have the largest representation as seen in the figure below.[19]

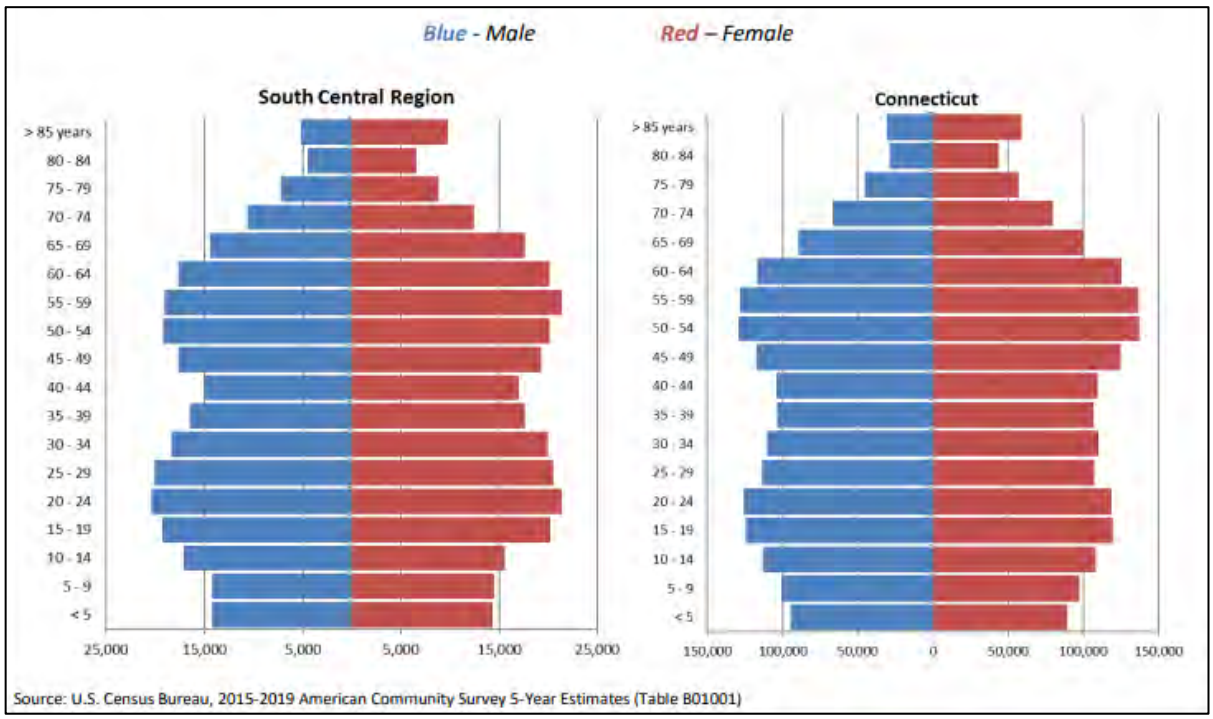


Figure 4. Population Distribution by Age, 2019.[20]

The South Central Region has seven colleges and universities which include:

1. Albertus Magnus College
2. Gateway Community College
3. Middlesex Community College
4. Quinnipiac University
5. Southern Connecticut State University
6. University of New Haven
7. Yale University. [21]

As of Fall 2019, there were about 48,000 undergraduate and graduate students in the region with Yale University having the highest total enrollment at 10,000 students.[22] Figure 5 below highlights the locations of all institutions of higher education in the South Central Region.

[19] "South Central Region, CT: Demographic & Socioeconomic Trends." (2021). South Central Regional Council of Governments. Pg. 9.
[20] "South Central Region, CT: Demographic & Socioeconomic Trends." (2021). South Central Regional Council of Governments.
[21] "South Central Region, CT: Demographic & Socioeconomic Trends." (2021). South Central Regional Council of Governments. Pg. 12.
[22] "South Central Region, CT: Demographic & Socioeconomic Trends." (2021). South Central Regional Council of Governments. Pg. 12.

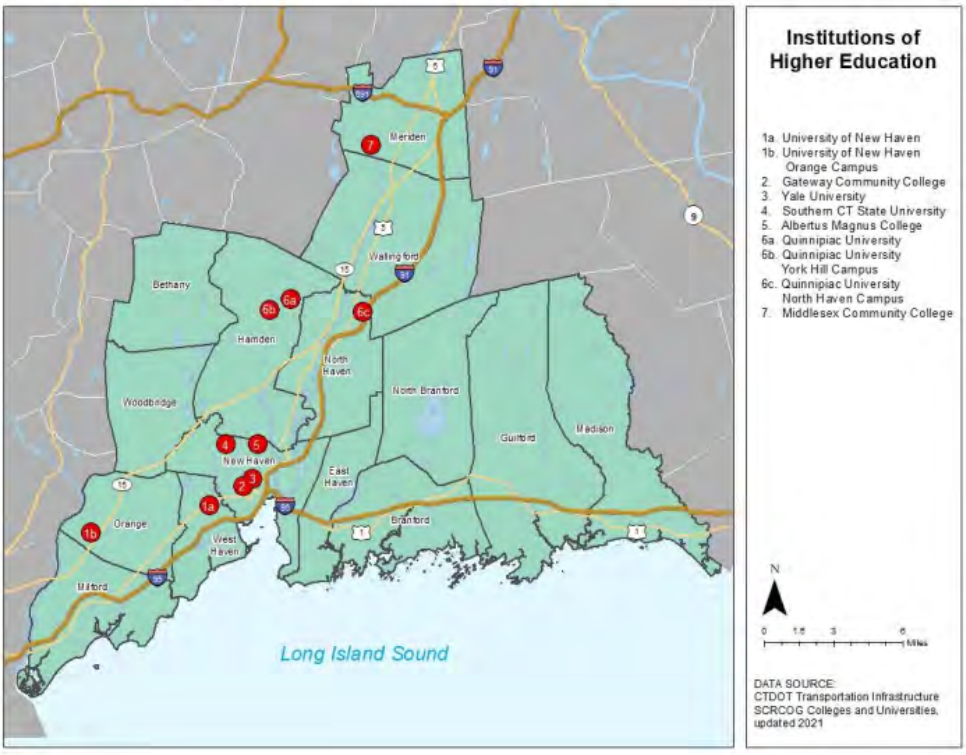


Figure 5. Institutions of Higher Education, South Central Region.[23]

Regarding the educational attainment of the planning area's population, fourteen out of the fifteen municipalities saw an increase in educational attainment (population aged 25 years and older with a bachelor's degree or higher) from 2000 to 2019. Orange, North Haven, and Milford experienced a 10.0% or greater increase in educational attainment.[24]

Median home sale prices increased in all fifteen municipalities between 2020 and 2021. The largest increase occurred in Orange (72.4%) and the smallest occurred in Wallingford (3.4%).[25] As of 2019, the total number of owner-occupied units was 134,549. Renter-occupied units remained relatively stable since 2000 at 86,918, while the number of vacant units increased by about 9,058.[26]

As for housing affordability and total assisted units in the region for 2019, three municipalities (Meriden, New Haven, and West Haven) had more than 10% of their housing stock designated affordable, while Bethany had the lowest at less than 1%. Table 5 outlines housing affordability by municipality, however, this table uses data sources other than the U.S. Census Bureau and therefore the information may differ to what is present elsewhere in the plan.[27]

[23] "South Central Region, CT: Demographic & Socioeconomic Trends." (2021). South Central Regional Council of Governments.
[24] "South Central Region, CT: Demographic & Socioeconomic Trends." (2021). South Central Regional Council of Governments. Pg. 14.
[25] "South Central Region, CT: Demographic & Socioeconomic Trends." (2021). South Central Regional Council of Governments. Pg. 17.
[26] "South Central Region, CT: Demographic & Socioeconomic Trends." (2021). South Central Regional Council of Governments. Pg. 18.
[27] "South Central Region, CT: Demographic & Socioeconomic Trends." (2021). South Central Regional Council of Governments. Pg. 19.

Table 5. Existing Affordable Housing Units per the State Definition, 2019.[28]

Town	Total Housing Units (2010 Census)	Total Assisted Units (2019 Census)	% of Housing Stock
Bethany	2,044	14	0.68%
Branford	13,972	469	3.36%
East Haven	12,533	1,007	8.03%
Guilford	9,596	231	2.41%
Hamden	25,114	2,178	8.67%
Madison	8,049	136	1.69%
Meriden	25,892	4,260	16.45%
Milford	23,074	1,226	5.31%
New Haven	54,967	17,615	32.05%
North Branford	5,629	125	2.22%
North Haven	9,491	516	5.44%
Orange	5,345	73	1.37%
Wallingford	18,945	821	4.33%
West Haven	22,446	3,236	14.42%
Woodbridge	3,478	43	1.24%
Total	**240,575**	**31,950**	**13.28%**

Source: CT Department of Economic and Community Development: 2019 Affordable Housing Appeals List

2.1.1 Environmental Justice Populations

According to the Connecticut Department of Energy and Environmental Protection mapping software, three municipalities in the South Central Region were defined as "distressed" which included East Haven, Meriden, and West Haven. Distressed municipalities, as defined by the CT Department of Economic and Community Development (DECD), are those in which 30% or more of the population lives below 200% of the federal poverty level. The data was used from the 2019 American Community Survey 5-Year Estimates.[29]

In addition to the presence of these distressed populations, the region must also consider climate vulnerability. *Resilient Connecticut* is a resilience plan for the New Haven and Fairfield Counties. Working through the UCONN Connecticut Institute for Coastal Resilience and Adaptation (CIRCA), *Resilient Connecticut* has started identifying vulnerable communities through mapping, data collection, and outreach. Maps and data will be coming soon through the program's website. [30] The Climate Change Vulnerability Index (CCVI) created by Resilient Connecticut is an index-based spatial model that identifies community vulnerability to flood, wind, and heat-related impacts of climate change. It considers exposure, sensitivity, and adaptive capacity to measure vulnerability.[31]

[28] "South Central Region, CT: Demographic & Socioeconomic Trends." (2021). South Central Regional Council of Governments.
[29] "Connecticut 2021 Environmental Justice Communities." (2021). CT Department of Energy & Environmental Protection.
[30] "Coastal Vulnerability Index Model: Assessing the vulnerability of the coasts to climate stressors" (2020). UConn CIRCA.
[31] "Climate Change Vulnerability Index (CCVI) Fact Sheet". (2017). Resilient Connecticut.

2.2 Land Use and Development (Structures)

The South Central Region Plan of Conservation and Development (POCD) was updated in 2018. The POCD provides a "general guide for land use conservation and development."[32] The POCD "is organized around three broad themes: the human, natural, and built environments — all of which are integral to one another and include overlapping goals. Ensuring the long-term sustainability of the region is an over-arching objective of this plan that applies to all three thematic areas." [33]

The 2018-2028 POCD reviewed the existing plan, local changing demographics, and the direction of the POCD in the upcoming years.[34] For the purposes of this plan, the Municipal POCD Review Table on p. 71 in the South Central Region Plan of Conservation and Development 2018-2028 was used to identify the main goals, objectives and strategies from the municipality-specific Plans of Conservation and Development. The State of Connecticut's Conservation and Development Plan (2018-2028) guides the municipalities to update their own plans. In the South Central Region, there is a strong connection between transportation and development patterns. SCRCOG municipalities are continually working to balance development and their transportation needs in a way that promotes the region's broader long-term goals.[35] The region directs development toward areas that:

1. Preserving open space and historic/cultural heritage structures
2. Diversifying housing options
3. Transit and Village Center oriented development
4. A Healthy economy with a focus on education
5. Reinvest in underdeveloped/vacant parcels
6. Develop multimodal transportation connections and enhance walking/bike path networks.

According to the 2018 POCD, existing land use shows to have a direct relationship with the region's transportation networks. A significant amount of industrial and commercial use is located around I-91 and I-95, as well as Routes 1, 5, 10, and 80. About half of the region's land use is residential, while 30% is open space. Higher-density residential is found mostly in Branford, East Haven, Hamden, Meriden, Milford, New Haven, Wallingford, and West Haven, with four to eight or eight and more dwelling units per acre.[36]

The South Central Region Generalized Existing Land-Use Map from the POCD is shown below.

[32] "South Central CT Region Plan of Conservation & Development." (2018). South Central Regional Council of Governments. Pg. 3.
[33] "South Central CT Region Plan of Conservation & Development." (2018). South Central Regional Council of Governments. Pg. 7.
[34] "South Central CT Region Plan of Conservation & Development." (2018). South Central Regional Council of Governments.
[35] "South Central CT Region Plan of Conservation & Development." (2018). South Central Regional Council of Governments.
[36] "South Central CT Region Plan of Conservation & Development." (2018). South Central Regional Council of Governments. Pg. 45.

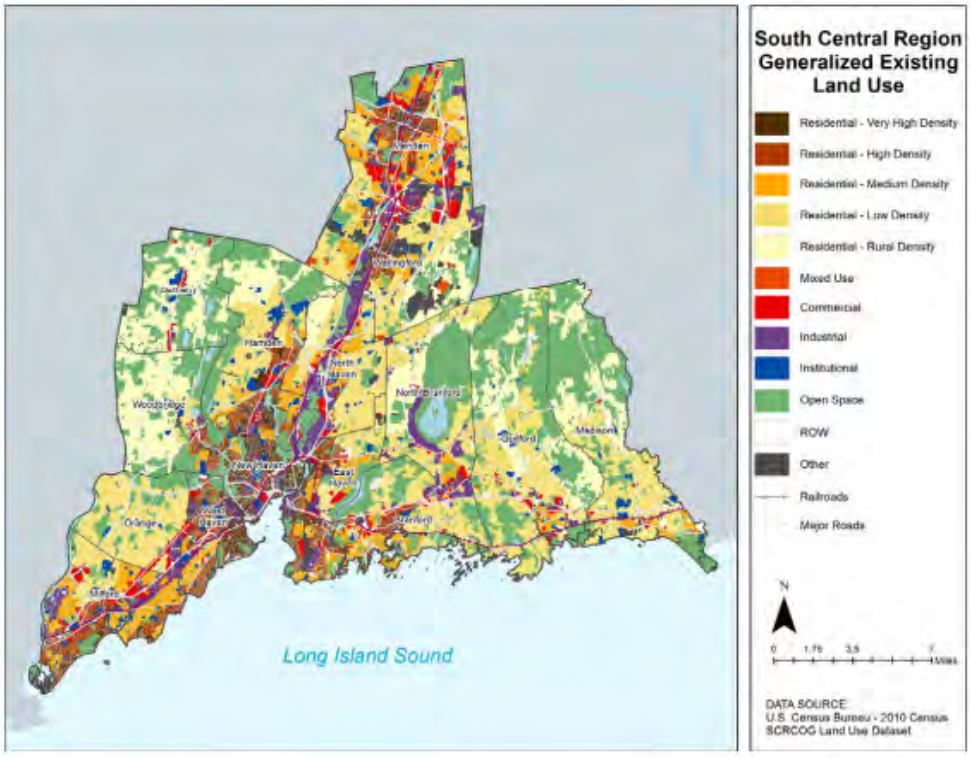


Figure 6. South Central Region Generalized Existing Land-Use Map.[37]

2.3 Natural Resources

The South Central Region is bordered by Long Island Sound on the south. The southernmost part of the planning area includes the towns of Branford, Madison, Orange, and West Haven. These towns are situated among the Coastal Lowlands, a narrow strip of level shore that runs along Long Island Sound. The coastline of Long Island Sound is dotted with many small coves and inlets and varies from sections of sandy beach to rocky bluffs to saltwater marshes. Researchers have graded the health of Long Island Sound as a "B+" on water quality. Towns such as Bethany, Hamden, North Branford, North Haven, Wallingford, and Woodbridge have elevations at or near sea level and are characterized by a gently to moderately sloping landscape of nutrient-rich farming soil. The South Central Region rests mainly on the well-drained Connecticut Valley Lowlands soil that has been formed by glacial stratified drift, a type of sediment that was deposited by glacial meltwater streams.

Figure 7 below shows the South Central Region's three major rivers: the Housatonic River, the Hammonasset River, and the Quinnipiac River. The Housatonic River flows from western Massachusetts south to Connecticut and into Long Island Sound. Many people use the Housatonic River for canoeing and other recreational activities. The Housatonic River estuary is the most consistent producer of seed oysters in the northeast, providing a vital part of Connecticut's commercial shellfish industry.[38] The Quinnipiac River bisects the State of Connecticut from north to south and forms the Central Lowlands

[37] "South Central Region, CT: Demographic & Socioeconomic Trends." (2021). South Central Regional Council of Governments.
[38] "A Paddling Guide to the Housatonic River in Connecticut." (2012). The Housatonic Valley Association.

region. The Quinnipiac River Watershed extends into Wallingford and North Haven and flows thirty-eight miles from its headwaters in Plainville to its mouth in New Haven. The Hammonasset River helps define the region's southeastern boundary. The Hammonasset travels about twenty-one miles from Durham to Long Island Sound near Hammonasset Beach State Park in Madison. All three rivers empty into Long Island Sound.

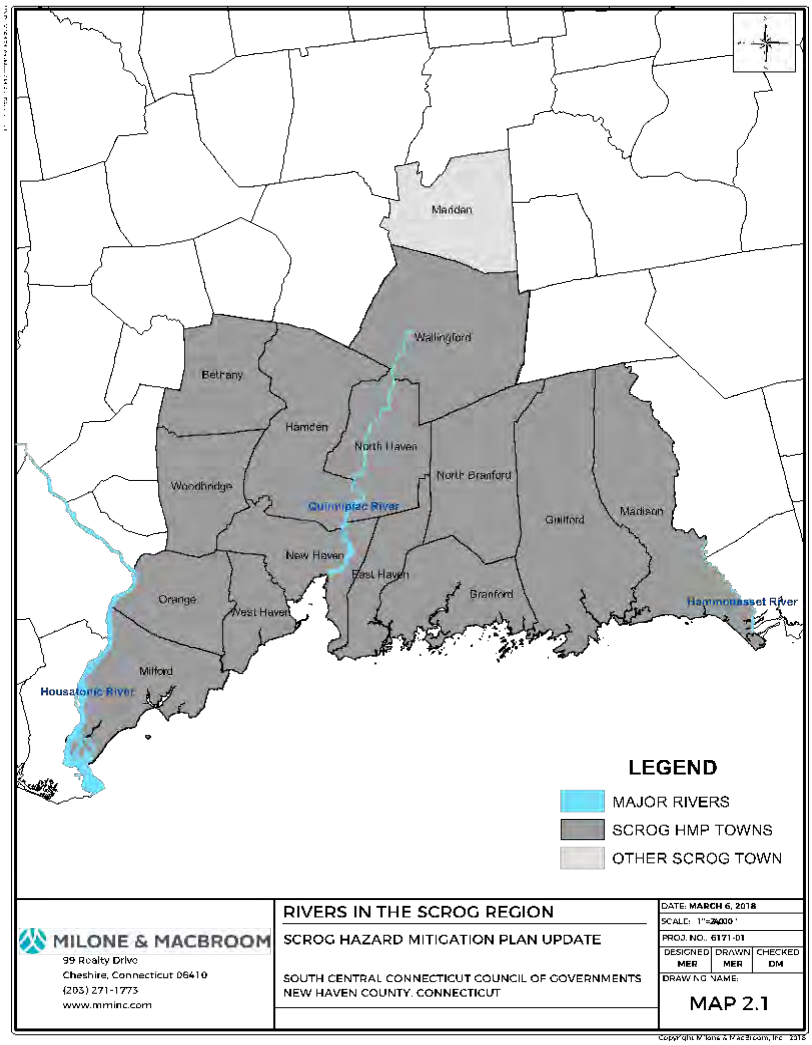


Figure 7. Major Rivers in South Central Region. [39]

Overall, the physical characteristics of the region range from marshland to farmland to urban areas. Much of the coastal land, including areas within floodplains, have developed into densely populated areas of commerce, industry, and residence.[40] Long Island Sound also supports the region's growing commercial and recreational interests, including shell fishing, sport fishing, boating, and swimming. As one of the largest estuaries in the United States, Long Island Sound is also home to a diversity of marine

[39] "South Central Region, CT: Demographic & Socioeconomic Trends." (2021). South Central Regional Council of Governments.
[40] "FEMA Flood Insurance Study, New Haven County, CT." (2010). Federal Emergency Management Agency.

animal and plant life.[41] Considerable efforts have been made by the State of Connecticut and its coastal region to protect the Sound's tidal wetlands as an irreplaceable natural resource.[42]

Water quality has improved in the region, but there remain issues. For example, CT Deep selected Farm River, its estuary, and the Quinnipiac River, as priorities to restore. The efforts of the Quinnipiac River Watershed Association (QRWA) have improved the water quality of the river due to education efforts, building civic awareness, and clean-up work. The Quinnipiac River Watershed Based Plan was created in 2013 to address any remaining quality issues.[43]

Alongside its many waterways, the region has several agricultural assets. Small-sized farms of less than 49 acres have been increasing in the area. Agri-Tourism has also become one of the fastest growing parts of the Connecticut Tourism industry.[44]

Recently, the region along Long Island Sound, including Milford, West Haven, New Haven, East Haven, Branford, Guilford, and Madison municipalities have worked with three other coastal municipalities (Bridgeport, Fairfield, Stratford) to develop the 2017 Southern Connecticut Regional Framework for Coastal Resilience in Southern Connecticut (Regional Framework). This Regional Framework constructed by the SCRCOG, the Metropolitan Council of Governments (MetroCOG), and The Nature Conservancy (TNC) works to comprehensively "catalogue, assess, prioritize and design resilience opportunities to help reduce risk…and increase the viability of natural resources along approximately 30% of Connecticut coastline."[45] The project proposed the following four components:

1. A comprehensive assessment of the coastline and adjoining watershed
2. Conduct community resilience planning meetings and workshops
3. Define the scope and design of the highest priority projects to reduce risk
4. Create a Final Report as an immediate and long-term guide for future mitigation to advance the Regional Resilience Frameworks.

More information about this project and Resilience Planning can be found in Chapter 4 of this plan, and on the SCRCOG website (http://scrcog.org/regional-planning/coastal-resilience/).

All the municipalities participating in the plan mentioned concerns regarding trees and their negative impact on utilities and roads when they come down during extreme hazard events. In addition, several municipalities mentioned they have a huge number of trees that have been impacted by the Emerald Ash Borer beetle. According to DEEP the Emerald Ash Borer "is a small, green beetle that belongs to a

[41] "Connecticut Statewide Comprehensive Outdoor Recreation Plan." (2016). Connecticut Department of Energy and Environmental Protection. Pg. 11
[42] "Living on the Shore Tidal Wetlands." (2016). Connecticut Department of Energy & Environmental Protection.
[43] "South Central CT Region Plan of Conservation & Development." (2018). South Central Regional Council of Governments. Pg. 34.
[44] "South Central CT Region Plan of Conservation & Development." (2018). South Central Regional Council of Governments. Pg. 39.
[45] "Southern CT: Regional Framework for Coastal Resilience." (2017). South Central Regional Council of Governments – MetroCOG, Nature Conservancy.

large family of beetles known as the buprestids, or metallic wood boring beetles. Because the larval EAB feeds on the phloem and cambium of the tree, and because its numbers in an area tend to build up rapidly, infestation by EAB usually leads to the death of trees that are infested, often within 2-3 years." According to a May 31, 2013, article in the Ridgefield Press, "this destructive insect was first detected in Connecticut in the town of Prospect in July 2012 and was subsequently found in eight other towns, all in New Haven County, as part of surveys conducted by Agricultural Experiment Station, The Department of Energy and Environmental Protection (DEEP), and the University of Connecticut Cooperative Extension or from reports by the public." Each municipality has a tree warden who has the authority to determine the health and fate of the area's trees. Some municipalities reported that they are removing multiple diseased trees each week, and many reported needing more funding, equipment, and staff to manage the removal of diseased trees. Several municipalities have included mitigation actions related to trees in this plan. In the following section related to utilities, information is included from Eversource and United Illuminating regarding their work in the region to manage trees in relation to power lines.

While trees do pose a threat to roads and utility lines when they are impacted by natural hazards, trees also prevent disasters. Trees have the ability through their root systems to prevent erosion from rain and flooding. Trees also provide shade which can cool temperatures during periods of extreme heat or drought. The Hamden Tree Commission participated in the Regional Public Meeting during the Planning Process as well as in several other meetings related to the plan. They are working hard to educate their community and others about the value of trees in Connecticut. They would like to play a larger role in decisions made regarding trees in their communities. They mentioned that perhaps for all trees removed a certain number of new trees could be planted. According to a letter from Diane Hoffman of the Hamden Tree Commission, "it is important that we look at the full cost of removing our trees and the cost savings trees provide by controlling flooding and soil erosion, cooling our homes in the summer, providing homes for wildlife and birds who in turn eat insects, creating oxygen so we can breathe and cleaning our air."

2.3.1 Climate

The South Central Region has relatively mild winters and warm summers. Average temperatures for midsummer are between 63˚F (daily low) and 84˚F (daily high). Midwinter temperatures range from 18˚F (daily low) to 35˚F (daily high). The average annual precipitation is about forty-seven inches. The region experiences westerly winds and is subject to cyclonic disturbances—twenty to thirty mile per hour winds that are often accompanied by heavy rain—that follow the prevailing west to southwest winds. The region is also affected by northward moving coastal storms that can reach hurricane intensity during the summer and fall seasons.[46]

The coastal communities in the planning area – Milford, West Haven, New Haven, East Haven, Branford, Guilford, and Madison – are located on Long Island Sound. The inland communities in the planning area are Orange, Woodbridge, Bethany, Hamden, North Haven, Meriden, Wallingford, and North Branford. On average, the coastal communities receive less rainfall and less snowfall than the inland communities.

[46] "FEMA Flood Insurance Study, New Haven County." (2010). Federal Emergency Management Agency.

The average high and low temperatures tend to be approximately the same for the coastal communities as for the inland communities.

The coastal communities have the highest density and most populated coastline between Boston and New York and as a result, flooding and downed trees remain some of the region's biggest hazard concerns. Many of the areas along the region's primary waterbodies fall within either the 100-year or the 500-year flood zone as designated by FEMA; however, many of these areas have been preserved as parks or open space.[47] Additionally, predictions by The Connecticut Institute for Resilience and Climate Adaptation (CIRCA) show that Connecticut sea level rise could increase 1.5 feet by 2050 and up to 3 feet by 2100 based on the present actions taken to reduce carbon emissions.[48]

The region has seen Nor'easters, Tropical Storms, and Hurricanes. In 2012, SuperStorm Sandy hit Connecticut with speeds estimated at 81mph and damaging 3,000 shoreline homes.[49] Major weather events and changes in weather patterns are likely to affect the region in the future. CIRCA aims to create a Regional Resilience Plan for New Haven and Fairfield Counties through *Resilient Connecticut*.[50]

2.4 Infrastructure and Critical Facilities

2.4.1 Infrastructure

Water

The Regional Water Authority (RWA) is the primary water service provider, except for Guilford and Madison, which are serviced by the CT Water Company in nearby Clinton, CT. Wallingford and Meriden supply water to themselves through a municipal water division.[51] The RWA purchased the Birmingham Utility Water Company recently which includes the neighboring services areas of Ansonia, Derby, Seymour and Ansonia Division Properties in Bethany and Woodbridge. SCRCOG and RWA are currently studying the effects of climate change on public drinking water in the region. [52]

Sewer

The South Central Region has eight wastewater treatment facilities and though most service is provided by individual municipal water pollution control authorities, there is one regional agency: The Greater New Haven Water Pollution Control Authority (GNHWPCA). GNHWPCA was formed as an independent regional sewer authority in 2005 by an act of the legislature and concurrent ordinances adopted by each of its constituent municipalities (New Haven, East Haven, Hamden, and Woodbridge).[53] The purpose of the GNHWPCA is to own, use, equip, repair, maintain, supervise, manage, operate, and perform any act pertinent to the collection, transportation, treatment and disposal of sewage with respect to its

[47] "South Central CT Region Plan of Conservation & Development." (2018). South Central Regional Council of Governments. Pg. 35.
[48] "Connecticut: Our Changing Climate." (2020). Connecticut Department of Energy and Environmental Protection. Pg. 6.
[49] "Connecticut: Our Changing Climate." (2020). Connecticut Department of Energy and Environmental Protection. Pg. 10.
[50] "About Resilient Connecticut." (2022). Connecticut Institute for Resilience and Climate Adaptation.
[51] "South Central CT Region Plan of Conservation & Development." (2018). South Central Regional Council of Governments. Pg. 35.
[52] "South Central CT Region Plan of Conservation & Development." (2018). South Central Regional Council of Governments. Pg. 35.
[53] "South Central CT Region Plan of Conservation & Development." (2018). South Central Regional Council of Governments. Pg. 52.

constituent municipalities. GNHWPCA also maintains an Emergency Response Plan and a Business Continuity Plan.[54]

The GNHWPCA applied for and received funding from a FEMA HMGP grant to implement resiliency improvements at four coastal pump stations in East Haven. The East Haven Pump Station Resiliency Implementation Project was completed to address flood resiliency at the GNHWPCA's Cosey Beach Pump Station, Minor Road Pump Station, Meadow Street Pump Station, and Farview Road Pump Station. Funding was acquired for a project in New Haven called the New Haven Pump Station Resiliency Implementation Project, which was completed to address flood resiliency improvements at the East Street Pump Station, Boulevard Pump Station, Fort Hale Pump Station, and ESWPAF Operations Building.[55]

The region's major city of New Haven has invested heavily in its sewer system and how it is impacted by stormwater. CIRCA has a project "New Haven – Assessing Impacts of Tides and Precipitation on Downtown Storm Sewer System," which uses real-time depth and flow monitoring data to assess the increasing need for resiliency planning due to the increase in precipitation intensity and volume because of climate change.[56]

Waste

Since 2008, all municipalities have adopted recycling programs and the State of Connecticut's current recycling rate is approximately 30%, with a goal of 60% by 2024. Several municipalities have also begun energy conservation efforts to promote green energy which include many solar energy projects that can be found in Hamden, Meriden, North Haven, and Wallingford.[57]

Six SCRCOG municipalities (Hamden, Woodbridge, Guilford, Madison, Meriden, West Haven) will be piloting the "Unit-Based Pricing and Food Waste Diversion Pilot." The pilot includes curbside co-collection of municipal solid waste (MSW) and food waste in different colored bags. After sorting, the pilot states that "the bags containing MSW are hauled to a waste-to-energy facility or out-of-state landfills, while the food waste is hauled to a bio-digester or a composting facility." SCRCOG's role aims to identify areas of the pilot programs that can lend themselves to "regional solutions including:

- Coordinated program launch
- Common instructions and messaging,
- Shared sites for sorting of bags
- Shared hauling routes

[54] "About GNHWPCA." (2018). The Greater New Haven Water Pollution Control Authority.
[55] "Construction Projects." (2018). The Greater New Haven Water Pollution Control Authority.
[56] UCONN, https://circa.uconn.edu/new-haven-stormwater/
[57] "South Central CT Region Plan of Conservation & Development." (2018). South Central Regional Council of Governments. Pp. 53-54.

- Development of regional aerated static pile composting sites at convenient locations created by the conversion of existing municipal brush and leaf composting sites in the SCRCOG region." [58]

SCRCOG held the first "Regional Backyard Composting Sale" in April 2021. It was reported that "Residents purchased over 200 backyard composters, over 60 rain barrels and other accessories on-line."[59]

Gas and Heating Oil

Southern Connecticut Gas (SCG) and Yankee Gas Service Company currently provide the region with Natural Gas. Within the State of Connecticut, besides home heating, natural gas is primarily used for some gas-fired electric generating facilities such as Milford's Power Plant which is adjacent to the Iroquois Pipeline. Natural gas energy providers have made progress in conserving energy by converting 58,000 heating customers to natural gas over three years.[60]

Over half of Connecticut households use oil and petroleum products to heat their homes and it is still the largest sector in the home heating market. Most of the home heating oil distributed throughout the region comes through the Port of New Haven. [61]

Electric

Eversource provides gas and electricity to Bethany, Branford, Guilford, Madison, and Meriden. United Illuminating provides electrical service to the remaining towns in the planning area. United Illuminating is now a part of a larger national energy company AVANGRID.[62] Wallingford has its own municipal-owned electric service, so it receives only gas from Eversource. Eversource reports to the Public Utilities Regulatory Authority (PURA) on a regular basis and has budgeted for four types of system resiliency:

1. Vegetation Management
2. Structure Hardening
3. Electrical System Hardening
4. System Automation.[63]

In terms of mitigating risk caused by trees, Eversource maintains a four-year cycle of tree trimming in the region. They have begun "enhanced tree trimming" which means they are working ground-to-sky. They are also hardening circuits, conducting performance analysis, and transitioning to more resistant wiring. In terms of structures, they now use poles that are taller and larger and use attachment hardware rated for Category 3 Hurricane Winds. Eversource now has smart grid automation devices that can section outages to smaller areas by rerouting power. In terms of flood mitigation, Eversource has removed substations in the 100-year and 500-year flood zones or installed barriers around these substations. The barriers protect the substation from storm surge from up to a Category 3 Hurricane. By

[58] "Solid Waste, Recycling, and Food Waste Diversion Initiative." (2018). South Central Regional Council of Governments.
[59] "2021 Annual Report." (2021). South Central Regional Council of Governments. Pg. 9.
[60] "South Central CT Region Plan of Conservation & Development." (2018). South Central Regional Council of Governments. Pg. 53.
[61] "Utility by Town List." (2014). State of Connecticut.
[62] "South Central CT Region Plan of Conservation & Development." (2018). South Central Regional Council of Governments. Pg. 53.
[63] "South Central Region Multi-Jurisdiction Hazard Mitigation Plan Update." (2018). South Central Regional Council of Governments.

implementing these four resiliency measures, Eversource has seen improvements in system interruption and outages.[64]

Eversource works closely with the University of Connecticut (UCONN) through the Eversource Center. This center conducts research and analysis to predict outage events. They do a lot of the disaster modeling and forecasting for Eversource. Eversource considers forecasting as a crucial part of resource planning and outage response. The storm modeling done by UCONN is helping Eversource make the electrical grid more efficient. UCONN also does forestry modeling which enables Eversource to effectively thin the forest, so it is more resilient to wind. [65]

Like Eversource, United Illuminating has a vegetation management program to reduce the amount of vegetation that threatens power lines during hazards such as high winds. United Illuminating works closely with communities to survey and determine tree work that may be required to maintain a "utility protection zone" and to reduce the threat of downed power lines. United Illuminating's 2017 Emergency Response Plan outlines the response activities and management structure for emergency incidents. The Emergency Response Plan is based on the Incident Command System (ICS). Connecticut Public Utilities Regulatory Authority (PURA) which governs the work of Eversource, United Illuminating and the Wallingford Utility, requires that each utility maintain an Emergency Response Plan and follow the ICS system.[66]

Communications

When looking to the region's communications infrastructure, about 97% of the region's population has access to Digital Subscriber Line (DSL) according to the Federal Communications Commission. DSL brings bandwidth information via telephone lines. Access to higher quality fiber and cable broadband services is hindered by high costs and confusion over options; however, both are needed to maintain competitiveness in the region.[67]

2.4.2 Critical Facilities

Critical facilities in the South Central Region include federal, state, and local facilities and infrastructure. For this plan, emphasis was placed on identifying and mapping critical facilities in each of the fifteen municipalities along with a regional inventory. Critical facilities for each municipality are within the municipal annexes. This section only includes the regional critical facilities and infrastructure which can be found in the table below.

[64] "South Central Region Multi-Jurisdiction Hazard Mitigation Plan Update." (2018). South Central Regional Council of Governments.
[65] "South Central Region Multi-Jurisdiction Hazard Mitigation Plan Update." (2018). South Central Regional Council of Governments.
[66] "South Central Region Multi-Jurisdiction Hazard Mitigation Plan Update." (2018). South Central Regional Council of Governments.
[67] "South Central CT Region Plan of Conservation & Development." (2018). South Central Regional Council of Governments. Pg. 53.

Table 6. South Central Regional Critical Facilities.

Municipalities	Correctional Insts.	EMS	Fire Stations	Health Dept.	Law Enforc.	Storage Tank Farm	Water Treatment Infra. – RWA or Privately Owned	Water Treatment Infra. - Municipality Owned	Sewer Treatment Infra. – GNHWPCA or Privately Owned	Sewer Treatment Infra. - Municipality Owned
Bethany		2	2		1					
Branford		5	5	1	1				1	1
East Haven		3	4		1	1	1			
Guilford		1	5	1	1		1			
Hamden		7	7		1		1			
Madison		3	2	1	1		1			
Meriden		2	2		1			1		1
Milford		4	4	1	1					1
New Haven	2	1	11	1	8	9			1	
North Branford		4	4		1		1			
North Haven		4	4	1	1					
Orange		2	2	1	1					
Wallingford		5	6	1	1			1		1
West Haven		10	10	1	2					1
Woodbridge			1		1		1			

In New Haven's municipality meeting held during the 2018 Hazard Mitigation Planning Process, participants emphasized how the City has several regionally important critical facilities. They mentioned the Port of New Haven, the New Haven Rail Yard, as well as the interstate highway systems of I-95 and I-91. These facilities often receive attention before smaller local critical facilities which is a concern to New Haven.

The Port of New Haven is an integral component of the regional economy and transportation network. The Port has been used to promote shipping freight and commerce since the founding of the New Haven settlement in the 1600's. In 2007, the Port Authority adopted a Strategic Land Use Plan to ensure the safety and success of the port.[68] The US Army Corps of Engineers is currently considering deepening the channel from 35 feet to 42 feet to give the area a competitive edge.[69] The Pearl Harbor Memorial Bridge provides easy access to the port area, and the Tomlinson Bridge connects the rail service to the port. [70]

The Tweed-New Haven Airport began flight service in 1931, the first plane landing 20 years prior, and has proved useful in past disasters as a distribution service.[71] According to the Federal Aviation Administration, in 2017 the Tweed-New Haven Airport serviced over 36,000 flights, half of which were local flights.[72] The Airport covers 394 acres, at 12 feet above sea level, with two asphalt runways.[73] Tweed Airport is currently proposing a reconstruction and expansion project.[74]

2.4.3 Critical Transportation

Transportation resources in the planning area include railways, waterways, roads, and natural gas pipelines. Among these are two major interstate highways (I-91 and I-95), Tweed-New Haven Regional Airport, which serves 130 destinations around the globe, a major rail hub serving Amtrak, Metro-North, and Shoreline East, and the Port of New Haven, which is the State's largest deep-water port.[75] Figure 8 shows the locations of the major transportation corridors. Over 76% of South Central Region workers are commuters who drove alone in 2019 which slightly exceeds the national average. New Haven residents use the most public transportation at 11.9%, with the rest of the region falling below the national average of 5.0%.[76]

[68] "Port Authority." (2017). The City of New Haven.
[69] O'Leary, Mary. (2015). "New Connecticut Port Authority to focus on boosting maritime economy." New Haven Register.
[70] "South Central Region Multi-Jurisdiction Hazard Mitigation Plan Update." (2018). South Central Regional Council of Governments.
[71] "Tweed Airport Timeline." (2017). Tweed New Haven: Southern Connecticut's Airport.
[72] "Air Traffic Activity System (ATADS)." (2017). Federal Aviation Administration.
[73] "Tweed-New Haven." (2017). Airport IQ 5010.
[74] "Future of Tweed: Letter from the Mayor of New Haven." (2015). Tweed New Haven: Southern Connecticut's Airport.
[75] "South Central Region, CT: Demographic & Socioeconomic Trends." (2017). South Central Regional Council of Governments. Pg.24.
[76] "South Central Region, CT: Demographic & Socioeconomic Trends." (2021). South Central Regional Council of Governments. Pg.24.

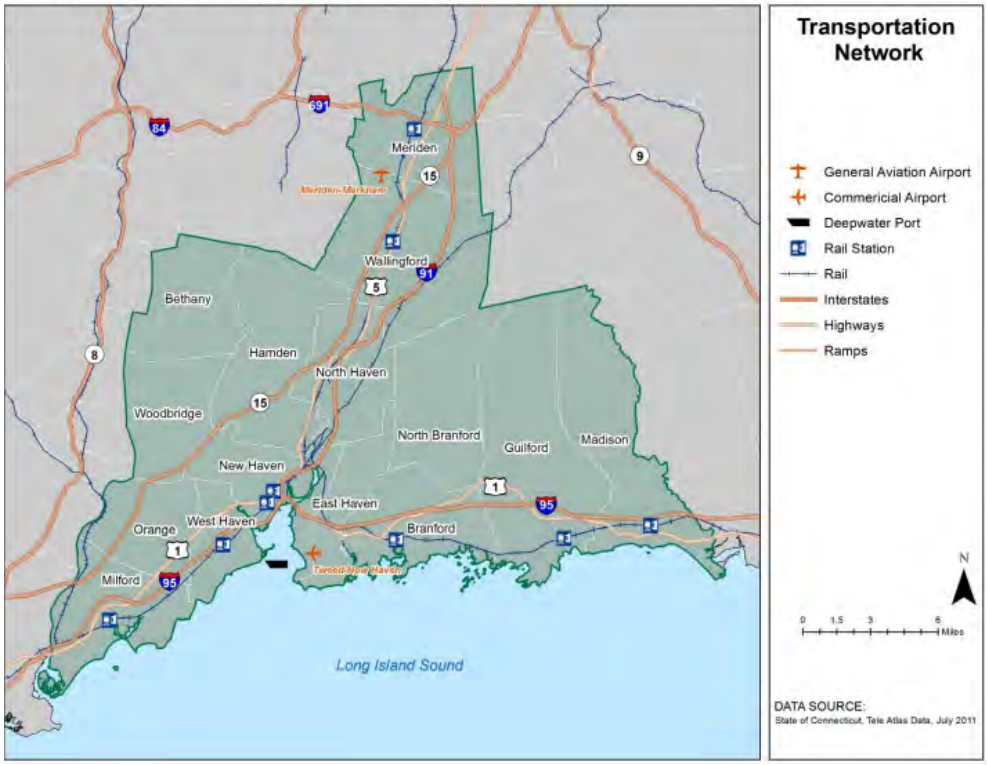


Figure 8. Transportation Network, South Central Region.[77]

The planning area contains a variety of transportation options, making coordination and development a top priority. SCRCOG hosts monthly meetings to facilitate interagency communication and cooperation regarding transportation between municipalities and state and federal agencies. The South Central Regional Council of Governments develops and updates the Regional Long Range Transportation Plan (LRTP), which "addresses broad goals for the transportation needs of the region."[78] The latest LRTP, which covers the years between 2015 to 2040, lists the following major goals and focus areas:

- Travel options
- Transportation funding
- Policy guidance
- Regional solutions
- Linking land use with transportation
- Aging infrastructure
- Economic vitality
- Congestion management process

[77] "South Central Region, CT: Demographic & Socioeconomic Trends." (2021). South Central Regional Council of Governments.
[78] "South Central Regional Long Range Transportation Plan 2015-2040." (2015). South Central Regional Council of Governments.

- Preservation of existing transportation resources
- Climate change.[79]

The LRTP does not address natural hazards, but it does seek to reduce congestion, improve quality of transportation, and account for the challenges climate change presents. Environmental permitting for transportation rests primarily at the state level; however, the LRTP mentions that review by "municipalities will provide the potential for local input to the state permitting process, working toward the goal of a better environmental outcome for every transportation project."[80] For further information about the transportation systems present in the region see the 2015 updated LRTP found on the SCRCOG website (http://www.scrcog.org).

The region is also focused on the development of complete streets, which creates a safe network for all users and modes of transportation.[81] The completion of the I-95 Central Corridor Expansion Project and new investments in commuter rail, such as the new Hartford Line, has improved the region's transit system even further.[82]

2.5 Economy

All municipalities in the South Central Region, except for Milford and Woodbridge, fall within the New Haven Labor Market area. A labor market area is defined by the U.S. Bureau of Labor Statistics as a geographic area where individuals can reside and find employment within a "reasonable distance" or can readily change employment without changing their place of residence.[83]

2.5.1 Employment Trends and Occupations

Unemployment in the region decreased from 5.05% in 2018 to 3.69% in 2019. The highest unemployment rates in the region were experienced in 2010 with rates over 9.0% due to the economic recession from 2007 to 2009. In 2019, East Haven, Meriden, New Haven, and West Haven had unemployment rates higher than the State's average of 4.0%.[84]

The table from the SCRCOG Demographic and Socioeconomic Trends document highlights the region's trends from 2000-2019 in comparison to the State of Connecticut and the United States.

[79] "South Central Regional Long Range Transportation Plan 2015-2040." (2015). South Central Regional Council of Governments.
[80] "South Central Regional Long Range Transportation Plan 2015-2040." (2015). South Central Regional Council of Governments.
[81] "South Central CT Region Plan of Conservation & Development." (2018). South Central Regional Council of Governments. Pg. 49.
[82] "South Central Regional Metropolitan Transportation Plan 2019-2045" (2019). South Central Regional Council of Governments. Pg. 22.
[83] "South Central Region, CT: Demographic & Socioeconomic Trends." (2021). South Central Regional Council of Governments. Pg. 4.
[84] "South Central Region, CT: Demographic & Socioeconomic Trends." (2021). South Central Regional Council of Governments. Pg. 35.

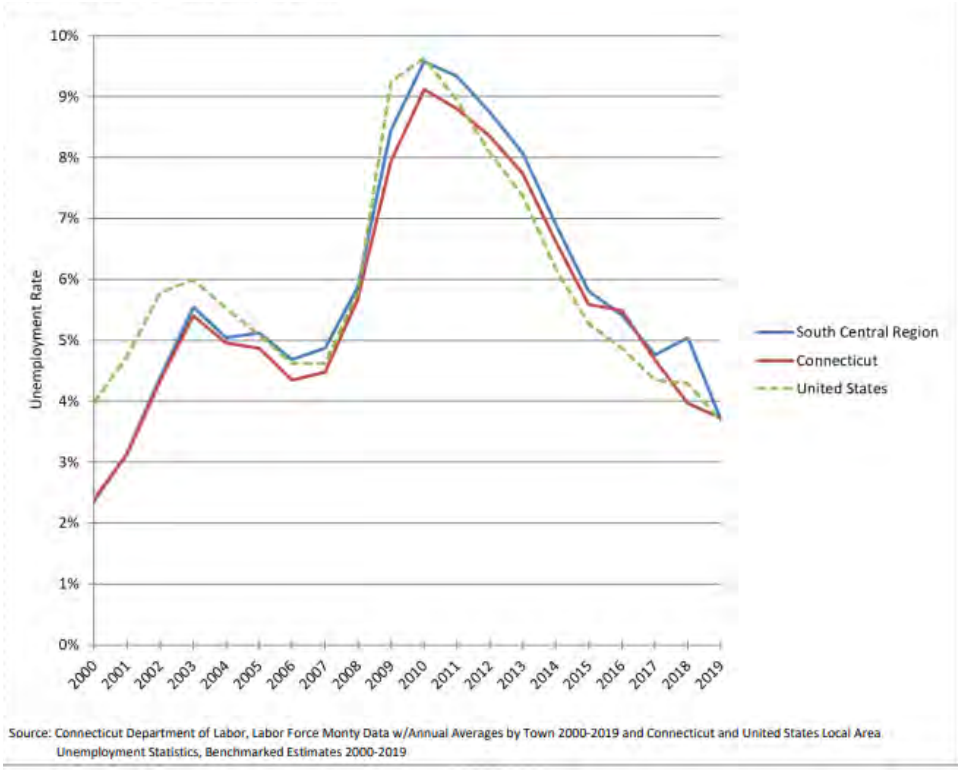


Figure 9. Unemployment Rates, 2000-2019 [85]

The labor force in the region has remained relatively stable since 2010, though four municipalities experienced a decrease which included East Haven, Meriden, West Haven, and Woodbridge.[86]

REX Development is a quasi-public agency that is promoting economic development in South Central Connecticut and helps coordinate the development and implementation of the federally mandated Comprehensive Economic Development Strategy (CEDS). In the current CEDS (2013-2018), the targeted industry clusters providing the region's economic base are healthcare, higher education, advanced manufacturing, advanced materials, biomedical/ life sciences, arts, entertainment and tourism, business, and financial services, agribusiness/agri-bioscience, and green technology. The diversity of these industries highlight that no single sector dominates the region. As of 2014, there were 359,106 jobs in the region which is close to pre-recession levels.[87] The area's annual labor force in 2019 was more than 310,000 people.[88]

For continued economic development, however, the region identified addressing skills gaps in its workforce as a significant need. According to the Workforce Alliance's 2016 Local Plan, employers in the planning area report shortages of "qualified workers" in priority industry sectors like health care,

[85] "South Central Region, CT: Demographic & Socioeconomic Trends." (2021). South Central Regional Council of Governments.
[86] "South Central Region, CT: Demographic & Socioeconomic Trends." (2021). South Central Regional Council of Governments. Pg. 32.
[87] "South Central CT Region Plan of Conservation & Development." (2018). South Central Regional Council of Governments. Pg. 47.
[88] "South Central Region, CT: Demographic & Socioeconomic Trends." (2021). South Central Regional Council of Governments. Pg. 34.

manufacturing, and information technology. Additionally, economic development and innovation were noted issues for the region according to municipal survey results, while respondents also mentioned wanting to see "more jobs."[89]

[89] "South Central CT Region Plan of Conservation & Development." (2018). South Central Regional Council of Governments. Pg. 47.

Chapter 3. Planning Process

The planning process was developed in full compliance with the current planning requirements of the Federal Emergency Management Agency (FEMA) per the following rules and regulations:

- Robert T. Stafford Disaster Relief and Emergency Assistance Act (Public Law 93-288), as amended by the Disaster Mitigation Act of 2000
- Code of Federal Regulations – Title 44, Chapter 1, Part 201 (§201.6: Local Mitigation Plans)
- Federal Emergency Management Agency Local Mitigation Plan Review Guide (dated October 1, 2011)

The Federal Emergency Management Agency's recently released; Local Mitigation Planning Policy Guide (Released April 19, 2022, Effective April 19, 2023) was considered but all requirements may not be included. In addition, the plan was prepared with the suggestions found in the Demonstrating Good Practices Within Local Hazard Mitigation Plans, FEMA Region 1, January 2017.

A1. Does the Plan document the planning process, including how it was prepared and who was involved in the process for each jurisdiction? (Requirement §201.6(c)(1))

3.1 Planning Process

This multi-jurisdiction hazard mitigation plan eases the burden of keeping these communities safe by identifying and communicating hazard risks, developing actions to reduce or eliminate those risks, and making each municipality eligible for FEMA mitigation program funding. In addition, the mitigation planning process educated key stakeholders within each municipality and strengthened partnerships between these stakeholders and SCRCOG staff.

The previous Multi-Jurisdiction Hazard Mitigation Plan included fourteen Municipalities out of the fifteen in the SCRCOG Region. For this plan, the City of Meriden joined. This plan is considered an update to their City of Meriden Hazard Mitigation Plan Update, Adopted on February 4, 2019.

The South Central Regional Council of Governments received a grant from the State of Connecticut, Department of Emergency Services & Public Protection, Division of Emergency Management & Homeland Security through the Federal Emergency Management Agency (FEMA), Building Resilient Infrastructure and Communities (BRIC) to develop the 2023 SCRCOG Mitigation Plan Update. The SCRCOG has assumed responsibility for developing and maintaining this plan since 2013. This is the third version of the plan. Rebecca Andreucci, Transportation Planner, SCRCOG led the planning process on behalf of SCRCOG. SCRCOG contracted with Jamie Caplan Consulting LLC to develop this plan. Jamie Caplan Consulting was supported by Punchard Consulting LLC, Resilient Land and Water LLC, and Dewberry. This group met with Rebecca Andreucci on a regular basis, beginning with a kick-off meeting on March 11, 2022.

A priority through the planning process was equity, which FEMA defines as the "consistent and systematic fair, just and impartial treatment for all individuals." This was a central theme through the planning process and effort was made to develop an inclusive planning process. The whole community (individuals, communities, private and nonprofit sectors, faith-based organizations, and all levels of government) were given an opportunity to participate.

In addition, the plan was prepared in a manner that maximizes credit points under the National Flood Insurance Program's Community Rating System (CRS) for participating municipalities. The JCC Team utilized FEMA's 2017 version of the *CRS Coordinator's Manual* along with the 2021 Addendum to the manual and its own internal planning crosswalk to ensure that the updated plan remains consistent with current CRS requirements for floodplain management planning (Activity 510). In the previous plan, only the City of Milford and the City of New Haven were active participants in the CRS. Now that the Town of Guilford has joined the program, this plan update includes three communities that actively participate in the CRS. The planning process used to develop this plan maximizes possible credits toward joining and participating in the CRS program. Additional details about the CRS are provided in Chapter 5 Capability Assessment.

The theme throughout the planning process was **Municipalities are individual entities with specific characteristics/risks that need to be addressed.**

The schedule for updating the plan is shown in the figure below.

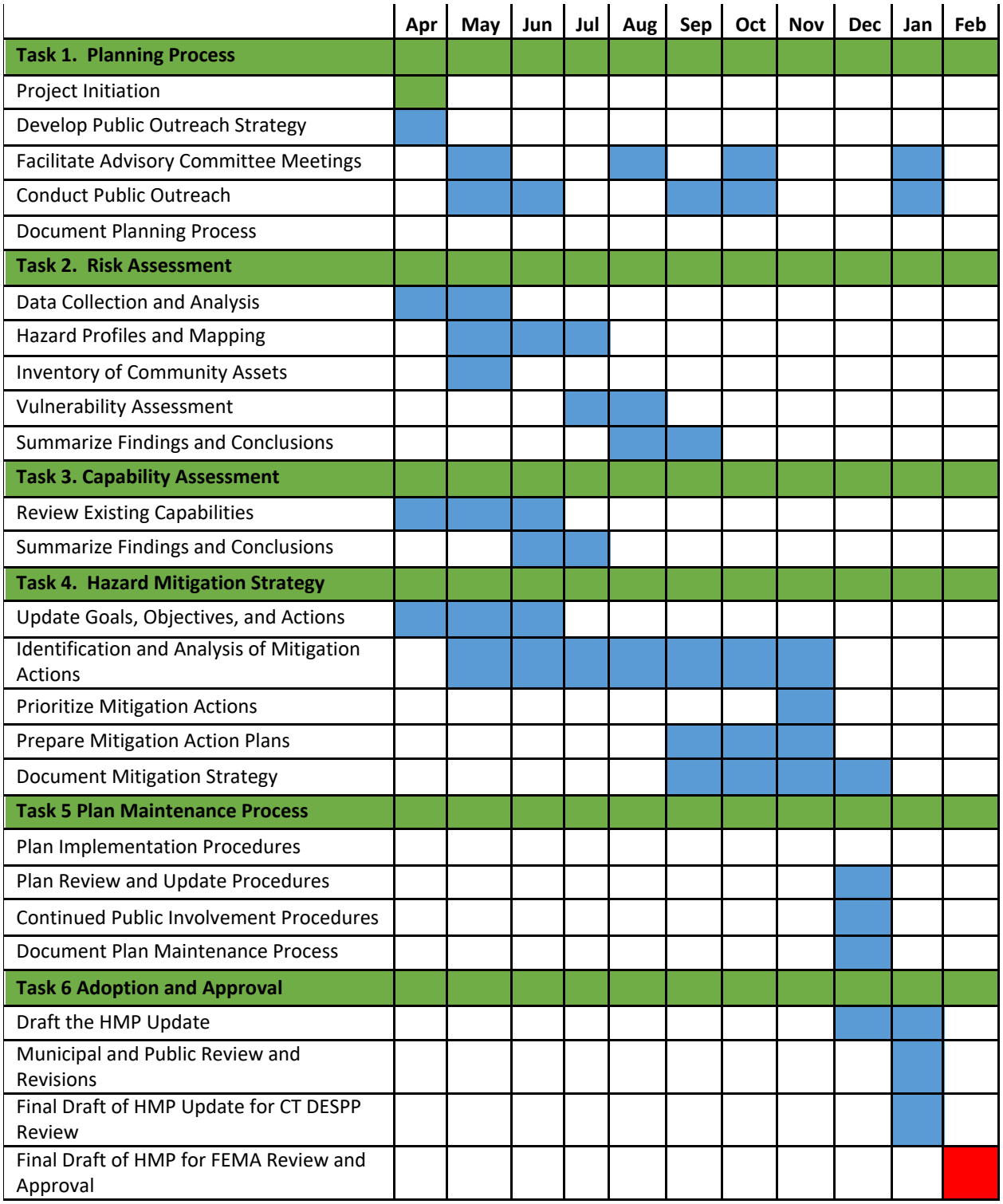


Figure 10. Planning Process Timeline.

3.1.1 Advisory Committee

The Advisory Committee formed for the original plan in 2013 continues to meet to this day. It includes representatives from each municipality and several key stakeholders, such as the Greater New Haven Water Pollution Control Authority (GNHWPCA). The Advisory Committee met as a group four times during the planning process, May 12, 2022, August 11, 2022, October 24, 2022, and January 5, 2023. Each of these meetings was held virtually to accommodate individual schedules and because of the Covid 19 pandemic. Details regarding participation are included in Appendix A. Members of the Advisory Committee are listed in the table below in alphabetical order by municipality.

Table 7. Advisory Committee Members.

	Municipality	First Name	Last Name	Job Title	Organization	Email	Phone
1	Bethany	Tony	Ciarleglio	Road Foreman	Town of Bethany	tciarleglio@bethany-ct.com	203-393-2100
2	Bethany	Paula	Cofrancesco	First Selectman	Town of Bethany	pcofrancesco@bethany-ct.com	203-393-2100
3	Bethany	Rich	Cogill	Fire Chief	Town of Bethany	chief@bethanyfirect.com	203-393-2100
4	Bethany	Lina Viviana	Frazer	Land Use Enforcement	Town of Bethany	lina.v.frazer@gmail.com	203-606-3839
5	Bethany	Clark	Hurlburt	CERT	Town of Bethany	clarkhurlburt@sbcglobal.net	N/A
6	Bethany	Mike	Katzmark	Emergency Management Director	Town of Bethany	EMD@bethany-ct.com	203-393-2100
7	Bethany	David	Merriam	Lieutenant	Town of Bethany	dmerriam@bethany-ct.com	203-393-2100
8	Bethany	Don	Shea	DPW and Facilities	Town of Bethany	dshea@bethany-ct.com	205-509-3883
9	Bethany	Stephen	Sousa	Fire Marshal	Town of Bethany	firemarshal@bethany-ct.com	203-393-2100
10	Branford	Jennifer	Acquino	Assistant Town Engineer	Town of Branford	jacquino@branford-ct.gov	203-315-0606
11	Branford	John	Hoefferle	Town Engineer	Town of Branford	jhoefferle@branford-ct.gov	203-315-0606
12	Branford	Kevin	Ortiz	Design Engineer	Town of Branford	kortiz@branford-ct.gov	203-315-0606

	Municipality	First Name	Last Name	Job Title	Organization	Email	Phone
13	East Haven	Jonathan	Bodwell	Town Engineer	Town of East Haven	jbodwell@townofeasthavenct.org	
14	East Haven	Matthew	Marcarelli	Fire Chief	Town of East Haven	mmarcarelli@easthavenfire.com	203-468-3221
15	Groton	John	Truscinski	Director of Resilience Planning	Connecticut Institute for Resilience and Climate Adaptation	john.truscinski@uconn.edu	860-405-9252
16	Guilford	Kevin	Magee	Environmental Planner	Town of Guilford Natural Resources Department	mageek@guilfordct.gov	203-453-8074
17	Guilford	Janice	Plaziak	Town Engineer	Town of Guilford	plaziakj@ci.guilford.ct.us	203-453-8037
18	Hamden	Eugene	Livshits	Town Planner	Town of Hamden	elivshits@Hamden.com	203-287-7074
19	Hamden	Stephen	White	Town Engineer	Town of Hamden	swhite@hamden.com	203-376-5547
20	Madison	John	Iennaco	Director of Public Works & Town Engineer	Town of Madison	iennacoj@madisonct.org	203-245-5660
21	Madison	Erin	Mannix	Town Planner	Town of Madison	mannixe@madisonct.org	203-245-5633
22	Meriden	Brian	Ennis	City Engineer	City of Meriden	bennis@meridenct.gov	203-630-4020
23	Milford	Steven	Johnson	Assistant Public Works Director	City of Milford	stevenjohnson@milfordct.gov	203-783-3265

	Municipality	First Name	Last Name	Job Title	Organization	Email	Phone
24	Milford	MaryRose	Palumbo	Inland Wetland Agent	City of Milford	mpalumbo@milfordct.gov	203-701-4452
25	Milford	William	Richards	Deputy Emergency Management Director	City of Milford	wrichards@milfordct.gov	203-671-6661
26	New Haven	Laura	E Brown	City Plan Director	City of New Haven	lebrown@newhavenct.gov	475-331-4109
27	New Haven	Anne	Hartjen	Asst Dir Comp Plan	City of New Haven	ahartjen@newhavenct.gov	203-946-6383
28	New Haven	Jacob	Robison	Senior Project Manager	City of New Haven	jrobison@newhavenct.gov	203-314-3263
29	New Haven	Tom	Schroeder	Senior Engineer	Greater New Haven Water Pollution Control Authority	ischroeder@gnhwpca.com	203-466-5280
30	North Branford	Victor	Benni	Town Engineer	Town of North Branford, CT	townengineer@townofnorthbranfordct.com	203-484-6009
31	North Haven	J Andrew	Bevilacqua	Town Engineer	Town of North Haven	bevilacqua.andrew@town.north-haven.ct.us	203-239-5321
32	North Haven	Lynn	Sadosky	Public Works Director	Town of North Haven	Sadosky.Lynn@northhaven-ct.gov	203-604-4553
33	Orange	Tom	Borer	Director Emergency Management	Town of Orange	tborer@orange-ct.gov	203-891-4708

	Municipality	First Name	Last Name	Job Title	Organization	Email	Phone
34	Orange	Robert	Brinton	Director of Public Works/Town Engineer	Town of Orange	bbrinton@orange-ct.gov	203-891-4741
35	SCRCOG	Rebecca	Andreucci	Transportation Planner	South Central Regional Council of Governments (SCRCOG)	randreucci@scrcog.org	203-466-8601
36	Wallingford	Alison	Kapushinski	Town Engineer	Town of Wallingford	a.kapushinski@wallingfordct.gov	203-294-2090
37	Wallingford	Kevin	Paganini	Town Planner	Town of Wallingford	kevin.pagini@wallingfordct.gov	203-294-2090
38	West Haven	Abdul	Quadir	City Engineer	City of West Haven	quadir@westhaven-ct.gov	203-937-3577
39	Wethersfield	Adam	Whelchel	Director of Science	The Nature Conservancy	awhelchel@tnc.org	860-970-8442
40	Woodbridge	Warren	Connors	Director of Public Works	Town of Woodbridge	wconnors@woodbridgect.org	203-389-3421

Members of the Advisory Committee had the following responsibilities:

- Attend 4 committee meetings
- Provide supporting data/information upon request
- Assist in the evaluation and prioritization of mitigation actions
- Review and comment on draft plan
- Facilitate public outreach and stakeholder engagement

The table below details each of the Advisory Committee meetings including its purpose and details regarding meeting outcomes. A list of who participated in each meeting is included in Appendix A.

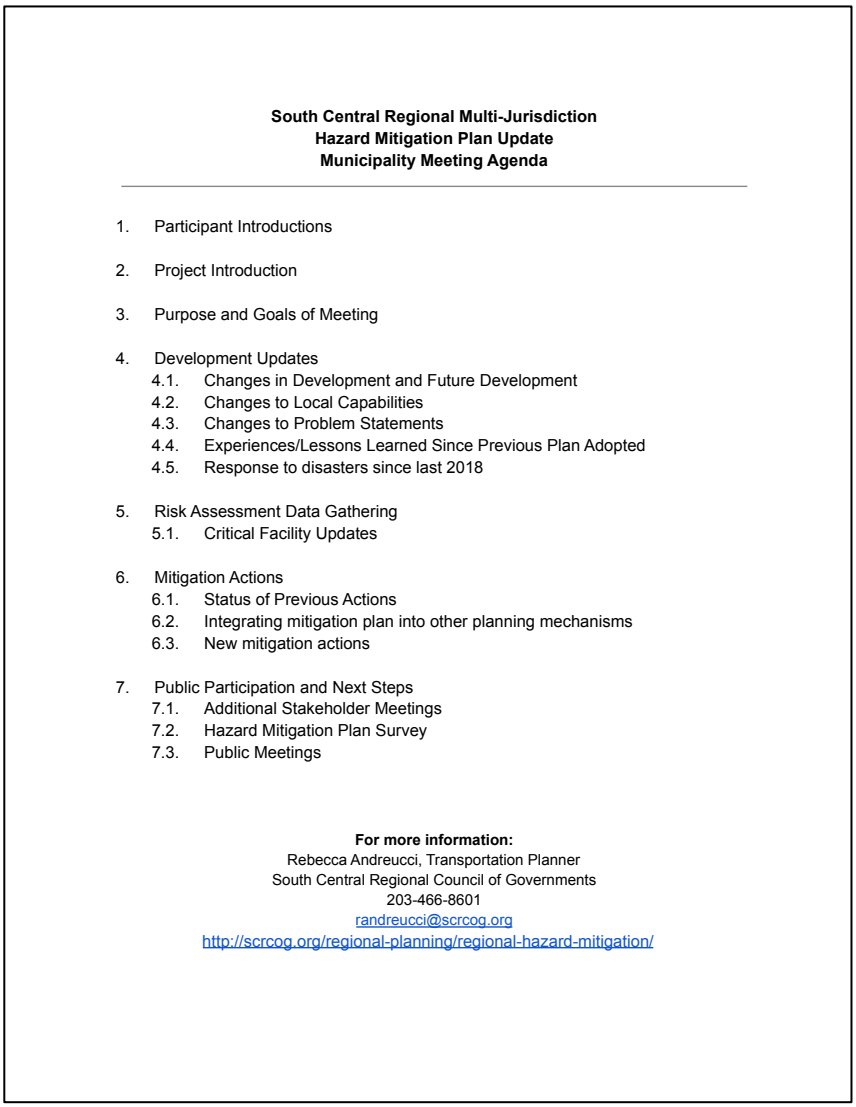
Table 8. Advisory Committee Meetings.

Date	Purpose	Outcomes
5/12/2022	• Review Timeline and Expectations • Outline Project Tasks and Assumptions for Plan Update • Discuss Survey Distribution • Discuss Organizing and Scheduling Municipality meetings	• Advisory Committee members shared expectations for the plan update. This included describing actions completed and naming those seeking funding for. • Agreed to add Invasive Species to the list of hazards in the plan. • Introduced the concept of Community Lifelines. • Discussed Resilience Project Pipeline from CIRCA.
8/11/2022	• Discuss Municipality Meetings • Risk Assessment Review Critical Facilities, Loss Estimates, Social Vulnerability Mapping • Review Status of Previous Mitigation Actions	• Number of NFIP policies has decreased. Is this because of Risk Rating 2.0 or more likely homeowners are underinsured. This highlights the need for education. • Critical facilities taken from CIRCA and then updated based on municipality meetings. • Advisory Committee is especially interested in intense rainfall modelling; the SLOSH surge model probably doesn't take this into account. Need to add rainfall and fluvial flooding need to the mitigation strategy. • Added "climate change" to the Mission Statement.

Date	Purpose	Outcomes
10/24/2022	• Discuss Survey Distribution and Public Outreach • Review Final Hazus Analysis • Discuss EJ Communities and Problem Statements • Share Capability Assessment Findings • Finalize Goal Statements • Discuss Essential Details for Mitigation Actions	• Survey distribution was discussed, and Advisory Committee members agreed to make another push. • SCRCOG shared that they are working on systems to achieve economies of scale amongst the municipalities. They are planning some larger grant applications for the future. • The Goal Statements were finalized. • Details for the mitigation actions were reviewed and Advisory Committee members will update their Mitigation Action Trackers.
1/5/2023	• Review Problem Statements • Prioritize and Review Mitigation Actions • Discuss Public Engagement for Plan Review	• Most of the municipalities have reviewed the problem statements and made minor corrections. • The consulting team will work with individual Advisory Committee members to finalize actions for each municipality. • Outreach for the Public Meeting has been extensive and similar methods will be used for Plan Review.

3.1.2 Municipality Meetings

To include as many municipal specific stakeholders as possible, the SCRCOG and the consulting team held a meeting with each municipality. These meetings were organized by the Advisory Committee and held virtually on Zoom. The meetings were recorded, and some communities posted the recordings on their websites. The agenda for these meetings is shown in Figure 11. Municipality meetings were scheduled in June 2022, as detailed below in Table 9.



South Central Regional Multi-Jurisdiction
Hazard Mitigation Plan Update
Municipality Meeting Agenda

1. Participant Introductions
2. Project Introduction
3. Purpose and Goals of Meeting
4. Development Updates
   - 4.1. Changes in Development and Future Development
   - 4.2. Changes to Local Capabilities
   - 4.3. Changes to Problem Statements
   - 4.4. Experiences/Lessons Learned Since Previous Plan Adopted
   - 4.5. Response to disasters since last 2018
5. Risk Assessment Data Gathering
   - 5.1. Critical Facility Updates
6. Mitigation Actions
   - 6.1. Status of Previous Actions
   - 6.2. Integrating mitigation plan into other planning mechanisms
   - 6.3. New mitigation actions
7. Public Participation and Next Steps
   - 7.1. Additional Stakeholder Meetings
   - 7.2. Hazard Mitigation Plan Survey
   - 7.3. Public Meetings

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Figure 11. Municipality Meeting Agenda.

Table 9. Municipality Meeting Schedule.

Municipality	Meeting Date	Key Outcomes
Bethany	6/2/2022 and 6/27/2022	Bethany held two meetings to accommodate schedules. They have not experienced a lot of diseased trees. They have experienced 2 tornadoes, and lost power during an ice storm. They received funding for capital projects such as refurbishing the Town Hall. The Town has repaved over 2/3rds of roads and added catch-basins; they reported that Bethany is known for good roads. Slow response time from utilities is one of their biggest concerns.
Branford	6/9/2022	The Town would like to see more feasibility studies for nature-based solutions. The Town set-up a Coastal Resilience Fund three years ago. They would like this plan to focus on hazards other than flood. Interested in developing resiliency at the water pollution control authority. Also, began a database of roads that have experienced

Municipality	Meeting Date	Key Outcomes
		flooding. Three Amtrack underpasses tend to flood. The Town will integrate Resilient Connecticut projects.
East Haven	6/6/2022	Priority is coastline resiliency. Hemingway Avenue and Farm River are key areas of flooding. The Police Chief has assumed a larger role in Emergency Management. Sheltering continues to be an issue.
Guilford	6/2/2022	Accepted into CRS! Lots of development, including some in the floodplain. Relocating Public Works facility out of the floodplain. They have a system to track downed trees, power outages, flooded areas, and erosion. Continue to have significant flooding in downtown. They have an active Tree Advisory Board that promotes burying power lines and protecting trees.
Hamden	6/13/2022	Have a Tree Ordinance in place and an active Community Emergency Response Team (CERT). They experience flooding during heavy rainfall that causes road closures. A couple of large new housing developments have been built since the previous plan was developed. Working closely with Quinnipiac University for shelter needs during disasters.
Madison	6/23/2022	Plan to update Stormwater Regulations and Floodplain Ordinance. Added Reverse 911 capability from Covid funding.
Meriden	6/9/2022	Town prioritizes green infrastructure. For instance, City Park used green infrastructure along the brook. They also prioritize connecting neighborhoods to natural environment. Biggest hazards of concern are flood, snow, wind, extreme heat, and wildfire.
Milford	6/13/2022	Elevation of homes has increased fire risk because wind travels under homes and acts as a chimney. They are active in the CRS program. Milford has had success with microgrid projects that operated during a couple of storms in 2021. The combination of aging trees, climate change, and invasive species have especially impacted Ash trees.
New Haven	6/6/2022	This was a large meeting with about 20 people including City staff, residents, Yale University, Greater New Haven Green Fund, Yale Center for Environmental Justice, CIRCA, Greater New Haven Water Pollution Control Authority, Long Island Sound Sustainability Resilience Program. This meeting focused a lot on equity and public engagement. It was mentioned that EJ communities are not just at risk but can also offer solutions to natural hazard issues. Requested that extreme heat be emphasized in the plan and that green design solutions always be considered.
North Branford	6/9/2022	New development includes new wings on the high school and a new Police Station that will function as the Emergency Operations Center (EOC). Drought not a big concern but erosion, tropical storms and winter storms are concerning. The Farm River Control Project and Farm River Watershed Study should be considered.

Municipality	Meeting Date	Key Outcomes
North Haven	6/28/2022	Able to get funding for some projects but need more staff. Need to rewrite stormwater section of planning and zoning regulations. Town has a policy of not working on private property and people expect the town to assist; this situation needs to be remedied. North Haven is booming, bringing in $1.7 million dollars in permitting fees. Amazon keeps growing and adding buildings. Kings Highway Bridge has washed out a couple of times.
Orange	6/28/2022	Some parts of town have flooded from rainfall events and residents are upset. Road culverts are inadequate for the size of storms occurring. Town has lots of new commercial development including a FedEx facility, an ink factory, and an assisted living facility.
Wallingford	6/27/2022	Zoning bylaws were redone, now new stormwater management. Town has a large reserve fund. Working to rewrite planning and zoning regulations to lessen the impact of development. Many culverts overtop with floodwaters. They report that tornadoes are more prevalent.
West Haven	6/15/2022	The Town reported that severe rainstorms wreak havoc on the town. They have a new high school, and it is built above the 500-year flood level. Have begun to add trees. They are interested in hardening the sewer plan and pump station #1.
Woodbridge	6/23/2022	Very little development in Woodbridge. Microgrid has some glitches. Staff has been reduced but this has not caused problems. Trees have become a bigger priority due to Ash Borer disease.

3.2 Public Outreach and Engagement

The Advisory Committee created multiple opportunities for the public to engage in the development of this plan. These opportunities included the SCRCOG and municipality websites, stakeholder meetings, municipality meetings (described above), public meetings, public survey, and plan review.

3.2.1 Websites

The SCRCOG website includes a page for Hazard Mitigation (https://scrcog.org/regional-planning/regional-hazard-mitigation/). Under the Regional Planning heading on the homepage is the Hazard Mitigation page link. This page includes information about this planning process, the 2018 and 2014 plans and a list of resources. Information for this plan update includes links to register for the public meetings, the Fact Sheet, and the Survey. The survey is provided in English and Spanish. The Advisory Committee was encouraged to have all municipal web pages link directly to the SCRCOG regional mitigation page. They were also encouraged to use their municipal web sites for public

engagement. The Figure 12 shows a screen shot of the Town of North Branford announcement and link to the survey.

Figure 12. North Branford Survey and Public Meeting Announcement.

3.2.2 Stakeholder Engagement

Through the public outreach strategy, multiple agencies and neighboring communities had the opportunity to participate in the planning process. During each Advisory Committee meeting and in each Municipality Meeting, SCRCOG and the consulting team led participants through a discussion about potential organizations or individuals to engage in the planning process. This included meetings with representatives from the following three organizations.

Connecticut Institute for Resilience and Climate Adaptation (CIRCA)

John Truscinski, Project Manager for Resilient Connecticut supported the hazard mitigation planning process by presenting at the October 11, 2022, Advisory Committee meeting. Mr. Truscinski spoke with SCRCOG and the consulting team on 9/22/2022 about the Resilient Connecticut project and how to incorporate it into the mitigation strategy portion of this plan. Mr. Truscinski developed a list of potential mitigation actions for each relevant SCRCOG municipality. He also shared the CIRCA Resilient Connecticut Project Fact Sheet which can be found here: https://resilientconnecticut.uconn.edu/wp-content/uploads/sites/2761/2022/06/CIRCA-RC-fact-sheet2022_statewide-FOR-ONLINE.pdf.

Greater New Haven Water Pollution Control Authority (GNHWPCA)

Isabella Schroader, Senior Engineer, GNHWPCA actively participated in the hazard mitigation planning process by attending Advisory Committee meetings and updating mitigation actions for all relevant municipalities. SCRCOG and the consulting team held a meeting with Ms. Schroader on 9/19/2022 to discuss those mitigation actions in detail. Ms. Shcroader mentioned that they received FEMA funding for hurricane wind retrofits in New Haven. The GNHWPCA is working on a grant application for the Union Pump Station which is under the highway in New Haven. The GNHWPCA works closely with the City of New Haven, specifically the City Engineering Department.

The Nature Conservancy

Adam Whelchel, Director of Science, The Nature Conservancy has been an active participant in the development of this plan since the first edition of the plan. The consulting team spoke with Mr. Whelchel throughout the planning process to discuss his ideas for hazard mitigation and climate adaptation. He was a strong proponent of including the Resilient Connecticut projects. The Nature Conservancy took a lead role in the development of the Southern Connecticut Regional Framework for Coastal Resilience.

3.2.3 Public Meetings

During the development of the 2018 Hazard Mitigation Plan each participating municipality held a public meeting in their municipality. These meetings proved burdensome for the Advisory Committee members and did not significantly improve the content of the mitigation plan. Development of this plan included a larger audience at the municipality meetings with key stakeholders engaged and two regional public meetings. The public meetings were held via Zoom on November 7, 2022, and January 12, 2023. Each meeting was recorded and a link to the recordings posted on SCRCOG's webpage, https://scrcog.org/regional-planning/regional-hazard-mitigation/.

Outreach for each meeting included distribution of a flyer and a press release (shown in Appendix A). SCRCOG distributed the press releases to their distribution list. In addition, the Advisory Committee was encouraged to share the public meeting announcements with the following list of potential participants:

- Selectboard or whomever will sign plan adoption
- Local government representatives
- Engineering
- DPW
- Fire
- Police
- Schools
- Planning Commission
- Planning
- Dept. of Public Health
- Fire District
- Flood Control District
- Utilities
- Airport
- Seaport
- Homeowner Associations
- Neighborhood Groups
- Chamber of Commerce
- Community Organizations
- Environmental Organizations
- University or College Representatives
- Major Employers
- Neighboring Municipalities
- Cultural Institutions

Each public meeting included interactive slides through Mentimeter. Results from the first meeting indicated participants were from Hamden, Milford, Guilford, New Haven, North Haven, West Haven, Meriden, and representatives of the SCRCOG region. In terms of hazards of concern Figure 15 shows a word cloud indicating responses. These are consistent with the plan's risk analysis, shown in Chapter 5.

Figure 13. Public Meeting Hazards of Concern Results.

Meeting participants were asked to make a list of critical facilities and the following results were collected. These results are consistent with the critical facility list developed by the Advisory Committee.

- Highways and Roads
- Trains
- Bridges, sewer, water mains, roads
- Fire Department, Police Department, City Hall
- Power Plants
- Drainage
- Hospitals
- Water and Sewer Treatment Facilities
- Bus
- Sanitation
- Grocery Stores
- Homes
- Municipal Buildings
- Gas Stations
- Emergency Management
- Electricity
- Cell Service
- Schools
- Evacuation Routes

The most informative part of the meeting was the list of mitigation actions the community developed. These included many of the ideas generated by the risk and capability assessments as well as the Advisory Committee. All have been included in some form to the list of regional or municipal mitigation actions.

- Put flood gates back on calf pen meadow bridge in Milford.
- Make sure all shelters have generators.
- Elevate homes.
- Raise low lying roads.
- Underground wires.
- Keep drainage systems clear.
- Manage stormwater by increasing drainage capacity.
- Build natural and man-made barriers on flood zone.
- Plant a lot of trees.
- Limit construction in areas that frequently flood.
- Encourage diverse plantings instead of lawns to increase groundwater permeability.
- Dune restoration.
- Raise street levels near waterfront.

The second public meeting took place over Zoom on January 12, 2023; 85 people pre-registered for this meeting (the list of people is included in Appendix A). A similar format was used as in the first public meeting. The list of hazards generated in this meeting from the question, what natural hazards concern you the most, is nearly identical to those in the first meeting, as seen in the figure below.

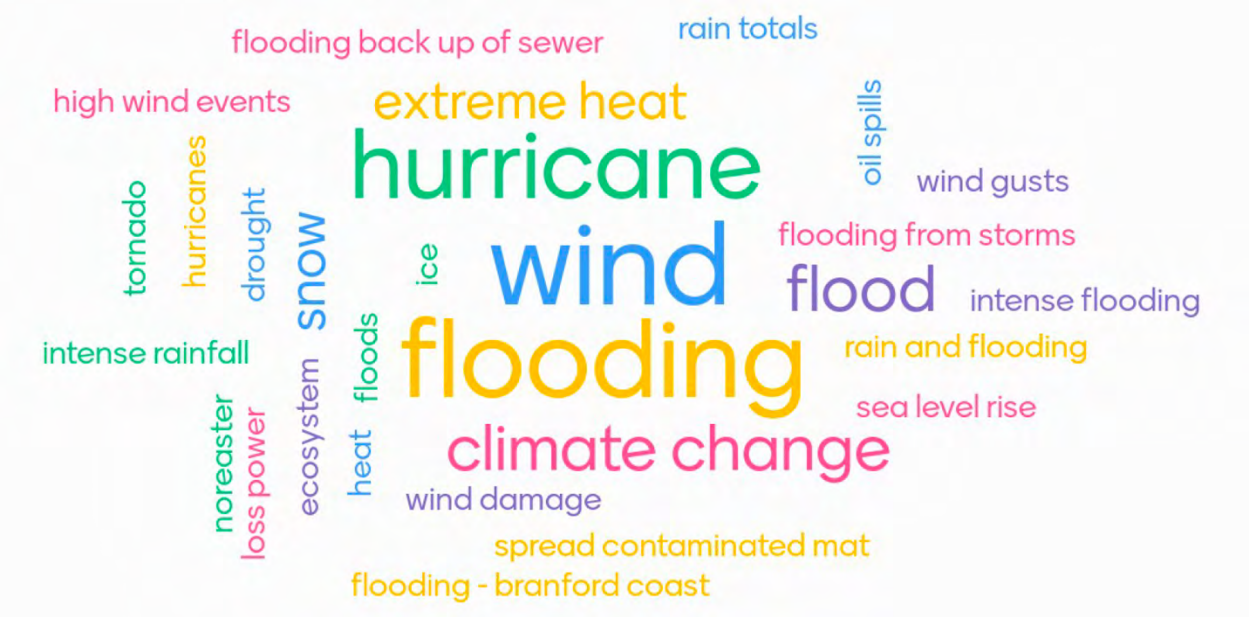


Figure 14. What hazards concern you the most?

A list of mitigation action recommendations from the public was also generated in this meeting and is shown in the list below.

- Limit impervious pavement.
- Retreat from shoreline.
- Protect TREES (which reduce runoff by hundreds of gallons per tree per year – for old trees), protect riparian regions – retrofit riparian regions, require low impact retrofitting of property.
- Improve infrastructure.
- Create warming/cooling centers.
- Reduce energy use.
- Would like to see for shoreline areas more sea walls and vegetation that can help shoreline.
- Restore the natural systems that protect us. Stop building!
- Focus more proactive measures like claiming our basins, detention basins, dam areas BEFORE storms and routinely.
- Power redundancy for vulnerable residents.
- Revising zoning regulations.
- Cleaning out basins before storms.
- Generators at shelters.
- Improve storm drains.
- Require low impact development.

- Protect and restore wetlands.
- Lower housing densities.
- Multilingual communication with residents.
- Inform coastal residents on risks of living near shore with sea level rise-limited emergency accessibility.
- Create mini-grids – to supply campuses on senior living.
- Build buy-in of communities through education about issues current and upcoming.
- Encourage strategic undergrounding of electric lines.
- Provide areas for marsh migration.
- Raise roads on streets that repeatedly flood.
- Provide solar batteries to multi-family housing – for people who require electricity for medical reasons.
- Require utilities to document the effectiveness of their vegetation management procedures.
- Elevate coastal access roads.

Two questions were asked to encourage participants to consider how they can mitigate risk to their homes or businesses and how prepared they may be for a disaster. In terms of mitigation for home participants responded favorably in the following order:

- Removed trees or tree limbs
- Purchased a generator
- Purchased flood insurance
- Elevated utilities or home
- Installed back flow valves

In terms of preparedness, most people installed smoke and carbon monoxide detectors but very few have prepared disaster supply kids or developed household Emergency Plans. During the Question and Answer period at the end of the meeting, someone raised the point that the way questions were asked assumed that people own their own home and future questions, including those in the survey, should account for the substantial number of renters in the region. This is an excellent point and the questions will be amended in the future.

3.2.4 Survey

An opportunity for public participation was developed through the South Central Connecticut Hazard Mitigation Plan Survey. The twenty-six-question survey was produced in Survey Monkey in English and

in Spanish. The survey, and complete results, are available for review in Appendix A. The survey was live from June 2022 through January 13, 2023.

The survey was organized into the same three sections, 1) Natural Hazards and Community Vulnerabilities, 2) Personal Preparedness and Mitigating Risk, and 3) A Little About You as the survey conducted for the 2018 mitigation plan. Outreach for the survey included announcements on municipality websites and the SCRCOG website and press releases sent to the New Haven Register, Northeast News Today and many local papers.

Natural Hazards and Community Vulnerabilities

Thirty-eight percent of survey respondents report that in the last ten years, they see a "Moderate Increase" in the rate of flood conditions due to high intensity rainfall events. This is consistent with reports from the Advisory Committee and public meeting participants. This fact translated into the development of mitigation actions related to stormwater management for many municipalities. Survey respondents overwhelming attribute this increase in flooding to "Increased Development," followed by "Proximity to Drainage," and "Land Cover/Vegetation."

When considering the importance of protecting areas of the community 96% listed protection of critical facilities as their biggest priority, followed by protection of utilities and then emergency services. They ranked protection of historical or cultural landmarks last. In terms of strategies to reduce risk and loss associated with natural hazards Table 10 below shows priority levels. Responses to this question may guide local governments when considering how to mitigate risk as it identifies how the public wants to spend money. When asked to prioritize the four types of mitigation projects (structure and infrastructure, education and awareness, local plans and regulations, and natural systems protection), survey respondents picked natural systems protection as the most important. Seventy-four percent of respondents were very concerned or somewhat concerned about impacts of climate change, which supports interest in protecting the natural environment and using natural systems to mitigate impacts of the natural hazards and climate change.

Table 10. How important are the following statements to you as they relate to natural hazard impacts?

	Agree		Neutral		Disagree		Total	Weighted Average
I support the disclosure of natural hazard risks during real estate transactions	88.92%	618	9.78%	68	1.29%	9	695	1.12
I support improving disaster preparedness of local schools	83.57%	580	15.13%	105	1.30%	9	694	1.18
I support policies to prohibit development in areas subject to natural hazards	83.00%	576	13.83%	96	3.17%	22	694	1.2
I support steps to safeguard the local economy following a disaster event	76.05%	527	22.66%	157	1.30%	9	693	1.25
I would be willing to make my home more disaster-resistant	72.65%	502	24.17%	167	3.18%	22	691	1.31
I support the use of local tax dollars to reduce risks and losses from natural disasters	69.35%	482	23.31%	162	7.34%	51	695	1.38
I support protecting historical structures	63.06%	437	33.19%	230	3.75%	26	693	1.41
I support a regulatory approach to reducing risk	63.70%	437	29.74%	204	6.56%	45	686	1.43
I support a non-regulatory approach to reducing risk	28.34%	189	51.57%	344	20.09%	134	667	1.92
I support the use of tax dollars (federal and/or local) to compensate landowners for not developing in areas subject to natural hazards	33.09%	229	33.82%	234	33.09%	229	692	2
							Answered	**702**
							Skipped	**7**

The survey included an open-ended question about education and hazards: Please list what you believe are the most effective ways to educate the public on changing hazard conditions. There were 208 responses, a sample of those are below. The Advisory Committee considered these responses, and many municipalities have education and outreach mitigation actions in this plan.

- Communication through media.
- Get in on the local news.
- Local community lecture.
- I would consider a municipal map that show the historic flood lines through the community. This would be both coastal flooding as well as river flooding. This document would be part of real estate transactions so that the buyer would know where their potential new property stands. Place a moratorium on local flood assistance to buildings that are built within sever flood risk areas.
- Put it into the curriculum in schools so children/teenagers are aware -Have it be in the news -Have community orientated fundraisers with the theme of climate change and have it be educational while fun. Something people of all ages would be interested in.
- Attendance at fairs/festivals, billboards, in schools, news, podcasts-any way people consume information, on town websites, enforcement of current ordinances and laws.
- I would like to be educated on how decisions are made to support new development that led to changing hazard conditions.
- Fact sheets snail and social media mails. Grants engaging smaller community projects engaging neighbors to care and community people in efforts to improve drainage and prevention projects of government owned properties including especially streets and more city street tree planting project which hasn't been a focus yet, the purchase of needed drainage systems pumps for severe inclement weather and greater storm conditions.
- Decreased development in high hazard areas. Preserve Historical buildings.
- Improve the zoning laws so we do not build on fragile land and then enforce the rules and laws that you pass.
- Ongoing education programs and involving all recreational, civic, religious, social, and professional groups about types of emergency situations, the types of hazards they present and how to react to warnings. 2) Create and promote a series of short courses on the various types of hazard conditions. 3) Identify the various warning systems available. Specific Radio and TV stations, web pages, Everbridge, sirens, loudspeakers, etc. and what kinds of messages they provide as well as the need to depend on more than one for accurate and timely messages.
- Share trend data clearly showing the increase in event count, severity, and financial loss for disaster events nationally & regionally. Is the increase only perceived due to modern media hysteria (including social media) or is it real? Numbers tell the story.

- I do not think education is very effective at changing behavior. The best way to change behavior is to regulate it or change the cost of the behavior through pricing of risk.

Personal Preparedness and Mitigating Risk

The beginning of this section asked about flood insurance. Seventy-six percent of people report they do not have flood insurance because they do not live in a floodplain. The survey asked about personal hazard mitigation and preparedness. Figure 15 below indicates that many people of have removed trees or limbs to protect their homes. This supports the continued focus of the Advisory Committee to mitigate the risk of trees impacting utilities and structures. In terms of preparedness, only 42% of respondents have a household disaster supply kit or household emergency plan.

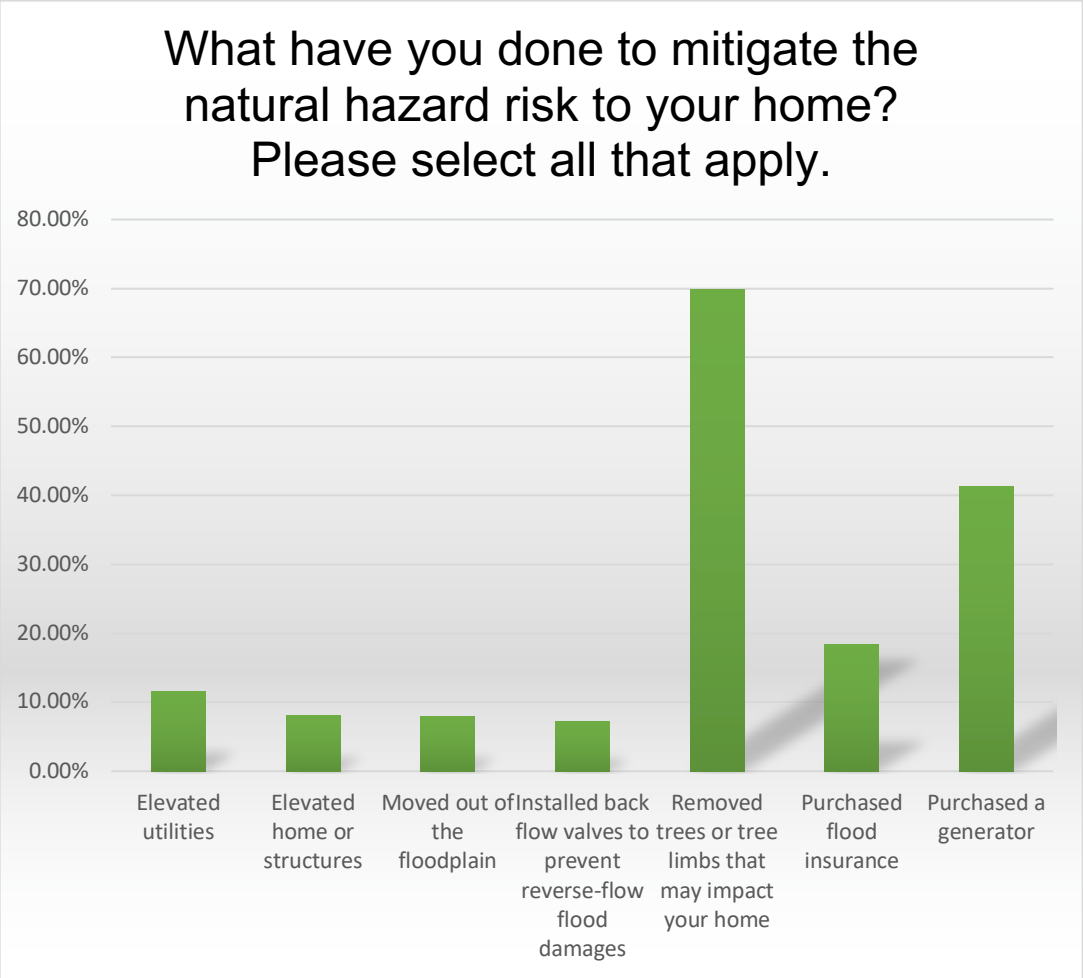


Figure 15. Responses to: What have you done to mitigate the natural hazard risk to your home?

A Little About You

Over 700 people took the survey, and most people took the survey in English. Most people completed the survey in July or August 2022. In 2018 two hundred people took the survey. The huge increase in participation can be attributed to the participation of residents in East Haven who make up 37% of the total number of surveys completed. Most people who took the survey, 46% were over the age of sixty,

32% have a family income between $100,000 - $150,000, 98% are not seasonal residents, and 65% report they live inland. This demographic is identical to the majority of 2018 survey participants. This similarity points to the need to change the system of survey distribution for the 2028 SCRCOG Hazard Mitigation plan Update to attract a wider audience.

When asked about effective ways for them to receive information, 62% prefer email or text message, followed by website, and mail. Only 5% of people prefer public workshops. Forty-eight percent have no preference between in-person or web-based meetings, however, 30% prefer web-based and 23% prefer in-person.

3.2.5 Hamden Alliance for Trees

Throughout the planning process, SCRCOG and the consulting team received comments from the Hamden Alliance for Trees regarding the value of trees. The Hamden Alliance for Trees made similar comments during the development of the previous mitigation plan. These comments were shared with the Advisory Committee and seriously considered throughout the development of the plan. Trees remain a named priority in the plan's goal statement.

> *Support proper care and planting of healthy, native trees across the region to increase their resilience to natural hazards including severe storms, flooding, erosion, and extreme heat and their ability to provide shade and withstand drought. Limit the impact of fallen and other hazardous trees by collaborating with utility companies and property owners to cut limbs and remove trees that pose threats to buildings, infrastructure, and utility lifelines.*

Nearly every municipality mentioned concern regarding tree health during the municipal specific meetings. These concerns are reflected in the risk assessment and addressed in the mitigation strategy. The written comments from the Hamden Alliance for Trees are included in Appendix A.

3.3 Plan Review and Adoption

Digital copies of the Plan were distributed to the SCRCOG Board of Directors and to members of the Advisory Committee for review prior to adoption. A digital copy of the Plan was posted on the SCRCOG website for public comment and review for two weeks beginning February 10, 2023. Many municipalities added a link to the Plan on their City or Town website. The consulting team provided the Advisory Committee with a press release (included in Appendix A) announcing the availability of the Plan for public review. Comments collected were used to amend the Plan when agreed upon by the Advisory Committee.

After the two-week period of public review, the plan was sent to the Connecticut Division of Emergency Management and Homeland Security (DEMHS) for their review. It was then forwarded to FEMA for their

approval. Upon FEMA approval each municipality was encouraged to adopt the plan. Adoption resolutions appear at the front of the plan.

The Hamden Tree Alliance submitted a seven page letter of comments and requested changes, as well as a letter of testimony from the Greenwich Tree Conservancy, both are included in Appendix A, the following comment was received from someone in East Haven:

I am writing to bring to your attention recent rainstorms that have caused flooding of properties situated along the Farm River (aka East Haven River) that runs along Meadow Street in East Haven. Since I've lived on Meadow Street I cannot recall a time when rainwater caused the river to overflow its banks. The only time flooding had occurred in the past 15 years was during hurricane/tropical storms with associated high tidal conditions.

The major change to typography that is a likely major contributing cause of this situation is the recent development of a multi-building apartment complex at ___ Hemmingway Avenue, East Haven. The asphalt parking area of this large complex appears to direct rainwater runoff into a stormwater drainage system that empties directly into (wet)land which forms an integral part of the Farm River Estuary. This condition contributes to overflowing the natural river delta causing the river's banks to overflow onto private properties along Meadow Street.

The person who made the comment requested that they be contacted, and the request was forward to East Haven. In terms of making edits based on the Hamden Tree Alliance letter, these changes were not directly addressed due to the FEMA deadline to submit this plan under current FEMA guidance. The letter and all of its contents will be addressed at the next Advisory Committee meeting and an addendum to the plan will be made if necessary.

Chapter 4. Hazard Profiles

4.1 Hazard Identification

SCRCOG initially identified a number of potential hazards to be addressed in the *first* edition of the South Central Region Multi-Jurisdiction Hazard Mitigation Plan which was adopted in 2013. These hazards were identified through an extensive process that considered input from Advisory Committee members, research of past disaster declarations in New Haven County, a review of Connecticut's 2010 Natural Hazard Mitigation Plan Update, and reviews of local hazard mitigation plans for neighboring municipalities. Subsequent to the planning process associated with the first edition of the SCRCOG Multi-Jurisdiction Hazard Mitigation Plan, the State of Connecticut adopted an update to its Natural Hazard Mitigation Plan in January 2014. The 2014 edition of the State's plan was used to update certain aspects of the hazard assessment in the *second* edition of the SCRCOG Multi-Jurisdiction Hazard Mitigation Plan, which was adopted in 2018.

The Connecticut Natural Hazard Mitigation Plan was last updated and adopted in 2019. Significant changes in its hazard profiles were not needed, and therefore changes were not necessary in the list of hazards profiled in this third edition of the SCRCOG Multi-Jurisdiction Hazard Mitigation Plan, renamed the 2023 SCRCOG Mitigation Plan Update. Table 11 summarizes the full range of potential natural hazards for the South Central Region. This includes 16 individual hazards classified according to four categories (Atmospheric, Hydrologic, Geologic and Other). Some of these hazards are considered to be interrelated or cascading (i.e., hurricanes may cause flooding and tornadoes, drought conditions may increase the likelihood of wildfires), but for preliminary hazard identification purposes these individual hazards are distinguished separately.

Table 11. Potential Natural Hazards for the South Central Region Considered in the Initial Hazard Mitigation Plan.

Atmospheric	**Hydrologic**	**Geologic**	**Other**
Extreme Temperatures	Coastal Erosion	Earthquake	Wildfire
Hurricane/Tropical Storm	Dam Failure	Landslide	
Nor'easter	Drought	Soil Hazards *(includes expansion, subsidence, and sinkholes)*	
Severe Thunderstorm *(includes high winds, hail,*	Flood *(includes coastal, riverine and urban flooding.*	Tsunami	

Atmospheric	Hydrologic	Geologic	Other
and lightning)	*Also includes ice jams and storm surge)*		
Severe Winter Storm *(includes snow and ice)*	Sea Level Rise		
Tornado			

Table 12 documents the evaluation process used for determining which of the initially identified hazards were significant enough for full characterization in the risk assessment found within the first edition of this plan. The table indicates whether or not the hazard was identified as a significant hazard, how this determination was made, and why this determination was made. The right hand column of the table has been updated to reflect whether any changes were needed.

Table 12. Evaluations of Potential Natural Hazards for the South Central Region.

Potential Natural Hazard	Significant Enough for Further Analysis in Initial HMP?	How was determination made in Initial HMP?	Why was determination made in the Initial HMP?	Is a change in status needed for 2023?
ATMOSPHERIC				
Extreme Temperatures	**YES**	• Recommended for further evaluation by Advisory Committee • Review of local hazard mitigation plans for neighboring municipalities • Review of NOAA historical event data	• Frequency of previous occurrences (extreme heat and extreme cold) • Potential life/safety threat for vulnerable populations • Potential for increased frequency, duration and intensity of extreme heat due to the effects of climate change	NO Extreme heat is a major concern expressed by the Governor's Council on Climate Change (GC3) and the Resilient Connecticut program, and it should remain in this plan.
Hurricane/Tropical Storm	**YES**	• Review of State Hazard Mitigation Plan	• Recent local experience (Sandy, 2012, Irene in 2011, Hanna in 2008), and	NO Events of 2021 have

Potential Natural Hazard	Significant Enough for Further Analysis in Initial HMP?	How was determination made in Initial HMP?	Why was determination made in the Initial HMP?	Is a change in status needed for 2023?
		• Review of Federal disaster declaration history • Use of NOAA Digital Coast (Historical Hurricane Tracks)	history of major, destructive storms in the past century • Identified as significant hazard for coastal and inland communities in the State Hazard Mitigation Plan • NOAA historical records indicate that 43 storm tracks have come within 65 miles of the planning area since 1858 (annual probability of 28%) • Potential to cause severe, extensive damage and disruption	underscored the significant risks posed by these types of storms.
Nor'easter	**YES** (Will be combined with Severe Winter Storm)	• Review of State Hazard Mitigation Plan • Review of Federal disaster declaration history • Review of local hazard mitigation plans for neighboring municipalities	• Frequency of previous occurrences • Recent historical events have caused fatalities, injuries, and property damage • Potential to cause severe, extensive damage and disruption – particularly along coastal areas	NO
Severe Thunderstorm *(includes high winds, hail, and lightning)*	**YES**	• Review of NOAA historical event data	• Frequency of previous occurrences	NO
Severe Winter Storm *(includes*	**YES**	• Review of State Hazard Mitigation Plan	• Frequency of previous occurrences	NO

Potential Natural Hazard	Significant Enough for Further Analysis in Initial HMP?	How was determination made in Initial HMP?	Why was determination made in the Initial HMP?	Is a change in status needed for 2023?
snow and ice)		• Review of Federal disaster declaration history • Review of local hazard mitigation plans for neighboring municipalities • Review of NOAA historical event data	• NOAA historical records include 20 severe winter storm events since 1996 resulting in property damages • Multiple Federal Disaster and/or Emergency Declarations	
Tornado	**YES**	• Review of State Hazard Mitigation Plan • Review of Federal disaster declaration history • Review of NOAA historical event data and National Severe Storms Laboratory (NSSL) website	• NOAA historical records include 15 tornado events in the region since 1955, causing fatalities, injuries and property damage – including a devastating F4 tornado that struck Hamden in 1989 • Significant life/safety threat	NO The tornadoes of 2018 caused severe losses in the SCRCOG region.
HYDROLOGIC				
Coastal Erosion	**YES**	• Identified as significant hazard concern in Branford, Madison and West Haven • Review of CT DEEP data on Erosion Susceptibility and Erosion Sites	• Erosion is a chronic condition along most shoreline areas in the region • Frequency of rapid, episodic erosion caused by storm events • Coastal and upland property is becoming more exposed to coastal flood hazards due to erosion	NO
Dam Failure	**YES**	• Review of State Hazard Mitigation Plan	• History of dam failure occurrences in Connecticut causing	NO

Potential Natural Hazard	Significant Enough for Further Analysis in Initial HMP?	How was determination made in Initial HMP?	Why was determination made in the Initial HMP?	Is a change in status needed for 2023?
		• Review of CT DEEP inventory of state-regulated dams • Review of National Performance of Dams Program Inventory (Stanford University)	multiple casualties and severe damage • 198 dams are located in the planning area (ten participating municipalities), with 47 dams classified as significant or high hazard potential Significant life/safety threat	
Drought	**YES**	• Review of State Hazard Mitigation Plan • Review of National Drought Mitigation Center website and Palmer Drought Severity Index (PDSI)	• There have been 5 severe droughts to impact Connecticut since 1929 per the State Hazard Mitigation Plan • According to the PDSI, the planning area is located in a region that experienced severe drought conditions 5-10% of the time during a 100-year period • Potential for increased frequency, duration and severity of drought events due to the effects of climate change • Future droughts may severely impact reservoirs and other sources of water supply	NO Flashy droughts of 2020 and 2022 impacted the SCRCOG region.
Flood ***(includes coastal, riverine and urban***	**YES**	• Review of State Hazard Mitigation Plan	• Flood identified as the most prevalent and frequent hazard in Connecticut per the	NO

Potential Natural Hazard	Significant Enough for Further Analysis in Initial HMP?	How was determination made in Initial HMP?	Why was determination made in the Initial HMP?	Is a change in status needed for 2023?
flooding. Also includes ice jams and storm surge)		• Review of Federal disaster declaration history • Review of FEMA Digital Flood Insurance Rate Maps • Review of NOAA historical event data • Review of FEMA NFIP policy and claims statistics • Use of CT DEEP Coastal Hazards Viewer (for storm surge)	State Hazard Mitigation Plan • Special flood hazard areas have been identified and mapped by FEMA for coastal and inland areas of the region • Multiple Federal Disaster and/or Emergency Declarations • Frequency of previous flood occurrences in the region. NOAA historical records include 89 flood events in the region since 1993, causing fatalities and property damage • FEMA NFIP claims statistics report 2,453 reported flood losses for costing more than $25 million in claims in the planning area (ten participating municipalities)	
Sea Level Rise	**YES**	• Use of The Nature Conservancy's Coastal Resilience Mapping Tool • Use of CT DEEP Coastal Hazards Viewer • Review of State Hazard Mitigation Plan • Review of local hazard mitigation plans for neighboring municipalities	• Visualization of potential future flood scenarios indicates potential inundation for planning area (Branford,	NO Public Act 18-82 requires use of State-adopted sea level rise planning figures.

Potential Natural Hazard	Significant Enough for Further Analysis in Initial HMP?	How was determination made in Initial HMP?	Why was determination made in the Initial HMP?	Is a change in status needed for 2023?
			Madison, West Haven)	
GEOLOGIC				
Earthquake	**YES**	• Review of State Hazard Mitigation Plan • Review of USGS data on historic earthquake events • Review of USGS hazard maps • Review of earthquake hazard information provided by the Northeast States Emergency Consortium • Review of NOAA National Geophysical Data Center (NGDC) Earthquake Intensity Database	• History of seismic activity in the state (140 since 1958 – all low magnitude events) • The New Haven-Greenwich area is one of two areas in the state identified as most vulnerable to earthquakes per the State Hazard Mitigation Plan • While considered a low probability event, the potential impacts of moderate earthquake event (MMI II-V) could be substantial, particularly for older and unreinforced masonry buildings built on fill or unstable soil	NO

Potential Natural Hazard	Significant Enough for Further Analysis in Initial HMP?	How was determination made in Initial HMP?	Why was determination made in the Initial HMP?	Is a change in status needed for 2023?
Landslide	**NO**	• Review of USGS Landslide Incidence and Susceptibility Map • Review of NOAA historical event data • Discussions with Advisory Committee and local municipal staff • Review of Public Opinion Survey results	• No historic landslide occurrences recorded in the planning area according to USGS and NOAA data • USGS hazard map shows low landslide incidence/ susceptibility for the planning area, with the exception of West Haven (moderate incidence/ susceptibility) • Not identified as significant hazard of concern by local officials or citizens in response to Public Opinion Survey	NO
Soil Hazards ***(includes expansion, subsidence, & sinkholes)***	**NO**	• Review of local hazard mitigation plans for neighboring municipalities • Discussions with Advisory Committee and local municipal staff • Review of Public Opinion Survey results	• No documented history of previous occurrences causing damage in the region • Not identified as significant hazard of concern by local officials or citizens in response to Public Opinion Survey	NO

Potential Natural Hazard	Significant Enough for Further Analysis in Initial HMP?	How was determination made in Initial HMP?	Why was determination made in the Initial HMP?	Is a change in status needed for 2023?
Tsunami	**NO**	• Review of State Hazard Mitigation Plan • Review of NOAA Digital Coast (Tsunami Prone Map) • Review of NGDC/WDS Global Historical Tsunami Database	• No history of previous tsunami occurrences affecting Connecticut • Tsunamis present an "extremely small risk" of impacting Connecticut, per the State Hazard Mitigation Plan	NO
OTHER				
Wildfire	**YES**	• Review of State Hazard Mitigation Plan • Review of Connecticut's Forest Resource Assessment and Strategy (2010) • Review of Connecticut Wildland Urban Interface Map (University of Wisconsin, SILVIS Lab)	• Frequency of previous occurrences, although most are small and suppressed early (burning less than 10 acres) • Large amount of wildland/urban interface and intermix areas in the region • Potential for increased frequency and intensity of wildfire events due to the effects of climate change • The introduction of disease, pests and invasive plants increases vegetative fuel	**NO**

Potential Natural Hazard	Significant Enough for Further Analysis in Initial HMP?	How was determination made in Initial HMP?	Why was determination made in the Initial HMP?	Is a change in status needed for 2023?
			loads in wildland areas	

Some hazards such as earthquakes or winter storms may impact a large area yet cause little damage, while other hazards, such as a tornado, may impact a small localized area yet cause extensive damage. Descriptive profiles of all hazards deemed significant enough for further analysis are provided in the hazard profiles below. Where applicable, these profiles have been updated to reflect the vulnerability and risk assessment products that resulted from the *Resilient Connecticut* planning effort completed by CIRCA. The *Resilient Connecticut* products can be found at CIRCA's web site and include:

- Resilient Connecticut: https://resilientconnecticut.uconn.edu/phase-ii/
- Climate Change Vulnerability Index (CCVI): https://resilientconnecticut.uconn.edu/ccvi/
- Vulnerability Assessment Report: https://resilientconnecticut.uconn.edu/resilience-opportunities/

4.2 Coastal Erosion

4.2.1 Description

Coastal erosion may be generally defined as a gradual, chronic but natural condition of losing shoreline sediments (mostly beach sand and dune systems) due to wind, waves, tides, currents, and other natural coastal processes. Other long-term influences may include subsidence and sea level rise. Rapid coastal erosion exacerbates the long-term threat posed by gradual chronic erosion, and typically results from episodic natural hazard events such as hurricanes, nor'easters, and storm surge. Such events have the ability to flatten dunes and create massive erosion in only hours or days. Erosion may also be worsened by human activities such as boat wakes, shoreline hardening, and offshore dredging.

As coastal erosion continues the shoreline moves landward, posing an increased threat of damage to adjacent property and infrastructure. Natural recovery from episodic erosion events can take months or years. If a beach and dune system does not recover quickly enough naturally, coastal and upland property may be exposed to further damage in subsequent events. Shoreline hardening techniques such as seawalls, revetments, bulkheads, groins and jetties may temporarily stave off coastal erosion, but in most cases, they worsen existing erosion or cause new erosion in adjacent areas.

4.2.2 Location

The areas along all seven shoreline towns (Milford, West Haven, New Haven, East Haven, Branford, Guilford, and Madison) with direct exposure to Long Island Sound are susceptible to the occurrence of long-term and storm-induced coastal erosion. The previous edition of this plan noted that although some information on areas of coastal erosion existed, formal compilation of this data and a spatial, graphic representation of erosion hazard areas had not been developed for the Connecticut shoreline.

However, since then, the State published the report and associated GIS mapping "Analysis of Shoreline Change in Connecticut: 100+ Years of Erosion and Accretion" (July 2014, Connecticut Department of Energy & Environmental Protection (DEEP), the Connecticut Sea Grant (CT Sea Grant) and the University of Connecticut Center for Land Use Education and Research (UCONN-CLEAR)).

According to the Connecticut Department of Energy and Environmental Protection (CT DEEP), erosion in beach areas along the north-south trending shoreline from Milford to New Haven (including West Haven) has traditionally been a concern and has been aggravated by extensive stabilization of sediment sources in headland areas. Most of the shoreline between New Haven and Guilford (including Branford) is deemed stable, though there are local areas of concern. From Guilford to Old Lyme (including Madison), erosion of beaches and low bluffs is common. In many areas, structural erosion control efforts such as groins and seawalls have altered natural shoreline processes and have aggravated the problem by trapping natural sediment needed for beach replenishment. In other areas, including Madison's Hammonasset Beach, sand replenishment has been used to slow the progress of coastal erosion.

Coastal resilience plans have been developed and published for Guilford (2014), Branford (2016), Madison (2016), Milford (2016), and West Haven (2017); only New Haven and East Haven have not developed such plans. However, all seven shoreline municipalities participated in the Regional Framework for Coastal Resilience in Southern Connecticut (2015-2017). Through these efforts, detailed mapping and descriptions of erosion areas in all seven municipalities have been developed.

4.2.3 Extent

Coastal erosion is measured as the rate of change in the position or horizontal displacement of a shoreline over a period of time, measured in units of feet or meters per year. There is no universal scientific scale or index used to classify the magnitude or severity of coastal erosion based on these rates. The report referenced above, "Analysis of Shoreline Change in Connecticut: 100+ Years of Erosion and Accretion," utilizes lateral distance per unit time to characterize erosion. These rates are calculated and presented using multiple statistical methods, including:

- End Point Rate (EPR): net shoreline movement divided by the time elapsed between the oldest and the most recent shoreline.
- Linear Regression Rate (LRR): determined by fitting a least-squares regression line to all shoreline points for a particular transect. This rate uses all data, regardless of changes in trend or accuracy over time, and is based on accepted statistical concepts. Tends to underestimate the rate of change relative to EPR.

4.2.4 Primary and Secondary Impacts

The primary impacts of coastal erosion include the loss of beaches, marshes, and other habitats, along with erosion undercutting developed lands abutting the shoreline. Erosion can change the shape of the shoreline, and the biodiversity of a habitat as sand, soil, and habitat is loss.
Secondarily, as substrate and land are washed away, this can result in sedimentation in tidal waterways, reduced flood protection from coastal and tidal habitats, and dangerous conditions for structures that are adjacent to eroding landscapes.

4.2.5 Warning Time

Erosion could be considered as one of the hazards with the longest warning time as it is typically a slow, lengthy process. Monitoring of long-term changes in the shoreline can help to plan for future erosion, and aid in identifying mitigation efforts before they are too serious. On the other hand, erosion rates can also be exacerbated by severe coastal storms such as tropical storms and hurricanes. Therefore, the warning time for erosion related to storms is somewhat shorter. The combined warning time of storm prediction and the longer-term monitoring and warning of slow erosion can allow community staff and residents to become more aware of the areas more prone to erosion, and potentially more susceptible to increase erosion during surge and tidal events.

4.2.6 Previous Occurrences and Losses

According to a recent USGS report (2010) the average rate of long-term shoreline change for the New England coast was -0.5 meters per year with an uncertainty in the long-term trend of ±0.09 meters per year.[90] However the actual rates of erosion vary substantially along the coast as a function of shoreline type and are influenced primarily by episodic events.

Connecticut's shoreline change report provides very detailed erosion figures for each one of hundreds of segments of the shoreline. The report provides a town-by-town summary; erosion end-point rates (EPR) for SCRCOG municipalities are summarized in Table 13**.**

Table 13. Erosion end-point rates from SCRCOG communities.

Short Term Change (1983-2006)		**Long Term Change (c. 1880-2006)**	
Town	*EPR Ave (m/yr)*	*Town*	*EPR Ave (m/yr)*
Milford B	0.81	Milford B	0.16
Milford B & C	0.38	Milford B & C	0.06
Milford C	0	Milford C	-0.04
West Haven	-0.24	West Haven	0.03

[90] Hapke, C.J., Himmelstoss, E.A., Kratzmann, M., List, J.H., and Thieler, E.R., 2010, National assessment of shoreline change; historical shoreline change along the New England and Mid-Atlantic coasts: U.S. Geological Survey Open-File Report 2010-1118.

Short Term Change (1983-2006)		Long Term Change (c. 1880-2006)	
New Haven C	N/A	New Haven C	0.03
New Haven C & D	0.02	New Haven C & D	0.1
New Haven D	0.02	New Haven D	0.1
East Haven	0.05	East Haven	0.05
Branford	0.04	Branford	0.01
Guilford D	0.23	Guilford D	-0.02
Guilford D & E	0.24	Guilford D & E	-0.07
Guilford E	0.35	Guilford E	-0.35
Madison	-0.17	Madison	-0.07

The most significant episodic erosion events for the planning area have been associated with large coastal storms including hurricanes, tropical storms and nor'easters (covered under *Hurricane/Tropical Storm* and *Severe Winter Storm/Nor'easter*). The most recent events include Hurricane Sandy (October 2012) and Tropical Storm Irene (August 2011). These events contributed to the rapid erosion of primary frontal dune systems, damage to seawalls and revetments, and the loss of other protective features along the immediate shoreline, which as a result significantly increases the risk of property damages to future coastal flooding events. Numerous erosion events have occurred periodically since SuperStorm Sandy, including 2018 nor'easters that occurred in fall 2018 and a bomb cyclone storm of December 23, 2022.

Despite the record of past events, coastal erosion losses are difficult to quantify because they are not reported via the tools typically reviewed for plan updates such as the NCEI Severe Storm database and the NFIP. One potential representation of erosion losses is the total cost of beach nourishment per year in the SCRCOG planning region, even though this does not account for occasional property damage. Among the seven shoreline municipalities, five (Milford, West Haven, East Haven, Guilford, and Madison) have completed numerous beach nourishment projects or have been subject to projects completed by others (i.e., Hammonasset Beach by the State of Connecticut and Ocean Beach [West Haven] by the Army Corps of Engineers. Another potential measure of erosion losses is the total unmet need associated with living shoreline project costs, which are only recently well-understood. These are described in the loss estimate chapter (Section 4.2.4).

4.2.7 Climate Change Impacts

Both long term and storm related erosion rates and severity may increase as a result of climate change. As sea levels rise, the Long Island Sound will slowly encroach landward, driving seawater landward and exposing those already sensitive areas to increase wave action and erosion. In addition to sea level rise, the potential increase in tropical storm frequency and intensity can potentially make coastal storms more severe, therefore increasing the degree of wave action, storm surge, and wind.

4.2.8 Probability of Future Events

Coastal erosion will continue to be a highly likely occurrence along many shoreline areas of the planning area. This includes both the continuous but slow onset, long-term effects of natural coastal processes as well as rapid, episodic erosion caused by large coastal storms. It is anticipated that the effects of climate change, including sea level rise, will result in an increase in the geographic extent and rate of coastal erosion.

4.3 Dam Failure

4.3.1 Description

Dam failure is the collapse, breach or other failure of a dam structure that results in an uncontrolled release of impounded water causing downstream flooding. Dam failures can result from natural events, human-induced events, or a combination. Failures due to natural events such as prolonged periods of rainfall and flooding can result in overtopping (the most common cause), though “dry day” failures caused by earthquakes or other unforeseen events are particularly hazardous because there is generally little to no advance warning. Human-induced failures may be attributed to improper design, improper maintenance, or negligent operation and typically include inadequate spillway capacity resulting in overtopping, or internal erosion caused by embankment or foundation leakage (piping). Complete failure occurs if internal erosion or overtopping results in a complete structural breach, releasing a high-velocity wall of debris-laden water that rushes downstream, damaging or destroying everything in its path.

4.3.2 Location

According to CT DEEP, as of October 2020, there are 259 state-regulated dams within the South Central Region, and an additional 59 dams that are upstream of the region along the Quinnipiac River and its tributaries. Hundreds of additional dams are located in the Housatonic River drainage basin, and therefore located upstream of the western boundaries of Orange and Milford. Of the dams located within the South Central Region, 28 are classified as having high hazard potential (Class C) and 10 are classified as having a significant hazard potential (Class B). A description of each hazard class as defined by the State is provided below, under *Extent*.

Maps later in this chapter show the location of all state-regulated dams in the South Central Region according to their assigned hazard class. Table 14 lists the number of these dams for each municipality in the region by hazard class.

Table 14. State-regulated dams in South Central Region, by hazard class.

Municipality	Hazard Class					
	High (C)	Significant (B)	Moderate (BB)	Low (A)	Negligible (AA)	Total
Bethany	3		4	14	1	22
Branford		1	4	3	1	9
East Haven	1		1	5		7
Guilford	2	1	11	9	5	28
Hamden	5	2	10	9	4	30
Madison			7	11	3	21
Meriden	4	3	3	10	2	22
Milford			10	11	2	23
New Haven	1		1	1		3
North Branford	2		2	11	3	18
North Haven			4	7	3	14
Orange			3	11	2	16
Wallingford	3	1	7	24	1	36
West Haven	4	2	1	3	1	11
Woodbridge	3			13		16
Total	**28**	**10**	**68**	**142**	**28**	**342**

Source: State of Connecticut, Department of Energy and Environmental Protection (Query dated 9/2/2022)

4.3.3 Extent

Two factors influence the potential severity of a dam failure: the amount of water impounded, and the density, type, and value of development and infrastructure located downstream. The potential extent of dam failure may be classified according to their "hazard potential," meaning the probable damage that would occur *if* the structure failed, in terms of loss of human life and economic loss or environmental

damage. The State of Connecticut classifies dam structures under its regulations according to hazard potential as described in Table 15**.** It is important to note that these classifications are not based on the adequacy or structural integrity of existing dam structures.

Table 15. Classification of hazard potential for Connecticut dams.

Class	Hazard Potential	Description of Impacts *(if dam were to fail)*
AA	Negligible	No measurable damage to roadways; no measurable damage to land and structures; negligible economic loss.
A	Low	Damage to agricultural land; damage to unimproved roadways; minimal economic loss.
BB	Moderate	Damage to normally unoccupied storage structures; damage to low volume roadways; moderate economic loss.
B	Significant	Possible loss of life; minor damage to habitable structures, residences, hospitals, convalescent homes, schools, etc.; damage to or interruption of the use of service of utilities; damage to primary roadways and railroads; significant economic loss.
C	High	Probable loss of life; major damage to habitable structures, residences, hospitals, convalescent homes, schools, etc.; damage to main highways; great economic loss.
Source: State of Connecticut, Department of Energy and Environmental Protection		

4.3.4 Primary and Secondary Impacts

Primary impacts to a community from dam failure primarily include downstream flooding. This flooding varies based on the size of the dam, and the degree to which failure occurred. The flooding may result in property damage, injury, or loss of life.

Secondary impacts include damage to the habitat and riverbanks downstream of the dam, including erosions and potential for landslides. In addition, economic consequences could be considered a secondary impact as businesses, homes, and infrastructure could be impacted by a failure.

4.3.5 Severity

To estimate life loss for a dam failure, the United States Army Corp of Engineers (USACE) utilizes a model, (Graham 1999) that classified dam failure severity into three categories: low, medium, and high. In general, these three classes can be defined as:

- Low: structures are flooded, but not destroyed

- Medium: some structures are destroyed while some structures and trees are unsubmerged
- High: the floodplain is swept clean, structures are destroyed, and there is little evidence or preexisting structures or vegetation

Severity of a dam failure is influenced by several factors including what is downstream of that structure, and the size of the impoundment.

4.3.6 Warning Time

While a dam failure can occur with little to no warning, the hazards that typically precede a dam failure event are predicted and allow for dam monitoring. For example, failure can occur as a result of heavy rain or flash flooding; these events are typically forecast hours to days in advance of the storm. In winter months, dams may experience stress in relation to ice jams which could cause failure; this is a slower process than a rain or flood event. Ultimately, depending on the event causing failure, whether naturally occurring or due to structural insufficiency, warning time can vary.
Owners of high and significant class dams are required to develop and maintain an Emergency Action Plan (EAP) which is used in the event of dam related emergencies, including failure. These plans include actions to be taken based on established protocols for emergency flood warning and response. Protocols include monitoring requirements when pre-failure conditions are detected or there is potential, milestones for emergency response and warning, and projected inundation areas and timeframes.

4.3.7 Previous Occurrences and Losses

There is no record of any damage, fatalities or injuries associated with dam failure in the planning area. According to the National Performance of Dams Program (NPDP) Inventory at Stanford University and a review of data made available by the Association of State Dam Safety Officials (ASDSO), there has been only one report of a dam failure event in the planning area.

On April 16, 2007, the Disbrow Pond dam in Bethany failed when the embankment failed near the inlet structure. The breach was approximately 12 feet high and 15 feet wide but resulted in no damage. The dam, which was designed by the Natural Resource Conservation Service, is classified as a low hazard dam (Class A).

There have been many significant dam failures across Connecticut, mainly caused by major flood events, which resulted in human casualties and millions of dollars in property damage. However according to CT DEEP all of these dam failures occurred outside of the SCRCOG planning area.

4.3.8 Climate Change Impacts

Climate change will not have a direct impact on dam failure occurrences, however, natural hazards that can result in dam failure are projected to shift under future climate. An increase in precipitation levels

and heavy rainstorm events can potentially result in increased stress on dam infrastructure. Dams are designed using specific flood levels relative to their stream and watershed as precipitation increases flood levels may also increase therefore altering the normal levels impounded by the structure. While failure of a high and significant dam is unlikely due to regulatory requirements, the climates change impacts could cause more failures in the future.

4.3.9 Probability of Future Events

Dam failure remains an unlikely occurrence for all state-regulated dams. The CT DEEP's Dam Safety Section is tasked with monitoring the routine inspection and maintenance of those dams that present the greatest risk or are in need of structural repair. Dam owners are responsible for complying with maintenance and repair requirements and developing emergency action plans.

State regulations require that over 600 dams in Connecticut be inspected annually and prioritize inspections of those dams which pose the greatest potential threat to downstream persons and properties. Other structures are inspected as time and funding permit, and upon notification of potentially significant deficiencies or emergency conditions. Regulated dams must be designed to pass the 100-year rainfall event with one foot of freeboard, an additional factor of safety against overtopping. The most critical and hazardous dams are required to meet a spillway design standard much higher than passing the runoff from a 100-year rainfall event. As more dams get repaired in the future, the number of those that do not meet these minimum requirements decreases.

It is anticipated that the effects of climate change will not increase the probability of future dam failure events, though projections for increased heavy rainfall events should continue to be considered in the regulation of dam repair and/or construction.

4.4 Drought

4.4.1 Description

Drought is defined as a period of abnormally dry weather sufficiently prolonged for the lack of water to cause serious hydrologic imbalance in the affected area. Drought is a natural climatic condition caused by an extended period of limited rainfall beyond that which occurs naturally in a broad geographic area. High temperatures, high winds and low humidity can worsen drought conditions, and can make areas more susceptible to wildfire. Human demands and actions can also hasten drought-related impacts. Droughts are frequently classified as one of following four types: meteorological, agricultural, hydrological or socio-economic. Meteorological droughts are typically defined by the level of "dryness" when compared to an average, or normal amount of precipitation over a given period of time.

Agricultural droughts relate common characteristics of drought to their specific agricultural-related impacts. Hydrological drought is directly related to the effect of precipitation shortfalls on surface and groundwater supplies. Human factors, particularly changes in land use, can alter the hydrologic

characteristics of a basin. Socio-economic drought is the result of water shortages that limit the ability to supply water-dependent products in the marketplace.

4.4.2 Location

The entire planning area is susceptible to the occurrence of droughts, though coastal areas may be considered somewhat less susceptible based on historical records.

4.4.3 Extent

The Palmer Drought Severity Index (PDSI), shown in Table 16, measures the difference between water supply (precipitation and soil moisture) and water demand (amount needed to replenish soil moisture and keep larger bodies of water at normal levels). It primarily reflects long-term drought and has been used extensively to initiate drought relief.

Table 16. Palmer drought severity index.

PDSI Value	Classification
+4.0 or above	Extremely Moist
+3.0 to +3.9	Very Moist Spell
+2.0 to +2.9	Unusual Moist Spell
-1.9 to +1.9	Near Normal
-2.0 to -2.9	Moderate Drought
-3.0 to -3.9	Severe Drought
-4.0 or less	Extreme Drought

Source: National Oceanic and Atmospheric Administration

4.4.4 Primary and Secondary Impacts

Drought events can severely impact drinking water supply, agricultural and livestock operations, and can implicate the health of various habitats throughout the region. When droughts occur, and persist, drinking water sources such as wells and reservoirs may experience reduced levels as groundwater level recede and recharge is not exceeding usage. During periods of more severe events, water usage restrictions may be put in place by local or state governments.

Secondary impacts include an increase in food prices as agricultural operations struggle to water crops and maintain healthy livestock, or an increase in water pollution levels in surface water. In addition, there is an increased risk for flash floods as soils begin to dry and harden and are unable to absorb excessive rainfall in a short period of time.

4.4.5 Severity

As noted above, the PDSI is an extensively used index which determines how severe a drought is and can aid in determining necessary water use restrictions or relief measures. At a State level the Interagency Drought Workgroup (IDW), which is a collection of State agency representatives, has developed the State Drought Preparedness and Response Plan which can be found at https://portal.ct.gov/Water/Drought/State-Drought-Plan. The Drought Preparedness and Response Plan was adopted in 2022, and provides a framework for response, guidance for action levels, and works to preserve balance between water usage and supply. This Drought Plan was in draft stages when the previous editions of this hazard mitigation plan were developed, and therefore this current edition captures a milestone in drought planning and response in Connecticut.

The drought plan identifies five stages of drought that increase in severity, each of which have specific thresholds for stage criteria. These stages are described below in Figure 16.

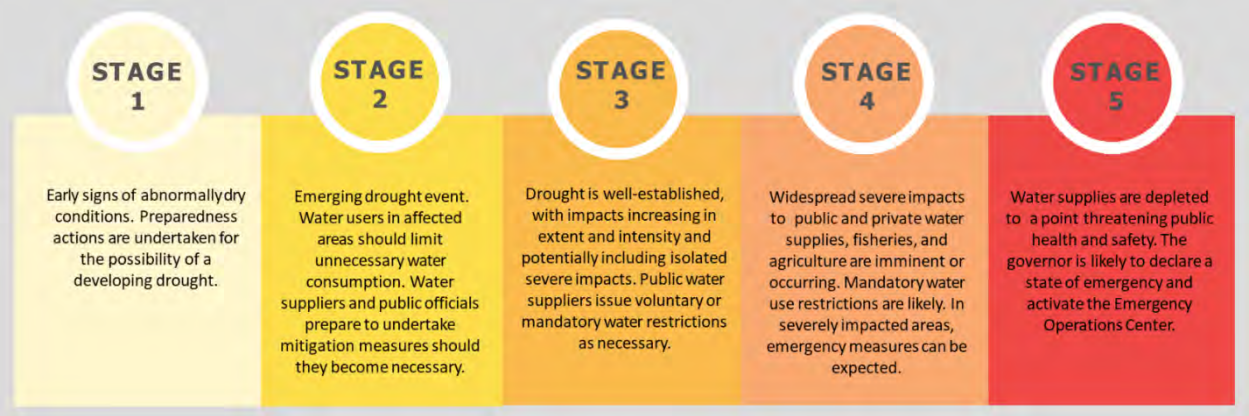


Figure 16. The five stages of drought as identified in the State Drought Plan.

4.4.6 Warning Time

Because droughts occur over longer periods of time, monitoring and warning can occur well before an event becomes very severe. The IDW, which is responsible for administering the State Drought Preparedness and Response Plan, monitors water-related data to ensure adequate warning as droughts progress in severity. Some of the data monitored includes cumulative precipitation patterns, streamflow, groundwater levels, reservoir levels, PDSI, Crop Moisture Index, Vegetation Drought Response Index, Fire Danger, and the U.S. Drought Monitor. When conditions become dry, and the State

Drought Coordinator has identified a potential drought concern as a result of monitoring, the IDW is convened to take a series of actions:

- A summary of drought conditions is prepared by the State Drought Coordinator.
- At the following meeting, the IDW discuss the conditions report and if deemed necessary, make a declaration of drought for any specific management areas.
- These recommendations are transmitted to the governor where they may be accepted, rejected, or modified. State agencies are then responsible for undertaking identified mitigation actions.
- During an active drought declaration, meetings are held as necessary to evaluate conditions and implement mitigation actions.
- The IDW determines when to upgrade or downgrade between stages using steps 2-4 from above.

4.4.7 Previous Occurrences and Losses

NOAA historical records indicate that there have been 22 periods of severe to extreme droughts in the region since 1895, as listed in Error! Reference source not found.. These records also indicate that s evere to extreme drought conditions were experienced by inland areas 8.5 percent of the time and coastal areas 6.2 percent of the time.

Table 17. Periods of severe or extreme drought in South Central Region, 1985 – 2022.

Drought Period	Duration	Lowest PDSI Value
1/1901 – 2/1901	2 months	-3.97 in 2/1901
11/1909 – 12/1909	2 months	-3.28 in 12/1909
4/1910 – 9/1911	18 months	-5.20 in 5/1911
9/1912 – 2/1913	6 months	-3.66 in 11/1912
7/1913 – 9/1913	3 months	-3.97 in 8/1913
9/1914 – 12/1914	4 months	-3.62 in 11/1914
4/1915 – 6/1915	3 months	-3.98 in 6/1915
11/1924 – 6/1925	8 months	-4.01 in 4/1925
11/1929 – 4/1931	18 months	-4.77 in 9/1930
10/1931 – 2/1932	5 months	-4.35 in 12/1931

Drought Period	Duration	Lowest PDSI Value
4/1932 –7/1932	4 months	-3.41 in 5/1932
11/1949 – 1/1950	3 months	-3.52 in 12/1949
7/1957 – 11/1957	5 months	-3.68 in 9/1957
9/1964 – 1/1965	5 months	-4.16 in 11/1964
3/1965 – 2/1967	24 months	-5.19 in 12/1965
3/1985 – 4/1985	2 months	-3.84 in 4/1985
8/1995 – 9/1995	2 months	-3.61 in 8/1995
7/1999 – 8/1999	2 months	-3.50 in 7/1999
1/2002 – 4/2002	4 months	-3.67 in 2/2002
4/2013 – 5/2013	2 Months	-3.19 in 4/2013
4/2015 – 5/2017	25 Months	-4.77 in 9/2016
9/2017	1 Month	-3.16 in 9/2017
8/2020	1 Week	
9/2020 – 10/2020	1 Month	
8/2022	1 Month*	

Sources: Northeast Regional Climate Center, Cornell University; and NOAA National Climatic Data Center
**While this plan was being developed, the region was in an ongoing severe drought.*
12/8/2022 Update: "Fairfield, Litchfield, New Haven, and Hartford Counties remain at the Stage 1 drought level."

The United States Department of Agriculture (USDA) Secretary of Agriculture is authorized to declare and designate counties as disaster areas in relation to drought, and other natural hazard events. Over the years, the process for declaring a drought disaster has evolved and is also the most widely used designation across the country. The USDA Declarations for New Haven County since 2012 can be seen in Table 18.

Table 18. USDA emergency drought declarations since 2012.

Year	Designation Number	Approval Date	Description of Disaster
2014	S3775	12/10/2014	Drought
2015	S3928	11/4/2015	Drought
2016	S4055	9/28/2016	Drought – FAST TRACK
2020	S4814	10/14/2020	Drought – FAST TRACK
2020	S4825	10/15/2020	Drought – FAST TRACK
2022	S5287	9/21/2022	Drought – FAST TRACK
2022	S5292	9/26/2022	Drought – FAST TRACK
2022	S5300	10/3/2022	Drought – FAST TRACK
2022	S5308	10/11/2022	Drought – FAST TRACK

USDA

Because the impacts of drought are not necessarily measured in the same way a hurricane or severe storm is, there are additional resources that can be used to determine past damages and future losses. The United States Department of Agriculture (USDA) offers several disaster assistance programs for agricultural operations that have been impacted by natural disasters.

The Non-Insured Assistance Program is most often utilized in the planning region in the wake of a natural disaster event. Since 2012, there have been an estimated $315,292 received by local agricultural operations in the SCRCOG region due to drought.

4.4.8 Climate Change Impacts

The Fourth National Climate Assessment states that droughts have already intensified across the United States and may continue to do so as global temperatures continue to rise. Though precipitation events are expected to become larger and more frequent, it is projected that the length of time between these events will also increase, resulting in lengthier dry spells. In addition, as temperatures increase, soil moisture is expected to decrease due to evapotranspiration, ultimately intensifying droughts, and reducing groundwater levels. A reduction in groundwater level, which can be attributed to lack of conservation, reduced recharge during dry spells, and saltwater inundation along the shoreline, will likely also exacerbate droughts.

4.4.9 Probability of Future Events

Drought will continue to be an occasional occurrence in the planning area. It is anticipated that the effects of climate change will result in an increase in the frequency, duration and intensity of droughts. By late this century, under a higher emissions scenario, short-term (one to three month) droughts are projected to occur as frequently as once each summer.

The Connecticut Hazard Mitigation Plan (2019) states that while climate change projections anticipate a "generally wetter future", climate forecasts typically predict summer months to have longer drier periods. The State HMP also highlights that modeled temperature changes show a potential 0.5 to 6.5 degree increase by 2080.

The State Water Plan (2018) includes a relatively detailed narrative regarding droughts. The plan notes that "typical climate forecasts tend to suggest that increased temperatures coupled with increased annual precipitation generally correspond to *higher intensity storms* (greater flood risk) and longer dry periods in the summer months (more frequent and/or intense droughts). Because Connecticut has so many small reservoir systems, these systems could be very sensitive to such changes…" The State Water Plan also notes that "the *distribution* of rainfall may change significantly (more rain in winter, less rain in summer), causing more frequent dry periods during the warmer months, where the impacts of drought can be exacerbated by increasing temperatures and resulting evaporative losses from water bodies and soil moisture."

Overall, given the above discussion and the occurrence of a severe drought in 2015-2017 and the flashy droughts of 2020 and 2022, the future probability of droughts is considered high.

4.5 Earthquake

4.5.1 Description

An earthquake is the sudden motion or trembling of ground caused by an abrupt release of accumulated strain on tectonic plates that comprise the Earth's crust. As these plates move slowly and continuously over the interior of the earth, they collide, slide, catch, and hold – but eventually, when the mounting stress exceeds the elastic limit of the rock, faults along or near plate boundaries rupture or slip abruptly and an earthquake occurs. The ensuing seismic hazard effects on the Earth's surface include ground shaking, surface fault ruptures, and ground failures, which have the potential to cause widespread damage to buildings and infrastructure. Earthquakes may also provoke secondary hazards such as tsunamis, landslides, dam failures, or large fires ignited by ruptured gas lines.

The underground point of initial rupture is known as an earthquake's focus or hypocenter, and the point at ground level directly above the hypocenter is known as its epicenter. In general, the severity of the resulting ground motion increases with the amount of energy released and decreases with distance from the epicenter. Larger earthquakes usually begin with slight tremors but rapidly take the form of

one or more violent shocks and are followed by vibrations of gradually diminishing force called aftershocks. While the great majority of earthquakes strike near continental margins or in areas where large plates collide or move past each other, some, including those in the Northeast United States, can occur within plate boundaries.

4.5.2 Location

The entire planning area is uniformly susceptible to the occurrence of earthquakes. Unlike other areas of the country where earthquakes occur along known fault lines, earthquakes in the Northeast do not correlate with the many known faults that exist in the region. They occur in the middle of plates, far from the plate boundaries.

Error! Reference source not found. shows peak ground acceleration and the location of epicenters for h istorically significant earthquakes across the Northeast United States according to the United States Geological Survey (USGS).

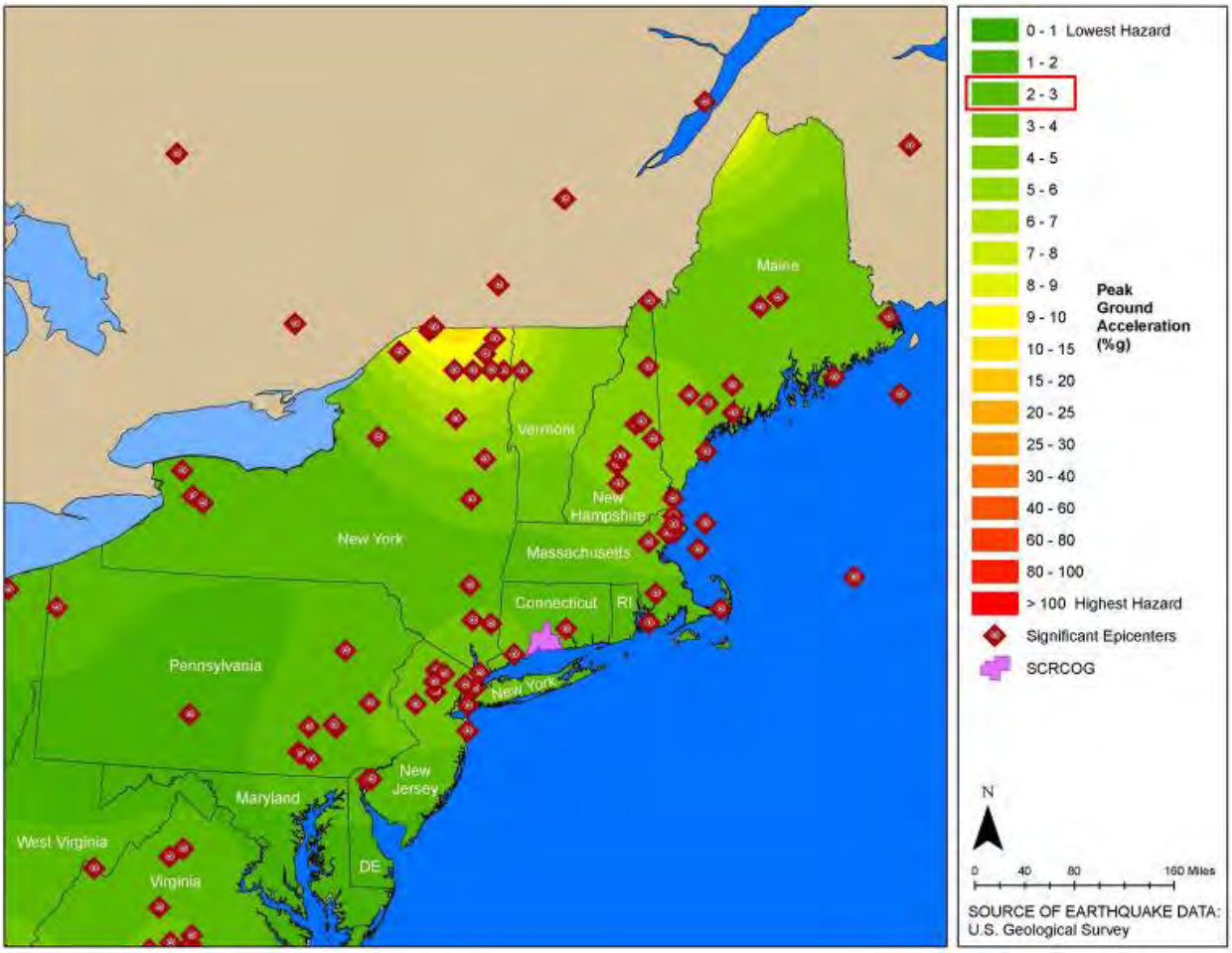


Figure 17. Peak ground acceleration and historically significant earthquake epicenters.

Peak ground acceleration is the amount of earthquake generated ground shaking that, over a specified period of time, is predicted to have a specified chance of being exceeded. It is expressed as a percentage of the force of gravity (%g). Map 4.3 shows the peak acceleration with 10 percent probability of exceedance in 50 years, a common standard for USGS earthquake hazard maps. The entire planning area falls within a zone with a peak ground acceleration value of 2-3%g, which is considered a low-risk zone.

Significant earthquakes, as defined by the USGS, are those "within or near to the United States that caused deaths, property damage, or geological effects, or that were experienced by populations in the epicentral area." More information on past notable earthquakes for the planning area is provided below under *Previous Occurrences*.

4.5.3 Extent

The magnitude of an earthquake is a measure of the amount of energy released as seismic waves at the hypocenter. The Richter Scale classifies earthquake magnitude as determined from measurements recorded by seismographs, and according to a single number on an open-ended logarithmic scale. Each unit increase in magnitude on the Richter Scale corresponds to a ten-fold increase in wave amplitude, or a 32-fold increase in energy. The intensity of an earthquake is a measure of the strength of ground shaking and its effects on the Earth's surface at a certain location. Intensity is most commonly measured using the Modified Mercalli Intensity Scale, which is based on observed seismic effects versus any mathematical basis. The Scale is composed of 12 increasing levels of intensity (designated by Roman numerals) that range from imperceptible shaking to catastrophic destruction.

Table 19 summarizes the range of magnitudes and related intensities for earthquakes according to the Richter and Modified Mercalli Intensity (MMI) scales, along with abbreviated descriptions of effects on people, human structures, and the natural environment near the epicenter.

Table 19. Classification of earthquake magnitude and intensity.

Magnitude (Richter Scale)	Typical Maximum Intensity (MMI Scale)	Abbreviated Description of Effects (Near Epicenter)
1.0 to 3.0	I	Not felt except by a very few under especially favorable conditions.
3.0 to 3.9	II	Felt only by a few persons at rest, especially on upper floors of buildings.
	III	Felt quite noticeably by people indoors, especially on upper floors of buildings. Many people do not recognize it as an earthquake. Standing motorcars may rock slightly. Vibrations similar to the passing of a truck. Duration estimated.
4.0 to 4.9	IV	Felt indoors by many, outdoors by few during the day. At night, some awakened. Dishes, windows, doors disturbed; walls make cracking sound. Sensation like heavy truck striking building. Standing motorcars rocked noticeably.
	V	Felt by nearly everyone; many awakened. Some dishes and windows were broken. Unstable objects overturned. Pendulum clocks may stop.
5.0 to	VI	Felt by all, many frightened. Some heavy furniture moved; a few

Magnitude (Richter Scale)		Typical Maximum Intensity (MMI Scale)	Abbreviated Description of Effects (Near Epicenter)
5.9			instances of fallen plaster. Damage slight.
	6.0 to 6.9	VII	Damage negligible in buildings of good design and construction; slight to moderate in well-built ordinary structures; considerable damage in poorly built or badly designed structures; some chimneys broken.
7.0 and higher		VIII	Damage slight in specially designed structures; considerable damage in ordinary substantial buildings with partial collapse. Damage is great in poorly built structures. Fall of chimneys, factory stacks, columns, monuments, and walls. Heavy furniture overturned.
		IX	Damage considerable in specially designed structures; well-designed frame structures thrown out of plumb. Damage is great in substantial buildings, with partial collapse. Buildings shifted off foundations.
		X	Some well-built wooden structures were destroyed; most masonry and frame structures were destroyed with foundations. Rails bent.
		XI	Few, if any (masonry) structures remain standing. Bridges destroyed. Rails bent greatly.
		XII	Damage total. Lines of sight and level are distorted. Objects thrown into the air.
Source: US Geological Survey			

As more seismograph stations were installed around the world following the 1930s, it became apparent that the method developed by Richter was valid only for certain frequency and distance ranges, particularly in the southwestern United States. New magnitude scales that are an extension of Richter's original idea were developed for other areas. In particular, the Moment magnitude scale (Mw) was developed in the 1970s to replace the Richter scale and has been in official use by the USGS since 2002. According to USGS, these multiple methods are used to estimate the magnitude of an earthquake because no single method is capable of accurately estimating the size of all earthquakes. Some magnitude types are calculated to provide a consistent comparison to past earthquakes, and these scales are calibrated to the original Richter scale. However, differences in magnitude of up to 0.5 can be calculated for the same earthquake through different techniques. In general, Moment magnitude

provides an estimate of earthquake size that is valid over the complete range of magnitudes and so is commonly used today.

Although Moment magnitude is the most common measure of earthquake size for medium and larger earthquakes, the USGS does not calculate Mw for earthquakes with a magnitude of less than 3.5 which is the more common situation for Massachusetts. Localized Richter scales or other scales are used to calculate magnitudes for smaller earthquakes.

Regionally, the Weston Observatory utilizes two scales to track the magnitude of earthquakes. These include the Nuttli magnitude (Mn) for North America east of the Rocky Mountains and is more appropriate for the relatively harder continental crust in Connecticut compared to California. Weston Observatory also utilizes the Coda Duration magnitude (Mc), which is based on the duration of shaking at a particular station. The advantages of the Coda Duration magnitude is that this method can quickly estimate the magnitude before the exact location of the earthquake is known.

4.5.4 Primary and Secondary Impacts

An earthquake can cause nominal to severe damage to homes, businesses, and infrastructure, depending on the magnitude of the event. In addition, there is a risk of injury or loss of life from an earthquake event attributed to structural collapse or infrastructural debris.

Earthquakes can also result in several secondary impacts as these events can trigger other hazards both natural and as a result of damage. Landslides, tsunamis or seismic waves, subsidence, and liquefaction of soil can all occur as a result of seismic activity. While these events and secondary impacts are not typically experienced in the region, they can be a result of more catastrophic earthquakes. Fires can also occur as a result of damaged structures, infrastructure, or ruptured utilities, causing an increase in damage and a risk of injury or loss of life.

4.5.5 Severity

The degree of an earthquake severity is directly related to magnitude, or amount of seismic activity released by the event. As seen in Table 19, the effects of an earthquake vary based on the magnitude, or intensity. In general, as noted in the 2019 State Hazard Mitigation Plan, some of the factors influencing severity and the degree of damage include:

- Duration of ground movement
- Depth of the focus or hypocenter
- Distance from epicenter
- Geologic setting
- Population and building density
- Types of buildings
- Time of day

4.5.6 Warning Time

The warning time for an earthquake is typically only minutes to seconds, with events occurring farther away allowing for more warning time to distant locations. Currently, technology does not allow for extended warning times, however, there are systems being tested outside the region to allow for earlier detection and ultimately more warning. Given the location of the South Central Region, it is unlikely a catastrophic event will occur in close proximity, and therefore impacts from larger distant events would be minimal and the distance may allow for more warning.

4.5.7 Previous Occurrences and Losses

The Northeast region of the United States has a long history of earthquakes, though the vast majority of these had a calculated magnitude of less than 3.0. This includes more than 140 earthquakes centered in Connecticut since 1638, according to the Northeast States Emergency Consortium and New England Seismic Network.

The largest and most severe earthquake in Connecticut's history occurred at East Haddam on May 16, 1791. It has been estimated to be a VII intensity event. According to USGS records, stonewalls were shaken down, tops of chimneys were knocked off, and latched doors were thrown open.

The second strongest earthquake in Connecticut occurred near Hartford on November 14, 1925. Plaster was knocked from walls and dishes were shaken from shelves. More recently, an intensity V earthquake in southern Connecticut occurred on November 3, 1968. Plaster was reportedly cracked in Madison during this event, and small items fell and broke.

Other notable earthquakes occurred in Connecticut in 1837, 1840, 1845, 1858, 1875, 1953, all of which were moderate tremors that caused alarm but resulted in minimal damage. There have also been several earthquakes centered outside of Connecticut that were strongly felt in the state but caused little to no damage. This includes recent strong earthquakes centered in Virginia (2011) and Maine (2012).

More recently A magnitude 2.7 quake occurred beneath the town of Deep River on August 14, 2014, several miles east of the planning area. A series of quakes hit Plainfield, Connecticut on January 8, 9, and 12, 2015, north of the planning area in northeastern Connecticut. These events registered magnitudes of 2.0, 0.4, and 3.1, respectively. Residents in the Moosup section of Plainfield reported minor damage such as the tipping of shelves and fallen light fixtures.

Earthquakes of note since the previous edition of this plan include:

- On March 5, 2021, a magnitude 1.9 earthquake occurred in West Hartford, which is north of the planning region. This event was felt in several places across the state including Meriden and North Branford.
- In Newington, Connecticut, north of the planning region, a 1.6 magnitude event occurred on July 21, 2020.

- Durham, Connecticut, which is just northeast of the planning region, experienced a 1.1 magnitude event on July 14, 2018, and a 1.9 event on July 27, 2019. The 2019 event was felt throughout communities in the planning region including Meriden, Wallingford, North Haven, North Branford, Branford, Madison, and Guilford.
- On February 27, 2018, a magnitude 1.5 earthquake occurred in Woodbridge which was felt in West Haven.

Losses have not occurred as a result of any earthquakes of the past 10-15 years.

4.5.8 Climate Change Impacts

Earthquakes are not thought to be impacted by climate change impacts, however the weakening of certain infrastructure from saltwater intrusion, or sea level rise inundation may weaken the structural integrity of some components, making these structures more susceptible to collapse or destruction during an event.

4.5.9 Probability of Future Events

Earthquakes with a magnitude of 3.0 or greater will remain an occasional occurrence in the planning area, however, based on historical data and USGS hazard maps, it is susceptible to only minor ground shaking events. It is anticipated that the effects of climate change will have no relation to the probability of future earthquake events.

4.6 Extreme Temperatures

4.6.1 Description

According to the National Weather Service, extreme temperature (including extreme heat, humidity, and extreme cold) is the number one weather-related killer in the United States.

Extreme heat may be generally defined as temperatures that hover 10 degrees or more above the average high temperature for the region, last for prolonged periods of time, and are often accompanied by high humidity. At certain levels the human body cannot maintain proper internal temperatures and may experience severe health disorders including heat cramps, heat exhaustion or heatstroke (a life-threatening condition).

Extreme cold may be generally defined as prolonged periods of time with freezing temperatures, often made worse by the impact of wind chill factors (the combined elements of air temperature and wind on exposed skin). At certain levels the human body may suffer from frostbite or hypothermia, making extreme cold a potentially severe and life-threatening hazard to people left unprotected from the

elements. Freezing temperatures may cause severe damage to crops and other vegetation, and pipes may freeze and burst in structures that are poorly insulated or without heat. Long cold spells may cause rivers and lakes to freeze and lead to ice jams that can act as a dam, resulting in severe flooding (covered under *Flood*).

4.6.2 Location

The entire planning area is susceptible to the occurrence of extreme temperatures. In general, inland areas are more susceptible to extreme heat and cold than coastal areas. Urbanized, or highly impervious areas, are also more susceptible to extreme heat.

4.6.3 Extent

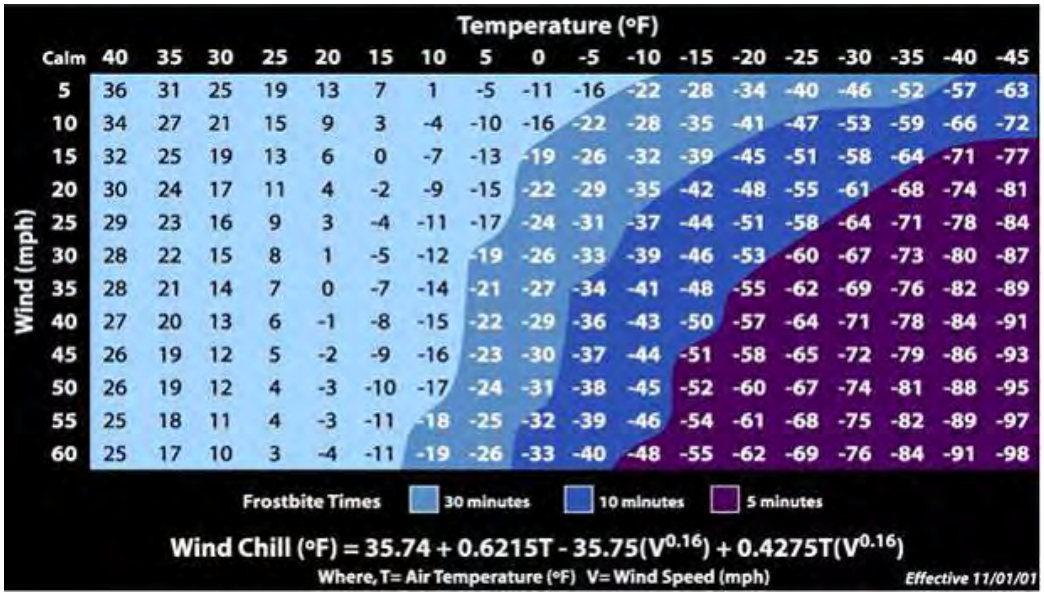
The National Weather Service's Heat Index is a measure of the effects of the combined elements of air temperature and relative humidity on the human body, particularly for people in higher risk groups (elderly persons, young children, persons with respiratory difficulties, and those who are sick or overweight). Table 20 summarizes the extent of these effects.

Table 20. Effects of extreme heat on the human body.

Heat Index	Heat Disorder
80–89° F	Fatigue possible with prolonged exposure and/or physical activity.
90–104° F	Sunstroke, heat cramps and heat exhaustion possible with prolonged exposure and/or physical activity.
105–129° F	Sunstroke, heat cramps or heat exhaustion likely, and heatstroke possible with prolonged exposure and/or physical activity.
130° F and Higher	Heatstroke/sunstroke highly higher likely with continued exposure.
Source: National Oceanic and Atmospheric Administration NWS	

The National Weather Service's Wind Chill Index is used to measure the dangers of frostbite caused by the combined elements of freezing temperatures and wind. Error! Reference source not found. Table 21 summarizes the extent of this effect.

Table 21. Effects of extreme cold/wind chill on the human body (NOAA NWS).



Wind (mph) \ Temperature (°F)	Calm	40	35	30	25	20	15	10	5	0	-5	-10	-15	-20	-25	-30	-35	-40	-45
5		36	31	25	19	13	7	1	-5	-11	-16	-22	-28	-34	-40	-46	-52	-57	-63
10		34	27	21	15	9	3	-4	-10	-16	-22	-28	-35	-41	-47	-53	-59	-66	-72
15		32	25	19	13	6	0	-7	-13	-19	-26	-32	-39	-45	-51	-58	-64	-71	-77
20		30	24	17	11	4	-2	-9	-15	-22	-29	-35	-42	-48	-55	-61	-68	-74	-81
25		29	23	16	9	3	-4	-11	-17	-24	-31	-37	-44	-51	-58	-64	-71	-78	-84
30		28	22	15	8	1	-5	-12	-19	-26	-33	-39	-46	-53	-60	-67	-73	-80	-87
35		28	21	14	7	0	-7	-14	-21	-27	-34	-41	-48	-55	-62	-69	-76	-82	-89
40		27	20	13	6	-1	-8	-15	-22	-29	-36	-43	-50	-57	-64	-71	-78	-84	-91
45		26	19	12	5	-2	-9	-16	-23	-30	-37	-44	-51	-58	-65	-72	-79	-86	-93
50		26	19	12	4	-3	-10	-17	-24	-31	-38	-45	-52	-60	-67	-74	-81	-88	-95
55		25	18	11	4	-3	-11	-18	-25	-32	-39	-46	-54	-61	-68	-75	-82	-89	-97
60		25	17	10	3	-4	-11	-19	-26	-33	-40	-48	-55	-62	-69	-76	-84	-91	-98

4.6.4 Primary and Secondary Impacts

The primary impacts of extreme heat and cold are primarily public health, or agriculturally related. During extreme heat waves individuals may suffer from heat related conditions or death such as heat stroke, or cardiovascular disease or disorders, respiratory disease and disorders, or kidney disorders. Hospitalizations, typically in urbanized areas or among the elderly, often increase during heat waves due to these conditions. Agricultural operations face challenges as during extreme heat waves crops may become stressed and require increased irrigation, and livestock operations may face challenges in keeping animals cool and hydrated. Extreme cold events have similar implications with public health being a primary impact. In addition, critical infrastructure such as roadways or rail lines, can become stressed during extreme, extended heat waves.

During cold events individuals may be at risk of hypothermia, frost bite, particularly for those that are exposed to the outdoors for prolonged periods, or the young and elderly. When cold events occur during growing periods, crops can become damaged or yields are drastically reduced, while livestock operations may face challenges with keeping animals healthy during extreme periods.
Secondary impacts include stress on power grids during periods when there is an increased demand for heating and cooling, a rise in food prices if damage occurs to crops livestock operations, and extreme temperature events can put a strain on community resources when having to respond to individuals that are not actively mitigating personal impacts from heat or cold.

4.6.5 Severity

An extreme heat wave is when temperatures and humidity are higher than normal for two to three days. This threshold is considered 90 degrees or more for the region. As temperatures and humidity rise

above that threshold the risk of heat-related illness or death increases, ultimately increasing the severity of the heat wave.

Similarly, an extreme cold event is when temperatures drop below normal, and wind speed increases which increases the wind chill and the risk for illness.

4.6.6 Warning Time

Temperature is included in both long- and short-term weather forecasts, with temperature related advisories, warnings, and watches typically disseminated about a week in advance of the event. The National Weather Service (NWS), which is typically the most relied upon service for weather warning information, has four heat alerts that can be issued depending on the time until the heat wave event, and the severity of the temperature.

- **Excessive Heat Outlook – Be Aware!** Issued 3 to 7 days prior to an event when excessive heat is possible.
- **Excessive Heat Watch – Be Prepared!** Typically issued when excessive heat is expected within 24 to 72 hours, even though timing and occurrence is still uncertain.
- **Heat Advisory – Take Action!** Issued within 12 hours of an extreme heat event where maximum heat index is expected to be 100 degrees or higher for at least two days, and the nighttime air temperatures will not drop below 75 degrees.
- **Excessive Heat Warning – Take Action!** Issued within 12 hours of an extreme heat event where maximum heat index is expected to be 105 degrees or higher for at least two days, and the nighttime air temperatures will not drop below 75 degrees.

The NWS also has certain alerts that can be issued during wind chill events, and freeze/frost events:

- **Wind Chill Advisory – Be Aware!** Issued when seasonably cold wind chill values are expected or occurring and *not* extremely cold values.
- **Wind Chill Watch – Be Prepared!** This is issued when dangerously cold wind chills values are possible.
- **Wind Chill Warning – Take Action!** Issued when dangerously cold wind chill values are expected or actively occurring.
- **Frost Advisory – Be Aware!** Issued when areas of frost are expected or occurring.
- **Freeze Watch – Be Prepared!** Issued when there are significant, widespread freezing temperatures within 24 to 36 hours.
- **Freeze Warning – Take Action!** Issued when temperatures are expected to go below 32 degrees for a long period of time; this can be damaging to commercial crops.
- **Hard Freeze Warning – Take Action!** Issued when temperatures are expected to drop below 38 degrees for an extended period of time.

4.6.7 Previous Occurrences and Losses

NOAA historical records indicate that there have been no direct fatalities in the planning area due to extreme temperatures from 1995 through 2022. Table 22 shows the number of heat-related emergency room visits and hospitalizations per 100,000 for the entire state. Between 2018 and 2021 a total of 12 extreme heat warnings and advisories were issued by the National Weather Service for various parts of the state.

Table 22. Emergency department visits and hospitalizations per 100,000 people for the State of Connecticut.

Year	Emergency Department Visits per 100,000 People	Hospitalizations per 100,000 People
2020	8.5	1.2
2019	13.8	1.3
2018	15.3	1.6
2017	10.1	1.3
Source: CDC National Environmental Public Health Tracking Network		

While summers are humid and very warm, temperatures rarely exceed 100° F and only exceed 90°F on 7-8 days per year. In the summer of 1999, Connecticut experienced extreme heat for a period of 3-5 consecutive days over 100 degrees making it the most severe heat wave on record. The highest recorded ambient temperature for the region is 103°F. Most recently, as of September 2022, the region experienced 17 days with temperatures above 90 degrees in 2022, and a total of 42 days above 90 degrees between 2017 and 2021.

Table 23. Annual maximum and minimum temperatures throughout the region.

Year	New Haven (Tweed)		Meriden (Meriden Airport)		Mount Carmel	
2017	90	6	94	-3	95	-1
2018	93	0	98	-14	96	-9
2019	97	2	98	-1	96	-2
2020	94	11	95	3	94	7
2021	94	12	98	6	-	-
Source: National Weather Service						

Freezing temperatures are common throughout the region during winter months, with average low temperatures falling below 30°F from December through February. The lowest recorded ambient temperature for the region is -24°F.

Notable recent occurrences in the planning area include:

- July 18, 2012 – The heat index reached or exceeded 106°F at Meriden Markham Municipal airport.
- July 19, 2013 – The combination of high heat and humidity resulted in a heat index of 105°F at Meriden Airport.
- February 15-16, 2015 – Strong northwest winds and frigid air in the wake of an intense storm over the Canadian Maritimes combined to produce dangerous wind chills across parts of interior southern Connecticut. Wind chills fell to 28 degrees below zero at 3 AM at Waterbury-Oxford Airport.
- August 12-13, 2016 – Hot temperatures along with high humidity resulted in a heat index of 108°F at Meriden Airport.
- July 20-21, 2019 – The NWS issued an excessive heat watch for all counties in the state. The Meriden Airport recorded temperatures on those two days between 73 to 98 degrees, and Tweed Airport observed temps from 75 to 97 degrees.
- July 1-4, 2018 – The NWS issued a heat advisory along the shoreline, and an excessive heat warning for inland communities in the state. Between the first and fourth, Meriden Airport observed temperatures as high as 98 degrees, and Tweed Airport as high as 90 degrees.
- July 18-24, 2022 – On July 18 Governor Lamont activated a statewide extreme heat protocol in preparation for a heat wave. The following days were expected to reach temperatures above 95 degrees, with heat indexes over 100 degrees. Tweed New Haven observed temperatures as high as 95 degrees, and Meriden Airport as high as 96 degrees.

4.6.8 Climate Change Impacts

The Connecticut Governor's Council on Climate Change (GC3) has compiled relevant state data and information on several climate change topics including increasing temperatures. The statewide average temperature has been increasing by 0.3 degrees since 1895, which equals about 3 degrees warmer in 2020. While projections vary across the world as to what is expected by way of temperature increase, it is anticipated that for Connecticut the average temperature will increase by about 5 degrees by 2050. This shift is expected to increase hot weather events and summer droughts.

The increasing temperatures also means a shift in cold weather events. These warming temperatures also mean slightly warmer winters. It is expected that the number of frost days for the state, which is currently averaging 124 per year, will drop to 85.

CIRCA developed the CCVI during the *Resilient Connecticut* planning process to characterize extreme heat and flood vulnerabilities in the context of climate change. The extreme heat module of the CCVI depicts extreme heat vulnerabilities throughout New Haven County and therefore throughout the SCRCOG planning region. The extreme heat CCVI viewer does not depict risk; rather, it shows vulnerabilities in a spatial pattern that can be used for

4.6.9 Probability of Future Events

The effects of climate change will result in an increase in the frequency, duration and intensity of extreme heat events, and a decrease in the frequency of extreme cold events. The State's Physical Climate Science Assessment Report (2019) and the work of the GC3 suggest that extreme temperatures will continue to be a likely occurrence in the planning area. Projections can be found in CIRCA's summary fact sheet (https://circa.uconn.edu/wp-content/uploads/sites/1618/2020/10/CIRCA-Temperature-and-Precipitation-fact-sheet.pdf). Heat waves are projected to become much more commonplace in a warmer future with potentially major implications for human health.

4.7 Flood

4.7.1 Description

Flooding is the most frequent and costly natural hazard in the United States (and in Connecticut). Nearly 90-percent of presidential disaster declarations result from natural events where flooding was a major cause of human casualties and property damage.

Flooding may be generally defined as the partial or complete inundation of normally dry land by the overflow and accumulation of excess water. Flooding may be classified according to three distinct hazard types:

- *Riverine floods* include overbank flooding from a river or stream channel onto adjacent floodplains and are generally caused by excessive precipitation from large-scale weather systems. A rapid accumulation of heavy localized downpours may also impact smaller streams and creeks to cause *flash floods*, characterized by a rapid rise in water level and/or high velocity flow with little warning. Other potential causes of riverine floods include ice jams or dam failures.
- *Coastal floods* occur along the shorelines of large water bodies and are caused by the wind-driven waves, storm surge and heavy rainfall produced by hurricanes, tropical storms, nor'easters and other large, low-pressure coastal storms with cyclonic flows. Coastal flood hazards are often exacerbated over the long term by coastal erosion and sea level rise.
- *Urban floods* occur where the physical development of a community has decreased the ability of natural groundcover to absorb and retain surface water runoff, and existing drainage systems are incapable of conveying or retaining storm water flow. They are most often caused by isolated, high-intensity rainfall events of relatively short duration (1 to 3 hours). Even when drainage systems are designed to acceptable standards, urban flooding may occur when they are obstructed by debris, sediment or other materials that limit their functional capacity.

4.7.2 Location

Riverine Flood

Most of the South Central Region is located in the South Central Coast River Basin, with some western portions of Bethany Woodbridge and Orange in the Housatonic River Basin, and very small portions of Wallingford, North Branford, and Madison in the Connecticut River Basin.

Several major rivers flow through planning area, including the Quinnipiac, Housatonic and Hammonasset. The Housatonic River flows southeasterly and defines a portion of the western municipal boundary for Orange. The Quinnipiac River flows south through Wallingford, North Haven, and Hamden before continuing through New Haven to New Haven Harbor, an inlet of Long Island Sound. The Hammonasset River flows south and defines the eastern municipal boundary for Madison, emptying into Long Island Sound just east of Hammonasset State Park. In addition to these major rivers, there are a large number of smaller rivers and tributaries, streams, lakes and other water bodies throughout the region that are associated with special flood hazard areas as delineated by FEMA.

The locations of all special flood hazards areas for the South Central Region are depicted in maps for each municipality later in this chapter, reflecting the current FEMA Digital Flood Insurance Rate Maps (DFIRMs)[91]. Municipality-specific maps provided in the *Risk Analysis* show the locations of these special flood hazard areas for each participating municipality. Descriptions for these special flood hazard areas are provided in the *Extent* portion of this section.

Coastal Flood

Coastal special flood hazard areas as currently mapped on FEMA DFIRMs are included in the map figures listed above for riverine flood. This includes "VE Zones" which are defined as areas subject to inundation by the 1 percent annual chance flood event with additional hazards due to storm-induced velocity wave action.

The location of storm surge inundation areas for the South Central Region is depicted in maps for applicable municipalities (Milford, West Haven, Orange, New Haven, Hamden, North Haven, East Haven, Branford, Guilford, and Madison) later in this chapter. These maps illustrate areas that could be inundated by "worst case" scenarios associated with Category 1 through 4 hurricanes striking the coast of Connecticut.

Urban Flood

Urban floods often strike rapidly, terminate quickly, and occur in areas generally not considered at risk to major flooding (including areas outside of mapped floodplains). The primary areas of concern with regard to urban flooding for each participating municipality are well known to local officials and are often attributed to inadequate drainage of impervious surfaces. The localized areas of most critical concern, as identified by municipalities, are included in the Problem Statement tables provided in the *Risk Analysis* section.

[91] Current effective date for FEMA's Digital Flood Insurance Rate Maps (DFIRMs) for New Haven County is 5/16/2017.

4.7.3 Extent

Riverine Flood

The severity of a riverine flood event is typically determined by a combination of several major factors, including stream and river basin topography and physiography; precipitation and weather patterns; recent soil moisture conditions; the degree of vegetative clearing; and impervious surface.

The periodic flooding of lands adjacent to rivers, streams and shorelines (floodplains) is a natural and inevitable occurrence that can be expected to take place based upon established recurrence intervals. The recurrence interval of a flood is typically defined as the average time interval, in years, expected between a flood event of a particular magnitude and an equal or larger flood. Flood magnitude (spatial extent and depths) increases with increasing recurrence interval.

Floodplain areas are delineated according to the frequency of the flood that is large enough to cover them. For example, the 10-year floodplain will be covered by the 10-year flood and the 100-year floodplain by the 100-year flood. A more appropriate way of expressing flood frequency is the percent chance of occurrence in any given year (annual probability). For example, the 100-year flood has a 1 percent chance of occurring in any given year, and the 500-year flood has a 0.2 percent chance of occurring in any given year. Statistically, the 1 percent annual chance flood has a 26 percent chance of occurring during a 30-year period of time, which is equal to the duration of many home mortgages. Contrary to what the term suggests, a "100-year flood" is not a flood that occurs only once every 100 years. A "100-year flood" can and often does occur multiple times in a century.

Special flood hazard areas identified on FEMA DFIRMs (as shown in the map figures for riverine flood) are defined as the areas that will be inundated by the flood event having a 1 percent chance of being equaled or exceeded in any given year. The 1 percent annual chance flood is also referred to as the base flood and is the national minimum standard for applying FEMA's NFIP floodplain management regulations and mandatory flood insurance purchase requirements. Areas shown to be inundated by the 0.2 percent annual chance are considered moderate flood hazard areas, and areas outside of these areas are considered minimal flood hazard areas.

Coastal Flood

The intensity and duration (or forward speed) of a storm is the most influential factor affecting the severity and impact of storm surges. While hurricanes and tropical storms often move through areas relatively quickly, nor'easters can last for days and multiple tidal cycles – often causing major coastal flooding, erosion and damage from wind-driven wave action.

Special flood hazard areas identified as "VE Zones" on FEMA DFIRMs (as shown in the map figures for riverine flood) are defined as areas subject to inundation by the 1 percent annual chance flood event with additional hazards due to storm-induced velocity wave action. Mandatory flood insurance purchase requirements and floodplain management standards apply for these areas.

Urban Flood

The severity of urban flooding varies greatly and is highly dependent on rainfall intensity and duration, but is generally limited to minimal, localized damages and/or temporary disruptions to transportation infrastructure. However, the lack of warning associated with urban flood events often creates significant threats to public safety due to flooded roadways, and results in increased damage to property that could have been prevented with more advance notice (particularly for vehicles left unattended in areas susceptible to urban flooding).

4.7.4 Primary and Secondary Impacts

Flooding events can be extremely damaging to property, infrastructure, and the environment. The moving flood waters can transport natural or structural debris throughout the floodplain, resulting in damage. In addition, these moving waters can cause erosion along riverbanks, underneath bridges, or cause structures like culverts to fail or collapse. Flood waters can also inundate properties causing water damage to the building or property within the structure. There is also a risk of injury or loss of life during a flood that can be caused by drowning, debris, or vehicular accidents or stranding.

Some of the secondary impacts include utility disruption or damage, and of course economic loss to residents, agricultural operations, and the community. In addition, there are numerous public health implications. The entire South Central region is comprised of residential, commercial, and industrial land uses, and with flooding being one of the most impactful hazards, it is critical to understand the public health implications during and after a flood event. Though not an exhaustive list, the subsequent concerns are most relevant to the SCRCOG communities.

There are the immediate concerns that are present during a flood such as drowning, injuries or death, hypothermic responses, along with the challenges associated with loss of egress and emergency response. Drainage systems can become inundated during an event, ultimately challenging the capacity of the system causing problems with wastewater and sewage systems.

After a flood event, standing waters can be contaminated and present a health risk to those who come in contact with flooded areas, and also act as prime breeding grounds for disease carrying insects like mosquitos. Flood waters can inundate private and public drinking water wells contaminating drinking water supplies, and potentially disrupt the water quality in surface water supplies.

Flood damaged homes and buildings may be unsafe for occupants to return to. Inundation presents an increased risk of mold growth, structural damage may weaken buildings increasing the chance for collapse, and electrical and utility lines may be implicating posing a hazard.

The impacts from ice jams are similar to those above, however the debris that is moved during a flood tends to collect and accumulate where it then damages adjacent buildings and infrastructures. Ice jam events can also cause transportation disruptions and increase flooding or flash flooding occurrences in the surrounding areas.

4.7.5 Severity

Flooding impacts and severity vary from one location to another given that what is considered a more severe flood in terms of stage of geographic reach, may not be as severe as what is seen along streams and rivers elsewhere. The NWS characterizes flood severity using three categories. These categories are used in a more qualitative sense rather than using flood stage measurements. The three categories are:

- **Minor:** There is little to no property damage, but potentially minor inconveniences.
- **Moderate:** Some structures and roadways are inundated, and some people may need to be evacuated from specific areas.
- **Major:** There is extensive inundation and damage, and a significant number of evacuations or transfer of people and property to higher ground.

4.7.6 Warning Time

Given that floods are typically associated with events such as heavy precipitation, or severe and tropical storms, this usually allows for at least two to three days warning for an event. Flash floods, however, can occur much faster with less warning time, though these do occur as a result of heavy rainfall which can often be forecast ahead of time. The NWS prepares flood and flood-related advisories, watches, and warnings as needed to provide warning time prior to flood events.

4.7.7 Previous Occurrences and Losses

NOAA historical records include 149 flood events (including coastal and flash floods), in the region since 1996, causing 3 fatalities, no injuries and more than $5.57 million in reported property damages (2022 dollars). The majority of these events may be classified as urban or flash floods, with significant street flooding that makes roads impassable, submerge parked vehicles, and result in serious life safety threats to drivers. These flood events also often isolate people in localized areas with access restricted by low-lying roadways. However, the damage figures associated with these events are believed to greatly underestimate the value of actual flood losses that have occurred but gone unreported or unrecorded in NOAA records. This includes some of the more recent major coastal flood events associated with hurricanes and tropical storm events, which are covered in more detail under *Hurricane/Tropical Storm*. FEMA historical records include a total of over $163 million in insured damages for participating municipalities as recorded through the National Flood Insurance Program (NFIP) since the late 1970s. The average claims payment per flood loss is approximately $18,200. Table 24 lists the number of insured losses and total claims payments for historical flood damages in each municipality as recorded under the NFIP as of June 31, 2022. It should be noted that this information only reflects previous losses as reported through claims under the NFIP, and that additional uninsured or unreported losses have occurred throughout the region.

Table 24. NFIP statistics on flood losses and claims payments (as of June 1, 2022).

Municipality	NFIP Entry Date	Total Flood Losses	Total Claims Payments
Bethany	08/23/1977	3	$7,226
Branford	12/15/1977	745	$12,441,001
East Haven	02/01/1978	1,660	$34,394,712
Guilford	05/01/1978	434	$8,045874
Hamden	06/15/1979	540	$3,196,433
Madison	09/15/1978	587	$11,309784
Meriden	9/30/1982	241	$2,512,297
Milford	12/6/1971	3,190	$76,118,397
New Haven	07/16/1980	432	$4,732,465
North Branford	07/03/1978	76	$526,704
North Haven	09/17/1980	173	$2,078,872
Orange	03/18/1980	154	$1,555,591
Wallingford	09/15/1978	137	$978,754
West Haven	01/17/1979	520	$5,090,246
Woodbridge	03/16/1981	76	$523,458
	Total	**8,968**	**$163,511,822**

Notable recent occurrences in the planning area include:

- April 16, 1996 – Flash flooding across New Haven County caused more than $2.2 million in estimated property damage (2012 dollars).
- April 15, 2007 – A strong late season Nor'easter impacted the region with a period of heavy rain that caused widespread and significant rivers, streams, and urban flooding of low lying and poor drainage areas. The storm also produced moderate tidal flooding across portions of Long Island Sound. This storm resulted in considerable damage to property.
- April 15, 2007 – A strong late season Nor'easter impacted the region with a period of heavy rain that caused widespread and significant rivers, streams, and urban flooding of low lying and poor

drainage areas. The storm also produced moderate tidal flooding across portions of Long Island Sound. This storm resulted in considerable damage to property.

- May 27, 2008 – Strong thunderstorms in advance of a cold front crossed the tri-state area producing isolated flash flooding in New Haven County and more than $600,000 in estimated property damages.
- March 31, 2010 – A Nor'easter centered off the Delmarva coast produced an extended period of heavy rainfall across the area as it tracked very slowly to the northeast. This caused widespread flooding across portions of Southern Connecticut and more than $100,000 in estimated property damages.
- March 7, 2011 – Heavy rains and melting snow from an unnamed winter storm caused the Housatonic River to swell more than two feet above flood stage. Several vehicles and approximately 20 homes in New Haven County were damaged.
- July 8, 2011 – The combination of an approaching upper-level disturbance and a stationary front in the vicinity produced thunderstorms with very heavy rainfall that caused flash flooding in Middlesex and New Haven Counties, and more than $1 million in estimated property damages.
- August 28, 2011 – The large envelope of winds associated with Tropical Storm Irene pushed a 3 to 8 foot storm surge into Long Island Sound resulting in moderate to major coastal flooding, wave damage and erosion. This resulted in damage or destruction of over 100 homes along the Connecticut shoreline, though the majority of these were in neighboring municipalities outside of the planning area. Heavy damage to public beaches and other public and private facilities also occurred. In West Haven, heavy damage was sustained to several coastal properties in Savin Rock. In Branford, several feet of water inundated Linden Avenue and neighboring properties. This combined with wave action caused severe erosion and undermining of roadways in the area with about a dozen homes and businesses significantly damaged. Along Seaview Avenue several homes were flooded and damaged with up to 6 feet of surge.
- March 14, 2017 – A nor'easter event caused coastal flooding in parts of the South Central Region, with the tidal gauge at New Haven having recorded a peak water level of 9.4 feet, at 2:18 pm; this exceeded the moderate coastal flood threshold of 9.2 feet. Reports of flooding included roadway inundation between 2 and 4 feet in Milford. October 29-30, 2012 – The storm surge and tidal flooding associated with Hurricane Sandy (covered under *Hurricane/Tropical Storm*) resulted in major flood damage and erosion along the Connecticut shoreline. According to FEMA estimates for New Haven County, the storm caused minor damage to 342 structures, major damage to 150 structures, and destroyed 4 structures. It is estimated that storm surge inundation impacted hundreds of roadways, 3 schools, 1 fire station, 34 electrical facilities, 1 waste water facility, and 65 communication facilities throughout the county. As of January 9, 2013, more than 1,453 people had applied to FEMA for Individual Assistance for more than $9 million in losses.

- September 25, 2018 – Heavy rain brought flash flooding across the region and the state, with reports of 5 to 9 inches of rainfall during 3 to 4 hours. Hamden reported 8.51 inches, Madison 4.48, and 2.26 inches of rain fell at Tweed Airport. Roads were impassable in Orange, Hamden, Meriden, Madison, and Guilford. The Quinnipiac River in Wallingford rose to a minor flood stage of 10.0 feet at 10:30 pm, with a maximum height of 10.09 feet.
- July 9, 2021 – Tropical Storm Elsa resulted in heavy rain across Connecticut, with some SCRCOG communities seeing flash floods and severe damage. Several roads in New Haven were closed and impassable, stranded motorists needed to be rescued, and moving floodwaters were seen as high as hoods of cars in Meriden. In addition, a landslide in West Haven compromised the Metro-North train track causing service disruptions.
- September 1, 2021 – Hurricane Ida caused a flash flood emergency for the entire state. Roads were closed due to flooding in many communities including West Haven, Meriden, and Milford. There were reports of flooded first floors in New Haven apartment buildings and Yale University dormitories. The Quinnipiac River in Wallingford rose above minor flood stage levels of 10.0 feet and crested at a height of 11.25 feet.

According to FEMA's Flood Insurance Study (FIS), the most notable and serious riverine floods in the region occurred in 1815, 1893, 1927, March 1936, January and September 1938, January 1949, August and October 1955, January 1978, June 1982, March and April 1987, and June 1992. Riverine floods have occurred in every season of the year, with some of the most severe floods occurring in early spring as a result of snow melt and heavy rains. Late summer and autumn are another critical season for flood danger due to heavy rainfall and the possibility of hurricanes and tropical storms. Winter floods result from occasional thaws, particularly in years of heavy snowfall.

The most severe coastal flooding in the region has occurred as a result of high tides and storm surge caused hurricanes, tropical storms and nor'easters (covered under *Hurricane/Tropical Storm* and *Severe Winter Storm/Nor'easter*). The region was heavily impacted by storm surge from hurricanes in 1938 and 1954. The storm surge accompanying these storms represented a recurrence interval ranging from 22 to 50 years. In more recent years, the region has suffered damaging storm surges and tidal flooding from Tropical Storm Irene (2011) and Hurricane Sandy (2012), as described earlier in this section.

Some of the historic major flood events impacting the region as noted in the FIS and the State Hazard Mitigation Plan include:

- June 1982 – The South Central Region was especially hard hit during the 1982 floods across Connecticut, caused by a large low-pressure system that produced prolonged and heavy rainfall over several days following a prior week of rainfall that had saturated the ground. Flooding in the south central portion of New Haven County was estimated to be greater than a 200-year recurrence interval. Streams that experienced the most severe flooding were the Wepawaug River (Lower Reach) in Orange and Milford, and the Mill River in Hamden. Very little flooding of large rivers occurred during this event. In total more $662 million in damages (2012 dollars) and 11 fatalities were recorded across Connecticut as a result of the 1982 floods. More than 15,000

homes were damaged (mostly by minor flooding), with 1,500 homes considered moderately damaged and 37 homes destroyed. In addition, more than 400 commercial and industrial properties were damaged, and many state and local roads, bridges, dams, and utility infrastructure also suffered damages.

- August 1955 – The greatest flood of record within the Housatonic and Naugatuck River watersheds occurred in August 1955 when two tropical storms, Connie and Diane, produced heavy precipitation across saturated soils within one week of each other. Severe flooding occurred across Connecticut as a result of these back-to-back storms, causing more than 100 fatalities and more than $4.3 billion in estimated property damage (2012 dollars) across Connecticut. It is estimated that the August 1955 peak flood discharge has a return frequency of about 110 years on the Housatonic River.
- March 1936 – The "Great Connecticut River Flood" of March 1936 was the result of a combination of melting snow and moderately heavy rains over a 13-day period. The Housatonic River was one of three major rivers affected with record flood heights. The floodwaters left an estimated 14,000 people homeless, and several people died as a result of this event. The flood resulted in an estimated $333 million in property damage (2012 dollars) across Connecticut.

NCEI

Since 2017 NOAA NCEI has reported 25 flash flood events and one flood even, with no injuries or deaths from any of these incidents. Within the past decade there have been 37 flash flood events and two flood events, again without injuries or deaths reported. There have also been no reported economic losses associated with the 39 flood events since 2012.

NFIP

The NFIP continuously maintains data on flood policies, losses, and claims to help understand the impact of flood events on a community. As of June 30, 2022, there were a total of 6,979 flood policies throughout the South Central Region, with a total coverage of $1,790,961,200; this equals an average policy coverage of $256,621. Table 25 shows the breakdown of the number of policies and the total policy coverage in each community. To date, the total dollars paid by the NFIP for 8,905 losses is over $162 million.

Table 25. Total NFIP policy count and coverage for each community in the SCRCOG region.

Community	Number of Policies	Total Coverage
Bethany	6	$2,100,000
Branford	878	$224,606,300
East Haven	722	$171,920,000
Guilford	493	$138,584,400
Hamden	169	$52,485,200

Community	Number of Policies	Total Coverage
Madison	434	$136,649,500
Meriden	122	$32,588,900
Milford	2,190	$569,499,900
New Haven	678	$174,588,500
North Branford	74	$19,966,000
North Haven	109	$37,099,700
Orange	55	$14,825,200
Wallingford	103	$28,542,200
West Haven	908	$177,572,600
Woodbridge	38	$9,932,800
Grand Total	**6,979**	**$1,790,961,200**

4.7.8 Climate Change Impacts

The effects of climate change will result in an increase in the average precipitation and sea level rise, which will both increase flooding. Projections can be found in CIRCA's summary fact sheet (https://circa.uconn.edu/wp-content/uploads/sites/1618/2020/10/CIRCA-Temperature-and-Precipitation-fact-sheet.pdf).

The State Water Plan (2018) includes an analysis associated with four climate change scenarios (warm/wet, warm/dry, hot/wet, and hot/dry) and notes that "Precipitation projections are more variable, although consistently projecting a generally wetter future for all four scenarios. The largest precipitation increases are projected for the wetter months (higher percentiles), including extreme wet months. It follows, then, that the seasonality plots show that winter and spring precipitation changes are projected to be larger than summer and autumn changes. Drier months are generally projected to remain about the same in terms of both frequency and rainfall level." The State Water Plan further notes that "The largest increases in streamflow are generally projected for the winter months (Dec - Feb), for all four climate ensembles. This is likely attributable to a combination of both greater winter precipitation and reduced snow accumulation."

According to CIRCA and the work of the GC3[92], climate change is expected to shift precipitation patterns throughout the state. The average amount of precipitation is expected to increase by about 8%, or four inches per year. In addition, the number of heavy precipitation days is expected to increase from three to five, with the fraction of heavy precipitation increasing from 15% to 20%. The 1-day precipitation maximum is anticipated to rise from 2.8 to 3.5 inches, and the 3-day from 4.5 to 5.4 inches. These increases in heavy rainstorms may also increase the frequency or severity of flood events along rivers and streams in the region, and throughout urban areas that already experience drainage related, urban flooding.

CIRCA developed the CCVI during the *Resilient Connecticut* planning process to characterize extreme heat and flood vulnerabilities in the context of climate change. The flood module of the CCVI depicts flood vulnerabilities throughout New Haven County and therefore throughout the SCRCOG planning region. The flood CCVI viewer does not depict risk; rather, it shows vulnerabilities in a spatial pattern that can be used for community-level assessments and decision-making.

In addition to increased precipitation, the increase in sea levels may also have an impact on coastal flooding events.[93] Storm surge may become amplified with higher sea levels, and larger surge evets more occur more frequently, and chronic "sunny day" high tide flooding may extend further inland impacting properties and roadways. As salt water encroaches along the coast pushing fresh groundwater levels inland and toward the surface, drainage patterns may change along the shoreline, exacerbating flooding.

4.7.9 Probability of Future Events

Floods of varying extent will continue to occur in the planning area. Riverine floods will continue to be an occasional occurrence in planning area, while coastal and urban floods will likely occur more frequently. It is anticipated that the effects of climate change, including sea level rise, will result in an increase in the extent and frequency of storm surge and coastal flooding. Severe urban flooding due to more precipitation and heavy downpours is also likely to occur more frequently.

The Connecticut Hazard Mitigation Plan Update (2019) notes that "Connecticut will continue to be at risk for flood events due to the geographic location along the Northeast Atlantic seaboard, abundance of waterways, and future projections by climate change models and studies that project an increase in more intense precipitation events punctuated by periods of drought conditions. Published climate change studies discuss an increase in extreme precipitation frequency, and an actual change in precipitation types and intensity throughout the next century."

Overall, the future probability of flooding and flood damage is considered high.

[92] https://resilientconnecticut.uconn.edu/wp-content/uploads/sites/2761/2020/10/CIRCA-Temperature-and-Precipitation-fact-sheet.pdf
[93] https://resilientconnecticut.uconn.edu/wp-content/uploads/sites/2761/2020/10/CIRCA-Sea-Level-Rise-Fact-Sheet.pdf

4.8 Hurricane and Tropical Cyclone

4.8.1 Description

Hurricanes and tropical storms are classified as cyclones and defined as any closed circulation of winds developing around a low-pressure center in which the winds rotate counterclockwise (in the Northern Hemisphere) and with a diameter averaging 10 to 30 miles across. When maximum sustained winds reach or exceed 39 miles per hour, the system is designated a tropical storm, given a name, and is closely monitored by the National Hurricane Center (NHC). When sustained winds reach or exceed 74 miles per hour the storm is deemed a hurricane. The primary damaging forces associated with these storms are high-level sustained winds, heavy precipitation, and tornadoes. Coastal areas are also vulnerable to the additional forces of storm surge, wind-driven waves, and tidal flooding which can be more destructive than cyclone wind. The majority of hurricanes and tropical storms form in the Atlantic Ocean, Caribbean Sea, and Gulf of Mexico during the official Atlantic hurricane season, which extends from June through November.

4.8.2 Location

The entire planning area is susceptible to the occurrence of hurricanes and tropical storms. Coastal areas are more susceptible to the forces of storm surge and tidal flooding (covered under *Flood*).

4.8.3 Extent

The National Weather Service's Saffir-Simpson Hurricane Wind Scale, shown in Table 26, is used to categorize the strength and magnitude of hurricane events according to sustained wind speed, and provides estimates of potential property damage.

Table 26. Saffir-Simpson hurricane wind scale.

Category	Sustained Winds	Types of Damage Due to Hurricane Winds
1	74–95 mph	**Very dangerous winds will produce some damage:** Well-constructed frame homes could have damage to roof, shingles, vinyl siding and gutters. Large branches of trees will snap, and shallowly rooted trees may be toppled. Extensive damage to power lines and poles likely will result in power outages that could last a few to several days.
2	96–110 mph	**Extremely dangerous winds will cause extensive damage:** Well-constructed frame homes could sustain major roof and siding damage. Many shallowly rooted trees will be snapped or uprooted and block numerous roads. Near-total power loss is expected with outages that could last from several days to weeks.

Category	Sustained Winds	Types of Damage Due to Hurricane Winds
3 (major)	111–129 mph	**Devastating damage will occur:** Well-built framed homes may incur major damage or removal of roof decking and gable ends. Many trees will be snapped or uprooted, blocking numerous roads. Electricity and water will be unavailable for several days to weeks after the storm passes.
4 (major)	130–156 mph	**Catastrophic damage will occur:** Well-built framed homes can sustain severe damage with the loss of most of the roof structure and/or some exterior walls. Most trees will be snapped or uprooted, and power poles downed. Fallen trees and power poles will isolate residential areas. Power outages will last weeks to possibly months. Most of the area will be uninhabitable for weeks or months.
Source: National Oceanic and Atmospheric Administration		

4.8.4 Primary and Secondary Impacts

The primary impacts of a hurricane or tropical storm event include damage to property and infrastructure from high winds, heavy rain and flooding, storm surge, and tornadic activity if it occurs. Damage can be extremely catastrophic depending on the size and strength of the storm system. And as with many natural hazards, this is also the risk of injury or loss of life during a storm.
Secondary impacts include coastal erosion from wind and storm surge, an increased risk of fire or landslides, and public health concerns such as those related to flooding. Economic losses related to tropical storms and hurricanes can also be exponential depending on the impacts. Economic losses might include property damages, loss of wages, and loss of tourism revenue.

4.8.5 Severity

The severity of a hurricane or tropical storm event depends on several factors including landfall location, intensity, and the associative hazard severity like rainfall and storm surge. There are four primary natural hazards that can determine the severity of an event: storm surge, wind, rain, and wave action. Storm surge, rain, and wave action can all result in some type of flooding whether it be coastal, riverine, urban. Wind speeds from these events can reach over 100, with gusts measuring well above that. These high winds can cause severe damage to utilities, homes, and the environment, and can sometimes spawn tornadoes.

4.8.6 Warning Time

The NOAA National Hurricane Center (NHC) monitors oceanic activity for the formation of tropical cyclones of subtropical storms. When a storm forms, the NHC releases notifications depending upon the severity of the anticipated event. There are four general categories of emergency notifications issued by

the NHC: outlooks, advisories, watches, and warnings. Each category, and its associated warning, have certain thresholds which trigger the notification, these are described below.

Outlooks

- **Tropical Weather Outlook:** This is a discussion point when there is potential for tropical development within the following 5 days.

Advisories

- **Tropical Cyclone Public Advisory:** This advisory contains all current watches and warnings, and includes hazards associated with each event.
- **Tropical Cyclone Track Forecast Cone:** A graphic showing areas under watches and warnings, position of the storm, and predicted track. This graphic includes a "cone" shape which conveys the uncertainty in the storm's track.

Watches

- Storm Surge Watch: Issued when there is a chance for life-threatening surge within 48 hours.
- **Hurricane Watch:** Issued when hurricane conditions are possible (sustained winds of 74 mph or more) with at least a 48-hour notice of such winds occurring.
- **Tropical Storm Watch:** Issued when tropical storm conditions (sustained winds between 39 to 73 mph) are possible within 48 hours.

Warnings

- **Storm Surge Warning:** Issued when there is a threat of life-threatening surge within 36 hours.
- **Hurricane Warning:** Issued when hurricane conditions (sustained winds of 74 mph or greater) are expected within at least 36 hours of the winds occurring.
- **Tropical Storm Warning:** Issued when tropical storm conditions (sustained winds of 39 to 73 mph) are expected to occur within at least 36 hours.

The NHC strives to issue warnings at least 36 hours in advance of conditions occurring to allow for preparation. In addition, watches and warnings may be issued when a system has not quite developed into tropical storm or hurricane, but the NWS believes it will develop into such a system.

4.8.7 Previous Occurrences and Losses

According to NOAA historical records, 42 hurricane/tropical storm tracks have come within 75 miles of New Haven since 1851. This includes 32 tropical storms, eight Category 1 hurricanes, four Category 2 hurricanes, and three Category 3 hurricanes (note that storms that change in intensity are counted multiple times, once for each intensity level). Error! Reference source not found. shows the historical t racks of these storms, some of which are further described below. The map does not include the tracks of additional extra-tropical systems or tropical depressions that also came within 75 miles of the planning area.

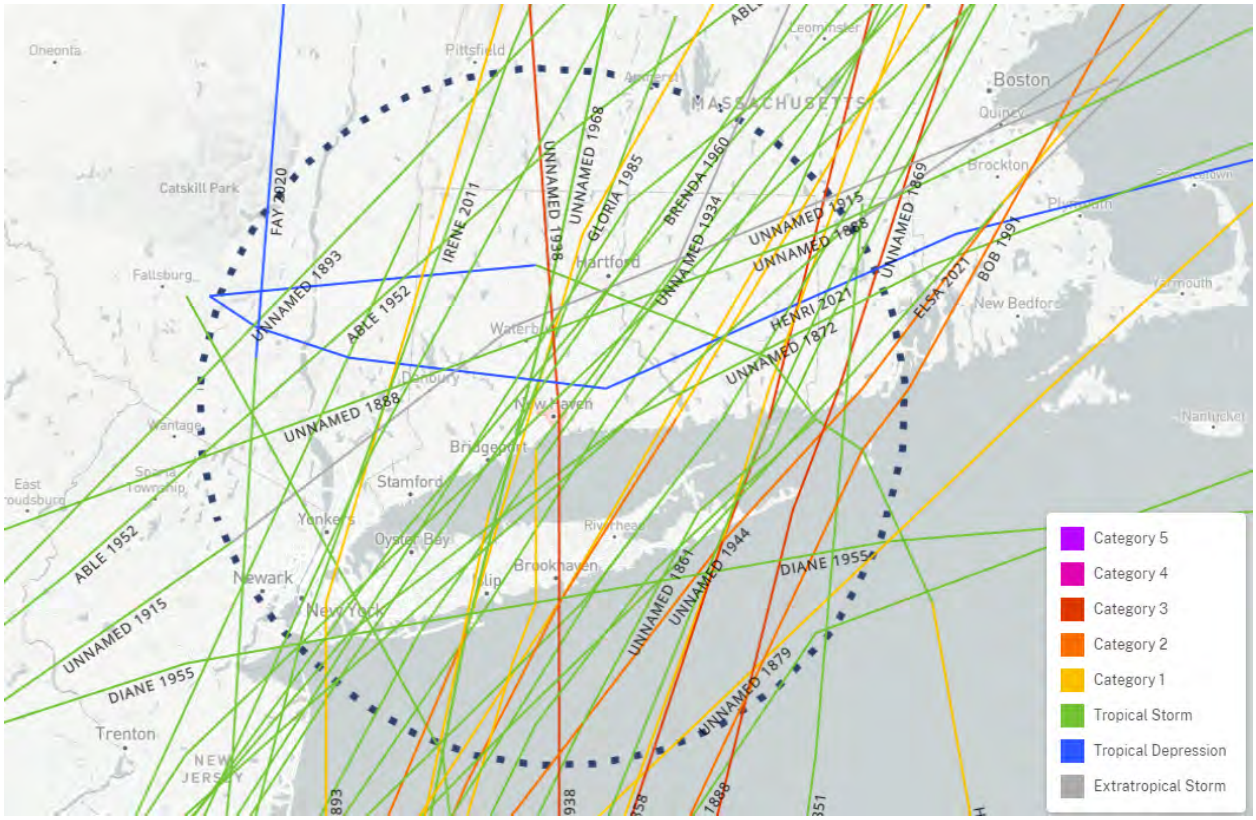


Figure 18. Historical tropical storm and hurricane tracks from 1851 to 2021 (NOAA).

The most intense hurricane to strike Connecticut occurred on September 21, 1938. Known widely as the "New England Hurricane of 1938" or "Long Island Express," the storm made landfall as a Category 3 hurricane near Milford and moved rapidly through New England. The storm generated wind gusts as high as 130 miles per hour, a storm surge up to 18 feet along coastal areas, and up to 17 inches of rainfall in central Connecticut causing severe inland flooding. Overall, the storm is estimated to have resulted in 564 fatalities and 1,700 injuries, and $624 million in property damages in Connecticut (2012 dollars).

Other notable historic hurricane and tropical storm events for Connecticut include:

- September 8, 1869 – A major unnamed storm made landfall in southwestern Rhode Island as a Category 3 hurricane. This was a compact storm, estimated at only 60 miles wide, and it quickly weakened over land.
- September 15, 1944 – The "Great Atlantic Hurricane" made landfall as a Category 1 hurricane near New London, bringing strong winds and heavy rainfall across the state. Most of the wind damage occurred in Southeastern portions of the state, though wind gusts over more than 100 miles per hour were recorded in Hartford.
- August 31, 1954 (Hurricane Carol) – Hurricane Carol made landfall as a Category 3 hurricane near Clinton shortly after high tide, producing storm surges of 10 to 15 feet from New London

eastward that caused widespread coastal flooding. The combination of strong winds and storm surge damaged or destroyed thousands of buildings across the Northeast. Downed trees caused many damages and power outages across the eastern portion of Connecticut, but the western part of the state suffered little effects due to the compact nature of the storm.

- August 11-18, 1955 (Tropical Storms Connie and Diane) – The combined effects of these two back-to-back storms caused devastating flooding across Connecticut (covered under *Flood*).
- September 12, 1960 (Hurricane Donna) –Hurricane Donna made landfall as a Category 2 hurricane near Old Lyme, generating a storm surge of up to 10 feet along the coast and moderate rainfall across inland areas.
- August 10, 1976 (Hurricane Belle) – After passing over Long Island as a Category 1 hurricane, Belle made landfall as a Tropical Storm near Stratford. The high winds downed trees and caused widespread power outages, spread moderate to heavy rainfall across the area, and generated a small storm surge that caused minor shoreline damage.
- September 27, 1985 (Hurricane Gloria) – Hurricane Gloria made landfall as a Category 2 hurricane in the Westport area, felling thousands of trees and causing minor structural damage across Connecticut. The storm struck at low tide, resulting in low to moderate storm surges along the coast, and did not cause substantial inland flooding due to relatively light rainfall. The amount and spread of vegetative debris and widespread power outages were the greatest impacts caused by the storm.
- August 19, 1991 (Hurricane Bob) – Hurricane Bob made landfall as a strong Category 2 hurricane near Newport, Rhode Island, with winds causing light to moderate damage throughout Connecticut. Coastal and inland flooding was minimal. The storm was blamed for 6 fatalities in the state, and an overall total of approximately $1.1 billion in property damages (2012 dollars) for Southern New England.
- September 15, 1999 (Tropical Storm Floyd) – The remnants of Tropical Storm Floyd dumped heavy rainfall across Connecticut resulting in widespread flooding, while winds caused many downed trees and power outages throughout New England.
- August 28, 2011 (Tropical Storm Irene) – Tropical Storm Irene passed to the west of the planning area, bringing damaging winds, storm surge and coastal flooding (covered under *Flood)* to the planning area. The most significant local impacts to the region caused by tropical storm force winds were downed trees, which resulted in moderate property damages, road closures, communications disruptions (especially cellular networks), and widespread long-term power outages, with some areas going longer than a week before power was restored.
- October 29-30, 2012 (Hurricane Sandy) – Hurricane Sandy, with a wind diameter stretching more than 1,000 miles, became the largest Atlantic hurricane on record and is estimated to be the second costliest in history, only surpassed by Hurricane Katrina in 2005. The storm made landfall as a “post-tropical cyclone” in Atlantic City, New Jersey with sustained winds of 90 miles per hour and a devastating storm surge for communities in the tri-state area. Its effects were

directly felt in the South Central Region, with damaging winds and storm surge that caused extensive flooding and erosion along the immediate shoreline (covered under *Flood*).

- June 7, 2013 (Tropical Storm Andrea) – Tropical Storm Andrea moved 40 miles southeast of the region and brought heavy rain to some areas with projections showing two to four inches for some areas. The Connecticut Department of Transportation reported flooding impacting traffic on Interstate 95 in Milford, and West Pond Extension, among other roadways, were underwater with several cars reportedly stuck in the floodwaters.

Notable recent occurrences in the planning area include:

- August 2, 2020 (Tropical Storm Isaias) – Tropical Storm Isaias passed about 100 miles to the west of the region after making landfall in North Carolina as a category 1 hurricane and traveling north. Isaias brought severe winds with gusts up to 60 mph, tornado warnings, and left hundreds of thousands without power for several days. The South Central Region experienced many reports of downed trees and associated damage, Metro-North services were temporarily suspended, and there were several reports of injuries from trees.
- July 9, 2021 (Tropical Storm Elsa) – Elsa made landfall as a tropical storm in Florida and traveled along the eastern seaboard. It passed through Southeastern New England bringing high winds and rainfall. The storm passed just southeast of Connecticut on July 9, delivering wind and flooding rains while transitioning to an extratropical storm later that day. Gusts were reported over 40 mph, and residents throughout the region and state were left without power. Severe flood damage occurred in Meriden.
- August 19, 2021 (Extratropical Storm Fred) – Storm Fred passed north of Connecticut and parallel to the state line on August 19 and 20, delivering flooding rains to parts of southern New England.
- August 22, 2021 (Tropical Depression Henri) – Storm Henri looped through Connecticut on August 22-24, delivering flooding rains to parts of southern New England. The path and slow movement of the storm contributed to widespread flooding, made worse due to the conditions caused by storm Fred only a few days before. While the impacts for Henri were projected to be more severe than they were, the storm did result in heavy rainfall and thousands of power outages.
- September 1, 2021 (Extratropical Storm Ida) – Though Hurricane Ida made landfall in Louisiana as a category 1, the storm moved south of Long Island as an extratropical storm. Ida caused major flooding across Connecticut and the South Central Region. A statewide flash flood warning was issued, and flood emergencies were declared in several communities including Meriden, Wallingford, and the Greater New Haven area due to sewage discharge. In addition, there was one casualty on record in Connecticut associated with this storm due to flooding.[94] Ida was a FEMA declared disaster on October 30, 2021; communities in New Haven County were eligible for Individual Assistance.

[94] https://www.nhc.noaa.gov/data/tcr/AL092021_Ida.pdf

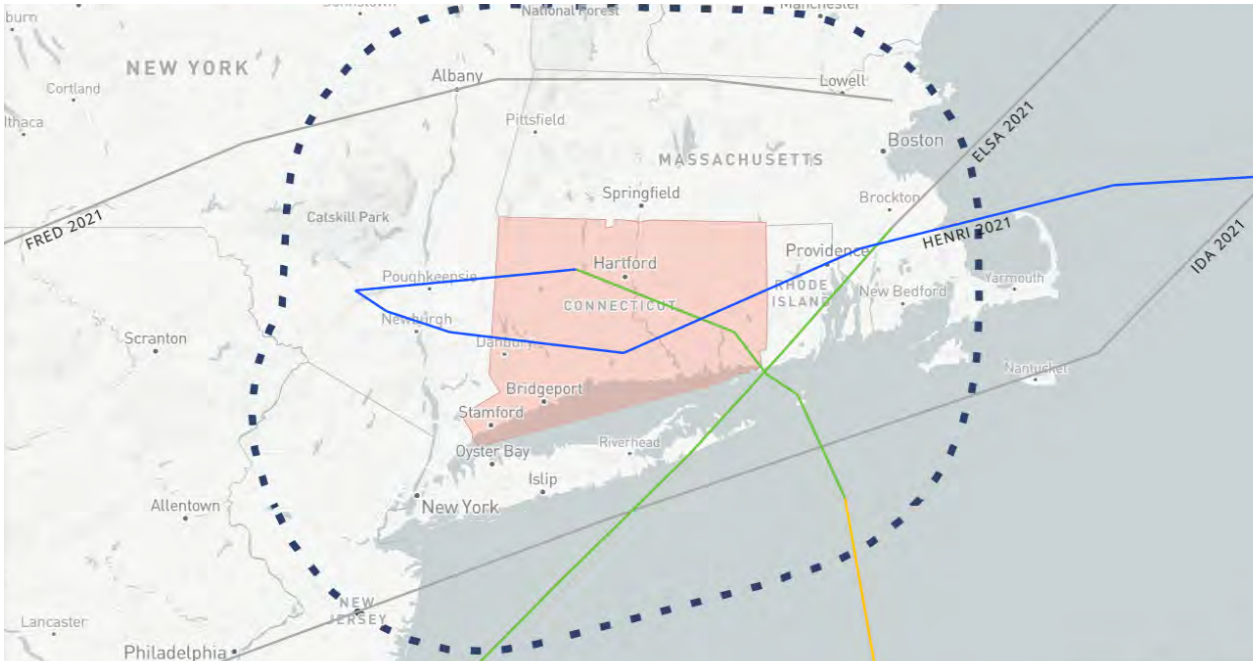


Figure 19. Tropical storm and hurricane tracks in 2021 (NOAA).

FEMA Public Assistance

There have been two FEMA hurricane/tropical storm FEMA disaster declarations in the past five years, and three since 2012. The recent events, Tropical Storm Isais (DR-4580) and Hurricane Ida (DR-4629) resulted in millions of dollars in damages. Communities in the South Central region received $3,915,143 in public assistance under six different categories (**Error! Reference source not found.**). A majority of t he funds were distributed for debris removal purposes. The remaining 11% of the assistance was received for protective measures, public building needs, recreational or other purposes, road and bridge repairs, and state management purposes. Figures for Hurricane Ida for the South Central region have not been compiled by FEMA as of September 2022 and are therefore unavailable for the region. Of the 15 communities in SCRCOG, 14 received these funds; these figures can be found in Table 27.

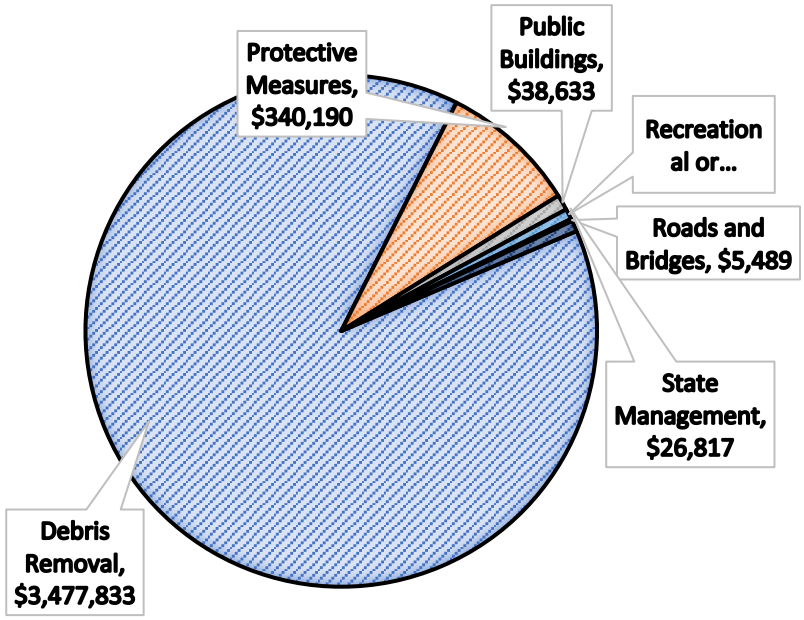


Table 27. Public assistance received by community for Tropical Storm Isaias.

Community	Amount of PA Received	Community	Amount of PA Received
Bethany	$135,743	**Milford**	$633,378
Branford	$251,628	**New Haven**	$122,933
East Haven	$387,031	**North Branford**	$4,783
Guilford	$227,838	**North Haven**	$773,252
Hamden	$285,879	**Orange**	$283,975
Madison	$101,805	**Wallingford**	$421,147
Meriden	$78,486	**Woodbridge**	$207,264

FEMA Individual Assistance

In addition to public assistance, in the wake of disasters FEMA offers Individual Assistance (IA) to homeowners and renters. This assistance program includes the program Individuals and Household Program (IHP) which breaks down into Housing Assistance (HA) and Other Needs Assistance (ONA). The IHP subsidizes those that are uninsured or underinsured. The HA component provides assistance to help meet basic needs such as temporary housing, repair or replacement of homes, and hazard mitigation assistance. The ONA component of IHP provides funds for other essentials such as necessary medical equipment, disaster related funeral expenses, and some personal property such as furniture or appliances. Communities throughout the South Central region have had residents receive IA funds for several disasters. The most recent being Hurricane Sandy and Hurricane Ida. Regional distributions can be found in Table 28.

Table 28. FEMA Individual Assistance received for the region for Hurricane Sandy and Ida.

	Owner			**Renter**	
	No. Approved for FEMA Assistance	Total Damages	IHP Received	No. Approved for FEMA Assistance	IHP Received
Hurricane Sandy	541	$9,361,847	$3,283,706	268	$1,054,779
Hurricane Ida	72	$435,334	$471,110	11	$20,265
	613	**$9,797,181**	**$3,754,816**	**279**	**$1,075,044**

4.8.8 Climate Change Impacts

With global and regional ocean surface temperatures increasing, it is expected that hurricane intensity and frequency will also increase. Observations have already determined that extreme storm event frequency and intensity has increased as a result of human-induced climate change.[95] In addition to storm intensity and frequency, storm surge inundation is also likely to increase as sea levels rise.

4.8.9 Probability of Future Events

Hurricanes and tropical storms will continue to be a likely occurrence in the planning area. Based on historical event data, the annual probability of a hurricane or tropical storm track coming within 75 miles of the planning area is about 20 percent, though the chance of a major hurricane (Category 3-5) at landfall is much less. The effects of climate change on future hurricane and tropical storm events cannot be determined at the present time due to insufficient evidence, however, The Connecticut Hazard Mitigation Plan (2019) states that it is likely the frequency and intensity of tropical storms and hurricanes may increase in the presence of warming waters. Predicting how climate change will impact these events beyond rising surface and water temperatures *is* still a challenge.

The State Hazard Mitigation Plan (2019) also presents modeled potential return periods for various hurricane events making landfall in or near the State of Connecticut. These results can be seen in Table 29.

Table 29. Modeled return periods for various hurricane events.

Hurricane Event	Return Period
Category 1	10 to 15 years
Category 2	23 to 30 years
Category 3	46 to 74 years
Source: Connecticut State Hazard Mitigation Plan (2019)	

4.9 Sea Level Rise

4.9.1 Description

Sea level rise refers to an increase in mean sea level over time. There is strong scientific evidence that global sea level is now rising at an increased rate and will continue to rise during this century.

[95] https://www.ipcc.ch/report/ar6/wg2/downloads/report/IPCC_AR6_WGII_SummaryForPolicymakers.pdf

The major causes of **global sea level rise** are thermal expansion caused by the warming of the oceans (since water expands as it warms) and the loss of land-based ice (such as glaciers and polar ice caps) due to increased melting.

Local sea level change, which is of more direct concern to coastal communities, is caused by a combination of global sea level rise, changes in local and global ocean currents, and local changes in land elevation. Weakening Atlantic currents and local land subsidence accelerate the rate of sea level rise occurring in Long Island Sound. Coastal communities experiencing increases in mean sea level are at greater risk to the effects of coastal flood hazards as natural, protective buffers such as coastal wetlands and dunes are lost, and property and infrastructure become more exposed to the frequency and severity of coastal flood and storm surge inundation.

4.9.2 Location

Maps were prepared to show potential sea level rise inundation areas for the South Central Region based on the "planning threshold" of a 0.5-meter (1.64 feet) rise in sea level expected by 2050. This figured was developed by CIRCA and is required to be used for planning in Connecticut per Public Act 18-82 as explained below. CIRCA has also defined a "Caution Threshold" of 1.0 meters (3.28 feet) in sea level rise expected by the 2090s, or as soon as 2060. Connecticut sea level rise projections are described in detail later in this section.

4.9.3 Extent

The sea level rise hazard is a slow onset hazard, and its severity or magnitude is measurable only over long periods of time as further described below. "Nuisance flooding" refers to the inundation of low-lying areas under "blue sky," non-storm conditions; this phenomenon has already and will continue to become a problem with regards to access and asset-degradation as water more regularly renders roads impassable and affects structures and infrastructure systems.

To aide in planning, and to supplement and support the National Climate Assessment, NOAA has been developing a technical report related to sea level rise, with the most recent being published in 2022 since the last 2017 edition. This report provides some of the most recent science and modeling by way of sea level rise and includes short- and long-term scenarios that can be incorporated into regional and local planning efforts. This report, in addition to accompanying data developed to illustrate these projections, are some of the best tools to determine the extent of observed, current, and projected sea levels.

4.9.4 Primary and Secondary Impacts

Though sea level rise is a "slow" hazard in relation to others, impacts could be severe. Primary impacts include nuisance or sunny day flooding, an increase in the geographic area potentially inundated during a coastal flood or storm surge event, saltwater intrusion, and increased erosion along the coastline.

As a result, secondary impacts include impeded transit during flooding, deterioration of infrastructure, damage to structures, and loss of habitats from erosion. Sea level rise also pushes fresh groundwater inland which can potentially result in saltwater encroaching into private wells along the shoreline making these unusable water sources.

4.9.5 Severity

The severity of sea level depends upon the impact being assessed. Coastal flooding events can be classified using the three categories used by the NWS: minor, moderate, and major. Erosion, which can occur rapidly during a storm, or over a longer period of time, can be measured by the rate of retreat or volumetric loss; this is discussed in greater detail in the coastal erosion chapter. I addition, severity can be measured by the economic and infrastructural damage and loss associated with the impacts.

4.9.6 Warning Time

Given that sea level rise projections are developed decades beforehand, the warning time is much greater than most other hazards. Communities have significant time to plan for the impacts of sea level rise.

4.9.7 Previous Occurrences and Losses

According to the NOAA, while studies show that sea levels changed little from AD 0 until 1900, sea levels began to climb in the 20th century. Records and research show that global sea level has been steadily rising at a rate of 1 to 2.5 millimeters (0.04 to 0.1 inches) per year since 1900, and this rate may be increasing. Since 1992, new methods of satellite altimetry indicate a rate of rise of 3 millimeters (0.12 inches) per year.

Two long-term tide gauges are operated by the National Oceanic and Atmospheric Administration (NOAA) along the Connecticut coastline as demonstrated in Error! Reference source not found.. Data c ollected by these gauges is available online at tidesandcurrents.noaa.gov.

The Bridgeport gauge, located at Steel Point, has been operating since 1964. The historic mean sea level trend at that gauge has been a rise of 3.14 millimeters per year (1.03 feet in 100 years) with a 95% confidence interval of plus-or-minus 0.38 millimeters per year, based on monthly mean sea level data from 1964 to 2022.

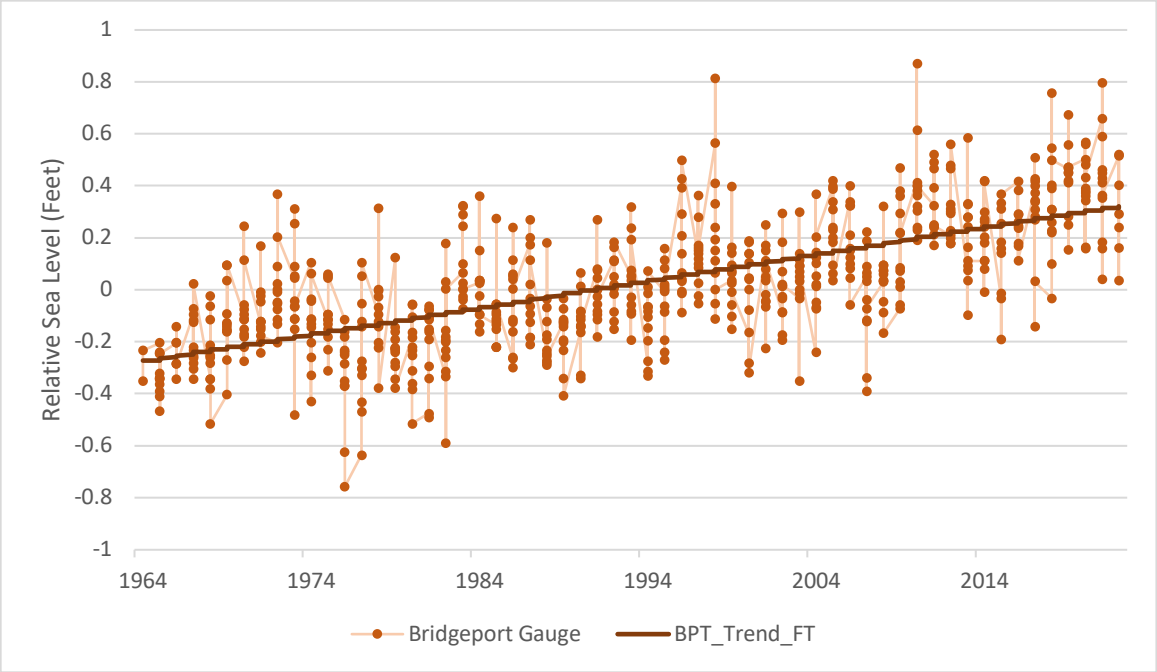


Figure 20. Monthly mean sea level (Ft) Bridgeport.

The New London gauge, Figure 21, located in the mouth of the Thames River, has been operating since 1938. The historic mean sea level trend at that gauge has been a rise of 2.76 millimeters per year (0.91 feet in 100 years) with a 95% confidence interval of plus-or-minus 0.21 mm/year, based on monthly mean sea level data from 1938 to 2022.

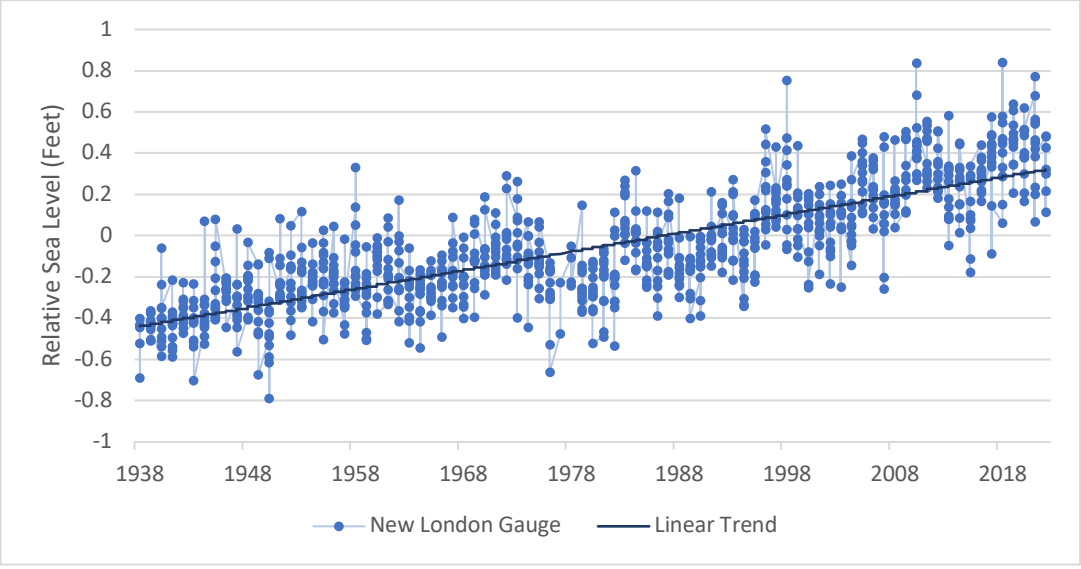


Figure 21. Monthly mean sea level (Ft) New London.

Losses associated with sea level rise cannot be attributed only to the relative rise. Instead, the incremental losses associated with more frequent and damaging coastal floods and coastal erosion are

an appropriate measure of sea level rise losses. These losses are described in the flood and erosion sections of this plan.

4.9.8 Climate Change Impacts

The primary drivers of climate change related to sea level rise have been thermal expansion attributed to warming ocean temperatures, and the addition of water from glacier and ice sheet melting. As temperatures continue to rise, and ice mass is lost, sea levels will likely continue to rise, and relative hazard severity will also increase. Of great concern is the influence sea level rise will have on the severity of episodic hazard events such as storm surge and coastal flooding, as well as long term coastal erosion. It can be expected that sea level rise will be an amplifier of the magnitude for these other coastal hazards.

4.9.9 Probability of Future Events

Sea level rise is expected to continue occurring along the Connecticut shoreline well into the future, with projections ranging from nearly 2 to nearly 7 feet by the end of the century. It is anticipated that the effects of climate change will increase the rate and severity of sea level rise, and perhaps more importantly, continued sea level rise will result in an increase in the extent and frequency of storm surge and coastal flooding.

Global Sea Level Rise Projections

In its landmark 2001 report, the IPCC projected that global sea level may rise 9 to 88 centimeters (0.30 - 2.89 feet) during the 21st century. According to the February 2007 update report by the IPCC, these predictions have been refined using six global climate models to project a narrower range of sea level rise of 28 to 43 centimeters (0.92 to 1.41 feet) in the 21st century.

The 2022 IPCC Sixth Assessment Report predicts global mean sea level (GMSL), by 2050, will rise between 0.15 and 0.23 meters (0.49 to 0.75 feet) under more optimistic emissions scenarios, or 0.20 to 0.30 meters (0.65 to 0.98 feet) under high emissions scenarios. This report also provides long term projections, with GMSL rise of up to 3.3 feet under high emission scenarios.

Sea Level along the Connecticut shoreline has risen 0.91 to 1.03 feet since NOAA began operating gauges here in the 1930s.

NOAA Technical Report titled Global and regional Sea Level Rise Scenarios for the United States: Update Mean Projections and Extreme Water Level Probabilities Along U.S. Coastlines (February 2022) has built upon the efforts from the 2017 report. The 2022 report an increased confidence in a narrower range of global, national, and regional projections than the 2017 edition. Current projections show that along the U.S. coastline, on average, sea levels are expected to rise 0.25 to 0.30 meters between 2020 and 2050, with up to 5 centimeters more for the east coast. By 2100 a rise of about 0.6 to 2.2 is expected along the U.S coastline, and up to 3.9 meters by 2150. In addition, minor or disruptive

high tide flooding is expected to increase from 3 to more than 10 events per year by 2050. On a global scale, mean sea level is expected to rise between 0.15 to 0.43 meters by 2050, 0.3 to 2.0 meters by 2100, and up to 3.7 by 2150.

Local Relative Sea Level Rise Projections

Sea level rise is not consistent around the world, and as noted above is affected by local variations in currents, temperature, and changes in land surface elevation. It has long been expected that the rate of sea level rise in Connecticut will be slightly higher than the global projections due to the effects of regional subsidence. However, more recent studies have asserted that changes in ocean circulation will increase the relative sea level rise along the Atlantic coast even more than previously thought.

The 2017 NOAA report finds that local sea level along the Northeast Atlantic Coast is projected to be greater than the global average for almost all future scenarios. In Connecticut specifically, local sea level rise is projected to be 0 to greater than 1 meter (3.3 feet) higher than the rise in global mean sea level. To provide more local guidance for Connecticut, The Connecticut Institute for Resilience and Climate Adaptation (CIRCA) at the University of Connecticut has developed local sea level rise scenarios. These localized scenarios were derived from the 2012 NOAA report but modified to include the effects of local oceanographic conditions, more recent data and models, and local land motion. Based on the localized scenarios, CIRCA recommends that Connecticut communities plan for 0.5 meters (1.64 feet) of sea level rise above 2001 levels by 2050, and continued sea level rise beyond that date. These projections have been developed per Connecticut Public Act 18-82; the Act also requires CIRCA to update these projections no less than once every ten years to ensure communities have up to do regional projections.

Figure 22 below graphically displays the four localized sea level rise scenarios developed by CIRCA.

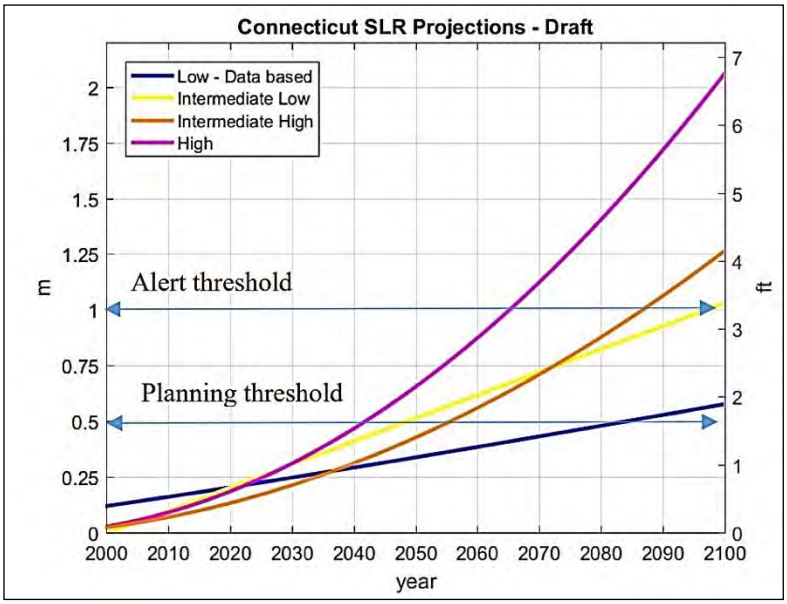


Figure 22. Four localized sea level rise scenarios in Connecticut.

4.10 Severe Thunderstorm

4.10.1 Description

Severe thunderstorms are created when air masses of varying temperatures meet, and can occur singularly, in lines, or in clusters, but generally affect a small area when they occur. They can move through an area very quickly or linger for several hours. The primary damaging forces associated with these storms are straight-line winds, hail, and lightning – but they can also cause flash flooding or spawn tornadoes.

- *Straight-line winds* (including downbursts and microbursts), which in extreme cases have the potential to cause wind gusts that exceed 100 miles per hour, are capable of toppling trees, downing down power lines, and causing moderate to major property damage.
- *Hail* has the potential to cause minor to moderate property damage, particularly the larger hail stones associated with severe thunderstorms. The size of hailstones is a direct result of the size and severity of the storm.
- *Lightning* remains one of the top three storm-related killers in the United States and is a significant life/safety threat to people, but also has the potential to damage property and ignite both structure and wildland fires.

Thunderstorms can occur during any season but are more likely to occur during the spring and early summer months of March through June. They can occur at any time of day but are more likely to form in the late afternoon and early evening.

4.10.2 Location

The entire planning area is uniformly susceptible to the occurrence of severe thunderstorms.

4.10.3 Extent

A thunderstorm is classified as "severe" when it contains one or more of the following damaging effects: winds gusting in excess of 50 knots (57.5 mph), hail measuring at least three-quarters of an inch in diameter, or a tornado.

4.10.4 Primary and Secondary Impacts

The primary impacts from a severe thunderstorm event include damage to infrastructure and utilities from strong winds, and at times, hail. Also flooding or flash flooding can occur because of heavy rain which often accompanies a severe thunderstorm.
Secondary impacts might include power outages from utility damage or down wires, the health and safety impacts as discussed in the flood chapter, and property damage losses associated with

hailstorms. All of primary impacts can also disrupt transit networks, critical facility and infrastructure operations, and pose a risk of injury or loss of life, particularly because of lightning.

4.10.5 Severity

The severity of a thunderstorm can be gauged by measuring winds, hail size, flooding, and overall severity of damage caused by the storm. A severe thunderstorm, as defined by the NWS, and a storm that produces hail at least one inch in size, with wind gusts of 58 mph or more. Hail severity is measured by size, duration, and the geographic extent of the storm. Flooding severity, as discussed in the flood chapter, can be categorized as mild, moderate, or major. Lastly wind severity is determined by both sustained and gust speeds. The NWS has six wind threat levels based on the risk posed life and property:

- **Non-threatening:** No severe gusts from thunderstorms
- **Very Low:** A 2% to 5% probability of severe wind, potential for minor damaging gusts between 57 to 73 mph and/or low likelihood (6% chance) of strong winds (39 to 56 mph)
- **Low:** A 2% to 5% probability of severe wind, potential for moderately damaging gusts between 74 to 91 mph and/or low likelihood (6% to 15% chance) of strong winds (57 to 73 mph).
- **Moderate:** A 2% to 5% probability of severe wind, potential for majorly damaging gusts over 92 mph and/or low likelihood (6% to 15% chance) of strong winds (74 to 91 mph) causing moderate damage and/or a moderate likelihood (16% to 25% chance) of damaging winds (57 to 73 mph) causing minor damage.
- **High:** A 6% to 15% probability of severe wind, potential for violent gusts over 92 mph and/or moderate likelihood (16% to 25% chance) of very damaging gusts (74 to 91 mph) causing moderate damage and/or a high likelihood (26% to 35% chance) of damaging winds (57 to 73 mph) causing minor damage.
- **Extreme:** A 16% chance or greater of severe wind with potential for violent gusts over 92 mph causing major damage, and/or high likelihood (26% or more chance) of very damaging gusts (74 to 91 mph) causing moderate damage and/or a very high likelihood (36% or greater chance) of damaging winds (57 to 73 mph) causing minor damage.

In general, strong wind gusts are between 39 and 57 mph, damaging gusts are between 58 and 74 mph, very damaging gusts are between 75 and 91 mph, and violent wind gusts are greater than 92 mph.

4.10.6 Warning Time

Tracking severe thunderstorms and weather is typically included in daily weather forecasts and monitoring, therefore potential severe storm events can sometimes be detected several days in advance. For the South Central Region, the warning for a severe thunderstorm given days in advance is due to the development of a weather system in a different region that has the potential to move into the region. As severe weather systems move closer an NWS watch or warning is issued. A severe thunderstorm warning is issued when a severe system has been detected by radar or spotters, and

typically encompasses a smaller area that may be impacted. A severe thunderstorm watch is typically issued for a larger area when a thunderstorm is near or possible in the watch area. While there is no definitive timeframe for when warnings are issued, events can be detected days in advance, with official warnings being issued just hours before a storm.

4.10.7 Previous Occurrences and Losses

Severe thunderstorms are a frequent occurrence in the planning area. NOAA historical records include 469 severe thunderstorm events, including hail and severe winds, in New Haven County since 1955, causing 2 fatalities, 20 injuries and approximately $4.74 million in reported property damages (2022 dollars). The majority of damages were caused by severe thunderstorm winds, though $156,000 in damage was attributed to lightning, along with 1 death and 15 injuries. It is believed that many additional historic events and/or losses have occurred but gone unreported or unrecorded.

Notable recent occurrences in the planning area include:

- February 26, 2016 – Multiple trees and power lines were reported down throughout the city of New Haven. $10,000 in property damage were reported.
- July 7, 2016 – Two people in West Haven received minor injuries when the tree they were taking shelter under was struck by lightning.
- February 13, 2017 – Strong winds caused more than $100,000 in property damage across the region. A wind gust up to 52mph was measured at New Haven Airport. In Branford, wires were reported down at Woodside Drive and Ark Road. In Hamden, power lines were knocked down and closed Evergreen Avenue at Cumpstone Drive.
- March 2, 2017 – Strong winds caused more than $100,000 in property damage across the region. In Meriden, Route 15 was closed due to 2 cars hitting a downed tree, but no casualties were reported for this event.
- May 15, 2018, – A severe thunderstorm in the region, which also resulted in multiple tornadoes, came through the region leaving roads impassable from debris and causing severe property damage in several communities. A confirmed microburst also damaged Wharton Brook State Park and caused extensive damage in multiple communities. NOAA reports damages of $106,000, however this event likely resulted in greater numbers as it was a FEMA declared disaster. This event is also included discussed in the tornado chapter.
- August 19, 2019 – Strong winds impacted the East River area in Madison, which resulted in downed trees and power lines and about $10,000 in damages.
- August 27, 2020 – Severe storms in the South Central caused a reported $70,000 in damages in North Haven, Branford, North Madison, North Branford, and New Haven. There were reports of large hardwood trees being uprooted and twisted, power lines across roads, and a reported wind gust of 69 mph.

- November 13, 2021 – A severe thunderstorm resulted in a reported $40,000 of damage along the coast in East Haven and Branford. Wind gusts were measures at 58 mph, and downed trees, poles, and powerlines were reported by law enforcement and the residents.

NCEI

NCEI data has been used to determine past losses associated with severe thunderstorms. The NCEI losses include reports of hail, lightning, and thunderstorm wind. Since 2017, severe thunderstorm events have resulted in $285,500 worth of damage as reported by NCEI.

4.10.8 Climate Change Impacts

The Fourth National Climate Assessment (2018) noted that while certain changes in hazards associated with severe thunderstorms, such as heavy rainfall, can be linked to climate change, projecting thunderstorm frequency and severity changes from climate change is more challenging. Some models anticipate the climate becoming more favorable for thunderstorm formation and allowing for an increase in intensity, however overall confidence levels in these models are low. This low confidence can be attributed to the difficulty in modeling small-scale and short-lived events. [96]

4.10.9 Probability of Future Events

Severe thunderstorms will continue to be a highly likely occurrence in the planning area. Because these events are relatively unpredictable, it is challenging to determine the probability of future occurrences. The State Hazard Mitigation Plan (2019) assesses the occurrence of past events and determined that on average the western part of the state, including the South Central Region, typically experiences 16 storms in a given year. Therefore, it is reasonable to conclude that the Region will continue to experience a similar number of events on an annual basis.

4.11 Severe Winter Storm/Nor'easter

4.11.1 Description

Severe winter storms can range from a moderate snowfall over a period of a few hours to blizzard conditions (sustained winds or frequent gusts of 35 miles per hour or more) with blinding wind-driven snow that lasts for several days. Heavy accumulations of snow or ice can bring down trees and power lines, disabling electric power and communications for days or weeks, and can paralyze a region by shutting down all air and rail transportation and disrupting medical and emergency services. Severe winter storms are indirectly and deceptively a significant threat to human life and safety, primarily due

[96] https://nca2018.globalchange.gov/

to automobile accidents, overexertion, and exposure. The cost of snow removal, repairing damages, and loss of business can have large economic impacts on local communities.

Severe winter storms may include snow, ice, sleet, freezing rain, or a mix of these wintry forms of precipitation. Heavy accumulations of snow create hazards to transportation, as well structures with flat rooftops not engineered to withstand heavy snow loads. Sleet – raindrops that freeze into ice pellets before reaching the ground – usually bounce when hitting a surface and do not stick to objects; however, sleet can accumulate like snow and cause a hazard to motorists. Freezing rain is rain that falls onto a surface with a temperature below freezing, forming a glaze of ice. Even small accumulations of ice or freezing rain can cause a significant hazard, especially to trees and power lines. An ice storm occurs when heavy accumulations of freezing rain falls and freezes immediately upon impact. Communications and power can be disrupted for days, and even small accumulations of ice may cause extreme hazards to motorists and pedestrians.

Nor’easters are low pressure, severe storm systems that affect the Mid-Atlantic and New England States primarily during winter months. They can form over land or water and are notorious for producing heavy snow, rain, and tremendous waves that crash onto Atlantic beaches, often causing beach erosion and structural damage. Wind gusts associated with these storms can exceed hurricane force in intensity, and when combined with snow result in blizzard conditions that form deep drifts capable of paralyzing a region. Similar to hurricanes, nor’easters are capable of causing substantial damage to coastal areas due to their associated strong winds and heavy surf. A nor'easter gets its name from the continuously strong northeasterly winds blowing in from the ocean ahead of the storm.

4.11.2 Location

The entire planning area is susceptible to the occurrence of severe winter storms and nor’easters. Coastal areas are more susceptible to the forces of strong winds, heavy surf and tidal flooding (covered under *Flood*).

4.11.3 Extent

There are several different scales and indexes that can be used to classify winter/snowstorms, though there is no single scale that is more widely used than another. The Northeast Snowfall Impact Scale (NESIS, 2004), developed by Paul Kocin and Louis Uccellini of the NWS, is a five-category scale used to characterize and rank snowstorms specifically in the Northeast. The NESIS waws developed The five categories include: Notable, Significant, Major, Crippling, and Extreme. In addition to meteorological measurements, this scale also includes population information to aid in determining the storm's impacts. Using a Geographic Information System (GIS), the raw scores used to categorize an event are calculated using the geographic coverage of the event, and the population within the area. An example of this process can be seen in Figure 23. The raw scores can then be converted to one of the five categories.

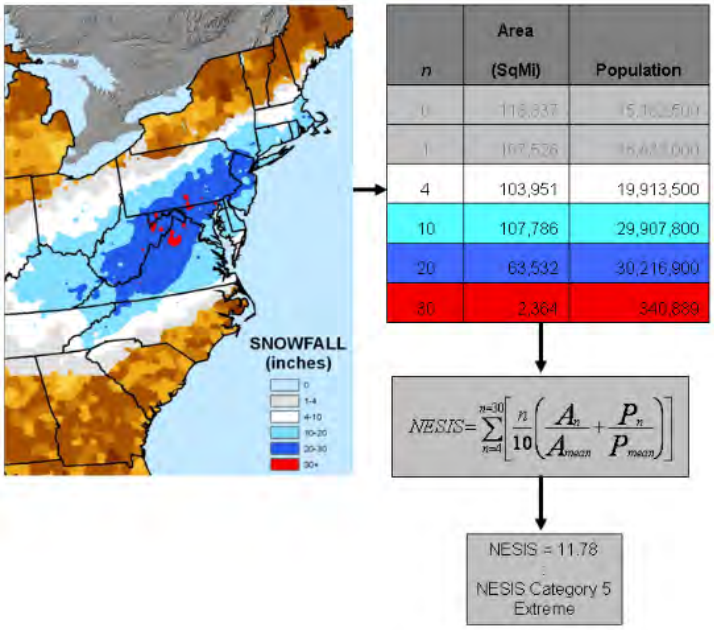


Figure 23. An example of the NESIS raw score processing.

The Regional Snowfall Index (RSI) is a progression of the NESIS in that an index is created for the six NCEI climate regions in the eastern two-thirds of the U.S. The RSI is calculated the same way as the NESIS but using region-specific parameters and thresholds.

Table 30 identifies the RSI categories, their description and relative RSI score which is derived from the raw score calculations.

Table 30. The RSI description, classification, and respective score values.

Category	RSI Value	Description
1	1 – 3	Notable
2	3 – 6	Significant
3	6 – 10	Major
4	10 – 18	Crippling
5	18+	Extreme

The classification scale presented in

Table 31 categorizes severe winter storms/nor'easters on the eastern and central United States by intensity index category. It consists of a five-level hierarchy, with a category 1 winter storm/nor'easter

being the least severe in terms of its intensity and a category 5-winter storm/nor'easter being the most severe.

Table 31. Snow intensity classification scale.

Intensity Index Category	Maximum Snowfall Amounts	Maximum Snowfall Rate	Potential Wind Speeds	Maximum Drifting Potential	Closings/ Delays on Communities, Schools, And Travel	Impact On Coastal and Maritime Interests	Nature Of Disruption
1	< 10 in.	Very low < 1 in./hr	Weak	Minor < 20 in.	Maybe minor (hours)	Minor	Minimal nuisance
2	10–20+ in.	Moderate 1+ in./hr	Strong	Moderate 3 ft.	Maybe moderate (hours to a day common)	Minor to moderate	Nuisance–inconvenience
3	20–30+ in.	High 2+ in./hr	Gale Force	High 4–6+ ft.	Possibly extensive/ lengthy (several days possible)	Moderate to severe	Inconvenience–crippling
4	30–40+ in.	Very High 2-3+ in./hr	Gale-force hurricane	Very High 6–10+ ft.	Probably extensive/ lengthy (up to a week may be common)	Severe	Crippling–paralyzing
5	40–50+ in.	Overwhelming > 3+ in./hr	Gale-force hurricane	Exceptional 10–15+ ft.	Extensive/ lengthy (up to a week common)	Extreme	Paralyzing

Source: Gregory A. Zielinski, Institute for Quaternary and Climate Studies, University of Maine

4.11.4 Primary and Secondary Impacts

A severe winter weather event can produce heavy snow, ice, sleet, and freezing rain, all of which can accumulate on roadways and structures impacting access, egress, transit, and structural integrity. Secondary impacts could include degraded water quality from sand, salt, and other roadway treatments before and during and event, or schools and businesses may need to close for periods of time potentially causing economic disruptions, particularly during longer periods of recovery. During more sever events, where utilities are impacted and temperatures drop, there is concern for public health as warming becomes a concern.

4.11.5 Severity

Winter storms and nor'easter events increase in severity as accumulation and conditions increase. For example, as snowfall levels increase, wind speeds pick up, and as temperatures drop, the primary and cascading effects.

4.11.6 Warning Time

Winter weather systems can typically be forecast several days in advance ultimately providing sufficient warning for communities and residents to prepare. Local advisories, watches, and warnings are issued by the local NWS office given that criteria can vary between regions. For example, conditions that trigger a warning in the southeast, may be much less than what triggers the same warning in the northeast. The NWS has a total of 10 winter advisories, watches, and warnings that are issued.

Advisories

- **Winter Weather Advisories:** Issued when winter weather conditions are expected, but not necessarily hazardous enough for a warning.
- **Wind Chill Advisories:** Issued when low wind chill temperatures are expected, but do not meet local warning criteria.
- **Lake Effect Snow Advisory:** Issued widespread, or locally, when lake effect snowfall is expected, but not above the warning threshold.

Watches

- **Winter Storm Watch:** Issued when conditions are favorable for a winter storm event.
- **Wind Chill Watches:** Issued when there is potential for extremely cold air and strong winds, resulting in low wind chill values.

Warnings

- **Blizzard Warnings:** Issued when there are frequent gusts over 35 mph accompanied by falling snow, visibility is less than ¼ mile for at least 3 hours. This warning means conditions are expected or are currently occurring.

- **Winter Storm Warnings:** Issued when a significant weather event is expected such as snow, ice, sleet, blowing snow, or a combination of these hazards.
- **Ice Storm Warning:** Issued when there is ice accumulation of ¼ inch or more, leading to difficulty traveling or snapped utilities and tree limbs.
- **Wind Chill Warnings:** Issued when very cold air and strong winds are occurring, and this level of wind chill will lead to frostbite or hypothermia.
- **Lake Effect Snow Warning:** Issued when widespread or localized lake induced snow fall or squalls are expected to result in significant accumulation; this type of snow typically impacts a limited area.

4.11.7 Previous Occurrences and Losses

NOAA historical records include 191 winter storm events in the region between 1955 and 2021 (including events classified as winter storm, blizzard, or ice storm), causing 2 fatalities and 5 injuries, and approximately $3.6 million in reported property damages (2022 dollars). It is believed that additional losses have occurred but gone unreported or unrecorded in NOAA records.

Notable recent occurrences in the SCRCOG planning area include:

- April 15, 2007 (Nor'easter) – A strong late season Nor'easter brought high winds that downed many trees and power lines across the region, and heavy rains that caused widespread and significant flooding across the region. FEMA reported that flood damage in Connecticut exceeded an estimated $7.1 million (2012 dollars) and more than 200 people were forced to evacuate their residences. In New Haven County, 32 residential properties and two commercial structures were reported to have sustained major damage.
- January 6, 2009 (Ice Storm) – A significant amount of ice accumulated across interior portions of southern Connecticut. Numerous power lines and large tree limbs were reported down across the region.
- January/February 2011 – A heavy snowpack after multiple snowstorms since the end of December caused multiple roof collapse events across Southern Connecticut. A barn roof collapsed in Bethany at the end of a cul-de-sac on Hunter Trail, trapping between 12 and 15 horses. Rescue operations took 3½ hours. Also in Bethany, about 13 people escaped injury when half of the roof collapsed at Fairfield County Millwork, Inc. at 20 Sargent Drive.
- October 29-30, 2011 (Winter Storm Alfred) – A historic and unprecedented early-season winter storm impacted the area with more than one foot of heavy wet snow falling on interior portions of Southern Connecticut, while coastal areas received mainly rainfall during the event. In addition to the heavy rain and snow, strong winds were experienced along the immediate coastline. Hundreds of thousands of people across southern Connecticut lost power during this event as heavy snow accumulated on trees that still had partial to full foliage during mid-autumn. This caused extensive felling of trees and limbs across the region, which not only

downed power lines but also resulted in many road closures, creating many dangerous situations of isolated residential areas with no ingress for emergency vehicles. Communications networks were also significantly disrupted (especially cellular networks). This was the first time a winter storm of this magnitude has ever occurred in October.

- February 7-8, 2013 "Winter Storm Nemo" – By February 7, 2013, this powerful winter storm had prompted winter storm warnings and winter weather advisories for the entire northeastern United States, from the Upper Midwest to New England, including the state of Connecticut. A blizzard warning was also in effect for all of Connecticut and surrounding areas and a state of emergency was declared in Connecticut on February 8. The highest amount of snowfall in the United States recorded from this storm event was 40 inches in Hamden. More than 800 National Guard soldiers and airmen were activated in Connecticut, Massachusetts, and New York to support actions needed on state roads.
- January 27, 2015 "Winter Storm Juno" – A strong nor'easter brought heavy snow and strong winds to the Northeast. Blizzard conditions with 41 mph wind gusts were observed at the Groton - New London Airport. In the SCRCOG region, snowfall amounts ranged from 6.0 inches in Bethany to 17.0 inches in Guilford. A presidential disaster was later declared (DR-4213, declared April 8, 2015) for New Haven, New London, Tolland, and Windham counties. Over $9.6 million in Public Assistance Grants were obligated Statewide.
- February 9, 2017 – Blizzard conditions occurred across southern Connecticut with heavy snow and strong winds. The blizzard also created delays and cancellations to the region's transportation systems as well as numerous accidents on roadways. New Haven Airport reported blizzard conditions, with visibility less than one quarter mile in heavy snow and frequent wind gusts over 35mph.
- March 14, 2017 – Blizzard conditions were experienced through New Haven County. Trees were brought down onto power lines and approximately 3,700 power outages resulted from the strong winds and heavy snow.
- April 2, 2018 – A late winter snow event brought moderate to heavy snow with reports of one inch falling per hour in some areas. Trained spotters reported 4 to 7 inches in some areas, with some of the highest amounts found in Wallingford. This storm also disrupted Metro-North operations during the morning commute.
- March 3, 2019 – A statewide snowfall event caused heavy inland accumulation, with a snow/rain mix along the shoreline. Some areas reported 7 to 12 inches of accumulation.
- December 16/17, 2020 – Wintry mix conditions fell across southern portions of the State with reports of 12 inches of accumulation in Guilford and Wallingford, and between 6 and 10 inches in other areas in the South Central region. The Meriden Airport measured wind gusts of 39 mph on the morning of December 17.

Other historic severe winter storm events for Connecticut as recorded by NOAA or as noted in the State Hazard Mitigation Plan include:

- March 11-14, 1888 (Blizzard) – The most significant blizzard to impact Connecticut also referred to as the "Great White Hurricane." Snowfall in Connecticut from this event was estimated at 45-50+ inches. Significantly high snowdrifts were created (some areas of the northeast reported up to 50 foot snow drifts) and the storm literally shut down major cities throughout the Northeast states. It is recorded that over 400 hundred people along the east coast died as a result of the blizzard. Total damages were estimated at over 492 million dollars (2012 dollars).
- December 18, 1973 (Ice Storm Felix) – Connecticut's most severe ice storm resulted in two fatalities and caused widespread power outages, lasting several days.
- February 5, 1978 (Blizzard of 1978) – Record snowfall amounts were recorded in several areas of Connecticut. The State of Connecticut was essentially shut down for three days when the Governor ordered all roads closed except for emergency travel.
- December 10-13, 1992 (Nor'easter of 1992) – Three people were killed, and 26 homes were destroyed in Connecticut as a result of the storm. Tides in Long Island Sound were stacked up by the continued strong east/northeast winds reaching 55 miles per hour. This "stacking" of water resulted in the third highest tide (10.16 Feet NGVD as measured at Bridgeport, CT) ever recorded in Long Island Sound and caused more than $7.1 million in damages (2012 dollars) to over 6,000 homes. Inland areas received up to four feet of snow in northeastern Connecticut. The heavy wet snow snapped tree limbs and power lines, cutting power to 50,000 homes.
- March 12-14, 1993 (Storm of the Century) – Snowfall totals of 10-20 inches recorded across Connecticut.
- January 8-9, 1996 (Winter Storm Ginger / Blizzard of 1996) – Snowfall totals up to 27 inches recorded in Connecticut. The storm forced the State to shut down for twenty-four hours, with all roads shut except for emergency travel.
- December 5-7, 2003 – Heavy snowfall amounts were recorded in parts of Connecticut including as much as twenty inches in Windham County, nineteen inches in Hartford County, and eighteen inches in Fairfield, New London, and Tolland Counties. This event received a Presidential Emergency Declaration.
- January 22-23, 2005 (Blizzard) – Connecticut received a Presidential Emergency Declaration for this storm event. NOAA analyzed this storm and ranked it a Category 4 – Crippling event on its Northeast Snowfall Impact Scale.
- February 11-12, 2006 (Nor'easter) – Connecticut received record snowfall in parts of the state from this storm (second largest snowfall recorded since 1906) and received a Presidential Emergency Declaration. The Governor ordered state highways shut down to help facilitate efficient snow removal by State Department of Transportation snow removal crews.

- January 3-4, 2018 (Bomb Cyclone) – A low pressure system rapidly intensified and resulted in heavy snowfall and blizzard conditions. A daily snowfall record was set for January 4 in Bridgeport with an accumulation of 9 inches.

FEMA Public Assistance

There have been two winter storm FEMA disaster declarations since 2012, neither of which has occurred in the past five years. These events, Winter Storm Nemo (DR-4106) and the January 2015 Severe Storm (DR-4213) resulted in millions of dollars in damage. Communities in the South Central region received $8,150,742 in public assistance under six different categories (Figure 24). A majority of the funds were distributed for protective measures purposes. The remaining 6% of the assistance was received for debris removal, public buildings, public utilities, roads and bridges, and recreational or other uses. All 15 SCRCOG communities received funds for at least one of these events; these figures can be found in Table 32.

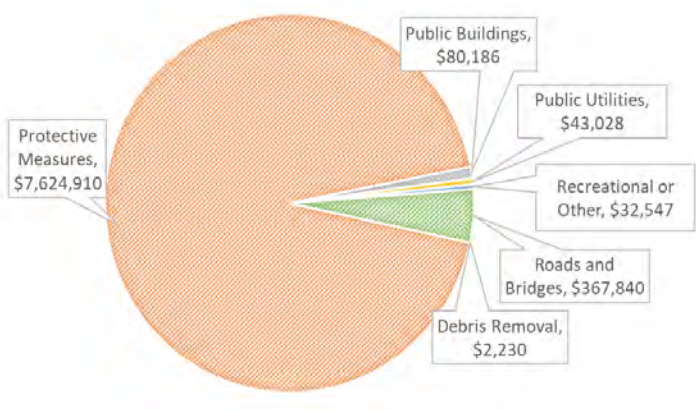


Figure 24. FEMA Funds Received for Winter Storms by Category.

Table 32. FEMA Funds Received for Winter Storm Events Since 2012.

Community	Amount of PA received
Bethany	$121,354
Branford	$293,876
East Haven	$65,844
Guilford	$343,085
Hamden	$1,133,404
Madison	$116,908
Meriden	$1,131,481
Milford	$462,845
New Haven	$2,191,610

Community	Amount of PA received
North Branford	$308,308
North Haven	$319,749
Orange	$251,908
Wallingford	$412,245
West Haven	$714,679
Woodbridge	$283,447
Grand Total	**$8,150,742**

4.11.8 Climate Change Impacts

As discussed in the Fourth National Climate Assessment, annual precipitation during winter months is expected to increase for the northeast region, however, this does not necessarily mean more snow accumulation. Projections anticipate that winter precipitation will fall more often as rain resulting in a decrease in snow cover extent. An increase in winter rain precipitation could also mean an increase in sleet and ice events.

4.11.9 Probability of Future Events

Severe winter storms will continue to be a highly likely occurrence in the planning area. It is anticipated that the effects of climate change will result in winters that are much shorter with fewer cold days and more precipitation, but less precipitation falling as snow and more as rain. This will result in reduced snowpack, earlier breakup of winter ice on lakes and rivers, and earlier spring snowmelt resulting in earlier peak river flows.

The Connecticut Hazard Mitigation Plan Update (2019) contains a thorough discussion of the impacts of climate change on winter storms. Due to climate change effects which will increase by mid to late century, the number of major snowstorms and snow-covered days may decrease, however as temperatures rise and winter events increasingly become more rain than snow, the frequency of ice storms may also increase. In general, recent climate change studies have projected a shorter winter season for Connecticut (by as much as two weeks), and less snow-covered days with a decreased overall snowpack. In addition, climate models have indicated that fewer but more intense precipitation events will occur during the winter period with more precipitation falling as rain rather than snow.

This change in winter precipitation could result in less frequent but more intense snowstorms with heavier (denser) snow. NOAA's Snowfall/Meltwater Table shows that as temperatures increase the

amount and weight of snowfall decreases. In addition, the increasing change in the type of winter precipitation may also decrease the number of major snowstorms experienced, but increase the number of ice storms occurring. This is an important issue that requires further study as a change in snow density or changeover to more freezing rain/ice could have a large impact on managing future winter storms and the impact of such storms on the residents of Connecticut (including travel and utility services).

Overall, the probability of severe winter storms will continue to be high.

4.12 Tornado

4.12.1 Description

A tornado is a violent windstorm characterized by a twisting, funnel-shaped cloud extending to the ground. Tornadoes are most often generated by strong thunderstorm activity (but may also be spawned from hurricanes and other coastal storms) when cool, dry air intersects and overrides a layer of warm, moist air forcing the warm air to rise rapidly. The damage caused by a tornado is a result of the high wind velocity and wind-blown debris, also accompanied by lightning or large hail. Most tornadoes are a few dozen yards wide and touch down only briefly, but even small short-lived tornadoes can inflict tremendous damage. Highly destructive tornadoes may carve out a path over a mile wide and several miles long.

Tornadoes often develop so rapidly that little, if any, advance warning is possible, making them a significant life/safety threat to people. They are more likely to occur during the spring and early summer months of March through June and can occur at any time of day but are more likely to form in the late afternoon and early evening. Tornadoes associated with tropical cyclones are most frequent in September and October when the incidence of tropical storm systems is greatest.

4.12.2 Location

The entire planning area is uniformly susceptible to the occurrence of tornadoes.

4.12.3 Extent

The Enhanced Fujita Scale (EF-scale), shown in Table 33, is used to categorize the strength and magnitude of tornado events based on estimated wind speeds and related damage. This represents an update to the original Fujita Scale (F-scale) and has been implemented since February 2007.

Table 33. Enhanced Fujita Scale.

Rating	Wind Speed (3 Second Gust)	Potential Damage
EF-0	65–85 mph	Light – Causes some damage to siding and shingles.
EF-1	86–110 mph	Moderate – Considerable roof damage. Winds can uproot trees and overturn singlewide mobile homes. Flagpoles bend.
EF-2	111–135 mph	Considerable – Most singlewide mobile homes destroyed. Permanent homes can shift off foundations.
EF-3	136–165 mph	Severe – Hardwood trees debarked. All but small portions of houses destroyed.
EF-4	166–200 mph	Devastating – Complete destruction of well - built residences, large sections of school buildings.
EF-5	Over 200 mph	Incredible – Significant structural deformation of mid- and high-rise buildings.

Source: National Oceanic and Atmospheric Administration

4.12.4 Primary and Secondary Impacts

Tornadoes can produce catastrophic winds that can lead to injury and loss of life. Aside from winds, tornado events can often be accompanied by heavy rains, thunderstorms, straight line winds, and hail; each of these hazards has their own impacts. Tornadoes winds can cause extensive damage to buildings, infrastructure, utilities, and the environment. The destruction caused by the event can lead to high economic by way of business disruptions, recovery efforts and needs, and reconstruction costs. Tree and utility damage can lead to widespread power outages, therefore impacting those the rely on a consistent power supply.

4.12.5 Severity

The severity of a tornado can be gauged by the associated wind speeds and the damage produced. The larger the vent, or higher the rating, the more severe and destructive the event. Wind and rain severity can also be gauged by using the NWS classifications discussed in the thunderstorms and flood chapters.

4.12.6 Warning Time

A tornado can occur with little to no indicator, making it difficult to issue a warning with ample time. Tornadoes often accompany a severe thunderstorm event, which can sometimes be detected several days before occurring. While warnings can be issued for the issue farther in advance, it is relatively unpredictable whether a tornado will occur or not.

The NWS does, however, issue tornado watches and warnings. A tornado watch is issued when there is the possibility of a tornado, and a tornado warning is issued when a tornado has been sighted or detected by radar. According to the State Hazard Mitigation Plan (2019) the average lead time for tornado warnings is 13 minutes.

4.12.7 Previous Occurrences and Losses

NOAA historical records include 21 tornado events in New Haven County since 1955, causing 1 fatality, 137 injuries and approximately $690 million in reported property damages (2022 dollars). Several of these tornado events occurred within the planning area.

Notable previous occurrences include:

- May 24, 1962 – An F3 tornado caused 1 fatality, 45 injuries, and approximately $19 million in property damages (2012 dollars) across a damage path estimated to be 11.6 miles long from near Middlebury, through Waterbury and to Southington.
- July 10, 1989 – As part of a widespread outbreak, a violent F4 tornado touched down in Hamden. The damage path was five miles long and damaged or destroyed nearly 400 structures in its path, mostly in the Highwood section of town. Industrial cranes and cars were tossed through the air, and rows of houses, as well as an industrial park, were flattened. The event caused an estimated $350 million in property damage (2012 dollars) and approximately 40 injuries, but no fatalities.
- July 31, 2009 – An EF-1 tornado cut a narrow, discontinuous swath of damage nearly 3 miles long in Madison from near Copse Trail east-southeast to Hull Road between Acorn and Saxon Roads. Downed trees on Wellsweep Drive were strewn in multiple directions in a pattern indicative of a tornado. Snapped and uprooted hardwood trees were also indicative of maximum wind speeds around 100 mph. No fatalities or injuries were associated with this event, but it did cause an estimated $10,000 in property damage.
- August 10, 2016 – A weak EF-0 tornado moved east across Southern New Haven County, briefly touching down just south of North Haven. Wind damage occurred on a line from about 1/4 mile west of I-91 to Quinnipiac Avenue near the Montowese section of North Haven, then east to Barberry Road. Damage was mainly limited to trees that fell onto power lines and cars with only

minor structural damage. Property damage was estimated at $15,000 and no injuries or fatalities were reported.

- May 15, 2018 – Severe storms produced five tornadoes, with two of those impacting New Haven County. The first, an EF-1 with maximum winds of 100 mph, traveled from Southbury into Oxford. The second, an EF-1 with maximum winds of 110, touched down in Beacon Falls and traveled through the South Central Region into Bethany and Hamden. This tornado destroyed barns, and severely damaged Sleeping Giant State Park. NOAA reports $200,000 in damages from these two tornadoes.
- August 27, 2020 – An EF-1 tornado touched down in Bethany and traveled 11.1 miles into North Haven, with a maximum path width of 500 yards and winds of 110 mph. Road damage was extensive along the path of the tornado, and hardwood tree damage was evident in North Haven. Damages from this event are estimated at $500,000.
- November 13, 2021 – Two EF-0 tornadoes were confirmed on this day with one in Cheshire and the other in Branford. Damage in Branford included uprooted hardwood trees, snapped pine trees, and toppled light tower generators. Similar damage was seen in Cheshire. Both tornadoes caused an estimated $250,000 in damage.

FEMA Public Assistance

Since 2017, FEMA has declared one tornado event a disaster; this was the May 2018 storms (DR-4385). A total of $6,213,312 was received in public assistance toward $8,187,833 worth of projects in the wake of the event. The funds were split between six communities with a majority being distributed to Hamden, and the remainder to Wallingford, Bethany, North Haven, Woodbridge, and Madison. Most of the funds were allocated for debris removal or public utilities needs and repairs. The remaining funds were for protective measures, road and bridge repairs, and management and administration costs. The specific breakdown for funds received in each FEMA PA category can be seen in Figure 25 This is the only event used to calculate annualized loss estimates using FEMA PA figures (Figure 25).

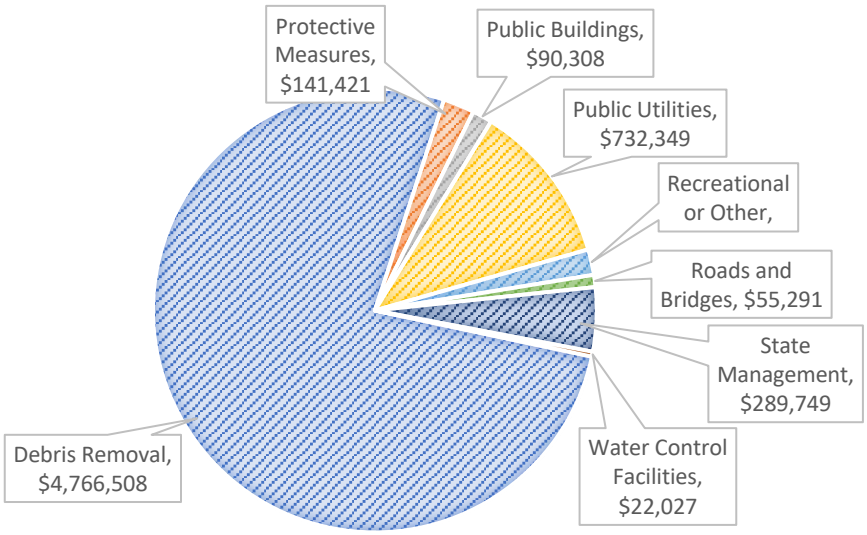


Figure 25. FEMA PA received for the 2018 tornadoes by category.

NCEI

NCEI records have two tornado events occurring in the region in the past five years: one in Bethany and one in Branford. Combined, these events caused an estimate $600,000 in losses, and no injuries or deaths. In the past decade NCEI has identified three tornadoes with a total loss estimation of $615,000. Annualized losses, found in Figure 25 are based on the past decade of events for tornadoes.

4.12.8 Climate Change Impacts

Just like severe thunderstorms, there is no clear link between climate change and a shift in frequency and intensity of tornadoes, though there have been observed changes that could potentially attributed to climate change. The Fourth National Climate Assessment has noted that there has been an overall decrease in the number of days per year the tornado occurrences, however, there has been an increase on the number of tornadoes occurring on these days. Because climate change is likely to create more favorable conditions for severe thunderstorms and extreme storm events, there is a likelihood that tornadic activity could also increase as they often accompany extreme storm events.

4.12.9 Probability of Future Events

Tornadoes will continue to be an occasional occurrence in the planning area. Based on historical data (), the annual probability for tornado events in the planning area is estimated to be 5 percent. It is unlikely that very strong tornadoes (EF-3, EF-4 or EF-5) will strike the area though as proven by historic events it does remain possible.

The Connecticut Hazard Mitigation Plan (2014) reports that “according to NOAA, it is uncertain whether climate change will directly influence the frequency and intensity of tornadoes. However, climate change may directly increase the frequency and intensity of thunderstorms in the future. This potential future increase in thunderstorm activity will be the primary factor affecting the frequency and intensity of future tornado events. This in turn may increase the risk and occurrence of tornadoes within Connecticut. Therefore, climate change may act as an underlying influence on future tornado activity.” Overall, the probability of tornadoes will continue to be moderate.

4.13 Wildland Fire

4.13.1 Description

A wildfire is an uncontrolled fire burning in an area of vegetative fuels such as grasslands, brush, or woodlands. Other names such as brush fire or forest fire may be used to describe the same phenomenon depending on the type of vegetation being burned. Heavier fuels with high continuity, steep slopes, high temperatures, low humidity, low rainfall, and high winds all work to increase the frequency and severity of wildfire for people and property located within wildfire hazard areas, and

particularly for those in rural areas with limited capabilities for rapid fire suppression. When not quickly detected and contained, wildfires have the potential to cause extensive damage to property and threaten human life.

For a wildfire to ignite and spread, it is understood that all four components of the fire tetrahedron are required. These four components are heat, oxygen, fuel, and the chemical chain reaction which technically keeps the fire burning, linking the three prior components together (**Error! Reference source not found.**).

The type and abundance of **fuel** will determine the overall susceptibility and risk of wildfire in an area. Without fuel, a fire cannot burn. To stop a wildfire, the fuel can be removed naturally when it is all consumed by the fire, or manually or chemically. Fuel separation is important to wildfire suppression and is typically the basis for prescribed burns and controlling wildfires.

Heat is also required for a wildfire to start and continue to burn. Heat can be removed from a fire by using substances to remove it from equation; this includes the use of water, powder, or certain gases. Scraping and removing embers from a wildfire or burning structure also removes the heat source.

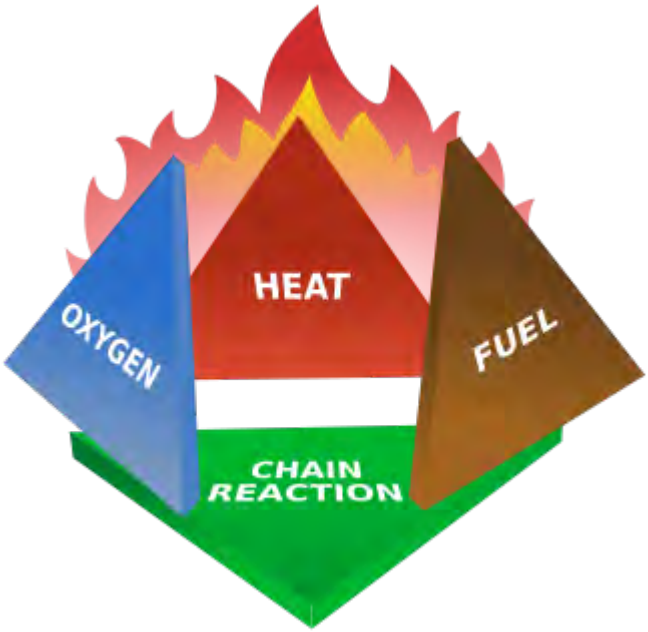


Figure 26. The fire tetrahedron.

A fire cannot burn without the presence of **oxygen**. Because this is the most abundant component of a burning wildfire, removing oxygen presence is not the major factor when suppressing wildfires.

Wildfires are part of the natural management of many forest ecosystems, but most are caused by human ignition factors. Over 80 percent of wildfires are started by negligent human behavior during dry conditions such as improperly discarding cigarettes, burning debris, or extinguishing campfires in wooded areas. The second most common cause of wildfires is lightning strikes that occur during dry thunderstorms.

4.13.2 Location

The wildland/urban interface (WUI) is defined as the area where structures and other human development meet or intermingle with undeveloped wildland or vegetative fuels. Locations of wildfires

hazard areas across the region were mapped by the SILVIS Laboratory at the University of Wisconsin[97] for the initial edition of this plan. These hazard areas included two types of wildland/urban interface areas: intermix and interface. Intermix areas are described as areas where housing and vegetation intermingle; interface areas are described as areas with housing in the vicinity of contiguous wildland vegetation.

Municipality-specific maps provided in the *Risk Analysis* section show locations of wildfire hazard areas for each participating municipality. For the individual municipalities, areas of risk were developed by considering distances from public water systems and large bodies of water and excluding highly urbanized areas. Impervious surfaces from CT Eco land use maps were also eliminated. Then contiguous areas of 50 acres or more were analyzed against 2010 CT ECO land cover data. Any area that was classified as a type of forested or grassed area was selected. A 50 ft. buffer was added to simulate the effect of wildfires on parcels and structures at the wildland/urban interface.

4.13.3 Extent

The magnitude of wildfire events is often characterized by their speed of propagation, total number of acres burned, and potential destructive impacts to people and property. The magnitude and severity of wildfires is greatly dependent on weather, fuel conditions, topography, and existing fire detection, control and suppression capabilities.

4.13.4 Primary and Secondary Impacts

A wildfire or brush fire, whether naturally occurring or man-made, can result in severe fire damage to the environment and to buildings and infrastructure within the burned area. An event may require closure of recreational areas, impact roadways or other transit routes, and can exhaust and stress water supplies and firefighting capacity. Wildfires can also displace residents, and cause injury or loss of life to firefighters or residents.

In addition, areas that have been severely burned are oftentimes more prone to other hazards such as flooding or landslides. Once vegetation is burned, the remaining landscape is left barren and charred, making rainfall absorption more difficult than a lush, vegetated area.

4.13.5 Severity

As noted in the 2019 State Hazard Mitigation Plan, the severity of a wildfire is typically gauged by how quickly it spreads, how many acres are burned, and the destruction caused to people and property. Due to the fact that most communities in the region have rapid response time to such fires, damage, and ultimately severity, is often minimal.

[97] Radeloff, V.C., R.B. Hammer, S.I Stewart, J.S. Fried, S.S. Holcomb, and J.F. McKeefry. (2005). The Wildland Urban Interface in the United States. Ecological Applications 15: 799-805.

4.13.6 Warning Time

The Connecticut DEEP Division of Forestry is responsible for monitoring the weather in relation to fire risk. Monitoring begins in early spring and fire danger ratings are broadcast daily to warn of the wildfire risks before an event occurs. There are five classes used when issuing the fire danger rating, each has specific ranges for spread and build up (. The spread index is a measurement of how the current weather will affect the rate of movement of a fire. This is an approximate measurement and actual spread rates are also influenced by fuel type, topography, and aspect. Build up is an index used to track fuel moisture which is based on precipitation.

Table 34. The five forest fire danger ratings used by the DEEP Division of Forestry.

Ratings or Class Days	Spread Index	Build Up Index
Low	0 to 10	0 to 22
Moderate	11 to 15	23 to 44
High	16 to 29	45 to 59
Very High	30 to 39	60 to 74
Extreme	>40	>75

After a wildfire is detected, the warning lead time depends on factors such as the wind, relative moisture, and precipitation. Higher wind, and lower moisture and precipitation may allow a fire to spread quickly, therefore reducing warning times.
The NWS also has three watches and warnings that can be issued if conditions are right.

- **Red Flag Warning:** Issued to alert land managers of ongoing or imminent fire weather patterns. This also warns individuals to be extremely careful with open flames.
- **Fire Weather Watch:** Issued to alert land managers and locals that forthcoming weather conditions could result in a wildfire but is not imminent or occurring.
- **Extreme Fire Behavior:** Issued to imply that a wildfire is likely to rage out of control and is unpredictable or erratic. At least one of the following criteria must be met for this warning:
- Moving fast/high rate of spread
- Prolific crowning and/or spotting
- Presence of fire whirls
- Strong convection column

4.13.7 Previous Occurrences and Losses

The Forestry Division of CT DEEP maintains statistical records of past wildfire occurrences that were reported from local Fire Marshals and Fire Departments throughout the state. According to these records there have been 330 wildfire incidents reported in the planning area since 1991, however the

average size (total acres burned) per occurrence is very small at only 3.36 acres. Table 35 summarizes these statistics for each municipality in the planning area. As can be seen in the table, most of the historically reported wildfire events have occurred in the Town of Hamden, and according to local officials, most of these were located in Sleeping Giant State Park in the northeastern portion of town (and not in proximity to human development).

According to the State Forest Fire Supervisor there are no recorded property damages or human casualties attributed to these events, and it is believed that many additional small fires have occurred in the planning area but gone unreported to the State.

Table 35. Statistics on reported wildfire occurrences in the planning area.

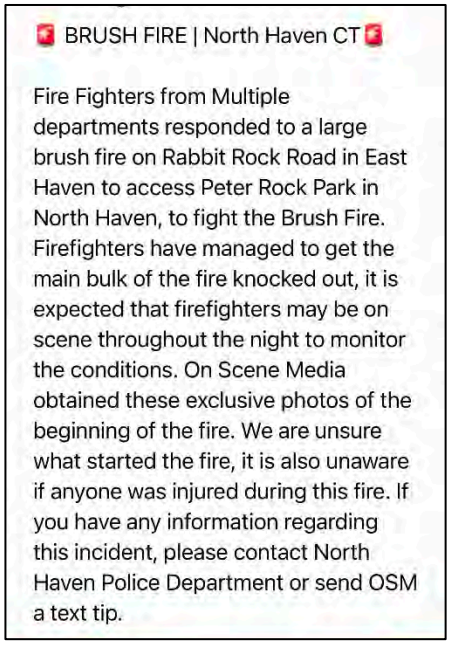
Municipality	2015		2016		2017		2018		Annual Average		
	Fires	Total Acres	Fires	Total Acres	Fires	Total Acres	Fires	Total Acres	Fires	Total Acres	Average Acreage
Bethany	0	0.0	0	0.0	5	25.6	0	0.00	1.25	6.39	5.11
Branford	0	0.0	0	0.0	0	0.0	0	0.00	0	0.00	0.00
East Haven	0	0.0	0	0.0	0	0.0	0	0.00	0	0.00	0.00
Guilford	0	0.0	0	0.0	0	0.0	0	0.00	0	0.00	0.00
Hamden	1	0.1	1	1.0	2	0.2	1	0.25	1.25	0.39	0.31
Madison	0	0.0	0	0.0	0	0.0	0	0.00	0	0.00	0.00
Milford	0	0.0	1	0.5	0	0.0	0	0.00	0.25	0.13	0.50
New Haven	1	0.5	1	0.1	0	0.0	0	0.00	0.5	0.15	0.30
North Branford	0	0.0	0	0.0	0	0.0	0	0.00	0	0.00	0.00
North Haven	0	0.0	1	3.0	1	0.1	0	0.00	0.5	0.78	1.55
Orange	0	0.0	0	0.0	0	0.0	0	0.00	0	0.00	0.00
Wallingford	0	0.0	2	0.4	0	0.0	0	0.00	0.5	0.09	0.18
West Haven	0	0.0	0	0.0	0	0.0	0	0.00	0	0.00	0.00
Woodbridge	0	0.0	0	0.0	0	0.0	0	0.00	0	0.00	0.00

Total	**2**	**0.6**	**6**	**5.0**	**8**	**25.9**	**1**	**0.25**	**4.25**	**7.92**	**1.86**

Source: State of Connecticut, Department of Energy and Environmental Protection

Details for specific fire events in recent years can be found below:

- January 24, 2021: On Sullivan Drive in Guilford, a two acre wildland fire occurred with no injuries or damage reported.
- January 24, 2021: A campfire on Orchard Avenue in Branford sparked a 1.5 acre wildland fire. No injuries or damage were reported.
- March 3, 2021: A campfire on Rose Hill Road sparked a four acre wildland fire that resulted in one firefighter injury.
- May 1, 2022: In Madison on state owned property a wildland fire of less than 0.5 acres occurred with no injuries or damages reported.
- November 7, 2022: The Peters Rock Park area of North Haven was affected by a significant bush fire this past fall. Social media from the event is pictured to the right.



4.13.8 Climate Change Impacts

A warming climate is likely to mean a longer wildfire season as winters become milder, and droughts increase in frequency and severity. Fuel loads may increase as vegetation dies out from invasive species or dies out from drought, and fuel moisture may decrease because of the droughts and increased temperatures.

Using wildfires as a climate change indicator, the EPA has identified several key points in regard to wildfire trends.[98] Since the 1980's the geographic area of areas burned by wildfires has increased, with the 10 years of the largest acreage burned all having occurred since 2004. It has also been observed that the U.S. wildfire season is occurring earlier with peak fire season occurring in July, rather than August which was observed as peak season two to four decades ago.

[98] https://www.epa.gov/climate-indicators/climate-change-indicators-wildfires#:~:text=Multiple%20studies%20have%20found%20that,wildfire%20frequency%2C%20and%20burned%20area.&text=The%20wildfire%20season%20has%20lengthened,and%20drier%20soils%20and%20vegetation.

4.13.9 Probability of Future Events

Wildfires will continue to be a highly likely occurrence in the planning area, though the magnitude and impact of these events will be minimal due to some aggressive forest/fuels management programs, as well as early detection and fire suppression. It is anticipated that the effects of climate change, including more frequent and prolonged drought conditions, will increase the frequency and intensity of wildfire events.

The Connecticut Natural Hazard Mitigation Plan (2019) notes that at least five events will continue to occur each year throughout the state, however the size and severity are likely to be minimal due to several reasons. While the state is much smaller in comparison to states that experience large and severe wildfires, there is potential that wildland fires may pose a greater risk in the future. Several factors play a role in this including increased development in wildland-urban interface and intermix areas, disease, pests, and storms increasing fuel loads in vegetate areas, and potentially drier and longer fire seasons as a result of climate change. While predicting a wildfire event is near impossible, is critical that the likelihood and risk of a fire be monitored and gauged by professionals on a regular basis.

The contributing factors for potential fire risk increase are all relative to SCRCOG as communities continue to expand developed areas, and as storms and disease or pests continue to work their way through vegetated areas. For example, the Emerald Ash Borer has caused considerable tree mortality in the western part of the South Central Region.

Overall, the probability of small wildfires and brush fires will continue to be high whereas the probability of damaging wildfires will be moderate to low.

Chapter 5. Risk Analysis

5.1 Methodology and Data Sources

5.1.1 Overview

The primary objective of the risk analysis is to quantify exposure and potential loss estimates for each hazard. In so doing, participating municipalities better understand their unique risks to identified hazards and potential problem areas, which aids in evaluating and prioritizing mitigation actions. This section builds upon the information provided in the previous *Hazard Identification* and *Hazard Analysis* sections by identifying and characterizing an inventory of at-risk assets for each municipality and then assessing the potential impact and amount of damage that can be expected from each identified hazard event. The fundamental tools for the risk assessment are the same as they were for the previous plan. Specifically:

- An exposure analysis was used to tally potential maximum exposed property values and assets located in areas of risk; and
- Loss estimates were developing using HAZUS, FEMA PA, NCEI, and other commonly utilized data sets.

This update is the first to include results from the *Resilient Connecticut* vulnerability assessment report. This report focused on extreme flood and heat vulnerability to critical assets and infrastructure throughout the region. High level results from this endeavor are summarized throughout this chapter.

5.1.2 Hazard Data

The following are certain hazard-specific data, methods, and assumptions that were used in the analysis.

Coastal Erosion

- When the initial HMP was developed, data did not exist to prepare accurate or meaningful exposure analysis or loss estimation for this hazard. In July 2014, the publication *Analysis of Shoreline Change in Connecticut* was published by DEEP, Sea Grant, and UConn/CLEAR. This publication and its GIS dataset were used for the first HMP update. The GIS data delineates former shoreline positions for Milford, West Haven, New Haven, East Haven, Branford, Guilford, and Madison. This dataset has not been updated by the State.
- Milford, West Haven, Branford, Guilford, and Madison prepared municipal coastal resilience plans in 2016-2017. Narrative descriptions of erosion were taken from these plans as appropriate.

Dam Failure

- Assets potentially vulnerable to dam failure were determined based on dam failure inundation mapping available for eight high hazard dams in the planning area.

Drought

- Annualized loss estimates for this hazard are based on historical damages reported to the National Centers for Environmental Information (NCEI, previously the National Climatic Data Center) or the National Oceanic and Atmospheric Administration, and the United States Department of Agriculture.
- Drought adversely impacts private wells, but until 2021, private well locations could only be guessed based on water system mapping. Spatial data of the assumed private well locations throughout the region was acquired from the CT Department of Public Health (DPH) Private Well Program. This data was developed in 2021 by CIRCA and its consultant as a statewide effort to identify locations of private wells. This private well parcel mapping is dated September 2021.

Earthquake

- The numbers and values of vulnerable assets for the earthquake hazard are total exposure values, assuming that all buildings and populations would be equally exposed to the effects of this hazard.
- Hazus-MH was used to calculate estimated losses for this hazard. The largest earthquake in Connecticut history occurred in East Haddam on May 16, 1791. For the loss estimate calculated using Hazus-MH 4.0, this event was simulated. Specific parameters include:
    - Longitude of epicenter: -72.40
    - Latitude of epicenter: 41.50
    - Depth: 10.00 km.
    - Magnitude: 6.40
    - Attenuation function: CEUS 2008

Extreme Temperatures

- Annualized loss estimates for this hazard are based on historical damages reported to the National Centers for Environmental Information (NCEI, previously the National Climatic Data Center) of the National Oceanic and Atmospheric Administration.
- The *Resilient Connecticut* vulnerability assessment provides information relative to populations and assets at risk from extreme heat events.

Flood

- Exposure results for the flood hazard are not cumulative. In other words, the number of buildings intersecting the 0.2-percent-annual-chance floodplain does not include the number of buildings intersecting the 1-percent-annual-chance floodplain. Numbers and values of assets for events of increasing magnitude should be read as “in addition to” the preceding magnitudes.
- Exposure results for the storm surge hazard are also not cumulative. In other words, the number of buildings intersecting the Category 2 storm surge inundation area does not include the number of buildings intersecting the Category 1 storm surge inundation area. Numbers and

values of assets for events of increasing magnitude should be read as "in addition to" the preceding magnitudes.

- Digital Flood Insurance Rate Map (DFIRM) data was identified as best available data and therefore utilized for this analysis. Included in the DFIRM data are the 1-percent-annual-chance floodplain (Zone A/AE), the 0.2-percent-annual-chance floodplain, and Zone VE.
- Hazus-MH was used to calculate estimated losses for the riverine and coastal components of this hazard using the riverine model for riverine flooding and the coastal model for coastal flooding.
- The calculations for riverine flooding and coastal flooding are handled separately within Hazus-MH using distinct methodologies for riverine and coastal flood hazard areas. As such, loss estimates and annualized losses for these two separate types of flooding do not always correlate when compared with one another. Depth of flooding plays a large part in the difference between the riverine results and the coastal results for the planning area, in addition to the mapped flood hazard boundaries.
- Coastal flood hazard results are presented for Milford, West Haven, New Haven, Hamden, North Haven, East Haven, Branford, Guilford, and Madison.
- Source of flood hazard data: Federal Emergency Management Agency Preliminary DFIRM (Digital Flood Insurance Rate Map) data; National Flood Insurance Program (NFIP) records.
- Source of hydrology data (for mapping purposes): State of Connecticut Department of Energy and Environmental Protection (http://www.ct.gov/deep/cwp/view.asp?a=2698&q=322898&depNav_GID=1707)
- Source of storm surge inundation data: State of Connecticut Department of Energy and Environmental Protection (http://www.ct.gov/deep/cwp/view.asp?a=2698&q=322898&depNav_GID=1707)
- FEMA Public Assistance (PA) and Individual Assistance (IA) payments data is also used to identify past losses, which is in turn used to calculate expected annualized loss estimates for each community and the region as a whole.
- The *Resilient Connecticut* vulnerability assessment provides information relative to populations and assets at risk from extreme heat events.

Hurricane/Tropical Storm

- The numbers and values of vulnerable assets for the hurricane/tropical storm hazard are total exposure values, assuming that all buildings and populations would be equally exposed to the effects of this hazard.
- Hazus-MH was used to calculate estimated losses for the hurricane wind component of this hazard.

- Probabilistic hurricane conditions were used for Hazus-MH 4.0 calculations of hurricane damages. Storm conditions with return frequencies of 10-, 20-, 50-, 100-, 500-, and 1,000-years were used.

Sea Level Rise

- Sea level rise (SLR) extent is mapped using the CIRCA's scenarios including Mean High Higher Water (MHHW), MHHW plus 1 foot SLR, MHHW plus 20 inches SLR, 10-year flood event, 10-year plus 20 inches SLR, 30-year flood event, 30-year plus 20 inches SLR, and 100-year flood event.

Severe Thunderstorm

- The numbers and values of vulnerable assets for the severe thunderstorm hazard are total exposure values, assuming that all buildings and populations would be equally exposed to the effects of this hazard.
- Annualized loss estimates for this hazard are based on historical damages reported to the NCEI.

Severe Winter Storm/Nor'easter

- The numbers and values of vulnerable assets for the severe winter storm/nor'easter hazard are total exposure values, assuming that all buildings and populations would be equally exposed to the effects of these hazards.
- Annualized loss estimates for this hazard are based on historical damages reported to the NCEI.

Tornado

- The numbers and values of vulnerable assets for the tornado hazard are total exposure values, assuming that all buildings and populations would be equally exposed to the effects of these hazards.
- Annualized loss estimates for this hazard are based on historical damages reported to the NCEI.

Wildfire

- Wildfire risk zones were mapped using a combination of the U.S Fire Administration Wildland-Urban Interface (WUI) data and the DPH private well data. The intersection of the two datasets highlights areas in the region that are more susceptible to wildfires due to vegetation type and development, and the private well data insinuates a potential reduced firefighting capacity because of the lack of public water supply/hydrants.

5.1.3 Parcel Data

Parcel data was provided by SCRCOG and is considered updated through mid-2022. Parcel data includes both the parcel boundaries and the values that are typically captured in property assessment (Computer Assisted Mass Appraisal, or "CAMA") data.

5.1.4 Critical Facilities

Critical facilities are structures and institutions necessary for a community's response to and recovery from emergencies. Critical facilities must continue to operate during and following a disaster to reduce the severity of impacts and accelerate recovery. Critical facilities may include airports, emergency operations centers (EOCs), fire stations, hospitals and medical facilities, police stations, rail stations, schools, shelters, and town halls. A table of critical facilities provided by each town is presented in the sections dedicated to each municipality.

Critical facility data for each community was initially collected from State agencies, with additions and revisions made by each municipality every time this plan is updated. The *Resilient Connecticut* planning effort also compiled critical facilities and assets; the lists in this plan have been supplemented using that data where appropriate, with redundancies corrected. Each community had the final determination in which facilities are included in their lists.

5.1.5 Historic and Cultural Resources

Cultural resources and historic assets are generally unique or irreplaceable in nature due to their age or unique properties or characteristics. Museums, geological sites, concert halls, parks, stadiums, and other such assets are important to a community and can be considered a cultural resource. Officially recognized cultural resources and historic assets can be found on lists maintained as part of the National Register of Historic Places, State historic registries, and local historical preservation societies.

Historic and cultural resources were digitized by Dewberry under contract to CT SHPO in 2016-2017 using funds from SuperStorm Sandy through the National Park Service; and were updated by Dewberry under a new contract from SHPO in 2021-2022. The point data was provided directly by Dewberry and SHPO for use in this plan update.

5.1.6 Road and Bridge Data

Spatial roadway data has been sourced from Connecticut DOT, which is a compilation of other datasets. In addition to this spatial layer, each SCRCOG community has provided specific information regarding risks and vulnerability to roads and bridges. This data is collected during the planning process to document specific risks that may not be identified during any spatial analysis.

5.1.7 Social Vulnerability Index

As part of the *Resilient Connecticut* program, CIRCA developed social vulnerability (SV) mapping specifically for New Haven and Fairfield Counties. This SV mapping is a hybrid approach, fine scale representation of social vulnerability throughout the region.

Specifically, the methodology for developing the Resilient Connecticut social vulnerability (SV) mapping utilizes two commonly cited sources: the CDC Social Vulnerability Index (CDC SVI) and the University of South Carolina Social Vulnerability Index (SoVI). The SoVI is comprised of 30 socioeconomic variables, all of which were identified as pertinent to the *Resilient Connecticut* study region and ultimately adopted for this social vulnerability assessment mapping. Almost all 30 variables used for *Resilient Connecticut* exactly align with the SoVI variables identified, apart from nursing home residents per capita which was replaced with number of individuals with independent living difficulties. The percent employment in extractive industries variable was replaced with percent workers in blue collar industries. Blue collar industries encompass agriculture, forestry, fishing/hunting, mining, construction, manufacturing, transportation, warehousing, and utilities. These replacements were made due to the scale of mapping and data availability. The SV mapping is calculated and mapped at the census block group level, while the SoVI, which is a nationwide dataset, is calculated at the census tract level. In addition, almost all data was sourced from the U.S. Census American Community survey (ACS) 5-year estimates of 2015 – 2019. The only data sourced outside of the ACS were the hospitals per capita which is from the American Hospital Directory and is also mapped at the county level.

The CDC SVI methodology was utilized for the mathematical processing of the data to quantitatively represent vulnerability as a "score", based on a percentile rank. For the analysis a higher percentile was translated to "higher vulnerability" i.e., a higher percentile of those living in poverty equates to higher vulnerability. However, five variables were incorporated using the opposite logic i.e., higher per capita income equates to lower vulnerability. Each variable was evaluated on how it impacts social vulnerability, either negatively or positively.

The *Resilient Connecticut* SV mapping is developed at the census block group scale using statewide demographics. The use of statewide demographics was chosen in the event this SV mapping methodology is expanded beyond the current study region. In addition to overall social vulnerability, which encompasses all 30 variables, five subgroup types were also developed based loosely on the groupings of the CDC SVI methodology. Calculating vulnerability indices for each of these five subgroups (Table 2) allowed for the highlighting of types of vulnerabilities that may not be as obvious in the mapping of overall social vulnerability. These subgroup scores are calculated based on only the variables within that subgroup, other subgroup variables are excluded from that calculation. Ultimately, there are six different social vulnerability scores attributed to a community that are relative to overall social vulnerability and five different subgroups:

- Minority Status
- Household Composition & Disability
- Socioeconomic Status
- Labor Force
- Housing Type & Transportation

To calculate overall social vulnerability the percentile rank for all 30 variables was first calculated. After all percentile ranks were identified, the sum of those ranks was calculated across each block group. The percentile rank was then determined using the sums, resulting in a vulnerability score on a scale of 0 to1. This process was repeated for each of the five subgroups using only those variables relative to each group. Final scores closer to 1 indicate increased vulnerability, while a lower score closer to 0 represents lower vulnerability.

5.1.8 Population and Environmental Justice

In addition to the SV mapping, other data used to evaluate population and social vulnerabilities includes the incorporation of Connecticut's Environmental Justice (EJ) and distressed municipalities data. Connecticut Public Act 20-6 defines an Environmental Justice community as "a U.S. census block group, as determined in accordance with the most recent U.S. census, for which 30% or more of the population consists of low-income persons who are not institutionalized and have an income below 200% of the federal poverty level OR a distressed municipality." The Connecticut Department of Economic Community Development (DECD) has developed a methodology to score all municipalities in the state, with the top 25 identified as distressed municipalities.

CIRCA is currently developing new EJ mapping for the State of Connecticut, working with a mapping advisory committee consisting of representatives from different State agencies. As of winter 2022-2023, this mapping was in draft form, and State agencies were not releasing it for public viewing. Future editions of this plan will include the EJ mapping, assuming that it becomes available sometime in 2023.

5.1.9 Data Availability and Reporting Limitations

Certain limitations are associated with datasets used to evaluate past events and associated losses. Some of these include:

- Some communities may not submit FEMA PA funds for certain damages or projects; therefore, loss data may not be fully representative of what the damages were.
- Property owners and renters may not all be aware of the FEMA Individual Assistance (IA) funding opportunity, limiting the accuracy of IA figures.
- NOAA NCEI data relies on several different sources, including spotters and media outlets, for reporting; therefore, not every event that occurs in every community may be reported, particularly those that are "smaller" in comparison to extreme and severe storms.
- There are no specific outlets for certain types of events, making reports scarce or inconsistent. For example, erosion events or smaller brush fires may not be reported as frequently as floods or winter storms.

In general, data limitations remain the same as they were in previous editions of this plan. For example, the inundation mapping for many high and significant hazard dams exists, but remains unavailable for

public use. On the other hand, new data sources were available for this update, such as the Resilient Connecticut vulnerability assessment report (2021), CCVI mapping (2021), and private well parcel mapping (2021). SCRCOG will continue to incorporate new data sets in future editions of this plan.

5.2 Risk Analysis

5.2.1 Exposure Analysis

Vulnerable assets were identified by intersecting GIS-based asset inventories and demographics data with known hazard boundaries to determine the numbers of parcels, critical facilities, and historic resources. This results in an estimation of vulnerable assets for the entire region, by hazard as shown in Table 36**.** The numbers and figures in this section are simply an indicator of the total number of assets potentially exposed to the hazard and of potential interest in the mitigation planning process. Specific community results and maps can be found in that respective annexes.

Table 36. Vulnerable assets by hazard for the South Central Region.

Hazard	Number of Parcels	Number of Buildings	Critical Facilities	Historic Assets
Extreme Temperatures	185,616		384	13,141
Hurricane/Tropical Storm	185,616		384	13,141
Severe Thunderstorm	185,616		384	13,141
Severe Winter Storm/Nor'easter	185,616		384	13,141
Tornado	185,616		384	13,141
Dam Failure				
High Hazard (Class C)				174
Drought	22,471		16	147
Flood				
1-Percent-Annual-Chance	25,661		31	1,116
0.2-Percent-Annual-Chance	28,144		44	1,276
Storm Surge				
Category 1	8,589		7	619
Category 2	15,873		30	965

Hazard	Number of Parcels	Number of Buildings	Critical Facilities	Historic Assets
Category 3	22,442		50	1,323
Category 4	28,252		69	1,653
Earthquake	185,616		384	13,141
Wildfire	20,849		13	143

Table 37 shows the total estimated value of improved parcels (parcels that contain at least one building), critical facilities, and historic assets that intersect with known hazard areas, as an indicator of the potential impacts should a hazard event occur.

Table 37. Potential impacts by hazard for the South Central Region.

Hazard	Value of At-Risk Parcels	Value of At-Risk Critical Facilities	Value of At-Risk Historic Assets
Extreme Temperatures	$58,156,548,581	$1,986,731,670	$5,376,119,650
Hurricane/Tropical Storm	$58,156,548,581	$1,986,731,670	$5,376,119,650
Severe Thunderstorm	$58,156,548,581	$1,986,731,670	$5,376,119,650
Severe Winter Storm/Nor'easter	$58,156,548,581	$1,986,731,670	$5,376,119,650
Tornado	$58,156,548,581	$1,986,731,670	$5,376,119,650
Dam Failure			
High Hazard (Class C)			$260,987,388
Drought	$5,702,563,552	$5,305,840	$41,547,720
Flood			
1-Percent-Annual-Chance	$11,109,730,761	$636,373,160	$890,631,182
0.2-Percent-Annual-Chance	$11,900,194,319	$647,690,730	$1,008,554,800
Storm Surge			
Category 1	$4,031,162,083	$250,774,910	$428,828,050

Hazard	Value of At-Risk Parcels	Value of At-Risk Critical Facilities	Value of At-Risk Historic Assets
Category 2	$7,139,374,674	$378,246,090	$714,086,312
Category 3	$9,333,994,834	$408,372,380	$874,537,822
Category 4	$11,283,596,498	$433,403,360	$1,046,799,372
Earthquake	$58,156,548,581	$1,986,731,670	$5,376,119,650
Wildfire	$5,339,139,292	$5,093,640	$39,725,730

A parallel exposure analysis was conducted for buildings, critical facilities, and historic resources at risk to coastal flooding that is worsened by sea level rise. Numerous scenarios are presented below, including a variety of flood frequencies (recurrence intervals) with and without the 20 inches of sea level rise required for planning in Connecticut.

Table 38. Assets Vulnerable to Sea Level Rise in the South Central Region.

	SLR Scenario	Buildings Affected	Critical Facilities	Historic Resources
Base Scenario	Mean Higher High Water (MHHW)	118	0	25
	10-year Flood Event	2,058	6	253
	30-year Flood Event	2,866	9	345
	50-year Flood Event	3,187	11	373
	100-year Flood Event	3,554	12	394
	500-year Flood Event	3,589	12	395
Future Conditions	Mean Higher High Water (MHHW) +1 foot	264	0	28
	Mean Higher High Water (MHHW) +20 inches	392	0	31
	10-year Flood Event + 20 inches	3,471	10	394
	30-year Flood Event + 20 inches	4,933	20	492
	50-year Flood Event + 20 inches	5,347	20	534

	100-year Flood Event + 20 inches	5,831	21	561
	500-year Flood Event + 20 inches	6,605	26	616

5.2.2 *Resilient Connecticut* Vulnerability Assessment Report

The *Resilient Connecticut* Phase II project used several methods to evaluate the flood and heat vulnerability of critical facilities and other assets throughout Fairfield and New Haven Counties; this included all SCRCOG communities. The following tables are directly from the *Resilient Connecticut* Vulnerability Assessment Report[99] and are representative of the most heat and flood vulnerable facilities and assets in the SCRCOG region using the Climate Change Vulnerability Index (CCVI). The CCVI is a gridded tool which incorporates flood or heat sensitivity, exposure, and adaptive capacity factors to determine a locations overall vulnerability. The tables below vary in how vulnerability is represented with some tables showing only flood, only heat, or a combined vulnerability using both hazards.

Both Table 39 and Table 40 present the designated shelters and cooling centers that are in the highest flood and heat vulnerable locations.

Table 39. Municipal Shelters in High Flood or High Heat Locations.

Facility	Municipality	Flood Vulnerability	Heat Vulnerability
Shelter: East Haven Senior Center	East Haven	Moderate-High	High
Hill Career High School	New Haven	Moderate-Low	High
Muravnick Senior Center	Meriden	Moderate-High High	High

Table 40. Cooling Centers in High flood or High Heat Locations.

Facility	Municipality	Flood Vulnerability	Heat Vulnerability
Meriden YMCA	Meriden	High	High
Meriden Police Department	Meriden	High	High

[99] https://resilientconnecticut.uconn.edu/resilience-opportunities/

Atwater Senior Center	New Haven	High	High
ML Keefe Center	Hamden	Moderate	High
Brundage Community Branch Library	Hamden	Mod-Low	High
Taking Initiative Center	New Haven	Mod-Low	High
Courtland Seymour Wilson Branch Library	New Haven	Mod-High	High
Fair Haven Branch Library	New Haven	Moderate	High
The 180 Center	New Haven	Mod-High	High
Fellowship Place	New Haven	Mod-Low	High
Youth Continuum	New Haven	Mod-High	High

Accessibility to cooling centers during an event was another focus of the *Resilient Connecticut* project. To identify those cooling centers in the study region, a 1 mile radius was used to determine whether or not the center was on a public transit line. Table 41 shows the four cooling centers that are greater than one mile from a bus route, therefore potentially making these cooling centers less accessible for transportation limited populations during an extreme event.

Table 41. Cooling Centers Greater than One Mile from Bus Routes.

Facility	**Municipality**	**Flood/Heat Combined Vulnerability**
Atwater Memorial Library	North Branford	Mod Flood, Mod-Low Heat
Edward Smith Library	North Branford	Mod Flood, Low Heat
Bethany Town Hall Senior Center	Bethany	Mod-Low Flood, Mod-Low Heat
North Branford Recreation Department	North Branford	Mod-Low Flood, Low Heat

In addition to cooling center accessibility, the CCVI was also used to identify those bus hubs that have the highest flood and heat combined vulnerability. This analysis to identify locations where several bus routes intersect, which could ultimately mean a high density of travelers in one area, and greater

potential for disruptions during an event due to the high vulnerability. Those bus hubs that are most vulnerable are identified in

Table 42. Bus Hubs with High Combined Flood and Heat Vulnerability.

Facility	Municipality	Flood/Heat Combined Vulnerability
New Haven Green	New Haven	Mod-High Flood, High Heat
Meriden Transit Center	Meriden	High Flood, Moderate-High Heat
Hamden 1	Hamden	Mod-Low Flood, Mod-High Heat
Hamden 2	Hamden	Mod-Low Flood, Mod-High Heat
Milford Mall	Milford	Mod Flood, Mod-Low Heat

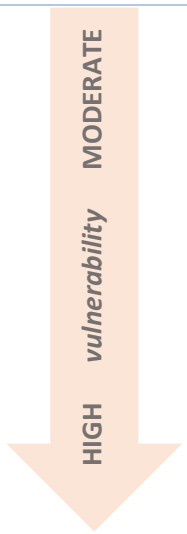
Multiple types of affordable housing assets were also included in the flood and heat vulnerability analysis. Multi-family affordable housing unit and housing complex datasets from HUD were used, in addition to a dataset collected from SCRCOG. These three datasets were used to identify those affordable housing assets most vulnerable to flooding and heat.

Table 43 through Table 45 show only the most vulnerable of the assets throughout the region. Those that have low vulnerability have not been identified in the tables.

Table 43. HUD Multifamily Affordable Housing Sites Most Vulnerable to Flood and Hea.t

HIGH vulnerability MODERATE	Multifamily Complex in Flood Vulnerable Location	Multifamily Complex in Heat Vulnerable Location
	38 Crown Street - New Haven	Fair Haven Elderly - New Haven
	The Towers, Formerly Tower I-Tower - East New Haven	Fairmont-Ruoppolo - New Haven
	Fairmont-Ruoppolo -New Haven	Westfield Glen Apts - Meriden
	Farnam 9% - New Haven	Farnam 9% - New Haven
	Parkside Apts - Meriden	Seacrest Retirement Center - West Haven
	Brewery Square Apartments - New Haven	Apple Rehab - T.A. Coccomo Memorial - Meriden
	Bella Vista E - New Haven	West River Health Care Center - Milford
	Bella Vista Cd - New Haven	Milford Health Care Center - Milford
	Bella Vista A - New Haven	
	Hemingway Place - East Haven	
	Fair Haven Elderly - New Haven	

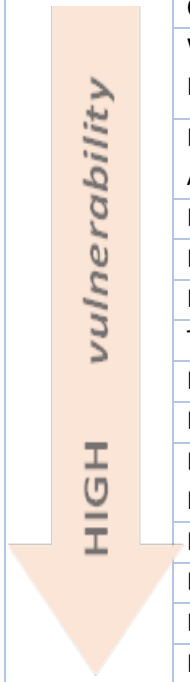
Table 44. HUD Housing Complexes Vulnerable to Flood and Heat.



Housing Development in Flood Vulnerable Location	Housing Development in Heat Vulnerable Location
Brookside Phase I East Haven	Wt Rowe New Haven
Charles T. Mcqueeney Twr New Haven	Family Scattered Sites Milford
Waverly Townhouses New Haven	Charles T. Mcqueeney Twr New Haven
Farnum Courts New Haven	Surfside 200 Highrise West Haven
Parkside Apts - Meriden	Seacrest Retirement Center - West Haven
Spring Heights West Haven	
Brookside Phase II New Haven	
Essex Townhouses New Haven	

Table 45. SCRCOG Identified Affordable Housing Properties Vulnerable to Flood and Heat.

	Property Name or Location in Flood Vulnerable Location	Municipality	Property Name or Location in Heat Vulnerable Location	Municipality
MODERATE vulnerability	Howard Apartments	New Haven	Farnam Courts New Haven Public Housing Apartments	New Haven
	Mountain Valley Place	New Haven	Woodbridge Elderly Housing	Woodbridge
	Hart Residences, Inc	New Haven	Legion Woods	New Haven
	Waverly Townhouses Public Housing Apartments	New Haven	Legion Avenue Court	New Haven
	Richard Street Coop	New Haven	Mckenna Court	Meriden
	Fellowship Commons Westville N	New Haven	Ulbrich Heights & Extension	Wallingford
	Fellowship Commons Whalley	New Haven	William T Rowe (The Rowe)	New Haven
	Morrissey Manor	West Haven	Antillean Manor Cooperative	New Haven
	Matthew Ruopollo Manor	New Haven	63 Washington Street	Milford
	Park Ridge Towers I	New Haven	Renaissance Hill	New Haven
	Park Ridge Towers II	New Haven	McGuire Court	Wallingford
	Scattered Sites - II	New Haven	Beechwood Gardens - CT	New Haven
	Leeway Welton Apartments	New Haven	Whalley Terrace	New Haven
	Carmen Romano Apartments	North Haven	Whalley Avenue Housing II	New Haven
	Trinity New Haven Housing II	New Haven	Waverly Townhouses New Haven Public Housing Apartments	New Haven
	Columbus West Apartments	New Haven	Wheelers Woods	Orange
	Winslow-Celentano Apartments	New Haven	Gulf Street Commons	Milford
	Meriden Commons	Meriden	Gulf Street Commons II	Milford
	Meriden Commons II	Meriden	Parkside Village I	Branford
	Harbor Towers	Meriden	Winchester Lofts Apartments	New Haven
	The Towers at Tower Lane	New Haven	Johnson Farms	Meriden
	Towers East	New Haven	Hill Central Homes	New Haven
	River Run Apartments	New Haven	Margaret B. Mack Supportive Housing	New Haven



East Farm Village E	East Haven	Bella Vista E	New Haven
Charles T. McQueeny	New Haven	Bella Vista Cd	New Haven
Waverly Townhouses New Haven Public Housing Apartments	New Haven	Constance B. Motley	New Haven
Farnam Courts New Haven Public Housing Apartments	New Haven	River Run Apartments	New Haven
Parkside Apartments	Meriden	St. Martin's Townhouses	New Haven
Brewery Square	New Haven	Charles T. McQueeny	New Haven
Rolling Ridge Apartments	West Haven	Rolling Meadows of Milford	Milford
Town Homes at Eastview Terrace	New Haven	Park Ridge Towers I	New Haven
Bella Vista B	New Haven	Park Ridge Towers II	New Haven
Bella Vista A	New Haven	Ferry Street	New Haven
Essex Townhouses New Haven Public Housing Apartments	New Haven	Island View Park	Milford
Hanover Towers	Meriden	Monterey 2	New Haven
Bella Vista E	New Haven	Foran Towers	Milford
Bella Vista Cd	New Haven	Surfside 200 Highrise	West Haven
Katherine Harvey Terrace	New Haven	Monterey Place	New Haven
Fair Haven Elderly	New Haven	Monterey 5	New Haven

Some infrastructure was also included in the Resilient Connecticut vulnerability analysis. Public drinking water systems and wastewater system components were analyzed to determine the most at-risk public water supply wells, wastewater pump stations, and water pollution control facilities. The results can be found in Table 46 through Table 48.

Table 46. Public Water System Wells in High flood Vulnerable Areas.

Facility	PWS Type/Well Name	Flood/Heat Combined Vulnerability
531 Forest Road - N. Branford	NC/Well	North Branford
Regional Water Authority	C/Derby Well 1	New Haven

Table 47. Wastewater System Infrastructure Combined Heat and Flood Vulnerability.

Facility Name	Facility Type	Municipality	Combined Heat-Flood Vulnerability
Johnsons Point Pump Station	Pump Station	Branford	Mod-High Flood, Low Heat
Summer Island Pump Station	Pump Station	Branford	Mod-High Flood, Mod-Low Heat
Beckett Ave Pump Station	Pump Station	Branford	Mod-High Flood, Mod-Heat
Pawson Rd Pump Station	Pump Station	Branford	Mod-High Flood, Mod-Low Heat
Lanphier Season Pump Station	Pump Station	Branford	Mod-High Flood, Low Heat
Sunrise Cove Pump Station	Pump Station	Branford	Mod-High Flood, Mod Heat
Pages Pump Station	Pump Station	Branford	Mod-High Flood, Mod Heat
Sybil Pump Station	Pump Station	Branford	Mod-High Flood, Mod Heat
WWTP (Inter) Pump Station	Pump Station	Branford	Mod-High Flood, Mod Heat
Treatment Plant	Wastewater Treatment Plant	Branford	Mod-High Flood, Mod-High Heat
Harbor St Pump Station	Pump Station	Branford	Mod-High Flood, Mod-High Heat
So Montowese Pump Station	Pump Station	Branford	Mod-High Flood, Mod- Heat
Central Pump Station	Pump Station	Branford	High Flood, Mod-High Heat

Facility Name	Facility Type	Municipality	Combined Heat-Flood Vulnerability
Rice Terrace Pump Station	Pump Station	Branford	Mod-High Flood
Bradley Ave Pump Station	Pump Station	Branford	Mode-High Flood, Mod-High Heat
Blocks Pump Station	Pump Station	Branford	Mod-High Flood, Mod Heat
Lanphier Cove Pump Station	Pump Station	Branford	Mod-High Flood, Mod Heat
Little Bay Lane Pump Station	Pump Station	Branford	Mod-High Flood, Low Heat
Maltby Pump Station	Pump Station	Branford	Mod-High Flood, Low Heat
Hotchkiss Grove Pump Station	Pump Station	Branford	Mod-High Flood, Mod-Low Heat
Sewer Pump Station	Pump Station	Hamden	High Flood, High Heat
Sewer Pump Station	Pump Station	Hamden	Mod-High Flood, Mod-High Heat
Sewer Pump Station	Pump Station	Hamden	Mod-High Flood, Mod-High Heat
Branford Road PS (sewer)	Pump Station	North Branford	Mod-High Flood, Mod-Low Heat
White Hollow Rd PS (sewer)	Pump Station	North Branford	Mod-High Flood, Mod-Low Heat
Wastewater Treatment	Wastewater Treatment Plant	Wallingford	High Flood, Mod-High Heat
Trumbull PS	Pump Station	West Haven	Mod-High Flood, Low Heat
Baybrook PS	Pump Station	West Haven	Mod-High Flood, Mod Heat
Woodycrest PS	Pump Station	West Haven	Mod-High Flood, Mod-High Heat
Woodmont Road PS	Pump Station	West Haven	Mod-High Flood, Mod-Low Heat
Dawson Av PS	Pump Station	West Haven	Mod-High Flood, Mod Heat
Oyster River PS	Pump Station	West Haven	Mod-High Flood, Mod-High Heat
Savin Av PS	Pump Station	West Haven	Mod-High Flood, Mod-High Heat
East Ave PS	Pump Station	West Haven	Mod-High Flood, Mod Heat
Main Pump Station	Pump Station	West Haven	Mod-High Flood, Mod-High Heat

Facility Name	Facility Type	Municipality	Combined Heat-Flood Vulnerability
Cover River PS	Pump Station	West Haven	Mod-High Flood, Mod-Low Heat
Jones St PS	Pump Station	West Haven	Mod-High Flood, Mod-High Heat
WWTP	Wastewater Treatment Plant	West Haven	Mod-High Flood, High Heat
Front Av PS	Pump Station	West Haven	Mode-High Flood, Mod-High Heat

Table 48. water Pollution Control Facilities and Combined Flood and Heat Vulnerability.

Facility	Municipality	Flood/Heat Combined Vulnerability
Branford WPCF	Branford	Mod-High Flood, Mod Heat
Meriden WPCF	Meriden	Mod-High Flood, Mod Heat
Milford (Beaver Bk) WPCF	Milford	Mod-High Flood, Mod Heat
New Haven-East Shore WPCF	New Haven	Mod-High Flood, Mod-High Heat
North Haven WPCF	North Haven	Mod-High Flood, Mod Heat
Wallingford WPCF	Wallingford	Mod Flood, Mod-Low Heat
West Haven WPCF	West Haven	Mod-High Flood, High Heat
Milford (Housatonic) WPCF	Milford	Mod Flood, Mod-Low Heat

The Resilient Connecticut Vulnerability Assessment also identified the largest employers in the region and their respective vulnerability, as well as the critical habitats in high flood areas. The results can be found in below.

Table 49. Regional Employment Centers Located in High Flood and Heat Locations.

Employment Center	Municipality
American Medical Response	New Haven
Ct Transit	Hamden
Walmart Supercenter	New Haven

Table 50. Regional Employment Centers with Highest Flood Vulnerability Regardless of Heat Vulnerability.

Employment Center	Municipality
Fire Lite	North Branford
New Haven Police Dept	New Haven
New Haven Register	New Haven
Sargent Manufacturing Co	New Haven
Ue Union	New Haven
Stop & Shop Supermarket	East Haven
Town Fair Tire	East Haven

Table 51. Critical Habitat Sites and Types in High Flood Vulnerable Areas.

Site	Habitat Type	Site	Habitat Type
East River	Intertidal Marsh	**Quinnipiac R - Wharton Brook**	Floodplain Forest
Hammonasset State Park	Coastal Woodland/Shrubland , beachshore, intertidal marsh	**Quinnipiac River/Walco Park**	Floodplain Forest
Kelsey Island	Beachshore, coastal bluffs and headlands	**Quinnipiac River**	Intertidal Marsh
Kelsey Island Marsh	Intertidal Marsh	**Seaview Beach**	Beachshore
Long Point	Intertidal Marsh	**Silver Sands Beach**	Beachshore
Milford Point	Beachshore	**Stony Creek Marshes**	Intertidal Marsh
Morse Point Beach	Beachshore	**West River**	Intertidal Marsh
Nells Island	Intertidal Marsh		

5.2.3 Resilient Connecticut Social Vulnerability (SV) Mapping

Using the *Resilient Connecticut* methodology resulted in the identification of several areas throughout the planning region that rank high based on all 30 variables included in the analysis. A majority of the more socially vulnerable areas are centered within the highly urbanized areas of the region such as New Haven and Meriden. Other areas of vulnerable populations include southern Hamden, West Haven, and East Haven where SVI map patterns are continuous with the vulnerable core areas in New Haven.

The subgroup "household composition and disability" vulnerability does not present a strong pattern of vulnerability in the SCRCOG region. This subgroup is comprised of variables representing age sensitive populations, certain economic or family care related challenges, and those with disabilities or mobility challenges. Many of these vulnerable populations are dispersed throughout the suburban and more rural areas of the region, with less prominent concentrations in the larger cities and urbanized areas that have increased overall social vulnerability. Some of the most vulnerable block groups in this category can be identified in suburban or rural areas such as in the towns of Wallingford and Woodbridge. High vulnerability in this category indicates where elderly or disabled populations and certain care facilities may be located, as well as higher concentrations of single parent households.

The subgroup "labor force" vulnerability patterns are consistent with overall social vulnerability, with highest scores in New Haven, West Haven, East Have, and Meriden. However, some notable high concentrations are also in suburban communities such as North Branford and Wallingford.
While it is challenging to draw conclusions at a large scale, the patterns conveyed in the maps may identify some correlations between certain vulnerability types. For example, socioeconomic status and housing type and transportation subgroups have similar patterns with concentrations in urbanized areas. On the other hand, populations vulnerable due to age or disability may be concentrated in areas that are more rural, and not often thought of as socially vulnerable areas.

5.2.4 Loss Estimates

Coastal Erosion
Despite the record of past events, coastal erosion losses are difficult to quantify because they are not reported via the tools typically reviewed for plan updates such as the NCEI Severe Storm database and the NFIP. Coastal erosion losses are not quantified in the 2019 Connecticut Natural Hazard Mitigation Plan.

One representation of erosion losses is the total cost of beach nourishment per year in the SCRCOG planning region, even though this does not account for occasional property damage. Among the seven shoreline municipalities, five (Milford, West Haven, East Haven, Guilford, and Madison) have completed numerous beach nourishment projects or have been subject to projects completed by others (i.e., Hammonasset Beach by the State of Connecticut and Ocean Beach [West Haven] by the Army Corps of Engineers.

Another measure of erosion losses is the total unmet need associated with living shoreline project costs, which have only recently become well-understood over the last five years. Living shoreline projects are anticipated in almost all of the SCRCOG shoreline municipalities, at well over $1,000,000 per municipality based on engineering opinions of probable cost.

Summing beach nourishment budgets and living shoreline implementation needs, erosion losses over the last decade have likely exceeded $2,000,000 per municipality plus at least $10 million for the most recent Hammonasset Beach nourishment, for a total of more than $24 million for the SCRCOG planning area.

Dam Failure

Dam failures have been rare in Connecticut. In the SCRCOG region, one has occurred in the last 20 years. On April 16, 2007, the Class A (low hazard) Disbrow Pond dam in Bethany failed when the embankment failed near the inlet structure. The breach was approximately 12 feet high and 15 feet wide but resulted in no damage. Without damage figures, this breach cannot be used to project losses for the region.

The 2019 Connecticut Natural Hazard Mitigation Plan provides an annualized loss estimate for dam failure in Table 2-22 based on figures compiled by the National Performance for Dams Program (NPDP). The total annual loss for New Haven County is $33,935. The downscaled annual loss for the 15 municipalities of the SCRCOG region based on the year 2020 census population is $22,385.

Drought

Drought related losses are somewhat challenging to track in Connecticut where agriculture is not a dominant economic driver. However, the United States Department of Agriculture (USDA) tracks agricultural operations that receive emergency assistance in the wake of natural hazards; this assistance includes payments to offset drought losses. These recent losses have been used to calculate annualized estimates for communities in the region where payments have been made. Estimates are show in Table 52.

Table 52. Annualized Drought Loss Estimates based on USDA Funding.

Community	Sum of Disbursement Amount over Ten Years	Annualized Loss Estimates for Drought
Branford	$40,623	$4,062
Hamden	$60,220	$6,022
North Haven	$75,022	$7,502
North Branford	$370,484	$37,048
Wallingford	$46,696	$4,670

Community	Sum of Disbursement Amount over Ten Years	Annualized Loss Estimates for Drought
Grand Total	$593,045	$59,305

Another appropriate measure of drought losses could include losses borne by water utilities that experience drought-related challenges. These types of losses were compiled in the Hazard Mitigation Plan Update for the Western Connecticut Region (WestCOG) in 2021, based on the significant costs incurred by Aquarion Water Company during the drought of 2015-2017. However, the water utilities of the SCRCOG region did not incur significant drought-related costs during the droughts of 2015-2017, 2020, and 2022.

The 2019 Connecticut Natural Hazard Mitigation Plan provides an annualized loss estimate for drought in Table 2-71 based on figures compiled by the NCEI. The total annual loss for New Haven County is $16,369. The downscaled annual loss for the 15 municipalities of the SCRCOG region based on the year 2020 census population is $10,798. These figures are likely somewhat lower than actual drought losses, given the challenges associated with quantifying drought losses across all affected sectors.

Earthquake

FEMA 366 (2017) provides an annualized earthquake loss for Connecticut at $6,755,000. The downscaled loss for the SCRCOG region based on the year 2020 census population is $1,078,215. Because HAZUS is available for estimated earthquake losses, additional steps were taken to characterize losses.

HAZUS

Hazus-MH v5.1 was used to complete the earthquake analysis for vulnerability and loss estimates for this plan update. The Hazus software was developed by FEMA and the National Institute of Building Sciences. Level 1, with default parameters, was used for the analysis done in this plan. For analysis purposes, the U.S. Census tracts are the smallest extent in which the model runs. The analysis was run based on the largest earthquake in Connecticut history, which occurred in the Moodus section of East Haddam on May 16, 1791. Specific parameters include:

- Longitude of epicenter: -72.40
- Latitude of epicenter: 41.50
- Depth: 10.00 km.
- Magnitude: 6.40
- Attenuation function: CEUS 2008

After the earthquake analysis was performed, two tables for each municipality were created to minic the tables for the previous edition of this plan: Numbers of Buildings Damaged (Table 53) and Building-Related Economic Loss (

Table 54). An additional table was created to mimic and to compare with the hurricane results: Other Earthquake Impacts (Table 55) which includes information related to debris generated, number of displaced households, and the number of individuals who need to seek temporary shelter. Including this table allows these impacts to be compared across different hazards.

The results for building-related economic loss show a minor increase from the results generated in 2018, however the number of buildings damaged shows a marked increase. This is likely due to improvements in the model and updates to the general building stock information used as the data for the model.

Table 53. Number of Buildings Damaged from the East Haddam Earthquake Scenario for SCRCOG.

2022 Count	Slight	Moderate	Extensive	Complete	Total
Bethany	4,907	4,686	4,576	4,545	18,713
Branford	25,208	23,947	23,255	23,008	95,418
East Haven	22,635	21,443	20,884	20,744	85,707
Guilford	22,119	20,805	20,043	19,824	82,790
Hamden	40,796	38,739	37,722	37,444	154,701
Madison	19,185	18,030	17,246	17,040	71,500
Meriden	42,035	39,758	38,376	37,883	158,052
Milford	43,658	42,038	41,414	41,311	168,421
New Haven	60,347	57,969	56,223	55,651	230,190
North Branford	12,023	11,327	10,951	10,840	45,142
North Haven	20,716	19,592	18,992	18,809	78,109
Orange	11,803	11,317	11,112	11,074	45,306
Wallingford	36,059	34,117	32,978	32,575	135,728
West Haven	33,197	31,748	31,068	30,920	126,933
Woodbridge	7,887	7,525	7,373	7,342	30,127
SCRCOG Total	**402,574**	**383,038**	**372,215**	**369,010**	**1,526,836**

Table 54. Total Building Related Economic Loss from the East Haddam Earthquake Scenario for SCRCOG.

2022 Losses	Residential	Commercial	Industrial	Others	Total
Bethany	$14,871,792	$5,408,472	$2,049,466	$1,443,734	$23,773,465
Branford	$122,356,231	$106,765,660	$45,142,648	$14,422,667	$288,687,207
East Haven	$83,878,964	$41,588,163	$16,156,061	$8,534,577	$150,157,765
Guilford	$161,677,117	$119,729,343	$52,570,224	$24,368,668	$358,345,351
Hamden	$222,984,688	$106,443,994	$30,541,151	$25,783,105	$385,752,938
Madison	$198,942,917	$157,634,320	$34,034,505	$27,881,181	$418,492,924
Meriden	$343,233,131	$246,863,256	$166,503,026	$36,929,987	$793,529,400
Milford	$68,312,718	$43,565,892	$16,085,441	$5,220,198	$133,184,250
New Haven	$336,013,232	$411,760,152	$44,447,673	$220,998,458	$1,013,219,515
North Branford	$65,894,178	$37,849,750	$27,894,343	$9,605,219	$141,243,490
North Haven	$100,708,390	$130,034,669	$56,458,589	$12,815,720	$300,017,369
Orange	$23,560,552	$22,200,465	$5,480,424	$2,212,453	$53,453,893
Wallingford	$241,054,261	$254,371,042	$128,935,152	$89,137,004	$713,497,459
West Haven	$98,701,735	$44,461,919	$15,357,245	$8,817,252	$167,338,151
Woodbridge	$24,724,833	$12,717,048	$2,122,405	$3,047,520	$42,611,806
SCRCOG Total	**$2,106,914,740**	**$1,741,394,146**	**$643,778,353**	**$491,217,743**	**$4,983,304,982**

Table 55. Other Earthquake Impacts from the East Haddam Earthquake Scenario for SCRCOG.

2022 Results	Debris Generated (Tons)	Households Displaced	Individuals Seeking Temporary Shelter
Bethany	5	1	0
Branford	92	286	126
East Haven	44	206	114
Guilford	95	143	68

2022 Results	Debris Generated (Tons)	Households Displaced	Individuals Seeking Temporary Shelter
Hamden	116	468	263
Madison	103	141	66
Meriden	279	1,119	761
Milford	37	90	43
New Haven	351	1,214	983
North Branford	41	102	50
North Haven	95	138	73
Orange	14	12	6
Wallingford	234	557	291
West Haven	53	252	168
Woodbridge	9	13	6
SCRCOG Total	**1,566**	**4,742**	**3,020**

The losses generated for the specific earthquake in Moodus cannot be used to generate annual losses, as sufficient information is not available for geologic hazards to be summarized over a time period in the way that floods and severe storms can be analyzed.

Extreme Temperatures

Publications such as *Extreme Heat in Connecticut: A Yale Center on Climate Change and Health Issue Brief* and *Climate Change and Health in Connecticut: 2020 Report*[100] contain detailed narratives on the effects of extreme heat events, but do not include loss estimates. One potential method of estimated extreme heat losses is to compile costs associated with transporting people to cooling centers and shelters, and operating cooling centers and shelters. However, this is complicated by the fact that most cooling centers are already open (as libraries, schools, etc.) during the timeframes they are open as cooling centers.

Additional study in the emerging field of extreme heat management is planned over the next few years in Connecticut, and future editions of this plan will develop loss estimates.

[100] https://ysph.yale.edu/yale-center-on-climate-change-and-health/ycch_cchc2020report_395366_5_v1.pdf

Flood

HAZUS Riverine Flood

Floods are described in terms of annual percentage chance of occurrence. Floodplains have been delineated by FEMA to reflect the 1- and 0.2-percent-annual-chance flood events previously known as 100-year and 500-year floods, respectively. The area that has a 1 percent chance annually to flood each year is delineated as a Special Flood Hazard Area (SFHA) for the purposes of the National Flood Insurance Program (NFIP). The 0.2-percent-annual-chance floodplain indicates areas of moderate flood hazard.

Hazus-MH v5.1 was used to complete the riverine flood analysis for vulnerability and loss estimates for this plan. The Hazus software was developed by FEMA and the National Institute of Building Sciences. A The flood loss estimation methodology consists of two modules that carry out basic analytical processes: flood hazard analysis and flood loss estimation analysis. The flood hazard analysis module uses characteristics, such as frequency, discharge, and ground elevation to estimate flood depth, flood elevation, and flow velocity. The flood loss estimation module calculates physical damage and economic loss from the results of the hazard analysis.

Hazus building stock is the inventory of buildings (i.e., square footage) of each respective type or sub-type of buildings in the following categories: residential, commercial, industrial, agricultural, religious, government, and education. Hazus assumes that all square footage (i.e., buildings) are evenly distributed throughout a given census block and therefore damage is estimated as a percent and is weighted by the area of inundation at a given depth for a given census block. The methodology, therefore, is known as an area-weighted methodology. FEMA has initiated recent improvements to the area-weighted methodology by further refining the distribution of building square-footage to land areas characterized by development and removing land areas typical of non-developed land classes (e.g., forests, wetlands, etc.). This refinement is called dasymetric mapping and the current Plan modeling utilizes the FEMA dasymetric building stock. Figure 27 shows a small example area in which the developed areas are pink.

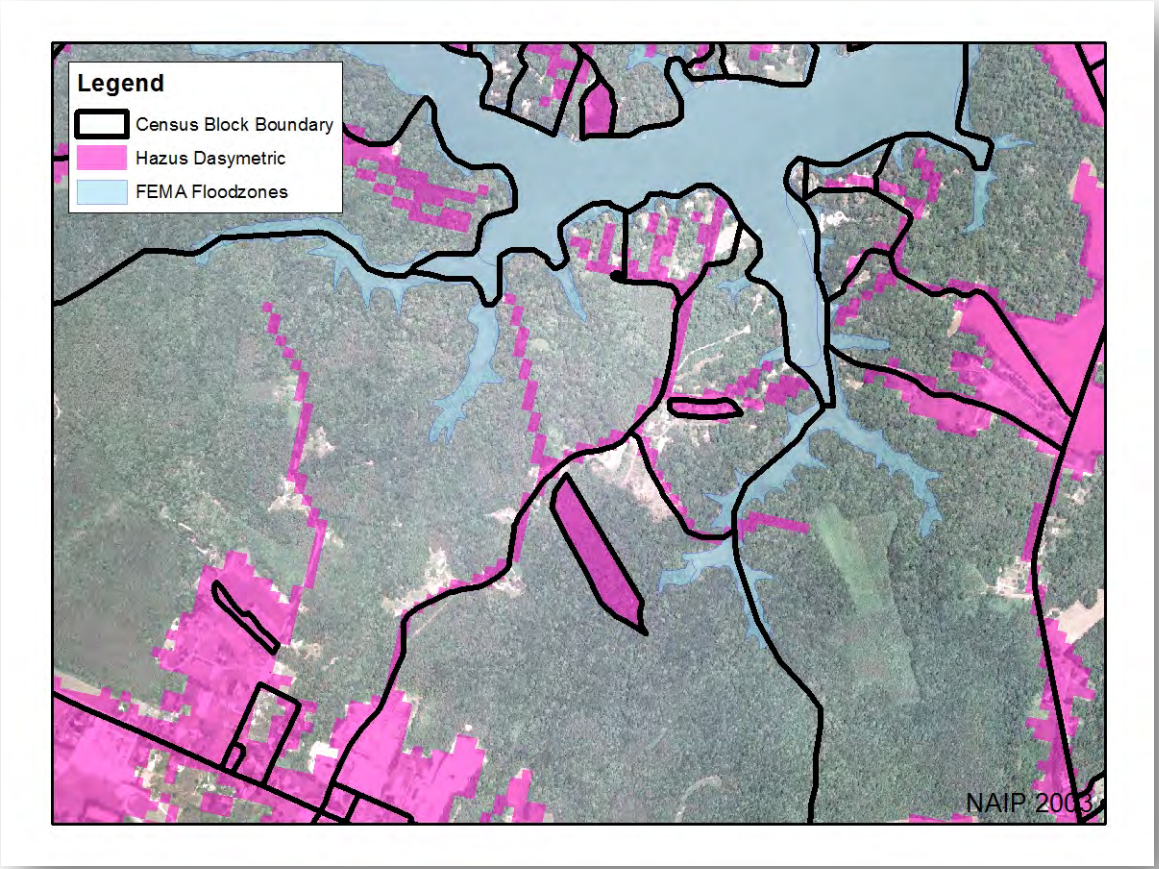


Figure 27. Example of Hazus Dasymetric Census Block Areas when Compared to FEMA Flood Zones.

Use of the dasymetric data will typically reduce the total area subject to area-weighted loss estimations – particularly for those census blocks that have flood risk, yet actual development does not exist within the floodplains. An area analysis of the dasymetric versus full stock census blocks is exemplified in the chart below:

Table 56. Census Block Area Comparison.

Digital FIRM Acreage Type	Census Block Type	
	Dasymetric	**Full Stock**
Acres of 0.2% Annual Chance Floodplains (500-year)	18,380 Ac (5% of Total Acres)	47,926 Ac (12% of Total Acres)
Acres of 1% Annual Chance Floodplains (100-year)	14,747 Ac (4% of Total Acres)	39,727 Ac (10% of Total Acres)
Total Acres of Census Blocks SCRCOG	182,406 Ac (46% of Total Acres)	395,726 Ac (Total Acres)

As noted earlier, loss estimations are first based on inundation area for specified sub-types of building square-footage. The second type of data includes information on the local economy that is used in estimating losses. Estimated building losses for the riverine flood hazard is broken down into two categories: direct building losses and business interruption losses. The direct building losses are the estimated costs to repair or replace the damage caused to the building and its contents. The business interruption losses are the losses associated with the inability to operate a business because of the damage sustained during the flood. Business interruption losses also include the temporary living expenses for those people displaced from their homes because of the flood. Table 57 displays the economic loss categories used to calculate annualized losses by Hazus. Data for this analysis has been provided at the census block level.

Table 57. Hazus Direct Economic Loss Categories and Descriptions.

Category Name	Description of Data Input into Model	Hazus Output
Direct Losses		
Building	Cost per sq. ft to repair damage by structural type and occupancy for each level of damage	Cost of building repair or replacement of damaged and destroyed buildings
Contents	Replacement value by occupancy	Cost of damage to building contents
Inventory	Annual gross sales in $ per sq. ft	Loss of building inventory as contents related to business activities
Business Interruption		
Income	Income in $ per sq. ft per month by occupancy	Capital-related incomes losses as a measure of the loss of productivity, services, or sales
Relocation	Multiple factors; primarily a function of Rental Costs ($/ft^2/month) for non-entertainment buildings where damage ≥10%	Relocation expenses (for businesses and institutions); disruption costs to building owners for temporary space.
Rental	Rental costs per month per sq. ft by occupancy	Loss of rental income to building owners
Wage	Wages in $ per sq. ft per month by occupancy	Employee wage loss as described in income loss

A Hazus Level 2 analysis was performed for the SCRCOG region with user-provided depth grids. These depth grids come from the Quinnipiac Watershed Flood Risk Project (FRP) in Connecticut, and they do not cover the entire SCRCOG region. The flood model was used to run a multi-frequency depth grid scenario which included the following return periods: 10- percent (10 year), 4-percent (25 year), 2-percent (50 year), 1-percent (100 year), as well as the 0.2-percent (500 year). The average annualized losses (AAL) for floods were calculated using this multi-frequency scenario. For analysis purposes, the U.S. Census blocks are the

smallest extent in which the model runs. Hazus generates economic loss estimates based on direct building damage and business interruption.

Table 58 shows the annualized losses for the riverine flood scenario in the Quinnipiac Watershed.

Table 58. Annualized Riverine Flood Loss Estimated for SCRCOG.

SCRCOG	2022 Results				
	RES	COM	IND	OTHER	TOTAL
Direct					
Building	$4,982,000	$1,688,000	$1,202,000	$107,000	$7,979,000
Contents	$2,389,000	$5,150,000	$3,021,000	$756,000	$11,316,000
Inventory	$0	$64,000	$394,000	$5,000	$463,000
Subtotal	$7,371,000	$6,902,000	$4,617,000	$868,000	$19,758,000
Business Interruption					
Income	$88,000	$4,440,000	$108,000	$329,000	$4,965,000
Relocation	$1,537,000	$964,000	$101,000	$93,000	$2,695,000
Rental Income	$590,000	$690,000	$14,000	$5,000	$1,299,000
Wage	$203,000	$4,651,000	$135,000	$1,393,000	$6,382,000
Subtotal	$2,418,000	$10,745,000	$358,000	$1,820,000	$15,341,000
Total	**$9,789,000**	**$17,647,000**	**$4,975,000**	**$2,688,000**	**$35,099,000**

Table 59 to Table 63 contain the riverine flood loss estimates for each recurrence interval (each percent-annual-chance depth grid included in the multi-frequency hazard scenario).

Table 59. 10-percent-annual-chance Riverine Flood Loss Estimates for SCRCOG.

SCRCOG	2022 Results				
	RES	COM	IND	OTHER	TOTAL
Direct					

SCRCOG	2022 Results				
	RES	COM	IND	OTHER	TOTAL
Building	$31,682,000	$11,635,000	$8,163,000	$695,000	$52,175,000
Contents	$15,177,000	$34,404,000	$20,184,000	$4,687,000	$74,452,000
Inventory	$0	$483,000	$2,736,000	$48,000	$3,267,000
Subtotal	$46,859,000	$46,522,000	$31,083,000	$5,430,000	$129,894,000
Business Interruption					
Income	$475,000	$33,230,000	$872,000	$2,461,000	$37,038,000
Relocation	$11,149,000	$6,899,000	$804,000	$564,000	$19,416,000
Rental Income	$4,288,000	$4,959,000	$159,000	$44,000	$9,450,000
Wage	$1,141,000	$34,140,000	$1,145,000	$9,107,000	$45,533,000
Subtotal	$17,053,000	$79,228,000	$2,980,000	$12,176,000	$111,437,000
Total	**$63,912,000**	**$125,750,000**	**$34,063,000**	**$17,606,000**	**$241,331,000**

Table 60. 4-percent-annual-chance Riverine Flood Loss Estimates for SCRCOG.

SCRCOG	2022 Results				
	RES	COM	IND	OTHER	TOTAL
Direct					
Building	$45,837,000	$16,263,000	$11,461,000	$1,065,000	$74,626,000
Contents	$22,057,000	$48,628,000	$28,291,000	$6,999,000	$105,975,000
Inventory	$0	$728,000	$3,888,000	$64,000	$4,680,000
Subtotal	$67,894,000	$65,619,000	$43,640,000	$8,128,000	$185,281,000
Business Interruption					
Income	$707,000	$42,714,000	$1,142,000	$3,336,000	$47,899,000
Relocation	$14,829,000	$9,107,000	$1,035,000	$867,000	$25,838,000

Rental Income	$6,036,000	$6,564,000	$216,000	$64,000	$12,880,000
Wage	$1,681,000	$44,582,000	$1,470,000	$12,062,000	$59,795,000
Subtotal	$23,253,000	$102,967,000	$3,863,000	$16,329,000	$146,412,000
Total	**$91,147,000**	**$168,586,000**	**$47,503,000**	**$24,457,000**	**$331,693,000**

Table 61. 2-percent-annual-chance Riverine Flood Loss Estimates for SCRCOG.

SCRCOG	**2022 Results**				
	RES	**COM**	**IND**	**OTHER**	**TOTAL**
Direct					
Building	$59,206,000	$20,368,000	$14,329,000	$1,421,000	$95,324,000
Contents	$28,654,000	$60,470,000	$35,277,000	$9,148,000	$133,549,000
Inventory	$0	$936,000	$4,872,000	$90,000	$5,898,000
Subtotal	$87,860,000	$81,774,000	$54,478,000	$10,659,000	$234,771,000
Business Interruption					
Income	$1,074,000	$51,031,000	$1,361,000	$4,189,000	$57,655,000
Relocation	$17,984,000	$11,095,000	$1,204,000	$1,169,000	$31,452,000
Rental Income	$7,590,000	$8,011,000	$254,000	$91,000	$15,946,000
Wage	$2,546,000	$53,339,000	$1,734,000	$16,310,000	$73,929,000
Subtotal	$29,194,000	$123,476,000	$4,553,000	$21,759,000	$178,982,000
Total	**$117,054,000**	**$205,250,000**	**$59,031,000**	**$32,418,000**	**$413,753,000**

Table 62. 1-percent-annual-chance Riverine Flood Loss Estimates for SCRCOG.

SCRCOG	2022 Results				
	RES	COM	IND	OTHER	TOTAL
Direct					
Building	$76,671,000	$25,923,000	$17,928,000	$1,907,000	$122,429,000
Contents	$37,414,000	$75,453,000	$43,778,000	$12,078,000	$168,723,000
Inventory	$0	$1,234,000	$6,034,000	$114,000	$7,382,000
Subtotal	$114,085,000	$102,610,000	$67,740,000	$14,099,000	$298,534,000
Business Interruption					
Income	$1,626,000	$61,769,000	$1,648,000	$5,188,000	$70,231,000
Relocation	$21,854,000	$13,798,000	$1,446,000	$1,637,000	$38,735,000
Rental Income	$9,453,000	$10,003,000	$311,000	$131,000	$19,898,000
Wage	$3,845,000	$63,921,000	$2,070,000	$23,426,000	$93,262,000
Subtotal	$36,778,000	$149,491,000	$5,475,000	$30,382,000	$222,126,000
Total	**$150,863,000**	**$252,101,000**	**$73,215,000**	**$44,481,000**	**$520,660,000**

Table 63. 0.2-percent-annual-chance Riverine Flood Loss Estimates for SCRCOG.

SCRCOG	2022 Results				
	RES	COM	IND	OTHER	TOTAL
Direct					
Building	$117,593,000	$39,536,000	$26,661,000	$3,098,000	$186,888,000
Contents	$58,452,000	$111,374,000	$64,144,000	$18,488,000	$252,458,000
Inventory	$0	$1,964,000	$8,889,000	$206,000	$11,059,000
Subtotal	$176,045,000	$152,874,000	$99,694,000	$21,792,000	$450,405,000
Business Interruption					
Income	$2,296,000	$84,142,000	$2,278,000	$7,128,000	$95,844,000

SCRCOG	2022 Results				
	RES	COM	IND	OTHER	TOTAL
Relocation	$30,310,000	$19,455,000	$2,043,000	$2,355,000	$54,163,000
Rental Income	$13,342,000	$14,103,000	$443,000	$201,000	$28,089,000
Wage	$5,428,000	$88,053,000	$2,874,000	$32,577,000	$128,932,000
Subtotal	$51,376,000	$205,753,000	$7,638,000	$42,261,000	$307,028,000
Total	**$227,421,000**	**$358,627,000**	**$107,332,000**	**$64,053,000**	**$757,433,000**

HAZUS 1-Percent-Annual-Chance Flood Scenario

While annualized loss is the preferred manner with which to express potential risk for hazard mitigation planning, as it is useful for creating a common denominator by which different types of hazards can be compared, an annual loss was not able to be generated for the entire SCRCOG as only a portion of the COG was covered the by the Quinnipiac Watershed FRP multi-frequency data. For comparison between municipalities, and comparison with previous iterations of this plan, a 1-percent-annual-chance depth grid was created for the entire SCRCOG utilizing the 1-percent-annual-chance depth grid from the Quinnipiac Watershed FRP data. This assessment has been completed using a Level 2 analysis with a user-provided depth grid. For analysis purposes, the U.S. Census blocks are the smallest extent in which the model runs. Hazus generates economic loss estimates based on direct building damage and business interruption. Future work to improve this assessment would involve creating a full suite of return periods, either independently or through a Flood Risk Project. Table 64 shows the 1-percent-annual-chance losses for the riverine flood scenario while Table 65 compares the direct losses and business interruption losses for the municipalities in SCRCOG.

Table 64. 1-percent-annual-chance Riverine Flood Loss Estimates for SCRCOG.

SCRCOG	2022 Results				
	Residential	Commercial	Industrial	Other	Total
Direct					
Building	$17,084,000	$2,404,000	$3,229,000	$214,000	$22,931,000
Contents	$8,856,000	$7,288,000	$9,021,000	$1,403,000	$26,568,000
Inventory	$0	$192,000	$1,313,000	$2,000	$1,507,000
Subtotal	$25,940,000	$9,884,000	$13,563,000	$1,619,000	$51,006,000

SCRCOG	2022 Results				
	Residential	Commercial	Industrial	Other	Total
Business Interruption					
Income	$289,000	$20,192,000	$354,000	$1,993,000	$22,828,000
Relocation	$12,039,000	$6,415,000	$470,000	$1,197,000	$20,121,000
Rental Income	$8,953,000	$4,133,000	$91,000	$194,000	$13,371,000
Wage	$692,000	$21,827,000	$600,000	$14,695,000	$37,814,000
Subtotal	$21,973,000	$52,567,000	$1,515,000	$18,079,000	$94,134,000
Total	**$47,913,000**	**$62,451,000**	**$15,078,000**	**$19,698,000**	**$145,140,000**

Table 65. 1-percent-annual-chance Riverine Flood Loss Estimates for the SCRCOG Municipalities.

Municipality	Direct				Business Interruption					Total
	Building	*Contents*	*Inventory*	*Subtotal*	*Income*	*Relocation*	*Rental Income*	*Wage*	*Subtotal*	
Bethany	$427,000	$223,000	$0	$650,000	$156,000	$240,000	$72,000	$306,000	$774,000	**$1,424,000**
Branford	$26,420,000	$32,086,000	$916,000	$59,422,000	$26,955,000	$20,919,000	$10,677,000	$31,342,000	$89,893,000	**$149,315,000**
East Haven	$21,907,000	$21,310,000	$290,000	$43,507,000	$26,340,000	$23,181,000	$11,385,000	$38,216,000	$99,122,000	**$142,629,000**
Guilford	$30,119,000	$28,854,000	$1,041,000	$60,014,000	$20,915,000	$18,533,000	$7,936,000	$23,681,000	$71,065,000	**$131,079,000**
Hamden	$35,152,000	$48,087,000	$1,329,000	$84,568,000	$23,469,000	$14,449,000	$7,946,000	$42,665,000	$88,529,000	**$173,097,000**
Madison	$6,999,000	$5,739,000	$57,000	$12,795,000	$13,646,000	$10,963,000	$4,850,000	$17,105,000	$46,564,000	**$59,359,000**
Meriden	$22,931,000	$26,568,000	$1,507,000	$51,006,000	$22,828,000	$20,121,000	$13,371,000	$37,814,000	$94,134,000	**$145,140,000**
Milford	$35,898,000	$37,192,000	$616,000	$73,706,000	$43,124,000	$34,324,000	$15,912,000	$49,781,000	$143,141,000	**$216,847,000**
New Haven	$14,574,000	$24,436,000	$455,000	$39,465,000	$69,604,000	$29,928,000	$22,631,000	$95,048,000	$217,211,000	**$256,676,000**
North Branford	$14,491,000	$16,977,000	$642,000	$32,110,000	$6,209,000	$4,359,000	$1,697,000	$9,022,000	$21,287,000	**$53,397,000**
North Haven	$25,722,000	$39,988,000	$3,202,000	$68,912,000	$12,217,000	$8,511,000	$4,154,000	$12,116,000	$36,998,000	**$105,910,000**
Orange	$6,386,000	$7,350,000	$307,000	$14,043,000	$4,387,000	$3,027,000	$1,442,000	$8,431,000	$17,287,000	**$31,330,000**
Wallingford	$23,445,000	$32,150,000	$1,768,000	$57,363,000	$19,768,000	$11,489,000	$4,981,000	$25,517,000	$61,755,000	**$119,118,000**
West Haven	$12,334,000	$11,506,000	$317,000	$24,157,000	$15,854,000	$15,966,000	$10,298,000	$32,269,000	$74,387,000	**$98,544,000**
Woodbridge	$1,749,000	$1,668,000	$20,000	$3,437,000	$5,121,000	$1,755,000	$883,000	$4,904,000	$12,663,000	**$16,100,000**

Municipality	Direct				Business Interruption					Total
	Building	*Contents*	*Inventory*	*Subtotal*	*Income*	*Relocation*	*Rental Income*	*Wage*	*Subtotal*	
SCRCOG	**$22,931,000**	**$26,568,000**	**$1,507,000**	**$51,006,000**	**$22,828,000**	**$20,121,000**	**$13,371,000**	**$37,814,000**	**$94,134,000**	**$145,140,000**

NFIP

As of June 2022, the total losses, or dollars paid out from the NFIP, totaled $162,987,558. The regional and community losses were used to determine annualized loss estimates. These estimates can be considered a rate of loss on a year to year basis and is a number a community and the region can expect in losses. This of course can vary greatly depending upon the severity of flooding in a given year. Table 66 summarizes the losses to date, and annualized NFIP loss estimates for the entire region, and each community.

Table 66. Annualized flood loss estimates for the Region based on NFIP losses.

Community	Losses to Date	Annualized Loss Estimates
Bethany	$7,226	$164
Branford	$12,290,383	$279,327
East Haven	$34,248,461	$778,374
Guilford	$8,045,874	$182,861
Hamden	$3,102,582	$70,513
Madison	$11,306,345	$256,962
Meriden	$2,512,298	$57,098
Milford	$76,003,353	$1,727,349
New Haven	$4,732,466	$107,556
North Branford	$526,705	$11,971
North Haven	$2,078,873	$47,247
Orange	$1,545,521	$35,125
Wallingford	$977,165	$22,208
West Haven	$5,086,847	$115,610
Woodbridge	$523,459	$11,897
Total for the Region	**$162,987,558**	**$3,704,263**

FEMA Individualized Assistance

Financial assistance provided to property owners and renters through the FEMA Individualized Assistance (IA) program during recent hurricane events can help to characterize flood losses for property owners and renters. The annualized loss estimates found in Table 67 and Table 68 are based on payments received for flood losses from storms Sandy and Ida; note that not all communities had owners or renters that received assistance.

Table 67. Annualized hurricane loss estimates for property owners.

Community	Total Owner IA Received for Ida and Sandy	Annualized Loss Estimates for Property Owners
Bethany	$1,776	$178
Branford	$225,427	$22,543
East Haven	$427,387	$42,739
Guilford	$116,570	$11,657
Hamden	$30,399	$3,040
Madison	$50,533	$5,053
Meriden	$3,493	$349
Milford	$2,332,318	$233,232
New Haven	$118,518	$11,852
North Branford	$300	$30
Orange	$48,763	$4,876
Wallingford	$3,193	$319
West Haven	$380,994	$38,099
Woodbridge	$3,408	$341
Grand Total	$3,743,079	$374,308

Table 68. Annualized hurricane loss estimates for renters.

Community	Total Renter IA Received for Ida and Sandy	Annualized Loss Estimates for Property Renters
Branford	$46,886	$4,689
East Haven	$241,268	$24,127
Guilford	$2,110	$211
Hamden	$300	$30
Madison	$4,720	$472
Milford	$660,632	$66,063
New Haven	$25,409	$2,541
North Branford	$500	$50
West Haven	$93,219	$9,322
Grand Total	**$1,075,044**	**$107,504**

FEMA Public Assistance

The FEMA Public Assistance (PA) Program provides financial assistance by way of grants to state, local, territorial, and local governments in the wake of federally declared disasters or emergencies. Some private non-profits are also eligible for these funds. The most recent flood event can be attributed to Hurricane Isaias where the City of Milford received $90,473 for flood related damages. Prior to that, Hurricane Sandy was the most impactful flood event for the region within the past decade. Table 69 summarizes the flood losses received by each community since 2012, along with annualized flood estimates for those communities and the Region. It is important to note that while these funds received were technically distributed for a "hurricane" event, PA details insinuate that funds received were received in part for flood related damages. It is important to note that these values are the total project costs, so ultimately the total value of losses attributed to hurricanes. The PA received is typically between 75% and 85% of the total losses.

Table 69. Annualized flood losses for the Region based on FEMA Public Assistance.

Community	Flood Losses since 2012	Annualized Flood Estimates
Branford	$123,430	$12,34
East Haven	$45,754	$4,575
Guilford	$229,525	$22,952
Hamden	$18,707	$1,871
Milford	$443,422	$44,342
New Haven	$484,709	$48,471
West Haven	$984,265	$98,426
Total for the Region	**$2,329,811**	**$232,981**

Hurricane and Tropical Cyclone

Hazus Wind

Hazus-MH v5.1 was used to complete the wind analysis for vulnerability and loss estimates for this plan update. The Hazus software was developed by FEMA and the National Institute of Building Sciences. Level 1, with default parameters, was used for the analysis done in this plan. For analysis purposes, the U.S. Census blocks are the smallest extent in which the model runs. This analysis includes the same storm conditions as the previous HMP (10%, 4%, 2%, 1%, 0.2%, and 0.01%).

Hazus-MH uses historical hurricane tracks and computer modeling to identify the probable tracks of a range of hurricane events and then assigns potential wind gusts that result. Widespread extreme thunderstorm wind events, such as those associated with well-developed squall lines, may have wind

gusts of a similar magnitude to those of the 50- or 100-year hurricane wind event. A 1000-year event is the rough equivalent of a strong Category 1 or low-end Category 2 hurricane (or weak to mid-strength EF-1 tornado) with 3-second wind gusts of up to around 95 mph.

Three tables for each municipality were created based off the tables for the 2018 update: Numbers of Buildings Damaged and level of anticipated damage, Building-Related Economic Loss, and Other Hurricane Impacts which includes information related to debris generated, number of displaced households, and the number of individuals who need to seek temporary shelter. These tables break down the values for the six hurricane return periods.

The output was close to the 2018 results for the buildings damaged and other hurricane impacts (debris generated, households displaced, and individuals seeking temporary shelter). The building-related economic losses showed a substantial decrease in the estimated losses, though still in the same general order of magnitude. This is likely due to improvements in the model and updates to the general building stock information used as the data for the model.

Table 70. Number of Buildings Damaged from the Probabilistic Hurricane Scenario for SCRCOG.

SCRCOG	Return Period	Minor	Moderate	Severe	Destruction	Total
2022 Results	10-year	0	0	0	0	0
	20-year	170	7	0	0	177
	50-year	1,275	87	5	0	1,366
	100-year	6,307	679	23	2	7,011
	200-year	17,279	2,614	110	27	20,030
	500-year	35,966	8,785	704	314	45,769
	1,000-year	51,368	17,499	2,161	1,001	72,030

Table 71. Total Building Related Economic Loss from the Probabilistic Hurricane Scenario for SCRCOG.

SCRCOG	Return Period	Minor	Moderate	Severe	Destruction	Total
2022 Results	10-year	$0	$0	$0	$0	$0
	20-year	$301,295	$13,053	$360	$0	$314,709
	50-year	$2,382,191	$149,257	$8,619	$27	$2,540,094
	100-year	$12,270,086	$1,176,277	$45,356	$4,491	$13,496,211

	200-year	$34,173,793	$4,667,316	$221,289	$56,305	$39,118,704
	500-year	$71,855,601	$16,369,482	$1,406,819	$634,106	$90,266,008
	1,000-year	$103,251,730	$33,104,490	$4,306,744	$2,025,150	$142,688,114

Table 72. Other Hurricane Impacts from the Probabilistic Hurricane Scenario for SCRCOG.

SCRCOG	Return Period	Debris Generated (Tons)	Households Displaced	Individuals Seeking Temporary Shelter
2022 Results	10-year	0	0	0
	20-year	1,380	0	0
	50-year	30,513	3	2
	100-year	126,678	244	162
	200-year	247,808	990	652
	500-year	479,578	2,873	1,843
	1,000-year	761,566	6,165	3,950

Hazus Storm Surge

Hazus-MH v5.1 was used to complete the storm surge analysis using the National Hurricane Center's (NHC) Sea, Lake, and Overland Surges from Hurricanes (SLOSH) Maximum of the Maximum Envelope of Waters (MEOWs) (MOM) for vulnerability and loss estimates for this plan. The Hazus software was developed by FEMA and the National Institute of Building Sciences. A Hazus Level 2 analysis was performed using user-provided depth grids.

SLOSH models estimate the height of the surge waters at a given location. The term "height" in this case means the height of the top of the water above mean sea level. The SLOSH model creates a worst-case scenario dataset for mitigation and disaster relief planning. The worst scenarios from these models result in the MEOWs which show the maximum likely extents of the surge flooding. The maximum of these MEOW models are the MOMs. MOM models are most widely used for insurance purposes, as they represent the most conservative extent of surge water. The MOM data, while still height information, deals more with the depth of a surge wave at a given location. The MOMs calculate depth by subtracting ground elevation from the surge heights in the MOMs.

The flood model was utilized to run four separate single-frequency depth grid scenarios for the SLOSH MOMs Category 1 to 4 hurricanes. A loss estimate for SCRCOG was determined for each hurricane

Category (Table 73 to Table 76). Figure 28 shows the location of the storm surge areas in SCRCOG and their relation to critical facilities. Table 77 to

Table 80 show the direct loss and business interruption loss for each affected municipality in SCRCOG.

Table 73. Category 1 Storm Surge using SLOSH MOM for SCRCOG.

SCRCOG	2022 Results				
	RES	COM	IND	OTHER	TOTAL
Direct					
Building	$530,053,000	$98,676,000	$48,754,000	$8,288,000	$685,771,000
Contents	$460,234,000	$273,542,000	$115,960,000	$50,611,000	$900,347,000
Inventory	$0	$5,047,000	$14,639,000	$350,000	$20,036,000
Subtotal	$990,287,000	$377,265,000	$179,353,000	$59,249,000	$1,606,154,000
Business Interruption					
Income	$148,141,000	$70,735,000	$5,199,000	$10,045,000	$234,120,000
Relocation	$2,640,000	$253,967,000	$4,933,000	$19,855,000	$281,395,000
Rental Income	$68,631,000	$52,345,000	$1,179,000	$1,259,000	$123,414,000
Wage	$6,252,000	$245,716,000	$7,173,000	$113,742,000	$372,883,000
Subtotal	$225,664,000	$622,763,000	$18,484,000	$144,901,000	$1,011,812,000
Total	**$1,215,951,000**	**$1,000,028,000**	**$197,837,000**	**$204,150,000**	**$2,617,966,000**

Table 74. Category 2 Storm Surge using SLOSH MOM for SCRCOG.

SCRCOG	2022 Results				
	RES	COM	IND	OTHER	TOTAL
Direct					
Building	$1,430,377,000	$307,172,000	$136,355,000	$25,177,000	$1,899,081,000
Contents	$1,179,465,000	$762,721,000	$324,247,000	$136,274,000	$2,402,707,000
Inventory	$0	$14,230,000	$41,346,000	$977,000	$56,553,000
Subtotal	$2,609,842,000	$1,084,123,000	$501,948,000	$162,428,000	$4,358,341,000

SCRCOG	2022 Results				
	RES	COM	IND	OTHER	TOTAL
Business Interruption					
Income	$284,821,000	$146,356,000	$9,015,000	$21,699,000	$461,891,000
Relocation	$4,578,000	$528,826,000	$8,681,000	$40,468,000	$582,553,000
Rental Income	$140,235,000	$109,379,000	$2,071,000	$2,778,000	$254,463,000
Wage	$10,807,000	$491,924,000	$12,540,000	$321,061,000	$836,332,000
Subtotal	$440,441,000	$1,276,485,000	$32,307,000	$386,006,000	$2,135,239,000
Total	**$3,050,283,000**	**$2,360,608,000**	**$534,255,000**	**$548,434,000**	**$6,493,580,000**

Table 75. Category 3 Storm Surge using SLOSH MOM for SCRCOG.

SCRCOG	2022 Results				
	RES	COM	IND	OTHER	TOTAL
Direct					
Building	$2,831,029,000	$941,273,000	$274,191,000	$64,373,000	$4,110,866,000
Contents	$2,178,262,000	$1,896,181,000	$619,486,000	$280,463,000	$4,974,392,000
Inventory	$0	$28,137,000	$76,028,000	$1,705,000	$105,870,000
Subtotal	$5,009,291,000	$2,865,591,000	$969,705,000	$346,541,000	$9,191,128,000
Business Interruption					
Income	$466,907,000	$356,026,000	$13,766,000	$41,955,000	$878,654,000
Relocation	$9,518,000	$1,275,028,000	$13,427,000	$77,804,000	$1,375,777,000
Rental Income	$244,821,000	$268,372,000	$3,147,000	$5,532,000	$521,872,000
Wage	$22,469,000	$1,016,343,000	$19,029,000	$578,704,000	$1,636,545,000
Subtotal	$743,715,000	$2,915,769,000	$49,369,000	$703,995,000	$4,412,848,000
Total	**$5,753,006,000**	**$5,781,360,000**	**$1,019,074,000**	**$1,050,536,000**	**$13,603,976,000**

Table 76. Category 4 Storm Surge using SLOSH MOM for SCRCOG.

SCRCOG	2022 Results				
	RES	COM	IND	OTHER	TOTAL
Direct					
Building	$5,096,893,000	$1,867,503,000	$454,757,000	$165,538,000	$7,584,691,000
Contents	$3,578,763,000	$3,276,316,000	$951,833,000	$545,331,000	$8,352,243,000
Inventory	$0	$47,026,000	$111,608,000	$3,582,000	$162,216,000
Subtotal	$8,675,656,000	$5,190,845,000	$1,518,198,000	$714,451,000	$16,099,150,000
Business Interruption					
Income	$705,584,000	$569,250,000	$18,271,000	$80,755,000	$1,373,860,000

Relocation	$18,756,000	$2,021,572,000	$17,730,000	$146,685,000	$2,204,743,000
Rental Income	$399,104,000	$425,994,000	$4,068,000	$10,871,000	$840,037,000
Wage	$44,209,000	$1,659,880,000	$25,339,000	$1,119,374,000	$2,848,802,000
Subtotal	$1,167,653,000	$4,676,696,000	$65,408,000	$1,357,685,000	$7,267,442,000
Total	**$9,843,309,000**	**$9,867,541,000**	**$1,583,606,000**	**$2,072,136,000**	**$23,366,592,000**

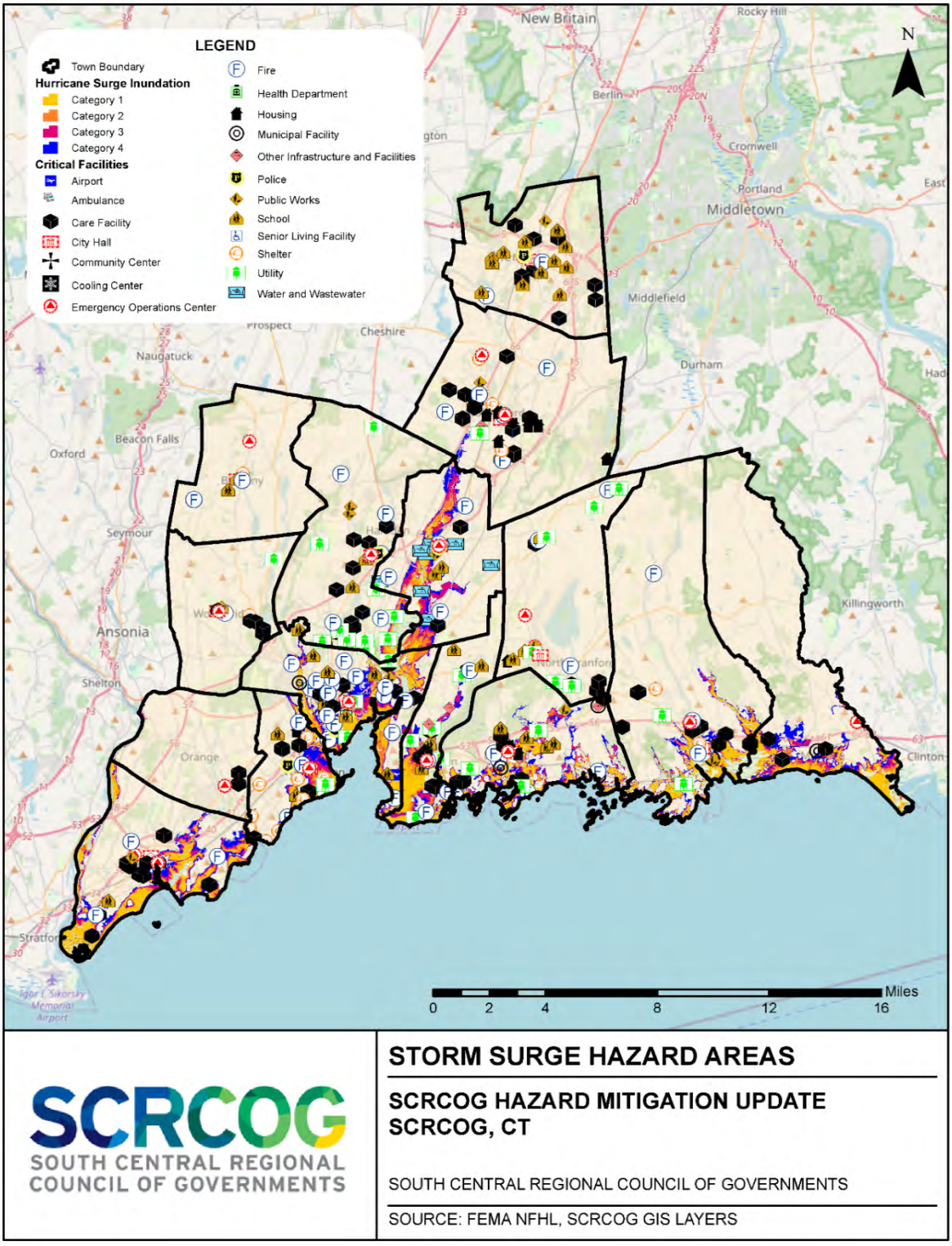


Figure 28. Storm Surge Hazard Areas in SCRCOG.

Table 77. Category 1 Storm Surge using SLOSH MOM for the SCRCOG Municipalities.

Municipality	Direct				Business Interruption					Total
	Building	*Contents*	*Inventory*	*Subtotal*	*Income*	*Relocation*	*Rental Income*	*Wage*	*Subtotal*	
Branford	$128,191,000	$151,412,000	$1,773,000	$281,376,000	$30,786,000	$33,168,000	$15,777,000	$37,161,000	$116,892,000	$398,268,000
East Haven	$94,007,000	$111,078,000	$1,652,000	$206,737,000	$30,844,000	$32,984,000	$16,273,000	$31,786,000	$111,887,000	$318,624,000
Guilford	$63,918,000	$81,843,000	$2,286,000	$148,047,000	$16,148,000	$16,043,000	$6,802,000	$19,276,000	$58,269,000	$206,316,000
Hamden	$10,553,000	$32,730,000	$2,618,000	$45,901,000	$5,065,000	$3,039,000	$1,885,000	$11,264,000	$21,253,000	$67,154,000
Madison	$38,453,000	$52,546,000	$722,000	$91,721,000	$19,706,000	$13,844,000	$6,510,000	$21,573,000	$61,633,000	$153,354,000
Milford	$188,044,000	$217,320,000	$2,363,000	$407,727,000	$41,851,000	$60,143,000	$25,392,000	$55,105,000	$182,491,000	$590,218,000
New Haven	$98,707,000	$174,598,000	$6,052,000	$279,357,000	$100,846,000	$47,062,000	$32,649,000	$137,419,000	$317,976,000	$597,333,000
North Haven	$6,979,000	$16,466,000	$1,529,000	$24,974,000	$4,503,000	$2,036,000	$1,291,000	$4,467,000	$12,297,000	$37,271,000
Orange	$557,000	$1,494,000	$116,000	$2,167,000	$111,000	$87,000	$44,000	$205,000	$447,000	$2,614,000
Wallingford	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
West Haven	$56,362,000	$60,860,000	$925,000	$118,147,000	$31,535,000	$25,714,000	$16,791,000	$54,627,000	$128,667,000	$246,814,000
SCRCOG	$685,771,000	$900,347,000	$20,036,000	$1,606,154,000	$281,395,000	$234,120,000	$123,414,000	$372,883,000	$1,011,812,000	$2,617,966,000

Table 78. Category 2 Storm Surge using SLOSH MOM for the SCRCOG Municipalities.

Municipality	Direct				Business Interruption					Total
	Building	*Contents*	*Inventory*	*Subtotal*	*Income*	*Relocation*	*Rental Income*	*Wage*	*Subtotal*	
Branford	$298,232,000	$322,717,000	$3,573,000	$624,522,000	$55,095,000	$57,947,000	$27,857,000	$69,940,000	$210,839,000	$835,361,000
East Haven	$241,600,000	$272,850,000	$4,395,000	$518,845,000	$57,281,000	$61,828,000	$31,273,000	$67,821,000	$218,203,000	$737,048,000
Guilford	$138,593,000	$166,062,000	$4,146,000	$308,801,000	$29,465,000	$27,782,000	$12,353,000	$35,686,000	$105,286,000	$414,087,000
Hamden	$31,318,000	$79,961,000	$6,562,000	$117,841,000	$10,801,000	$7,187,000	$4,354,000	$24,151,000	$46,493,000	$164,334,000
Madison	$94,405,000	$115,685,000	$1,297,000	$211,387,000	$29,380,000	$25,692,000	$11,174,000	$34,409,000	$100,655,000	$312,042,000
Milford	$477,877,000	$529,006,000	$5,448,000	$1,012,331,000	$78,565,000	$106,674,000	$46,304,000	$103,828,000	$335,371,000	$1,347,702,000
New Haven	$370,544,000	$600,660,000	$21,142,000	$992,346,000	$236,864,000	$107,204,000	$77,496,000	$368,102,000	$789,666,000	$1,782,012,000
North Haven	$34,797,000	$81,686,000	$6,693,000	$123,176,000	$21,270,000	$9,547,000	$6,071,000	$28,402,000	$65,290,000	$188,466,000
Orange	$1,601,000	$3,848,000	$292,000	$5,741,000	$286,000	$229,000	$116,000	$508,000	$1,139,000	$6,880,000
Wallingford	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
West Haven	$210,114,000	$230,232,000	$3,005,000	$443,351,000	$63,546,000	$57,801,000	$37,465,000	$103,485,000	$262,297,000	$705,648,000
SCRCOG	$1,899,081,000	$2,402,707,000	$56,553,000	$4,358,341,000	$582,553,000	$461,891,000	$254,463,000	$836,332,000	$2,135,239,000	$6,493,580,000

Table 79. Category 3 Storm Surge using SLOSH MOM for the SCRCOG Municipalities.

Municipality	Direct				Business Interruption					Total
	Building	*Contents*	*Inventory*	*Subtotal*	*Income*	*Relocation*	*Rental Income*	*Wage*	*Subtotal*	
Branford	$507,095,000	$507,767,000	$5,593,000	$1,020,455,000	$84,905,000	$85,540,000	$41,435,000	$111,541,000	$323,421,000	$1,343,876,000
East Haven	$461,814,000	$496,020,000	$8,935,000	$966,769,000	$93,534,000	$98,689,000	$51,613,000	$129,472,000	$373,308,000	$1,340,077,000
Guilford	$239,330,000	$275,015,000	$6,225,000	$520,570,000	$49,958,000	$42,887,000	$19,343,000	$72,513,000	$184,701,000	$705,271,000
Hamden	$88,400,000	$142,871,000	$9,997,000	$241,268,000	$17,518,000	$15,226,000	$9,016,000	$37,359,000	$79,119,000	$320,387,000
Madison	$213,496,000	$247,794,000	$2,455,000	$463,745,000	$53,679,000	$48,581,000	$21,367,000	$76,612,000	$200,239,000	$663,984,000
Milford	$885,792,000	$908,182,000	$9,659,000	$1,803,633,000	$124,435,000	$163,580,000	$72,928,000	$163,130,000	$524,073,000	$2,327,706,000
New Haven	$1,106,633,000	$1,608,167,000	$38,762,000	$2,753,562,000	$781,639,000	$292,115,000	$221,807,000	$768,934,000	$2,064,495,000	$4,818,057,000
North Haven	$98,808,000	$214,636,000	$17,031,000	$330,475,000	$44,624,000	$21,835,000	$13,817,000	$60,922,000	$141,198,000	$471,673,000
Orange	$4,261,000	$9,746,000	$733,000	$14,740,000	$740,000	$651,000	$337,000	$1,328,000	$3,056,000	$17,796,000
Wallingford	$201,000	$509,000	$35,000	$745,000	$162,000	$44,000	$26,000	$102,000	$334,000	$1,079,000
West Haven	$505,036,000	$563,685,000	$6,445,000	$1,075,166,000	$124,583,000	$109,506,000	$70,183,000	$214,632,000	$518,904,000	$1,594,070,000
SCRCOG	$4,110,866,000	$4,974,392,000	$105,870,000	$9,191,128,000	$1,375,777,000	$878,654,000	$521,872,000	$1,636,545,000	$4,412,848,000	$13,603,976,000

Table 80. Category 4 Storm Surge using SLOSH MOM for the SCRCOG Municipalities.

Municipality	Direct				Business Interruption					Total
	Building	*Contents*	*Inventory*	*Subtotal*	*Income*	*Relocation*	*Rental Income*	*Wage*	*Subtotal*	
Branford	$795,004,000	$745,017,000	$8,693,000	$1,548,714,000	$125,642,000	$120,224,000	$59,007,000	$165,323,000	$470,196,000	$2,018,910,000
East Haven	$789,981,000	$771,735,000	$13,976,000	$1,575,692,000	$134,817,000	$139,592,000	$74,202,000	$218,525,000	$567,136,000	$2,142,828,000
Guilford	$392,918,000	$419,635,000	$9,111,000	$821,664,000	$81,558,000	$64,145,000	$29,844,000	$119,443,000	$294,990,000	$1,116,654,000
Hamden	$140,487,000	$179,761,000	$11,215,000	$331,463,000	$21,754,000	$20,195,000	$12,004,000	$44,312,000	$98,265,000	$429,728,000
Madison	$463,484,000	$495,034,000	$5,287,000	$963,805,000	$90,007,000	$81,551,000	$36,624,000	$145,305,000	$353,487,000	$1,317,292,000
Milford	$1,470,817,000	$1,387,349,000	$17,472,000	$2,875,638,000	$199,565,000	$240,334,000	$110,603,000	$265,712,000	$816,214,000	$3,691,852,000
New Haven	$2,306,749,000	$2,961,500,000	$55,557,000	$5,323,806,000	$1,283,464,000	$498,314,000	$381,139,000	$1,465,563,000	$3,628,480,000	$8,952,286,000
North Haven	$215,049,000	$381,387,000	$26,650,000	$623,086,000	$78,933,000	$40,860,000	$26,211,000	$104,359,000	$250,363,000	$873,449,000
Orange	$10,891,000	$24,849,000	$1,798,000	$37,538,000	$1,658,000	$1,447,000	$787,000	$3,004,000	$6,896,000	$44,434,000
Wallingford	$2,039,000	$4,440,000	$330,000	$6,809,000	$1,221,000	$386,000	$231,000	$789,000	$2,627,000	$9,436,000
West Haven	$997,272,000	$981,536,000	$12,127,000	$1,990,935,000	$186,124,000	$166,812,000	$109,385,000	$316,467,000	$778,788,000	$2,769,723,000
SCRCOG	$7,584,691,000	$8,352,243,000	$162,216,000	$16,099,150,000	$2,204,743,000	$1,373,860,000	$840,037,000	$2,848,802,000	$7,267,442,000	$23,366,592,000

FEMA Public Assistance

The most recent tropical storm event that resulted in PA distributions was Tropical Storm Isaias. The regional total received from this event was $3,915,143. Prior to that, Hurricane Sandy was the most impactful hurricane event for the region within the past decade. Table 69 summarizes the hurricane losses received by each community since 2012, along with annualized hurricane estimates for those communities and the Region. Losses for these communities can be attributed to hurricane related hazards other than flood, which is summarized in the previous section. It is important to note that these values are the total project costs, so ultimately the total value of losses attributed to hurricanes. The PA received is typically between 75% and 85% of the total losses.

Table 81. Annualized hurricane losses for the Region based on FEMA Public Assistance.

Community	Hurricane Losses since 2012	Annualized Flood Estimates
Bethany	$290,967	$29,097
Branford	$2,391,851	$239,185
East Haven	$1,060,663	$106,066
Guilford	$746,161	$74,616
Hamden	$1,069,125	$106,913
Madison	$253,114	$25,311
Meriden	$260,948	$26,095
Milford	$2,509,071	$250,907
New Haven	$2,794,203	$279,420
North Branford	$29,563	$2,956
North Haven	$1,004,470	$100,447
Orange	$985,672	$98,567
Wallingford	$1,534	$153
West Haven	$1,066,517	$106,652
Woodbridge	$1,224,689	$122,469
Total for the Region	$16,349,272	$1,634,927

Sea Level Rise

As noted in Section 4.9.7, losses associated with sea level rise cannot be attributed only to the relative rise. Instead, the incremental losses associated with more frequent and damaging coastal floods and coastal erosion are an appropriate measure of sea level rise losses. Unfortunately, sufficient data is not yet available to quantify the incremental losses attributed to sea level rise. Certainly, a significant fraction of the $24 million in erosion-related costs for the SCRCOG region is attributable to sea level rise, but not all of this figure given that Connecticut has been nourishing its beaches for many decades. Over the next five to ten years, additional flood loss data will help characterize losses due to sea level rise.

Severe Thunderstorm

The NOAA NCEI has reported losses for both hail and thunderstorm related. Some of these losses have been reported for the May 2018 severe storm event which has also been summarized under tornado losses for FEMA Public Assistance. Total NCEI reported losses for the region since 2017 for are $285,500; within the past decade losses are $375,750 ($5,000 for hail and $370,750 for severe winds).

Table 82. Annualized Hail Loss Estimates Based on NOAA NCEI.

Community	Losses from Hail since 2012	Annualized Loss Estimates for Hail
Wallingford	$5,000	$500
Grand Total	$5,000	$500

Table 83. Annualized Thunderstorm Wind Loss Estimates Based on NOAA NCEI.

Community	Losses from Thunderstorm Wind since 2012	Annualized Loss Estimates for Thunderstorm Wind
Bethany	$50,000	$5,000
Branford	$70,000	$7,000
Guilford	$46,000	$4,600
Hamden	$40,500	$4,050
Madison	$8,000	$800
Meriden	$7,500	$750
Milford	$2,000	$200

Community	Losses from Thunderstorm Wind since 2012	Annualized Loss Estimates for Thunderstorm Wind
New Haven	$40,000	$4,000
North Branford	$15,000	$1,500
North Haven	$24,000	$2,400
Orange	$11,000	$1,100
Wallingford	$20,000	$2,000
West Haven	$34,000	$3,400
Woodbridge	$2,750	$275
Grand Total	$370,750	$37,075

The 2019 Connecticut Natural Hazard Mitigation Plan provides an annualized loss estimate for severe thunderstorms in Table 2-77 based on figures compiled by the NCEI. The total annual loss for New Haven County is $53,115. The downscaled annual loss for the 15 municipalities of the SCRCOG region based on the year 2020 census population is $35,037. These figures are very similar to those developed using ten years of NCEI data through 2022.

Severe Winter Storm/Nor'easter

FEMA PA

The winter storm event that resulted in PA distributions was the January 2015 severe winter storms and Winter Storm Nemo in 2013. The regional total received from these events was $10,855,803. Table 84 summarizes the winter storm losses received by each community since 2012, along with annualized estimates for those communities and the Region. It is important to note that these values are the total project costs, so ultimately the total value of losses attributed to winter storms. The PA received is typically between 75% and 85% of the total losses.

Table 84. Annualized Winter Storm Loss Estimates for the Region Based on FEMA Public Assistance.

Community	Losses from 2015 and 2013 Winter Storm Disaster Events	Annualized Loss Estimates for Winter Events
Bethany	$161,805	$16,180
Branford	$391,835	$39,184
East Haven	$87,792	$8,779

Community	Losses from 2015 and 2013 Winter Storm Disaster Events	Annualized Loss Estimates for Winter Events
Guilford	$457,446	$45,745
Hamden	$1,511,205	$151,120
Madison	$155,877	$15,588
Meriden	$1,508,642	$150,864
Milford	$617,127	$61,713
New Haven	$2,922,147	$292,215
North Branford	$411,077	$41,108
North Haven	$426,332	$42,633
Orange	$335,878	$33,588
Wallingford	$549,660	$54,966
West Haven	$952,905	$95,291
Woodbridge	$377,929	$37,793
Grand Total	$10,867,656	$1,086,766

The 2019 Connecticut Natural Hazard Mitigation Plan provides an annualized loss estimate for severe winter storms in Table 2-33 based on figures compiled by the NCEI. The total annual loss for New Haven County is $179,972. The downscaled annual loss for the 15 municipalities of the SCRCOG region based on the year 2020 census population is $118,718. These figures are an order of magnitude lower than those developed using ten years of FEMA PA figures. This is likely due to the difference in the methods. FEMA PA figures typically capture extreme events rather than the typical year-to-year losses captured by NCEI data. True annual winter storm losses for the SCRCOG region are likely somewhere between these two extreme figures.

Tornado

FEMA PA

Though not common to the region, SCRCOG communities received FEMA Public Assistance for a tornado event in May 2018. The regional total received for six communities was $8,187,833. Table 85 summarizes the tornado related losses received by each community since 2012, along with annualized estimates for those communities and the Region. It is important to note that these values are the total

project costs, so ultimately the total value of losses attributed to winter storms. The PA received is typically between 75% and 85% of the total losses.

Table 85. Annualized Tornado Loss Estimates for the Region Based on FEMA Public Assistance.

Community	Losses from 2018 Tornado Event	Annualized Loss Estimates for Tornado Events
Bethany	$843,904	$84,390
Hamden	$4,982,060	$498,206
Madison	$34,736	$3,474
North Haven	$543,405	$54,341
Wallingford	$1,765,416	$176,542
Woodbridge	$30,163	$3,016
Grand Total	$8,187,833	$818,783

The 2019 Connecticut Natural Hazard Mitigation Plan provides an annualized loss estimate for tornado events in Table 2-84 based on figures compiled by the NCEI. The total annual loss for New Haven County is $8,520,115. The downscaled annual loss for the 15 municipalities of the SCRCOG region based on the year 2020 census population is $5,620,290. These figures are much higher than those developed using FEMA PA figures divided over ten years. This is due to the infrequent nature of tornado damage. Both FEMA PA and NCEI captured the significant costs associated with the events of 2018. True annual tornado losses for the SCRCOG region are likely somewhere between these two extreme figures.

Wildland Fire

The 2019 Connecticut Natural Hazard Mitigation Plan provides an annualized loss estimate for wildfire events in Table 2-101 based on figures compiled by the National Interagency Fire Center (NFIC). The total annual loss for the SCRCOG region based on the year 2020 census population is $357,584.

5.2.6 Future Loss Estimates Summary

The following table summarizes the individual loss figures developed in the preceding section. The final two columns provide a statement about whether losses will increase in the next five to ten years, and a planning-level figure that represents loss estimates for the hazard.

Table 86. Future Loss Estimates for the SCRCOG Region.

Hazard	Sources of Loss Estimates	Annualized or Annual Loss	Will Losses Increase?	Planning Figure Annual Loss Estimates
Coastal Erosion	Beach nourishment and living shoreline needs	$2,400,000	Likely	$3,000,000
Dam Failure	2019 CT HMP: NPDP	$22,385	Unlikely	$20,000
Drought	USDA	$59,305	Likely	$100,000
Drought	2019 CT HMP: NCEI	$10,798		
Earthquake	FEMA P-366	$1,078,215	Unlikely	$1,000,000
Earthquake	HAZUS (Moodus event)	---		
Extreme Heat	None	---	Likely	Additional Study Needed
Flood (Riverine)	HAZUS Annualized	$35,099,000	Likely	$5,000,000 or more
Flood (Riverine)	HAZUS 10% to 0.2%	---		
Flood (Storm Surge)	HAZUS Cat 1, 2, 3, 4	---		
Flood (All)	PA	$232,981		
Flood (All)	NFIP	$3,704,263		
Flood (All)	IA (Sandy and Ida)	$481,812		
Hurricanes	HAZUS Probabilistic	---	Likely	$2,000,000
Hurricanes	FEMA PA	$1,634,927		
Sea Level Rise	None	---	Will increase flood and erosion losses	See other figures
Severe Thunderstorm	NCEI direct calculation	$37,575	Likely	$50,000
Severe Thunderstorm	2019 CT HMP: NCEI	$35,037		

Hazard	Sources of Loss Estimates	Annualized or Annual Loss	Will Losses Increase?	Planning Figure Annual Loss Estimates
Severe Winter Storm	FEMA PA	$1,086,766	Uncertain	$500,000
Severe Winter Storm	2019 CT HMP: NCEI	$118,718		
Tornado	FEMA PA	$818,783	Uncertain	$5,000,000
Tornado	2019 CT HMP: NCEI	$5,620,290		
Wildfire	2019 CT HMP: NFIC	$357,584	Uncertain	$300,000

Overall, the SCRCOG region is likely to continue experiencing losses from the hazards profiled in this plan, with annual loss totals in the tens of millions (dollars) for the entire region.

5.2.7 Priority Risk Index

The vulnerability assessments completed for each participating municipality include both quantitative and qualitative information to help determine the potential impact of each identified hazard on community assets. These findings were used in combination with the information included in the *Hazard Analysis* section to prioritize hazard risks for the South Central Region during development of the initial plan.

To assist in this process, the Advisory Committee developed and applied a "Priority Risk Index" (PRI). The PRI is a tool designed to (1) summarize relevant hazard profile information and (2) measure the degree of relative risk each hazard poses to the planning area based on that information. The PRI was used to assist the Advisory Committee in ranking and prioritizing hazards based on a variety of characteristics including location, probability, potential impact, warning time, and duration.

The PRI resulted in numerical values that allow identified hazards to be ranked against one another – the higher the PRI value, the greater the hazard risk. PRI values were obtained by assigning varying degrees of risk to each of the five characteristics, or categories. Each degree of risk was assigned an index value (1 to 4) and an agreed upon weighting factor. This process was used for the previous two editions of this plan.

During this update, the ranges of indices for "location," "potential impact," "warning time," and "duration" were expanded from 1-4 to 1-5, with the new higher indices (5) designating social vulnerability combined with the highest choice that was previously ranked 4. For example, the largest

location was previously ranked 4, but is now ranked 5 if it includes areas of social vulnerability. Scores that were previously ranked 1-3 were not "upscored" for social vulnerability; for example, a tornado remained at "1" because this hazard could occur anywhere and does not tend to favor areas with high social vulnerability.

For "probability," the scale was revised to portray risks more accurately from "rare" to "highly likely." As in the previous editions of this plan, to calculate the PRI value for a given hazard, the assigned index value for each category is multiplied by the weighting factor. The sum of all five categories equals the final PRI value, as demonstrated in the below equation:

PRI VALUE = (LOCATION x .20) + (PROBABILITY x .30) + (POTENTIAL IMPACT x .30) + (WARNING TIME x .10) + (DURATION x .10)

According to the weighting scheme applied for the South Central Region, the highest possible PRI value is 5 (up from 4 in the previous editions). Prior to being finalized, PRI values for each hazard were reviewed and accepted by the Advisory Committee.

Table 87. Priority Risk Index.

PRI Category	DEGREE OF RISK			Assigned Weighing Factor
	Level	**Criteria**	**Index Value**	
Location	Negligible	Less than 1% of planning area affected	1	20%
	Small	1-10% of planning area affected	2	
	Moderate	10-50% of planning area affected	3	
	Large	50-100% of planning area affected	4	
	Large SVI	50-100% of planning area affected including mostly SVI	5	
Probability	Rare	Less than 1% annual probability (i.e. 500-yr flood)	1	30%
	Unlikely	1-10% annual probability (i.e. 10 to 100 yr flood)	2	
	Moderate	10-50% annual probability (i.e. 2 to 10 yr flood)	3	
	Likely	50-90% annual probability (i.e. 1.1 to 2 yr flood)	4	
	Highly Likely	90-100% annual probability (i.e. 1 to 1.1 yr flood)	5	
Potential Impact *	Minor	Very few injuries, if any. Only minor property damage and minimal disruption to quality of life. Partial or complete shutdown of critical facilities for less than one day.	1	30%
	Limited	Minor injuries only. 10-25% of property in affected area damaged or destroyed. Complete shutdown of critical facilities for more than one day.	2	

	Critical	Multiple fatalities/injuries possible. More than 25% of property in affected area damaged or destroyed. Complete shutdown of critical facilities for more than one week.	3	
	Catastrophic	High number of fatalities/injuries possible. More than 50% of property in affected area damaged or destroyed. Complete shutdown of critical facilities for more than one month.	4	
	Catastrophic SVI	High number of fatalities/injuries possible in mostly SVI area. More than 50% of property in affected area damaged or destroyed, including mainly SVI areas. Complete shutdown of critical facilities for more than one month, including critical facilities serving SVI.	5	
Warning Time	More than 24 hours		1	10%
	12 to 24 hours		2	
	6 to 12 hours		3	
	Less than 6 hours		4	
	Less than 6 hours and barriers to messaging in SVI areas		5	
Duration	Less than 1 day		1	10%
	1 to 2 days		2	
	2 to 7 days		3	
	More than 1 week		4	
	More than 1 week in mostly SVI areas		5	

Table 88. Estimated Probably Extent.

Hazard	Maximum Probable Extent
Extreme Temperatures	5 consecutive days with a heat index exceeding 100° or wind chill of less than 20°
Hurricane/Tropical Storm	Category 3 hurricane on Saffir-Simpson Hurricane Wind Scale
Severe Thunderstorm	Winds gusts in excess of 50 knots, hail measuring at least three-quarters of an inch in diameter, or tornado occurrence
Severe Winter Storm/Nor'easter	Intensity Index Category 3 on Classification Scale for Severe Winter Storms/Nor'easters
Tornado	EF-3 Rating on Enhanced Fujita Scale
Coastal Erosion	Long-term erosion rate of 2+ feet per year
Dam Failure	Complete failure of high hazard dam (Class C)
Drought	PDSI Value of -4.0 (Extreme Drought) on Palmer Drought Severity Index

Hazard	Maximum Probable Extent
Flood (3 Types):	
Riverine Flood	1 Percent Annual Chance Flood for all inland FEMA Special Flood Hazard Areas
Coastal Flood	Worst Case Storm Surge Inundation for Category 2 Hurricane
Urban Flood	10-year Design Storm Event
Sea Level Rise	1-meter SLR scenario for 2080s, no storm, medium inundation zone as mapped by The Nature Conservancy
Earthquake	Intensity VII on Modified Mercalli Intensity scale
Wildfire	100 acres burned along urban/wildland interface

Table 89 summarizes the degree of risk assigned for all identified hazards in the South Central Region based on the application of the PRI tool, along with the calculated PRI values.

Table 89. Summary of PRI results.

Hazard	Category / Degree of Risk					
	Location	**Probability**	**Potential Impact**	**Warning Time**	**Duration**	**PRI score**
Extreme Temperatures	5 (Large SVI)	5 (Very likely)	3 (Critical)	1 (>24 hr)	3 (2-7 days)	3.8
Hurricane/Tropical Storm	5 (Large SVI)	3 (Moderate)	3 (Critical)	1 (>24 hr)	3 (2-7 days)	3.2
Severe Thunderstorm	3 (Moderate)	5 (Very likely)	2 (Limited)	3 (6-12 hr)	1 (<1 day)	3.1
Severe Winter Storm/Nor'easter	5 (Large & SVI)	5 (Very likely)	2 (Limited)	1 (>24 hr)	3 (2-7 days)	3.5
Tornado	1 (Negligible)	3 (Moderate)	4 (Catastrophic)	4 (<6 hr)	3 (2-7 days)	3
Coastal Erosion	2 (Small)	5 (Very likely)	1 (Minor)	1 (>24 hr)	4 (>1 wk)	2.7
Dam Failure	1 (Negligible)	1 (Rare)	5 (Catastrophic SVI)	3 (6-12 hr)	2 (1-2 days)	2.5

Drought	5 (Large & SVI)	3 (Moderate)	2 (Limited)	1 (>24 hr)	5 (>1 wk & SVI)	3.1
Riverine Flood	3 (Moderate)	3 (Moderate)	5 (Catastrophic & SVI)	2 (12-24 hr)	3 (2-7 days)	3.5
Coastal Flood	2 (Small)	4 (Likely)	5 (Catastrophic & SVI)	2 (12-24 hr)	3 (2-7 days)	3.6
Urban Flood	3 (Moderate)	5 (Very likely)	2 (Limited)	3 (6-12 hr)	2 (1-2 days)	3.2
Earthquake	5 (Large & SVI)	1 (Rare)	2 (Limited)	4 (<6 hr)	4	2.7
Wildfire	1 (Negligible)	3 (Moderate)	2 (Limited)	2 (12-24 hr)	2 (1-2 days)	2.1

The calculated PRI values were used to classify each hazard according to three defined risk levels (low, moderate, or high) as show in Table 90. It should be noted that although some hazards are classified as posing "low" risk, their occurrence of varying or unprecedented magnitudes is still possible and will continue to be evaluated by each participating municipality and during future plan updates.

Table 90. hazard risk Rating Conclusions.

High Hazards (3.5 through 3.8)	Extreme Temperatures Coastal Flood Riverine Flood Severe Winter Storm/Nor'easter
Moderate Hazards (3.1 through 3.4)	Urban Flood Hurricane/Tropical Storm Drought Severe Thunderstorm
Low Hazards (3.0 and under)	Tornado Coastal Erosion Earthquake Dam Failure Wildfire

Extreme temperatures moved up to the "high" category and droughts moved up to the "moderate" category relative to the last edition of this plan. This is consistent with the State's attention to extreme heat risks and droughts.

5.3 Problem Statements

The problem statements from the previous edition of this plan have been updated to reflect municipality input and conclusions from *Resilient Connecticut*. They continue to be structured as before, with "primary hazards of concern" followed by "geographic areas of concern" and finally "vulnerable community assets." Problem statements for each municipality are in their Municipal Annex.

5.4 Risk Conclusion Statement

Based on the hazard profiles, loss estimates, results of *Resilient Connecticut*, and the State's attention to extreme heat impacts, this hazard mitigation plan focuses its mitigation strategy on the same hazards as the previous editions (different types of flooding, severe storm events) with the addition of extreme heat events and droughts.

Chapter 6. Capability Assessment

C1. Does the plan document each jurisdiction's existing authorities, policies, programs and resources and its ability to expand on and improve these existing policies and programs? FEMA Requirement §201.6(c)(3)

The purpose of conducting the capability assessment is to identify the strengths, weaknesses, gaps, and opportunities for local governments within the planning area in terms of mitigating risks. Coupled with the risk assessment, the capability assessment serves as the foundation for designing an actionable and effective hazard mitigation strategy. It not only helps establish the goals for the mitigation plan, but it ensures that those goals are realistically achievable under existing local conditions. As in any planning process, it is important to establish which activities are feasible based on the organizational capacity of those agencies or departments tasked with their implementation. This assessment also helps to identify any critical capability gaps or shortfalls to be addressed through future actions, as well the key strengths or positive measures already in place which should continue to be supported or enhanced when opportunities arise.

The capability assessment also addresses three key planning requirements: (1) the documentation of each municipality's existing authorities, policies, programs and resources, and its ability to expand on and improve these existing policies and programs[101]; (2) the review and incorporation of existing plans, studies, reports, and technical information[102]; and (3) each municipality's participation in the NFIP and continued compliance with NFIP requirements, as appropriate?[103]

The capability assessment completed for the SCRCOG region includes a comprehensive examination of all relevant mitigation capabilities as summarized in Table 91. All information has been updated for the 2023 plan as necessary, and more detailed information on each participating municipality's capabilities is provided in the individual annexes prepared for this plan update.

Table 91. Capability Assessment Components.

Components	Description
Planning and Regulatory Capabilities	Local plans, policies, codes, and ordinances that are relevant to reducing the potential impacts of hazards.
Administrative and Technical Capabilities	Local human resources and their skills/tools that can be used to support mitigation activities.

[101] 44 CFR 201.6(c)(3)
[102] 44 CFR 201.6(b)(3)
[103] 44 CFR 201.6(c)(3)(ii)

Components	Description
Financial Capabilities	Fiscal resources the community has access to for helping to fund the implementation of hazard mitigation projects.
Education and Outreach Capabilities	Local programs and methods already in place that can be used to support mitigation activities.
NFIP Participation and Compliance	Summary of information relevant to the community's participation in the NFIP and continued compliance with NFIP requirements.

6.1 Review and Incorporation of Existing Plans

A4. Does the Plan describe the review and incorporation of existing plans, studies, reports, and technical information? FEMA Requirement §201.6(b)(3)

The first step in completing the updated capability assessment was to gather and review any new or updated plans (since 2018) to help gain a current understanding of each municipality's ability to mitigate risk. In addition to the review of local plan documents, this included a review of any updated versions of the most relevant state and regional level plans incorporated into previous versions of this plan as described below.

2019 Connecticut Natural Hazards Mitigation Plan Update

The State of Connecticut, Department of Emergency Services and Public Protection (DESPP), Division of Emergency Management and Homeland Security, and the Department of Energy and Environmental Protection (DEEP), Department of Energy and Environmental Protection, prepared the 2019 Natural Hazard Mitigation Plan as an update to the earlier 2014 plan. The 2019 plan provides guidance for hazard mitigation activities within Connecticut went through a full revision using the best available data and subject matter experts for the required update. This updated state-level plan was thoroughly reviewed to ensure continued consistency with this multi-jurisdictional plan for the SCRCOG region. For example, the State's primary mitigation goal statements were reviewed and considered by the Advisory Committee during the review and discussion on updating their own goals for the regional plan. In addition, the State's Natural Hazard Identification and Risk Assessment (Chapter 2) and Capability Assessment (Chapter 3) were reviewed for notable updates and content that could help inform updates to the corresponding assessments for the South Central region. It was also recognized that the State has continued to place emphasis on the inclusion of climate change as a key concern and as an amplifier of many existing natural hazards, something that has been replicated in this plan.

State Plan of Conservation and Development, 2018-2023

The Connecticut Office of Policy and Management prepares a State Plan of Conservation and Development (State C&D Plan, also known as the POCD), every five years. The 2018-2023 State C&D Plan was adopted on May 4, 2022. Review of this updated plan indicates the mitigation plan still aligns

with the priorities of the State. Three of the six growth management principles in this plan directly relate to mitigation and risk management, as follows:

- Growth Management Principle #4: Conserve and restore the natural environment, cultural and historic resources, and traditional rural lands.
- Growth Management Principle #5: Protect and ensure the integrity of environmental assets critical to public health and safety.
- Growth Management Principle #6: Promote integrated planning across all levels of government to address issues on a statewide, regional, and local basis.

In addition, several state agency policies cited in the plan directly support hazard mitigation. For example, Policy 1.13 is to "Minimize the potential risks and impacts from natural hazards, such as flooding, high winds, and wildfires, when siting infrastructure and developing property. Consider potential impacts of climate change on existing and future development."[104]

South Central Region: Plan of Conservation and Development, 2018-2028

The South Central Regional Plan of Conservation and Development is a general guide for land use conservation and development for the fifteen member municipalities of the SCRCOG region. The chapters and content of plan is determined by State Statute (CGS 8- 35a) and must be consistent with the State C&D Plan described above. The regional POCD is updated at least once every ten years and sets policy priorities for the future of the region. This plan was last updated in 2017 through a participatory process and reviewed extensively with local planning staff and the Regional Planning Commission (RPC) in coordination with local chief elected officials. The plan became officially adopted on June 27, 2018.

The regional POCD is organized around three broad themes: the human environment, the natural environment, and the built environment. While these themes help to present the information and objectives of the region in a cohesive manner, no one theme operates independently of the others. The objectives in any one thematic area are intended to support the guiding vision and objectives of all three "environments' of the region.

The POCD supports the region's ability to reduce risks to natural hazards and now includes multiple cross references to the SCRCOG Hazard Mitigation Plan. It has integrated the notion of resilience across all three broad themes identified above, and there is also an explicit goal focused on coastal resilience. Below are some specific strategies determined to be of most relevance to and supportive of this hazard mitigation plan:

- Continue to update and adopt natural hazard mitigation plan for the region in a timely manner to prepare, adapt, and recover quickly from severe weather events by securing necessary federal and state grants for pre-/post-disaster mitigation.

104 Conservation & Development Policies: The Plan for Connecticut, 2018-2023, p. 8.

- Continue to promote and update regional disaster mitigation planning to protect critical agricultural lands and animal species from intensive flooding and to plan for wildfires based on forest and grassland ecosystem management principles.
- Support and promote the education of regional residents and business-owners regarding projected changes to coastal lands and resources, and the need and basis for resiliency strategies.
- Support and promote implementation of identified coastal resilience projects in the Region, including identifying funding and resources to help advance projects.
- Ensure that regional transportation projects consider and incorporate science-based sea level rise and resiliency information and a cost-benefit analysis that includes long-term maintenance costs, as much the Region's critical infrastructure is located along the coast.
- Encourage updates to local floodplain ordinances to meet or exceed Federal Emergency Management Agency (FEMA) requirements.
- Promote effective stormwater management strategies to reduce runoff from impervious surfaces and minimize flooding; increase the capacity of drainage systems through sewer separation in areas with combined sewers; promote low impact developments.
- Educate communities on the financial benefits of FEMA's Community Rating System program and assist them in participating in the program.
- Collaborate with partners within and outside the region, including neighboring regions to provide and seek technical assistance, to avoid duplication of efforts, and to develop a coordinated response for dealing with natural disasters.
- Explore funding opportunities to advance conceptual designs developed as part of the Regional Framework for Coastal Resilience in Southern CT, projects identified as part the SCRCOG Mitigation Plan Update, and projects identified as part of the municipal coastal resilience efforts.
- Facilitate coordination between towns, Division of Emergency Management and Homeland Security (DEMHS), Department of Public Health (DPH) and utilities to ensure critical utility infrastructure is prioritized for maintenance and restoration in the event of disasters and emergencies, and to install stronger, storm/flood resistant new infrastructure including telephone poles and transmission wires to prepare for future storms.

South Central Regional Metropolitan Transportation Plan, 2019-2045

The South Central Regional Metropolitan Transportation Plan (MTP) addresses broad goals for the transportation needs of the region and outlines the ways the region plans to invest in the transportation system through 2045. It was prepared by SCRCOG in cooperation with the U.S. Department of Transportation (USDOT), Federal Highway Administration (FHWA), Federal Transit Administration (FTA) and the Connecticut Department of Transportation (CTDOT). The plan is designed to provide overall direction for the region on major policy issues on all modes of transportation. It includes both long-

range and short-range program strategies/actions that can lead to the development of an integrated intermodal transportation system that facilitates the efficient movement of people and goods. That said, the plan is fiscally constrained, with many of the initiatives, services, and infrastructure needs identified within the document beyond existing budgets and current funding resources.

Several major goals of the Regional MTP are notable for informing the hazard mitigation plan. This includes those addressing aging infrastructure and climate change. The plan recognizes that portions of the region's infrastructure were constructed many years ago, and while improvements have been made, needs for modernization and enhancements remain and the region must ensure that its infrastructure is maintained, upgraded, and enhanced as appropriate. The plan is also mindful of the impacts of transportation on the environment and the environment on transportation, noting that the region encourages wise transportation decisions that reduce emissions of greenhouse gasses and improve coastal resiliency, while providing improved transportation choices throughout the region. These decisions will reflect the varying character of the region and will involve different solutions for densely populated and rural sections.

Local Plans of Conservation and Development

Connecticut General Statutes set forth required procedures by which each municipality must prepare or amend and adopt a Plan of Conservation and Development (POCD). In Connecticut, POCDs are essentially the local municipality's master or comprehensive plan – a long-range, visionary and policy document to guide how the community wants to develop over the next 10 years, and it supports local decision making in areas such as natural resources preservation, economic development, housing, land use, and public services. Given their direct relevance and significance to long-term hazard risk reduction, all current versions of formally adopted POCDs for participating municipalities were reviewed during the plan update process to ensure general consistency and integration as appropriate. Content from each POCD that is particularly relevant to this hazard mitigation plan is detailed in each municipal annex (under Section 4: Capabilities) and thereby incorporated by reference.

Coastal Resilience Plans

To help build and enhance the long-term resilience of coastal areas specifically, five municipalities in the region had previously prepared and adopted their own Coastal Resilience Plans including Branford (June 2016), Guilford (May 2014), Madison (June 2016), Milford (June 2016), and West Haven (March 2017). Preparation of these plans were funded through the U.S. Department of Housing and Urban Development's (HUD's) Community Development Block Grant Disaster Recovery Program (CDBG-DR). These funds were allocated to HUD through the 2013 Disaster Relief Appropriations Act, which designated aid assistance for communities affected by Hurricane Sandy.

The planning process used to prepare the plans was loosely based on the coastal resilience planning process established in 2011-2012 by The Nature Conservancy (TNC) to address the current and future social, economic, and ecological resilience of the shoreline to the impacts of sea level rise and

anticipated increases in the frequency and severity of storm surge, coastal flooding, and erosion. The process included four general steps, including:

- Generate awareness of coastal risks.
- Assess coastal vulnerabilities, risks, and opportunities.
- Identify options or choices for addressing risks.
- Develop and implement an action plan to pursue selected options.

Each of the Coastal Resilience Plans for the municipalities listed above present a menu of municipality and location-specific options that are available to adapt to changing conditions or, at the very least, prepare for the future events like Hurricane Sandy. Each plan has been reviewed for consistency and integration with this plan as appropriate, including the addition of some higher priority projects or activities into the Mitigation Strategy. These specific projects and activities were included in each applicable municipality's mitigation action plan during the 2018 plan update and have carried forward as appropriate in the Mitigation Strategy.

Regional Framework for Coastal Resilience for Southern Connecticut

In addition to the local Coastal Resilience Plans, SCRCOG, in association with Metropolitan Regional Council of Governments (MetroCOG) and the Nature Conservancy (TNC), developed a *Regional Framework for Coastal Resilience for Southern Connecticut* in 2017 (regional framework). The regional framework addresses strategies for reducing coastal flooding risks for seven communities in SCRCOG (Milford, West Haven, New Haven, East Haven, Branford, Guilford, and Madison) and three communities in MetroCOG (Fairfield, Bridgeport, and Stratford). Over 300 regional mitigation projects were identified with a primary focus on green infrastructure and hybrid projects, including many that incorporate coastal resilience actions as identified in the local plans. In addition, various hard engineering projects were also proposed by individual towns, such as seawalls and berms. In some cases, state or federal grants and other funding sources are still needed to further analyze, design and implement these projects; though as done for the above-referenced local plans, some of these projects have also been included in each applicable municipality's mitigation action plan.

The Regional Framework, in combination with the municipality-specific Coastal Resilience Plans and the network of other local plans, have helped participating coastal cities and towns integrate hazard risk reduction initiatives across existing community planning and development processes. The figure below is an example of how these local plans have been linked together through various areas of focus that relate to managing hazard risk and resilience throughout the coastal zone.

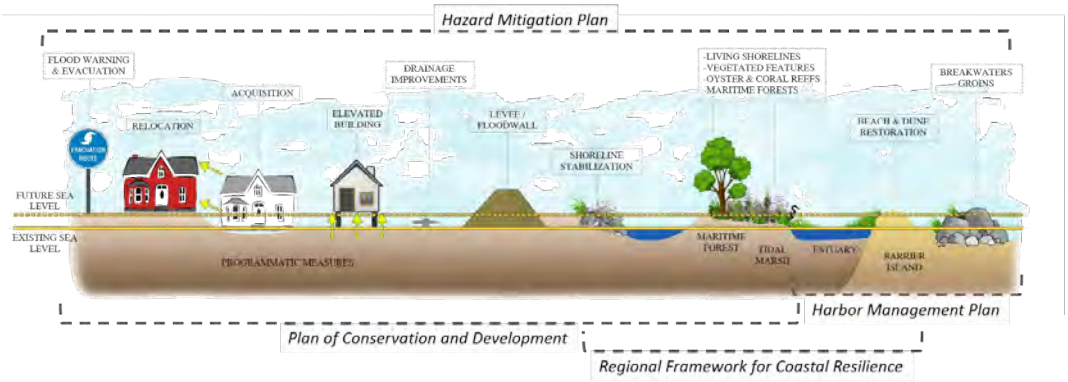


Figure 29. Example of Local Plan Integration, City of West Haven.

Resilient Connecticut

Building upon the previous coastal resilience planning efforts described above, the Connecticut Institute for Resilience and Climate Adaptation (CIRCA) launched *Resilient Connecticut* in coordination with state agencies, regional councils of governments, and municipalities. CIRCA is a multi-disciplinary, center of excellence that brings together experts in the natural sciences, engineering, economics, political science, finance, and law to provide practical solutions to problems arising because of a changing climate. CIRCA's mission) is to increase the resilience and sustainability of communities vulnerable to the growing impacts of climate change on the natural, built, and human environments.

Resilient Connecticut focuses on regional resilience and adaptation planning through engagement and risk assessments that inform municipal to regional scale initiatives and pilot projects. Resilient Connecticut's guiding principle is to establish resilient communities through smart planning that incorporates economic development framed around transit-oriented development, conservation strategies, and critical infrastructure improvements. Beginning in late 2018, CIRCA began creating a regional coastal resilience plan for Fairfield and New Haven Counties. The plan will help establish resilient coastal communities with healthy buffering ecosystems and critical infrastructure that's adapted to withstand occasional flooding; critical services, infrastructure and transport hubs should be resilient and have strong connections. Increasing investment in identified "Resilient Opportunity Areas" (ROARs) will provide an opportunity to increase economic resilience by strongly tying back to the regional transportation network and regional economic opportunities.

Resilient Connecticut is currently in Phase 3 of the process which includes site and implementation plan development, funding strategies, and a synthesis report that will document all project activities along with recommendations for a Connecticut Statewide Resilience Roadmap. All these project development activities have been considered and incorporated into the plan update process as appropriate in the Mitigation Strategy, particularly as it relates to developing more refined scoping and/or conceptual designs and the pursuit of funding for project implementation.

Regional Emergency Support Plan

Due to the lack of county government structure in Connecticut, and to facilitate improved emergency management planning and regional collaboration, the State developed with its local partners, five emergency preparedness regions in 2007. The South Central Region is part of DEMHS[105] Region 2. This 30-municipality area encompasses all the South Central Region municipalities, the Valley Council of Governments (Shelton, Derby, Ansonia, and Seymour), and municipalities in other Council of Governments including Cheshire, Middlefield, Durham, Haddam, Killingworth, Clinton, Chester, Deep River, Essex, Westbrook and Old Saybrook. Each DEMHS Region, working with their Regional Emergency Planning Team (REPT), made up of representatives from all public safety disciplines and planning organizations, releases its own Regional Emergency Support Plan (RESP) and Public Safety documents. The REPT maintains and use a RESP to support mutual aid among regional communities in emergencies. The RESP does not usurp local Incident Command or operational aspects of existing plans. Like traditional mutual aid, the RESP is another support tool for the local CEO and IC and does not interfere with local management of an emergency.

State Historic Preservation Office (SHPO) Reports

Following Hurricane Sandy, the Connecticut State Historic Preservation Office (SHPO) received federal funding to support historic preservation in the state's four coastal counties. The SHPO designed much of its Hurricane Sandy program to promote resiliency for historic properties in the state's coastal communities. Each of the coastal towns in the region received its own report under the SHPO grant (Milford, West Haven, New Haven, East Haven, Branford, Guilford, and Madison). These reports were considered again when identifying mitigation actions for this plan. Actions may include conducting a survey to identify historic resources in areas of risk. The SHPO offers funding for some actions such as these. Each report includes eight categories of resilience strategies that are identified below:

- Strategy 1: Identify Historic Resources
- Strategy 2: Revisit Historic Preservation Regulations and Ordinances
- Strategy 3: Coordinate Regionally and with the State
- Strategy 4: Revisit Floodplain Regulations and Ordinances
- Strategy 5: Incorporate Historic Preservation into Planning Documents
- Strategy 6: Strengthen Recovery Planning
- Strategy 7: Adaptation Measures
- Strategy 8: Educate

South Central Region: Affordable Housing Plans

Beginning in 2020, SCRCOG developed individual municipal Affordable Housing Plans that provided analysis and guidance on how and where each participating municipality can address its housing needs. The plans are compliant with Connecticut General Statute 8-30j and adhere to the process outlined in

[105] CT Department of Emergency Services and Public Protection (DESPP), Division of Emergency Management and Homeland Security (DEMHS).

the "Planning for Affordability in Connecticut: Affordable Housing Plan and Process Guidebook" developed by CT Department of Housing and the Regional Plan Association. Each municipality was required to adopt its plan by no later than June 1, 2022, and at least once every five years thereafter.

These Affordable Housing Plans were reviewed as part of this plan update process but were not deemed particularly relevant for hazard mitigation planning purposes, though some did include supporting language. For example, the housing goals established in the Town of Guilford's plan stated that "new housing locations should avoid environmentally sensitive areas such as wetlands and floodplains, where possible."[106]

Single Jurisdiction Hazard Mitigation Plans

Prior to the most recent update to this regional plan, six municipalities within the SCRCOG region had developed their own single municipality hazard mitigation plans. Except for one municipality, all these previous plans had been reviewed and incorporated into the 2018 version of this plan. The City of Meriden had opted to maintains its own plan at the time, which was most recently updated and adopted in February 2019. As a participant to this regional plan update process for 2023, Meriden's 2019 Hazard Mitigation Plan has been reviewed and incorporated to the maximum extent possible and the City has helped achieve SCRCOG's vision is to create one fifteen-municipality plan.

6.2 Data Gathering Methods

Multiple methods were used to update the inventory and analysis of relevant capability information for the 2023 plan. This includes the use of several survey questionnaires for municipal staff in addition to detailed discussions during the individual municipality meetings held at the beginning of the plan update process. These meetings are discussed in greater detail in the Chapter 3 (Planning Process). In addition, each municipality was given a copy of the latest capability assessment tables and findings as part of the draft plan review process and asked to make any required updates or corrections based on the most current information available.

6.3 Regional Findings

This section provides an overall regional summary of the four main components of local mitigation capabilities for participating municipalities. More detailed information on the key capability findings for each municipality is provided in each respective municipality annex (under Section 4: Capabilities), including additional documentation on the existing local authorities, policies, programs, and resources to support mitigation and each municipality's ability to expand on and improve these existing capabilities.

[106] Guilford Affordable Housing Plan. 2022. P. 46.

6.3.1 Planning and Regulatory Findings

Planning and regulatory capability is based on what plans or regulations exist at the local level and how they are implemented. Their existence and use indicate a municipality's commitment and ability to manage growth, development, natural hazards, and other local issues in a safe and effective manner. All municipalities within Connecticut have developed, adopted, and implemented, locally or on a regional level, several sets of plans and regulations. These plans and regulations are updated on a regular basis either due to a statutory requirement or through normal practices at the local level. Connecticut's 2019 Natural Hazard Mitigation Plan Update describes many of these plans and regulations and their significance to hazard mitigation.

Table 92 includes these descriptions along with some general comments on their effectiveness for hazard mitigation purposes in the SCRCOG region.

Table 92. Local Plans and Regulations Used by Communities.[107]

Plan or Regulations	Significance to Hazard Mitigation	Effective for Hazard Mitigation?
Emergency Operations Plans	Assist local communities in the preparation and implementation of resources prior to and during an emergency, including natural hazard events. The plans are updated as needed and help local communities assess the locations of vulnerable areas within their communities and how to handle these areas during an emergency. This plan may be a good source of information for local risk assessment activities. A new template was issued by DEMHS in 2016, and most communities are working toward a revision toward the new template.	Not directly used for hazard mitigation, but the process of updating the local EOP will help inform vulnerability and risk assessments and will help identify gaps in capabilities at the local level.
Floodplain Management Regulations/ Ordinance or Flood Damage Prevention Regulations/Ordinance	These regulations assist a community in effectively manage its floodplain areas and are typically organized similar to the NFIP regulations. These regulations are usually part of a community's land use regulations (described below). However, depending on the community, they may be a part of the municipal code	Typically, very effective. Some communities may benefit from updating these regulations and more strongly linking the municipal code and zoning regulations (when they are found in both). Local hazard mitigation plans typically recommend these types of modifications.

[107] Connecticut's Natural Hazard Mitigation Plan Update, 2019, Table 3-6 Local Plans and Regulations Used by Communities, p.460.

Plan or Regulations	Significance to Hazard Mitigation	Effective for Hazard Mitigation?
	of ordinances. These regulations may require specific minimum design, construction, or development elements which must be complied with for health and safety reasons.	The State's adoption of the latest International Residential Code (IRC) made significant changes to the elevation requirement for new construction and substantially improved structures in 100-year floodplains, especially coastal floodplains, which may be different than the standards previously contained in local floodplain zoning regulations or ordinance. The current code requires one foot of freeboard in all A, AE, and VE zones; coastal A zones will be regulated like VE zones where the LiMWA is delineated; flood openings will be required in breakaway walls; and essentially facilities must be elevated two feet above the BFE or to the 0.2% annual chance flood elevation.
Zoning Regulations	Primary tool for community for shaping the character and development of a community. Zoning regulations may restrict particular uses or structures from being located in vulnerable areas in a community. These regulations may also require specific minimum design/construction/or development elements which must be complied with for health and safety reasons. If the flood damage prevention regulations are not in the municipal code of ordinances, they are typically in the Zoning Regulations.	Zoning Regulations are typically very effective for mitigating several hazards (flooding, geologic hazards, and wind hazards) because they guide development in flood zones, on slopes, and near sensitive resources; and because they regulate structures and accessories (such as signs) that can be damaged or cause damage during events.
Subdivision Regulations	Important tool for community for shaping the character and development of a community through subdivisions. These regulations often describe how flood prone areas must be addressed, specify minimum and maximum roadway dimensions, specify where utilities may be placed (underground vs. above-ground), and specify how	Subdivision Regulations are typically very effective for mitigating several hazards because they specify how roads and lots should be arranged and appropriately sized for safe access and egress. They may also specify how fire protection should be provided, which helps mitigate for wildfires and wildland fires.

Plan or Regulations	Significance to Hazard Mitigation	Effective for Hazard Mitigation?
	fire protection will be provided. Some elements of the flood damage prevention regulations are often repeated in the Subdivision Regulations.	
Stormwater Regulations	Some communities have developed stormwater regulations or ordinances that are separate than the Zoning and Subdivision Regulations. Stormwater regulations provide requirements for addressing stormwater in connection with development, redevelopment, and road projects.	When available, these regulations are often very effective. Not all communities follow the same principles for managing stormwater. Therefore, local hazard mitigation plans typically include discussion about how to best to manage stormwater.
Wetland Regulations	In Connecticut, all wetland regulations describe wetlands as necessary for a number of functions including flood management. These regulations help a community maintain and protection the integrity of its wetland resources. Wetland areas often coincide with FEMA delineated floodplain areas in a community.	Wetland regulations are most effective for mitigation of flood hazards when setbacks and review areas are very wide. Many communities enforce wide review areas, such as 100 feet or greater, which aids mitigation. Examples of 200 feet are found in some communities.
Local Adoption of CT State Building Code	Critical to maintain adequate safety and building integrity factors in construction. In addition, these codes may limit structure size, type or place additional requirements in the construction of structures located in a identified hazard area (i.e., high wind, coastal, floodplain, wildland/urban interface area, etc.).	Very effective. All local communities must adopt and enforce the current State Building Code. Effective October 1, 2022, the Office of the State Building Inspector (OSBI) amended the previous State Building Code to conform with the International Code Council's widely adopted 2021 International Codes. * *More information on the 2022 Connecticut State Building Code is provided below this table.*
Local Plan of Conservation and Development	Primary plan that helps guide a community in its land use and management decisions with regard to development and conservation and/or preservation of open space.	These plans are effective when communities use them to modify zoning districts and regulations, acquire open space, and actively guide development and infrastructure expansions. Because the plans are updated

Plan or Regulations	Significance to Hazard Mitigation	Effective for Hazard Mitigation?
		once per decade, many communities are now incorporating discussions about natural hazards and climate change for the first time in the updated plans.
Local Municipal Coastal Programs	Assists local coastal communities with development and management of coastal resources and preventing adverse impacts on coastal resources. As the municipal coastal programs are updated, communities typically increase the emphasis on coastal hazard mitigation and management.	Many of the 1982-1983 editions of these plans do not address elements of hazard mitigation, but they typically address coastal hazards as they are updated. In communities that have updated their municipal coastal programs since the year 2000, these documents are very effective in helping the community mitigate for coastal hazards.

2022 Connecticut State Building Code

As noted above, all Connecticut municipalities in the state must adopt and enforce the current State Building Code. The State Building Code applies to most buildings and some other structures, being newly constructed new, being altered or added to, or undergoing a change of use. In conjunction with the Codes and Standards Committee, the Office of the State Building Inspector (OSBI) establishes the building, electrical, mechanical, plumbing and energy code requirements of the SBC, necessary to promote the health and safety of the people of Connecticut.

The current State Building Code obtained legislative approval on September 27, 2022, and went into effect on October 1, 2022. The 2022 Connecticut State Building Code is based on the International Code Council's widely adopted 2021 International Codes (I-Codes) and applies to projects with permit applications filed from October 1, 2022. Specifically, the 2022 SBC adopts the following model codes:

- 2021 International Building Code
- 2021 International Existing Building Code
- 2021 International Plumbing Code
- 2021 International Mechanical Code
- 2021 International Residential Code
- 2021 International Energy Conservation Code
- 2021 International Swimming Pool and Spa Code
- 2020 National Electrical Code (NFPA 70)
- 2017 ICC A117.1 Accessible and Usable Buildings & Facilities

Along with the adoption of stronger model codes, two notable resiliency measures have been incorporated into the 2022 SBC, including (1) new requirements for elevated homes, so the elevated homes won't fall off their new elevated foundations; and (2) new requirements for roof shingles, so water damage doesn't occur as frequently if shingles are blown off. Even before the most recent update to the State Building Code, Connecticut and its municipalities have been recognized for strong building codes. In its most recent "Rating the States" report[108], the Insurance Institute for Business and Home Safety (IBHS) ranked Connecticut among its Top 5 States (scoring 89 out of a possible 100 points on the IBHS scale). Now in its fourth edition, IBHS's 2021 report evaluates the 18 states along the Atlantic and Gulf coasts, all vulnerable to catastrophic hurricanes, based on building code adoption, enforcement, and contractor licensing. Connecticut's 2021 scores were based on the 2018 State Building Code and will likely only improve during the next IBHS assessment scheduled for 2024 based on the State's adoption of the 2021 editions of the I-Codes.

As noted in the IBHS report, over the past few years, the Connecticut Division of Construction Services has been developing initiatives to improve resilience of the residential dwellings in the state. Although the state is no longer in the high-wind design required category, the initiatives focus on homes located in coastal areas at risk for high wind, flooding, and storm surge. As noted elsewhere in this chapter, all Connecticut municipalities must comply with the floodplain building elevation requirements of the State Building Code which in some cases exceed the minimum requirements of the NFIP.

Table 93 indicates with a check mark the positive responses each SCRCOG municipality made to the question of existence of each of the plans listed in the first column. The listing of planning and regulatory capabilities is based on those included in FEMA's Capability Assessment Worksheet.[109] Many of the positive responses indicate compliance with state standards (for example, adequate enforcement of the State Building Code). Also, for some of the smaller municipality their local plans may overlap. For instance, economic development may in fact be covered in the local Plan of Conservation and Development.

Table 93. Planning and Regulatory Findings.

Planning or Regulatory Capability	Bethany	Branford	East Haven	Guilford	Hamden	Madison	Meriden	Milford	New Haven	North Branford	North Haven	Orange	Wallingford	West Haven	Woodbridge
Comprehensive/Master Plan (Plan of Conservation and Development)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

[108] Rating the States. 2021. Insurance Institute for Business and Home Safety.
[109] Worksheet 4.1: Capability Assessment Worksheet. Local Mitigation Planning Handbook, 2013. FEMA.

Planning or Regulatory Capability	Bethany	Branford	East Haven	Guilford	Hamden	Madison	Meriden	Milford	New Haven	North Branford	North Haven	Orange	Wallingford	West Haven	Woodbridge
Capital Improvements Plan	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Economic Development Plan	✓	✓	✓	✓	✓	✓	✓		✓			✓	✓		✓
Local Emergency Operations Plan	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Continuity of Operations Plan	✓		✓		✓						✓	✓	✓	✓	
Transportation Plan	✓	✓	✓	✓			✓	✓	✓				✓	✓	
Stormwater Management Plan	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Community Wildfire Protection Plan					✓										
Disaster Recovery Plan			✓		✓		✓	✓		✓		✓			✓
Coastal Zone Management Plan		✓	✓	✓				✓	✓		✓	✓		✓	
Climate Change Adaptation Plan				✓				✓	✓			✓			
Coastal Resilience Plan		✓	✓	✓		✓		✓	✓					✓	
Building Codes Adequately Enforced	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Zoning Ordinance Adequately Enforced	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Land Use Planning	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Zoning Ordinance	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Subdivision Ordinance	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓
Natural Hazard Specific Ordinance	✓				✓				✓	✓		✓			✓

Planning or Regulatory Capability	Bethany	Branford	East Haven	Guilford	Hamden	Madison	Meriden	Milford	New Haven	North Branford	North Haven	Orange	Wallingford	West Haven	Woodbridge
Acquisition of Land for Open Space & Recreation	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓

Safe Growth Survey

As was done for the initial plan development process and the previous plan update, the Safe Growth Survey was distributed to each participating municipality as part of the plan update process. This unique survey instrument was adapted from the concept of performing a Safe Growth Audit[110] as recommended by the American Planning Association (APA) and FEMA to help better evaluate the extent to which each local municipality is positioned to grow safely relative to its natural hazards. Appropriate planning, zoning and/or community development staff for each municipality completed the survey and their specific responses are included in the respective municipality annex (under Section 4: Capabilities).

In completing the survey each respondent was asked to indicate how strongly they agree or disagree with the "Safe Growth Statements" as they relate to their own municipality's current plans, policies and programs for guiding future community growth and development, according to the following scale:

1 = Strongly Disagree 2 = Somewhat Disagree 3 = Neutral 4 = Somewhat Agree 5 = Strongly Agree

Table 94 provides the individual community responses for each Safe Growth Statement using the above scale. As done for previous versions of this plan, average responses were calculated for each survey question for the entire region as well as for each municipality.

Table 94. Safe Growth Survey Results.

Safe Growth Statement	Bethany	Branford	East Haven	Guilford	Hamden	Madison	Meriden	Milford	New Haven	North Branford	North Haven	Orange	Wallingford	West Haven	Woodbridge	Region Average
COMPREHENSIVE/MASTER PLAN ***(i.e., Plan of Conservation and Development)***																
Land Use																

[110] Worksheet 4.2: Safe Growth Audit. Local Mitigation Planning Handbook, 2013. FEMA.

Safe Growth Statement	Bethany	Branford	East Haven	Guilford	Hamden	Madison	Meriden	Milford	New Haven	North Branford	North Haven	Orange	Wallingford	West Haven	Woodbridge	Region Average
The comprehensive/master plan includes a future land use map that clearly identifies natural hazard areas.	5.0	4.0	1.0	1.5	3.0	2.0	4.0	5.0	2.0	5.0	1.0	3.0	2.0	2.0	2.0	**2.8**
Current land use policies discourage development and/or redevelopment within natural hazard areas.	5.0	3.0	5.0	2.5	5.0	2.0	4.0	2.0	3.0	4.0	4.0	2.0	4.0	4.0	2.0	**3.4**
The comprehensive/master plan provides adequate space for expected future growth in areas located outside of natural hazard areas.	5.0	5.0	4.0	3.5	5.0	4.0	4.0	4.0	3.0	3.0	3.0	5.0	4.0	4.0	4.0	**4.0**
Transportation																
The transportation element limits access to natural hazard areas.	3.0	2.0	2.0	2.5	3.0	3.0	3.0	3.0	2.0	4.0	2.0	3.0	4.0	3.0	1.0	**2.7**
Transportation policy is	4.0	3.0	5.0	2.5	4.0	3.0	3.0	1.0	4.0	4.0	2.0	4.0	3.0	3.0	1.0	**3.1**

Safe Growth Statement	Bethany	Branford	East Haven	Guilford	Hamden	Madison	Meriden	Milford	New Haven	North Branford	North Haven	Orange	Wallingford	West Haven	Woodbridge	Region Average
used to guide future growth and development to safe locations.																
Transportation systems are designed to function under disaster conditions (e.g., evacuation, mobility for fire/rescue apparatus, etc.).	5.0	3.0	5.0	2.5	3.0	4.0	4.0	2.0	3.0	3.0	2.0	3.0	3.0	4.0	1.0	**3.2**
Environmental Management																
Environmental features that serve to protect development from hazards (e.g., wetlands, riparian buffers, etc.) are identified and mapped.	5.0	2.0	1.0	3.5	5.0	2.0	3.0	5.0	2.0	4.0	4.0	3.0	4.0	4.0	3.0	**3.4**
Environmental policies encourage the preservation and restoration of protective ecosystems.	5.0	2.0	5.0	2.5	5.0	2.0	4.0	3.0	3.0	5.0	4.0	5.0	5.0	4.0	5.0	**4.0**

Safe Growth Statement	Bethany	Branford	East Haven	Guilford	Hamden	Madison	Meriden	Milford	New Haven	North Branford	North Haven	Orange	Wallingford	West Haven	Woodbridge	Region Average
Environmental policies provide incentives to development that is located outside of protective ecosystems.	3.0	2.0	5.0	1.5	3.0	2.0	2.0	1.0	1.0	3.0	2.0	3.0	3.0	4.0	3.0	**2.6**
Public Safety																
The goals and policies of the comprehensive/master plan are related to and consistent with those in the hazard mitigation plan.	5.0	2.0	3.0	2.5	4.0	4.0	4.0	3.0	3.0	4.0	4.0	4.0	4.0	4.0	3.0	**3.6**
Public safety is explicitly included in the comprehensive/master plan's growth and development policies.	5.0	3.0	1.0	1.5	3.0	3.0	4.0	3.0	2.0	3.0	4.0	4.0	2.0	5.0	4.0	**3.2**
The monitoring and implementation section of the comprehensive/master plan covers safe growth objectives.	4.0	2.0	3.0	1.5	3.0	3.0	3.0	2.0	4.0	3.0	2.0	5.0	3.0	4.0	2.0	**3.0**

Safe Growth Statement	Bethany	Branford	East Haven	Guilford	Hamden	Madison	Meriden	Milford	New Haven	North Branford	North Haven	Orange	Wallingford	West Haven	Woodbridge	Region Average
ZONING BYLAWS																
The zoning bylaws conform to the comprehensive/master plan in terms of discouraging development and/or redevelopment within natural hazard areas.	5.0	2.0	5.0	2.5	5.0	2.0	4.0	1.0	2.0	4.0	4.0	5.0	4.0	5.0	2.0	**3.5**
The bylaws contain natural hazard overlay zones that set conditions for land use within such zones.	5.0	1.0	4.0	1.5	4.0	2.0	3.0	1.0	2.0	3.0	3.0	3.0	4.0	2.0	1.0	**2.6**
Rezoning procedures recognize natural hazard areas as limits on zoning changes that allow greater intensity or density of use.	5.0	5.0	5.0	2.5	4.0	2.0	3.0	2.0	3.0	2.0	2.0	4.0	4.0	4.0	2.0	**3.3**
The bylaws prohibit development within, or filling of,	4.0	4.0	5.0	2.5	4.0	2.0	3.0	1.0	1.0	5.0	2.0	4.0	4.0	5.0	4.0	**3.4**

Safe Growth Statement	Bethany	Branford	East Haven	Guilford	Hamden	Madison	Meriden	Milford	New Haven	North Branford	North Haven	Orange	Wallingford	West Haven	Woodbridge	Region Average
wetlands, floodways, and floodplains.																
SUBDIVISION REGULATIONS																
The subdivision regulations restrict the subdivision of land within or adjacent to natural hazard areas.	5.0	3.0	3.0	2.5	4.0	2.0	3.0	1.0	1.0	3.0	2.0	5.0	3.0	3.0	2.0	**2.8**
The regulations provide for conservation subdivisions or cluster subdivisions to conserve environmental resources.	5.0	1.0	5.0	4.5	5.0	4.0	3.0	5.0	1.0	2.0	4.0	5.0	4.0	2.0	1.0	**3.4**
The regulations allow density transfers where hazard areas exist.	3.0	5.0	3.0	1.0	1.0	2.0	1.0	1.0	1.0	1.0	1.0	4.0	2.0	2.0	1.0	**1.9**
CAPITAL IMPROVEMENT PROGRAM AND INFRASTRUCTURE POLICIES																
The capital improvement program limits expenditures on projects that would encourage development and/or	5.0	5.0	3.0	2.5	4.0	3.0	3.0	1.0	1.0	2.0	3.0	3.0	4.0	3.0	3.0	**3.0**

Safe Growth Statement	Bethany	Branford	East Haven	Guilford	Hamden	Madison	Meriden	Milford	New Haven	North Branford	North Haven	Orange	Wallingford	West Haven	Woodbridge	Region Average
redevelopment in areas vulnerable to natural hazards.																
Infrastructure policies limit the extension of existing facilities and services that would encourage development in areas vulnerable to natural hazards.	5.0	5.0	3.0	2.5	4.0	3.0	3.0	3.0	1.0	3.0	3.0	4.0	4.0	3.0	3.0	**3.3**
The capital improvements program provides funding for hazard mitigation projects identified in the hazard mitigation plan.	3.0	2.0	3.0	3.0	5.0	4.0	5.0	3.0	4.0	2.0	2.0	3.0	3.0	3.0	3.0	**3.2**
OTHER																
Small area or corridor plans recognize the need to avoid or mitigate natural hazards.	5.0	3.0	4.0	2.5	4.0	3.0	4.0	3.0	2.0	3.0	2.0	5.0	4.0	4.0	3.0	**3.4**
The building code contains provisions to strengthen or	5.0	3.0	4.0	3.5	4.0	5.0	4.0	5.0	4.0	3.0	4.0	3.0	4.0	5.0	5.0	**4.1**

Safe Growth Statement	Bethany	Branford	East Haven	Guilford	Hamden	Madison	Meriden	Milford	New Haven	North Branford	North Haven	Orange	Wallingford	West Haven	Woodbridge	Region Average
elevate new or substantially improved construction to withstand hazard forces.																
Economic development and/or redevelopment strategies include provisions for mitigating natural hazards or otherwise enhancing social and economic resiliency to hazards.	5.0	3.0	3.0	1.5	4.0	3.0	4.0	1.0	2.0	3.0	3.0	4.0	4.0	3.0	3.0	**3.1**
Municipality Average	**4.6**	**3.0**	**3.6**	**2.4**	**3.9**	**2.8**	**3.4**	**2.5**	**2.3**	**3.2**	**2.8**	**3.8**	**3.6**	**3.6**	**2.6**	**3.2**

While somewhat of a subjective exercise, the Safe Growth Survey analysis provides some quantitative measure of how adequately existing planning mechanisms and tools for each municipality are being used to address the notion of safe growth as advocated by APA and FEMA. In addition, the insertion of the survey instrument into the capability assessment was aimed at further integrating the subject of hazard risk management into the dialogue of local planners and to possibly consider and identify new mitigation actions as it relates to those local planning policies or programs already in place.

The key findings for the 2022 safe growth survey analysis include the following:

- Average responses from across the region indicate strongest agreement with the following statements, suggesting these are the types of safe growth practices considered most prevalent and/or effective at the local community level (top 5, listed in ranked order):
- The building code contains provisions to strengthen or elevate new or substantially improved construction to withstand hazard forces.

- The local POCD provides adequate space for expected future growth in areas located outside of natural hazard areas.
- Environmental policies encourage the preservation and restoration of protective ecosystems.
- The goals and policies of the local POCD are related to and consistent with those in the hazard mitigation plan.
- The zoning bylaws conform to the local POCD in terms of discouraging development and/or redevelopment within natural hazard areas.
- Average responses from across the region indicate the weakest agreement with the following statements, suggesting these are the types of safe growth practices considered least prevalent and/or effective at the local community level:
- Regulations allow density transfers where hazard areas exist.
- Environmental policies provide incentives to development that is located outside of protective ecosystems.
- Zoning bylaws contain natural hazard overlay zones that set conditions for land use within such zones.
- The transportation element of the POCD limits access to natural hazard areas.
- The regional average response of 3.2 is down from the average response in 2017 (3.5), but higher than the average response in 2012 (2.9). Results still suggest neutral to mild agreement with the majority of safe growth statements across the region.
- Averages responses from each municipality indicate the following municipalities have the strongest relative agreement with the safe growth statements (exceeding the regional average response): Bethany, East Haven, Hamden, Meriden, Orange, Wallingford, and West Haven.

6.3.2 Administrative and Technical Findings

Administrative and technical resources are an indication of a municipality's ability to implement hazard mitigation actions. This was measured by examining existing staff resources and related capabilities as included in FEMA's Capability Assessment Worksheet.[111] Administrative capability indicates how mitigation activities may be designated to specific departments, and technical capability indicates the level of knowledge or expertise held by municipality employees. The check marks in Table 95 indicate a positive response on the survey.

[111] Worksheet 4.1: Capability Assessment Worksheet. Local Mitigation Planning Handbook, 2013. FEMA.

Table 95. Administrative and Technical Findings.

Administrative / Technical Capability	Bethany	Branford	East Haven	Guilford	Hamden	Madison	Meriden	Milford	New Haven	North Branford	North Haven	Orange	Wallingford	West Haven	Woodbridge
Planning Commission	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Maintenance Programs to Reduce Risk	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Mutual Aid Agreements	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Chief Building Official	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Floodplain Manager	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Emergency Manager	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Community Planner		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
Civil Engineer	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
GIS Coordinator	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓			✓	✓
Warning Systems	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Hazard Data	✓	✓	✓				✓	✓	✓	✓					
Hazus Analysis		✓	✓					✓	✓						

6.3.3 Financial Findings

The ability for a local government to implement mitigation actions is closely tied to the amount of money available to them. This availability is based on internal financial resources in addition to leveraging outside funding. including access to state and federal funding, the ability to levy taxes, and debt financing. Table 96 indicates with check marks positive responses to the ability to access the types of funding in the first column. These financial capabilities are based on those included in FEMA's Capability Assessment Worksheet.[112] It should be noted that during the individual municipality meetings most municipalities reiterated their wish to have a dedicated grants specialist on staff (someone to identify external funding opportunities and pull grant applications together). This was a need identified in previous iterations of this plan as well.

[112] Worksheet 4.1: Capability Assessment Worksheet. Local Mitigation Planning Handbook, 2013. FEMA.

Table 96. Financial Findings.

Financial Capability	Bethany	Branford	East Haven	Guilford	Hamden	Madison	Meriden	Milford	New Haven	North Branford	North Haven	Orange	Wallingford	West Haven	Woodbridge
Capital improvement project funding	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Authority to levy taxes for specific purposes		✓	✓	✓	✓	✓	✓	✓	✓		✓			✓	✓
Fees for water, sewer, gas, or electric services		✓	✓				✓	✓		✓	✓		✓	✓	✓
Impact fees for development		✓						✓							✓
Storm water utility fee															
Community Development Block Grant	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓		✓	✓	✓
Federal Funding	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
State Funding	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

6.3.4 Education and Outreach Findings

Frequently, education and outreach activities can be cost-effective mitigation actions that are often overlooked by local municipalities. Table 97 indicates which opportunities the municipalities have incorporated based on the listing of education and outreach capabilities identified in in FEMA's Capability Assessment Worksheet.[113] As noted in the individual annexes for each municipality, there are other related capabilities available such as using municipal websites, email notifications/listservs, and social media to increase awareness and educate the public about natural hazards and emergency preparedness or mitigation practices.

[113] Worksheet 4.1: Capability Assessment Worksheet. Local Mitigation Planning Handbook, 2013. FEMA.

Table 97. Education and Outreach Findings.

Education and Outreach Capability	Bethany	Branford	East Haven	Guilford	Hamden	Madison	Meriden	Milford	New Haven	North Branford	North Haven	Orange	Wallingford	West Haven	Woodbridge
CERT Team	✓		✓		✓		✓	✓	✓		✓	✓	✓	✓	
Public Education Program	✓	✓	✓			✓	✓	✓	✓	✓					✓
Natural Disaster Program in Schools	✓		✓	✓			✓	✓							
Citizen Group or Nonprofit Focused on Emergency Preparedness	✓				✓		✓		✓						
Public-Private Partnership for Disaster Issues		✓		✓		✓	✓	✓	✓				✓		

6.4 National Flood Insurance Program

C2. Does the Plan address each jurisdiction's participation in the NFIP and continued compliance with NFIP requirements, as appropriate? FEMA Requirement §201.6(c)(3)(ii)

This section provides an overall regional summary of NFIP participation and continued compliance with NFIP requirements. More detailed information for each municipality is provided in each respective municipality annex (under Section 4: Capabilities), including opportunities to improve local floodplain management activities through possible new actions related to NFIP participation and compliance.

6.4.1 NFIP Participation and Compliance

Flooding represents the greatest and costliest natural hazard facing communities across the nation. At the same time, the tools available to reduce the impacts associated with flooding are among the most developed when compared to other hazard-specific mitigation techniques.

Capabilities for conducting community floodplain management and flood mitigation activities are typically guided, evaluated and enhanced through participation in the National Flood Insurance Program (NFIP). In addition to approaches that cut across hazards, such as education, outreach and the training of local officials, participation in the NFIP requires specific regulatory and administrative measures that enable government officials to determine where and how growth occurs relative to flood hazards. Participation in the NFIP is voluntary, but it is promoted by FEMA as a crucial means to implement and sustain an effective flood hazard mitigation program. Community participation in the NFIP also enables property owners within the community to purchase federally backed flood insurance for buildings and personal belongings.

For a municipality to participate in the NFIP, they must adopt a local flood damage prevention ordinance that requires municipalities to follow established minimum building standards in the floodplain. These standards require that all new buildings and substantial improvements to existing buildings will be protected from damage by the flood having a 1-percent- annual-chance of occurring (i.e., the 100-year flood), and that new floodplain development will not aggravate existing flood problems or increase damage to other properties.

All municipalities in the South Central Region have adopted and enforce local floodplain management regulations in compliance with NFIP standards. It is the intent of all communities covered by this plan to maintain continued compliance and local enforcement of all NFIP Regulations per 44 CFR Part 60.3 as required**.** Through the adoption of the State Building Code and other higher regulatory standards, all municipalities in the region have gone beyond FEMA's minimum requirements as further described later in this section and within each municipality annex (under Section 4: Capabilities).

Through the adoption and enforcement of these floodplain management regulations, all municipalities in the South Central Region actively participate in the NFIP and are currently in good standing with FEMA. Table 98 summarizes NFIP participation and policy statistics for each municipality in the planning area as of August 31, 2022, with a comparison to statistics included in the previous plan.

It is worth noting that the total number of NFIP policies and flood insurance coverage has ***decreased*** for all municipalities in the region since the last plan update. The total number of policies in the region declined from 9,445 in 2017 to 6,946 in June 2022 (a 27 percent decrease in policy count). Specific reasons for this vary but it is generally assumed that many policyholders have dropped their NFIP policies due to increasing premium rates. As reported by the Association of State Floodplain Managers (ASFPM) in September 2022, this sharp decline in coverage is consistent with a national trend in which

hundreds of thousands of Americans have dropped their flood insurance through the NFIP following recent program overhauls.[114]

Statistics on past flood losses and NFIP claims payment is provided in Chapter 4 (Hazard Profiles), and more site-specific information on at-risk structures and repetitive loss properties is provided in Chapter 5 (Risk Analysis).

[114] After FEMA Overhaul, Hundreds of Thousands Are Forgoing Federal Flood Insurance, The Insider. ASFPM. September 2022. PP. 7-8.

Table 98. NFIP Participation and Policy Statistics (FEMA, August 31, 2022).[115]

Municipality	NFIP Entry Date	Latest Effective FIRM	Policies In Force 2017	Policies In Force 8/31/2022	Change in Policies 2017-2022	Total Written Premium + Fees 2022	Total Coverage 2022
Bethany	8/23/1977	07/08/2013	8	6	-2	$3,458	$2,100,000
Branford	12/15/1977	5/16/2017	1,284	848	-436	$1,202,434	$226,546,600
East Haven	2/1/1978	5/16/2017	1,076	689	-387	$937,401	$174,804,400
Guilford	5/1/1978	5/16/2017	621	510	-111	$625,919	$146,344,700
Hamden	6/15/1979	5/16/2017	205	175	-30	$292,570	$53,976,600
Madison	9/15/1978	7/8/2013	594	439	-155	$786,436	$139,417,200
Meriden	9/30/1982	5/16/2017	183	120	-63	$260,680	$32,311,200
Milford	9/29/1978	5/16/2017	2,961	2,152	-809	$2,390,010	$568,787,300
New Haven	7/16/1980	5/16/2017	964	716	-248	$1,178,370	$193,243,600
North Branford	7/3/1978	5/16/2017	115	71	-44	$74,062	$21,327,300
North Haven	9/17/1980	5/16/2017	138	112	-26	$135,418	$38,445,400
Orange	3/18/1980	5/16/2017	69	57	-12	$66,372	$15,561,700
Wallingford	9/15/1978	5/16/2017	149	106	-43	$159,554	$29,397,200
West Haven	1/17/1979	7/8/2013	1,023	906	-117	$873,275	$178,994,900
Woodbridge	3/16/1981	5/16/2017	55	39	-16	$23,590	$10,504,800
		TOTAL	**9,445**	**6,946**	**-2,499**	**$9,009,549**	**$1,831,762,900**

[115] Flood Insurance Data and Analytics, Policy Information by State. FEMA. 2022. Retrieved on September 26, 2022 from: https://nfipservices.floodsmart.gov/reports-flood-insurance-data

Another key service provided by the NFIP is the mapping of identified flood hazard areas. Once prepared, the Flood Insurance Rate Maps (FIRMs) are used to assess flood hazard risk, regulate construction practices and set flood insurance rates. FIRMs are an important source of information to educate residents, government officials and the private sector about the likelihood of flooding in their municipality.

The effective FIRM is the primary NFIP map for a community or county. The latest digital FIRMs (DFIRMs) for New Haven County first became effective on December 17, 2010. Updates were prepared to reflect re-analyzed coastal risks, resulting in the re-issuance of some DFIRMs on July 8, 2013. These were re-adopted locally as necessary. Additional updates to some towns were prepared for the Quinnipiac River drainage basin, resulting in issuance of new DFIRMs for portions of the drainage basin on May 16, 2017. These changes were re-adopted locally as necessary. Therefore, the planning region currently consists of FEMA panels dated (effective) December 17, 2010; July 8, 2013; and May 16, 2017.

As described above, all SCRCOG municipalities continue to participate in the NFIP and enforce local flood damage prevention regulations and ordinances. Given the changes to the FIRM in 2010, 2013, and 2017, all SCRCOG municipalities have had opportunities to update their flood damage prevention regulations and ordinances in the last decade. The Connecticut Department of Energy and Environmental Protection (CT DEEP) continuously works with municipalities to review and support changes to regulations and ordinances that occur when maps are changed as well as between map updates. This includes the provision of model floodplain regulations for both inland/riverine communities (regulating all A Zones) as well as coastal communities (regulating VE Zones in addition to all A Zones).

Table 99 provides a regional overview of local floodplain management standards that have been adopted by each participating municipality that exceed the minimum standards of the NFIP. While some municipalities have adopted freeboard requirements that exceed the minimum NFIP requirements, other municipalities have found that this is not necessary because the Connecticut State Building Code requires freeboard of one (1) foot for A and V zones, in addition to the higher standard of regulating coastal A zones as if they were V zones if the area of Limit of Moderate Wave Action (LiMWA) has been established and mapped on the FIRM.

Table 99. NFIP Standards.

Does the local floodplain ordinance exceed FEMA minimum requirements?	**Bethany**	**Branford**	**East Haven**	**Guilford**	**Hamden**	**Madison**	**Milford**	**New Haven**	**North Branford**	**North Haven**	**Orange**	**Wallingford**	**West Haven**	**Woodbridge**
Require freeboard (elevation requirements	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

Does the local floodplain ordinance exceed FEMA minimum requirements?	Bethany	Branford	East Haven	Guilford	Hamden	Madison	Milford	New Haven	North Branford	North Haven	Orange	Wallingford	West Haven	Woodbridge
higher than the base flood)														
Require soil tests or engineered foundations		✓	✓				✓	✓	✓				✓	
Require compensatory storage for new developments		✓	✓	✓	✓		✓	✓	✓	✓			✓	
Prohibit or minimize new development in floodplain areas	✓		✓		✓			✓		✓	✓		✓	
Prohibit or enforce higher standards for critical facilities subject to flood hazards	This is required by State Statute and State Building Code													
Provision for cumulative substantial damage/improvement requirements		✓	✓	✓	✓		✓	✓	✓	✓		✓	✓	
Provisions that protect natural and beneficial functions of floodplains	✓		✓		✓		✓	✓					✓	

6.4.2 Community Rating System

The Community Rating System (CRS) is a voluntary program within the NFIP that encourages floodplain management activities that exceed the minimum NFIP requirements. Flood insurance premiums are discounted to reflect the reduced flood risk resulting from community actions meeting the following three goals of the CRS:

- Reduce flood losses
- Facilitate accurate insurance rating
- Promote awareness of flood insurance

For participating communities, flood insurance premium rates are discounted in increments of 5 percent. For example, a Class 1 community would receive a 45 percent premium discount, and a Class 9

community would receive a 5 percent discount. The CRS classes for local communities are based on 18 creditable activities in the following categories:

- Public information
- Mapping and regulations
- Flood damage reduction
- Flood preparedness

Of the 15 municipalities participating in this plan, 5 have participated in the CRS since its launch in the early 1990s: East Haven, Guilford, Hamden, Milford, and New Haven. As of October 1, 2022, Guilford, Milford, and New Haven are active participants in the program as shown in

Table 100.[116] The Town of Guilford is the most recent community to enter the program, joining in 2018. Future CRS participation for other communities in the region was the subject of discussion at multiple Advisory Committee meetings as well as the individual municipalities meetings. Applying to join the CRS was also considered as a potential mitigation action for each non-participating community as part of the plan update process.

Table 100. CRS Participation for the SCRCOG Region.

Community Name	CRS Entry Date	Current Class	Discount for NFIP Policyholders
Town of Guilford	5/1/2018	9	5%
City of Milford	5/1/2012	9	5%
City of New Haven	5/1/2017	7	15%

6.5 Conclusion

Overall, the SCRCOG region has proven capabilities to reduce the impact of natural hazards. While the specific capabilities of each municipality are further discussed in each municipality annex to this plan, including current limitations and opportunities to expand and improve on existing capabilities, this concluding section provides a higher level summary of mitigation capabilities across the planning area. The planning and regulatory capabilities across the SCRCOG region are moderate to relatively high. Each participating municipality has a series of effective plans and regulations in place and the resources to maintain and implement these plans as required. For example, as demonstrated in each municipality annex, most municipalities have integrated hazard mitigation and community resilience to natural hazards and/or climate change into their local Plans of Conservation and Development (POCDs). The local enforcement of the Connecticut State Building Code has further strengthened the regulatory

[116] FEMA. Community Rating System Eligible Communities. Effective October 1, 2022: https://www.fema.gov/sites/default/files/documents/fema_october-2022-crs-eligible-communites.pdf

capability of all municipalities in the region by requiring new construction standards that are based on the widely adopted 2021 International Codes (including floodplain management regulations that go beyond FEMA's minimum NFIP standards).

While the local administrative and technical capabilities across the region vary significantly, most participating municipalities indicate they have sufficient (moderate) levels of existing staff capabilities and resources to implement mitigation practices and projects. However, for many communities (both large and small), the same employee fills multiple positions. For instance, the Floodplain Administrator position is typically filled by a Town Engineer or Director of Public Works. Serving this role via such auxiliary position assignments is not ideal for most communities and often stretch local staff beyond their capacity, particularly during and following hazard events when demand for their time increases significantly across multiple areas. Also, for many participating municipalities, it was noted that additional hires or the conversion of part-time to full-time employment are needed, as are some re-hires for positions that are currently vacant or recently eliminated.

The financial capabilities of municipalities also vary widely across the region and typically correlate with a community's size and tax base. Most do not have a dedicated funding source for hazard mitigation funding, with the Town of Branford's Shoreline Resiliency Fund and Madison's Coastal Resiliency Fund being notable exceptions. All municipalities develop a capital improvement plans and budgets, but these funds are typically limited to addressing drainage issues as part of roadway and other larger infrastructure improvements. While external grant funding is available to support all communities, many of these sources require internal resources or capabilities that are not readily available for many, such as the ability to debt finance and/or provide a local cost-share to match state or federal grants. Another challenge for some communities as it relates to mitigation project funding has been overcoming relatively complex application procedures and/or meeting FEMA's benefit-cost analysis requirements (specific to federal Hazard Mitigation Assistance funding). Many of the specific hazard problems and proposed solutions won't pass the minimum criteria for cost-effectiveness using FEMA's BCA methodology, or in other cases, would require the voluntary involvement of private property owners who may not be interested or able to participate in or help pay for the project. Also, as noted earlier in this chapter, most municipalities expressed the need to have a dedicated grants specialist on staff (someone to identify external funding opportunities and pull grant applications together) to build this capability to assist more with the implementation of hazard mitigation projects.

Education and outreach capabilities are more prevalent across the region, with most communities having some resources and methods to engage with and inform their residents and constituents on the topics of natural hazards, emergency preparedness, and hazard mitigation. As expected, the larger municipalities have relatively higher capabilities to implement these types of activities, including more targeted outreach initiatives, but all municipalities maintain the ability to implement these lower cost mitigation actions to some degree.

All municipalities in the South Central Region actively participate in the NFIP and are currently in good standing with FEMA. However, floodplain management capabilities also vary from community to community as summarized in this chapter and each individual annex. All municipalities have gone beyond NFIP minimum standards through the administration and enforcement of local development regulations and the State Building Code, however only the larger municipalities with higher administrative and technical resources or financial capabilities are able to do more in terms of floodplain management activities such as increasing flood risk awareness, implementing flood mitigation projects, or participating in FEMA's voluntary CRS program.

As concluded in the last plan update, each of the municipalities remains well positioned to mitigate risks from natural hazards, and more importantly, the region has proven the capacity to collaborate on efforts to mitigate risk. While all municipalities have some degree of capability and resources to support hazard mitigation activities, each can expand and improve on the capabilities described in this chapter. Specific opportunities to address the existing gaps or limitations in local capabilities to reduce risk have been identified for each capability type and are further described in each municipality annex. Each of these opportunities were then considered by each municipality during the plan update process as potential new mitigation actions to be included in the updated Mitigation Strategy (Chapter 7).

Chapter 7. Mitigation Strategy

7.1 Introduction and Mission Statement

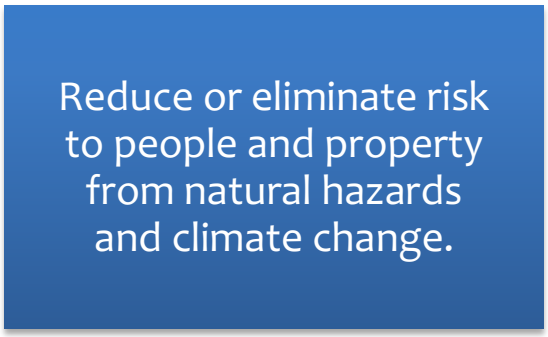


Figure 30. Mission Statement.

The hazard mitigation strategy is the culmination of work presented in the planning area profile, risk assessment and capability assessment. It is also the result of multiple meetings and thorough public outreach. The work of the Advisory Committee was essential in developing the mitigation goals and actions included in this chapter. As described in Chapter 3 Planning Process, the Advisory Committee worked in a consistent, coordinated manner to identify and prioritize the goals and mitigation actions for this Plan.

The Advisory Committee updated the previous Mission Statement, shown in Figure 30 above, to include climate change. The new Mission Statement, Reduce or eliminate risk to people and property from natural hazards and climate change.

This chapter includes SCRCOG's mitigation actions. Actions for each municipality are shown in their Municipal Annex.

7.2 Goals and Objectives

C3. Does the Plan include goals to reduce/avoid long-term vulnerabilities to the identified hazards? (Requirement §201.6(c)(3)(i))

Mitigation goals represent broad statements that are achieved through the implementation of more specific mitigation actions. These actions include both hazard mitigation policies (such as land use regulations) and hazard mitigation projects (such as structure or infrastructure projects).

The Advisory Committee reviewed the goals from the previous plan and made some slight revisions. These revisions include adding climate change. The five main areas of the goals, community planning, flood hazards, trees, regional collaboration, public awareness, and preparedness did not change.

Goal Categories	Mitigation Plan Goals
Community Planning	Reduce the impact of natural hazards by integrating natural hazard mitigation policies and practices into local community planning.
Flood Hazards	Minimize flood hazards in the region by maintaining continued compliance with the National Flood Insurance Program, adopting higher regulatory standards for new floodplain development, and implementing flood mitigation projects for existing flood prone structures.
Trees	Support proper care of healthy, native trees across the region to increase their resilience to natural hazards including severe storms, flooding, erosion, and extreme heat. Limit the impact of fallen and other hazardous trees by collaborating with utility companies and property owners to cut limbs and remove trees that pose threats to buildings, infrastructure, and utility lifelines.
Regional Collaboration	Build capacity for natural hazard mitigation and climate adaptation at the local level through regional collaboration.
Public Awareness and Preparedness	Increase public awareness and preparedness for natural hazards by implementing community-based public education programs across the region.

Table 101. Goal Statements.

All natural hazards identified in the hazard profiles are addressed by these goal statements. In fact, most goals address more than one type of hazard, including those classified as low risk. While many of the specific mitigation actions included later In this chapter are focused on mitigating the adverse impact of certain hazards classified as high or moderate risk per the risk assessment, there are also many actions that seek to mitigate the impact of multiple hazards – and in some cases, all hazards.

7.2.1 SCRCOG Mitigation Plan Objectives

SCRCOG intends to continue staying actively involved in hazard mitigation in the region. They are fully committed to the mission of reducing risk to people and property in the region. SCRCOG staff developed the following four objectives for themselves, based on the goal statements above.

Table 102. SCRCOG Mitigation Plan Objectives.

Objective Category	Objectives
Mitigation Planning	Facilitate mitigation planning and the implementation of mitigation actions in the region.
Multi-Municipality Collaboration	Facilitate collaboration between municipalities in the region.
Education	Provide education regarding natural hazards, grant opportunities, and mitigation best practices.
Floodplain Management	Assist the SCRCOG municipalities with floodplain management and lessening the impact of flooding in the region.

7.2.2 Progress of SCRCOG Mitigation Efforts

The Advisory Committee began this planning process with a review of the previous plan's mitigation actions. For the purposes of this plan's development, all the actions were reviewed for their status and relevance. The following table shows the mitigation actions assigned to SCRCOG in the previous plan, if an action was moved forward to this plan, the final column in the table indicates the title of the new action. Mitigation Actions for each municipality are included in their respective Annex.

Table 103. Status of Previous Mitigation Actions – SCRCOG.

Action #	Action Title	Action Description	Current Status	Status Description/Explanation	Keep for Plan Update?
1	Plan Maintenance	SCRCOG will maintain the current mitigation plan by seeking additional grant funding as needed.	Partially Completed / In Progress	Applied for and received the FY20 FEMA BRIC grant award to update the Multi-Jurisdiction Hazard Mitigation Plan.	YES (see Action #1)
2	Host and Facilitate Annual Mitigation Meetings	SCRCOG will continue to facilitate multi-jurisdiction collaboration through the hosting of annual mitigation meetings.	Completed + To Be Continued	Meeting held on May 29, 2019. Follow-up materials emailed June 10, 2019. 2020 Annual Meeting held on June 25th (conducted via Zoom).	YES (see Action #2)
3	Maintain Mitigation Website	SCRCOG will continue to maintain and update the Regional Hazard Mitigation webpages.	Completed + To Be Continued	Added and updated HMP webpage content.	YES (see Action #3)
4	Increase Plan Participation for Local Municipalities	SCRCOG will work to incorporate the City of Meriden into the plan during the next plan update process.	Completed	The current HMP update included the City of Meriden and now has all 15 member municipalities as active participants in the Multi-jurisdiction Hazard Mitigation Plan.	NO (see explanation at left)
5	Promote the CRS Program	SCRCOG will collaborate with its member municipalities to determine if there is interest in the CRS Program, and the type of technical assistance its member municipalities may require.	Completed + To Be Continued	Technical assistance has not been requested, but the HMP will continue to be updated in a manner that will promote and maximize CRS credit points for participating municipalities.	YES (see Action #4)
6	Mitigation Education and Awareness	SCRCOG will engage with its member municipalities to determine the necessary materials that may be needed for education opportunities.	Completed + To Be Continued	SCRCOG has collaborated via the CIRCA Resilient CT effort to bring about Mitigation Education and Awareness. SCRCOG has developed a robust stakeholder list and provided/developed	YES (see Action #5)

Action #	Action Title	Action Description	Current Status	Status Description/Explanation	Keep for Plan Update?
		The materials may include mapping and presentations.		data for the educational tools developed by CIRCA.	
7	Promote Awareness of Mitigation Grant Funding Opportunities	SCRCOG will continue to provide information to its members of mitigation grant opportunities. SCRCOG will explore opportunities for collaboration to pursue grant opportunities relevant to hazard mitigation.	Completed + To Be Continued	SCRCOG has continued to provide information to its member municipalities on the availability of grant funding and has been active in supporting their pursuit of financial assistance through continued grant application efforts.	YES (see Action #6)

7.2.3 Comprehensive Range of Mitigation Actions

C4. Does the Plan identify and analyze a comprehensive range of specific mitigation actions and projects for each jurisdiction being considered to reduce the effects of hazards, with emphasis on new and existing buildings and infrastructure? (Requirement §201.6(c)(3)(ii))

The mitigation goals and objectives as established for this plan are broad in scope. Mitigation actions on the other hand are more specific and identify a specific activity or process that is intended to reduce or eliminate risk to natural hazards in alignment with the goals and objectives. In general, mitigation actions can be categorized into four categories: Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, and Education and Awareness Programs. For this multi-jurisdiction plan, specific mitigation actions were identified by SCRCOG and each of the participating municipalities and categorized under these four categories. Table 104, taken from FEMA's Local Mitigation Planning Handbook, clearly describes each of these mitigation types and provides examples.

In addition, there are some actions related to risk management and emergency preparedness that aren't customarily considered "hazard mitigation" activities, but nevertheless are important to local communities and encouraged by FEMA through hazard risk reduction programs such as the Community Rating System (CRS). Examples include activities such as hazard warning systems, backup power generation and supply (e.g., generators), disaster preparedness and response operations (including evacuation, sheltering, etc.), and post disaster recovery measures. While these types of actions were included in the original 2014 plan under the "Education and Awareness" category, they are now included under a fifth, separate non-mitigation category titled "Emergency Preparedness."

Table 104. Types of Mitigation Actions.

Mitigation Action Category	Examples of Mitigation Actions
Local Plans and Regulations	• Comprehensive plans • Land use ordinances • Subdivision regulations • Development review • Building codes and enforcement • NFIP Community Rating System • Capital improvement programs • Open space preservation • Stormwater management regulations and master plans
Structure and Infrastructure Projects	• Acquisitions and elevations of structures in flood-prone areas • Utility undergrounding • Structural retrofits • Floodwalls and retaining walls • Detention and retention structures • Culverts

Mitigation Action Category	Examples of Mitigation Actions
Natural Systems Protection	• Sediment and erosion control • Stream corridor restoration • Forest management • Conservation easements • Wetland restoration and preservation
Education and Awareness Programs	• Radio or television spots • Websites with maps and information • Real estate disclosure • Presentations to school groups or neighborhood organizations • Mailings to residents in hazard-prone areas

To develop the mitigation actions each of the types of mitigation action were considered. Following Advisory Committee meetings, Advisory Committee members consulted with representatives and experts in their municipality to update their list of mitigation actions, including those prior actions to be carried forward in the plan update, in addition to new actions that fall under the four categories named above. Additional and specific mitigation actions for consideration were identified through the public outreach and stakeholder engagement activities completed during the plan update process as described further in Chapter 3.

The mitigation actions included in this plan update are more focused on actionable, measurable projects or activities and do not include those actions that have become existing capabilities or ongoing activities (e.g., routine physical maintenance, standard operating procedures, or other regularly occurring actions).

7.3 Evaluating and Prioritizing Mitigation Actions

C5. Does the Plan contain an action plan that describes how the actions identified will be prioritized (including cost benefit review), implemented, and administered by each jurisdiction? (Requirement §201.6(c)(3)(iv)); (Requirement §201.6(c)(3)(iii))

The Advisory Committee members considered a wide range of potential mitigation actions for the region as a whole and for individual municipalities to implement on their own. In order to further evaluate and narrow this range of potential actions down to a manageable number, each municipality revisited the status of prior mitigation actions and discussed the key findings and conclusions of the updated risk assessment and capability assessment. Particular attention during this step was paid to the problem statements that were updated in the Risk Assessment, as well as the progress of implementation with regard to prior mitigation actions.

Mitigation actions for each participating municipality are included in their Annex, while SCRCOG's actions are included here. Each mitigation action is presented in tabular format with the following attribute information for each identified action:

- **Action #** – a unique identifier assigned to each action.
- **Action Title** – provides a summary of the proposed action.
- **Action Description** – describes the action in more detail, with some background on the issue or problem it will address.
- **Estimated Cost** – provides a general cost estimate, if applicable, or indicates other resources required for implementation (e.g., "staff time"). In cases where a dollar estimate is not available, the following qualitative descriptions are used: Very High = more than $1M; High = between $500k and $1M; Medium = between $100k and $500k; Low = less than $100k.
- **Potential Funding Source** – identifies potential funding sources, if applicable.
- **Lead Department** – Indicates the department/agency with primary responsibility to carry the action out.
- **Implementation Schedule** – Indicates the general schedule or anticipated date of completion.
- **Priority** – Classifies the action as a High, Moderate, or Low Priority based on the criteria defined below.

Next, in coordination with other local staff and municipal leaders, each municipality relied on the criteria listed in Table 105 to further evaluate and prioritize their proposed mitigation actions. These criteria helped to not only provide further qualitative screening for proposed mitigation actions to include in the plan update, but also aided in the specific ranking prioritization of specific mitigation actions included for SCRCOG and each municipality. This system was used in the previous version of this plan and proved beneficial.

Table 105. Evaluation and Prioritization Criteria.

Priority Level	Evaluation and Prioritization Criteria
Very High	Extremely beneficial projects that will greatly contribute to mitigation of multiple hazards and the protection of people and property. These projects are also given a numeric ranking within the category.
High	Strategies that provide mitigation of several hazards and have a large benefit that warrants their cost and time to complete.
Medium	Strategies that would have some benefit to people and property and are somewhat cost effective at reducing damage to property and people.
Low	Strategies that would not have a significant benefit to property or people, address only one or two hazards, or would require funding and time resources that are impractical.

These priority levels were developed utilizing the following criteria:

- **Application to multiple hazards** – Strategies are given a higher priority if they assist in the mitigation of several natural hazards.

- **Time required for completion** – Projects that are faster to implement, either due to the nature of the permitting process or other regulatory procedures, or because of the time it takes to secure funding, are given higher priority.
- **Estimated benefit** – Strategies which would provide the highest degree of reduction in loss of property and life are given a higher priority. This estimate is based on the risk assessment chapter, particularly regarding how much of each hazard's impact would be mitigated.
- **Cost effectiveness** – To maximize the effect of mitigation efforts using limited funds, priority is given to low-cost strategies. Strategies that have identified potential funding streams, such as the Hazard Mitigation Grant Program, are also given higher priority.

Using the above evaluation and prioritization criteria, combined with local community knowledge, SCRCOG and the Advisory Committee classified each mitigation action to be included in their action plan as either Very High, High, Medium, or Low priority. Regardless of priority level assigned, the completion of many mitigation actions is contingent on the availability of funding. These priority classifications are specific to each municipality and will be evaluated and updated as a matter of routine plan maintenance, and as local community conditions or planning objectives change over time.

Mitigation actions for each municipality are listed in their respective Annex, while the SCRCOG actions are listed in Table 106 below.

Table 106. Updated Mitigation Actions (2023-2028) – SCRCOG.

Action #	Action Title	Action Description	Estimated Cost	Potential Funding Source	Lead Department	Implementation Schedule	Priority
1	Plan Maintenance	SCRCOG will maintain the current mitigation plan by seeking additional grant funding as needed.	$200,000	FEMA HMA (BRIC or HMGP)	SCRCOG Staff	2023-2028	Very High
2	Host and Facilitate Annual Mitigation Meetings	SCRCOG will continue to facilitate multi-municipality collaboration through the hosting of annual mitigation meetings.	$1,000	SCRCOG	SCRCOG Staff	2023-2028	High
3	Maintain Mitigation Website	SCRCOG will continue to maintain and update the Regional Hazard Mitigation webpages.	$2,000	SCRCOG	SCRCOG Staff	2023-2028	High
4	Promote the CRS Program	SCRCOG will collaborate with its member municipalities to determine if there is interest in the CRS Program, and the type of technical assistance its member municipalities may require.	$50,000	FEMA HMA (BRIC, HMGP, or FMA); SCRCOG	SCRCOG Staff	2023-2028	Medium
5	Mitigation Education and Awareness	SCRCOG will engage with its member municipalities to determine the necessary materials that may be needed for education opportunities. The materials may include mapping and presentations.	$10,000	SCRCOG	SCRCOG Staff	2023-2028	Medium
6	Promote Awareness of Mitigation Grant	SCRCOG will continue to provide information to its members of mitigation grant opportunities.	$5,000	SCRCOG (subscription service)	SCRCOG Staff	2023-2028	Medium

Action #	Action Title	Action Description	Estimated Cost	Potential Funding Source	Lead Department	Implementation Schedule	Priority
	Funding Opportunities	SCRCOG will explore opportunities for collaboration to pursue grant opportunities relevant to hazard mitigation.					
7	Apply to DEEP Climate Resilience Fund (DCRF) on Behalf of Member Municipalities	Continue to submit applications for DCRF funding to support the development of resilience projects for each of SCRCOG's member municipalities.	$5,000	SCRCOG	SCRCOG Staff	2023-2028	Medium

7.5 Plan Incorporation into Existing Planning Mechanisms

C6. Does the Plan describe a process by which local governments will integrate the requirements of the mitigation plan into other planning mechanisms, such as comprehensive or capital improvement plans, when appropriate? (Requirement §201.6(c)(4)(ii))

Integrating components of this Plan with other plans is the responsibility of each participating municipality. To date SCRCOG and each municipality have integrated this plan into other planning mechanisms. For instance, in the South Central Region: Plan of Conservation and Development, 2018-2028 which supports the region's ability to mitigate risk and cross references the SCRCOG Hazard Mitigation Plan. It prioritizes resilience and specifically names this plan. The South Central Regional Metropolitan Transportation Plan, 2019-2045, includes goals that inform this plan such as managing aging infrastructure and climate change impacts. Municipalities have integrated this plan into their Plans of Conservation and Development, Coastal Resilience Plans, Emergency Operations Plans, Floodplain Management and Zoning Regulations, and Capital Improvement Plans.

Plan integration is expected to continue for SCRCOG and each municipality with the implementation of this plan. The integration process and schedule of incorporating elements of this Plan will vary based on the plan's update cycle. The yearly mitigation meetings will provide an opportunity to track the progress on the integration of this Plan into local planning mechanisms. Per Section 8-23 of the Connecticut General Statutes, the municipalities will update their plans of conservation and development (POCD) at least once every ten years. The Capability Assessment Chapter of this plan and each Annex details each of the municipalities Plans of Conservation and Development and the date it was updated.

The Regional Framework for Coastal Resilience for Southern Connecticut and the municipality specific coastal resilience plans include actions integrated with this Plan. Their future iterations will include updated content from this Plan.

Following Plan adoption, SCRCOG will instruct the Advisory Committee at their first annual meeting how to identify locally specific opportunities to integrate the relevant components of this Plan into other local plans and planning processes. To assist in this effort, SCRCOG staff will utilize FEMA's publication, titled *Integrating Hazard Mitigation Into Local Planning: Case Studies and Tools for Community Officials*.

The recommended process in FEMA's publication includes the following five steps:

1. Assess your community's planning framework with a lens for resilience.
2. Inform and engage local leadership, staff, and stakeholders.
3. Establish an integration agenda of resilient community principles and actions.
4. Be opportunistic.
5. Monitor, measure, report, and repeat.

Now, it is deemed appropriate for SCRCOG staff to lead the effort to maintain this 2023 SCRCOG Mitigation Plan Update and future regional plans. However, individual municipalities have the authority to choose their level of participation in this Plan.

7.6 Funding Sources

7.6.1 FEMA Funding Sources

All the mitigation actions included in this plan have identified one or more potential funding sources. Below is a description of the FEMA Hazard Mitigation Assistance Grants. These grant programs provide funding for eligible mitigation activities that reduce disaster losses and protect life and property from future disaster damages. They are not intended to fund repair, replacement, or deferred maintenance activities but are rather designed to assist in developing long-term, cost-effective improvements that will reduce risk to natural hazards.

- **Building Resilient Infrastructure and Communities (BRIC)**
  BRIC is a new FEMA hazard mitigation program designed to replace the agency's former HMA Pre-Disaster Mitigation (PDM) grant program, aiming to categorically shift the federal focus away from reactive disaster spending and toward research-supported, proactive investment in community resilience. It is a result of recent amendments made to Section 203 of the Robert T. Stafford Disaster Relief and Emergency Assistance Act (Stafford Act) by Section 1234 of the Disaster Recovery Reform Act of 2018 (DRRA). BRIC will support states, local communities, tribes, and territories as they undertake hazard mitigation projects reducing the risks they face from natural hazards. The BRIC program's guiding principles are supporting communities through capability- and capacity-building; encouraging and enabling innovation; promoting partnerships; enabling large projects; maintaining flexibility; and providing consistency.

- **Hazard Mitigation Grant Program (HMGP)**
  The HMGP is authorized under Section 404 of the Stafford Act. The HMGP provides grants to states, tribes, and local governments to implement long-term hazard mitigation measures after a major disaster declaration. The purpose of the HMGP is to reduce the loss of life and property due to natural disasters and to enable mitigation measures to be implemented during the immediate recovery from a disaster. A key purpose of the HMGP is to ensure that any opportunities to take critical mitigation measures to protect life and property from future disasters are not lost during the recovery and reconstruction process following a disaster. HMGP is typically available only in the months after a federal disaster declaration, as funding amounts are determined based on a percentage of the funds spent on FEMA's Public and Individual Assistance programs.

- **Flood Mitigation Assistance (FMA) Program**
  The FMA program was created as part of the National Flood Insurance Reform Act (NFIRA) of 1994 (42 U.S.C. 4101) with the goal of reducing or eliminating claims under the NFIP. FEMA provides FMA funds to assist states and communities with implementing measures that reduce

or eliminate the long-term risk of flood damage to buildings, manufactured homes, and other structures insurable under the NFIP. The long-term goal of FMA is to reduce or eliminate claims under the NFIP through mitigation activities. One limitation of the FMA program is that it is generally used to provide mitigation for structures that are insured or located in Special Flood Hazard Areas (SFHAs) as mapped by FEMA. Federal funding for this nationally competitive grant program is generally an annual allocation (subject to Congressional appropriation) and eligibility is linked to a community's good standing in the NFIP.

- **HMGP Post Fire Assistance**

The Disaster Recovery Reform Act (DRRA), Public Law 115-254, was enacted on October 5, 2018, and made numerous legislative changes to the Robert T. Stafford Relief and Emergency Assistance Act (Stafford Act). Section 1204 of the DRRA amended Section 404 of the Stafford Act to allow FEMA to provide HMGP assistance for hazard mitigation measures that substantially reduce the risk of future damage, hardship, loss, or suffering in any area affected by a major disaster, or any area affected by a fire for which assistance was provided under Section 420 Fire Management Assistance Grant (FMAG). The HMGP Post Fire framework is outlined in FEMA HMGP Post Fire Policy #207-088-2.

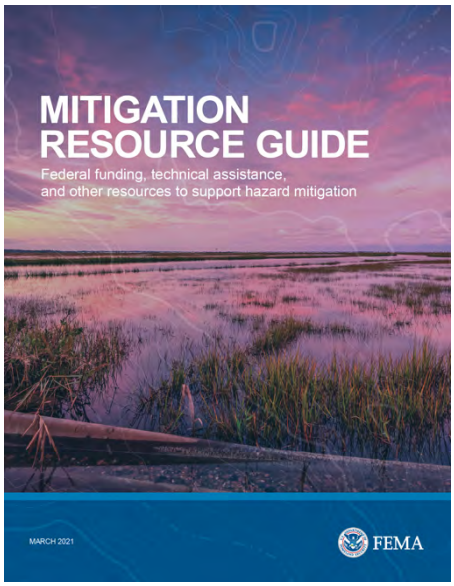


Figure 31. Mitigation Resource Guide cover.

For information regarding a wider range of Federal funding sources, FEMA's Mitigation Resource Guide is a terrific reference and may be found here:

https://www.fema.gov/sites/default/files/documents/fema_mitigation-resource-guide.pdf.

7.6.2 Additional Funding Sources

Municipalities are encouraged to look for mitigation funds from sources other than FEMA. The list below represents some of the options for SCRCOG municipalities.

Table 107. Funding Options.

Fund Name	Web Address
Connecticut Institute for Resilience and Climate Adaptation (CIRCA) Municipal Resilience Grant	https://circa.uconn.edu/funds-muni-2/
Clean Water State Revolving Fund	https://www.epa.gov/cwsrf

Fund Name	Web Address
DEEP Climate Resilience Fund - new for 2022-2023; anticipated for 2023-2024	https://portal.ct.gov/ConnecticutClimateAction/Executive-Order/DEEP-Climate-Resilience-Fund
Drinking Water State Revolving Fund	https://www.epa.gov/dwsrf
Environmental Protection Agency (EPA) grants through Section 319 water quality programs	https://www.epa.gov/nps/319-grant-program-states-and-territories
Rehabilitation Of High Hazard Potential Dam Grant Program	https://www.fema.gov/emergency-managers/risk-management/dam-safety/rehabilitation-high-hazard-potential-dams/resources
Infrastructure Investment and Jobs Act	https://www.congress.gov/bill/117th-congress/house-bill/3684/text
National Culvert Removal, Replacement, and Restoration Grants (Culvert AOP Program)	https://www.fhwa.dot.gov/engineering/hydraulics/culverthyd/aquatic/culvertaop.cfm
Bridge Investment Program	https://www.fhwa.dot.gov/bridge/bip/
Buses and Bus Facilities Program	https://www.transit.dot.gov/bus-program
Restoring Fish Passage through Barrier Removal Grants - may have been 2022 only	https://www.fisheries.noaa.gov/grant/restoring-fish-passage-through-barrier-removal-grants
State and Local Cybersecurity Grant Program	https://www.fema.gov/grants/preparedness/state-local-cybersecurity-grant-program
Long Island Sound Futures Fund	https://www.nfwf.org/programs/long-island-sound-futures-fund
Local Transportation Capital Improvement Program	https://portal.ct.gov/DOT/Office-of-Engineering/Highway-Design-Local-Roads-LOTCIP
Municipal Capital Improvement Program or equivalent local program	https://portal.ct.gov/OPM/IGPP/Grants/LoCIP/Local-Capital-Improvement-Program-LoCIP-HOME-PAGE
National Oceanic and Atmospheric Administration (NOAA) grants administered by the National Fish and Wildlife Foundation	https://www.nfwf.org/media-center/press-releases/nfwf-and-noaa-announce-1-6-million-grants-aid-communities-affected-2020-2021-hurricane-season
Save the Sound is a resource for partnering to seek grant funds; Save the Sound also has some funding available	https://www.savethesound.org
Southeastern Connecticut Enterprise Region	https://www.secter.org

Fund Name	Web Address
State Historic Preservation Office	https://portal.ct.gov/DECD/Services/Historic-Preservation
Small Town Economic Assistance Program	https://portal.ct.gov/OPM/Bud-Other-Projects/STEAP/STEAP_Home
U.S. Department of Agriculture Natural Resources Conservation Service	https://www.nrcs.usda.gov

Chapter 8. Plan Implementation and Maintenance

8.1 Plan Implementation

SCRCOG staff and the Advisory Committee will implement the mitigation strategy and specific mitigation actions outlined in this Plan and update and maintain the Plan according to the guidelines below. SCRCOG staff and each of the participating municipalities will use the Plan's goals, as well as continued analysis of hazard risks and capabilities, to weigh the available resources against the costs and benefits for each mitigation action. The participating municipalities understand the value of this Plan and its positive mitigation impact and intend to continue updating this Plan and implementing the Plan's strategies. SCRCOG's Transportation Planner will champion the effort of plan implementation and maintenance on behalf of SCRCOG and the region. Advisory Committee members will champion the plan's implementation and maintenance on behalf of their municipality's.

Each of the municipalities represented in this Plan, as well as SCRCOG staff, will implement portions of the Plan. They will collaborate on the completion of regional mitigation actions in addition to plan monitoring, evaluating, and updating. They will independently implement their own municipality-specific mitigation actions. Each mitigation action in this Plan is prioritized and assigned to a specific department or person for implementation. Timelines are given for each mitigation action where appropriate.

Two potential barriers to plan implementation and maintenance are funding and staff turnover. SCRCOG will assist with funding by providing grant announcements, assistance in applying for grant funding. They will also secure grant funds on behalf of the region. To allay the inevitable challenges of staff-turnover, SCRCOG will host Advisory Committee meetings twice a year to keep current employees aware of the plan.

8.2 Continued Regional Public Participation

A5. Is there discussion of how the community(ies) will continue public participation in the plan maintenance process? (Requirement §201.6(c)(4)(iii))

Public participation was an integral component of the mitigation planning process and will continue to be essential as this plan is implemented and update. The Advisory Committee with SCRCOG's leadership is committed to continuing public outreach and public involvement. To this end, the public will remain involved in hazard mitigation, in the region and specifically in this Plan, via several vehicles.

Public involvement will be fostered through the strategies listed below.

- The SCRCOG Mitigation Webpages (https://scrcog.org/regional-planning/regional-hazard-mitigation/) will contain a copy of the plan and all updates as well as funding resources.

- Public meetings will be advertised in local newspapers and local websites. Meetings will be offered in-person or in a virtual environment depending on need.
- Advisory Committee members will update their local constituency of Plan implementation and update progress.
- Copies of this plan will be available in each municipality's Town Hall or other venue for public view.

SCRCOG intends to develop the next version of this plan as an interactive and website. They intend to model the plan after other successful web-based mitigation plans, such as the City of New York Hazard Mitigation Plan (https://nychazardmitigation.com). SCRCOG and the Advisory Committee believe a website to be the most effective way to engage stakeholders and residents and to keep the plan current through transparency.

8.3 Monitoring, Evaluating and Updating the Mitigation Plan

A6. Is there a description of the method and schedule for keeping the plan current (monitoring, evaluating and updating the mitigation plan within a 5-year cycle)? (Requirement §201.6(c)(4)(i))

The Advisory Committee has agreed to meet twice a year, at a minimum, to review the Plan. SCRCOG staff will host these meetings. All the SCRCOG municipalities will be invited to participate in these meetings. Previously, the Advisory Committee met annually, and due to staff turnover throughout the region, this is not adequate. These meetings may be held virtually to limit the barrier of transportation to a central location.

Three key methods to keeping this Plan current are monitoring, evaluating, and updating the Plan. FEMA defines these the following way:

1. Monitoring: Tracking the implementation of the plan over time.
2. Evaluating: Assessing the effectiveness of the plan at achieving its stated purpose and goals.
3. Updating: Reviewing and revising the plan at least once every five years.

8.3.1 Monitoring

The SCRCOG Transportation Planner will maintain the Mitigation Action Tracker (a tool to record the status of each mitigation action). This person will share the Mitigation Action Tracker via Google Drive with the Advisory Committee and remind them quarterly to update the status of their mitigation actions. During semi-annual Advisory Committee meetings, the Mitigation Action Tracker will be reviewed. This system was used over the last five years with success.

If there is a large-scale disaster in the region, the SCRCOG Transportation Planner will host an Advisory Committee meeting to update and review the list of mitigation actions based on current priorities.

Actions not included in this Plan will be added to the Plan via the Mitigation Action Tracker and discussed at semi-annual Advisory Committee meetings. Advisory Committee members are responsible for collecting additional mitigation actions from their municipality and adding them to the Mitigation Action Tracker.

8.3.2 Evaluating

The SCRCOG Transportation Planner and the Advisory Committee will use the Plan Update Evaluation Worksheet (shown in Appendix B) to evaluate this Plan and make recommendations for plan updates and enhancements. The worksheet will be completed approximately three months after this Plan is adopted by all municipalities. It will then be completed annually at an Advisory Committee meeting.

The Advisory Committee will review the effectiveness of the planning process, public and stakeholder engagement, risk analysis, and the mitigation strategy, including its implementation. Beyond considering the planning process, the Advisory Committee will seek to answer the following questions to determine if the plan is effective at mitigating risk in the region to residents, the built environment, and the natural environment.

- Can the Advisory Committee identify success stories of losses avoided because of hazard mitigation measures implemented? Can the Advisory Committee identify political, social, and economic successes from plan implementation.
- Have the mitigation actions implemented achieved benefits beyond the cost of their implementation?
- Have the implemented mitigation actions saved lives or protected property?
- Does the list of mitigation action jive with current regional priorities? Do additional actions need to be added?

SCRCOG has decided that the next version of this plan should be web-based. This should increase access and transparency to the plan and facilitate plan implementation.

8.3.3 Updating

SCRCOG agrees to update and adopt this mitigation plan on a five-year basis, as do each of the SCRCOG municipalities. SCRCOG has committed to maintaining this Plan by applying for funding **two years** prior to plan expiration. The SCRCOG Transportation Planner will take the lead in this effort. SCRCOG staff will invite all municipalities to participate in plan updates. The update will include a comprehensive review and planning process like the one used to develop this mitigation plan update. SCRCOG will facilitate the update of the Mitigation Action Tracker, current land use practices, collecting and reviewing best available data, reviewing the capability assessment, and engaging the public and stakeholders. This process will occur according to FEMA guidelines.

SCRCOG will host semi-annual Advisory Committee meetings to review the plan's goals and the status of each mitigation action. If necessary, the mitigation strategy will be revised to reflect current priorities in the region and in each municipality. The SCRCOG Transportation Planner will develop a brief plan update report to share with the SCRCOG Board of Directors semi-annually. These reports will be posted to the SCRCOG mitigation webpage to keep the public informed.

SCRCOG staff and Advisory Committee members will participate in regional and state-based meetings to stay current with best risk-mitigation practices. Such meetings may include CIRCA, the Nature Conservancy, and DEMHS.

In the event of a large-scale disaster, SCRCOG staff will review the Plan with the impacted municipalities and the Advisory Committee to verify the Plan's accuracy. A meeting will be convened, with all municipalities, and the Plan will be updated as necessary. Table 108 shows the annual method and schedule for monitoring, evaluating, and updating the Plan.

Table 108. Method and Schedule for Plan Update.

Timeline	Activities
2023	Host Advisory Committee meetings semi-annually, in June and December, led by the SCRCOG Transportation Planner. (Meeting includes monitoring the status of all mitigation actions through the Mitigation Action Tracker, evaluation of the effectiveness of the mitigation strategy, development of a status report to share with the SCRCOG Board of Directors and to post on the SCRCOG website.)
2024	Host Advisory Committee meetings semi-annually, in June and December, led by the SCRCOG Transportation Planner. (Meeting includes monitoring the status of all mitigation actions through the Mitigation Action Tracker, evaluation of the effectiveness of the mitigation strategy, development of a status report to share with the SCRCOG Board of Directors and to post on the SCRCOG website.)
2025	Host Advisory Committee meetings semi-annually, in June and December, led by the SCRCOG Transportation Planner. (Meeting includes monitoring the status of all mitigation actions through the Mitigation Action Tracker, evaluation of the effectiveness of the mitigation strategy, development of a status report to share with the SCRCOG Board of Directors and to post on the SCRCOG website.) Seek FEMA BRIC funding for plan update.
2026	Host Advisory Committee meetings semi-annually, in June and December, led by the SCRCOG Transportation Planner. (Meeting includes monitoring the status of all mitigation actions through the Mitigation Action Tracker, evaluation of the effectiveness of the mitigation

Timeline	Activities
	strategy, development of a status report to share with the SCRCOG Board of Directors and to post on the SCRCOG website.)
2027	Host Advisory Committee meetings semi-annually, in June and December, led by the SCRCOG Transportation Planner. (Meeting includes monitoring the status of all mitigation actions through the Mitigation Action Tracker, evaluation of the effectiveness of the mitigation strategy, development of a status report to share with the SCRCOG Board of Directors and to post on the SCRCOG website.)

8.4 Plan Adoption

E2. For multi-jurisdictional plans, has each jurisdiction requesting approval of the plan documented formal plan adoption? FEMA Requirement §201.6(c)(5)

Following FEMA “approved-pending-adoption” status, each municipality adopted the plan. Signed adoption resolutions appear at the front of this document. The SCRCOG Board also formally adopted the plan.

Appendices

Appendix A. Planning Process Supporting Materials

Fact Sheet

SCRCOG

SOUTH CENTRAL REGIONAL COUNCIL OF GOVERNMENTS

Planning for Our Region's Future

Bethany Branford East Haven Guilford Hamden Madison Meriden Milford
New Haven North Branford North Haven Orange Wallingford West Haven Woodbridge

Carl J. Amento, Executive Director

Hazard Mitigation Plan Update Fact Sheet
PUBLIC ENGAGEMENT NEEDED

SCRCOG has received funding from the Connecticut Division of Emergency Management and Homeland Security (DEMHS) to update the South Central Region: Multi-Jurisdiction Hazard Mitigation Plan.

The plan serves as an essential strategy for reducing current and future risks to natural hazards and improving the emergency preparedness in all fifteen municipalities. Updates are required every five years. This update is scheduled for completion in January 2023.

A Regional Plan with Local Focus
Updating the Hazard Mitigation Plan requires involvement from each of SCRCOG's 15 municipalities and the public. SCRCOG has hired Jamie Caplan Consulting LLC, the author of the two previous versions of this plan, to lead the project update. The update began in April 2022 with a completed plan, ready for public and state review, expected in January 2023.

The SCRCOG Hazard Mitigation Plan Update will focus on the identification, assessment, and mitigation of natural hazards such as **winter storms, hurricanes, and coastal flooding**. The plan will result in a list of mitigation actions or projects each municipality can take to save lives and reduce damages. It will also double as a creditable "floodplain management plan" under FEMA's Community Rating System (CRS).

An Advisory Committee with representation for each municipality has been formed to guide the planning process and facilitate local engagement. This Committee is hosting meetings in each municipality with a diverse group of local leaders to local government staff. Virtual public meetings will be held in September 2022 and January 2023; details will be announced on the project webpage and through news media.

GET INVOLVED TODAY YOUR OPINIONS MATTER!
Take the Mitigation Planning Survey in English or Spanish:
https://www.surveymonkey.com/r/SCRCOG2023 or
https://www.surveymonkey.com/r/SCRCOG2023espanol

Visit the Project Web Page:
https://scrcog.org/regional-planning/regional-hazard-mitigation/

NATURAL HAZARDS THREATEN LIVES, PROPERTY, AND ASSETS

- Hazard Mitigation Plans Identify Activities to Mitigate These Risks
- Share Your Ideas Today https://scrcog.org/regional-planning/regional-hazard-mitigation/

South Central Regional Council of Governments (SCRCOG)
The South Central Regional Council of Governments (SCRCOG) brings together local governments to coordinate transportation planning, regional planning, and municipal services programs on a regional basis. SCRCOG provides a forum to foster communication and collaboration among its member municipalities in identifying and addressing these and other regional issues.

Federal Emergency Management Agency (FEMA)
Once approved by FEMA, the plan makes each municipality eligible for pre- and post-disaster mitigation grant funding through FEMA's Hazard Mitigation Assistance (HMA) programs and other non-emergency disaster assistance.

Hazard Mitigation Plans form the foundation for a community's long-term strategy to reduce disaster losses and break the cycle of disaster damage, reconstruction, and repeated damage.

The greatest value of a hazard mitigation plan is in the implementation of cost-effective mitigation measures that reduce or eliminate short- and long- term risk to life and property.

TAKE THE PUBLIC SURVEY TODAY

- Identify hazards of concern
- Recommend ways to adapt to climate change
- Name specific areas of your community that are vulnerable to hazards
- Define your priorities for mitigating risk
- Recommend strategies for projects your community can take

For more information:
Rebecca Andreucci, Senior Regional Planner
203-466-8601
randreucci@scrcog.org
http://scrcog.org/regional-planning/regional-hazard-mitigation/

Advisory Committee Meetings

First Name	Last Name	Job Title	Organization	May 12, 2022 Mtg	August 11, 2022	October 24, 2022	January 5, 2023
Mike	Katzmark	Emergency Management Director	Town of Bethany	☐	☐	☐	☐
David	Merriam	Lieutenant	Town of Bethany	☐	☐	☐	☑
Don	Shea	DPW and Facilities	Town of Bethany	☐	☐	☐	☑
Stephen	Sousa	Fire Marshal	Town of Bethany	☐	☐	☐	☑
Jennifer	Acquino	Assistant Town Engineer	Town of Branford	☑	☐	☐	☐
John	Hoefferle	Town Engineer	Town of Branford	☐	☐	☑	☑
Kevin	Ortiz	Design Engineer	Town of Branford	☐	☑	☐	☐
Jonathan	Bodwell	Town Engineer	Town of East Haven	☐	☐	☐	☐
Matthew	Marcarelli	Fire Chief	Town of East Haven	☐	☑	☐	☑
John	Truscinski	Director of Resilience Planning	Connecticut Institute for Resilience and Climate Adaptation	☑	☐	☑	☐
Kevin	Magee	Environmental Planner	Town of Guilford Natural Resources Department	☑	☑	☑	☑
Janice	Plaziak	Town Engineer	Town of Guilford	☑	☑	☑	☐
Eugene	Livshits	Town Planner	Town of Hamden	☑	☑	☑	☑
Stephen	White	Town Engineer	Town of Hamden	☑	☐	☑	☑
John	Iennaco	Director of Public Works & Town Engineer	Town of Madison	☑	☑	☑	☑
Erin	Mannix	Town Planner	Town of Madison	☐	☐	☐	☐
Brian	Ennis	City Engineer	City of Meriden	☑	☑	☑	☑
Steven	Johnson	Assistant Public Works Director	City of Milford	☑	☑	☑	☑
MaryRose	Palumbo	Inland Wetland Agent	City of Milford	☑	☑	☑	☑
William	Richards	Deputy Emergency Management Director	City of Milford	☑	☑	☑	☑
Laura	E Brown	City Plan Director	City of New Haven	☑	☑	☑	☐
Anne	Hartjen	Asst Dir Comp Plan	City of New Haven	☑	☑	☐	☐
Jacob	Robison	Senior Project Manager	City of New Haven	☑	☐	☐	☐
Tom	Schroeder	Senior Engineer	Greater New Haven Water Pollution Control Authority	☑	☐	☑	☐
Victor	Benni	Town Engineer	Town of North Branford, CT	☑	☑	☑	☑
J Andrew	Bevilacqua	Town Engineer	Town of North Haven	☑	☑	☐	☑
Lynn	Sadosky	Public Works Director	Town of North Haven	☐	☑	☐	☐
Tom	Borer	Director Emergency Management	Town of Orange	☐	☐	☐	☐
Robert	Brinton	Director of Public Works/Town Engineer	Town of Orange	☑	☐	☑	☐
Rebecca	Andreucci	Transportation Planner	South Central Regional Council of Governments (SCRCOG)	☑	☑	☑	☑
Alison	Kapushinski	Town Engineer	Town of Wallingford	☐	☐	☐	☐
Kevin	Paganini	Town Planner	Town of Wallingford	☐	☐	☐	☐
Abdul	Quadir	City Engineer	City of West Haven	☑	☑	☑	☑
Adam	Whelchel	Director of Science	The Nature Conservancy	☑	☐	☐	☐
Warren	Connors	Director of Public Works	Town of Woodbridge	☑	☐	☐	☑

Advisory Committee Meeting
May 12, 2022

South Central Regional Council of Governments
Multi-Jurisdictional Hazard Mitigation Plan Update

Introductions

Project Scope and Timeline

- Mitigation Planning 101
- Municipality Expectations and Priorities
- Timeline

Project Tasks and Assumptions

- Outreach and Engagement
  - Advisory Committee
  - Municipality Stakeholders
  - Public Outreach
- Risk Assessment
  - Data Collection
  - Methodology and Approach
  - High Hazard Potential Dams
- Capability Assessment
  - Updated municipal plans (POCD, Resilience Plans, etc.) and regulations
  - NFIP/CRS Participation & Compliance
- Hazard Mitigation Strategy
  - Mitigation Action Tracker
  - Resilience Projects
- Plan Maintenance Process
  - What has worked and what needs improvement?

Next Steps

- Survey Distribution
- Municipality Meetings
- Updated Plans and Data to Google Drive
- Advisory Committee Meeting for August

Advisory Committee Meeting
August 11, 2022

South Central Regional Council of Governments

Multi-Jurisdictional Hazard Mitigation Plan Update

Project Update

- ✓ Municipality Meetings
- ✓ Capability Assessment (NFIP and Safe Growth Surveys)
- ✓ Fact Sheet and Survey

Risk Assessment

- ✓ Critical Facilities
- ✓ Loss Estimates
- ✓ Approach for Repetitive Loss Properties
- ✓ Environmental Justice Communities
- ✓ Social Vulnerability Mapping
- ✓ Conclusions from Resilient Connecticut

Mitigation Strategy

- ✓ Regional Goal Statements
- ✓ FEMA Funding (Sources and Priorities)
- ✓ Previous Mitigation Actions
- ✓ Identifying New Mitigation Actions

Public and Stakeholder Engagement

- ✓ Survey Distribution
- ✓ Stakeholder Meetings

Next Steps

- ✓ Survey Distribution
- ✓ Mitigation Actions Development

Advisory Committee Meeting
October 24, 2022

South Central Regional Council of Governments

Multi-Jurisdictional Hazard Mitigation Plan Update

Project Schedule

- ✓ Status Update

Public and Stakeholder Engagement

- ✓ Survey Distribution and Current Results
- ✓ Public Meeting – Date and Invitations

Risk Assessment

- ✓ Final HAZUS Analysis
- ✓ Final Non-Hazus Losses
- ✓ Exposure Analysis
- ✓ Environmental Justice Communities and Distressed Municipalities
- ✓ Initial Problem Statements

Capability Assessment Findings

- ✓ Summary Findings
- ✓ Regional and Local Suggested Actions

Mitigation Strategy

- ✓ Regional Goal Statements
- ✓ CIRCA Resilient Connecticut Projects
- ✓ New Mitigation Actions
- ✓ Essential Details

Next Steps

- ✓ Final Survey Distribution
- ✓ Public Meeting Outreach
- ✓ Mitigation Actions Development and Prioritization

Advisory Committee Meeting
January 5, 2023

South Central Regional Council of Governments

Multi-Jurisdictional Hazard Mitigation Plan Update

Project Schedule and Public Review

- ✓ Plan Review
- ✓ Public Meeting
  - January 12, 2023, 6:00pm-7:00pm
  - Outreach
- ✓ Public Review

Survey Results

Problem Statements

Mitigation Strategy

- ✓ Regional Actions
- ✓ Municipality Actions

Next Steps

- ✓ Public Meeting Outreach
- ✓ Final Review of Mitigation Actions
- ✓ Plan Review

Public Meetings

SCRCOG
SOUTH CENTRAL REGIONAL COUNCIL OF GOVERNMENTS
Planning for Our Region's Future

Bethany Branford East Haven Guilford Hamden Madison Meriden Milford
New Haven North Branford North Haven Orange Wallingford West Haven Woodbridge

Carl J. Amento, Executive Director

Public Invited to Disaster Planning Zoom Meeting

Do you live or work in South Central Connecticut? Are you concerned about the potential impact of natural hazards such as flooding, hurricanes, winter storms, and drought? Join regional and local leaders and residents to voice your opinions about how to prevent the types of loss recently seen in Florida.

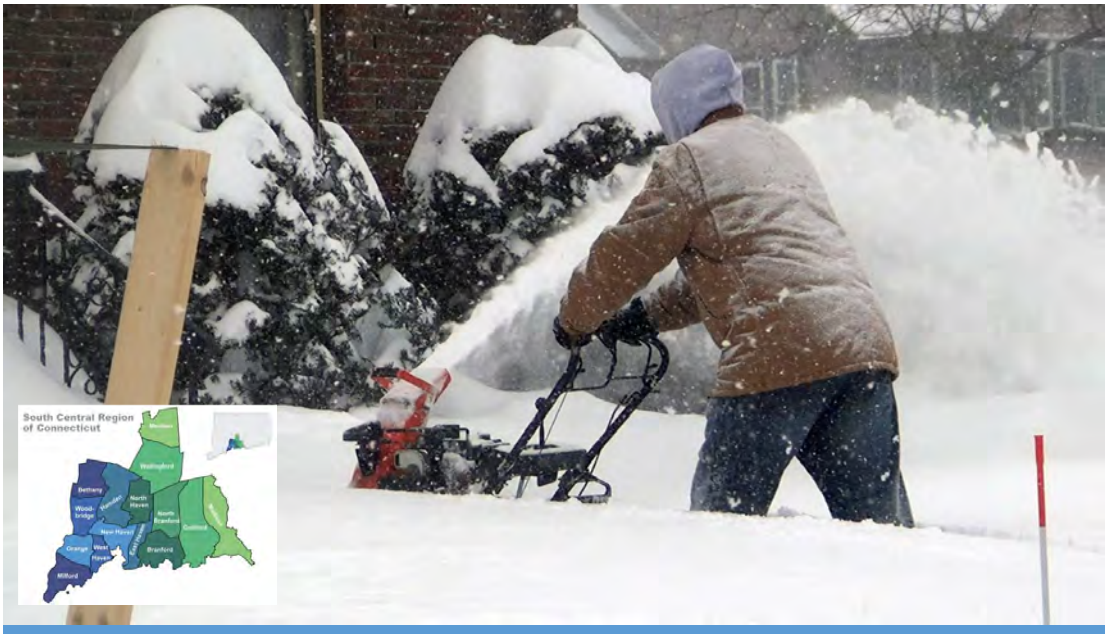
Date/Time: Nov 7, 2022, 6:00 PM – 7:00 PM
For Zoom Link Visit: https://scrcog.org/regional-planning/regional-hazard-mitigation/

The fifteen municipalities in South Central Connecticut, with the help of the South Central Regional Council of Governments (SCRCOG), are preparing an update to the region's Multi-Jurisdiction Hazard Mitigation Plan. This plan names natural hazards and their potential impacts to each community. The plan then identifies activities each community may take to mitigate identified risks. This Plan makes each city and town eligible for Federal Emergency Management Agency (FEMA) pre-disaster funding. This grant funding may be used for projects that mitigate risk to vulnerable residents, build resilient infrastructure and transit systems, and protect the natural environment.

The Hazard Mitigation Plan is your community's tool to prevent damage from natural hazards. Take the opportunity to voice your concerns and share your ideas. The Zoom meeting is interactive! Participants will answer several multiple choice and open-ended poll questions. Plan developers want to know how you recommend your community protect itself from natural hazards?

Prior to the meeting, share your opinions by taking the South Central Connecticut Hazard Mitigation Plan Survey. The information provided will help the Planning Team to better understand local concerns and issues. Participation in this survey is voluntary and none of the information provided will be attributed to individuals directly. The survey is available in **English and in Spanish**. To participate in the survey or to learn more about the project, please visit the project web page at: http://scrcog.org/regional-planning/regional-hazard-mitigation.

For more information:
Rebecca Andreucci, Transportation Planner
203-466-8601
randreucci@scrcog.org
http://scrcog.org/regional-planning/regional-hazard-mitigation/



PUBLIC INVITED TO DISASTER PLANNING MEETING

Do you live or work in South Central Connecticut? Are you concerned about the potential impact of natural hazards such as flooding, hurricanes, winter storms, and drought? Join regional and local leaders and residents to voice your opinions about how to prevent disasters.

November 7, 2022, 6:00 pm – 7:00 pm
Zoom Link and More Information at:
https://scrcog.org/regional-planning/regional-hazard-mitigation/

South Central Regional Council of Governments (SCRCOG) is updating the region's Hazard Mitigation Plan, your community's tool to prevent damage from natural hazards.

SCRCOG SOUTH CENTRAL REGIONAL COUNCIL OF GOVERNMENTS
Planning for Our Region's Future

JOIN A VIRTUAL MEETING ABOUT DISASTER MITIGATION

The public is invited to learn about the regions' Hazard Mitigation Plan and to voice their opinions about how each municipality should mitigate risk. The meeting includes an introduction to the contents of the recently developed Hazard Mitigation Plan with an emphasis on actions to mitigate risk to people, buildings, and infrastructure from natural hazards such as floods, winter storms, and hurricanes.

Take the opportunity to voice your concerns and share your ideas. **The Zoom meeting is interactive!** Participants will answer several multiple choice and open-ended poll questions as well as have a chance to ask questions and participate in a discussion. Plan developers want to know how you recommend your community protect itself from natural hazards.

The fifteen municipalities in South Central Connecticut, with the help of the South Central Regional Council of Governments (SCRCOG), have prepared an update to the region's Multi-Jurisdiction Hazard Mitigation Plan. This plan names natural hazards and their potential impacts to each community. The plan then identifies activities each community may take to mitigate identified risks. This Plan makes each city and town eligible for Federal Emergency Management Agency (FEMA) pre-disaster funding. This grant funding may be used for projects that mitigate risk to vulnerable residents, build resilient infrastructure and transit systems, and protect the natural environment.

Date/Time: January 12, 2023, 6:00 PM – 7:00 PM
For Zoom Link Visit: https://scrcog.org/regional-planning/regional-hazard-mitigation/

Prior to the meeting, share your opinions by taking the South Central Connecticut Hazard Mitigation Plan Survey. The information provided will help the Planning Team to better understand local concerns and issues. Participation in this survey is voluntary and none of the information provided will be attributed to individuals directly. The survey is available in **English and in Spanish**. Survey closes on **January 13, 2023**.To participate in the survey or to learn more about the project, please visit the project web page at: http://scrcog.org/regional-planning/regional-hazard-mitigation.

For more information:
Rebecca Andreucci, Transportation Planner
203-466-8601
randreucci@scrcog.org
http://scrcog.org/regional-planning/regional-hazard-mitigation/

JOIN A VIRTUAL MEETING ABOUT DISASTER MITIGATION

Do you live or work in South Central Connecticut? Are you concerned about the potential impact of natural hazards such as flooding, hurricanes, winter storms, and drought? Join regional and local leaders and residents to voice your opinions about how to prevent disasters.

January 12, 2023, 6:00 pm – 7:00 pm

Zoom Link and More Information at:
https://scrcog.org/regional-planning/regional-hazard-mitigation/

South Central Regional Council of Governments (SCRCOG) has updated the region's Hazard Mitigation Plan, your community's tool to prevent damage from natural hazards.

SCRCOG SOUTH CENTRAL REGIONAL COUNCIL OF GOVERNMENTS
Planning for Our Region's Future

People Registered for Public Meeting #2. January 12, 2023

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Gabriela Campos	gaby.Gabriela.ella@gmail.com
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Stephen Castiglione	partyexpress@comcast.net
Chris Ozyck	Christopher.ozyck@yale.edu
Darlene P	Redsoxdp@yahoo.com
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Rebecca Andreucci	randreucci@scrcog.org
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peter hentschel	PETERH@TECTONPC.COM

Tree Feedback Received

From: *Diane Hoffman* <hoffmandiane30@gmail.com>
Date: Thu, Jan 12, 2023 at 7:26 PM
Subject: Public input for the SCRCOG Hazard Mitigation Plan
To: Rebecca Andreucci <randreucci@scrcog.org>

1/12/23

Dear Hazard Mitigation Planning Committee,

Trees are being removed by the hundreds in every town in Connecticut by the electric utilities. Trees are a fundamental part of our natural world and are central to the survival of life as we know it. We cannot afford to lose the critical benefits and services they provide which includes fighting climate change by capturing and storing carbon, fighting the heat island effect which is most prevalent in underserved neighborhoods and absorbing water to mitigate flooding everywhere they grow.

As a part of your Hazard Mitigation plan, Hamden Alliance for Trees is asking that the Planning Committee please advise town leaders who are members of our COG of the following:

1. Each town should carefully review the utility schedule and location of planned work for 2023 and the size of the Utility Protection Zone

A. According CGS 16-234 7i "Not later than January 31st...the utility shall provide to the tree warden or town...a plan detailing the proposed roads or areas in said town where such vegetation management will take place and the estimated time schedule for such proposed work."
Late receiving of this schedule does not allow for proper review and planning by the town or notification to the public so the trees can be monitored.

B. **Please ensure the public has access to the schedule and location of work. According** to the same law "**Each town** shall make such plan publicly available by electronic means or otherwise, not later than 14 days after receipt and keep such plan publicly available for the remainder of the forthcoming calendar year."
Please ensure the location includes the circuit #s and street addresses. The utility often refers to circuit numbers but that is meaningless to most residents.

C. **Please do not allow the utility to add circuits during the year**. There is no provision for this in the current law. Circuits were added in Hamden in Nov. and Dec in 2022. This does not allow for proper review or planning by the town or the public.

D. **Please do not allow the utility to expand the Utility Protection Zone beyond the legally defined UPZ area (in section 16-234) of 8 feet.** The town CEO has the right to require them to stay within the legal definition of the UPZ. Please put this requirement in writing and ask that the utility representative date and sign off on the requirement.
Eversource has informed their pilot project towns that it will enlarge the UPZ from 8 feet to 10 feet in each of the towns. In previous legislative committee meetings, UI indicated that they might expand the UPZ in their service area even more.

If the utility says trees are responsible for a % of outrages, ask them to document that claim. Eversource claims trees account for 90% of outages but in their 12 pilot projects the actual range they reported was 23%-65%. (per their letter to each town)

E**. Please ask town leaders to use their office to encourage residents to protect their healthy trees** and seriously consider the important economic, health, environmental and social benefits of trees before allowing the removal of any of their healthy trees.

Eversource is asking private property owners to consent to the utility removing large **healthy** trees that might fall on the utility lines or poles, for any reason at any time, wherever those trees grow, even if they are hundreds of feet away from the utility's infrastructure. They call this the "Fall Zone".

2. Communicate directly with the utility, not just through the Tree Warden.

A. Please require the utility to provide both the CEO and the tree warden, the plan detailing the work and the schedule for the year and any other legally required correspondence of the utility to the town. If both must be notified there is less chance something will inadvertently be missed.

B. Please ask that the CEOs tell the utility that they must receive confirmation of receipt and approval of the work from both the CEO and the Tree Warden before they can start their vegetation management work. This will reinforce their acknowledgement of this requirement and ensure that the notifications are sent to the correct addresses.

We recognize that the tree warden position is very difficult and we believe the tree warden must not be subject to undue influence or pressure by the utility to agree to work that is not in the best interest of the health of our treescape or the town.

We do not trust UI to be an honest broker or to put the interests of our trees and town above their concern for their bottom line. They were banned from Hamden twice because they were not considered to be honest or trustworthy.

3.Timely posting of tree notices of work being done by the town on the Public Works website by the Tree Warden. Please ask town CEOs to ensure this is done so the public knows where and when work is scheduled by the town and so the trees can be looked at before they are pruned or removed. This is important for transparency and accountability.

This could be the same place the utility's yearly schedule is posted so residents know there is one place to go to see all planned tree work.

4.Lastly, please encourage the CEOs to investigate providing funds or apply for grants for the purchase of a resistograph for their Tree Warden to use. This tool will greatly expand the ability to analyze the health of any tree being considered for pruning or removal.

The cost of this tool ranges from hundreds to $65,000 and more.

I appealed the removal of a tree in Hamden's town center park this summer. Both the tree warden and the consulting arborist thought it should be removed. The resistograph reading convinced both of them that the tree did not need to be removed.

We believe our town leaders must be proactive in staying on top of the law and enforcing the provisions to protect our precious assets, our trees. All of these steps will help make our trees safer from utility overreach and will increase the public's awareness of where and when tree work is planned, allowing them to advocate more successfully for responsible tree pruning and removals. We support removal of dead and diseased trees but firmly believe our healthy trees must be protected and removed trees should be replaced with appropriate healthy saplings that can survive and thrive where planted.

Thank you very much! Please confirm you received this email and let me know if you will share this information with the town leaders who are represented by SCRCOG.

Sincerely,
Diane Hoffman
For Hamden Alliance for Trees

From: Diane Hoffman <hoffmandiane30@gmail.com>
Sent: Monday, November 21, 2022 9:55 AM
To: Rebecca Andreucci <randreucci@scrcog.org>
Subject: Public input on SCRCOG Hazard Mitigation Plan

11/21/22

Dear SCRCOG Hazard Mitigation Planning Committee,

Several members of Hamden Alliance for Trees have been involved in a regional tree group that was formed to bring concerned residents across the state together to work to better protect our trees. A large part of our work has been to participate in PURA Dockets involving the utilities.

We view the utilities and the Department of Transportation as major threats to the wellbeing of our trees and tree canopy. This letter is a summary of what has happened regarding Eversource and PURA since Eversource's recent activities came to light this spring.

Background:

* January 2022 - Eversource sent letters to 12 towns in their service territory to advise the top official and tree warden in each of those towns of Eversource's new 2022 "Resiliency" tree trim and removal plans. These towns were: Chester, Clinton, Guilford, Mansfield, Middletown, Naugatuck, Newtown, Redding, Sharon, West Hartford, Windham, and Woodstock.

* There was a public outcry against this work which called for expanding the tree trimming project from 8' to 10' either side of the primary wires (a 25% increase) and creating a "Fall Zone" where any tree, including healthy trees on private property, would be removed if they could fall on a wire or utility pole at any time for any reason regardless of how far away from the infrastructure they were located.

* Hamden Alliance for Trees and numerous other individuals and tree groups including The Garden Club of New Haven, Greenwich Tree Conservancy, Redding Tree Conservancy, and the Branford Community Forest Commission, wrote to PURA requesting that this work be stopped, a thorough vetting of the plan takes place and public input be considered.

* Eversource's new plan was not vetted or approved by PURA or legislation.

* PURA issued a Cease-and-Desist order on Eversource, effective 8/23/22 in response to Motion 33 that was filed raising objections to the work Eversource was initiating.

* After review, PURA lifted the Cease-and-Desist order on Eversource, effective 9/6/22 because PURA determined Eversource had provided notification of their plans to the municipalities and tree wardens as required. PURA did not address the other points that were raised in Motion 33 that CT residents believe are equally as important as this notification requirement. Other points included lack of a robust evaluation of the costs and benefits of this type of tree work, proof that meaningful resilience will be achieved, increased costs and possible rate hikes, and failure to consider the benefits of retaining tall trees.

* In the Order, PURA acknowledged the public's concerns and provided suggested steps that can be taken by the public. (Private property owners can say NO to the utilities, as can tree wardens, and legislation can be changed.)

* Per existing law, UI must notify the top elected official and the tree warden of each town they service of their vegetation management plan in January of each year. UI has indicated they have similar plans to increase the tree trimming area in their service territory so the entire state will be impacted by this change.

* Concerned citizens continue to follow the activities of the utilities and are working with our state legislators to get stronger legislation in place to protect our trees and help CT be a leader in protecting our natural world upon which we all depend for a healthy life.

This summer the entire country endured a serious heat wave. This is not the time to be removing trees, our natural cooling allies which work 24/7 to make our communities more livable. Removing healthy trees is especially dangerous as it makes our entire ecosystem weaker. Our trees are the lungs of our planet and what we do in Connecticut matters.

Please see the attached documents from Ct Forest and Park Assoc. and Hamden's legislative delegation. To read more letters please see **Docket and Document Information (ct.gov)** Docket # is 17-12-03RE08, Page 2 has letters from the above groups and others. Please also see Docket 17-12-03 RE08 Motion No. 33 and Motion Number 35.
Thank you for reviewing this information and giving it serious consideration.

Please confirm you received this email.

Sincerely,
Diane Hoffman 190 Wilmot Rd.

Ralph Jones 73 Mulberry Hill St.
Susan Neitlich 30 Spring Glen Terrace
Phil Cronan 315 Woodin St.
Melinda Tuhus 103 Carmalt Rd.
Elizabeth Langhorne 16 Morris St.
Susan Etkind 67 Gordon St.
Core members, Hamden Alliance for Trees

11/6/22

Dear Members of the SCRCOG Advisory Committee:

Hamden Alliance for Trees appreciates this opportunity to participate in the SCRCOG's hazard mitigation planning process. HAT has been working since 2013 to educate the public on the benefits of trees and the need to nurture and protect healthy trees in our town and state. During those years the incidents of extreme weather due to climate change, and the corresponding devastation and financial cost, have dramatically increased as has the loss of trees in Connecticut.

There is no single solution that will solve this crisis, but Trees are our best NATURAL ally in the fight against climate change and in hazard mitigation, especially regarding flooding and alleviating the heat island effect. https://www.earthday.org/concrete-jungles-the-critical-role-of-tree-cover-in-public-health/

We know that trees help fight climate change by absorbing CO2, removing and storing carbon while releasing oxygen back into the air. Every tree we remove hastens the loss of this battle. The more trees we have, the stronger our resilience, and the more water we can keep from flooding our homes and the less soil erosion we have to deal with.
According to American Forests, one of the nation's oldest conservation organizations:

- More than half of U.S. drinking water originates in forests.
- One large tree can capture and filter up to 36,500 gallons of water per year.
- On average, a mature tree can absorb 36 percent of the rainfall it comes in contact with.
- Forests capture rain in the canopy and on the forest floor, reducing stormwater runoff and flooding.
- Healthy forested watersheds provide high-quality habitat for sensitive aquatic species.
- Forests help improve water quality by extracting pollutants through tree roots.
- The value of water derived from national forests is estimated to be several billion dollars annually.

Regarding Erosion:

- A tree's penetrating roots improve the soil structure by improving aeration and drainage. Probing root growth breaks up the soil, which creates spaces for storing air and water. Tree roots improve drainage because each root acts as an underground water channel to help water penetrate the soil.

- A tree's deep, strong root system protects against soil erosion due to heavy rain and flooding. The roots of healthy, mature trees do the best job of preventing soil erosion, whether the tree produces many smaller roots or a few larger tap roots.

This plan is a regional effort. All 15 towns need to work together to make retention of healthy trees a top priority. Trees are being removed from our forests, state parks, town neighborhoods, private property and along our roads and highways by the Department of Transportation, developers, private property owners, town public works departments and the electric utilities. In Hamden alone, United Illuminating reported to the Public Utility Regulatory Authority (PURA) that in 2015 and 2016 they removed a total of 2070 trees. Shockingly, 1323, more than half, were non-hazardous, by United Illuminating's own report! According to UI reports from 2019 to 2021- 3231 trees have been removed on 115.70 miles in Hamden. We do not know how many of those trees were healthy. If the same number of trees were removed from all 17 UI towns during this time period, 54,900 trees will have been removed! According to a 2017 Harvard University report "Connecticut is losing about 3,700 acres of forest a year to development."

This new hazard mitigation plan is an opportunity to put our understanding of the essential services that trees provide into action through a more comprehensive Hazard Mitigation Plan. We call upon SCRCOG to look at the full cost of removing our trees by including the values of all the environmental, social, economic, and physical and mental health benefits trees provide. HAT believes trees should be viewed as a community asset.

Tree Wardens, by law responsible for the fate of our trees, must be called upon to be good stewards of our trees as they are our first line of defense. The entities they report to must be called upon to help the Wardens get the education and tools they need so they can perform this critical task with confidence and skill. In turn, Tree Wardens must be held accountable for the work they do and there must be significant consequences for failure to follow the law.

We also believe that Undergrounding of our electric infrastructure must be seriously pursued so that our electric service is not threatened every time there is extreme weather. Please see
https://www.scenic.org/visual-pollution-issues/underground-power-lines/
https://www.scenic.org/wp-content/uploads/2022/09/CT-Official-One-Pager_2022.pdf
https://www.greenwichsentinel.com/2022/06/15/column-bury-the-lines-save-the-trees/
City receives $8.5 million FEMA grant to underground utilities - Rhino Marking & Protection (rhinomarkers.com)
Using Grants to Help Convert Overhead Electrical Lines to Underground | FEMA.gov

Unlike our electric utility companies, trees do not send us a monthly bill. They give freely of their services and ask nothing of us. The goal of the utilities is to remove every large tree, including healthy trees, that might fall on their infrastructure at any time for any reason. More information regarding this will be provided.

We need to recognize how essential trees are to our survival and treat them like the precious natural resource that they are. We must work together to change the attitude that trees are a threat and a nuisance, to a recognition that trees are our life blood and are as much victims of severe weather as we are.

In the long term, the best way to accomplish the mission to reduce or eliminate risk to people and property from natural hazards is to reduce the threat of natural hazards in the first place. We can reduce the threat of climate change if we have the courage and resolve to take actions that are scientifically recognized to address this threat including seriously increasing the planting, care, and maintenance of trees.

Sincerely,
Diane Hoffman 190 Wilmot Rd.
Ralph Jones 73 Mulberry Hill St.
Phil Cronan 315 Woodin St.
Elizabeth Langhorne 16 Morris St.
Susan Neitlich 30 Spring Glen Terrace
Henry Dynia 335 Forest St. Extension
Melinda Tuhus 103 Carmalt Rd.

Core members of Hamden Alliance for Trees

From: Elaine Dove <elainedove@gmail.com>
Sent: Thursday, October 27, 2022 11:11 PM
To: Rebecca Andreucci <randreucci@scrcog.org>
Subject: SCROG Zoom Meeting comment to the commissioners RE: Disaster Planning

Dear Members of SCROG:
I am a resident of Hamden and I am quite concerned about the leveling of trees that has taken place throughout our state in the last 5 years. In some places, you would hardly recognize the landscape because so many trees have been removed. It seems that some think the only way to resolve the aftermath of climate-related storms is to remove trees that break electrical cables.
Tonight's meeting is about disaster planning. I want to emphasize that SCROG must make decisions and recommendations that are in the best interest of the residents of CT and our community. Trees are an essential part of climate control. There is no argument about that.
Destroying trees to preserve overhead utility cables is not a great solution. I am proposing that you make it a priority that our utility companies underground electric wires. They will not voluntarily do this, they must be prodded to do the right thing. Laws must be in place and you must support such legislation that requires them to begin undergrounding electrical cables.
All of us have the benefit of living in a state that is stable, beautiful, traditional in building, and strong in sensible legislation, but we seem to weaken our resolve when it comes to requiring electric companies to do what is best for the environment and for the residents of our great state. Please be proactive and make saving trees and undergrounding electric cables a priority of disaster planning.
Thank you.
Elaine Dove
Santa Fe Ave.
Hamden, CT 06517

Letter printed on Sunday New Haven Register
1/30/22. https://www.nhregister.com/opinion/article/Opinion-Street-trees-deserve-protection-16813876.php

On December 16, 2021 Governor Lamont issued his Executive Order 21-3 designed to reduce carbon emissions by enacting 23 recommendations from the Governor's Council on Climate Change Report.

This is an excellent next step but it fails to address the critical importance of protecting the state's local communities' treescapes. Our street trees are the trees all residents interact and live with. Trees are essential workers in this climate crisis, sequestering carbon 24/7 while producing the oxygen essential for life. Street trees clean our air, fight the heat island effect, reduce flooding, beautify our neighborhoods, reduce road rage and positively impact emotional and physical health, all benefits that are especially needed in our vulnerable communities.

Our street trees are a critical contributor to the quality of life in our communities. They work along with our forests as our greatest natural asset in the fight against climate change.

DEEP commission Chair Katie Dykes described the executive order as a "whole government approach." A whole government approach must include calling upon the public utilities and the Department of Transportation to change their tree pruning and removal practices in our communities. These practices are destroying the ability of our trees to naturally provide their healing benefits, and help us in our fight against climate change.

Electric utility companies and the DOT are fostering an unhealthy fear of trees among residents and are adding to the climate crisis we are experiencing through many of their policies and public statements. Trees are victims of the storms, not the cause. Focusing on tree location regardless of their health and removing or aggressively pruning healthy trees, while ignoring dead and diseased trees, makes the remaining system weaker and even more vulnerable. A change in their policies and practices is essential to the health of our most basic infrastructure and all life that depends on it. The utilities and DOT must change their approach and include replacing healthy trees they remove.

DOT and the electric utilities have a responsibility to do the least amount of harm possible to the trees, while safely providing their services to the public. It's essential that there be a course correction on how trees are viewed, cared for, and valued by these entities and our society in general.

We cannot effectively address equity and environmental justice without taking steps to increase and better protect our street trees.

Thank you,

Diane Hoffman
Ralph Jones
Phil Cronan

Elizabeth Langhorne
Henry Dynia
Core members of Hamden Alliance for Trees

11/7/22
Dear and Rebecca,

The meeting was very helpful and informative. I really did appreciate many of your comments. Regarding the importance of environmental justice I am sending you a copy of a HAT article that was printed in the New Haven Register on 1/30/22. Our proposed title was:

For Equity and Environmental Justice – Protect our Street Trees! The Register changed it to: Street trees deserve protection.

They did print a picture of a beautiful tree ;-)

We hope that SCRCOG will advocate for a greater understanding and recognition of the critical importance of our trees. with our town leaders.
Thanks very much.
Diane

I was disgusted with the action the State Department of Transportation took in removing trees along the Wilbur Cross parkway between exits 61 and 58. The trees that were taken down were no hazard to road or traffic. They were healthy, not near any utility lines and not overhanging the roadway. And they provided all the positives that trees contribute to the environment and climate.
Please consider the need to protect the forestry along our parkways in your Hazard Mitigation Plan.

Thank you,

Marietta Mattei
Hamden CT

SCRCOG members,

Underground utilities are an investment in the future.

I feel that anyone in leadership positions , such as SCRCOG, have the opportunity and obligation to work towards that investment.

Please carefully consider undergrounding utilities .

Sincerely,

Janet Kazienko

Connecticut General Assembly
Transportation Committee
Legislative Office Building
Hartford, CT 06106

February 27, 2023

R.B. 6744 An Act Concerning Tree Removal and Vegetation Management by the Department of Transportation

Support in part; suggested changes

Co-Chairs Senator Cohen and Representative Lemar, Vice Chairs Senator Lopes and Representative Berger-Girvalo, and Ranking Members Senator Hwang and Representative Kennedy, and distinguished members of the Transportation Committee

The Greenwich Tree Conservancy (GTC) is a 501(c)3 with over 1000 supporters. Our mission includes the preservation and protection of our town's urban tree canopy to benefit the community, its health and its quality of life. Both I-95 and the Merritt Parkway bisect our town, as does Route 1 from east to west. The vegetation lining these roads is an important buffer which acts as a sound barrier, improves air and water quality, reduces flooding and sequesters carbon. In most cases these edge forests create habitats that provide health benefits to nearby neighborhoods, not the least of which are our environmental justice neighborhoods that abut I-95 and have experienced heat island effects. They also provide an aesthetic appeal that gives a sense of place and community to all our neighborhoods and improve real estate values.

The CT Department of Transportation seems to be of the view that roadside trees and vegetation are obstacles to be removed not assets to enhance and preserve. For example, a recent proposal to resurface I-95 (Project 0056-0316) includes plans for scores of tree removals for staging of equipment and temporary utility relocation.

In the past when similar bills have been raised in the CGA, CT DOT has testified that it has effective vegetation management guidelines, but we have witnessed quite the opposite. Clearcutting has been the favored vegetative management strategy along these transportation corridors throughout the State. This management approach, by a State Department, is inconsistent with the goals of the State's Council on Climate Change report "which recognizes the importance of protecting and enhancing our forest for both climate mitigation and adaptation/resiliency benefits."

Recommended Changes:

- We ask that the DOT overhaul their existing guidelines to protect Connecticut's Transportation infrastructure while protecting and enhancing our green infrastructure to meet Connecticut's' climate adaptation /resiliency goals.
    - We believe this should be done by a multi-disciplinary effort with representatives from DOT, DEEP, Governor's Committees and other relevant organizations to mitigate risk while ensuring that our urban and edge forests are conserved, restored, and made more resilient.

- We believe that although website posting is important, it is not enough. Notification to the local Head of Municipality and Tree Warden should occur at least 60 days prior to any tree removal commencing. That notification should include the number, size and species of the trees to be removed and what the replanting plan will look like with input from the Tree Warden.

- The stipulation of an Arborist approving removal plans is only appropriate if that individual is not an employee of the Department of Transportation.

- We understand the intent of this legislation is not to limit tree work accomplished by public service companies, but we do not believe a *carte blanche* should be given to these utilities along state roads. Many of these areas have CT DOT easements and we believe the utilities should be restricted by CT DOT as to their tree trimming or more appropriately termed, clearcutting.

In summary, please preserve and enhance our state valuable assets, edge forests and urban canopies along state highways and roadways.

Respectfully submitted,

Urling Searle, President
Cheryl Dunson, Advisory Board Chair
Francia Alvarez, Advocacy Chair
JoAnn Messina, Executive Director
The Greenwich Tree Conservancy
www.greenwichtreeconservancy.org
greenwichtreeconservancy@gmail.com

Hamden Alliance for Trees
Diane Hoffman
Convenor
190 Wilmot Road
Hamden CT 06514
203 387 1695
Hamdentrees@gmail.com

3/20/23

Dear Hazard Mitigation Planning Committee,

Hamden Alliance for Trees thanks you for this opportunity to comment on your draft final plan. We appreciate all the hard work and thought that has gone into addressing our current and future hazards.

This plan is more crucial than ever before, now that we are living in an environmental climate crisis that is already changing how we live, work, and play in CT. We believe it is essential to learn how to live and work with nature and nurture it to bring about environmentally sound, sustainable solutions. We also believe trees are our best natural ally in the fight to control climate change

Many of the Hazards listed in the draft report such as hurricane/ tropical storms, severe thunderstorms, and severe winter storms, are mitigated by the presence of trees which absorb rainfall and standing water and assist in stormwater control. They are also critical in cleaning and filtering our water as it goes through the Watersheds. Trees strong root systems also improve soil conditions by aerating the soil, discouraging it from getting compacted, and allowing the water to filter down through the soil levels. Trees also play an important role in moving moisture across the land to avoid droughts. How do trees help in increasing rainfall (byjus.com)

We also know that trees provide health benefits. Urban trees are associated with a wide range of benefits including: reduced harms such as ultraviolet radiation, air pollution-related respiratory conditions, and excess heat stress; greater restorative capacities such as cognition and attention restoration and benefits to mood and mental health; and positive health effects such as better birth outcomes, immune functioning, active living, cardiovascular function, weight status, and social cohesion.[1]

We ask that you please seriously consider the following comments/suggestions/requests and incorporate them into the final plan to enhance sustainability and help make Hamden more resilient.

1 Urban Trees and Human Health: A Scoping Review
Wolf, KL et al Int. J. Environ, Res. Public Health 2020, 17(12), 4371

1.4 Land use and Development (page 6-7)

Please add concern for the health and shrinking size of Hamden's tree scape due to development, DOT and utility activities, extreme weather, and removals by private property owners. Please acknowledge the critical services and benefits trees provide to the residents at the beginning of the report so readers understand the immense benefits of trees that go along with some of the challenges.

When asked in a SCRCOG survey, what actions people took to reduce or eliminate risk to people and property from natural hazards and climate change, the majority of responders said they removed trees and limbs that MAY impact their home. HAT believes this reflects an unhealthy fear that has been fed by the utility companies and also, by a lack of knowledge about the important role trees play to mitigate climate change by capturing and storing carbon in their leaves, bark and roots and naturally mitigate natural disasters like flooding and drought from having catastrophic impacts. The more trees removed, the greater the severity of the weather will be. People need to understand that removing non-hazardous trees is not the solution.

3.1 Vulnerable Assets: Exposure Analysis (page 20)

Please add Increasing Heat to table 5 hazard chart. Heat is increasing in intensity and duration every year and is the leading cause of weather-related deaths. As pointed out on page 5, 8.8% of Hamden's population of 60,982, live below the poverty level Our underserved neighborhoods and the elderly are most at risk of heat related health risks.

3.5 Annualized Losses for the town of Hamden, Table 27 page 42-43)

Extreme heat is listed showing "none available" for source or method and zero-dollar losses in Hamden. There does not appear to be any effort to anticipate the potential social, economic, environmental and medical impacts of increasing heat, especially on vulnerable communities which are already suffering daily from inequities. Heat impacts soil health, agriculture, increasing air conditioning costs, the ability of people to be outdoors to work or play, increased health problems and medical costs and much more not to mention the impact it has on the rest of the natural world. **Please create a model or projection for heat related hazards. This model should show anticipated hospitalizations and deaths.**

If this is not included in a model that SCRCOG has to use, please work to have it included ASAP. This is a serious threat that cannot be ignored. Trees provide natural cooling and their importance was critical during covid summers when people could not gather indoors and forests and parks became the go to places for rest and recreation. A walk down any street in the hot summer is much more tolerable on streets with trees than treeless streets.

This year the 2 SCRCOG educational sessions reported that they listed trees as a separate category and acknowledged the important role trees play in hazard mitigation as well as the concerns of falling limbs and trees during extreme weather events. The draft report details the history of disasters that have affected Hamden and how those disasters have shaped the hazard mitigation plan for our region including floods, hail, high wind storms and tornadoes. **Please include the importance of trees in shaping this hazard mitigation plan due to their ability to naturally mitigate the negative effects of so many different weather events and therefore help to reduce losses.**

3.6 Problem Statements regarding Urban Forest Management Table 28 (pages 43- 44)

HAT fully supports the report's call to set up a program to identify diseased trees and replace them with more appropriate species giving careful consideration to the future impact of climate change. We also agree that the town should develop a database of the town's tree inventory along its right of way. We believe a tree inventory is needed for all of Hamden.

To maintain and grow the town treescape so it is prepared to prevent and mitigate future severe weather, there needs to be a plan to replace the trees and vegetation lost in severe weather. Focus should be on removing dead and diseased trees and a replanting and care plan of appropriately sized species that can survive for the average life span of the species to replace removed trees. Non-hazardous trees should <u>not</u> be removed as the services they provide can not be replaced by newly planted trees for decades. An overlay on a map of the town showing tree canopy would be very helpful in identifying where trees need to be planted. Such a map is available from iTree.

The Plan should also call for all laws to be enforced, especially CGS 16-234 to ensure proper notification to the townspeople by the utilities. Specifically:

- **Each town should carefully review the utility schedule and location of planned work each year as called for in CGS 16-234 7i "Not later than January 31st...the utility shall provide to the tree warden or town...a plan detailing the proposed roads or areas in said town where such vegetation management will take place and the estimated time schedule for such proposed work." Late receiving of this schedule does not allow for proper review and planning by the town or notification to the public so the trees can be monitored.**

- **The public should have access to the schedule and location of work as required by the same law. "Each town shall make such plan publicly available by electronic means or otherwise, not later than 14 days after receipt and keep such plan publicly available for the remainder of the forthcoming calendar year."**

- **Utilities should communicate directly with the town CEO AND the Tree Warden on the yearly plan detailing the work and any other legally required correspondence between the utility and the town. If both must be notified there is less chance something will inadvertently be missed.**

Urban Flooding- (page 44)

Please include planting appropriately sized and species of trees where ever possible.

Geographic Areas of Concern (page 44):

- A geographic area of concern in the report was Meadowbrook Park. **Please urge the town to look at planting trees to assist in flood control.**

- **Please advise the town to become involved in conversations about the removal of trees along our parkways and other state roads and how these removals impact residents living on the parallel streets as well the safety of drivers on these roads**.- (please see the attached testimony–Greenwich Tree Conservancy)

4. Capabilities (page 45). The plan states that "Hamden is a densely developed and growing Community with moderate capabilities and resources to support the implementation of hazard mitigation actions**." Please use this plan as a call to action to our town to recognize the benefits and abilities of our natural resources such as our trees to address and mitigate as many of these natural hazards as possible**. The benefits of trees are underrepresented in this report on natural hazards and the need for mitigation. **Also, now more than ever, citizen appreciation for trees and nature is growing and can be mobilized by town leaders to protect and nurture our natural world and mitigate future hazardous events.**

4.1 Summary of Local Findings (page 45) HAT urges a stronger call for low impact development and pursuing undergrounding of electric wires that is referenced to the Hamden POCD. Specifically, the recommendation to "seek over the long term to put overhead wires into underground conduits where lines/ circuits will have the greatest impact if they fail" page 41 in the POCD.

4.3.1 Improvement Opportunities (page: 54-55)

- HAT fully supports all of the recommendations made by the planning committee regarding Improvement opportunities for Hamden, especially: Planning and Regulatory Capabilities and Education and Outreach Capabilities

5. Mitigation Actions (page 57), table 31 Action #3. Tree Pruning- addresses the UI plan. **Please insert the UI plan for 2023 and call upon the town to require the United Illuminating Co. to provide the information that is called for in CGS 16-234 to provide names of streets being worked on and dates of expected work to assist town planning and transparency to residents. UI did not provide this information as required by law to Hamden for 2023.**

Table 31 Action #4 (page 57) We fully support Promoting Nature Based Solutions for hazard mitigation.

Table 31, Action #8 (page 58) Educational Outreach on Tree Preservation- Much more attention is needed on developing and conducting an outreach The town must provide leadership especially in regard to activities of UI.

Table 31 Action #9 (page 59) Please stress importance of #9 to Develop an action plan to significantly increase tree planting, caring for these newly planted trees (including watering when necessary), and protecting our existing healthy trees. Emphasize the essential services that trees provide, which includes natural hazard risk reduction. **Please call for the town to ensure money is budgeted each year to ensure STREET tree purchase and planting can happen.**

Updated Mitigation Actions (2023-2028) Table 32 (page 59). This table covers 19 actions. Every action has a high or medium priority. This means that the medium priorities are effectively low priorities.

Action #18 Table 32 (page 64) HAT greatly appreciates that a high priority was given to this action regarding the CIP, Capital Improvement Plan, to "increase the integration of hazard mitigation and climate resiliency into the towns existing CIP planning and project lists.

-

Action #19 Table 32 Regulatory Updates (page 65)

Lastly we believe a high priority should be assigned to this action to: "Assess relevant regulations and the towns permit review process to identify improvements to better address natural hazards, climate change, and projected future conditions including extreme heat, heavy down poor events etc . This includes the incorporation of nature-based solutions into existing rules and regulations where most appropriate." **We would argue the words "most appropriate" should be changed to "wherever needed".** In our current crisis an ounce of prevention is worth a TON of cure. We must be proactively working to make our town as resilient as possible. This work and focus may be inconvenient but it is essential to achieve any measure of success.

We respectfully request that SCRCOG add the following actions:

- **Investigate and promote undergrounding for the region.** FEMA now recognizes it as a legitimate mitigation strategy. Hamden legislators (Representatives: Michael D'Agostino, Josh Elliott, Liz Linehan, Mary Welander, Dave Yaccarino, and Senators Paul Cicarella and Martin Looney) endorsed a Governors panel to investigate undergrounding for CT at a League of Women Voter Legislative Forum in February 2023. Undergrounding is used regularly for new developments and is the norm thorough out Europe and large cities such as NYC. Palm Beach gets $8.5M FEMA grant for utility undergrounding (palmbeachpost.com) Using Grants to Help Convert Overhead Electrical Lines to Underground | FEMA.gov and From Overhead to Underground: It Pays to Bury Power Lines | FEMA.gov and A Florida community built to weather hurricanes endured Ian barely scratched : NPR also https://www.tdworld.com/print/content/21253499

- **Prepare and regularly update a cost benefit analysis** of all of the economic, health, environmental and social benefits of trees to determine an accurate and complete dollar value for trees so that a wholistic , comprehensive vegetation management policy and set of procedures is followed by the utilities and DOT. itree can assist in this analysis.

Lastly, HAT has the following questions for SCRCOG:

Page 7 addresses brownfields. What does the planning committee suggest the town do regarding the Olin property and how to move forward on the cleaning up?

Page 16 table 4 flash floods 25 events in Hamden. Where did they occur?

What makes a hazard worthy of tracking?

Page 50 safe growth survey answered by town staff. Was survey monkey used to provide for anonymity? Were the surveyed allowed to make comments after every question or at the end of the survey?

Did SCRCOG review how and when Hamden requires environmental impact statements? Should Hamden re-evaluate when these statements should be required? RE: Public safety. Zoning decisions, land use etc.

Page 55 does the SCRCOG recommend that the town of Hamden participate in the community rating system? If so why?

HAT thanks the SCRCOG Hazard Mitigation Planning Committee for taking the time to read this letter. We hope you will give it careful consideration and we would be happy to meet with you or assist in furthering this plan in Hamden. We would appreciate confirmation that you received this letter.

Sincerely,

Diane Hoffman
Susan Neitlich
Melinda Tuhus
Elizabeth Langhorne
Susan Etkind
Henry Dynia
Ralph Jones

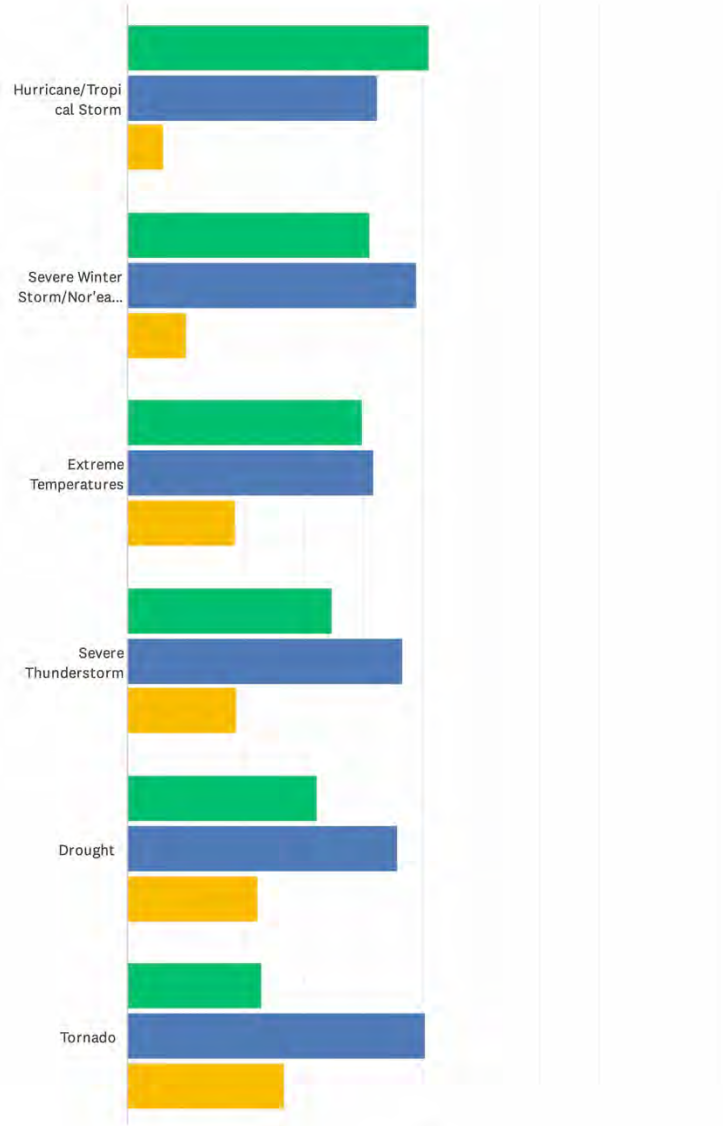
Core Members of Hamden Alliance for Trees

Public Survey Complete Results

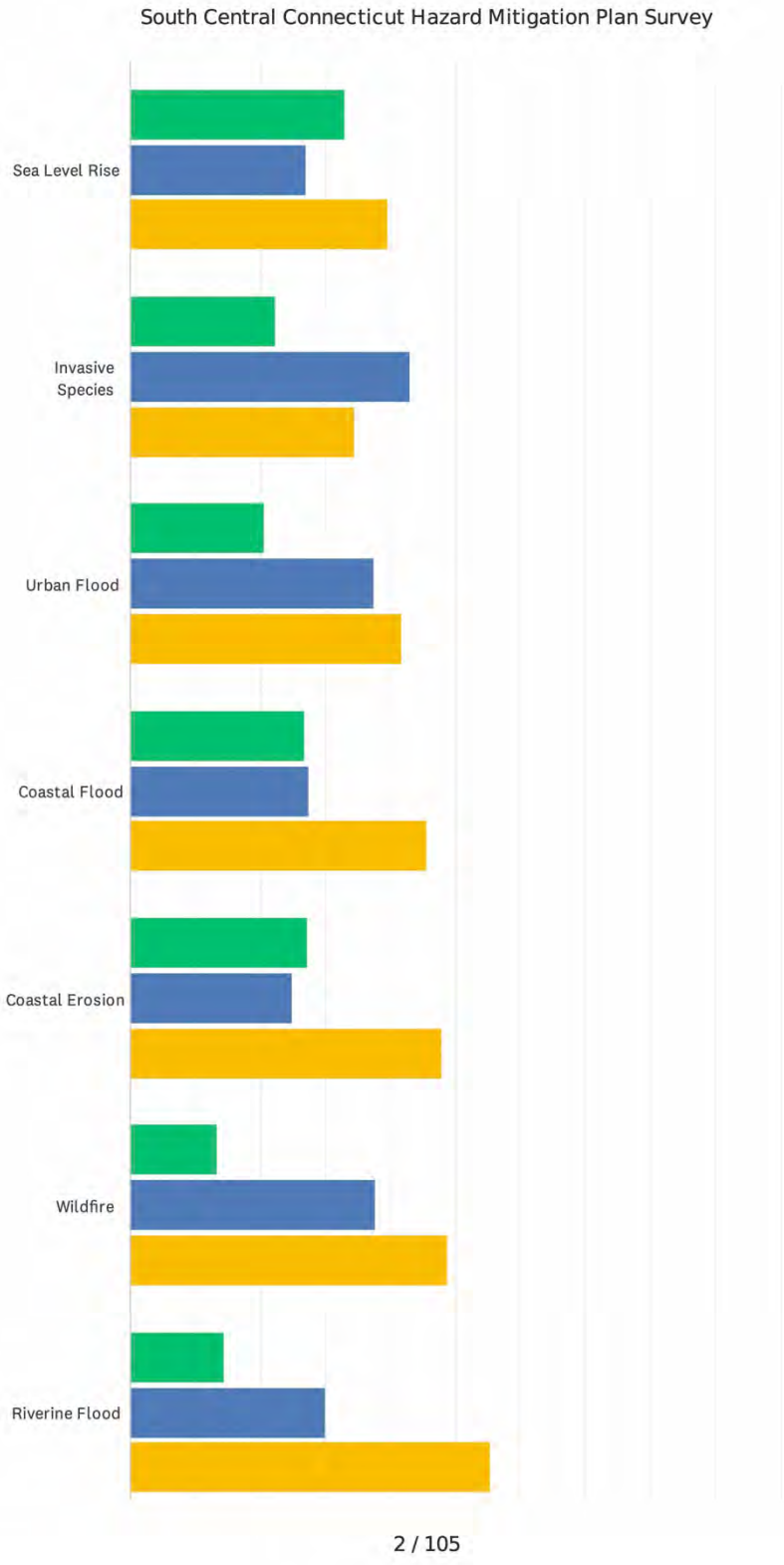
South Central Connecticut Hazard Mitigation Plan Survey

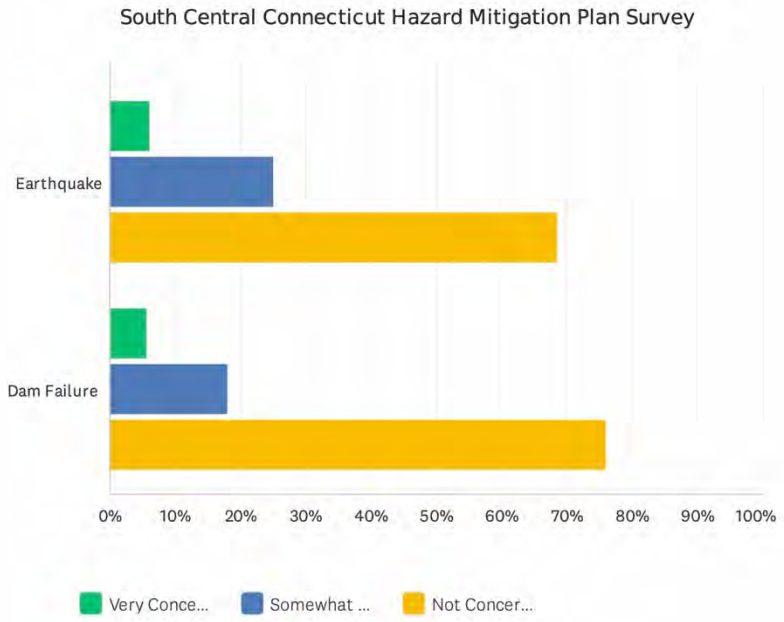
Q1 How concerned are you about the possibility of your home or business being impacted by a disaster from the following hazards?

Answered: 740 Skipped: 3



1 / 105


South Central Connecticut Hazard Mitigation Plan Survey
Sea Level Rise
Invasive Species
Urban Flood
Coastal Flood
Coastal Erosion
Wildfire
Riverine Flood
2 / 105


South Central Connecticut Hazard Mitigation Plan Survey
Earthquake
Dam Failure
0%
10%
20%
30%
40%
50%
60%
70%
80%
90%
100%
Very Conce...
Somewhat ...
Not Concer...

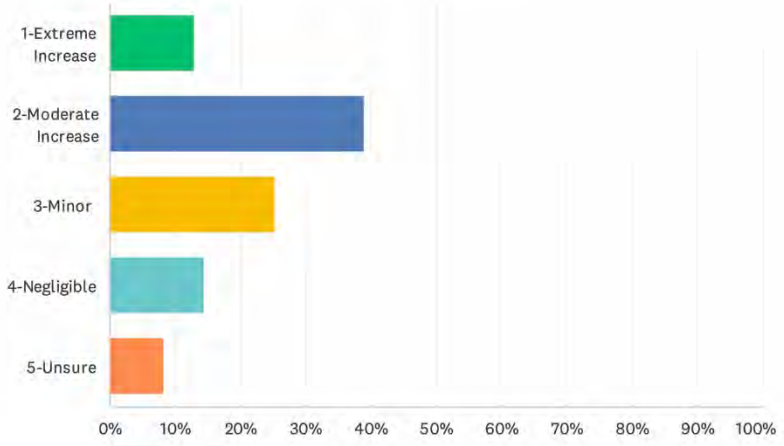
South Central Connecticut Hazard Mitigation Plan Survey

	VERY CONCERNED	SOMEWHAT CONCERNED	NOT CONCERNED	TOTAL	WEIGHTED AVERAGE
Hurricane/Tropical Storm	51.22% 377	42.53% 313	6.25% 46	736	1.61
Severe Winter Storm/Nor'easter	41.09% 302	48.98% 360	9.93% 73	735	1.79
Extreme Temperatures	39.84% 290	41.76% 304	18.41% 134	728	1.97
Severe Thunderstorm	34.66% 253	46.71% 341	18.63% 136	730	2.03
Drought	32.14% 233	45.79% 332	22.07% 160	725	2.12
Tornado	22.76% 165	50.62% 367	26.62% 193	725	2.30
Sea Level Rise	33.15% 243	27.15% 199	39.70% 291	733	2.46
Invasive Species	22.34% 162	43.17% 313	34.48% 250	725	2.47
Urban Flood	20.66% 150	37.47% 272	41.87% 304	726	2.63
Coastal Flood	26.88% 197	27.56% 202	45.57% 334	733	2.64
Coastal Erosion	27.24% 198	24.90% 181	47.87% 348	727	2.69
Wildfire	13.40% 97	37.71% 273	48.90% 354	724	2.84
Riverine Flood	14.52% 105	30.01% 217	55.46% 401	723	2.96
Earthquake	6.23% 45	25.07% 181	68.70% 496	722	3.31
Dam Failure	5.83% 42	18.03% 130	76.14% 549	721	3.46

South Central Connecticut Hazard Mitigation Plan Survey

Q2 On a scale of 1-5, in the last ten years, how would you rate changes in flood conditions due to high intensity rainfall events in your community?

Answered: 739 Skipped: 4

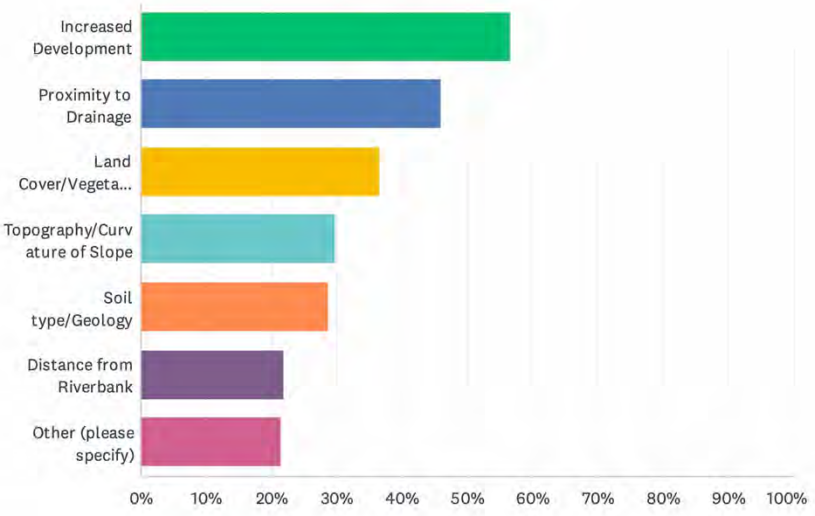


ANSWER CHOICES	RESPONSES	
1-Extreme Increase	12.99%	96
2-Moderate Increase	38.97%	288
3-Minor	25.30%	187
4-Negligible	14.48%	107
5-Unsure	8.25%	61
TOTAL		739

South Central Connecticut Hazard Mitigation Plan Survey

Q3 What factors do you think contribute the most to increases in flooding from high intensity rain events?

Answered: 726 Skipped: 17



ANSWER CHOICES	RESPONSES	
Increased Development	56.61%	411
Proximity to Drainage	46.01%	334
Land Cover/Vegetation	36.78%	267
Topography/Curvature of Slope	29.89%	217
Soil type/Geology	28.79%	209
Distance from Riverbank	22.04%	160
Other (please specify)	21.49%	156
Total Respondents: 726		

#	OTHER (PLEASE SPECIFY)	DATE
1	Ineffective drains	1/12/2023 4:55 PM
2	We are building or paving over too much land.	1/12/2023 10:52 AM
3	Improper maintenance of drains related to existing housing	1/12/2023 7:15 AM
4	drains clogged by leaves/debris and drainage systems not being vaccumed/cleaned.	1/10/2023 10:59 AM
5	rise in ocean level, coastal erosion, loss of marsh	1/10/2023 9:58 AM
6	Global warming	1/9/2023 7:11 PM

South Central Connecticut Hazard Mitigation Plan Survey

7	Climate Change	1/9/2023 2:53 PM
8	Erosion	1/7/2023 5:45 PM
9	High tide and full moon	1/7/2023 12:30 PM
10	Climate change	1/7/2023 11:36 AM
11	loss of wetlands/increase in impervious surface upstream	1/7/2023 10:03 AM
12	Road Storm drains clogged, not maintained	11/28/2022 2:45 PM
13	Tree Removal	11/17/2022 9:07 PM
14	blocked water drains on roads	11/17/2022 6:36 PM
15	downed trees, branches, vegetation causing blockage of water flow and drainage. Catch basins overflowing and not draining properly.	11/17/2022 10:26 AM
16	dumping of landscaping debris in waterways	11/14/2022 3:37 PM
17	older properties not being flood proof.	11/13/2022 10:29 AM
18	Maintenance of storm drains-all clogged up	11/13/2022 9:11 AM
19	trees being cut down	11/13/2022 7:51 AM
20	Climate Change	11/13/2022 7:13 AM
21	City doesn't clean storm drains often enough	11/12/2022 2:52 PM
22	Drought and heavy rain	11/12/2022 8:45 AM
23	Increased amounts of asphalt, due to overdevelopment, thus affecting runoff/drainage	11/12/2022 7:38 AM
24	Bad drainage systems	11/9/2022 5:48 AM
25	lack of dredging in Calf Pen Creek and removal of flood gates from bridge on Melba St. allowing water to flood the creek and our neighborhood	11/7/2022 8:17 PM
26	Storm intensity	11/7/2022 6:50 PM
27	City allowing homeowners to pave/ cover the yards which prevents drainage	11/7/2022 6:22 PM
28	Flood gates were removed from Bayshore bridge in Milford Ct and we are flooding from calf pen meadow creek	11/7/2022 4:21 PM
29	All of those things have an influence on flooding.	11/7/2022 3:34 PM
30	Ignorance of wetland significance on a policy level	11/7/2022 3:24 PM
31	Type of drainage. Need more backfliw preventera or ither that would push out water wven suring high tides . Also still need to increase atreet levels of asjacent to lis atreets well above median tide levels	11/6/2022 11:19 PM
32	Lack of drainage cleaning in both public and private areas. Periodic inspection of the geological state of the areas with major flooding. Lack of communication between local government and citizens.	11/3/2022 2:53 PM
33	Climate change	10/25/2022 6:26 PM
34	sea level rise	10/24/2022 1:54 PM
35	Proper cleaning and maintenance of drain pipes.	10/19/2022 4:17 PM
36	Sewage system overload	9/17/2022 5:34 PM
37	Roadway adjacent to brook	9/15/2022 4:03 PM
38	The lack of public works and other city agencies for keeping storm drains cleared better from leaves trash and many factors clogging our streets it is the city's biggest problem with rainwater I keep emailing and calling all agencies	9/13/2022 2:45 PM
39	Aging infrastructure needing maintenance	9/13/2022 2:00 PM

South Central Connecticut Hazard Mitigation Plan Survey

40	Distance from Harbor	9/7/2022 1:43 PM
41	Failing and/or lack of drainage systems	9/6/2022 10:42 AM
42	Climate change	9/5/2022 6:10 PM
43	Drought	9/2/2022 2:38 PM
44	Not impacted as we live on high ground	9/2/2022 1:25 PM
45	Climate Change	8/31/2022 4:14 PM
46	Poor design and management of hardscape and landscape. Over dependence on existing flood plain and old drainage systems.	8/26/2022 2:35 PM
47	Inconsistency of rainfall, drought/flood	8/26/2022 1:02 PM
48	Swales should be required around any new development to naturally handle runoff from parking lots etc	8/23/2022 2:41 PM
49	Distance from Long Island sound.	8/23/2022 10:03 AM
50	reducing the number of trees	8/23/2022 9:49 AM
51	CSO overwhelmed	8/23/2022 6:02 AM
52	Climate Change	8/22/2022 10:12 PM
53	Removal of wetlands, paving over any areas near shoreline near or on wetlands	8/22/2022 11:54 AM
54	The increased intensity of the events	8/22/2022 9:56 AM
55	Burning fossil fuels	8/22/2022 8:35 AM
56	Sea level change; extreme weather changes	8/22/2022 7:51 AM
57	Precipitation pattern changes from climate change	8/19/2022 3:23 PM
58	Global warming	8/18/2022 6:56 AM
59	Lack of maintenance to infrastructure and keeping waterways clear by town and state	8/17/2022 7:03 PM
60	Climate change	8/17/2022 2:05 PM
61	Coastal Waterfront	8/17/2022 9:24 AM
62	inadequate drainage & sewers	8/16/2022 2:20 PM
63	sea level rise & marsh erosion/riparian conversion	8/16/2022 11:46 AM
64	all of the above	8/16/2022 8:15 AM
65	rainfall intensity due to climate change	8/15/2022 10:37 AM
66	changes made by landowners, some to mitigate their own water/flood	8/15/2022 8:28 AM
67	Beach 6 blocks away and near Wetlands	8/15/2022 8:26 AM
68	Climate change	8/14/2022 5:24 PM
69	Hurricane	8/14/2022 12:29 PM
70	Tide levels	8/13/2022 9:25 AM
71	State roads, town roads, government/commercial/residential parking lots/driveways/sidewalks using concrete or asphalt or commemorative bricks that forces more water to runoff into peoples' homes/businesses/yards, when we should be replacing those road surface/pedestrian walkway surface materials with permeable pavement to reduce runoff. Contact https://purepave.can which is successfully used in Canada and in New York State because it works!	8/12/2022 8:07 PM
72	Cutting down trees and development	8/12/2022 7:45 PM
73	Drains not properly maintained	8/12/2022 6:53 PM

South Central Connecticut Hazard Mitigation Plan Survey

74	Blocked drainage	8/12/2022 5:23 PM
75	Na	8/12/2022 4:55 PM
76	Extremely heavy rainfall	8/12/2022 11:51 AM
77	Really not sure	8/12/2022 9:07 AM
78	High Tide and river backing up instead of dumping out	8/11/2022 6:17 PM
79	Town needs to reassess drainage in some areas	8/11/2022 6:13 PM
80	Climate Change	8/11/2022 3:11 PM
81	Littering by public and failure of Town to check and clear drains.	8/11/2022 3:06 PM
82	High tide, full moon, wind from the east	8/11/2022 2:50 PM
83	Poorly designed governmental work projects.	8/11/2022 2:26 PM
84	Water Company opening Dams in the North End of Town.	8/11/2022 2:03 PM
85	Storm drains not cleaned out regularly. Storm drains are clogged with leaves and other debris.	8/11/2022 2:00 PM
86	Dilungo contruct and friend bill a too much	8/11/2022 1:56 PM
87	Poor drainage system	8/11/2022 1:01 PM
88	Not sure	8/11/2022 12:42 PM
89	the farm river needs to be dregged to stop the smell of methane,biting flys,miscetoes,they did this up stream to free up the flowbut what about us who live on the marsh side any questions please call 203-915-0596 thank you	8/11/2022 12:42 PM
90	The roads in Morgan Point are below the unmaintain wetlands drainage and Shortbeach Rd at Clark storm drain that has not been cleared in more than 12 years. A curb would help to prevent the storm water from ENTIRE CLARK AND SHORTBEACH ONTO THE CORNER PROPERTIES running onto	8/11/2022 12:34 PM
91	I'm concerned about Tweed expansion	8/11/2022 12:33 PM
92	Sea level/high tide. Indirect waterfront	8/11/2022 12:33 PM
93	storm drains are blocked and not cleaned on a annual basic or more	8/11/2022 12:28 PM
94	Live near where building new airport terminal	8/11/2022 12:28 PM
95	Proximity to wetlands	8/11/2022 12:26 PM
96	This doesn't seem like a public opinion question. Surely an expert might have a definitive answer to address the issue?	8/11/2022 12:26 PM
97	climate change	8/11/2022 12:25 PM
98	Maintenance/upkeep of drainage infrastructure	8/11/2022 9:01 AM
99	need to clean farm river as years ago w mayor maturo	8/10/2022 4:52 PM
100	Intensity of the storm itself, amount of rain in a short period and high winds	8/10/2022 2:04 PM
101	More severe weather events	8/9/2022 3:02 PM
102	Building in known flood plains	8/9/2022 9:29 AM
103	Climate change	8/8/2022 6:23 AM
104	Higher tide cycles	8/7/2022 6:54 PM
105	I don't know	8/5/2022 11:46 AM
106	Climate change increasing intensity of weather generally	8/5/2022 11:33 AM
107	Siltation filling Farm River	8/5/2022 11:31 AM
108	Higher tides	8/4/2022 8:09 PM

South Central Connecticut Hazard Mitigation Plan Survey

109	Proximity to coast	8/3/2022 8:54 PM
110	Climate change	8/3/2022 2:07 PM
111	Sea level rise and severe storms	8/3/2022 12:01 PM
112	Topography	8/3/2022 11:06 AM
113	Increase of filling in wetlands and putting down pavement over grassy areas	8/3/2022 10:19 AM
114	Tweed Airport Expanding/ development on marshlands	8/3/2022 10:08 AM
115	Climate change	8/3/2022 10:00 AM
116	Lot Coverage	8/2/2022 4:42 PM
117	Farmland should be protected from development	7/31/2022 3:43 PM
118	Climate Change	7/30/2022 4:23 PM
119	climate change	7/30/2022 3:49 PM
120	driveways and parking lots. Elimination of open space. Encroachment of wetlands. Over sized houses taking up valuable ground needed for percolation of the rain water.	7/29/2022 5:15 PM
121	climate change	7/29/2022 3:08 PM
122	Lack of dredging the Channels	7/28/2022 9:04 PM
123	Climate Change	7/28/2022 7:44 PM
124	Too much impervious surfaces; outdated storm water management infrastructure	7/28/2022 11:29 AM
125	Impervious ground covering materials	7/27/2022 7:47 PM
126	Water tables rising- poor drainage	7/27/2022 5:09 PM
127	Restructuring the river's and land erosion at tweed airport.	7/27/2022 4:42 PM
128	Lack of underpass drainage	7/27/2022 12:26 PM
129	fossil fuel use, pollution, climate change	7/26/2022 2:28 PM
130	Lack of maintenance to storm drains and infrastructure	7/26/2022 11:55 AM
131	Rising sea levels, over development near wetland areas, lack of sea surge protection, overall climate change.	7/26/2022 11:17 AM
132	unbridled construction with removal of natural vegetation	7/26/2022 11:16 AM
133	climate change, leading to fiercer storms	7/26/2022 10:57 AM
134	Poor town infrastructure; poor/non-existent road drainage	7/26/2022 9:23 AM
135	Lack of maintenance and infrastructure upgrades	7/25/2022 11:20 AM
136	Proximity to Long Island Sound	7/23/2022 9:05 PM
137	I haven't noticed an increase in flooding.	7/22/2022 6:36 PM
138	Sea rise	7/16/2022 6:48 PM
139	Impermeable surfaces	7/15/2022 11:52 AM
140	Climate change	7/14/2022 4:09 PM
141	Not maintaining the shoreline properly	7/14/2022 1:56 PM
142	Warming	7/12/2022 8:16 PM
143	Climate change	7/12/2022 4:29 PM
144	Bad maintenance of drainage	7/12/2022 4:01 PM
145	Storm drain clogged and/or too small to remove water when heavy rainfall quickly	7/12/2022 12:32 PM

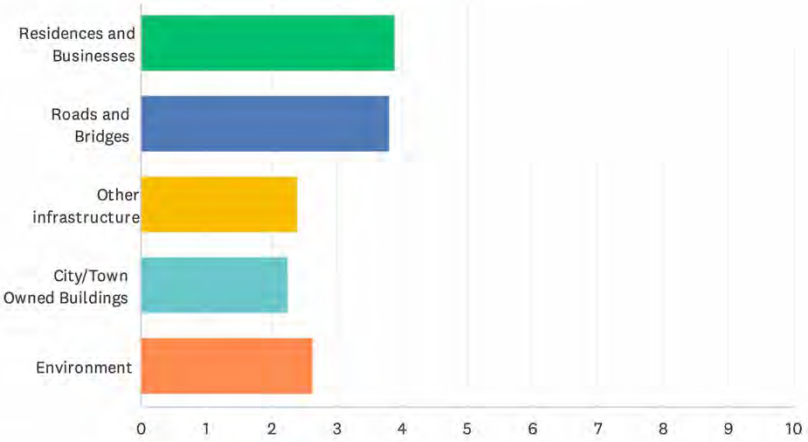
South Central Connecticut Hazard Mitigation Plan Survey

146	N/A	7/12/2022 12:27 PM
147	Poor infrastructure management and updates when needed	7/11/2022 9:55 AM
148	Poor management of stormwater	7/9/2022 4:09 PM
149	Climate change	7/7/2022 6:55 PM
150	climate change	7/7/2022 3:15 PM
151	Global warming	7/7/2022 12:36 PM
152	Global Warming	7/7/2022 11:26 AM
153	Neighborhood vegetation dumping in open spaces	7/7/2022 10:42 AM
154	Intensity & Duration events	7/3/2022 10:20 AM
155	Climate changes	7/1/2022 1:06 PM
156	prior development from the inception of Meriden, a couple hundred years of poor decisions, messing with natural waterways while the town was developed.	6/30/2022 1:51 PM

South Central Connecticut Hazard Mitigation Plan Survey

Q4 What assets do you believe are at most risk to flooding from increased rainfall intensity (e.g. flash, riverine, or drainage flooding)?

Answered: 719 Skipped: 24



	1	2	3	4	5	TOTAL	SCORE
Residences and Businesses	40.25% 256	29.25% 186	17.14% 109	6.76% 43	6.60% 42	636	3.90
Roads and Bridges	33.89% 222	34.81% 228	16.79% 110	7.94% 52	6.56% 43	655	3.82
Other infrastructure	6.06% 36	11.45% 68	27.27% 162	28.45% 169	26.77% 159	594	2.42
City/Town Owned Buildings	6.67% 41	9.43% 58	17.24% 106	35.77% 220	30.89% 190	615	2.25
Environment	14.64% 95	13.25% 86	23.88% 155	19.11% 124	29.12% 189	649	2.65

South Central Connecticut Hazard Mitigation Plan Survey

Q5 Are there any specific areas of your community vulnerable to the natural hazards above? If so, please list them by location. Please use street intersections or landmarks to describe locations.

Answered: 378 Skipped: 365

ANSWER CHOICES	RESPONSES	
1	99.74%	377
2	62.43%	236
3	35.19%	133
4	18.52%	70

#	1	DATE
1	Quinnipiac river park - grand Ave & front st new haven	1/13/2023 3:56 PM
2	Platt St and Morehouse Ave	1/13/2023 1:30 PM
3	Merwin Avenue south of Abigail Street in Milford	1/13/2023 9:50 AM
4	Naugatuck Ave Milford near post office	1/12/2023 6:18 PM
5	Morehouse Avenue	1/12/2023 4:55 PM
6	Bridge on Naugatuck Avenue adjacent to the VFW	1/12/2023 10:52 AM
7	Merwin btwn Abigail and Sperry	1/12/2023 7:15 AM
8	The Shoreline - Caroline Rd, Beach Ave, Cosey Beach Ave	1/10/2023 1:47 PM
9	Sewers at Forbes Place and Kimberly Ave SE corner clogged	1/10/2023 10:59 AM
10	Milford Point Road	1/10/2023 9:58 AM
11	Intersection Hemingway and Short Beach Road	1/9/2023 7:11 PM
12	For Ave/Hemingway Ave/Short Beach Road	1/9/2023 6:52 PM
13	Milford Shore line	1/9/2023 4:41 PM
14	Farm river needs to be cleaned out again	1/9/2023 3:02 PM
15	Shoreline residences	1/7/2023 11:11 PM
16	Walnut beach	1/7/2023 5:45 PM
17	Gulf Beach Gulf Street Milford CT	1/7/2023 12:30 PM
18	47 Point Beach Drive, Milford, CT	1/7/2023 11:36 AM
19	Whitney Ave near Todd along the Mill river	1/6/2023 1:08 PM
20	East broadway	1/6/2023 12:02 PM
21	Beach Avenue along Anchor Beach	1/5/2023 10:57 PM
22	South montewese st	1/5/2023 8:22 PM
23	Lake Whitney- Waite St, Athol place and Gordon Street	1/5/2023 12:31 PM
24	Merwin Ave, Sperry st milford	1/5/2023 12:30 PM
25	Rt 146 & Linden Ave Branford	1/3/2023 10:47 PM

South Central Connecticut Hazard Mitigation Plan Survey

26	Shore Drive west of Grove St, Branford	1/3/2023 3:16 PM
27	New Haven Ave bridge at Sundae House	1/3/2023 10:23 AM
28	Bird Sanctuary Court St. Milford	12/26/2022 12:25 PM
29	bradley and rt. 69	12/11/2022 5:24 PM
30	Beachfront - fort Trumbull, milford ct	12/8/2022 8:27 PM
31	Walnut beach area, Milford	11/28/2022 2:45 PM
32	Wastewater treatment plant	11/22/2022 8:26 AM
33	Housatonic River	11/19/2022 12:58 PM
34	Buckingham Avenue	11/17/2022 9:07 PM
35	Merwin Ave, Milford	11/17/2022 6:36 PM
36	Ocean Crest Condominiums, Merwin Avenue, Dunbar Road	11/17/2022 10:26 AM
37	330 Merwin ave rear a flooding due to landscaping debris from St Agnes Chuch	11/14/2022 3:37 PM
38	city hall area	11/14/2022 12:03 PM
39	New Haven Ave from Indian river Bridge to Pond Point	11/14/2022 6:39 AM
40	Coastal areas	11/13/2022 9:07 PM
41	Old Gate Lane bridge/street	11/13/2022 2:59 PM
42	Seaview Ave/Milford Point Rd	11/13/2022 2:24 PM
43	West Avenue going towards the Post RD	11/13/2022 10:29 AM
44	New Haven Avenue near Old Gate Lane	11/13/2022 7:51 AM
45	Wildermere Beach area, primarily small side streets that are a short distance from the beach. Example: Botsford, Wood Avenues	11/13/2022 7:13 AM
46	Silver Sands	11/12/2022 10:31 PM
47	Maxwell Drive and Caroline Drive flooding	11/12/2022 2:52 PM
48	city hall	11/12/2022 12:28 PM
49	Drainage at the bottom of Bic Drive near the railroad tracks	11/12/2022 10:07 AM
50	East Broadway - Milford	11/12/2022 8:45 AM
51	Bayshore Dr/Melba St in the Bayview section of Milford, CT	11/12/2022 7:38 AM
52	Old Gate Lane New Haven Ave	11/9/2022 5:48 AM
53	Calf Pen Creek in Bayview Beach, Milford	11/7/2022 8:17 PM
54	FieldCourt	11/7/2022 6:22 PM
55	Entire shoreline	11/7/2022 5:14 PM
56	Orland Street and Bayshore Drive Milford Ct	11/7/2022 4:21 PM
57	Low lying areas near waterways and homes / structures built over underground waterways are at increased risk for flooding.	11/7/2022 3:34 PM
58	Field court	11/6/2022 11:19 PM
59	The lake that is next to US Hwy 1 in front of Sound Auto Dealer	11/3/2022 2:53 PM
60	Cosey Beach Ave	11/2/2022 3:09 PM
61	Oyster river and surrounding housing	11/1/2022 11:11 AM
62	Trailer park on Rt. 150/ N. Turnpike, Yalesville section, between Little Italy and Brothers':	10/30/2022 1:21 PM

South Central Connecticut Hazard Mitigation Plan Survey

	flooding from Q river	
63	streets in So. Hamden with poor stormwater drainage	10/28/2022 9:26 AM
64	Glen street Branford Ct	10/28/2022 7:30 AM
65	train bridge on thimble island rd	10/25/2022 3:17 PM
66	RT 146 Indian Neck Branford	10/24/2022 1:54 PM
67	West River along Litchfield Tpke and Merritt Avenue	10/24/2022 12:24 PM
68	Bayview Heights Beach Association - Welches Point/Lawrence Avenue and Lawrence Court	10/19/2022 4:17 PM
69	Milford Harbor	10/3/2022 11:55 AM
70	ALL railroad passage	9/23/2022 11:13 AM
71	Tweed airport	9/19/2022 9:40 PM
72	South Water Street, Sea Street, Howard Ave area in New Haven	9/19/2022 7:24 PM
73	Brookside Drive and Glenbrook Road	9/19/2022 3:49 PM
74	Route 142 in short beach Branford	9/17/2022 6:04 PM
75	County Road near Rte. 80, North Branford, CT	9/15/2022 4:03 PM
76	Chapel and ferry sts	9/13/2022 2:45 PM
77	Repetitive Loss coastal areas - various locations	9/13/2022 2:00 PM
78	State/Mill River	9/10/2022 3:25 PM
79	East Shore	9/9/2022 11:13 PM
80	Quinnipiac River	9/9/2022 12:53 PM
81	Rivercliff Dr & Edgemont Rd	9/7/2022 8:48 PM
82	Locations adjacent to New Haven Harbor	9/7/2022 1:43 PM
83	All along shoreline especially Beach Street area	9/6/2022 10:42 AM
84	Oyster River Bridge	9/6/2022 9:56 AM
85	Downs and Brooks Rd intersection	9/4/2022 1:36 PM
86	Flooding on Amity Road around Russell road to teddy Bs	9/2/2022 2:38 PM
87	Campbell Ave RR bridge	9/2/2022 12:59 PM
88	field creek- Peck Ave.area	9/1/2022 1:11 PM
89	Intersection of West Rock and Whalley	8/31/2022 8:00 PM
90	Muddy River	8/27/2022 8:00 PM
91	Cosey Beach Avenue	8/26/2022 2:35 PM
92	Cosey Beach Ave and Coe Avenue	8/25/2022 11:37 AM
93	Melba St	8/24/2022 8:48 AM
94	RT 80 @ Farm River	8/24/2022 7:41 AM
95	Flooding in Stony Creek at the Thimble Island Bridge	8/23/2022 3:17 PM
96	Sewage Treatment plant in Branford located in flood zone	8/23/2022 2:41 PM
97	Salt marsh areas adjacent to trolley tracks in short beach	8/23/2022 10:03 AM
98	MLK Blvd and Temple Street, Temple Street Garage	8/23/2022 6:02 AM
99	Lighthouse Road and Cove Street	8/22/2022 10:12 PM

South Central Connecticut Hazard Mitigation Plan Survey

100	Intersection Townsend/Morris Causway, New Haven = Flooding	8/22/2022 5:57 PM
101	Tweed airport and wetlands and areas around runways, as well as terminal that has flooded twice	8/22/2022 11:54 AM
102	Criscuolo park	8/22/2022 10:32 AM
103	Lighthouse Rd and Morris Creek Rd, New Haven	8/22/2022 10:25 AM
104	Long wharf Drive	8/22/2022 10:01 AM
105	James Street going under the bridge in New Haven	8/22/2022 9:56 AM
106	Sewer Main on Long Wharf, Industrial waterfront	8/22/2022 9:56 AM
107	South of the Guilford Green (Whitfield Street to the town marina)	8/22/2022 8:43 AM
108	Low income communities throughout New Haven	8/22/2022 8:35 AM
109	Morris Cove	8/22/2022 7:27 AM
110	Coe Ave, Hemingway and Short Beach rd	8/21/2022 2:09 PM
111	Beach St. from Washington Ave to 3rd Ave Ext	8/19/2022 4:58 PM
112	Meadow Brook Community	8/19/2022 3:23 PM
113	State Street	8/18/2022 9:17 PM
114	beaches	8/18/2022 10:52 AM
115	Along the Quinnipiac River	8/18/2022 6:56 AM
116	Paradise Ave near Vignolas veg stand- flooding	8/17/2022 7:03 PM
117	Cosey Beach Ave, East Haven, CT	8/17/2022 9:24 AM
118	Mapledale Rd near bridge	8/17/2022 8:57 AM
119	old town highway & morgan ave.	8/16/2022 2:20 PM
120	Marshes & beaches - Chittenden, Chaffinch, East River	8/16/2022 11:46 AM
121	Shoreline	8/16/2022 11:36 AM
122	The corner of Ridge Road and Hickory Hill Road floods	8/16/2022 10:59 AM
123	The intersection of Coe Ave. and Hemingway Ave.	8/15/2022 4:16 PM
124	Robert Street and RT 69	8/15/2022 10:28 AM
125	Beach and wtlands on West Havne beach	8/15/2022 8:26 AM
126	Windsor Avenue on lots bordering Sodom Brook	8/15/2022 4:38 AM
127	1189 Johnson Road, Woodbridge	8/14/2022 5:24 PM
128	Downtown Meriden green	8/14/2022 5:06 PM
129	Elliot Street. Developement will cause severe water issues.	8/13/2022 7:12 PM
130	The Town Green due to increased concrete	8/13/2022 2:30 PM
131	Tweed Airport	8/13/2022 12:23 PM
132	Casey Beach Ave.	8/13/2022 9:25 AM
133	EVERY ROAD, such as River Road, that has to cross over the FARM RIVER length from East Haven at I-95 into North Branford in order to reach egress of Route 80 and/or North High Street and or Totoket Road/Brushy Plains Road to get to Route 80 or to Route 1/I-95 cedar street exit in Branford	8/12/2022 8:07 PM
134	Sacket point road	8/12/2022 7:50 PM
135	Brookfield rd	8/12/2022 6:53 PM

South Central Connecticut Hazard Mitigation Plan Survey

136	Mansfield Grove Road and Whalers Point Road intersection	8/12/2022 5:33 PM
137	Fairy Glen Dr	8/12/2022 5:30 PM
138	Poor drainage during heavy rains due to blockages in creek just west of Gene Street	8/12/2022 5:23 PM
139	intersections of short beach ave and coe ave	8/12/2022 3:31 PM
140	Vista Drive	8/12/2022 12:17 PM
141	Most of the town is vulnerable to flooding	8/12/2022 11:51 AM
142	Airport	8/12/2022 8:47 AM
143	The farm river needs to be dredged again	8/12/2022 8:37 AM
144	Foxon area for tornados	8/12/2022 8:18 AM
145	Beach Area	8/12/2022 8:16 AM
146	Lots of dead trees/low hanging branches…in fact, one just fell recently and landed on a neighbor's car...it could have resulted in serious injury/loss of life - streets to consider that need major trimming are Candlewood Hill Rd and Silver Springs Dr in Higganum CT	8/12/2022 8:09 AM
147	Coe Ave and short beach road	8/12/2022 5:44 AM
148	Hemingway and 142	8/12/2022 5:39 AM
149	Five Mile Brook tends to flood during extreme rainfall.	8/11/2022 10:06 PM
150	State St and rt 22	8/11/2022 8:51 PM
151	All beaches	8/11/2022 8:48 PM
152	Hemingway Ave at Short Beach Rd East Haven	8/11/2022 8:10 PM
153	Beach Area ,Sandpiper, houses and condos along Beach	8/11/2022 6:17 PM
154	Hartford Turnpike/Marlen Drive- flooding	8/11/2022 6:13 PM
155	Hemingway Ave.	8/11/2022 6:12 PM
156	Foxon rd and Maple. Developers investment lot has dead trees drop on house and land every time there is high winds or rain	8/11/2022 5:35 PM
157	Main Street	8/11/2022 5:21 PM
158	Hemingway Ave/Short Beach Rd	8/11/2022 4:44 PM
159	Hemingway and Short Beach Rd	8/11/2022 4:31 PM
160	all homes and roads along the Farm River	8/11/2022 4:12 PM
161	South St., & Old Town Hwy EH	8/11/2022 4:11 PM
162	Doran and Columbus	8/11/2022 4:06 PM
163	Short beach and Hemingway intersection	8/11/2022 4:00 PM
164	Short beach rd by Dunkin donuts	8/11/2022 3:24 PM
165	Saltonstall Parkway near Twin Pines Diner	8/11/2022 3:16 PM
166	Sacket Point Rd overpass of river	8/11/2022 3:11 PM
167	Cosey Beach Avenue	8/11/2022 3:06 PM
168	Whalley Ave and West Rock Rd	8/11/2022 2:59 PM
169	Cosey Beach Ave, Catherine St	8/11/2022 2:50 PM
170	Short Beach/Hemmingway	8/11/2022 2:43 PM
171	corner of short beach and coe ave (duncan donuts)	8/11/2022 2:37 PM
172	Hudson and Moulthrop Streets near Farm River.	8/11/2022 2:26 PM

South Central Connecticut Hazard Mitigation Plan Survey

173	Corner of View St and Strong St Ext	8/11/2022 2:17 PM
174	Coe Avenue & Short Beach Rd	8/11/2022 2:05 PM
175	Beach	8/11/2022 2:05 PM
176	River Road, Brookfield Road, North End of East Haven	8/11/2022 2:03 PM
177	Laurel st	8/11/2022 2:00 PM
178	Let's protect the scumbags in the condos = ghettos of the future	8/11/2022 1:56 PM
179	Coastal	8/11/2022 1:47 PM
180	short beach rd and Hemmingway ave	8/11/2022 1:38 PM
181	Short beach rd & Hemingway ave	8/11/2022 1:17 PM
182	Short Beach & Hemmingway Ave.	8/11/2022 1:12 PM
183	Corbin Rd bridge	8/11/2022 1:09 PM
184	Coe and short beach rd	8/11/2022 1:08 PM
185	Cloudland and Gail for Tornado concerns	8/11/2022 1:05 PM
186	edgemere rd	8/11/2022 1:01 PM
187	Coe Ave and Short Beach Road major flooding	8/11/2022 12:58 PM
188	high ridge area, due to flooding of farm river	8/11/2022 12:52 PM
189	flooding of the farm river resulting inj my house value go down	8/11/2022 12:42 PM
190	Cozy Beach area	8/11/2022 12:42 PM
191	Silver Sands Rd	8/11/2022 12:40 PM
192	Coe Ave. and Short Beach Rd.	8/11/2022 12:37 PM
193	Maple street	8/11/2022 12:36 PM
194	3 Clark Ave and old Town Hwy and Morgan Ave	8/11/2022 12:34 PM
195	Wetlands on silversands	8/11/2022 12:33 PM
196	What about the potential health hazards from the sewer plant and the odors? This is an issue that CAN be controlled. Seems to be ignored.	8/11/2022 12:33 PM
197	Prospect Place Extension	8/11/2022 12:33 PM
198	Cosey Beach	8/11/2022 12:32 PM
199	Shoreline areas	8/11/2022 12:32 PM
200	Tweed and surrounding area	8/11/2022 12:32 PM
201	hemingway and short beach	8/11/2022 12:30 PM
202	Farm river being overgrown with weeds and trees as well as debide	8/11/2022 12:30 PM
203	Morgan Point	8/11/2022 12:29 PM
204	If airport expands flooding in east haven- burgess, Edgar, Waldo, Victor, osmond st	8/11/2022 12:28 PM
205	All of East Haven south of 95=flooding, coastal erosion, sea level	8/11/2022 12:27 PM
206	Morgan point	8/11/2022 12:26 PM
207	Intersection of Hemingway Ave + Short Beach Road, East Haven	8/11/2022 12:26 PM
208	Ravens are so full of land waste from garbage. Grass. Leaves being dumped if it starts on fire all houses around are gone Josie and Benjamin	8/11/2022 12:26 PM
209	Cosey Beach Avenue	8/11/2022 12:25 PM

South Central Connecticut Hazard Mitigation Plan Survey

210	Hemingway and Coe Ave intersection	8/11/2022 12:24 PM
211	Cosey Beach Avenue is vulnerable to flooding	8/11/2022 12:24 PM
212	Shoreline	8/11/2022 12:24 PM
213	Hemingway Ave flooding/ dunkin rite aid intersection area	8/11/2022 12:24 PM
214	Cosey Beach ave	8/11/2022 12:22 PM
215	Catherine and cosey beach avenue	8/11/2022 12:19 PM
216	East Haven Beach Area	8/11/2022 12:19 PM
217	Bridge over the Farm River on Willow Street	8/11/2022 12:17 PM
218	shoreline neighborhoods near town beach and marina	8/11/2022 10:19 AM
219	Cedar Hill Road/ Cedarhurst Lane	8/11/2022 9:01 AM
220	end of tuutle place latge trra in water. high ridge farm river. has heavy trees and debre in water or banks.	8/10/2022 4:52 PM
221	Spring Rd	8/10/2022 4:34 PM
222	1900 - 1996 Hartford Turnpike North Haven	8/10/2022 8:44 AM
223	Upper west side of town	8/9/2022 5:10 PM
224	Drainage flooding 490 Skiff St. North Haven small waterway through property	8/9/2022 3:52 PM
225	Waterfront / coastal	8/9/2022 2:57 PM
226	Todd Drive South/ Hartford Tpke. North Haven	8/9/2022 2:14 PM
227	Patten Rd at Muddy River	8/9/2022 1:34 PM
228	blossom dr.	8/9/2022 1:26 PM
229	Patten Rd	8/9/2022 1:24 PM
230	Middletown Ave & Front St area of New Haven constantly floods	8/9/2022 1:16 PM
231	Route 146. Guilford	8/8/2022 3:56 PM
232	Farm river in Foxon	8/8/2022 1:46 PM
233	Coastal marshes	8/7/2022 11:37 PM
234	Cosey Beach Ext at Ellis Road	8/7/2022 6:54 PM
235	Tweed-New Haven Regional Airport	8/6/2022 8:41 AM
236	Seaside ave	8/5/2022 7:30 PM
237	Jeffrey Road	8/5/2022 2:02 PM
238	Cozy Beach Ave	8/5/2022 1:04 PM
239	Cosey Beach residents	8/5/2022 12:59 PM
240	Rt 146 and Old Sachem Head Rd under train trestle	8/5/2022 11:46 AM
241	Estelle Road - Farm River	8/5/2022 11:31 AM
242	Cosey beach ave east haven	8/5/2022 10:48 AM
243	Coe Ave and Short Beach - street drainage	8/5/2022 10:44 AM
244	Momauguin	8/5/2022 10:42 AM
245	Cosey Beach Avenue	8/5/2022 10:34 AM
246	Field rd area	8/4/2022 1:15 PM
247	The coastline of East Haven is very sensitive to flooding and storms	8/4/2022 9:51 AM

South Central Connecticut Hazard Mitigation Plan Survey

248	The beach community	8/3/2022 8:54 PM
249	Tweed Airport	8/3/2022 7:46 PM
250	Flooding at Second Ave. & Cosey Beach Ave., East Haven	8/3/2022 7:13 PM
251	Intersection of Hemingway, Coe, Short Beach was supposedly funded to be raised years ago but never happened. It floods all the time.	8/3/2022 3:57 PM
252	Cosey Beach Ave	8/3/2022 2:15 PM
253	Coe Ave & Short Beach Rd	8/3/2022 2:07 PM
254	Meadow Street, East Haven by the water company property, road heavily flood	8/3/2022 12:41 PM
255	hemmingway/short beach road intersection	8/3/2022 12:15 PM
256	Grannis Lake	8/3/2022 11:27 AM
257	Short beach and hemmingway Ave, east haven	8/3/2022 11:19 AM
258	Cosey Beach Ave	8/3/2022 10:56 AM
259	Hemingway Avenue at Short Beach Road	8/3/2022 10:19 AM
260	Cosey Beach Ave entirely	8/3/2022 10:11 AM
261	Tweed Airport Expansion negative affect on Wetlands/ residential areas	8/3/2022 10:08 AM
262	Intersection of coe ave, short beach rd and Hemingway ave	8/3/2022 10:06 AM
263	Boxford St	8/3/2022 10:06 AM
264	Morgan Point	8/3/2022 10:00 AM
265	Housatonic River - Harbor	8/3/2022 9:02 AM
266	Intersection of Boston Post Road and Woodmont Rd	8/2/2022 4:42 PM
267	Corner of Beachland Avenue and Melba Street	8/2/2022 2:26 PM
268	Route 146 Guilford ct	7/31/2022 3:43 PM
269	Maple street farm river	7/31/2022 1:56 PM
270	Madison south of the Boston Post Road	7/30/2022 3:49 PM
271	South Woodbridge near Westville	7/29/2022 8:56 PM
272	power outage with road closures	7/29/2022 5:15 PM
273	coastal areas	7/29/2022 9:56 AM
274	Fence Creek area	7/29/2022 7:36 AM
275	Channels near short beach road	7/28/2022 9:04 PM
276	Shoreline along Long Island Sound	7/28/2022 11:29 AM
277	any homes within a close proximity to West Lake	7/28/2022 8:19 AM
278	Corner of Short Beach Rd & Hemingway	7/28/2022 7:25 AM
279	Intersection of Coe and Short Beach	7/27/2022 8:43 PM
280	Mill Street	7/27/2022 8:25 PM
281	Mulberry Point Rd adjacent to assoc. beach	7/27/2022 7:47 PM
282	Cosey Beach	7/27/2022 7:41 PM
283	Hemingway and Short Beach	7/27/2022 7:19 PM
284	Intersection of Coe/Hemingway Ave. & Short Beach Road	7/27/2022 6:09 PM

South Central Connecticut Hazard Mitigation Plan Survey

285	Farm river	7/27/2022 5:36 PM
286	Coe Ave and Short Beach RD interection	7/27/2022 5:28 PM
287	The beach - sandpiper area	7/27/2022 5:27 PM
288	Gene - Miami	7/27/2022 5:09 PM
289	South end road and Townsend ave in New haven.	7/27/2022 4:42 PM
290	Many trees close to powerlines - View Street	7/27/2022 4:41 PM
291	intersection of RTs 80 & 77	7/27/2022 12:59 PM
292	Amtrak underpass Thimble Island Rd, Stony Creek, Branford	7/27/2022 12:26 PM
293	shoreline areas	7/27/2022 11:37 AM
294	Drains along river road are mostly clogged	7/27/2022 9:29 AM
295	Smith Bay shoreline area of Madison (Toffee Ln)	7/27/2022 9:16 AM
296	Shoreline, Jacobs beach, chittenden park	7/26/2022 5:06 PM
297	Beach areas	7/26/2022 4:05 PM
298	Water Street in Guilford, CT is incredibly susceptible to flooding	7/26/2022 2:28 PM
299	All of the land directly on the Sound	7/26/2022 2:26 PM
300	Joshua Cove	7/26/2022 2:10 PM
301	Driscoll, Reynolds and Bryan street flooding.	7/26/2022 2:08 PM
302	East wharf tidal marsh	7/26/2022 12:19 PM
303	Marina area	7/26/2022 12:18 PM
304	Middle Beach Road/Madison, from Island Avenue east to Seaview Beach	7/26/2022 11:55 AM
305	Middel Beach Road and Middle Beach Rd. West, all roads intersectine with these roads	7/26/2022 11:17 AM
306	constrcution at 8 Morgan terrace East Haven has put whole neighborhood at higher risk	7/26/2022 11:16 AM
307	Circle Beach	7/26/2022 9:59 AM
308	Middle Beach Road	7/26/2022 8:58 AM
309	Lower River Road near cemetery	7/26/2022 8:02 AM
310	Short beach rd and Hemingway ave	7/26/2022 7:34 AM
311	Route 1 under Rr tracks	7/25/2022 4:26 PM
312	Todd Drive South - Flood Zone	7/25/2022 3:15 PM
313	Beach st	7/25/2022 2:27 PM
314	Morgan Point, East Haven	7/25/2022 1:20 PM
315	Lake Street Beach West Haven, CT	7/25/2022 11:20 AM
316	Beach Street between Sandy Point and Washington Ave (West Haven)	7/24/2022 7:35 PM
317	Route 1 Under rail bridge near Garnett Park	7/24/2022 1:19 PM
318	Beach communities. Twin Coves.	7/23/2022 9:05 PM
319	Middle Beach Rd	7/23/2022 9:39 AM
320	The corner of Hunters Trail and Coose Road gets minor flooding easily during the winter months. Then the water freezes right by the stop sign on Hunters Trail facing Bauer Farm. I have seen and experienced vehicles sliding right past the stop sign on Hu tees Trail and straight into Ciose Road. Luckily the oncoming cars were able to avoid the sliding car. Or, luckily, there were no oncoming cars on Copse Rd.	7/23/2022 9:05 AM

South Central Connecticut Hazard Mitigation Plan Survey

321	Island Avenue & Middle Beach Rd	7/22/2022 9:37 PM
322	Madison Waterfront	7/22/2022 7:53 PM
323	Neck Rd	7/22/2022 5:44 PM
324	Hanover and Grove	7/22/2022 3:54 PM
325	Merwin Ave across from Village Bistro	7/20/2022 9:15 PM
326	Naugatuck Ave & Bic Drive	7/20/2022 10:35 AM
327	Washington St near elm	7/19/2022 10:54 AM
328	Pool Road	7/19/2022 9:36 AM
329	railroad under passes	7/19/2022 8:41 AM
330	Railroad underpasses	7/19/2022 8:39 AM
331	Litchfield Turnpike north of Bradley Road	7/18/2022 7:44 AM
332	Shoreline beaches and homes	7/16/2022 8:24 PM
333	Route 146 between branford and guilford	7/16/2022 6:48 PM
334	Whitney Dam	7/15/2022 11:52 AM
335	Córner benham & lane	7/14/2022 11:01 PM
336	Corner of Kelsey Avenue and Main Street	7/14/2022 4:09 PM
337	Patten Road along the Muddy River	7/14/2022 2:01 PM
338	All beach communities in Milford	7/14/2022 1:56 PM
339	Housatonic River in Devon	7/13/2022 4:39 PM
340	Savin and graham manor floods regularly as the storm drains are blocked and not functioning despite calls to the city	7/13/2022 8:59 AM
341	Walnut beach	7/13/2022 8:29 AM
342	Dickerman St & Villa Rd, Hamden	7/13/2022 8:12 AM
343	Gulf Pond marsh erosion and coastal surge flooding	7/13/2022 8:01 AM
344	Dixwell Ave	7/12/2022 8:16 PM
345	Gaylord mountain road	7/12/2022 5:36 PM
346	Anything along the coastline	7/12/2022 4:29 PM
347	Intersection of Treadwell and Leeder Hill, and surrounding area	7/12/2022 2:57 PM
348	Flooding - Thornton bend (117-121). Drain is often covered by leaves/debris and road floods	7/12/2022 1:59 PM
349	78 Springdale St - large oak trees over hanging in property	7/12/2022 1:42 PM
350	Athol Place and Gordon -	7/12/2022 1:00 PM
351	Hamre Lane Dead End	7/12/2022 12:42 PM
352	Fern/wood street-lots of trees and could be impacted by heavy storm/winds	7/12/2022 12:35 PM
353	Mather and Waite St causeways on Lake Whitney	7/12/2022 12:27 PM
354	Ursini Drive	7/12/2022 12:27 PM
355	West Haven High School and surrounding streets/communities	7/11/2022 9:55 AM
356	1st Ave and Beach Street from Monahan Place to Washington St.	7/9/2022 4:09 PM
357	Lake and Ocean	7/9/2022 4:29 AM
358	Indian Neck Ave at Meadow St Railroad Bridge	7/8/2022 4:58 PM

South Central Connecticut Hazard Mitigation Plan Survey

359	Kelsey ave and main st	7/8/2022 3:58 PM
360	Shoreline in West Haven gets flooded	7/8/2022 12:25 PM
361	Beach St	7/8/2022 10:06 AM
362	The Flats [south of Bradley rd both east and west to the New Haven border	7/7/2022 3:15 PM
363	East Broadway, Milford, CT	7/7/2022 10:42 AM
364	Patten Rd near Bridge. near Hansen park	7/7/2022 9:41 AM
365	Pine River	7/7/2022 9:23 AM
366	Roads	7/7/2022 8:51 AM
367	Substation State St	7/7/2022 7:51 AM
368	route 67 woodbridge ct	7/5/2022 12:49 PM
369	Low lying residences along state roads	7/3/2022 10:20 AM
370	Route 15 near the underpasses in Hamden and near exit 60	7/2/2022 8:32 PM
371	Kings Highway near/over Pine Brook South	7/1/2022 1:06 PM
372	West River along Litchfield Tpke and Merritt Avenue	7/1/2022 8:22 AM
373	hanover st./west main	6/30/2022 1:51 PM
374	Mill Rock/Newhall (Hamden)	6/30/2022 11:45 AM
375	The flats - anything south of brookside on 63, and anything on 69	6/30/2022 11:18 AM
376	Woodbridge Business District	6/30/2022 11:16 AM
377	Hemingway Ave and Coe Ave intersection	6/7/2022 1:45 PM
#	2	DATE
1	Many parts of Fair Haven neighborhood, new haven	1/13/2023 3:56 PM
2	Elaine Rd and Point Beach Dr	1/13/2023 1:30 PM
3	railroad underpass on Old Gate Lane in Milford	1/13/2023 9:50 AM
4	Underpass in New Haven James Street	1/12/2023 6:18 PM
5	Platt Street	1/12/2023 4:55 PM
6	Coe Ave & Hemingway	1/10/2023 1:47 PM
7	Three sewers in front of and across from 59 Forbes Place, need to be cvaccumed	1/10/2023 10:59 AM
8	North Street and Post Road	1/10/2023 9:58 AM
9	Tweed Airport	1/9/2023 7:11 PM
10	Casey Beach Ave	1/9/2023 6:52 PM
11	Silver Sands State Park	1/7/2023 5:45 PM
12	Lower Westland Avenue Milford CT	1/7/2023 12:30 PM
13	All of the coastline in Milford	1/7/2023 11:36 AM
14	Woodmont	1/6/2023 12:02 PM
15	Meadow st	1/5/2023 8:22 PM
16	Rt 146 So Montowese RR underpass Branford	1/3/2023 10:47 PM
17	Becket Ave, Branford	1/3/2023 3:16 PM
18	Buckingham Ave bisecting the pond, floods over in extreme weather	1/3/2023 10:23 AM

South Central Connecticut Hazard Mitigation Plan Survey

19	CT. Conservation Property Court St, and 2nd Ave. Ext. Milford.	12/26/2022 12:25 PM
20	All of silver sands state park, milford ct	12/8/2022 8:27 PM
21	Oyster River mouth, WH/Milford line	11/28/2022 2:45 PM
22	Cedar Beach & Smith Point	11/19/2022 12:58 PM
23	Gulf Street	11/17/2022 9:07 PM
24	Hillside Ave, Milford	11/17/2022 6:36 PM
25	landscapers throwing debris in protected wetlands	11/14/2022 3:37 PM
26	River corridors	11/13/2022 9:07 PM
27	Milford center of town	11/13/2022 7:51 AM
28	Flooding on Milford Point Road, Cedar Beach	11/13/2022 7:13 AM
29	Bayview	11/12/2022 10:31 PM
30	Red Bush Lane at Boston Post Rd area	11/12/2022 2:52 PM
31	Unknown effects due to recent clearing of vegetation around Milford Power Company	11/12/2022 10:07 AM
32	Shell Ave - Milford	11/12/2022 8:45 AM
33	New Haven Avenue/Old Gate Lane in Milford, CT	11/12/2022 7:38 AM
34	Melba from Beachland through Bayshore	11/9/2022 5:48 AM
35	flooding of Creek with no oversight - creek has invasive plants, is full of sand and now is so full that the flooding is a danger even at high tide	11/7/2022 8:17 PM
36	Bayshore Dr/ Oakland	11/7/2022 6:22 PM
37	Orland Street and Summer Place Milford Ct	11/7/2022 4:21 PM
38	Deerfield ave, lower adjacent to deerfield in bayview section	11/6/2022 11:19 PM
39	Beacon Hill Preserve	11/3/2022 2:53 PM
40	Hemingway Ave	11/2/2022 3:09 PM
41	Cove river and surrounding housing	11/1/2022 11:11 AM
42	Wallace Dam on Quinnipiac River, bridge over Q St	10/30/2022 1:21 PM
43	around Exit 60 on Merit Pkwy where trees were removed and exposed steep slopes	10/28/2022 9:26 AM
44	Shore drive Branford Ct	10/28/2022 7:30 AM
45	squaw brook rd and thimble isl rd and south to end	10/25/2022 3:17 PM
46	Waverly Rd.	10/24/2022 1:54 PM
47	Wepawaug River Center Road Rimmon Road	10/24/2022 12:24 PM
48	Deerfield Improvement Association - Deefield, Field Court, Milesfield, Grandview	10/19/2022 4:17 PM
49	Campbell Ave bridge	9/23/2022 11:13 AM
50	Concord Street Dean Street	9/19/2022 9:40 PM
51	Union Avenue in New Haven	9/19/2022 7:24 PM
52	Old Country Road and Coachmans Lane	9/19/2022 3:49 PM
53	George st and day	9/13/2022 2:45 PM
54	Various Wastewater pump stations	9/13/2022 2:00 PM
55	under railroad bridges throughout the city	9/6/2022 10:42 AM
56	Anderson Ave passage through wetlands	9/6/2022 9:56 AM

South Central Connecticut Hazard Mitigation Plan Survey

57	Steep slope on Bethany Woodbridge line Amity Road	9/2/2022 2:38 PM
58	Washington Ave RR bridge	9/2/2022 12:59 PM
59	Structures b/t Cosey Beach Ave and LIS	8/26/2022 2:35 PM
60	Hemingway Avenue	8/25/2022 11:37 AM
61	Point Beach Dr	8/24/2022 8:48 AM
62	Flooding at Sybil Creek at Sybil - Linden Ave	8/23/2022 3:17 PM
63	Branford Community House built in flood prone area & serves as shelter	8/23/2022 2:41 PM
64	Beckett st short beach Branford	8/23/2022 10:03 AM
65	Union Avenue between Water Street and Columbus Avenue	8/23/2022 6:02 AM
66	Tweed Airport	8/22/2022 10:12 PM
67	Concord St., New Haven towards Morris Creek = Flooding	8/22/2022 5:57 PM
68	Areas of residential homes near tweed around lighthouse rd and Townsend Ave, have already seen flooding in high volume rain events and hurricanes	8/22/2022 11:54 AM
69	Quinnipiac River Park	8/22/2022 10:32 AM
70	Forbes Avenue and Stiles St, New Haven	8/22/2022 10:25 AM
71	Intersection of Hemmingway Ave and 142 in East Haven	8/22/2022 9:56 AM
72	Fair Haven along Mill RIver	8/22/2022 9:56 AM
73	Guilford train station	8/22/2022 8:43 AM
74	Fair Haven	8/22/2022 7:27 AM
75	Railroad Underpass, Washington Ave	8/19/2022 4:58 PM
76	Upper Pardee Brook Watershed near Colonial Drive	8/19/2022 3:23 PM
77	marshes	8/18/2022 10:52 AM
78	Trees throughout town need to be properly pruned or removed if the will cause power outages during storms - West Shepard Ave.	8/17/2022 7:03 PM
79	North Greenbrier Dr betw. Derby-Milford Rd and Prudden La	8/17/2022 8:57 AM
80	South End st and Morgan Ave.	8/16/2022 2:20 PM
81	All areas waterward of Silver Sands Rd.	8/15/2022 4:16 PM
82	Lewis Avenue along Columbus Park	8/15/2022 4:38 AM
83	Ansonia Road and Johnson Roads, Woodbridge	8/14/2022 5:24 PM
84	Cosey Beach. Hurricane/Tropical Storm flooding.	8/13/2022 7:12 PM
85	Intersection of Hemmingway, Coe avenues, and Short Beach RD	8/13/2022 9:25 AM
86	The redesigned "snake hill road" section of Brushy Plains Road in Brantford that with the new slope, still lowest point crosses over stream leading into small circular fishing pond and the new asphalt bordered by sharp rocks collecting trash has no safe place for bicyclists and pedestrians, while many vehicles in both directions travel faster than safe, posted speed limits as does water runoff and flooding of that lowest point.	8/12/2022 8:07 PM
87	Spring Road	8/12/2022 7:50 PM
88	River rd bridge	8/12/2022 6:53 PM
89	Short beach road and Hemingway Ave intersection	8/12/2022 5:33 PM
90	Elm street	8/12/2022 5:30 PM
91	Short Beach Road & Hemingway Ave/ Coe Ave	8/12/2022 12:17 PM

South Central Connecticut Hazard Mitigation Plan Survey

92	Most of the town is vulnerable to wildfire due to the number of downed and standing dead trees.	8/12/2022 11:51 AM
93	Hemmigway way ave and short beach	8/12/2022 10:10 AM
94	Dodge Ave/Airport	8/12/2022 8:47 AM
95	The remaining unimproved bridges along the farm river need to be replaced	8/12/2022 8:37 AM
96	142 bridge over farm river	8/12/2022 5:39 AM
97	Shoreline homes on water	8/11/2022 8:10 PM
98	Houses along Farm River in High Ridge	8/11/2022 6:17 PM
99	Short beach and Coe Ave intersection has flooded since I was a child	8/11/2022 5:35 PM
100	Cozy Beach	8/11/2022 5:21 PM
101	Main Street	8/11/2022 4:06 PM
102	Quinnipiac Ave under Railroad Trestle	8/11/2022 2:59 PM
103	Cosey Beach Ave, Palmetto Trail	8/11/2022 2:50 PM
104	Cozy Beach	8/11/2022 2:43 PM
105	electric lines and poles especially tree overhangs	8/11/2022 2:37 PM
106	Eastern st	8/11/2022 2:00 PM
107	Drug dealer dens	8/11/2022 1:56 PM
108	Farm River	8/11/2022 1:47 PM
109	Hemingway ave	8/11/2022 1:17 PM
110	Edgemere Rd & Coe Ave.	8/11/2022 1:12 PM
111	Maple St Bridge	8/11/2022 1:09 PM
112	Todds Pond for flooding	8/11/2022 1:05 PM
113	naugatuck ave	8/11/2022 1:01 PM
114	Town beach coastline erosion and damage or destruction to property on Town Beach	8/11/2022 12:58 PM
115	flooding of short beach and cove and hemmingway intersection	8/11/2022 12:42 PM
116	Brazos Rd	8/11/2022 12:40 PM
117	3 Clark Ave and Old Town Hwy Morgan A	8/11/2022 12:34 PM
118	Wetlands on Mansfield	8/11/2022 12:33 PM
119	Hemingway Avenue @ Short Beach	8/11/2022 12:33 PM
120	Hemingway	8/11/2022 12:32 PM
121	Coe / Hemingway ave east haven	8/11/2022 12:28 PM
122	All of East Haven is vulnerable to all of the hazards above with the exception of dam failure.	8/11/2022 12:27 PM
123	Elliot Street/Hoop Pole Lane/Old DC Moore School	8/11/2022 12:26 PM
124	First Avenue	8/11/2022 12:25 PM
125	swamp areas	8/11/2022 12:24 PM
126	Coe ave	8/11/2022 12:22 PM
127	The East Haven Sea Wall	8/11/2022 12:19 PM
128	Shell Beach Road	8/11/2022 10:19 AM

South Central Connecticut Hazard Mitigation Plan Survey

129	Paschal Drive/Platt Tech High School/ Golf course/North St	8/11/2022 9:01 AM
130	Old Maple	8/10/2022 4:34 PM
131	Todd Drive	8/10/2022 8:44 AM
132	Kings Highway/ Mt. Carmel Avenue, North Haven	8/9/2022 2:14 PM
133	Pine River Rd	8/9/2022 1:34 PM
134	universal dr.	8/9/2022 1:26 PM
135	Area around Minor Road and Beach Avenue	8/7/2022 11:37 PM
136	Brazos Road	8/7/2022 6:54 PM
137	Hemingway Ave. at Short Beach Rd.	8/6/2022 8:41 AM
138	Whitfield street	8/5/2022 7:30 PM
139	Caroline Rd	8/5/2022 1:04 PM
140	Restraunts on the water	8/5/2022 12:59 PM
141	Minor rd east haven	8/5/2022 10:48 AM
142	North of Rt 80 with respect to tree/wind damage	8/5/2022 10:44 AM
143	Short Beach	8/5/2022 10:42 AM
144	Brazo Area	8/5/2022 10:34 AM
145	The Farm River area is quite low and there are may houses there.	8/4/2022 9:51 AM
146	Local infrastructure connecting my community to the rest of town	8/3/2022 8:54 PM
147	Rt 100 and bridge	8/3/2022 7:46 PM
148	Cosey Beach Avenue and Catherine Street floods all the time.	8/3/2022 3:57 PM
149	Hemingway and Coe Ave	8/3/2022 2:15 PM
150	West end of Cosey Beach Ave	8/3/2022 2:07 PM
151	Corner of Hemmingway and Short Beach - they "made repairs" but this always floods	8/3/2022 12:41 PM
152	short beach road the deli	8/3/2022 12:15 PM
153	Tweed airport	8/3/2022 11:19 AM
154	Short Beach Rd	8/3/2022 10:56 AM
155	Cosey Beach Avenue at Phillip Street (the whole area)	8/3/2022 10:19 AM
156	Momauguin (all)	8/3/2022 10:11 AM
157	Residential areas around Tweed Airport and Wetlands	8/3/2022 10:08 AM
158	Hill St	8/3/2022 10:06 AM
159	4-way intersection at Plains Road and Rutland Roads	8/2/2022 4:42 PM
160	Merwin Avenue between Hillside Avenue and Abigail Street intersections	8/2/2022 2:26 PM
161	residential buildings	7/29/2022 5:15 PM
162	Rt 146	7/29/2022 9:56 AM
163	The beach roads along the shore	7/29/2022 7:36 AM
164	Trolley museum	7/28/2022 9:04 PM
165	areas near Old Field Creek, West Haven	7/28/2022 11:29 AM
166	Tweed	7/28/2022 7:25 AM

South Central Connecticut Hazard Mitigation Plan Survey

167	North High Street	7/27/2022 8:25 PM
168	Intersection of Short Beach, Coe, Hemingway	7/27/2022 7:41 PM
169	Cosey Beach	7/27/2022 7:19 PM
170	Cosey Beach Area Residences	7/27/2022 6:09 PM
171	Ellis RD	7/27/2022 5:28 PM
172	Farm river off north high	7/27/2022 5:27 PM
173	Morgan Point	7/27/2022 5:09 PM
174	Townsend and lighthouse road.	7/27/2022 4:42 PM
175	Poor drainage on View Street -top of street and bottom of street	7/27/2022 4:41 PM
176	roadways	7/27/2022 11:37 AM
177	Drain running under river rd next to train clogged with branches and garbage	7/27/2022 9:29 AM
178	Runoff into Lake Quonnipaug	7/26/2022 5:06 PM
179	River areas	7/26/2022 4:05 PM
180	River and Broad Street area	7/26/2022 2:26 PM
181	Guilford Marina/Jacobs Beach	7/26/2022 2:10 PM
182	Meadow Street flooding.	7/26/2022 2:08 PM
183	Rt 146	7/26/2022 12:18 PM
184	Neck Road	7/26/2022 11:17 AM
185	destruction of wetlands around Tweed airport	7/26/2022 11:16 AM
186	Middle Beach Road	7/26/2022 9:59 AM
187	Island Ave	7/26/2022 8:58 AM
188	Middle beach road between east wharf & fence creek	7/26/2022 8:02 AM
189	Marlen Drive - Flooding	7/25/2022 3:15 PM
190	Washington Ave and Campbell Ave and Morgan lane RR bridge	7/25/2022 2:27 PM
191	Seaview Avenue Beach West Haven, CT	7/25/2022 11:20 AM
192	Morse Park and Old Field Creek, West Haven	7/24/2022 7:35 PM
193	Route 146 Guilford near	7/24/2022 1:19 PM
194	Surf Club	7/23/2022 9:39 AM
195	Some areas in town still look like they still have trees too close to power lines.	7/23/2022 9:05 AM
196	Tuxis Rd	7/22/2022 9:37 PM
197	Madison Downtown	7/22/2022 7:53 PM
198	Hanover and Cook	7/22/2022 3:54 PM
199	Naugatuck Ave heading towards Milford Point	7/20/2022 10:35 AM
200	Campbell Ave under the train overpass	7/19/2022 10:54 AM
201	coastal residental access	7/19/2022 8:41 AM
202	Wastewater treatment facilities	7/19/2022 8:39 AM
203	21 South Bradley road entrance bordering ball fields	7/18/2022 7:44 AM
204	Branford train station	7/16/2022 6:48 PM

South Central Connecticut Hazard Mitigation Plan Survey

205	Mill River	7/15/2022 11:52 AM
206	Dixwell ave by rt 15 entrance #60	7/14/2022 11:01 PM
207	Beach Street	7/14/2022 4:09 PM
208	Storm drains throughout west Haven are inadequate and there is often water pooling around them, causing flooding in some cases	7/13/2022 8:59 AM
209	Anchor beach	7/13/2022 8:29 AM
210	Sleeping Giant park	7/13/2022 8:12 AM
211	Above ground electric services where trees can take down lines	7/13/2022 8:01 AM
212	Whitney Near falls	7/12/2022 8:16 PM
213	Mather St and Waite St	7/12/2022 2:57 PM
214	Spring Glen neighborhood in general	7/12/2022 1:00 PM
215	Bridge on mather-flooding	7/12/2022 12:35 PM
216	Lake Whitney Dam	7/12/2022 12:27 PM
217	All Metro North underpasses (its been an ongoing problem for decades!)	7/11/2022 9:55 AM
218	Capt. Thomas Blvd from Washington to Platt Ave.	7/9/2022 4:09 PM
219	Jones Hill Rd and Ocean	7/9/2022 4:29 AM
220	Montowese St at Tabor Dr	7/8/2022 4:58 PM
221	Beach areas	7/8/2022 3:58 PM
222	Beach erosion at shoreline	7/8/2022 12:25 PM
223	Ocean Ave	7/8/2022 10:06 AM
224	Wepawaug River and other river courses	7/7/2022 3:15 PM
225	Milford Point Rd/Seaview Ave, Milford, CT	7/7/2022 10:42 AM
226	Rt 15 near Banton St	7/7/2022 9:41 AM
227	Northern section of Hartford Turnpike	7/7/2022 9:23 AM
228	Highways	7/7/2022 8:51 AM
229	Universal Dr	7/7/2022 7:51 AM
230	Woodbridge Flats	7/3/2022 10:20 AM
231	Todd Drive South closest to discharge beneath Route 15	7/1/2022 1:06 PM
232	Wepawaug River Center Road Rimmon Road	7/1/2022 8:22 AM
233	miller street/pratt	6/30/2022 1:51 PM
234	Union Ave @ PDHQ/Train Station (New Haven)	6/30/2022 11:45 AM
235	Merrrit Avenue area by river	6/30/2022 11:16 AM
236	Cosey Beach Avenue	6/7/2022 1:45 PM
#	**3**	**DATE**
1	Richard Street	1/12/2023 4:55 PM
2	Area around The Margaret Egan Center and Grove Circle	1/10/2023 9:58 AM
3	Anchor beach	1/7/2023 5:45 PM
4	All the low lying areas in Milford	1/7/2023 11:36 AM
5	Rt 146	1/5/2023 8:22 PM

South Central Connecticut Hazard Mitigation Plan Survey

6	Sunset Beach Summer Island Roads	1/3/2023 10:47 PM
7	Railroad bridge over Old Gate Lane, close to New Haven Ave	1/3/2023 10:23 AM
8	Marsh Boat Ramp Court St. Milford	12/26/2022 12:25 PM
9	East Broadway, milford ct	12/8/2022 8:27 PM
10	Sikorsky aircraft, main st Stratford, on Housatonic river	11/28/2022 2:45 PM
11	Downtown Milford	11/19/2022 12:58 PM
12	New Haven Avenue	11/17/2022 9:07 PM
13	Beach Ave, Milford	11/17/2022 6:36 PM
14	not enough clear water runoff	11/14/2022 3:37 PM
15	Point Beach	11/12/2022 10:31 PM
16	Naugatuck Gardens and surrounding communities relying on the flood warning system	11/12/2022 10:07 AM
17	Browdway in Walnut Beach & Wildemere Beach areas of Milford, CT	11/12/2022 7:38 AM
18	Summer Place, Orland Street and East Avenue	11/7/2022 8:17 PM
19	Bayshore/Milesfield	11/7/2022 6:22 PM
20	East Ave and Summer Place Milford Ct	11/7/2022 4:21 PM
21	East Haven Beach	11/2/2022 3:09 PM
22	Entire shoreline - erosion from runoff - lake street	11/1/2022 11:11 AM
23	Intersection Rt5/ Center/ Hall/ Q St: Street flooding	10/30/2022 1:21 PM
24	Beckett Ave Branford Ct.	10/28/2022 7:30 AM
25	Crouch Rd.	10/24/2022 1:54 PM
26	Bayview Improvement Association - Bayshore, Melba, Orland,	10/19/2022 4:17 PM
27	Washington Ave bridge	9/23/2022 11:13 AM
28	Downtown New Haven (many areas)	9/19/2022 7:24 PM
29	Pine Tree Drive and Peck Lane	9/19/2022 3:49 PM
30	Kimberly and grant	9/13/2022 2:45 PM
31	Wastewater treatment plants (Beaver Brook & Housatonic)	9/13/2022 2:00 PM
32	Along rivers	9/6/2022 10:42 AM
33	Burwell Beach Area	9/6/2022 9:56 AM
34	Any area downhill from not properly functioning septic tank (many locations)	9/2/2022 2:38 PM
35	Morgan Lane RR bridge	9/2/2022 12:59 PM
36	Lax regulation/restrictions for street vs off street parking	8/26/2022 2:35 PM
37	South End Road	8/25/2022 11:37 AM
38	Road erosion of Linden Ave along it's length	8/23/2022 3:17 PM
39	Rt 146 can become impassable in spots due to flooding - lack of evacuation signage	8/23/2022 2:41 PM
40	Low points of Shore drive, short beach, Branford	8/23/2022 10:03 AM
41	Middletown Avenue north of Quinnipiac River	8/23/2022 6:02 AM
42	Fair Haven	8/22/2022 10:12 PM
43	Tweed New Haven Airport = Flooding	8/22/2022 5:57 PM

South Central Connecticut Hazard Mitigation Plan Survey

44	Roadways adjacent to tweed airport such as burr st and others near parking lot and closer to road at west side of tweed	8/22/2022 11:54 AM
45	Dover Beach Park	8/22/2022 10:32 AM
46	West Rock Ave and Whalley, New Haven	8/22/2022 10:25 AM
47	Fair Haven neighborhood, Hill neighborhood for extreme heat	8/22/2022 9:56 AM
48	Henry Whitfield Museum and surrounding area	8/22/2022 8:43 AM
49	West River	8/22/2022 7:27 AM
50	Railrod Underpass, Campbell Ave	8/19/2022 4:58 PM
51	Connelly Parkway Bridge	8/19/2022 3:23 PM
52	erosion	8/18/2022 10:52 AM
53	Hall Dr and Chippendale Rd	8/17/2022 8:57 AM
54	Pequot st.	8/16/2022 2:20 PM
55	Hemingway Ave./Short Beach. Severe flooding.	8/13/2022 7:12 PM
56	The highest part of 7 Dorian Drive as the rains and runoff travel down towards the lowest point at 24 Pine View Drive East Haven and flows into driveways and yards	8/12/2022 8:07 PM
57	Wetlands/airport	8/12/2022 8:47 AM
58	Trolley lines	8/12/2022 5:39 AM
59	Cosey beach avenue	8/11/2022 5:35 PM
60	Hemingway ave	8/11/2022 5:21 PM
61	Coe and Hemingway	8/11/2022 4:06 PM
62	houses along the farm river	8/11/2022 2:43 PM
63	View terrace	8/11/2022 2:00 PM
64	Brazos Rd.	8/11/2022 1:12 PM
65	River Rd Bridge	8/11/2022 1:09 PM
66	Peter's Rock for landslide or issues on that hill	8/11/2022 1:05 PM
67	cosey beach ave	8/11/2022 1:01 PM
68	Damage to Splash Pad and Sandpiper	8/11/2022 12:58 PM
69	hunting is going on in the marsh and very close to our homes	8/11/2022 12:42 PM
70	Hemingway and Coe Ave	8/11/2022 12:34 PM
71	Wetlands on closet beach	8/11/2022 12:33 PM
72	Waldo street - east haven - no storm sewers - only one & caving in- street floods	8/11/2022 12:28 PM
73	Silver Sands rd	8/11/2022 12:22 PM
74	Neck Road long term viability	8/11/2022 10:19 AM
75	Elm St	8/10/2022 4:34 PM
76	Hartford Tpke/ Sherwood Drive, North Haven	8/9/2022 2:14 PM
77	Todd Dr	8/9/2022 1:34 PM
78	South End Rd. before Silver Sands Rd.	8/6/2022 8:41 AM
79	Cliff st east haven	8/5/2022 10:48 AM
80	Shoreline areas due to flooding and erosion	8/5/2022 10:44 AM

South Central Connecticut Hazard Mitigation Plan Survey

81	Farm River	8/5/2022 10:42 AM
82	Hemingway/Coe/Short Beach Road	8/4/2022 9:51 AM
83	coe ave and silver sands	8/3/2022 7:46 PM
84	Morgan Avenue, old Town Highway, South Street flood all the time	8/3/2022 3:57 PM
85	Gerrish Ave near Tuttle Brook	8/3/2022 2:15 PM
86	Morris cove area new haven	8/3/2022 11:19 AM
87	Main St	8/3/2022 10:56 AM
88	Thompson Avenue near Dodge Avenue and beyond to end of Thompson	8/3/2022 10:19 AM
89	Morgan Point	8/3/2022 10:11 AM
90	Four way intersection on Hemingway Ave in front of Rite Aid and near Dunkin	8/3/2022 10:08 AM
91	Field Court area of Bayview Beach	8/2/2022 2:26 PM
92	wetlands	7/29/2022 5:15 PM
93	Sewage treatment plants in low areas	7/29/2022 7:36 AM
94	Lake Street near Lake Phipps/Cove River	7/28/2022 11:29 AM
95	Hudson Street	7/27/2022 8:25 PM
96	Coe	7/27/2022 7:19 PM
97	Brazos RD	7/27/2022 5:28 PM
98	Hemingway - Short Beach	7/27/2022 5:09 PM
99	Coe and Hemingway ave.	7/27/2022 4:42 PM
100	Small residential are lakes overflowing	7/26/2022 5:06 PM
101	Harbor Street flooding	7/26/2022 2:08 PM
102	Bayview Terrace and Chapman Avenue	7/26/2022 11:17 AM
103	Green Hill Place	7/26/2022 9:59 AM
104	Tuxis	7/26/2022 8:58 AM
105	Circle beach Road	7/26/2022 8:02 AM
106	Colonial Blvd Drainage Culvert West Haven CT	7/25/2022 11:20 AM
107	Old Grove Park, West Haven	7/24/2022 7:35 PM
108	Neck Road neighborhood	7/23/2022 9:39 AM
109	Madison Town Campus	7/22/2022 7:53 PM
110	Pratt and Miller	7/22/2022 3:54 PM
111	coastal sanitary and septic systems	7/19/2022 8:41 AM
112	Thimble island road. Stony creek	7/16/2022 6:48 PM
113	Córner Dixwell & Whitney	7/14/2022 11:01 PM
114	Captain Thomas Boulevard	7/14/2022 4:09 PM
115	Post Road by commercial development	7/13/2022 8:29 AM
116	Hamden Plaza/mart where meets Whitney ave	7/13/2022 8:12 AM
117	Treadwell	7/12/2022 8:16 PM
118	Dixwell Ave	7/12/2022 2:57 PM

South Central Connecticut Hazard Mitigation Plan Survey

119	Mather St between Martin St and Lake Whitney	7/12/2022 12:27 PM
120	All beaches and coastal businesses/residences to severe erosion in places along First Ave/Ocean Ave	7/11/2022 9:55 AM
121	W. Spring St./Greta St area	7/9/2022 4:09 PM
122	Beach St	7/9/2022 4:29 AM
123	Tabor Drive at Ark Rd	7/8/2022 4:58 PM
124	Utilities during storms	7/8/2022 12:25 PM
125	Captain Thomas Blvd	7/8/2022 10:06 AM
126	The Wilbur Cross highway and entrances and exits	7/7/2022 3:15 PM
127	Boston Post Rd at Red Bush Ln/Roses Mill Rd, Milford, CT	7/7/2022 10:42 AM
128	Any street near the Muddy River	7/7/2022 9:23 AM
129	Slacker Point Rd	7/7/2022 7:51 AM
130	Old Maple Avenue (End, near Muddy River)	7/1/2022 1:06 PM
131	summer st./cook avenue	6/30/2022 1:51 PM
132	Meadowbrook CO-OP (Hamden)	6/30/2022 11:45 AM
133	Tweed Airport Expansion encroachment of wetlands in East Haven	6/7/2022 1:45 PM
#	4	DATE
1	Virginia Street	1/12/2023 4:55 PM
2	Beaches from Milford Harbor to Smith's Point	1/10/2023 9:58 AM
3	Point beach	1/7/2023 5:45 PM
4	Short Beach Road	1/5/2023 8:22 PM
5	Milford Sea Shore	12/26/2022 12:25 PM
6	Gulf Beach, milford ct	12/8/2022 8:27 PM
7	Wepawaug River	11/12/2022 10:31 PM
8	Bottom Melba St hill	11/7/2022 6:22 PM
9	Beach Land and Melba Street Milford Ct	11/7/2022 4:21 PM
10	City center and rail trestles with poor drainage	11/1/2022 11:11 AM
11	residential area around Spring Lake/ Muddy River	10/30/2022 1:21 PM
12	Montowese Ave branford ct	10/28/2022 7:30 AM
13	Melba Street	10/19/2022 4:17 PM
14	Moreland lane bridge	9/23/2022 11:13 AM
15	Long Wharf New Haven	9/19/2022 7:24 PM
16	Hall Drive, North Greenbrier Drive, Indian River Road	9/19/2022 3:49 PM
17	West st and Washington	9/13/2022 2:45 PM
18	Coastal evacuation routes	9/13/2022 2:00 PM
19	Wepawaug River	9/6/2022 9:56 AM
20	Lax regulation restrictions on occupancy, especially rental units	8/26/2022 2:35 PM
21	Hemingway and Short Beach Rd	8/25/2022 11:37 AM
22	Tidal and Storm Surge flooding Thimble Island Rd/ Indian Point Rd	8/23/2022 3:17 PM

South Central Connecticut Hazard Mitigation Plan Survey

23	Access/Egress to some neighborhoods is a single road w/significant populations at risk	8/23/2022 2:41 PM
24	Quinnipiac Ave at railroad underpass	8/22/2022 11:54 AM
25	Ball island	8/22/2022 10:32 AM
26	Trumbull and Whitney Ave,New Haven	8/22/2022 10:25 AM
27	Transfer stations	8/22/2022 9:56 AM
28	Hill South	8/22/2022 7:27 AM
29	Waite Street Bridge	8/19/2022 3:23 PM
30	Brookside Dr and Glenbrook Rd	8/17/2022 8:57 AM
31	Hellstrom Rd bridges (2)	8/11/2022 1:09 PM
32	Amazon - hazmat concern	8/11/2022 1:05 PM
33	hemingway ave	8/11/2022 1:01 PM
34	Damage to Trolley Museum	8/11/2022 12:58 PM
35	Farm River	8/11/2022 12:33 PM
36	riverine flood areas along West River	8/11/2022 10:19 AM
37	Patton Rd	8/10/2022 4:34 PM
38	Marlin Drive, North Haven	8/9/2022 2:14 PM
39	Blanton St	8/9/2022 1:34 PM
40	Brazos rd East haven	8/5/2022 10:48 AM
41	invasive species in wooded areas	8/5/2022 10:44 AM
42	Rt 1/ main street	8/3/2022 7:46 PM
43	Proto drive, east haven	8/3/2022 11:19 AM
44	Coe Ave	8/3/2022 10:56 AM
45	Point Beach on Platt Street	8/2/2022 2:26 PM
46	coastal flooding	7/29/2022 5:15 PM
47	Tyler	7/27/2022 7:19 PM
48	Farview RD	7/27/2022 5:28 PM
49	Branford Point erosion.	7/26/2022 2:08 PM
50	Route 1 near Neck River	7/26/2022 11:17 AM
51	Rt 1 near Friends & Company	7/26/2022 9:59 AM
52	Hammonassett state park	7/26/2022 8:02 AM
53	CT Pond on Lake St. in West Haven CT	7/25/2022 11:20 AM
54	Third Ave Extension - 2nd Avenue - Beach St, West Haven	7/24/2022 7:35 PM
55	All of town for tornados, power outages	7/23/2022 9:39 AM
56	State and Mill	7/22/2022 3:54 PM
57	wastewater treatment plants and pump stations	7/19/2022 8:41 AM
58	Córner Putnam & Dixwell	7/14/2022 11:01 PM
59	Rotary at the West Haven Milford town line	7/14/2022 4:09 PM
60	Silver Sands State Park	7/13/2022 8:29 AM

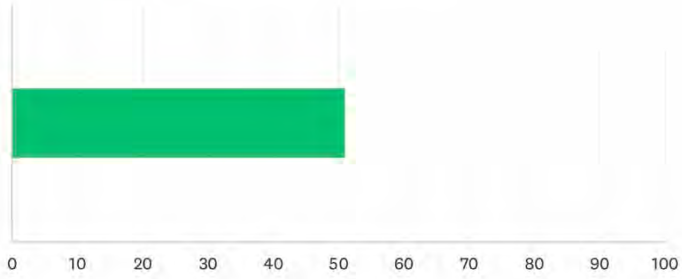
South Central Connecticut Hazard Mitigation Plan Survey

61	Putnam	7/12/2022 8:16 PM
62	Below grade portions of Lake Whitney Glen condo and Canal Crossing apartments	7/12/2022 12:27 PM
63	Underpasses on Campbell Ave and Morgan Lane	7/9/2022 4:09 PM
64	Harbor Street at Branford Point Beach	7/8/2022 4:58 PM
65	First Ave	7/8/2022 10:06 AM
66	Harborside Middle School Basement Flooding	7/7/2022 10:42 AM
67	Pine River Road, closest to Muddy River	7/1/2022 1:06 PM
68	cook avenue/hanover street	6/30/2022 1:51 PM
69	James Street @ The District (New Haven)	6/30/2022 11:45 AM
70	South End Road	6/7/2022 1:45 PM

South Central Connecticut Hazard Mitigation Plan Survey

Q6 Overall, how would you rank your municipal storm water systems' ability to handle current and future storm events?

Answered: 713 Skipped: 30



ANSWER CHOICES	AVERAGE NUMBER	TOTAL NUMBER	RESPONSES
	51	36,443	713

Total Respondents: 713

#		DATE
1	44	1/13/2023 3:56 PM
2	35	1/13/2023 1:30 PM
3	81	1/13/2023 9:50 AM
4	60	1/12/2023 6:18 PM
5	1	1/12/2023 4:55 PM
6	77	1/12/2023 10:52 AM
7	16	1/12/2023 7:15 AM
8	45	1/11/2023 7:49 PM
9	35	1/10/2023 1:47 PM
10	53	1/10/2023 10:59 AM
11	25	1/10/2023 9:58 AM
12	48	1/9/2023 7:11 PM
13	38	1/9/2023 6:52 PM
14	50	1/9/2023 4:41 PM
15	51	1/9/2023 3:02 PM
16	63	1/9/2023 2:53 PM
17	81	1/9/2023 2:48 PM
18	47	1/9/2023 8:44 AM
19	55	1/7/2023 11:11 PM

36 / 105

South Central Connecticut Hazard Mitigation Plan Survey

20	69	1/7/2023 5:45 PM
21	54	1/7/2023 12:30 PM
22	36	1/7/2023 11:36 AM
23	50	1/6/2023 1:08 PM
24	53	1/6/2023 12:02 PM
25	47	1/5/2023 10:57 PM
26	65	1/5/2023 8:22 PM
27	72	1/5/2023 8:00 PM
28	55	1/5/2023 12:31 PM
29	11	1/5/2023 12:30 PM
30	19	1/3/2023 10:47 PM
31	11	1/3/2023 3:16 PM
32	50	1/3/2023 10:23 AM
33	59	1/3/2023 9:58 AM
34	75	12/26/2022 12:25 PM
35	57	12/11/2022 5:24 PM
36	26	12/8/2022 9:14 PM
37	62	12/8/2022 8:27 PM
38	64	12/6/2022 9:48 PM
39	0	12/5/2022 9:53 AM
40	43	11/28/2022 2:45 PM
41	48	11/21/2022 9:42 AM
42	53	11/20/2022 7:49 AM
43	67	11/19/2022 12:58 PM
44	50	11/18/2022 9:23 PM
45	75	11/17/2022 9:07 PM
46	0	11/17/2022 6:36 PM
47	2	11/17/2022 10:26 AM
48	82	11/15/2022 7:55 PM
49	40	11/15/2022 10:56 AM
50	54	11/15/2022 9:31 AM
51	55	11/14/2022 9:39 PM
52	45	11/14/2022 3:37 PM
53	54	11/14/2022 1:52 PM
54	72	11/14/2022 12:03 PM
55	32	11/14/2022 8:16 AM
56	47	11/14/2022 6:39 AM
57	75	11/13/2022 9:07 PM

South Central Connecticut Hazard Mitigation Plan Survey

58	65	11/13/2022 2:59 PM
59	84	11/13/2022 2:24 PM
60	50	11/13/2022 10:29 AM
61	56	11/13/2022 9:54 AM
62	50	11/13/2022 9:11 AM
63	80	11/13/2022 8:09 AM
64	15	11/13/2022 7:51 AM
65	0	11/13/2022 7:13 AM
66	50	11/12/2022 10:31 PM
67	7	11/12/2022 2:52 PM
68	40	11/12/2022 10:07 AM
69	30	11/12/2022 8:45 AM
70	37	11/12/2022 7:38 AM
71	23	11/10/2022 7:47 AM
72	50	11/9/2022 5:48 AM
73	16	11/8/2022 9:01 AM
74	0	11/7/2022 8:17 PM
75	38	11/7/2022 6:50 PM
76	46	11/7/2022 6:22 PM
77	37	11/7/2022 5:14 PM
78	1	11/7/2022 4:21 PM
79	21	11/7/2022 3:34 PM
80	31	11/7/2022 3:24 PM
81	80	11/6/2022 11:19 PM
82	75	11/6/2022 2:34 PM
83	65	11/6/2022 10:22 AM
84	50	11/3/2022 2:53 PM
85	35	11/2/2022 3:09 PM
86	60	11/1/2022 11:11 AM
87	28	10/30/2022 1:21 PM
88	43	10/28/2022 9:26 AM
89	7	10/28/2022 7:30 AM
90	28	10/25/2022 9:22 PM
91	26	10/25/2022 6:26 PM
92	29	10/25/2022 3:17 PM
93	50	10/25/2022 10:27 AM
94	48	10/24/2022 3:01 PM
95	55	10/24/2022 1:54 PM

South Central Connecticut Hazard Mitigation Plan Survey

96	0	10/24/2022 12:24 PM
97	63	10/24/2022 11:42 AM
98	20	10/19/2022 4:17 PM
99	49	10/16/2022 10:42 AM
100	42	10/9/2022 1:05 PM
101	50	10/8/2022 10:10 AM
102	85	10/4/2022 2:26 PM
103	50	10/3/2022 11:55 AM
104	48	10/3/2022 11:22 AM
105	50	9/26/2022 12:51 PM
106	4	9/23/2022 11:13 AM
107	0	9/19/2022 9:40 PM
108	55	9/19/2022 7:24 PM
109	50	9/19/2022 3:49 PM
110	28	9/19/2022 9:51 AM
111	63	9/17/2022 6:04 PM
112	9	9/17/2022 5:34 PM
113	64	9/17/2022 5:31 PM
114	0	9/13/2022 2:45 PM
115	72	9/13/2022 2:00 PM
116	32	9/10/2022 3:25 PM
117	85	9/8/2022 8:22 PM
118	75	9/7/2022 8:48 PM
119	26	9/7/2022 1:43 PM
120	50	9/6/2022 12:24 PM
121	0	9/6/2022 10:42 AM
122	50	9/6/2022 9:56 AM
123	70	9/5/2022 6:10 PM
124	30	9/5/2022 8:33 AM
125	63	9/4/2022 1:36 PM
126	62	9/2/2022 2:38 PM
127	87	9/2/2022 1:25 PM
128	29	9/2/2022 12:59 PM
129	59	9/1/2022 3:33 PM
130	75	9/1/2022 1:11 PM
131	14	8/31/2022 9:27 PM
132	70	8/31/2022 8:00 PM
133	71	8/31/2022 4:14 PM

South Central Connecticut Hazard Mitigation Plan Survey

134	38	8/30/2022 10:51 AM
135	30	8/30/2022 10:09 AM
136	28	8/29/2022 11:24 AM
137	50	8/29/2022 10:25 AM
138	48	8/27/2022 8:00 PM
139	80	8/27/2022 12:07 PM
140	23	8/27/2022 7:47 AM
141	39	8/26/2022 2:35 PM
142	35	8/26/2022 2:20 PM
143	25	8/25/2022 11:37 AM
144	51	8/24/2022 8:48 AM
145	90	8/24/2022 7:41 AM
146	72	8/23/2022 3:17 PM
147	20	8/23/2022 2:41 PM
148	15	8/23/2022 12:50 PM
149	54	8/23/2022 11:40 AM
150	51	8/23/2022 10:03 AM
151	46	8/23/2022 9:49 AM
152	29	8/23/2022 6:02 AM
153	50	8/22/2022 10:12 PM
154	20	8/22/2022 5:57 PM
155	45	8/22/2022 4:43 PM
156	80	8/22/2022 12:06 PM
157	51	8/22/2022 10:58 AM
158	75	8/22/2022 10:32 AM
159	51	8/22/2022 10:25 AM
160	55	8/22/2022 10:01 AM
161	61	8/22/2022 9:56 AM
162	59	8/22/2022 9:56 AM
163	0	8/22/2022 9:16 AM
164	75	8/22/2022 9:01 AM
165	51	8/22/2022 8:43 AM
166	18	8/22/2022 8:35 AM
167	51	8/22/2022 7:51 AM
168	38	8/22/2022 7:27 AM
169	50	8/21/2022 10:10 PM
170	50	8/21/2022 2:09 PM
171	100	8/19/2022 6:44 PM

South Central Connecticut Hazard Mitigation Plan Survey

172	74	8/19/2022 4:58 PM
173	75	8/19/2022 3:23 PM
174	64	8/18/2022 9:17 PM
175	26	8/18/2022 10:52 AM
176	79	8/18/2022 9:07 AM
177	57	8/18/2022 6:56 AM
178	39	8/17/2022 7:03 PM
179	35	8/17/2022 5:54 PM
180	47	8/17/2022 2:05 PM
181	65	8/17/2022 12:14 PM
182	62	8/17/2022 9:24 AM
183	35	8/17/2022 8:57 AM
184	3	8/16/2022 2:20 PM
185	72	8/16/2022 2:17 PM
186	52	8/16/2022 1:30 PM
187	70	8/16/2022 1:17 PM
188	1	8/16/2022 11:46 AM
189	42	8/16/2022 11:36 AM
190	45	8/16/2022 10:59 AM
191	92	8/16/2022 8:15 AM
192	74	8/15/2022 4:41 PM
193	50	8/15/2022 4:16 PM
194	50	8/15/2022 1:35 PM
195	76	8/15/2022 1:09 PM
196	7	8/15/2022 10:37 AM
197	70	8/15/2022 10:28 AM
198	70	8/15/2022 10:14 AM
199	43	8/15/2022 8:28 AM
200	45	8/15/2022 8:26 AM
201	32	8/15/2022 4:38 AM
202	66	8/14/2022 10:55 PM
203	85	8/14/2022 9:21 PM
204	13	8/14/2022 5:24 PM
205	36	8/14/2022 5:06 PM
206	52	8/14/2022 2:54 PM
207	87	8/14/2022 1:28 PM
208	90	8/14/2022 12:29 PM
209	56	8/14/2022 12:11 PM

South Central Connecticut Hazard Mitigation Plan Survey

210	50	8/14/2022 7:12 AM
211	50	8/13/2022 9:18 PM
212	65	8/13/2022 7:12 PM
213	6	8/13/2022 3:18 PM
214	46	8/13/2022 2:30 PM
215	28	8/13/2022 12:23 PM
216	99	8/13/2022 10:43 AM
217	80	8/13/2022 10:25 AM
218	76	8/13/2022 9:25 AM
219	2	8/12/2022 8:07 PM
220	51	8/12/2022 7:50 PM
221	38	8/12/2022 6:53 PM
222	40	8/12/2022 6:50 PM
223	38	8/12/2022 5:33 PM
224	31	8/12/2022 5:30 PM
225	32	8/12/2022 5:23 PM
226	52	8/12/2022 5:05 PM
227	100	8/12/2022 4:55 PM
228	60	8/12/2022 4:33 PM
229	46	8/12/2022 3:31 PM
230	13	8/12/2022 3:03 PM
231	26	8/12/2022 3:00 PM
232	78	8/12/2022 2:18 PM
233	51	8/12/2022 2:09 PM
234	74	8/12/2022 12:17 PM
235	85	8/12/2022 11:21 AM
236	54	8/12/2022 11:19 AM
237	0	8/12/2022 10:10 AM
238	59	8/12/2022 9:07 AM
239	50	8/12/2022 9:05 AM
240	25	8/12/2022 8:50 AM
241	51	8/12/2022 8:47 AM
242	50	8/12/2022 8:37 AM
243	67	8/12/2022 8:18 AM
244	60	8/12/2022 8:09 AM
245	100	8/12/2022 7:55 AM
246	75	8/12/2022 7:35 AM
247	50	8/12/2022 7:28 AM

South Central Connecticut Hazard Mitigation Plan Survey

248	80	8/12/2022 6:57 AM
249	50	8/12/2022 5:44 AM
250	50	8/12/2022 5:39 AM
251	50	8/12/2022 1:04 AM
252	85	8/11/2022 11:12 PM
253	75	8/11/2022 10:06 PM
254	45	8/11/2022 9:41 PM
255	75	8/11/2022 9:26 PM
256	70	8/11/2022 8:51 PM
257	53	8/11/2022 8:48 PM
258	72	8/11/2022 8:39 PM
259	77	8/11/2022 8:10 PM
260	50	8/11/2022 7:58 PM
261	48	8/11/2022 7:10 PM
262	63	8/11/2022 6:17 PM
263	25	8/11/2022 6:13 PM
264	61	8/11/2022 6:12 PM
265	48	8/11/2022 5:51 PM
266	59	8/11/2022 5:35 PM
267	41	8/11/2022 5:21 PM
268	69	8/11/2022 5:09 PM
269	80	8/11/2022 4:49 PM
270	74	8/11/2022 4:44 PM
271	72	8/11/2022 4:34 PM
272	43	8/11/2022 4:32 PM
273	75	8/11/2022 4:31 PM
274	72	8/11/2022 4:25 PM
275	75	8/11/2022 4:12 PM
276	80	8/11/2022 4:11 PM
277	50	8/11/2022 4:06 PM
278	85	8/11/2022 4:05 PM
279	75	8/11/2022 4:00 PM
280	82	8/11/2022 3:47 PM
281	63	8/11/2022 3:44 PM
282	91	8/11/2022 3:44 PM
283	40	8/11/2022 3:30 PM
284	50	8/11/2022 3:24 PM
285	55	8/11/2022 3:22 PM

South Central Connecticut Hazard Mitigation Plan Survey

286	16	8/11/2022 3:16 PM
287	50	8/11/2022 3:13 PM
288	65	8/11/2022 3:11 PM
289	50	8/11/2022 3:08 PM
290	45	8/11/2022 3:06 PM
291	66	8/11/2022 3:00 PM
292	65	8/11/2022 2:59 PM
293	100	8/11/2022 2:58 PM
294	52	8/11/2022 2:54 PM
295	57	8/11/2022 2:50 PM
296	77	8/11/2022 2:48 PM
297	50	8/11/2022 2:43 PM
298	100	8/11/2022 2:37 PM
299	76	8/11/2022 2:37 PM
300	80	8/11/2022 2:26 PM
301	41	8/11/2022 2:23 PM
302	50	8/11/2022 2:21 PM
303	65	8/11/2022 2:17 PM
304	56	8/11/2022 2:11 PM
305	54	8/11/2022 2:06 PM
306	76	8/11/2022 2:05 PM
307	50	8/11/2022 2:05 PM
308	83	8/11/2022 2:03 PM
309	13	8/11/2022 2:00 PM
310	1	8/11/2022 1:56 PM
311	85	8/11/2022 1:47 PM
312	0	8/11/2022 1:46 PM
313	41	8/11/2022 1:38 PM
314	75	8/11/2022 1:37 PM
315	85	8/11/2022 1:23 PM
316	15	8/11/2022 1:21 PM
317	75	8/11/2022 1:20 PM
318	0	8/11/2022 1:17 PM
319	60	8/11/2022 1:13 PM
320	48	8/11/2022 1:13 PM
321	1	8/11/2022 1:12 PM
322	67	8/11/2022 1:12 PM
323	50	8/11/2022 1:10 PM

South Central Connecticut Hazard Mitigation Plan Survey

324	80	8/11/2022 1:09 PM
325	9	8/11/2022 1:08 PM
326	77	8/11/2022 1:06 PM
327	46	8/11/2022 1:05 PM
328	88	8/11/2022 1:03 PM
329	37	8/11/2022 1:02 PM
330	25	8/11/2022 1:01 PM
331	3	8/11/2022 1:01 PM
332	50	8/11/2022 12:58 PM
333	20	8/11/2022 12:58 PM
334	85	8/11/2022 12:55 PM
335	100	8/11/2022 12:55 PM
336	75	8/11/2022 12:53 PM
337	25	8/11/2022 12:52 PM
338	50	8/11/2022 12:51 PM
339	74	8/11/2022 12:47 PM
340	50	8/11/2022 12:43 PM
341	0	8/11/2022 12:42 PM
342	50	8/11/2022 12:42 PM
343	50	8/11/2022 12:42 PM
344	35	8/11/2022 12:41 PM
345	7	8/11/2022 12:40 PM
346	64	8/11/2022 12:39 PM
347	67	8/11/2022 12:38 PM
348	75	8/11/2022 12:37 PM
349	52	8/11/2022 12:36 PM
350	75	8/11/2022 12:35 PM
351	0	8/11/2022 12:34 PM
352	37	8/11/2022 12:33 PM
353	20	8/11/2022 12:33 PM
354	70	8/11/2022 12:33 PM
355	80	8/11/2022 12:33 PM
356	98	8/11/2022 12:33 PM
357	50	8/11/2022 12:32 PM
358	52	8/11/2022 12:32 PM
359	19	8/11/2022 12:32 PM
360	50	8/11/2022 12:31 PM
361	48	8/11/2022 12:30 PM

South Central Connecticut Hazard Mitigation Plan Survey

362	52	8/11/2022 12:30 PM
363	65	8/11/2022 12:30 PM
364	29	8/11/2022 12:30 PM
365	53	8/11/2022 12:30 PM
366	90	8/11/2022 12:30 PM
367	80	8/11/2022 12:29 PM
368	51	8/11/2022 12:29 PM
369	75	8/11/2022 12:29 PM
370	0	8/11/2022 12:28 PM
371	39	8/11/2022 12:28 PM
372	5	8/11/2022 12:28 PM
373	60	8/11/2022 12:28 PM
374	40	8/11/2022 12:27 PM
375	75	8/11/2022 12:26 PM
376	52	8/11/2022 12:26 PM
377	65	8/11/2022 12:26 PM
378	45	8/11/2022 12:26 PM
379	29	8/11/2022 12:25 PM
380	50	8/11/2022 12:24 PM
381	75	8/11/2022 12:24 PM
382	35	8/11/2022 12:24 PM
383	65	8/11/2022 12:24 PM
384	49	8/11/2022 12:24 PM
385	100	8/11/2022 12:23 PM
386	53	8/11/2022 12:22 PM
387	58	8/11/2022 12:22 PM
388	85	8/11/2022 12:21 PM
389	78	8/11/2022 12:20 PM
390	100	8/11/2022 12:19 PM
391	45	8/11/2022 12:19 PM
392	41	8/11/2022 12:17 PM
393	25	8/11/2022 10:19 AM
394	60	8/11/2022 9:01 AM
395	51	8/10/2022 4:52 PM
396	78	8/10/2022 4:34 PM
397	80	8/10/2022 2:04 PM
398	80	8/10/2022 10:06 AM
399	38	8/10/2022 8:44 AM

South Central Connecticut Hazard Mitigation Plan Survey

400	91	8/10/2022 8:02 AM
401	65	8/10/2022 7:39 AM
402	51	8/9/2022 8:01 PM
403	75	8/9/2022 5:10 PM
404	65	8/9/2022 4:26 PM
405	70	8/9/2022 3:52 PM
406	75	8/9/2022 3:24 PM
407	50	8/9/2022 3:21 PM
408	51	8/9/2022 3:02 PM
409	50	8/9/2022 2:57 PM
410	69	8/9/2022 2:42 PM
411	70	8/9/2022 2:14 PM
412	30	8/9/2022 2:11 PM
413	59	8/9/2022 1:34 PM
414	50	8/9/2022 1:26 PM
415	70	8/9/2022 1:24 PM
416	29	8/9/2022 1:16 PM
417	58	8/9/2022 9:29 AM
418	55	8/9/2022 7:39 AM
419	54	8/8/2022 3:56 PM
420	75	8/8/2022 1:46 PM
421	65	8/8/2022 10:33 AM
422	50	8/8/2022 6:23 AM
423	3	8/7/2022 11:37 PM
424	41	8/7/2022 2:53 PM
425	60	8/6/2022 9:59 AM
426	25	8/6/2022 8:41 AM
427	49	8/5/2022 7:30 PM
428	61	8/5/2022 7:07 PM
429	50	8/5/2022 3:40 PM
430	0	8/5/2022 2:02 PM
431	75	8/5/2022 1:04 PM
432	75	8/5/2022 12:59 PM
433	54	8/5/2022 11:46 AM
434	50	8/5/2022 11:33 AM
435	70	8/5/2022 11:31 AM
436	63	8/5/2022 10:55 AM
437	21	8/5/2022 10:52 AM

South Central Connecticut Hazard Mitigation Plan Survey

438	31	8/5/2022 10:48 AM
439	5	8/5/2022 10:44 AM
440	76	8/5/2022 10:42 AM
441	30	8/5/2022 10:38 AM
442	13	8/5/2022 10:37 AM
443	50	8/5/2022 10:34 AM
444	60	8/5/2022 10:06 AM
445	38	8/5/2022 9:13 AM
446	17	8/4/2022 8:09 PM
447	30	8/4/2022 1:15 PM
448	77	8/4/2022 1:02 PM
449	25	8/4/2022 12:39 PM
450	50	8/4/2022 9:51 AM
451	50	8/4/2022 9:10 AM
452	75	8/4/2022 7:47 AM
453	90	8/4/2022 6:42 AM
454	38	8/3/2022 8:54 PM
455	0	8/3/2022 7:46 PM
456	31	8/3/2022 7:13 PM
457	26	8/3/2022 6:17 PM
458	52	8/3/2022 4:31 PM
459	28	8/3/2022 3:57 PM
460	50	8/3/2022 3:38 PM
461	100	8/3/2022 3:34 PM
462	84	8/3/2022 3:27 PM
463	56	8/3/2022 2:31 PM
464	6	8/3/2022 2:15 PM
465	60	8/3/2022 2:07 PM
466	48	8/3/2022 1:25 PM
467	65	8/3/2022 12:41 PM
468	51	8/3/2022 12:40 PM
469	60	8/3/2022 12:15 PM
470	50	8/3/2022 12:10 PM
471	0	8/3/2022 12:06 PM
472	17	8/3/2022 12:01 PM
473	75	8/3/2022 11:55 AM
474	48	8/3/2022 11:27 AM
475	64	8/3/2022 11:19 AM

South Central Connecticut Hazard Mitigation Plan Survey

476	70	8/3/2022 11:12 AM
477	52	8/3/2022 11:07 AM
478	42	8/3/2022 11:06 AM
479	67	8/3/2022 10:56 AM
480	55	8/3/2022 10:55 AM
481	58	8/3/2022 10:53 AM
482	75	8/3/2022 10:49 AM
483	51	8/3/2022 10:39 AM
484	72	8/3/2022 10:21 AM
485	80	8/3/2022 10:20 AM
486	1	8/3/2022 10:19 AM
487	37	8/3/2022 10:11 AM
488	57	8/3/2022 10:11 AM
489	50	8/3/2022 10:08 AM
490	53	8/3/2022 10:06 AM
491	0	8/3/2022 10:06 AM
492	50	8/3/2022 10:00 AM
493	48	8/3/2022 9:02 AM
494	50	8/3/2022 7:03 AM
495	57	8/2/2022 5:01 PM
496	24	8/2/2022 4:42 PM
497	30	8/2/2022 2:26 PM
498	81	8/1/2022 11:29 PM
499	78	7/31/2022 3:43 PM
500	52	7/31/2022 1:56 PM
501	85	7/30/2022 4:23 PM
502	85	7/30/2022 3:49 PM
503	82	7/29/2022 11:00 PM
504	90	7/29/2022 9:42 PM
505	50	7/29/2022 8:56 PM
506	18	7/29/2022 5:15 PM
507	37	7/29/2022 3:08 PM
508	1	7/29/2022 9:56 AM
509	29	7/29/2022 7:36 AM
510	23	7/28/2022 9:04 PM
511	30	7/28/2022 7:44 PM
512	51	7/28/2022 5:58 PM
513	54	7/28/2022 5:25 PM

South Central Connecticut Hazard Mitigation Plan Survey

514	88	7/28/2022 1:21 PM
515	28	7/28/2022 11:29 AM
516	90	7/28/2022 10:08 AM
517	51	7/28/2022 9:57 AM
518	52	7/28/2022 9:46 AM
519	50	7/28/2022 8:19 AM
520	61	7/28/2022 7:25 AM
521	69	7/27/2022 10:22 PM
522	54	7/27/2022 9:35 PM
523	65	7/27/2022 8:43 PM
524	60	7/27/2022 8:25 PM
525	80	7/27/2022 7:47 PM
526	50	7/27/2022 7:44 PM
527	52	7/27/2022 7:41 PM
528	67	7/27/2022 7:19 PM
529	57	7/27/2022 7:06 PM
530	72	7/27/2022 6:38 PM
531	60	7/27/2022 6:09 PM
532	91	7/27/2022 5:37 PM
533	65	7/27/2022 5:36 PM
534	20	7/27/2022 5:28 PM
535	49	7/27/2022 5:27 PM
536	50	7/27/2022 5:09 PM
537	10	7/27/2022 4:58 PM
538	62	7/27/2022 4:54 PM
539	34	7/27/2022 4:42 PM
540	80	7/27/2022 4:41 PM
541	83	7/27/2022 12:59 PM
542	14	7/27/2022 12:26 PM
543	50	7/27/2022 11:37 AM
544	48	7/27/2022 9:29 AM
545	0	7/27/2022 9:16 AM
546	82	7/27/2022 9:02 AM
547	70	7/26/2022 10:35 PM
548	60	7/26/2022 5:21 PM
549	39	7/26/2022 5:06 PM
550	78	7/26/2022 4:05 PM
551	43	7/26/2022 2:28 PM

South Central Connecticut Hazard Mitigation Plan Survey

552	30	7/26/2022 2:10 PM
553	40	7/26/2022 2:08 PM
554	62	7/26/2022 1:29 PM
555	30	7/26/2022 12:19 PM
556	63	7/26/2022 12:18 PM
557	40	7/26/2022 11:59 AM
558	91	7/26/2022 11:56 AM
559	0	7/26/2022 11:55 AM
560	100	7/26/2022 11:17 AM
561	1	7/26/2022 11:16 AM
562	23	7/26/2022 9:59 AM
563	10	7/26/2022 9:23 AM
564	70	7/26/2022 8:58 AM
565	77	7/26/2022 8:30 AM
566	95	7/26/2022 8:22 AM
567	67	7/26/2022 8:02 AM
568	50	7/26/2022 7:58 AM
569	50	7/26/2022 7:34 AM
570	70	7/26/2022 7:33 AM
571	43	7/26/2022 7:23 AM
572	64	7/26/2022 7:07 AM
573	90	7/26/2022 6:48 AM
574	75	7/26/2022 6:17 AM
575	50	7/26/2022 6:12 AM
576	74	7/25/2022 10:27 PM
577	78	7/25/2022 4:29 PM
578	85	7/25/2022 4:26 PM
579	48	7/25/2022 4:11 PM
580	80	7/25/2022 3:15 PM
581	70	7/25/2022 2:27 PM
582	1	7/25/2022 1:20 PM
583	69	7/25/2022 1:17 PM
584	75	7/25/2022 11:52 AM
585	74	7/25/2022 11:31 AM
586	0	7/25/2022 11:20 AM
587	50	7/24/2022 7:35 PM
588	80	7/24/2022 1:19 PM
589	15	7/23/2022 9:05 PM

South Central Connecticut Hazard Mitigation Plan Survey

590	50	7/23/2022 2:53 PM
591	52	7/23/2022 9:39 AM
592	60	7/23/2022 9:05 AM
593	94	7/23/2022 8:01 AM
594	75	7/22/2022 11:28 PM
595	33	7/22/2022 9:37 PM
596	25	7/22/2022 8:52 PM
597	51	7/22/2022 7:53 PM
598	48	7/22/2022 7:47 PM
599	98	7/22/2022 6:57 PM
600	93	7/22/2022 6:55 PM
601	46	7/22/2022 5:50 PM
602	22	7/22/2022 5:44 PM
603	94	7/22/2022 5:37 PM
604	45	7/22/2022 5:30 PM
605	53	7/22/2022 5:17 PM
606	77	7/22/2022 5:09 PM
607	60	7/22/2022 5:09 PM
608	35	7/22/2022 3:54 PM
609	6	7/20/2022 9:50 PM
610	42	7/20/2022 9:15 PM
611	54	7/20/2022 10:35 AM
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614	40	7/19/2022 8:41 AM
615	0	7/19/2022 8:39 AM
616	87	7/18/2022 7:58 PM
617	37	7/18/2022 12:18 PM
618	75	7/18/2022 8:48 AM
619	62	7/18/2022 7:44 AM
620	52	7/17/2022 12:21 AM
621	43	7/16/2022 8:24 PM
622	51	7/16/2022 6:48 PM
623	76	7/16/2022 5:36 PM
624	27	7/15/2022 11:52 AM
625	39	7/14/2022 11:01 PM
626	0	7/14/2022 4:09 PM
627	88	7/14/2022 2:01 PM

South Central Connecticut Hazard Mitigation Plan Survey

628	64	7/14/2022 1:56 PM
629	59	7/14/2022 11:41 AM
630	50	7/14/2022 10:38 AM
631	85	7/13/2022 9:57 PM
632	45	7/13/2022 4:39 PM
633	50	7/13/2022 8:59 AM
634	0	7/13/2022 8:29 AM
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636	37	7/13/2022 8:01 AM
637	58	7/13/2022 5:38 AM
638	76	7/12/2022 10:03 PM
639	35	7/12/2022 8:16 PM
640	70	7/12/2022 6:18 PM
641	37	7/12/2022 5:36 PM
642	60	7/12/2022 5:00 PM
643	15	7/12/2022 4:29 PM
644	30	7/12/2022 4:01 PM
645	50	7/12/2022 3:02 PM
646	40	7/12/2022 2:57 PM
647	50	7/12/2022 1:59 PM
648	69	7/12/2022 1:42 PM
649	81	7/12/2022 1:34 PM
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652	50	7/12/2022 12:51 PM
653	77	7/12/2022 12:42 PM
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656	53	7/12/2022 12:27 PM
657	51	7/12/2022 12:27 PM
658	50	7/12/2022 12:22 PM
659	53	7/12/2022 12:11 PM
660	68	7/12/2022 12:10 PM
661	90	7/11/2022 3:43 PM
662	50	7/11/2022 3:24 PM
663	94	7/11/2022 11:50 AM
664	38	7/11/2022 10:54 AM
665	40	7/11/2022 9:55 AM

South Central Connecticut Hazard Mitigation Plan Survey

666	35	7/9/2022 10:22 PM
667	10	7/9/2022 4:09 PM
668	11	7/9/2022 2:46 PM
669	75	7/9/2022 4:29 AM
670	61	7/8/2022 4:58 PM
671	61	7/8/2022 3:58 PM
672	90	7/8/2022 2:39 PM
673	52	7/8/2022 12:25 PM
674	24	7/8/2022 11:13 AM
675	50	7/8/2022 10:06 AM
676	43	7/7/2022 8:16 PM
677	27	7/7/2022 7:51 PM
678	0	7/7/2022 6:55 PM
679	14	7/7/2022 3:15 PM
680	45	7/7/2022 1:07 PM
681	51	7/7/2022 12:36 PM
682	50	7/7/2022 11:40 AM
683	46	7/7/2022 11:26 AM
684	70	7/7/2022 11:24 AM
685	85	7/7/2022 10:42 AM
686	51	7/7/2022 9:49 AM
687	50	7/7/2022 9:41 AM
688	80	7/7/2022 9:23 AM
689	0	7/7/2022 9:18 AM
690	60	7/7/2022 9:14 AM
691	45	7/7/2022 8:53 AM
692	3	7/7/2022 8:51 AM
693	75	7/7/2022 8:17 AM
694	87	7/7/2022 8:06 AM
695	26	7/7/2022 7:51 AM
696	100	7/7/2022 7:44 AM
697	57	7/7/2022 5:58 AM
698	60	7/6/2022 7:25 PM
699	37	7/6/2022 5:12 PM
700	64	7/5/2022 12:49 PM
701	20	7/3/2022 10:20 AM
702	75	7/2/2022 8:32 PM
703	76	7/1/2022 1:06 PM

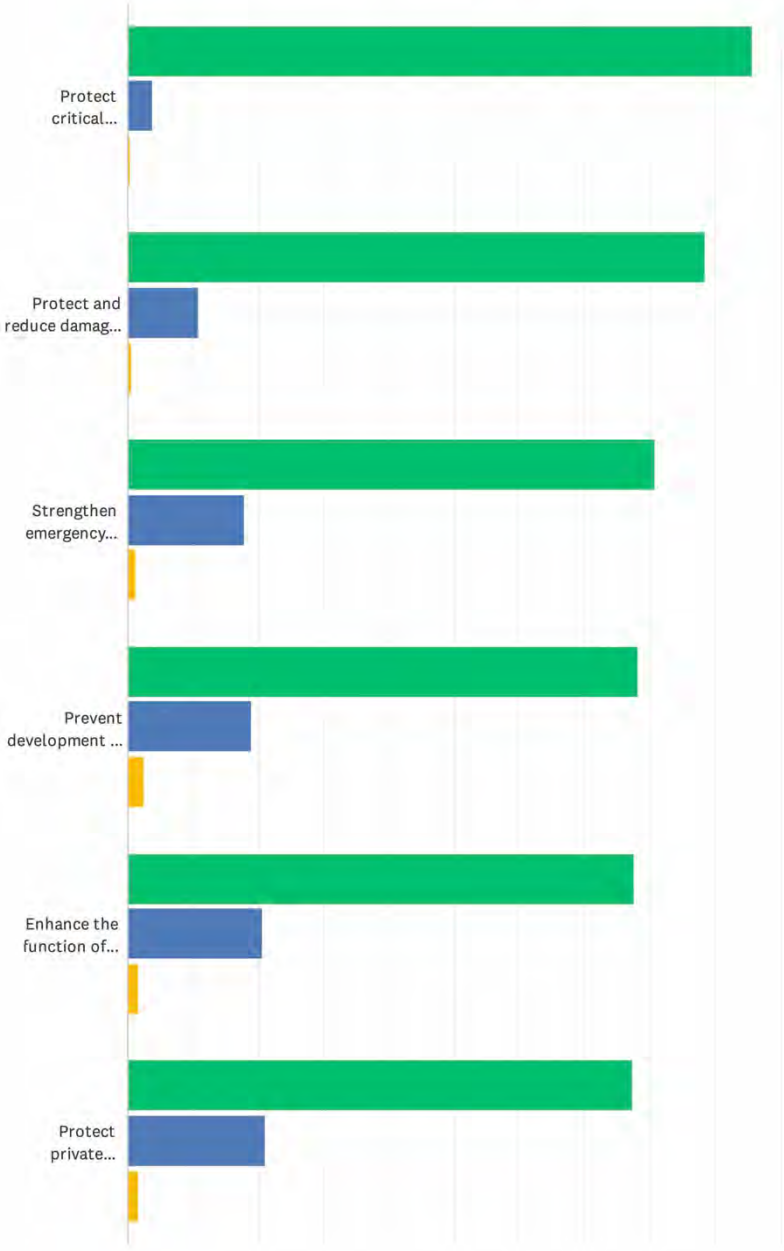
South Central Connecticut Hazard Mitigation Plan Survey

704	0	7/1/2022 8:22 AM
705	26	6/30/2022 10:27 PM
706	75	6/30/2022 9:07 PM
707	17	6/30/2022 1:51 PM
708	7	6/30/2022 1:28 PM
709	86	6/30/2022 12:12 PM
710	80	6/30/2022 11:45 AM
711	71	6/30/2022 11:18 AM
712	3	6/30/2022 11:16 AM
713	35	6/7/2022 1:45 PM

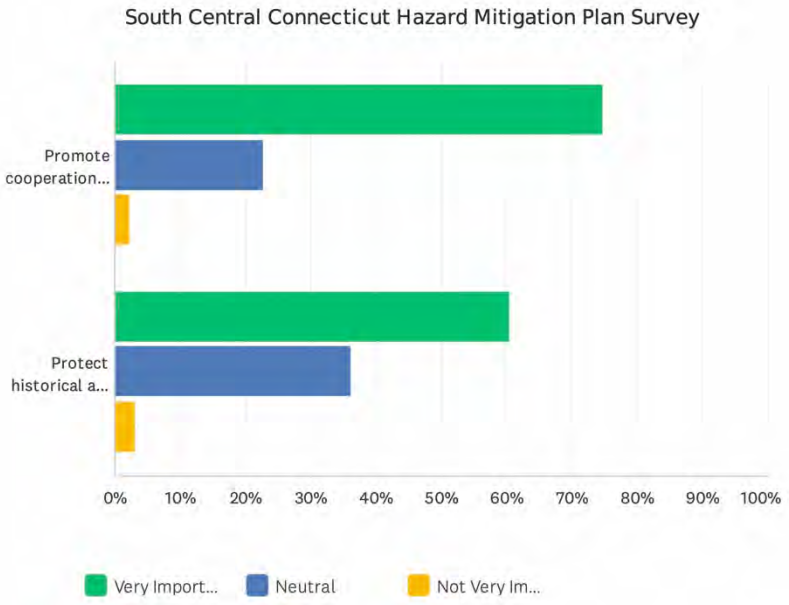
South Central Connecticut Hazard Mitigation Plan Survey

Q7 How important are the following statements to you as they relate to natural hazard impacts?

Answered: 737 Skipped: 6



56 / 105

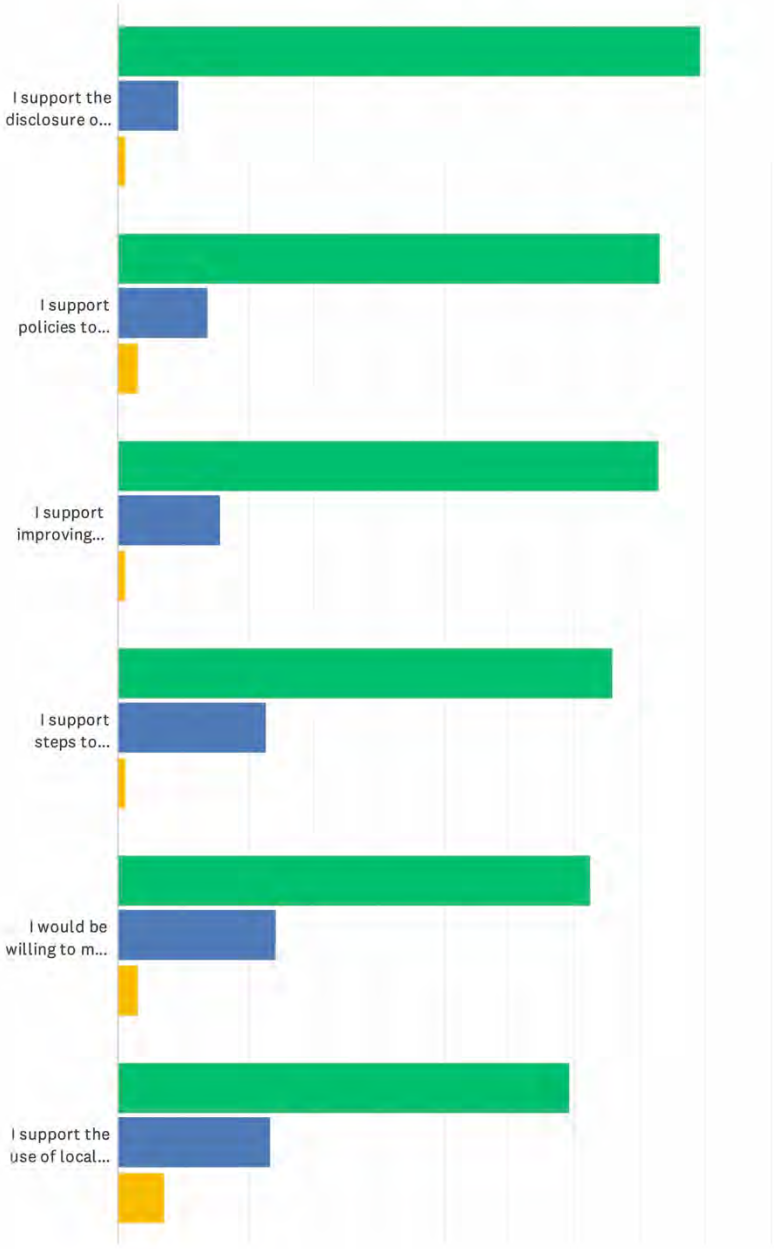


	VERY IMPORTANT	NEUTRAL	NOT VERY IMPORTANT	TOTAL	WEIGHTED AVERAGE
Protect critical facilities (i.e. transportation networks, hospitals, fire stations)	95.74% 696	3.85% 28	0.41% 3	727	1.09
Protect and reduce damage to utilities	88.54% 649	10.91% 80	0.55% 4	733	1.23
Strengthen emergency services	80.80% 589	17.83% 130	1.37% 10	729	1.40
Prevent development in high hazard areas	78.36% 572	19.04% 139	2.60% 19	730	1.46
Enhance the function of natural features (i.e. wetlands)	77.60% 568	20.63% 151	1.78% 13	732	1.47
Protect private property	77.34% 563	21.02% 153	1.65% 12	728	1.47
Promote cooperation between public agencies, citizens, non-profit groups and businesses.	74.93% 547	22.74% 166	2.33% 17	730	1.52
Protect historical and cultural landmarks	60.49% 441	36.35% 265	3.16% 23	729	1.82

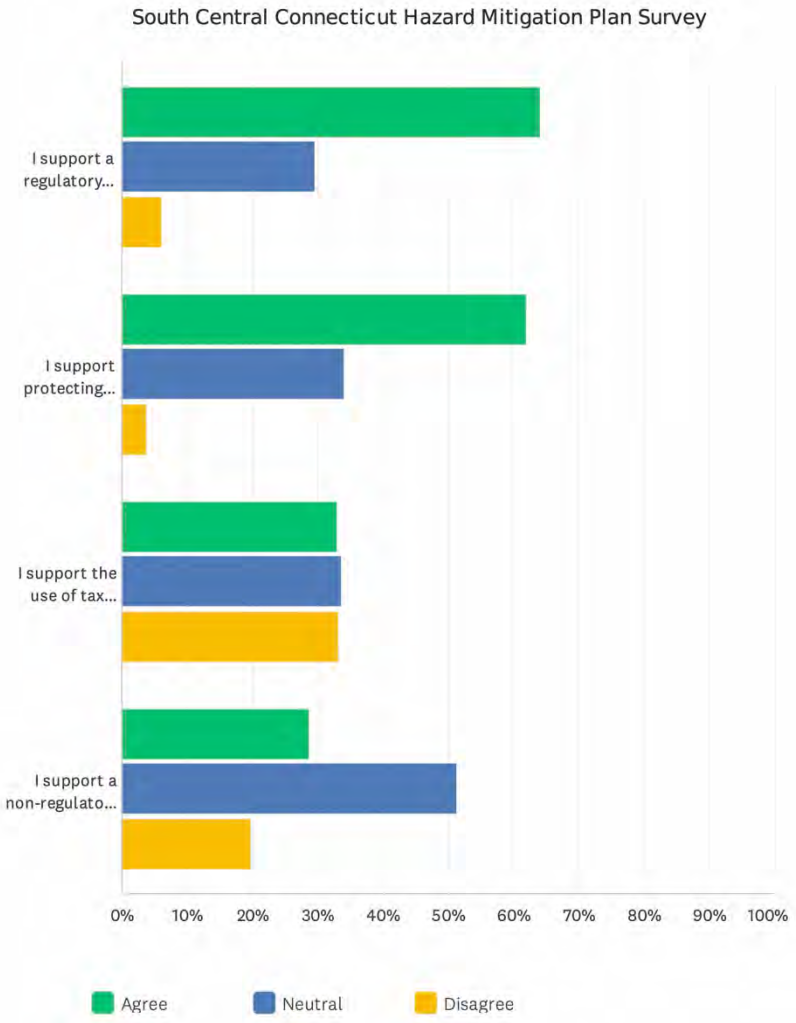
South Central Connecticut Hazard Mitigation Plan Survey

Q8 Please check the box that best represents your opinion of the following strategies to reduce the risk and loss associated with natural disasters.

Answered: 735 Skipped: 8



58 / 105


South Central Connecticut Hazard Mitigation Plan Survey
I support a regulatory...
I support protecting...
I support the use of tax...
I support a non-regulato...
0%
10%
20%
30%
40%
50%
60%
70%
80%
90%
100%
Agree
Neutral
Disagree

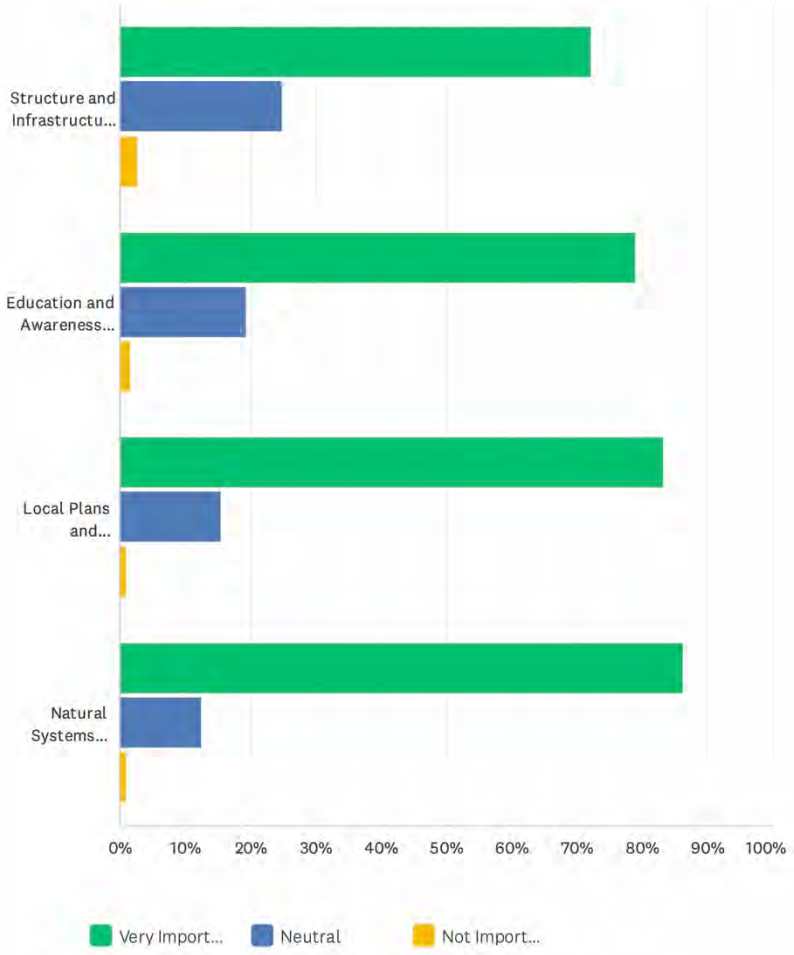
South Central Connecticut Hazard Mitigation Plan Survey

	AGREE	NEUTRAL	DISAGREE	TOTAL	WEIGHTED AVERAGE
I support the disclosure of natural hazard risks during real estate transactions	89.29% 650	9.34% 68	1.37% 10	728	1.12
I support policies to prohibit development in areas subject to natural hazards	83.08% 604	13.76% 100	3.16% 23	727	1.20
I support improving disaster preparedness of local schools	82.94% 603	15.82% 115	1.24% 9	727	1.18
I support steps to safeguard the local economy following a disaster event	75.90% 551	22.73% 165	1.38% 10	726	1.25
I would be willing to make my home more disaster-resistant	72.51% 525	24.31% 176	3.18% 23	724	1.31
I support the use of local tax dollars to reduce risks and losses from natural disasters	69.37% 505	23.35% 170	7.28% 53	728	1.38
I support a regulatory approach to reducing risk	64.12% 461	29.62% 213	6.26% 45	719	1.42
I support protecting historical structures	62.12% 451	34.02% 247	3.86% 28	726	1.42
I support the use of tax dollars (federal and/or local) to compensate land owners for not developing in areas subject to natural hazards	33.10% 240	33.66% 244	33.24% 241	725	2.00
I support a non-regulatory approach to reducing risk	28.71% 201	51.43% 360	19.86% 139	700	1.91

South Central Connecticut Hazard Mitigation Plan Survey

Q9 A number of activities can reduce the risk from natural hazards. In general, these activities fall into one of the following four categories. Please tell us how important you think each one is for your community to consider pursuing.

Answered: 732 Skipped: 11



61 / 105

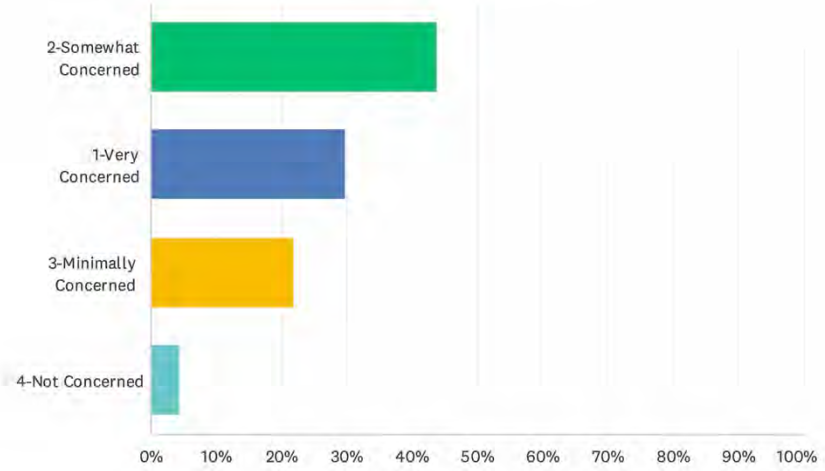
South Central Connecticut Hazard Mitigation Plan Survey

	VERY IMPORTANT	NEUTRAL	NOT IMPORTANT	TOTAL	WEIGHTED AVERAGE
Structure and Infrastructure ProjectsThese actions involve modifying existing structures and infrastructure to protect them from a hazard or remove them from a hazard area. This could apply to public or private structures as well as critical facilities and infrastructure. This also includes constructing man-made structures to reduce the impact of hazards.	72.24% 523	25.00% 181	2.76% 20	724	1.31
Education and Awareness ActivitiesThese are actions to inform and educate citizens, elected officials, and property owners about hazards and potential ways to mitigate them.	79.02% 565	19.30% 138	1.68% 12	715	1.23
Local Plans and RegulationsThese actions include government authorities, policies, or codes that influence the way land and buildings are developed and built.	83.36% 606	15.54% 113	1.10% 8	727	1.18
Natural Systems ProtectionThese are actions that minimize damage and losses and also preserve or restore the functions of natural systems. Natural systems protection may include sediment and erosion control, stream corridor restoration, forest management, conservation easements or wetland restoration and preservation.	86.38% 628	12.65% 92	0.96% 7	727	1.15

South Central Connecticut Hazard Mitigation Plan Survey

Q10 On a scale of 1-4, how concerned are residents in your community with the impacts of climate change?

Answered: 727 Skipped: 16

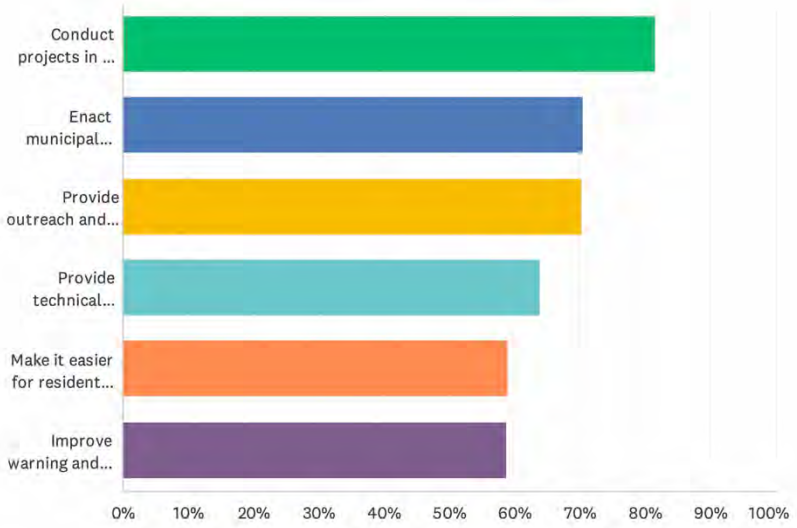


ANSWER CHOICES	RESPONSES	
2-Somewhat Concerned	43.88%	319
1-Very Concerned	29.85%	217
3-Minimally Concerned	21.87%	159
4-Not Concerned	4.40%	32
TOTAL		727

South Central Connecticut Hazard Mitigation Plan Survey

Q11 In your opinion, what are some steps that your local government could take to reduce or eliminate the risk of natural hazard damages in your community? Please choose all that apply.

Answered: 728 Skipped: 15



ANSWER CHOICES	RESPONSES	
Conduct projects in the community, such as drainage and flood control projects, to mitigate for hazards and minimize impacts from disasters.	81.59%	594
Enact municipal regulations, codes, and ordinances - such as zoning regulations and building codes - designed to protect people from natural hazards and disasters.	70.60%	514
Provide outreach and education to residents and businesses to help them understand risks and be better prepared.	70.47%	513
Provide technical assistance to residents and businesses to help them reduce losses from hazards and disasters.	63.87%	465
Make it easier for residents and businesses to take their own actions to mitigate risk and become more resilient to disasters.	59.07%	430
Improve warning and response systems to improve disaster management.	58.93%	429
Total Respondents: 728		

#	OTHER (PLEASE SPECIFY)	DATE
1	Protect and enhance natural resources especially coastal and riverine habitat. Reconnect flood plains and increase flood storage where ever possible.	1/13/2023 3:56 PM
2	Remove invasive species from wetlands. Phragmites in particular	1/12/2023 7:15 AM
3	Stop building on and modifying land that can help lessen the impacts of natural hazard damages.	1/10/2023 9:58 AM

South Central Connecticut Hazard Mitigation Plan Survey

4	Stop pandering to locals with political influence-you know who I mean	1/9/2023 7:11 PM
5	Take climate change seriously - stop building on the coast	1/7/2023 11:36 AM
6	BIG Green Infrastructure projects---including preserving large trees--should be prioritized	1/7/2023 10:03 AM
7	not allowing new or rebuilding in potential storm areas and high flood water areas	11/21/2022 9:42 AM
8	Educational programs about alternative energy uses, composting and recycling	11/17/2022 6:36 PM
9	restrict developmement in coastal areas prone to flooding	11/15/2022 10:56 AM
10	Limit development and limit removal of trees to only those that are compromised/dying	11/13/2022 10:29 AM
11	Develop and STRONGLY enforce tree ordinances, get Eversource under control with tree removal, bury wires.	11/13/2022 9:11 AM
12	When allowing new developments must consider impact of paved areas on water runoff to mitigate flooding of nearby properties.	11/12/2022 2:52 PM
13	return to dredging affected waterways to reduce flooding, return flood gates to reduce flooding	11/7/2022 8:17 PM
14	Monitor homeowners from covering their land which prevents drainage which increases flooding	11/7/2022 6:22 PM
15	Please put back the flood gates for Calf Pen Meadow Creek. Please install drain flaps on all sewers that auto fill when high tide or full moon or heavy rain so that our property stops flooding. Flood gates removed in 2003 and since there multiple media coverage shows increased flooding since flood gates removed. I have reached out to DEEP, Senator Maroney office, local Dept of public works, our local Alderman and Mayor for help.	11/7/2022 4:21 PM
16	Less regulation in and requires permit costs to aupport reaidents trying to so the maintenance if existent waterfront structures	11/6/2022 11:19 PM
17	We must look at all the other social practices that contribute to natural disasters. The list of natural disasters should be expanded to include food safety- loss of pollinators, use of dangerous pesticides, herbicides, and other toxins used in manufaturing and agriculture etc. use of plastics that end up inour oceans and are destroying the coral reefs and decreasing the ocean life etc/	10/28/2022 9:26 AM
18	Improve drainage systems	10/28/2022 7:30 AM
19	Locate power lines, cable, phone, electrical underground	10/25/2022 9:22 PM
20	educate the children on how important this is	10/24/2022 12:24 PM
21	Hold city agencies accountable for keeping our streets cleaner so less ends up in storm drains and less back ups I don't see these agencies cleaning like they used to and no one calls back for complaints I've had over the years no one cares	9/13/2022 2:45 PM
22	Develope partnerships with local NGOs to help with disaster response	9/6/2022 9:56 AM
23	Establish a community service commission to work with professional responders	8/26/2022 2:35 PM
24	Put professional on local Inland Wetland, zoning commissions, not campaign donors	8/25/2022 11:37 AM
25	Outreach and education must include $$ to help with needed preparations. Most of us can't afford costly imorovements.	8/23/2022 10:03 AM
26	Imminent domain and purchasing properties	8/23/2022 6:02 AM
27	Strengthen codes by protecting wetlands or prohibiting developments in affected areas along the coast	8/22/2022 5:57 PM
28	Special emphasis on outreach and education, as above	8/22/2022 12:06 PM
29	Prevent new developments of any kind on existing wetlands and in areas adjacent to residential, already saturated areas	8/22/2022 11:54 AM
30	Take steps to promote, including through regulation, the reduction of greenhouse gasses being emitted by the community.	8/22/2022 10:58 AM
31	initiate buy out programs for properties in hazard areas	8/22/2022 10:25 AM

South Central Connecticut Hazard Mitigation Plan Survey

32	Multilingual outreach, access to funding for lower income home owners	8/22/2022 9:56 AM
33	Support hyper local and mutual aid organization	8/22/2022 9:56 AM
34	Reduce development near the coasts	8/22/2022 8:43 AM
35	Radically reduce burning of fossil fuels or none of the above will be up to the task.	8/22/2022 8:35 AM
36	put electrical and communication wires undergroundrepeat mailings	8/16/2022 2:20 PM
37	Hold Utilities responsible for failure to maintain trees along lines while respecting rights of property owners and failure to properly maintain and improve robustness of systems	8/15/2022 4:38 AM
38	Require Permeable Paving and Monolithic Domes which are rated as nearly disaster proof structures for government/commercial/residential use for both new construction AND renovation and bring those jobs and building materials to CT; Commercial/Government/Residential structures/dwellings that have consistently been damaged/destroyed/flooded, etc. along fragile Long Island Sound beachfronts as well as Farm River, and wasted time and expense and higher insurance rates keep rebuilding in hazardous areas need to stop doing so and convert ALL of that to environmentally managed with natural vegetation/ wetlands/flood plains/wind turbines/tide (current) propelled energy generators for the entire community to benefit from.	8/12/2022 8:07 PM
39	Clean out the town property along the river	8/12/2022 6:53 PM
40	Provide Residents with Planting Trees as such to reduce Erosion	8/12/2022 12:17 PM
41	Encourage populations to adopt behaviors to reduce energy use and eliminate all plastic waste	8/12/2022 11:51 AM
42	We need to stop approving buildings that are in areas that do flood	8/12/2022 9:07 AM
43	Stop Avelo airlines from filling wetlands to extend the runway!	8/12/2022 8:47 AM
44	Stop building in high impact areas.	8/11/2022 2:26 PM
45	Improve mass transit and provide tax credits for people utilizing mass transit, carpooling and commuter lots	8/11/2022 2:00 PM
46	Stop renting property to illegal aluens	8/11/2022 1:56 PM
47	dredging of the farm river	8/11/2022 12:42 PM
48	Let's face it a lot of people don't care. They use the sewers as garbage cans. And still litter. I walk on closet beach and pick up bottles etc and put in trash. Three garbage cans are empty and one will be overflowing. Educated mother to teach their children that it makes a difference	8/11/2022 12:33 PM
49	More research and information on if tweed airport expands . Concerns for flooding	8/11/2022 12:28 PM
50	Government systems have a wider impact than pressing individual responsibility to community wide issues	8/11/2022 12:26 PM
51	Clear and clean out street storm drains.	8/8/2022 1:46 PM
52	Eliminate/reduce motor traffic in city and town centers; add bike lanes; make areas more walkable; incentivize less car use	8/8/2022 6:23 AM
53	Organize all the entities in towns currently related to this work so that they are working collectively	8/4/2022 8:09 PM
54	Pretext the wetlands from further development and restore the ones lost. Also stop Tweed from expanding. That alone is killing the community	8/3/2022 10:19 AM
55	stop developing on wetlands and allowing corporations to sacrifice the safety of residential areas & wildlife in terms of flooding, pollution, etc	8/3/2022 10:08 AM
56	Provide simple, yet attention literature or news videos providing evidence that Global Warming is real and here for those who don't believe or get their limited knowledge from FaceBook!	7/29/2022 5:15 PM
57	Promote property owner private insurance	7/26/2022 9:23 AM
58	Advocate for catastrophe insurance benefits such as CRS and promote action to ensure the NFIP flood insurance premium calculations do not deter people living outside zone A from	7/26/2022 7:07 AM

South Central Connecticut Hazard Mitigation Plan Survey

	purchasing a policy as the new rating systems tend to do.	
59	Prohibit development and rebuilding in hazard zones	7/26/2022 6:12 AM
60	Hold residents and businesses accountable for failure to comply with municipal codes and regulations	7/24/2022 7:35 PM
61	reconsider building lot coverage	7/20/2022 9:15 PM
62	Protect natural undeveloped areas along waterways	7/20/2022 10:35 AM
63	flood gages and automatic warning systems should be federally financed	7/19/2022 8:41 AM
64	Fix and or add more drains on the streets near the water.	7/14/2022 4:09 PM
65	get state or federal grants to deal with the flooding in the flats and at the parkway	7/7/2022 3:15 PM
66	State of Connecticut must update the building codes to require renewable energy and prevent building along the shore	7/7/2022 10:42 AM
67	Apply for grants to do natural mitigation. Stop Tweed Airport expansion into wetlands and residential areas	6/7/2022 1:45 PM

South Central Connecticut Hazard Mitigation Plan Survey

Q12 Please list what you believe are the most effective ways to educate the public on changing hazard conditions?

Answered: 298 Skipped: 445

#	RESPONSES	DATE
1	Mobile signs Social media, other media Text alerts Siren system	1/12/2023 6:18 PM
2	Text messages	1/12/2023 4:55 PM
3	emails, flyers in every mailbox, postings on city website	1/12/2023 10:52 AM
4	Social media, psa	1/12/2023 7:15 AM
5	Repeatedly using reverse 911 and public access television to inform the public of impending storms, starting at least 72 hours before impact.	1/10/2023 10:59 AM
6	First we have to educate our elected officials. When elected officials take these issues seriously we can have important discussions with the public about how we can reduce the impacts of the natural hazard conditions.	1/10/2023 9:58 AM
7	Pay them	1/9/2023 7:11 PM
8	Via local news outlets and social media videos	1/9/2023 2:48 PM
9	Education.	1/7/2023 5:45 PM
10	Have public and private citizens become experts and have the learning be cascaded on Broadcast radio, local media print and digital, social media	1/7/2023 12:30 PM
11	Bring people along - with education, stories, assistance and regulation	1/7/2023 11:36 AM
12	Bring scientists into each neighborhood to do workshops on the causes of risks and mitigation measures.	1/7/2023 10:03 AM
13	SMS, tv/radio, phone, sirens	1/6/2023 1:08 PM
14	Educate via mailings or seminars & laws	1/6/2023 12:02 PM
15	Printed materials, in person and Zoom meetings that are scheduled throughout the day, replays of meetings that people can watch at their convenience	1/5/2023 10:57 PM
16	Meetings; hands on workshops on how to disaster proof your home; workshops on resilient and sustainable landscaping	1/5/2023 12:31 PM
17	Online	1/3/2023 10:47 PM
18	Stop flood plain development. 8-30g is an an environmental disaster: look at building right by Queach Creek on Route 1. Building up one lot just causes more flooding on neighboring lots. Stop thinking we can engineer a solution to flooding.	1/3/2023 3:16 PM
19	Communication through Media	12/26/2022 12:25 PM
20	Using the US Mail to deliver a thoughtful pamphlet or factsheet, getting on the tv news, writing op-ed pieces in the paper.	12/8/2022 9:14 PM
21	Get it on the local news and awareness and involvement booths at farmers markets and local artisan events, like craft fairs on the local town green	12/8/2022 8:27 PM
22	News articles, public meetings and idscussions	11/28/2022 2:45 PM
23	being pro active and putting planning and zoning responsible for new or remolded construction near or allowed on flood prone areas	11/21/2022 9:42 AM
24	local community lecture	11/17/2022 6:36 PM

South Central Connecticut Hazard Mitigation Plan Survey

25	Telephone (cell and landlines).	11/17/2022 10:26 AM
26	Make it more readily available and easy for people to find the information	11/15/2022 7:55 PM
27	have public meetings to clear issus and have them addressed asap	11/14/2022 3:37 PM
28	inform people of threats as they happen	11/14/2022 12:03 PM
29	I would consider a municipal map that show the historic flood lines through the community. This would be both costal flooding as well as river flooding. This document would be part of real estate transactions so that the buyer would know where their potential new property stands. Place a moratorium on local flood assistance to buildings that are built within sever flood risk areas.	11/14/2022 6:39 AM
30	Use of all forms of media, including phone systems for immediate dangers.	11/13/2022 9:07 PM
31	- Put it into the curriculum in schools so children/teenagers are aware -Have it be in the news - Have community orientated fundraisers with the theme of climate change and have it be educational while fun. Something people of all ages would be interested in.	11/13/2022 2:59 PM
32	Info blasts/mailings, electronic or social media	11/13/2022 10:29 AM
33	Attendance at fairs/festivals, bill boards, in schools, news, podcasts-any way people consume information, on town websites, enforcement of current ordinances and laws	11/13/2022 9:11 AM
34	Targeted letters & other campaigns that address specifics for residents in affected (or potentially affected) areas.	11/13/2022 7:51 AM
35	Reach out to neighborhood organizations to attend local meetings to discuss important issues. Run articles in all Milford based and larger publications, i.e. CT Post on a regular basis.	11/13/2022 7:13 AM
36	Demonstrate effects	11/12/2022 10:31 PM
37	Milford Alerts does a good job.	11/12/2022 2:52 PM
38	I would like to be educated on how decisions are made to support new development that lead to changing hazard conditions.	11/12/2022 10:07 AM
39	At this point through online info or hard copy. I prefer meetings.	11/9/2022 5:48 AM
40	Public outreach at local level (farm markets, events, and via electronic means)	11/8/2022 9:01 AM
41	town meetings, mailings	11/7/2022 8:17 PM
42	Not sure	11/7/2022 6:22 PM
43	I am beginning to think people are idiots and don't really care to take advantage of education offered to them. But most likely the best way would be to send out hardcopy and PDF mailings with information to residents.	11/7/2022 3:34 PM
44	Fact sheets snail and social media mails. Grants engaging smaller community projects engaging neighbors to care and community people in efforts to improve drainage and prevention projects of government owned properties including especially streets and more city street tree planting projecta which hasnt been a focus yet , the purchase of needed drainage systems pumps for severe inclement weather and greater storm conditions.	11/6/2022 11:19 PM
45	TikTok, Facebook, Instagram, newsletters in libraries schools and hospitals, educational fairs, information materials at retailers such as Home Depot, Lowes, Big Y, Walmart, Aldi	11/3/2022 2:53 PM
46	projects on public buildings that don't cost local mammy (state/ grant funded), but demonstrate that they save money hands on, community-building projects (eg wetland restoration, park/ trail maintenance...) Go through sports teams, scouts and school groups; churches; rotary/ lions/ masons/ elks; senior centers/ childcare centers/ after school programs etc	10/30/2022 1:21 PM
47	hybrid informational meetings large signs on billboards news media including radio talk shows social media provide information in multiple languages teach in schools involve legislators and ask them to address in their info bulletins	10/28/2022 9:26 AM
48	Decreased development in high hazard areas. Preserve Historical buildings.	10/28/2022 7:30 AM
49	television	10/25/2022 3:17 PM

South Central Connecticut Hazard Mitigation Plan Survey

50	Improve the zoning laws so we do not build on fragile land and then enforce the rules and laws that you pass.	10/24/2022 1:54 PM
51	teach children in the schools and have programs at the town and library with knowledgeable experts.	10/24/2022 12:24 PM
52	The ER telephone system seems to work great regarding a pending or ongoing event. Sound / Siren announcements also work to notify those who are not familiar with the area.	10/19/2022 4:17 PM
53	all media sources	10/8/2022 10:10 AM
54	By mailing	9/23/2022 11:13 AM
55	Seminars	9/19/2022 9:40 PM
56	Mailing, website, meetings	9/19/2022 3:49 PM
57	Text alerts, Mass Notification System	9/15/2022 4:03 PM
58	Stop littering take care of your properties clean up after yourself	9/13/2022 2:45 PM
59	Campaigns dedicated to education on the above.	9/10/2022 3:25 PM
60	Use existing groups to reach people in small group settings. Provide food and financial incentives to attract them. Create very effective videos that are user friendly, without jargon (riverine, etc.) that appeal to heart and head.	9/9/2022 11:13 PM
61	Internet	9/9/2022 12:53 PM
62	billboards, flyers to mailboxes, short infomercials on local networks	9/8/2022 8:22 PM
63	1) On going education programs and involving all recreational, civic, religious, social and professional groups about types of emergency situations, the types of hazards they present and how to react to warnings. 2) Create and promote a series of short courses on the various types of hazard conditions. 3) Identify the various warning systems available. Specific Radio and TV stations, web pages, Everbridge, sirens, loudspeakers, etc and what kinds of messages they provide as well as the need to depend on more than one for accurate and timely messages.	9/6/2022 9:56 AM
64	Email, link to online educational information	9/5/2022 8:33 AM
65	Education in high schools, regular updates to all citizends on what is being done in this regard statewide and locally.	9/4/2022 1:36 PM
66	Public meetings Mentioning it in local newsletter Get people involved hands on	9/2/2022 2:38 PM
67	Media and online targeted PR and articles.	9/2/2022 1:25 PM
68	In the local school system.	9/2/2022 12:59 PM
69	newsletters delivered to homes - not everyone has computers. community (neighborhood) meetings	9/1/2022 1:11 PM
70	Direct mailers, info provided at community events, etc	8/31/2022 4:14 PM
71	Town Hall meetings & follow up Zooms	8/30/2022 10:51 AM
72	Provide examples of present risks and a range of mitigation strategies.	8/30/2022 10:09 AM
73	Simulations, bringing the issue to their local area, Provide actionable advice.	8/29/2022 10:25 AM
74	Share trend data clearly showing the increase in event count, severity, and financial loss for disaster events nationally & regionally. Is the increase only perceived due to modern media hysteria (including social media) or is it real? Numbers tell the story.	8/27/2022 7:47 AM
75	Public events such as Farmer's Market, schools. Take better advantage of existing nonprofit organizations to focus some of their service on community safety and preparedness	8/26/2022 2:35 PM
76	Mayor Joe CARFORA has done a lousy job at not educating anyone about the town risks. He has not applied to any grants. He has not protected open spaces. He did not write a letter against Tweed Airport expansion to the environmental consultants. Our stormwater Infrastructure on Hemingway is crumbling and more flooding is coming.	8/25/2022 11:37 AM

South Central Connecticut Hazard Mitigation Plan Survey

77	Citywide distribution of information via USPS, Town Meetings, accurate city website and ease of use	8/24/2022 8:48 AM
78	Direct contact, social media, local news, schools and mailers.	8/23/2022 3:17 PM
79	Handouts and publications; town-wide mailing; public meetings/discussions	8/23/2022 2:41 PM
80	Door to door, mailings, schools, colleges, library, other gathering spaces. Also See above.	8/23/2022 10:03 AM
81	public forum	8/23/2022 9:49 AM
82	K-12 education, libraries, and door-to-door	8/23/2022 6:02 AM
83	I do not think education is very effective at changing behavior. The best way to change behavior is to regulate it or change the cost of the behavior through pricing of risk.	8/22/2022 10:12 PM
84	Newspaper stories of best practices	8/22/2022 5:57 PM
85	Distributed materials/media about projected threats, the necessity of such awareness and preparedness, regular information about steps being taken to meet these challenges	8/22/2022 12:06 PM
86	Mail, email	8/22/2022 11:54 AM
87	Consistent presence on local news and social media.	8/22/2022 10:58 AM
88	newspaper articles showing changes over time presentations at management team meetings walking or bus tours of problem areas incude West Haven's buy out program for flooding at Sandy Point area. Show problems from "armoring" shoreline - just kicking the can down the road. Show examples of successful "living shorelines" Show the important roles of wetlands and our need to protect and restore them	8/22/2022 10:25 AM
89	Education at school for children and their families Media campaign (informational signage around the city) Direct outreach via phone call or door-knocking to impacted residents (not just mailing flyers) Providing specific examples about what is already happening in New Haven and what other communities have done successfully to mitigate	8/22/2022 9:56 AM
90	Art and culture as ways of imagining positive resilient futures	8/22/2022 9:56 AM
91	Provide multiple opportunities for town members to access information: through Zoom meeting, posted in the Town Hall, open forum meetings.	8/22/2022 9:16 AM
92	Educate the impacts of climate change and how to both reduce climate change and pre[pare for impacts.	8/22/2022 8:35 AM
93	Educational Posters/billboards; community awareness-building meetings; public school curricula enhancements; incentives to make individual and business changes in practices and behaviors.	8/22/2022 7:51 AM
94	Make it part of the public school curriculum, run neighborhood awareness programs, include information with property tax bills.	8/22/2022 7:27 AM
95	I really don't know, but, we all see what's happening. Whatever you decide, just make it easy for people to do as well as affordable. Let town residents know what programs are out there. If you want us to go solar, give us the best info and the bottom line on costs. We need "correct" information, especially seniors and disabled.	8/21/2022 2:09 PM
96	emails that are separate to other municipal issues; hard copies of flyers and informational mail.	8/19/2022 4:58 PM
97	Internet	8/18/2022 9:17 PM
98	repeated mailings, local televised meetings and updates	8/16/2022 2:20 PM
99	Municipal letters sent often signed by public officials, social media campaigns, regular in person meetings, recorded trainings and information publically available, partnerships with local utilties to include information with bills	8/16/2022 2:17 PM
100	believable news, meaning no opinions, just facts	8/15/2022 4:41 PM
101	Support local news	8/15/2022 10:37 AM
102	This is a very vague survey and leaves way too much wiggle room as to what is actually being discussed. Very sad and very telling	8/15/2022 8:28 AM

South Central Connecticut Hazard Mitigation Plan Survey

103	Re present the new City charter to the voters and activate town commissions	8/15/2022 8:26 AM
104	Sharing in formation in grocery stores.	8/14/2022 10:55 PM
105	Public forum, written communications via local paper, newsletter, email. Start educating children in public school system	8/14/2022 5:24 PM
106	Town Hall meetings, mailings, local television.	8/13/2022 7:12 PM
107	multiple approaches-newspaper, social media, mailings, gatherings	8/13/2022 3:18 PM
108	Local paper , the beach post information the library and town events. Maybe large retailers would allow information posted. Town website. Senior Center and Churches.	8/13/2022 9:25 AM
109	Immersive experience. Post first person accounts and first hand videos of actual disasters and aftermath from boots on the ground as IF the viewer was experiencing this for themselves and trying to keep themselves/their families/friends/coworkers/classmates/neighbors safe. Make effective communications a higher priority to reach older adults, frail elderly, and persons of all ages with physical mobility issues, vision loss, blindness, AND especially hearing loss and deafness. Fundraise or seek grants or ask wealthiest hedge fund managers and those who have "second homes" in CT to donate so that we can provide ALL citizens with bug out backpacks and duffle bags containing some basic essentials AND disability related supplies from medications to rechargable hearing aid batteries provided with SolarEar's solar powered recharger, plus some high tech to low tech assistive technologies, including portable solar rechargeable generators to keep refrigerator/oil fired furnace/internet/TV and POTS landline (which still works after five plus days without electricity so that people can SAFELY STAY in their own homes, with Heat, Water, Light, Essential Communication, when power lines are down, gas station pumps don't work, no captions of audio of portable battery powered radio transmissions, no spark to ignite and maintain ignition, even if you have a full tank of home heating oil, no power to safely maintain your refrigerated and frozen foods from spoiling, etc. CT needs to allow residents to install cold storage stockpiles for fresh, filtered drinking water, canned or long term storage packed foods, and a safety bunker or monolithic dome designated community shelter. We cannot expect the government (local/state/federal) will be able to rescue us or help maintain a bare bones level of warmth, shelter, water, food, backup power sources, hardwired/wireless effective communications, disability access needs, and more, so CT at state and local level MUST find ways to help citizens AFFORD home based provisions/emergency shelters in place/disability accessible dome POD or ADU attached to their existing dwelling or when renovating so they can maintain a safe, accessible place during disasters. Do NOT use tax CREDITS as that does not help lower income older adults and frail elders who NEED actual Price Reduction instead. Ex: a $4,000 tax credit for buying an energy efficient product for your home or vehicle is NOT as helpful as having the $4,000 deducted from the actual purchase price to make the property or home or vehicle modifications would impact climate change or reduce the potential damages of disasters or provide safe haven at home for longer periods of time when essential services and utilities are not functioning.	8/12/2022 8:07 PM
110	Newspaper, print ads	8/12/2022 7:50 PM
111	Giving information	8/12/2022 6:53 PM
112	Town news in news letters and town websites	8/12/2022 11:51 AM
113	Please no emails. Phone calls on automated systems work best.	8/12/2022 9:07 AM
114	Media/Internet	8/12/2022 8:47 AM
115	Email, text, recorded calls to landlines	8/12/2022 6:57 AM
116	Informing the public of what actions they should restrain from doing to prevent increased hazard in natural disasters	8/11/2022 11:12 PM
117	Town Hall style meetings , community television channels.	8/11/2022 8:10 PM
118	Although it create unfavorable responses, social media is effective.	8/11/2022 6:13 PM
119	Local newspaper, mailer, email	8/11/2022 6:12 PM
120	Text	8/11/2022 5:35 PM
121	Town Meetings, Informational video's	8/11/2022 5:21 PM

South Central Connecticut Hazard Mitigation Plan Survey

122	Social media campaigns	8/11/2022 4:49 PM
123	Come into the schools! Hold a town hall meeting.	8/11/2022 4:34 PM
124	Media, Public Announcements, Town Department Heads	8/11/2022 4:11 PM
125	evidence-based letters/brochures available in print and electronically to reach as many residents as possible	8/11/2022 4:05 PM
126	Weekly emails and news letters	8/11/2022 4:00 PM
127	Social media	8/11/2022 3:47 PM
128	Education I find the automated phone calls very helpful	8/11/2022 3:24 PM
129	Using real life examples of how human actions are causing risks to become more impactful for everyone.	8/11/2022 3:22 PM
130	Television, mailings, townhall meetings, internet, social media	8/11/2022 3:16 PM
131	Email notices.	8/11/2022 3:06 PM
132	Reverse 911, Twitter, TV ads	8/11/2022 2:59 PM
133	Surveys like this are a good start.	8/11/2022 2:50 PM
134	text, call or email	8/11/2022 2:43 PM
135	Showing direct impact programs or social media posts	8/11/2022 2:17 PM
136	Info on eh website	8/11/2022 2:05 PM
137	Teach children in schools about climate change and disaster response and preparations. Incorporate this into school science courses	8/11/2022 2:00 PM
138	WPA program. Look it up	8/11/2022 1:56 PM
139	Emails	8/11/2022 1:47 PM
140	Just to be aware	8/11/2022 1:46 PM
141	Local paper and town website.	8/11/2022 1:12 PM
142	Television information, automated phone messaging, public meetings at local schools per area of importance	8/11/2022 1:09 PM
143	Mail with Changing Hazard Conditions or some title. Very few words, use bullet points and a few key words like clickbait. And also email the same information. Both types containing where they can get more information to help themselves, and how to help do what we can to assist in the mitigation progects of our favorite or most cherished or area most in need. I'm referring to people lending a hand, not the town or residents asking for money.	8/11/2022 12:58 PM
144	Public meetings, newspapers and emails	8/11/2022 12:55 PM
145	Through social media	8/11/2022 12:53 PM
146	Social media, text/email alerts	8/11/2022 12:43 PM
147	knock on doors	8/11/2022 12:42 PM
148	Communication	8/11/2022 12:42 PM
149	Perhaps an information packet mailed with tax bills to reach residents.	8/11/2022 12:37 PM
150	Newspapers	8/11/2022 12:35 PM
151	If I knew I'd suggest it. I say things to people I see blatantly littering some listen others ignore. Hopefully if you can educate children from pre-school through high school, adult Ed, Pathways etc but if it's not enforced at home you'll loose them with ignorance	8/11/2022 12:33 PM
152	Town hall meetings.	8/11/2022 12:33 PM
153	Document mailings	8/11/2022 12:33 PM

South Central Connecticut Hazard Mitigation Plan Survey

154	Town sponsored workshops	8/11/2022 12:32 PM
155	Reverse 911 ststem	8/11/2022 12:32 PM
156	There are no ways to effectively educate people on this. No one will care until after something horrendous happens, and then it will be too late.	8/11/2022 12:30 PM
157	Not sure what this means ... notification of hazards? Or education about how to reduce hazards?	8/11/2022 12:30 PM
158	meetings education certifications	8/11/2022 12:29 PM
159	Phone calls, mail	8/11/2022 12:28 PM
160	Monthly newsletters mailed to homes and posted on the town website.	8/11/2022 12:27 PM
161	Automated phone calls, followed up by mail correspondence.	8/11/2022 12:26 PM
162	letters to residents informing them of hazard conditions also local news stations educating their viewers	8/11/2022 12:25 PM
163	COMMUNICATION	8/11/2022 12:24 PM
164	Telephone	8/11/2022 12:22 PM
165	Push text notifications and social media	8/11/2022 12:19 PM
166	a robust information campaign educating the citizens on what the hazards are	8/11/2022 10:19 AM
167	Mother nature herself.	8/11/2022 9:01 AM
168	past pic of hurricanes floods etc. to make them more aware. and to evacuate when told.	8/10/2022 4:52 PM
169	Text alerts are great	8/10/2022 2:04 PM
170	social media & town meetings	8/10/2022 8:44 AM
171	direct mail, advertising	8/10/2022 8:02 AM
172	Social Media	8/9/2022 5:10 PM
173	Local access TV/mailing information	8/9/2022 3:52 PM
174	Advertisements	8/9/2022 3:02 PM
175	TV, Social Media, Town Hall Meetings	8/9/2022 2:14 PM
176	Reverse 911 calls to homes and cell phones	8/9/2022 1:34 PM
177	News articles, example projects, thought leaders holding public meetings	8/9/2022 9:29 AM
178	Local newspaper and library	8/8/2022 3:56 PM
179	The reason it's changing is because we remove swaths of trees for utility towers or poles and we have little respect for our wetlands which are supposed to be a buffer for storm surge. Instead of leaving them intact we offer parcels up to the highest bidder and develop on them. Just stop.	8/8/2022 1:46 PM
180	Keep telling them. Make options to get rid of monocultures (esp. lawns) and replace them with native species. Help people get off gas and oil heat. Be loud.	8/8/2022 6:23 AM
181	Mail and email. Municipal meetings	8/7/2022 6:54 PM
182	Local news articles, mail flyers	8/7/2022 2:53 PM
183	Push messaging. Residents who are not engaged will not attend town meetings and the naysayers dominate the discussions.	8/6/2022 8:41 AM
184	Tv. Reverse 911. Local event speakers	8/5/2022 12:59 PM
185	Courier (local paper) and presentations at fairs	8/5/2022 11:46 AM
186	Public service announcements and educational services	8/5/2022 10:42 AM
187	Public Service Annoucements	8/5/2022 10:34 AM

South Central Connecticut Hazard Mitigation Plan Survey

188	local newspaper articles	8/5/2022 10:06 AM
189	Spend tax dollars which shows seriousness	8/4/2022 8:09 PM
190	Outreach	8/4/2022 1:15 PM
191	Government should explain in laymen's language the concept of the weight of buildings displacing water contributing to higher water levels. There is too much building going on in low areas and it has to stop. I would use ETV, short and succinct explanations on the town email distribution, flyers around town, anything to get the message out. People know when they have their feet in water. Let them know how likely it is for it to happen to them.	8/4/2022 9:51 AM
192	Non bias, non political education	8/4/2022 9:10 AM
193	Listen to the residents who live with your decisions to hear what results are expected and not exclusively to a state hire who only knows from books. Books are a good start but not necessarily near reality.	8/3/2022 7:46 PM
194	Online presentation (Zoom), Library programs	8/3/2022 7:13 PM
195	send the information in the mail with some kind of item that will interest them enough to open the envelope and make a presence on social media in an interesting way that will make you click bait	8/3/2022 3:38 PM
196	mailing flyers with pertinent information on natural hazard mitigation	8/3/2022 2:07 PM
197	Education and publicity	8/3/2022 1:25 PM
198	psa and providing free reading material during free concerts and events on the green	8/3/2022 12:15 PM
199	Social media	8/3/2022 12:10 PM
200	Conduct drills for natural disasters. Have plans in place for when natural disasters strike so the community can prepare and work together in the event of a natural disaster. Upgrade all infrastructure throughout municipalities to withstand the new onset of stronger severe storms.	8/3/2022 12:06 PM
201	small group neighborhood meetings	8/3/2022 11:55 AM
202	Social media	8/3/2022 11:19 AM
203	.	8/3/2022 10:53 AM
204	Talking about it more	8/3/2022 10:49 AM
205	Actually having a conversation would be nice. Public meetings at a time working people can attend either in person or via zoom. Work with local environmental agencies to restore preserve and protect our natural assets.	8/3/2022 10:19 AM
206	Teaching people the flood zone maps and risks. We bought our house in a flood zone and had no idea until we put down the deposit and offer. We didn't realize the large cost of flood insurance and the local issue of corporations continuing on wetlands (Tweed Airport and other businesses.)	8/3/2022 10:08 AM
207	Mailing, meetings, events	8/3/2022 10:00 AM
208	Brochures	8/3/2022 9:02 AM
209	Education Requirements for those considering purchasing a home in a flood zone prior to purchase. Local gatherings promoting fun events while also educating the public.	8/2/2022 4:42 PM
210	Honestly, scare tactics. Most people aren't going to pay attention or be interested until they feel like it's going to negatively impact them. Scaring people into believing that they're going to be affected will probably help educating more people in the long wrong. Obviously not in a mean or malicious way, but there's ways to instill fear of a potential hazardous event in a professional way	8/2/2022 2:26 PM
211	Guilford already has a call system. Financially Support our local news sources - shoreline times and Patch Include climate change and species considerations in every public works project and regulation change. Outlaw sale of invasive plants. Provide greater incentives for open space.	7/31/2022 3:43 PM

South Central Connecticut Hazard Mitigation Plan Survey

212	Enacting our Code Red system	7/30/2022 4:23 PM
213	Popular films with compelling visuals. Strong environmental programs in the schools. Election of public officials who understand how to communicate risks effectively.	7/30/2022 3:49 PM
214	Local news, government social media, outreach at local events	7/29/2022 8:56 PM
215	Clear and simple language must be used. The people who do not want to believe that Global Warming is real, or are too lazy to read credible resources need short videos on to attract their attention. Printed resources need to to include photos and short, simple, scientific evidence. There needs also the impact that they will be affected personally (health, injury, damage to property, loss of financial resources)>	7/29/2022 5:15 PM
216	repeated messaging about hazards and how they would affect individuals. provide information on financial costs, health impacts and future eventualities for our children, to individuals for our inaction. provide data on climate change realities and the need to safeguard our natural world	7/29/2022 3:08 PM
217	Public forums, social media, news outlets	7/29/2022 9:56 AM
218	Sigh for most people education and change won't happen unless they're forced to learn and change (or pay a lot from not learning and changing).	7/28/2022 7:44 PM
219	flyers to homes	7/28/2022 10:08 AM
220	Reverse 911; local papers; town meetings	7/28/2022 9:57 AM
221	any local media, local TV station, newspapers, email and snail mail and perhaps some phone or additional email surveys like this one.	7/28/2022 8:19 AM
222	Use data/photos to illustrate the changes over the past 10, 20, 30 years	7/27/2022 10:22 PM
223	Provide online and in person informational events. Use landline phones to reach home owners without computers or cell phones, to inform them how to obtain needed information. Local news announcements, posters and flyers distributed through out town, with important information on changing hazard conditions.	7/27/2022 8:25 PM
224	Social media, town meeting	7/27/2022 7:41 PM
225	Periodic public presentations and town websites.	7/27/2022 12:26 PM
226	in-person and/or Zoom outreach direct mailing	7/27/2022 11:37 AM
227	Email	7/27/2022 9:29 AM
228	Public meetings -local newspapers-weekly supervisor announcements=flyers	7/26/2022 10:35 PM
229	Public forum	7/26/2022 5:06 PM
230	I don't know what you mean by changing hazard conditions	7/26/2022 4:05 PM
231	Awareness campaigns statistically don't do much historically, so I think stronger regulation is the way to go. I do not support paying developers to not develop on wetlands and other vulnerable areas…they just shouldn't be allowed to build in those places period.	7/26/2022 2:28 PM
232	Require local cable/satellite companies to make FOX news a paid extra rather than a default channel.	7/26/2022 2:26 PM
233	Forums	7/26/2022 12:19 PM
234	On Line Webinars, Town Hall Meetings, use the Green for spring or summertime informational meetings. Providing classes in school as part of the school year curriculum that (beginning in Elementary School) introduces the need to protect the environment from increased effects of intense storms- continuing through High School. Use these classes to incorporate environmental studies, math, physics, science in real world situations. Use technology, art projects, written word projects in these school applications.	7/26/2022 11:17 AM
235	Local news sources, town meetings, mailings to property owners.	7/26/2022 9:23 AM
236	Before and after pictures, and potential future pictures	7/26/2022 8:02 AM
237	Work more closely with social media and no traditional media sources using easy to read exposure mals	7/26/2022 7:07 AM

South Central Connecticut Hazard Mitigation Plan Survey

238	Enact and publicize laws that prohibit development and rebuilding in hazard zones	7/26/2022 6:12 AM
239	Not sure if this question applies to an emergency or just in general. In the event of an emerging hazard condition, I find a text message as the most effective. For a non-emergency, email or postings to websites are effective.	7/25/2022 4:11 PM
240	Starting with a willfully benighted public more concerned with maintaining their right to engage in carbon-intensive activities than with considering the impact this will have on future generations....I don't have any ideas regarding this question.	7/24/2022 7:35 PM
241	emails, letter with tax bill,	7/24/2022 1:19 PM
242	Newspaper articles and tv programs.	7/23/2022 9:05 PM
243	Providing information both in written form and through public information sessions.	7/23/2022 9:39 AM
244	Deal with improving, creating, and repairing poor infrastructure to reduce risks and damage to roads, etc. repairing and improving infrastructure to reduce damages is paramount. Finding creative cost efficient ways to prevent natural disasters is key. Better to be proactive to prevent, than reactive to repair!	7/22/2022 9:37 PM
245	Local newspaper articles.	7/22/2022 6:57 PM
246	Webinars	7/22/2022 6:55 PM
247	Town meetings	7/22/2022 5:50 PM
248	Not spending a tremendous amount of money at this time, but through education	7/22/2022 5:37 PM
249	Even when you utilize TV, radio, newspapers, phone messages, text and social media there are still people out there who say I didn't hear or know about that.	7/22/2022 3:54 PM
250	Ad Hoc committee to adress concerns	7/20/2022 9:50 PM
251	webinars	7/20/2022 9:15 PM
252	Phone & TV alerts	7/20/2022 10:35 AM
253	Press Releases-Town Meetings	7/19/2022 9:36 AM
254	Federal and State regulations Local outreach and education Lesson plans starting in elementary school on the changing environment	7/19/2022 8:41 AM
255	Starting with the school district and reminders as PSA's.	7/19/2022 8:39 AM
256	Local classes Malings	7/16/2022 8:24 PM
257	Local newspaper	7/16/2022 6:48 PM
258	PSAs, community wide education via lectures and films	7/16/2022 5:36 PM
259	Videos	7/14/2022 11:01 PM
260	Sheriff formation at Townhall meetings, have a program at the schools and teach kids while they're young to help get them interested in conservation and climate change	7/14/2022 4:09 PM
261	Social media campaigns, community events, and mailers	7/14/2022 2:01 PM
262	public meetings as well as mailing to homes	7/14/2022 1:56 PM
263	Maintaining the tree canopy and mature trees that mitigate water run off and minimize use of pavement/asphalt that covering open grass areas that absorb rainwater.	7/13/2022 4:39 PM
264	Flyers and emails detailing hazards in the current and upcoming few months and services available to assist in them. In the face of an immediate disaster, emails with details on services for that disaster would also help	7/13/2022 8:59 AM
265	Awareness of climate change and how that effects coastal cities. Education.	7/13/2022 8:29 AM
266	I read paper mailing but I am not sure they are best return in investment if funds. Local TV ads and social media might reach the most people.	7/13/2022 8:12 AM
267	internet and local radio	7/12/2022 6:18 PM

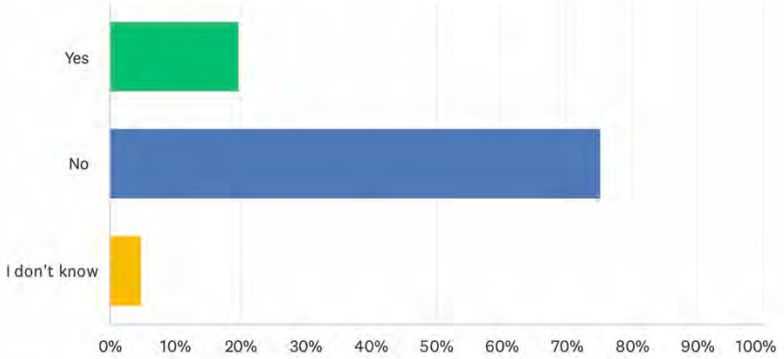
South Central Connecticut Hazard Mitigation Plan Survey

268	3 ways of communicating Meetings Mailings Community hearings	7/12/2022 5:36 PM
269	Flyers in local businesses, communication through Facebook and Nextdoor, educational materials/booths at town events.	7/12/2022 5:00 PM
270	Social media	7/12/2022 3:02 PM
271	Town meetings. Newsletters.	7/12/2022 1:00 PM
272	Text updates, grade school educatikn	7/12/2022 12:35 PM
273	N/A	7/12/2022 12:27 PM
274	Schools....educate the children. Make them the messenger.	7/12/2022 12:22 PM
275	Better information on Websites (for those who use tech., in multiple languages). Written and regularly updated information for those tech. illiterate, in multiple languages. Regular informational meetings in each of the three tax districts, no less than every 6 months, for ongoing updates. At EVERY event, carnival, craft fair, etc., have a display tent/table with information regarding the above, in multiple languages.	7/11/2022 9:55 AM
276	Tell the truth about them. Don't sugar coat it.	7/9/2022 4:09 PM
277	Honestly - people don't listen. Maybe TikTok videos?	7/9/2022 2:46 PM
278	Letters and door to door discussions.	7/9/2022 4:29 AM
279	WOM Maps detailing relevant info NOT social media	7/8/2022 3:58 PM
280	Educate the people appointed to local government abd the citizens who elected them. An ignorant government neglects the people they govern. NO Excuses.	7/8/2022 12:25 PM
281	publicize	7/8/2022 11:13 AM
282	public forums, zoom meetings, flyers, interviews in the newspaper	7/7/2022 3:15 PM
283	Social Media	7/7/2022 1:07 PM
284	Social media and in-person seminars, local free paper	7/7/2022 12:36 PM
285	tv/radio/social media	7/7/2022 11:40 AM
286	Mailings, Advertisements, Public Hearings	7/7/2022 11:26 AM
287	Explain how it directly affects them. Include monetary losses during coastal storms. Explain now is the time to make hard choices.	7/7/2022 10:42 AM
288	Create a link for a training that can be emailed to residents who are subscribed to Town communications.	7/7/2022 9:49 AM
289	Live seminars or Town wide TV broadcast.	7/7/2022 9:41 AM
290	News articles in local papers	7/7/2022 9:23 AM
291	Social media. Text message / cell phone push alerts.	7/6/2022 7:25 PM
292	Town meetings/ fliers and informational bulletin	7/6/2022 5:12 PM
293	social media	7/5/2022 12:49 PM
294	E-mail blasts, Internet education, YouTube infomercials, letters, public meetings, face-to-face neighborhood discussions	7/1/2022 1:06 PM
295	stop building in flood zone areas	7/1/2022 8:22 AM
296	phone alerts when downtown to going to flood, closing roads immediately so cars don't get struck. Also evacuating flood areas so apartment dwellers don't lose their cars when it floods.	6/30/2022 1:51 PM
297	Effective change comes from children teaching the adults in their support systems. Beginning in k-12, students should be assigned "homework" that includes discussions of resilience and mitigation with the adults in their lives.	6/30/2022 11:45 AM
298	Open, public forums and committees in Economic development office to connect residents and biz with grants and resources	6/7/2022 1:45 PM

South Central Connecticut Hazard Mitigation Plan Survey

Q13 Do you have flood insurance?

Answered: 674 Skipped: 69

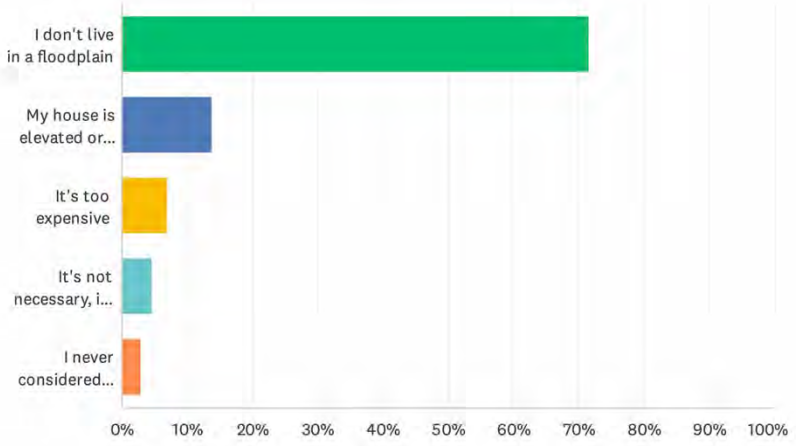


ANSWER CHOICES	RESPONSES	
Yes	19.73%	133
No	75.37%	508
I don't know	4.90%	33
TOTAL		674

South Central Connecticut Hazard Mitigation Plan Survey

Q14 Why don't you have flood insurance?

Answered: 517 Skipped: 226



ANSWER CHOICES	RESPONSES	
I don't live in a floodplain	71.57%	370
My house is elevated or otherwise protected	13.93%	72
It's too expensive	6.96%	36
It's not necessary, it never floods	4.64%	24
I never considered flood insurance	2.90%	15
TOTAL		517

#	OTHER (PLEASE SPECIFY)	DATE
1	The cost is too high for our low risk	1/13/2023 3:59 PM
2	Live in an apartment. Do not own the property.	1/7/2023 5:47 PM
3	Didn't know I could - I rent	1/6/2023 1:17 PM
4	Cost: $6K/year for $100K insurance. If I make it 20 years without a flood, insurance was a bad deal. Note, it's likely more expensive now. Over-priced for my risk.	1/3/2023 3:20 PM
5	N/A	11/17/2022 6:40 PM
6	Should be able to choose more than one answer	11/13/2022 2:29 PM
7	self ins.	11/12/2022 12:30 PM
8	I have flood insurance even though I live in the 500 year zone	11/12/2022 7:41 AM
9	I believe my elevation will mitigate any likely flooding. Anything greater than that will be a catastrophe anyway and insurance won't help that.	11/7/2022 3:37 PM
10	The insurance company does not want to sell me flood insurance, claiming I am not in a flood	11/3/2022 2:58 PM

81 / 105

South Central Connecticut Hazard Mitigation Plan Survey

	zone. If there is another one, let me know, because I would like to buy it.	
11	I have flood insurance	10/24/2022 1:56 PM
12	Not located in an identified hazard area	9/6/2022 10:02 AM
13	Our house is built on top of a ridge	9/2/2022 1:27 PM
14	plans of our property showed we are not in the flood plain.	9/1/2022 1:14 PM
15	I do have flood insurance	8/30/2022 10:55 AM
16	I'm required to have flood insurance	8/24/2022 8:51 AM
17	I have flood insurance	8/23/2022 6:06 AM
18	Need to check my policy and that of my coop.	8/22/2022 7:54 AM
19	Na	8/13/2022 10:25 AM
20	It is NOT clearly written in laypersons terms for me to determine if the homeowners policy includes or excludes flood insurance and while the "town maps" show the FARM RIVER is our closest potential source of flooding, the projected floodplains have NOT included the "once in 100 year or 1000 year" climate change disaster of rising sea levels and extremely hot summers and very snowy winters, poor street drainage and their impact on our local environment ability to handle runoffs of snow, rain and floods	8/12/2022 8:25 PM
21	Live in a Condo	8/12/2022 7:48 PM
22	We use to have it the price is outrageous and even though my house was surrounded by water never got water inside	8/12/2022 6:56 PM
23	Although not in a floodplain, we have experienced flooding due to extreme rainfall amounts.	8/12/2022 11:56 AM
24	na	8/11/2022 11:13 PM
25	if we have a tsunami no body will be in east haven ct	8/11/2022 1:07 PM
26	own home so not required river does'nt come up that far in 65 years	8/11/2022 12:47 PM
27	My insurance company says I don't need it. And I really disliked people I did speak to about it. I think capitalizing that way is wrong. Sorry. And question below is like asking for someone to come and spend my money!!	8/11/2022 12:41 PM
28	No comment	8/11/2022 12:32 PM
29	we are not in a flood zone	8/11/2022 12:30 PM
30	The condo association provides it via HOA dues.	8/6/2022 8:43 AM
31	Flood insurance states that adjoining properties must also flood. The properties around me are all at a higher elevation than my property. Thus, I would not be covered even if I had a policy	8/5/2022 7:35 PM
32	I work in insurnace and flood insurnace is the biggest scam out there	8/5/2022 2:04 PM
33	Although only 700 feet from Long Island sound I am 50 feet above sea level	8/3/2022 4:14 PM
34	I have it	8/3/2022 10:21 AM
35	I live in an apartment	8/3/2022 7:05 AM
36	I do	8/2/2022 2:30 PM
37	Live in an apartment	7/29/2022 9:46 PM
38	Having insurance is prudent despite no claims for many decades. Understand flood insurance can be helpful even if not the typical flood.e is helpful even if	7/28/2022 7:49 PM
39	I have flood insurance😄	7/27/2022 7:48 PM
40	Our land is worth more than our seasonal cottage and the cost of flood insurance is too high in our area, given that there are so many codicils that negate payment of a claim.	7/26/2022 11:58 AM
41	i live on a hill	7/19/2022 8:43 AM

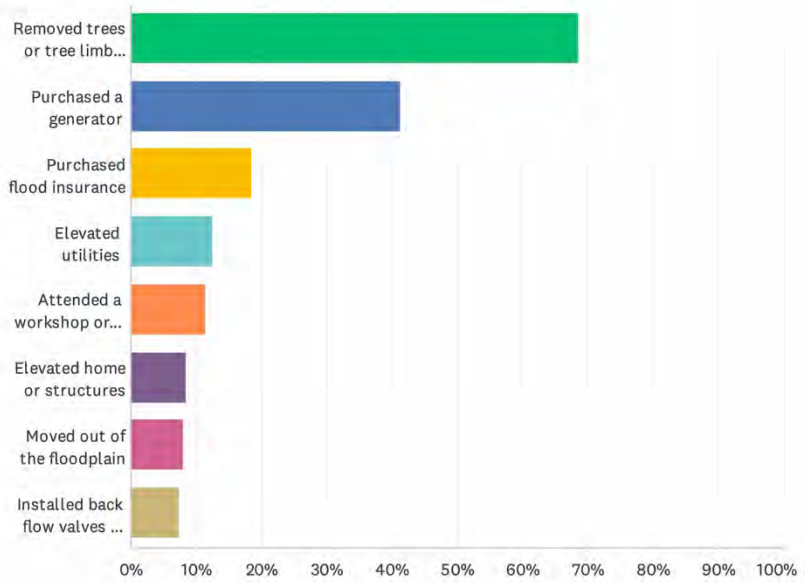
South Central Connecticut Hazard Mitigation Plan Survey

42	Live in an apartment.	7/13/2022 8:31 AM
43	Not sure I need it but have inquired.	7/12/2022 1:02 PM
44	Not sure	7/7/2022 11:27 AM
45	I rent an apartment so I only carry renters insurance.	7/1/2022 1:09 PM
46	i was told i was far away from the flood area and couldnt buy it	7/1/2022 8:26 AM
47	too expensive for the low risk	6/30/2022 1:29 PM

South Central Connecticut Hazard Mitigation Plan Survey

Q15 What have you done to mitigate the natural hazard risk to your home? Please select all that apply.

Answered: 577 Skipped: 166



ANSWER CHOICES	RESPONSES	
Removed trees or tree limbs that may impact your home	68.63%	396
Purchased a generator	41.42%	239
Purchased flood insurance	18.54%	107
Elevated utilities	12.65%	73
Attended a workshop or class about disaster preparedness	11.44%	66
Elevated home or structures	8.49%	49
Moved out of the floodplain	8.15%	47
Installed back flow valves to prevent reverse-flow flood damages	7.45%	43
Total Respondents: 577		

#	OTHER (PLEASE SPECIFY)	DATE
1	Chose not to live in low lying flood prone areas	1/13/2023 3:59 PM
2	Secure all loose objects prior to a storm. Secure motor vehicles inside a garage. Have weeks worth of food, medicine on hand.	1/10/2023 11:02 AM

84 / 105

South Central Connecticut Hazard Mitigation Plan Survey

3	I live in. Condo -there are restrictions on what we can do	1/9/2023 7:13 PM
4	Hurricane strips	1/7/2023 12:32 PM
5	built house with hurricane bracing	12/11/2022 5:27 PM
6	None of the above.	11/18/2022 9:24 PM
7	looked into solar and geothermal energy. Began composting.	11/17/2022 6:40 PM
8	Downspout extenders to redirect excess rainwater away from house.	11/17/2022 10:32 AM
9	Tied gutter's together to a French drain system.	11/15/2022 7:58 PM
10	nothing	11/14/2022 3:40 PM
11	Live in a condo so some things have been done by the association. Some units are in a flood zone.	11/13/2022 9:11 PM
12	Would purchase a generator if they were less expensive	11/13/2022 2:29 PM
13	I've had flood insurance for 35 years since initial purchase of home. Would not drop it even through my mortgage is paid off for years. Installed flood compliant vents to reduce hydrostatic flood pressure against crawl space foundation.	11/13/2022 7:17 AM
14	house on cinder blocks, in flood zone,	11/7/2022 8:20 PM
15	Due to age of house and type of house we are unable to raise our structure we have already met with ACE back in 2012 and were not a good candidate to raise. Recently built a new garage on a foundation with flood vents per new building code to minimize loss of garage.	11/7/2022 4:24 PM
16	Nothing. I'm poor.	11/7/2022 3:37 PM
17	Improved soil quality and added a diversity of perennial plants and shrubs as well as fresh wood chip mulch in various places to improve the soil's water permeability and storage. This also has helped certain plants to survive the recent extended drought periods.	11/7/2022 3:27 PM
18	I planted a tree to help absorb water and provide shade in the summer and block wind in the winter provide habitat and food for wildlife	10/28/2022 9:29 AM
19	None	9/19/2022 7:25 PM
20	Underground utilities	9/6/2022 10:02 AM
21	Install pump in crawl space	9/2/2022 2:41 PM
22	NA	9/1/2022 3:35 PM
23	FEMA is in error on our property. We had our property mapped by experts, including soil samples, and provided same along with an engineer's map to FEMA for a LOMA. FEMA rejected it without understanding what they were reading. Our home is not in a risk area, part of our yard is, but FEMA has it the other way around and as a result of FEMA's errors our flood insurance cost is much higher than it should be.	8/30/2022 10:55 AM
24	n/a	8/26/2022 2:21 PM
25	I go to public meetings like Town Council but the representation and mayor don't do anything around here, except backroom deals with developers on Coe Ave and Commerce St	8/25/2022 11:40 AM
26	High impact windows, fireplace, gas stove.	8/23/2022 10:05 AM
27	Elevated storage in basement	8/23/2022 6:06 AM
28	None of these except the last apply to renters. Renters are over 70% of inhabitants of places like New Haven	8/22/2022 9:59 AM
29	N/a do not own my home	8/22/2022 9:57 AM
30	I am beginning my education and planning!	8/22/2022 7:54 AM
31	planted trees and bushes and lawn to absorb water. protected and maintained old trees on property.	8/16/2022 2:30 PM

South Central Connecticut Hazard Mitigation Plan Survey

32	Make sure as much water flows away from house directing extended drain pipes	8/14/2022 5:25 PM
33	Unsure	8/13/2022 10:25 AM
34	Live in a Condo Complex	8/13/2022 9:28 AM
35	Am low/fixed income pensioner caring for frail elder to safely age in place at home. We have been taken advantage of by home repair persons and cannot afford to waste our limited funds to have poor quality improvements done by people seeking to profit from such programs without delivering quality products, installed correctly or making proper modifications to our property or home. IF state and local government could oversee and vett the businesses, owners, employees and subcontractors as well as the quality and sources of materials and products used to be certain that mitigations are done safely, correctly and thoroughly, that would help a lot as would actual price reductions or immediate cash rebates offered to offset those expenses.	8/12/2022 8:25 PM
36	Live in a Condo	8/12/2022 7:48 PM
37	Maintaining drainage system	8/12/2022 5:35 PM
38	None	8/12/2022 3:04 PM
39	Installed french drains in the basement; use long downspout drain extenders	8/12/2022 11:56 AM
40	I live in a condo community that we have to have flood insurance for. For 112 units it is 128,000.00 yearly. Insurance companies need to somehow lower the cost of the insurance and make it affordable for people to protect their assets. I know this is not what this survey is about but we need to regulate the profits made by companies. It is ridiculous that a 1300 square foot condo is over $1,000 a year for just flood insurance. Why are flood plans not allowed to be changed for 100 years?	8/12/2022 9:47 AM
41	None	8/11/2022 11:13 PM
42	We have 3 sump pumps in the house	8/11/2022 8:53 PM
43	N/a	8/11/2022 7:12 PM
44	Curtain drains	8/11/2022 3:25 PM
45	I rent. I lift my washer and dryer off the floor and place on pallets because my basement floods. I've already lost a chest freezer and suffered damage to a water heater due to basement flooding.	8/11/2022 3:19 PM
46	Amateur Radio Emergency Services member; have back power and communication systems (actually used and provided communication for neighbors during hurricane Irene)	8/11/2022 2:53 PM
47	Our big concern is trees falling on our house. They are very old but we can not afford to remove them ourselves since it can cost thousands for just one tree.	8/11/2022 2:47 PM
48	Nothing no one helps you anyway	8/11/2022 1:58 PM
49	N/A	8/11/2022 1:37 PM
50	To my disgust, not keep any valuables or furniture in finished basement due to flooding of marsh adjacent to Coe & Short Beach Rd.	8/11/2022 1:16 PM
51	none	8/11/2022 1:07 PM
52	Nothing	8/11/2022 12:43 PM
53	My home is about 15-20 feet above sea level. My crawlspace hasn't flood in my 22 years. It does have two layers of 6 mil plastic on dirt and under floorboards. I have small windows for airflow in summer. Anything else is out of my budget.	8/11/2022 12:41 PM
54	Condo has policy	8/11/2022 12:35 PM
55	None of the above	8/11/2022 12:32 PM
56	nothing	8/11/2022 12:31 PM
57	don't need to do anything not in flood area	8/11/2022 12:27 PM

South Central Connecticut Hazard Mitigation Plan Survey

58	Planted trees in yard	8/11/2022 9:03 AM
59	my house is on a hill	8/10/2022 8:11 AM
60	Help keep catch basins or any drainage ways clear of debris	8/9/2022 3:57 PM
61	LIMBS, not entire trees.	8/8/2022 1:49 PM
62	Read a lot on FEMA web page	8/7/2022 6:56 PM
63	Installed additional sump pumps, installed double paned windows	8/5/2022 7:35 PM
64	I live in a condominium	8/5/2022 3:41 PM
65	None necessary	8/4/2022 9:12 AM
66	You should add storm shutters to this checklist.	8/3/2022 4:14 PM
67	Had town put in drainage on street to stop flooding of my property	8/3/2022 12:08 PM
68	Had gutters extended underground to move water away from house foundation.	8/3/2022 11:29 AM
69	I RENT	8/3/2022 10:54 AM
70	None of the above	8/3/2022 10:23 AM
71	if we had more money we would purchase a house not on a floodplain: we were not education at the time of purchase. This is the best house we could afford before CoVID and before the housing market boom. Now it's impossible with prices. Due to our economical class/ status we have no choice but to stay. We also do love the home and community but we are seeing development on wetlands risk our property.	8/3/2022 10:13 AM
72	None	8/3/2022 10:08 AM
73	Drainage and connection to catch basin	8/3/2022 9:11 AM
74	Solar with battery back-up	8/2/2022 5:03 PM
75	Installed a heat pump Added insulation	7/31/2022 3:46 PM
76	Our home is on a hill a significant distance from the Long Island Sound and any river.	7/30/2022 3:55 PM
77	Live in an apartment	7/29/2022 9:46 PM
78	Have had emergency preparedness supplies (food, water, manual can opener, battery powered radio, etc.) for many decades.	7/28/2022 7:49 PM
79	None of the above	7/28/2022 1:22 PM
80	As a renter, there are limits to what I can do.	7/28/2022 11:30 AM
81	clean ditch in back of property to alleviate runoff from hill	7/28/2022 10:10 AM
82	Installed sump pump in basement	7/27/2022 12:29 PM
83	Installed basement drain	7/26/2022 5:24 PM
84	We had a full house generator while living on the shoreline. Now we live in a Condo which does not allow household (non-gasoline) generators. We would like to have an automatic generator.	7/26/2022 11:21 AM
85	Regraded entire property and added drainage	7/25/2022 11:21 AM
86	Installed gutter guards. Regularly check the grates/drains in our yard ti be sure they're not clogged w leaves, debris, etc.	7/23/2022 9:09 AM
87	Installed gravel pathways and driveway for drainage	7/22/2022 5:45 PM
88	I live in a condo. I feel supported	7/22/2022 5:40 PM
89	landscape property for proper drainage.	7/22/2022 3:55 PM
90	installed drainage pipes	7/20/2022 9:21 PM
91	I keep watch that the drain in my yard is clear and not covered with leaves. Luckily I live far enough from the water that it never floods here and my yard is a slight angle	7/14/2022 4:16 PM

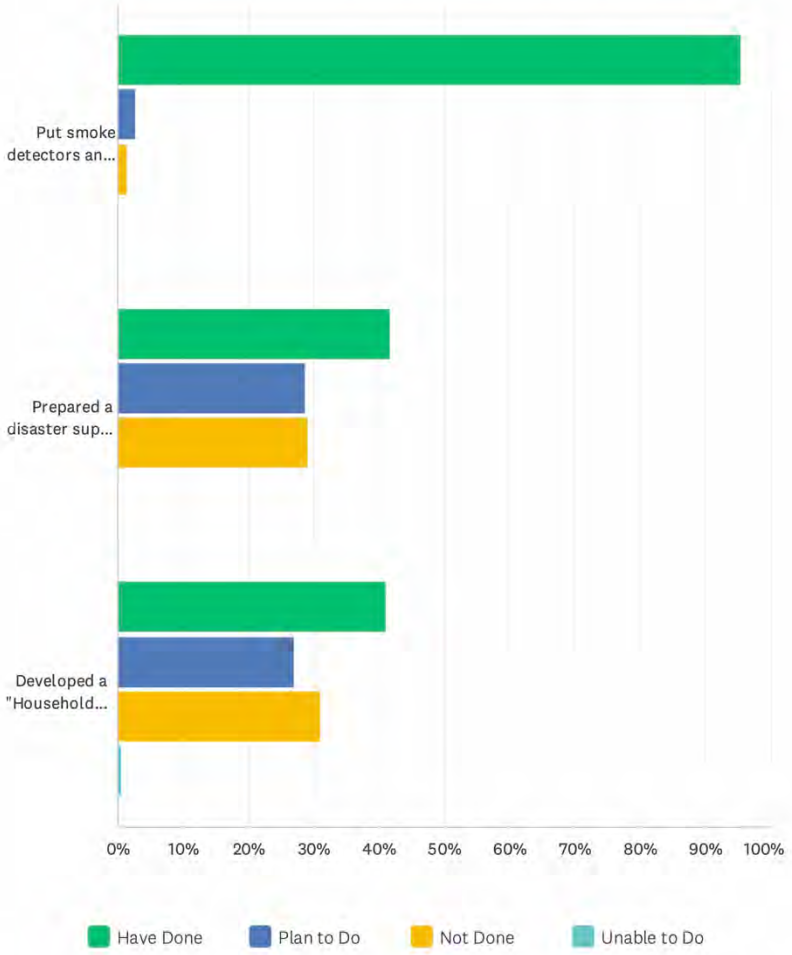
South Central Connecticut Hazard Mitigation Plan Survey

92	None.	7/13/2022 8:31 AM
93	cleared street drain outside home when clogged. street drains around me get clogged w debris and aren't cleared frequently enough in my opinion.	7/13/2022 8:17 AM
94	Added areas for runoff	7/12/2022 8:19 PM
95	Unsure	7/12/2022 1:13 PM
96	Nothing don't believe it's a problem	7/12/2022 12:59 PM
97	Live in Condo. No individual control	7/12/2022 12:30 PM
98	None of the above	7/12/2022 12:12 PM
99	solar battery backup, house is 100+ feet above sea level, no freshwater streams adjacent	7/9/2022 4:12 PM
100	Work done in basement Redid drive Lots of vegetation	7/8/2022 4:00 PM
101	Keep ourselves educated to safety awareness needs.	7/8/2022 12:30 PM
102	Sump pump in basement	7/2/2022 8:36 PM
103	None of the above as I live in an apartment. the apartment is elevated and is equipped with an emergency generator.	7/1/2022 1:09 PM
104	installed sump pumps	7/1/2022 8:26 AM

South Central Connecticut Hazard Mitigation Plan Survey

Q16 How prepared are you for a disaster?

Answered: 677 Skipped: 66

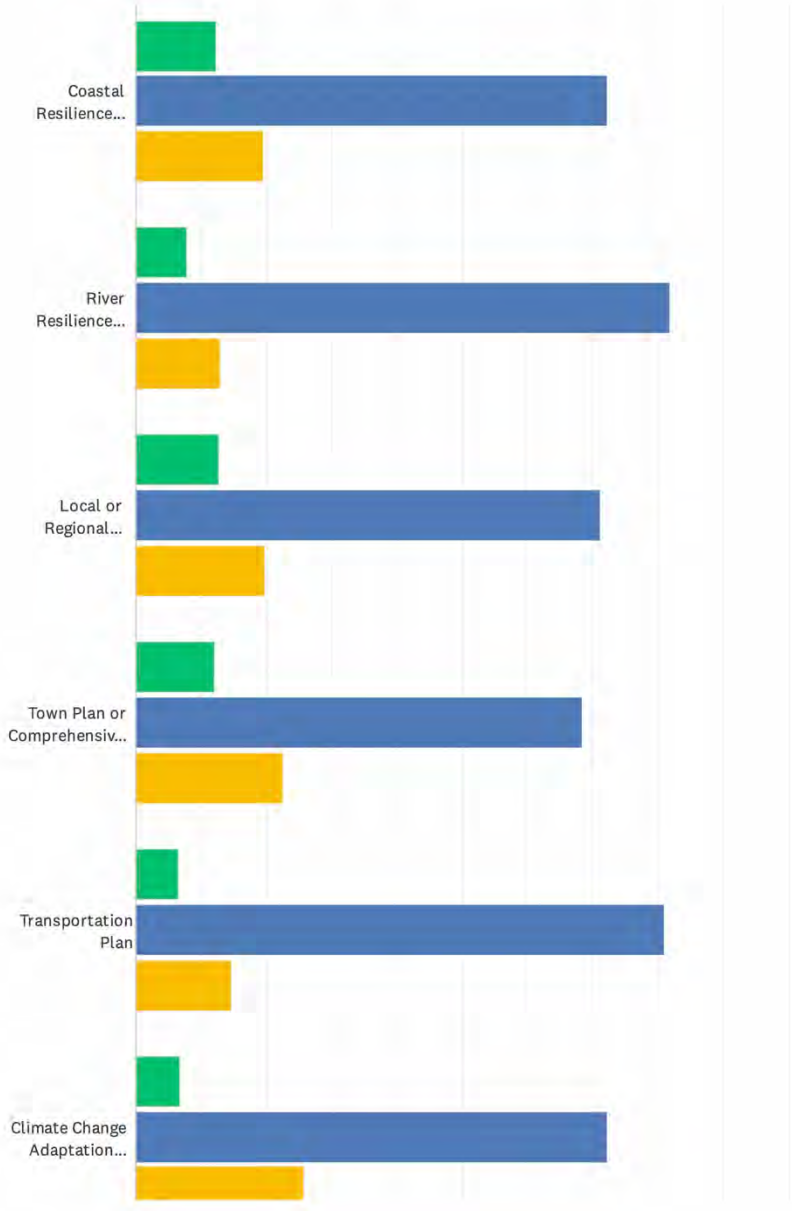


	HAVE DONE	PLAN TO DO	NOT DONE	UNABLE TO DO	TOTAL	WEIGHTED AVERAGE
Put smoke detectors and carbon monoxide detectors on each floor of your house?	95.57% 647	2.81% 19	1.48% 10	0.15% 1	677	1.06
Prepared a disaster supply kit for your home and car with food, water, batteries or other emergency supplies?	41.84% 282	28.78% 194	29.23% 197	0.15% 1	674	1.88
Developed a "Household Emergency Plan" in order to decide what everyone would do in the event of an emergency?	41.10% 277	27.15% 183	31.16% 210	0.59% 4	674	1.91

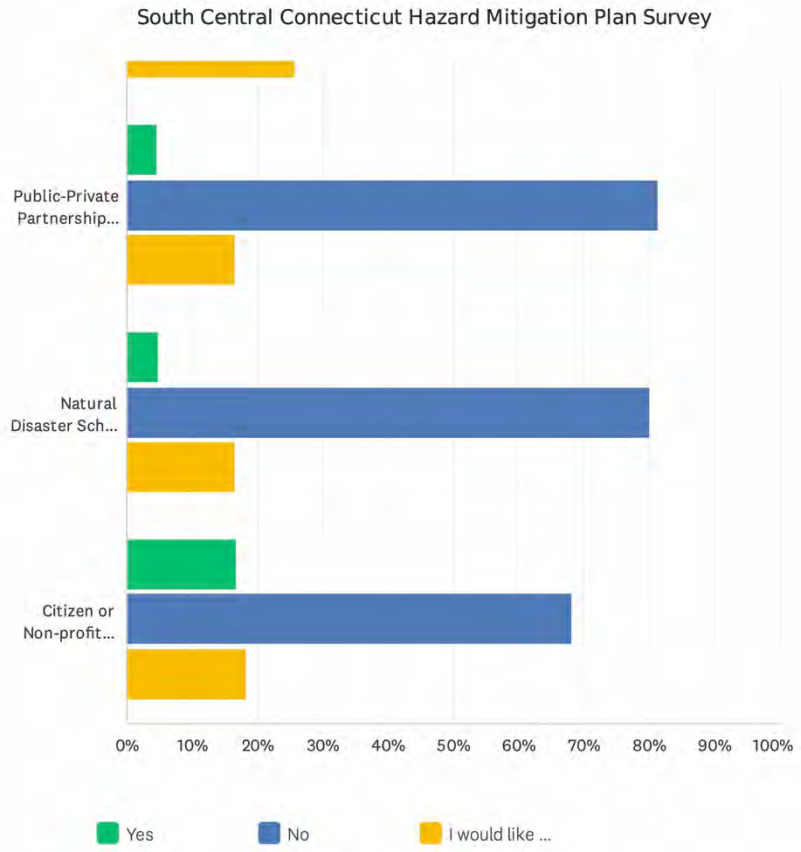
South Central Connecticut Hazard Mitigation Plan Survey

Q17 Have you participated in any of the following projects or plans to make your community safer? Would you like to participate in any of these activities?

Answered: 670 Skipped: 73



90 / 105

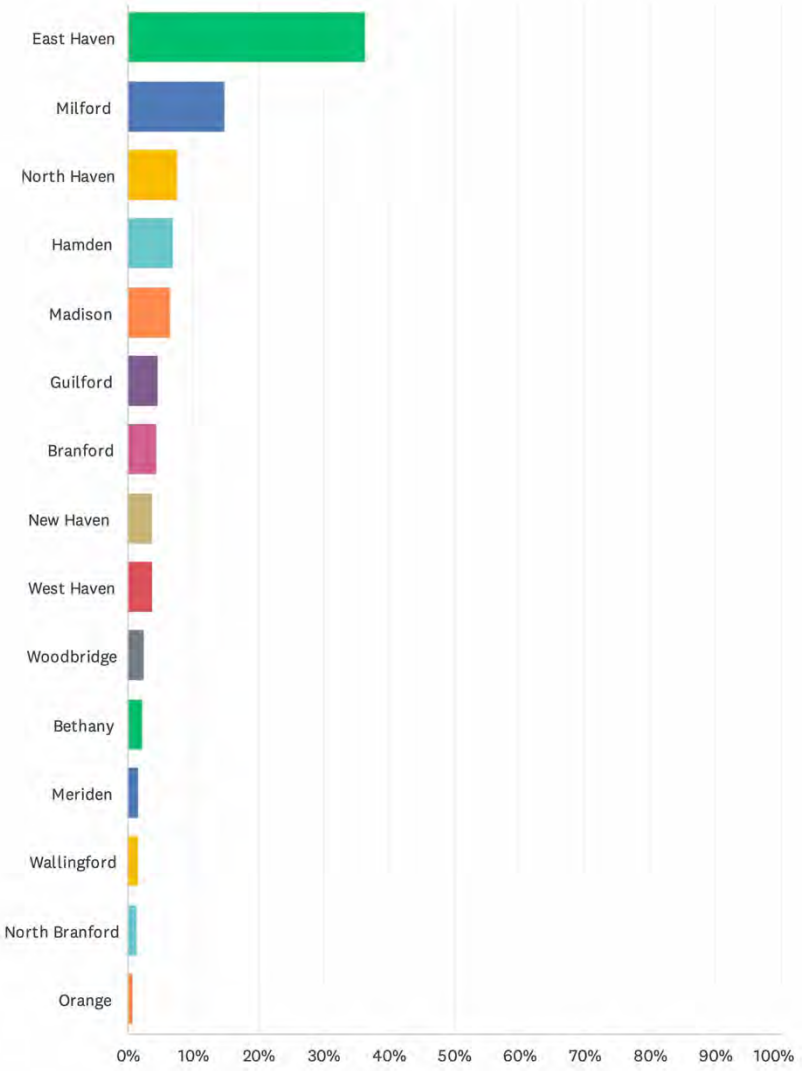


	YES	NO	I WOULD LIKE TO	TOTAL RESPONDENTS
Coastal Resilience Planning	12.39% 82	72.21% 478	19.64% 130	662
River Resilience Planning	7.81% 51	81.93% 535	13.02% 85	653
Local or Regional Mitigation Planning	12.73% 84	71.21% 470	19.85% 131	660
Town Plan or Comprehensive Master Plan	12.18% 80	68.49% 450	22.53% 148	657
Transportation Plan	6.70% 44	81.13% 533	14.61% 96	657
Climate Change Adaptation Planning	6.83% 45	72.23% 476	25.80% 170	659
Public-Private Partnership Initiative to Address Disaster-Related Issues	4.59% 30	81.47% 532	16.54% 108	653
Natural Disaster School Safety Program	4.92% 32	80.18% 522	16.59% 108	651
Citizen or Non-profit Organization Group focused on environmental protection or emergency preparedness	16.74% 111	68.17% 452	18.25% 121	663

South Central Connecticut Hazard Mitigation Plan Survey

Q18 Where do you live?

Answered: 660 Skipped: 83



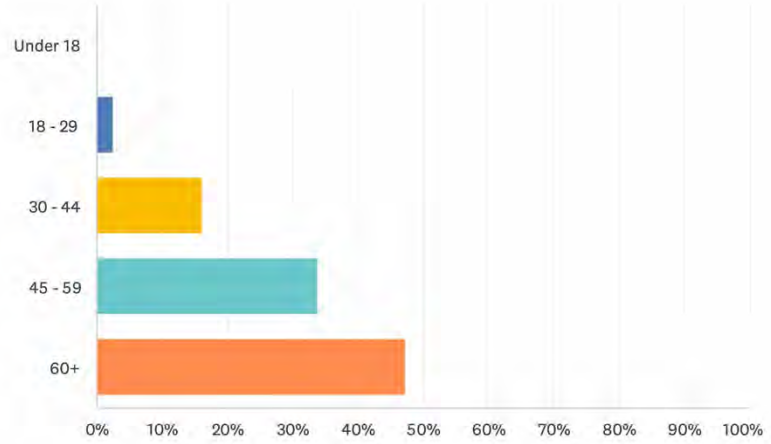
South Central Connecticut Hazard Mitigation Plan Survey

ANSWER CHOICES	RESPONSES	
East Haven	36.36%	240
Milford	15.00%	99
North Haven	7.58%	50
Hamden	7.12%	47
Madison	6.52%	43
Guilford	4.70%	31
Branford	4.55%	30
New Haven	3.94%	26
West Haven	3.79%	25
Woodbridge	2.58%	17
Bethany	2.27%	15
Meriden	1.67%	11
Wallingford	1.67%	11
North Branford	1.52%	10
Orange	0.76%	5
TOTAL		660

South Central Connecticut Hazard Mitigation Plan Survey

Q19 What is your age?

Answered: 663 Skipped: 80

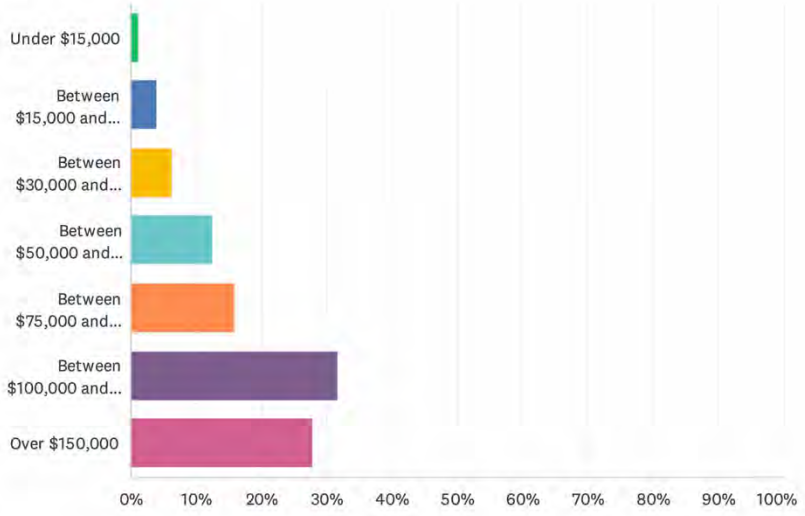


ANSWER CHOICES	RESPONSES	
Under 18	0.00%	0
18 - 29	2.56%	17
30 - 44	16.14%	107
45 - 59	33.94%	225
60+	47.36%	314
TOTAL		663

South Central Connecticut Hazard Mitigation Plan Survey

Q20 My total family income last year was:

Answered: 603 Skipped: 140

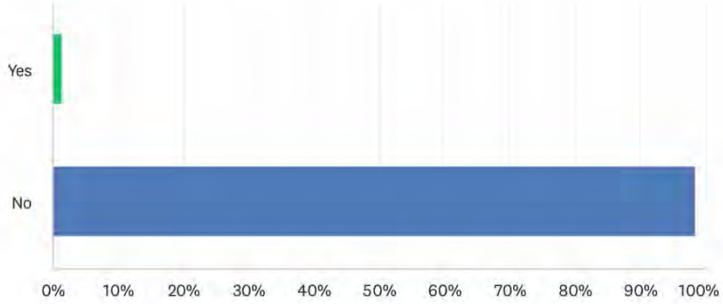


ANSWER CHOICES	RESPONSES	
Under $15,000	1.33%	8
Between $15,000 and $29,999	4.15%	25
Between $30,000 and $49,999	6.30%	38
Between $50,000 and $74,999	12.60%	76
Between $75,000 and $99,999	15.92%	96
Between $100,000 and $150,000	31.67%	191
Over $150,000	28.03%	169
TOTAL		603

South Central Connecticut Hazard Mitigation Plan Survey

Q21 Are you a seasonal resident?

Answered: 660 Skipped: 83

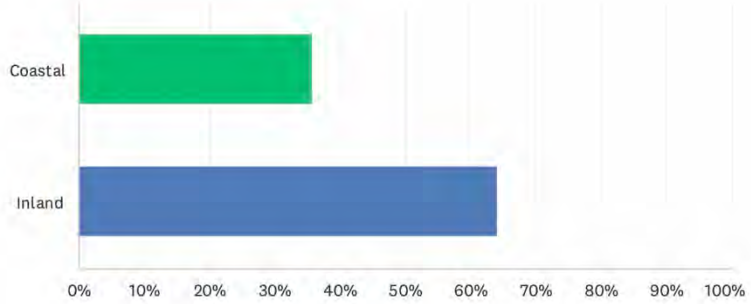


ANSWER CHOICES	RESPONSES	
Yes	1.52%	10
No	98.48%	650
TOTAL		660

South Central Connecticut Hazard Mitigation Plan Survey

Q22 Do you consider your home to be coastal or inland?

Answered: 657 Skipped: 86

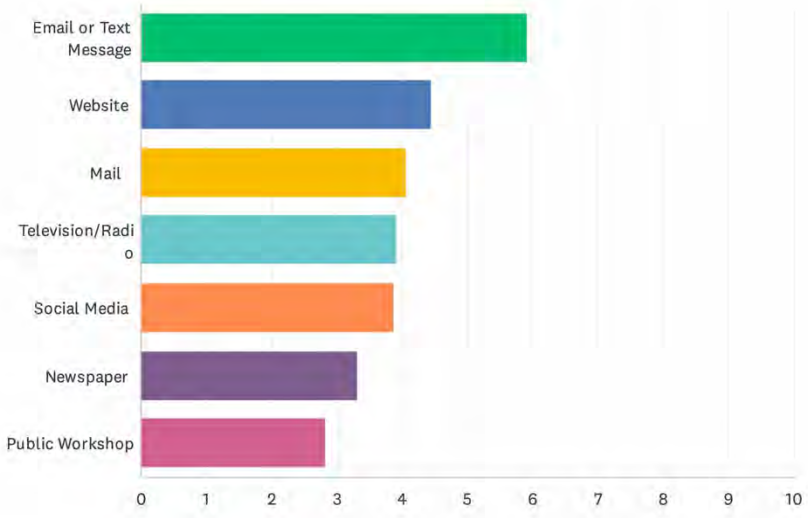


ANSWER CHOICES	RESPONSES	
Coastal	35.92%	236
Inland	64.08%	421
TOTAL		657

South Central Connecticut Hazard Mitigation Plan Survey

Q23 What is the most effective way for you to receive information about how to make your home or community more resistant to natural hazards? Please rank the following from best to worst (1-7).

Answered: 654 Skipped: 89

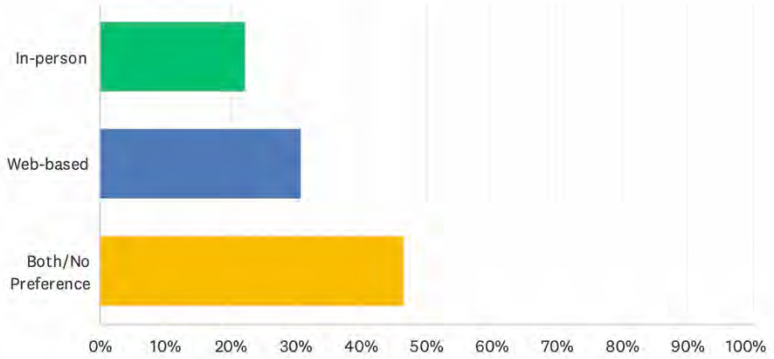


	1	2	3	4	5	6	7	TOTAL	SCORE
Email or Text Message	62.42% 372	11.58% 69	8.22% 49	4.70% 28	5.54% 33	2.18% 13	5.37% 32	596	5.93
Website	8.70% 49	15.99% 90	25.40% 143	23.45% 132	16.52% 93	7.64% 43	2.31% 13	563	4.45
Mail	9.32% 55	18.98% 112	15.93% 94	15.25% 90	14.75% 87	17.80% 105	7.97% 47	590	4.08
Television/Radio	7.66% 43	14.97% 84	16.93% 95	19.25% 108	15.69% 88	15.33% 86	10.16% 57	561	3.93
Social Media	6.58% 37	20.82% 117	15.30% 86	15.84% 89	11.74% 66	12.99% 73	16.73% 94	562	3.89
Newspaper	6.25% 35	12.86% 72	11.79% 66	11.07% 62	14.29% 80	21.79% 122	21.96% 123	560	3.33
Public Workshop	5.00% 29	7.76% 45	7.41% 43	10.00% 58	17.93% 104	18.28% 106	33.62% 195	580	2.83

South Central Connecticut Hazard Mitigation Plan Survey

Q24 Do you prefer in-person or web-based (Zoom) meetings?

Answered: 660 Skipped: 83

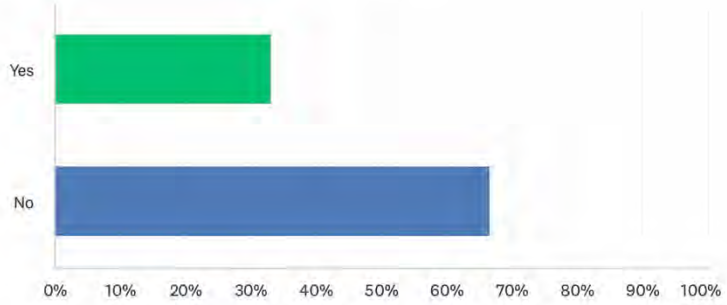


ANSWER CHOICES	RESPONSES	
In-person	22.42%	148
Web-based	30.91%	204
Both/No Preference	46.67%	308
TOTAL		660

South Central Connecticut Hazard Mitigation Plan Survey

Q25 Prior to receiving this survey, were you aware that your municipality has a Natural Hazard Mitigation Plan and that it needs to be updated every five years to remain eligible for pre- and post-disaster FEMA funding?

Answered: 663 Skipped: 80



ANSWER CHOICES	RESPONSES	
Yes	33.18%	220
No	66.82%	443
TOTAL		663

South Central Connecticut Hazard Mitigation Plan Survey

Q26 Please feel free to provide additional comments in the space provided.

Answered: 70 Skipped: 673

#	RESPONSES	DATE
1	Thank you for your work	1/13/2023 4:01 PM
2	I hope something effective is done.	1/12/2023 10:56 AM
3	A tree warden could prevent property damage and personal injury/death by requiring the remove/trimming of dangerous trees and vegetation. A annual schedule of storm drainage cleaning should be implemented and maintained. Fire hydrants should be inspected and tested annually.	1/10/2023 11:07 AM
4	Need side roads plowed so I can get to work-I'm a front line worker	1/9/2023 7:17 PM
5	We need individuals with home insecurity needs addressed during severe weather by the City of Milford. Warming and cooling centers in empty municipal buildings. We need public cell chargers for all citizens.	1/7/2023 12:36 PM
6	Stop flood plain development. 8-30g is an an environmental disaster: look at building right by Queach Creek on Route 1. Building up one lot just causes more flooding on neighboring lots. Stop thinking we can engineer a solution to flooding.	1/3/2023 3:21 PM
7	when i read about this Natural Hazard Mitigation Plan there was no clear path to the survey as in a website on any of the articles i read and searched Fema first which had no linking info	11/21/2022 4:56 PM
8	on going issue with flooding problems due to in land wetlands not doing anything.	11/14/2022 3:42 PM
9	When I worked for the city I was involved in hazard mitigation planning and grants for housing elevation projects.	11/13/2022 9:14 PM
10	Learned about this through NH Register article related to Milford responses. Had no idea this survey existed	11/13/2022 9:13 AM
11	Today's (11/13/22) article in CT Post got my attention It would have been more effective to give specific instruction on how to find this survey in the article if participation is truly a goal of this important study/issue.	11/13/2022 7:21 AM
12	Thank you for doing this survey.	11/12/2022 10:11 AM
13	I do not feel Calf Pen Creek has been properly evaluated as it is full of sand and invasive plants and has been flooding in major storms since it has stopped being dredged and the flood gates removed.	11/7/2022 8:27 PM
14	Enforce building codes- too many property owners are free to do as they like no consequences. The coastal building especially needs to enforce building and zoning codes	11/7/2022 6:29 PM
15	I am willing to meet with anyone to discuss our neighborhood future. During a meeting with our local town reps we were offered 3 suggestions. Raise your house, move, or get used to flooding. Our neighborhood has many houses close to 100 years old that can't be raised. Moving just causes another person who purchased the house to have the same issue you already have. There other states that have used barriers that provide some relief for flooding. My contact information is Doreen Stomsky 47 Orland Street, Milford Ct .. stomsky@sbcglobal.net. Please reach out to me I am working with all of my neighbors to come up with solutions to help our area.	11/7/2022 4:31 PM
16	I think it is important to remember how much overall resilience could be gained from the cumulative small efforts of an entire residential neighborhood working in a coordinated effort to improve their green spaces, especially those close to home, to improve their home and community resilience to the extreme weather effects of climate change that I've seen in my 4 years as a homeowner in Hamden.	11/7/2022 3:31 PM

South Central Connecticut Hazard Mitigation Plan Survey

17	Milford has worked hard with limites reaourcea on much of this. Ive helmed Our neighborhood association and a special flood mitig committee to be very involved for a decade resulting in some much better street drainage for our neighborhood. So much appreciated. however we still need the completion of bayview street projects with the purchase of mitigation pumps that operate in our newsystems. We need street raised much higher; with ideas and financial and other support for fir affected homeowner properties when that may happen; and also better in auatem pumps beneath grade that help pump pur street even during flooding resultant from severe rain and extreme tide events	11/6/2022 11:29 PM
18	Let's teach our community to prepare. In Branford, there are many people over 50 years old and need to prepare.	11/3/2022 3:01 PM
19	yearly local emergency plan meetings are informative, but at 9:30am, not much public participation. Different/ multiple sessions?Community survey? Why are there different ct alert links per town (on following page)??? add links to local emergency plan document/ meeting info?	10/30/2022 1:33 PM
20	First question limits response to concern about your personal home or business. Scope is too narrow. Should be on the community's wellbeing not just your personal wellbeing. Q 6 and 7 should allow for an answer of I don't know or unsure.	10/28/2022 9:31 AM
21	I thin the town should plant more trees to help with air quality and shade. Power lines should be placed underground so trees could be planted on both sides of the street.	10/25/2022 9:25 PM
22	Increase and preserve marshland to help absorb tidal flooding	10/24/2022 1:58 PM
23	To much Red Tape when you try to go some answers about different programs that my city, state and federal goverment has…	9/23/2022 11:21 AM
24	THanks for conducting this survey. WE as citizens can and need to do more to be informed and prepared.	9/2/2022 1:29 PM
25	East Haven Mayor CARFORA has not applied to State or federal funding, does not attend meetings. We have no costal resiliency plan. The dense population lives in Momauguin which is coastal, has wetlands. No one talks about how the Tweed Airport expansion is going to effect water flow pollution, runoff, pesticides, airplane de-icing chemicals in the waterways where people swim and eat crabs.	8/25/2022 11:43 AM
26	Our town does not communicate well about planning activities—particularly for individual projects that could affect many, I.e. Amazon distribution center, tweed airport. Using an online news source for public meetings is not sufficient.	8/23/2022 10:09 AM
27	Tweed airport is planning an extension. This is ridiculous given where the runway is located. If this goes through then all this planning and mitigating is a horse and pony show!	8/22/2022 6:01 PM
28	More attention to social vulnerability and social resilience should be part of this survey. Access to healthy and secure food systems, clean transportation, healthcare, and to safe housing (with AC for example) are not addressed here. Environmental justice and disproportionate impacts should be centered in any hazard mitigation planning. Historical urban coastal communities need a more nuanced approach with higher resilience measures in building and infrastructure rather than a "no development" approach.	8/22/2022 10:08 AM
29	It's hard to justify Connecticut investing heavily in protecting itself from climate impacts when it's our massive greenhouse gas pollution that's causing so much damage to communities around the world that did NOT cause the problem. Seems like the first step is to radically cut GHG emissions, and to support impoverished regions trying to adapt to climate change..	8/22/2022 8:41 AM
30	I am involved in a grassroots efforts in New Haven to build awareness and become a catalyst for change - Reimagine New Haven in an Era of Climate Change. Getting educated and active!	8/22/2022 7:56 AM
31	Hamden's infrastructure is a mess. Live adjacent to State property. Cannot get DEEP to return calls regarding a problem. We pay alot of municipal and state taxes and get little in return unless you have kids in the school system. This survey is great but the required plan will be put in place but nothing physically done to fix the problems.	8/17/2022 7:10 PM
32	Put electrical, cable, internet etc wires underground to obviate repeated power and seervice outage and repairs	8/16/2022 2:35 PM
33	Need citizen input and involvement. difficult time in West Haven because of MARB and past	8/15/2022 8:30 AM

South Central Connecticut Hazard Mitigation Plan Survey

	theft of Federal funds.	
34	Thank you for your work on this!!	8/14/2022 5:26 PM
35	ALL forms of communication MUST be communicatively accessible for persons with hearing loss and deafness, whether a town planning meeting or a workshop, or a live streaming on the internet or via the public access/government access cable TV channels or emergency alerts via phone MUST be open captioned (verbatim/in-sync) and also in American Sign Language. Would be glad to provide input as needed on issues I have raised in this survey to the town and state via email, etc. You must not ignore those on fixed incomes, those who are frail elders or older adults on small pensions, people of all ages with hearing loss and deafness, those seeking to renovate/remodel their cars, homes and property to be better able to manage disasters, offset climate change, have self sufficient dome home POD/accessible ADU for long term aging in place with less environmental impact.	8/12/2022 8:39 PM
36	I was an emergency preparedness planner for two health districts	8/12/2022 11:58 AM
37	I can't click links or copy text from this survey	8/11/2022 11:15 PM
38	Since one of the biggest costs during natural disasters is damage caused by fallen trees, either on houses/roads or knocking out electricity when they take down wires with them. It might actually be more cost effective to help home owner's remove or cut back trees that are in danger of falling.	8/11/2022 2:52 PM
39	Towns need to be proactive in disaster preparation. Street cleanings , tree and limb removal, and regular cleaning of storm drain cleanings so that water can be quickly removed during heavy rainfall events. In my neighborhood there is no regular street cleaning and storm drains are clogged with leaves and debri	8/11/2022 2:06 PM
40	First stop all da shooting in da streets. Day be killin us young. Ya know what I am sayin.	8/11/2022 1:59 PM
41	I hope I haven't wasted my time. Nothing gets done about flooding in my area. I purchased my home in 1999 and the flooding has gotten worse with each passing decade. I've not heard anything about any plans for my area whatsoever.	8/11/2022 1:19 PM
42	take a look at the marsh	8/11/2022 12:49 PM
43	I conserve water and recycle bath, dish to garden. Conserve electricity - no A/C. My house is over 110 years old. Yes I am concerned but I've lived through a bit and am not paranoid just perhaps disgusted by other people who then take advantage of my generations hard work to rectify wrongs. Doesn't set well and is frustrating - to say the least.	8/11/2022 12:47 PM
44	Stop the Tweed expansion! This is going to ruin homes, families, children and wildlife.	8/11/2022 12:43 PM
45	clean out storm drains and flush them to make sure they work.	8/11/2022 12:33 PM
46	One of my recreational activities is kayaking, which allows me to observe water and land conditions. I am surprised at the number of bridges that I see that are close to the water and could easily be overwhelmed in times of rising water. The best location example is the Route 146 (Montowese Avenue) bridge at the Branford River where the clearance at high tide is maybe one foot. Another example is the Buckingham Avenue bridge at Gulf Pond. When bridges are rebuilt, they should have at least four feet of clearance. Regulatory steps should be taken to not permit construction in areas that are subject to repeated flooding and damage.	8/9/2022 3:06 PM
47	This plan has to address social justice issues, otherwise tax dollars from low and middle income families will be spent protecting and repairing the houses of the wealthy. We need to have those folks move rather than take tax dollars to mitigate. Let's use this opportunity to give our beautiful shoreline back to everyone and give ourselves back the natural buffer it's supposed to be.	8/9/2022 9:36 AM
48	Climate change is an excuse of the Democrats to raise taxes, over regulate private citizens and control our lives.	8/5/2022 10:12 AM
49	I think this survey was generated due to the read FAA tweed approval of plans that were approved with issues that have not been fully disclosed. I have a seen changes in traffic and planes over my house (I assume in and effort to quiet those near the airport). East haven cannot accommodate the traffic, municipal services nor the congestion and providing revenue to New Haven. If the terminal is located in East Haven it will bring not only those problems but environmental, health and peaceful living to all.on town. I am not involved with any hater	8/3/2022 7:59 PM

South Central Connecticut Hazard Mitigation Plan Survey

	groups, their extreme, but see only flooding , environmental and town survivability at risk. This is being pushed through with BIG $ and government power and should be halted asap. It is awful for East Haven ,the whole shoreline and quality of life for all.	
50	The current administration lacks transparency and doesn't communicate effectively with the towns residents. The Mayor is usually MIA unless there are cameras and/or food available that's the only time he's out in public. Many wonder who is actually running the town.	8/3/2022 10:28 AM
51	The state should be considering the supply chain problems that the country has experienced. CT could restore its dairy industry and promote local small farming as a way to ensure basic food source independence.	7/31/2022 3:50 PM
52	I direct the Decision, Risk and Management Sciences Program at the National Science Foundation. Will send a separate email.	7/30/2022 3:58 PM
53	Thank you!	7/29/2022 3:11 PM
54	My biggest concern is loss of electric from tree damage.	7/29/2022 10:01 AM
55	Thank you for the information - valuable and helpful!	7/28/2022 7:51 PM
56	flood insurance is too expensive for people on the edge of the flood zone	7/28/2022 10:12 AM
57	I consider CTDEMHS to be mostly ineffective in providing timely emergency information to citizens. Typically, CT-Alerts are not issued until hours after the National Weather Service if at all. For example, Trop. Storm Ida, Nat. Weather Svc flood emergency (1st in CT history) was never conveyed through either DEMHS Twitter or CT-Alert. Regional CT-Alerts are left up to town emergency managers, who do not have technical resources that the state has.	7/27/2022 12:43 PM
58	Following Hurricane Irene and Sandy our town repaired an area of Middle Beach Road that had collapsed. The Army Corps of Engineers made recommendations on how best to repair it. The town did NOT follow their recommendations as they did not want to accept FEMA money and its oversight for the repairs. The area repaired has significantly deteriorated since then, with parts of the repairs having fallen away from wave action - there is also cracking in the pavement and sidewalk emanating from the eroded repair. There were many things the town could have done to reduce wave action on this area and chose not to. In Army Corps of Engineers records from the 40's there was an underwater "bern" installed off shore of Middle Beach road following the hurricane of 1938. It was repaired in the late 1950's, but NO maintenance has been done on it in the last 70+ years. Having the bern restored would immediately reduce the wave action that threatens Middle Beach Road, which is what causes damage during storms, not higher water levels. The bern is visible during very low tides and runs from Tuxis island past Gull Rock island to the east. The town of Stratford Ct has installed floating berns along parts of their shoreline to prevent damage and erosion from wave action. This would likely be far cheaper that building underwater berns, but equally affected. I feel the emphasis MUST be on improving and creating infrastructure to combat wave damage, NOT mandating private property elevation. Improving infrastructure should be a priority of your study.	7/26/2022 12:15 PM
59	I appreciate the survey and steps being taken to re-evaluate natural hazard mitigation along the coastline and Southern CT. While there is a balance between land development, residential and commercial, and growing local economy, there needs to be a concerted effort to maximize steps to protect current assets against long term intensifications of storms due to climate changes. Towns/Cities need to address the issue now. Using funds and spending mony now to protect future generations and our communities is a reality. Involving, educating, and exposing our school age people is a must. Igniting their interest at an early age will possibly give birth to new scholars, scientists, and creative thinkers on addressing this global issue that they are inheriting.	7/26/2022 11:36 AM
60	I do not think the state, county or especially towns should create overly restrictive and costly mandates and regulations for private homes and privately owned properties.	7/26/2022 9:31 AM
61	Climate change is a hoax	7/26/2022 8:24 AM
62	I believe in seas rising, global incineration etc. recycling and change ffor the bbst I guess.	7/26/2022 7:26 AM
63	West Haven needs to seriously upgrade the drainage infrastructure along the shoreline and neighborhoods surrounding the Colonial Blvd. culvert.	7/25/2022 11:22 AM
64	Any and all communication methods should be used to deseminate critical information.	7/23/2022 9:49 AM

South Central Connecticut Hazard Mitigation Plan Survey

65	There is coastal infrastructure in place since 1942 that has not been repaired/maintained since 1956. Post "Sandy" the army coros of engineers made recommendations to protect and shore up areas of a coastal road to prevent future damage. The town ignored these recommendations and instead did a substandard job of repair - The road is already undermined due to wave action, not water level rise. Prevention of safer infrastructure is key, rather than ignoring that wave action causes more damage than other storms/issues.	7/22/2022 9:46 PM
66	It seems a lot of money that someone is playing with	7/22/2022 5:42 PM
67	We hope the outcome of this survey isn't that we're going to pay more for property taxes, homeowners insurance & federal taxes for humans that don't maintain their property & landlords that don't for their renters either. The environment is very important to us & we take great care of our property. Our city needs to maintain the same amount of diligence. The side streets & main roads are an epic mess - riddled with potholes & poor drainage. Tall trees on city property aren't being maintained & brush isn't being cleared out in the wooded area that abuts our property.	7/9/2022 2:58 PM
68	Why doesn't the city of Meriden have public meetings on this five year plan? I don't think they do and it should be a process that involves public meetings as well as public outreach. Documents should be on the city website, agendas and minutes.	6/30/2022 1:57 PM
69	I own property inland as well as riverside, so these responses are a combination of those distinct hazard profiles.	6/30/2022 11:48 AM
70	East Haven needs a coastal resilience plan too! We lack stormwater management. New development at Sperry Lane and the Tweed Airport expansion risks encroachment to wetlands and flooding to populated residential areas. There are sea level rise issues.	6/7/2022 2:02 PM

Plan Review

Appendix B. Plan Implementation Supporting Materials

Plan Update Evaluation Worksheet

This worksheet was taken directly from FEMA's Local Mitigation Planning Handbook, p. A-37-38. It can be downloaded here: https://www.fema.gov/sites/default/files/2020-06/fema-local-mitigation-planning-handbook_03-2013.pdf

Plan Section	Considerations	Explanation
Planning Process	Should new jurisdictions and/or districts be invited to participate in future plan updates?	
	Have any internal or external agencies been invaluable to the mitigation strategy?	
	Can any procedures (e.g., meeting announcements, plan updates) be done differently or more efficiently?	
	Has the Planning Team undertaken any public outreach activities?	
	How can public participation be improved?	
	Have there been any changes in public support and/or decision- maker priorities related to hazard mitigation?	
Capability Assessment	Have jurisdictions adopted new policies, plans, regulations, or reports that could be incorporated into this plan?	
	Are there different or additional administrative, human, technical, and financial resources available for mitigation planning?	
	Are there different or new education and outreach programs and resources available for mitigation activities?	
	Has NFIP participation changed in the participating jurisdictions?	
Risk Assessment	Has a natural and/or technical or human-caused disaster occurred?	
	Should the list of hazards addressed in the plan be modified?	
	Are there new data sources and/or additional maps and studies available? If so, what are they and what have they revealed? Should the information be incorporated into future plan updates?	
	Do any new critical facilities or infrastructure need to be added to the asset lists?	
	Have any changes in development trends occurred that could create additional risks?	
	Are there repetitive losses and/or severe repetitive losses to document?	

Plan Section	Considerations	Explanation
Mitigation Strategy	Is the mitigation strategy being implemented as anticipated? Were the cost and timeline estimates accurate?	
	Should new mitigation actions be added to the Action Plan? Should existing mitigation actions be revised or eliminated from the plan?	
	Are there new obstacles that were not anticipated in the plan that will need to be considered in the next plan update?	
	Are there new funding sources to consider?	
	Have elements of the plan been incorporated into other planning mechanisms?	
Plan Maintenance Procedures	Was the plan monitored and evaluated as anticipated?	
	What are needed improvements to the procedures?	

Appendix C. Hazus Reports

Under Separate Cover.

2023 SCRCOG HAZARD MITIGATION PLAN UPDATE

JANUARY 2023

APPENDIX C: HAZUS REPORTS

Hazus: Earthquake Global Risk Report

Region Name: NewHaven_SCRCOG_EQ

Earthquake Scenario: East Haddam; May 16, 1791

Print Date: July 06, 2022

Disclaimer:

This version of Hazus utilizes 2010 Census Data.

Totals only reflect data for those census tracts/blocks included in the user's study region.

The estimates of social and economic impacts contained in this report were produced using Hazus loss estimation methodology software which is based on current scientific and engineering knowledge. There are uncertainties inherent in any loss estimation technique. Therefore, there may be significant differences between the modeled results contained in this report and the actual social and economic losses following a specific earthquake. These results can be improved by using enhanced inventory, geotechnical, and observed ground motion data.

Table of Contents

General Description of the Region

Hazus-MH is a regional earthquake loss estimation model that was developed by the Federal Emergency Management Agency (FEMA) and the National Institute of Building Sciences. The primary purpose of Hazus is to provide a methodology and software application to develop multi-hazard losses at a regional scale. These loss estimates would be used primarily by local, state and regional officials to plan and stimulate efforts to reduce risks from multi-hazards and to prepare for emergency response and recovery.

The earthquake loss estimates provided in this report was based on a region that includes 1 county(ies) from the following state(s):

Connecticut

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

The geographical size of the region is 618.17 square miles and contains 189 census tracts. There are over 334 thousand households in the region which has a total population of 862,477 people (2010 Census Bureau data). The distribution of population by Total Region and County is provided in Appendix B.

There are an estimated 280 thousand buildings in the region with a total building replacement value (excluding contents) of 129,167 (millions of dollars). Approximately 90.00 % of the buildings (and 73.00% of the building value) are associated with residential housing.

The replacement value of the transportation and utility lifeline systems is estimated to be 10,493 and 11,382 (millions of dollars) , respectively.

Building and Lifeline Inventory

Building Inventory

Hazus estimates that there are 280 thousand buildings in the region which have an aggregate total replacement value of 129,167 (millions of dollars) . Appendix B provides a general distribution of the building value by Total Region and County.

In terms of building construction types found in the region, wood frame construction makes up 83% of the building inventory. The remaining percentage is distributed between the other general building types.

Critical Facility Inventory

Hazus breaks critical facilities into two (2) groups: essential facilities and high potential loss facilities (HPL). Essential facilities include hospitals, medical clinics, schools, fire stations, police stations and emergency operations facilities. High potential loss facilities include dams, levees, military installations, nuclear power plants and hazardous material sites.

For essential facilities, there are 13 hospitals in the region with a total bed capacity of 3,045 beds. There are 443 schools, 114 fire stations, 38 police stations and 29 emergency operation facilities. With respect to high potential loss facilities (HPL), there are no dams identified within the inventory. The inventory also includes 304 hazardous material sites, no military installations and no nuclear power plants.

Transportation and Utility Lifeline Inventory

Within Hazus, the lifeline inventory is divided between transportation and utility lifeline systems. There are seven (7) transportation systems that include highways, railways, light rail, bus, ports, ferry and airports. There are six (6) utility systems that include potable water, wastewater, natural gas, crude & refined oil, electric power and communications. The lifeline inventory data are provided in Tables 1 and 2.

The total value of the lifeline inventory is over 21,875.00 (millions of dollars). This inventory includes over 477.21 miles of highways, 876 bridges, 13,890.75 miles of pipes.

Table 1: Transportation System Lifeline Inventory

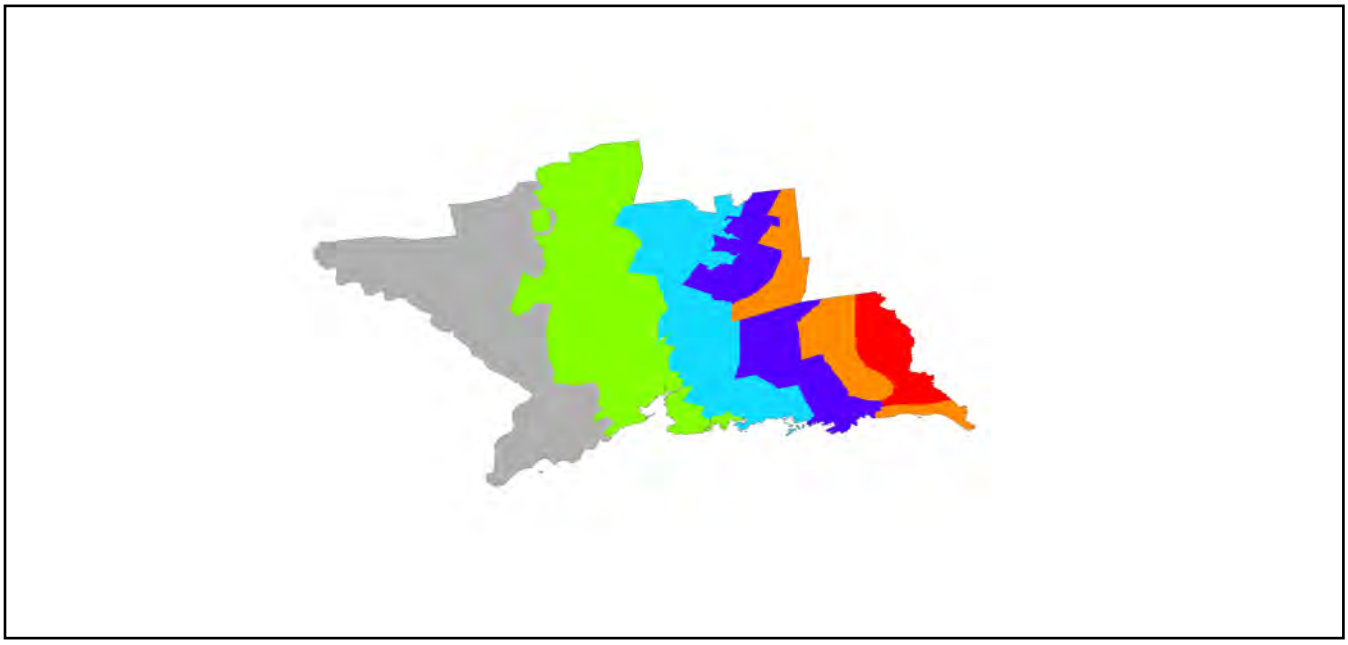
System	Component	# Locations/ # Segments	Replacement value (millions of dollars)
Highway	Bridges	876	4223.1292
	Segments	455	5055.2822
	Tunnels	2	47.1700
		Subtotal	**9325.5814**
Railways	Bridges	71	377.1875
	Facilities	5	13.3150
	Segments	196	368.4724
	Tunnels	0	0.0000
		Subtotal	**758.9749**
Light Rail	Bridges	0	0.0000
	Facilities	5	17.0000
	Segments	4	53.6656
	Tunnels	0	0.0000
		Subtotal	**70.6656**
Bus	Facilities	3	5.1000
		Subtotal	**5.1000**
Ferry	Facilities	0	0.0000
		Subtotal	**0.0000**
Port	Facilities	29	97.3675
		Subtotal	**97.3675**
Airport	Facilities	3	32.0875
	Runways	4	203.3986
		Subtotal	**235.4861**
		Total	**10,493.20**

Table 2: Utility System Lifeline Inventory

System	Component	# Locations / Segments	Replacement value (millions of dollars)
Potable Water	Distribution Lines	NA	277.4073
	Facilities	7	268.0650
	Pipelines	0	0.0000
		Subtotal	**545.4723**
Waste Water	Distribution Lines	NA	166.4444
	Facilities	32	4862.0000
	Pipelines	0	0.0000
		Subtotal	**5028.4444**
Natural Gas	Distribution Lines	NA	110.9629
	Facilities	2	3.7187
	Pipelines	90	117.9090
		Subtotal	**232.5906**
Oil Systems	Facilities	0	0.0000
	Pipelines	0	0.0000
		Subtotal	**0.0000**
Electrical Power	Facilities	10	5572.8125
		Subtotal	**5572.8125**
Communication	Facilities	31	3.5650
		Subtotal	**3.5650**
		Total	**11,382.90**

Earthquake Scenario

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



Scenario Name	East Haddam; May 16, 1791
Type of Earthquake	Arbitrary
Fault Name	NA
Historical Epicenter ID #	NA
Probabilistic Return Period	NA
Longitude of Epicenter	-72.40
Latitude of Epicenter	41.50
Earthquake Magnitude	6.40
Depth (km)	10.00
Rupture Length (Km)	NA
Rupture Orientation (degrees)	NA
Attenuation Function	Central & East US (CEUS 2008)

Direct Earthquake Damage

Building Damage

Hazus estimates that about 28,034 buildings will be at least moderately damaged. This is over 10.00 % of the buildings in the region. There are an estimated 1,619 buildings that will be damaged beyond repair. The definition of the 'damage states' is provided in Volume 1: Chapter 5 of the Hazus technical manual. Table 3 below summarizes the expected damage by general occupancy for the buildings in the region. Table 4 below summarizes the expected damage by general building type.

Damage Categories by General Occupancy Type

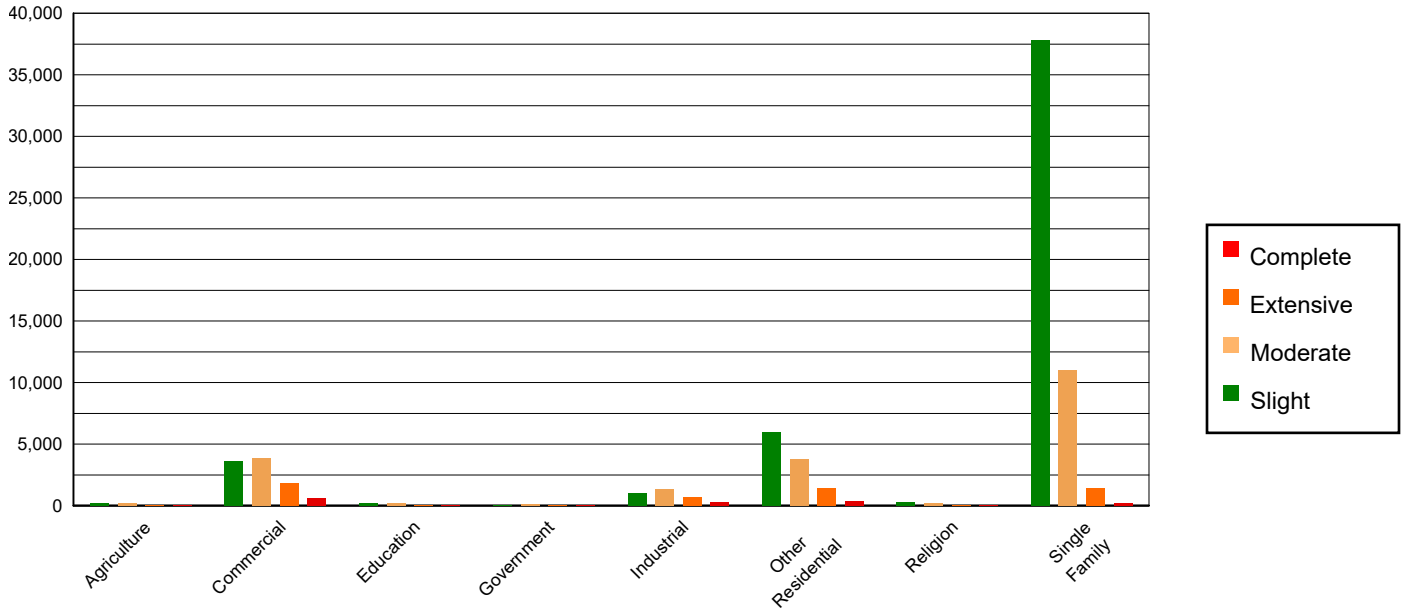


Table 3: Expected Building Damage by Occupancy

	None		Slight		Moderate		Extensive		Complete	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Agriculture	390.10	0.19	188.06	0.38	174.70	0.85	77.13	1.34	30.02	1.85
Commercial	8454.50	4.16	3599.57	7.33	3888.79	18.82	1841.15	32.02	655.99	40.51
Education	415.86	0.20	174.07	0.35	200.17	0.97	87.58	1.52	28.32	1.75
Government	170.03	0.08	74.34	0.15	96.98	0.47	52.29	0.91	21.36	1.32
Industrial	2395.83	1.18	1030.11	2.10	1336.60	6.47	731.71	12.73	289.75	17.89
Other Residential	22931.39	11.29	5940.84	12.10	3785.68	18.32	1428.93	24.85	390.15	24.09
Religion	887.04	0.44	262.93	0.54	205.54	0.99	83.89	1.46	23.60	1.46
Single Family	167382.99	82.44	37838.73	77.05	10976.68	53.12	1447.42	25.17	180.17	11.13
Total	**203,028**		**49,109**		**20,665**		**5,750**		**1,619**	

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

	None		Slight		Moderate		Extensive		Complete	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Wood	181042.30	89.17	40600.40	82.67	11035.42	53.40	1068.86	18.59	53.51	3.30
Steel	4845.34	2.39	2277.89	4.64	3569.44	17.27	2039.84	35.47	843.66	52.10
Concrete	1213.41	0.60	541.28	1.10	828.57	4.01	419.28	7.29	148.13	9.15
Precast	429.80	0.21	136.75	0.28	213.29	1.03	135.36	2.35	30.64	1.89
RM	3168.85	1.56	675.55	1.38	848.95	4.11	394.18	6.86	39.98	2.47
URM	11671.18	5.75	4473.78	9.11	3547.37	17.17	1289.17	22.42	349.81	21.60
MH	656.86	0.32	403.01	0.82	622.10	3.01	403.42	7.02	153.61	9.49
Total	**203,028**		**49,109**		**20,665**		**5,750**		**1,619**	

*Note:

RM Reinforced Masonry
URM Unreinforced Masonry
MH Manufactured Housing

Essential Facility Damage

Before the earthquake, the region had 3,045 hospital beds available for use. On the day of the earthquake, the model estimates that only 1,739 hospital beds (57.00%) are available for use by patients already in the hospital and those injured by the earthquake. After one week, 78.00% of the beds will be back in service. By 30 days, 94.00% will be operational.

Table 5: Expected Damage to Essential Facilities

Classification	Total	# Facilities		
		At Least Moderate Damage > 50%	Complete Damage > 50%	With Functionality > 50% on day 1
Hospitals	13	0	0	12
Schools	443	0	0	318
EOCs	29	0	0	21
PoliceStations	38	0	0	29
FireStations	114	0	0	79

Transportation Lifeline Damage

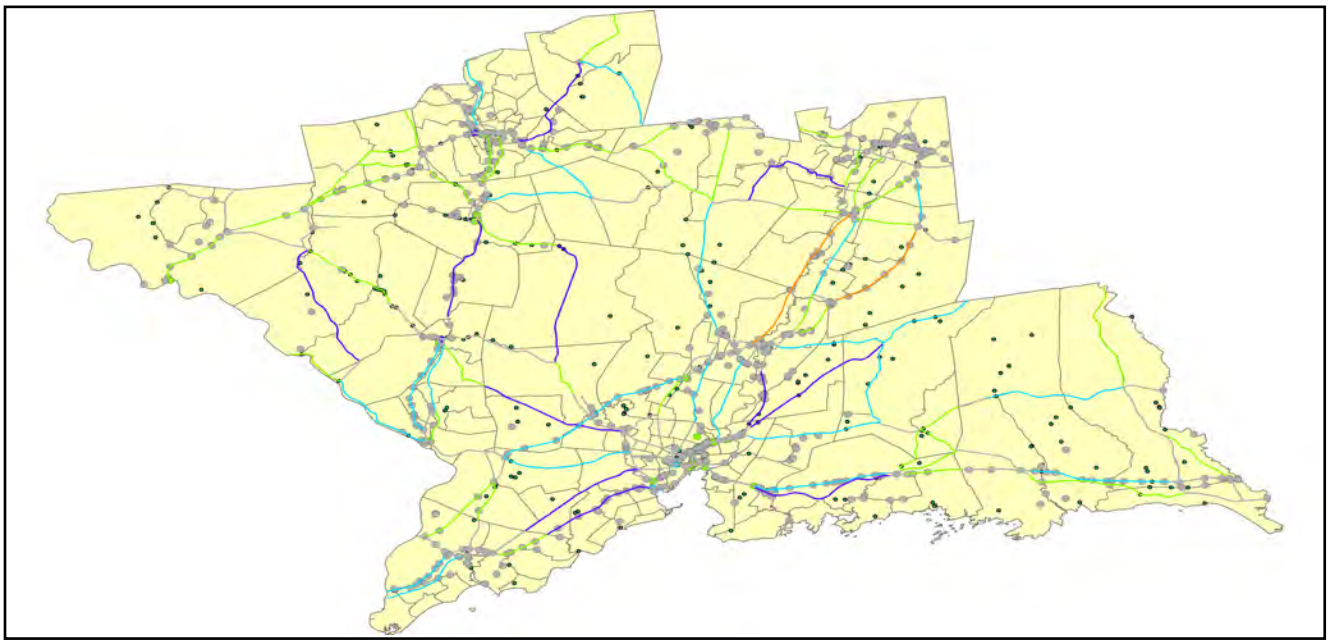


Table 6: Expected Damage to the Transportation Systems

System	Component		Number of Locations			
		Locations/ Segments	With at Least Mod. Damage	With Complete Damage	With Functionality > 50 % After Day 1	With Functionality > 50 % After Day 7
Highway	Segments	455	0	0	455	455
	Bridges	876	40	0	839	871
	Tunnels	2	0	0	2	2
Railways	Segments	196	0	0	196	196
	Bridges	71	0	0	71	71
	Tunnels	0	0	0	0	0
	Facilities	5	0	0	5	5
Light Rail	Segments	4	0	0	4	4
	Bridges	0	0	0	0	0
	Tunnels	0	0	0	0	0
	Facilities	5	0	0	5	5
Bus	Facilities	3	0	0	3	3
Ferry	Facilities	0	0	0	0	0
Port	Facilities	29	0	0	29	29
Airport	Facilities	3	0	0	3	3
	Runways	4	0	0	4	4

Table 6 provides damage estimates for the transportation system.

Note: Roadway segments, railroad tracks and light rail tracks are assumed to be damaged by ground failure only. If ground failure maps are not provided, damage estimates to these components will not be computed.

Tables 7-9 provide information on the damage to the utility lifeline systems. Table 7 provides damage to the utility system facilities. Table 8 provides estimates on the number of leaks and breaks by the pipelines of the utility systems. For electric power and potable water, Hazus performs a simplified system performance analysis. Table 9 provides a summary of the system performance information.

Table 7 : Expected Utility System Facility Damage

System	# of Locations				
	Total #	With at Least Moderate Damage	With Complete Damage	with Functionality > 50 %	
				After Day 1	After Day 7
Potable Water	7	0	0	7	7
Waste Water	32	0	0	22	32
Natural Gas	2	0	0	2	2
Oil Systems	0	0	0	0	0
Electrical Power	10	0	0	10	10
Communication	31	0	0	31	31

Table 8 : Expected Utility System Pipeline Damage (Site Specific)

System	Total Pipelines Length (miles)	Number of Leaks	Number of Breaks
Potable Water	8,619	1600	400
Waste Water	5,171	804	201
Natural Gas	101	7	2
Oil	0	0	0

Table 9: Expected Potable Water and Electric Power System Performance

	Total # of Households	Number of Households without Service				
		At Day 1	At Day 3	At Day 7	At Day 30	At Day 90
Potable Water	334,502	20,737	14,708	5,443	0	0
Electric Power		3,434	1,657	418	47	5

Induced Earthquake Damage

Fire Following Earthquake

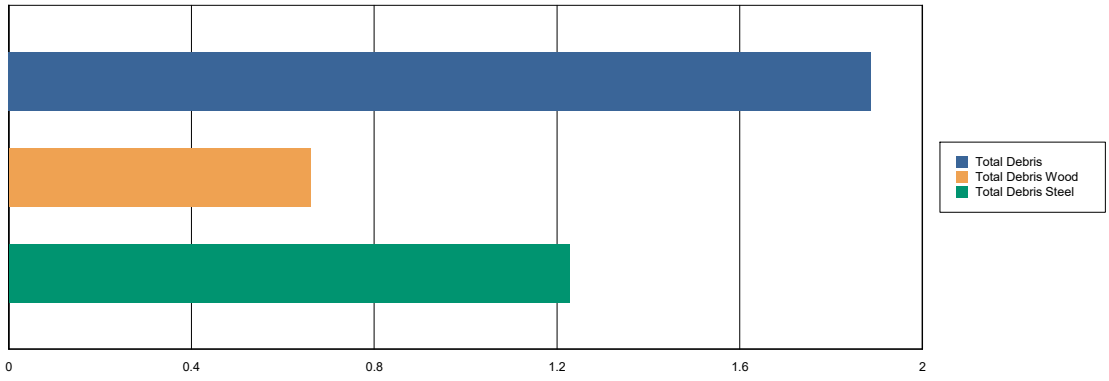
Fires often occur after an earthquake. Because of the number of fires and the lack of water to fight the fires, they can often burn out of control. Hazus uses a Monte Carlo simulation model to estimate the number of ignitions and the amount of burnt area. For this scenario, the model estimates that there will be 3 ignitions that will burn about 0.00 sq. mi 0.00 % of the region's total area.) The model also estimates that the fires will displace about 0 people and burn about 0 (millions of dollars) of building value.

Debris Generation

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

The model estimates that a total of 1,887,000 tons of debris will be generated. Of the total amount, Brick/Wood comprises 35.00% of the total, with the remainder being Reinforced Concrete/Steel. If the debris tonnage is converted to an estimated number of truckloads, it will require 75,480 truckloads (@25 tons/truck) to remove the debris generated by the earthquake.

Earthquake Debris (millions of tons)



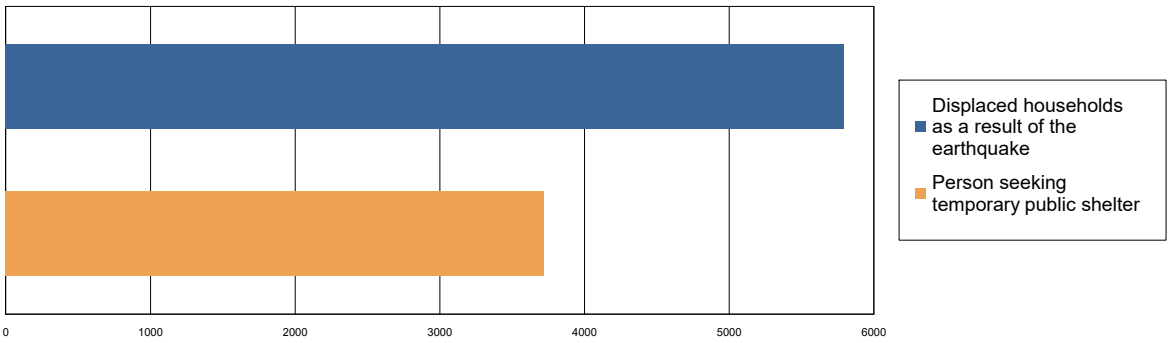
Brick/ Wood	Reinforced Concrete/Steel	Total Debris	Truck Load
0.66	1.23	1.89	75,480 (@25 tons/truck)

Social Impact

Shelter Requirement

Hazus estimates the number of households that are expected to be displaced from their homes due to the earthquake and the number of displaced people that will require accommodations in temporary public shelters. The model estimates 5,793 households to be displaced due to the earthquake. Of these, 3,723 people (out of a total population of 862,477) will seek temporary shelter in public shelters.

Displaced Households/ Persons Seeking Short Term Public Shelter



Displaced households as a result of the earthquake	Persons seeking temporary public shelter
5,793	3,723

Casualties

Hazus estimates the number of people that will be injured and killed by the earthquake. The casualties are broken down into four (4) severity levels that describe the extent of the injuries. The levels are described as follows;

- Severity Level 1: Injuries will require medical attention but hospitalization is not needed.
- Severity Level 2: Injuries will require hospitalization but are not considered life-threatening
- Severity Level 3: Injuries will require hospitalization and can become life threatening if not promptly treated.
- Severity Level 4: Victims are killed by the earthquake.

The casualty estimates are provided for three (3) times of day: 2:00 AM, 2:00 PM and 5:00 PM. These times represent the periods of the day that different sectors of the community are at their peak occupancy loads. The 2:00 AM estimate considers that the residential occupancy load is maximum, the 2:00 PM estimate considers that the educational, commercial and industrial sector loads are maximum and 5:00 PM represents peak commute time.

Table 10 provides a summary of the casualties estimated for this earthquake

Table 10: Casualty Estimates

		Level 1	Level 2	Level 3	Level 4
2 AM	Commercial	30.17	7.24	0.97	1.90
	Commuting	0.09	0.11	0.20	0.04
	Educational	0.00	0.00	0.00	0.00
	Hotels	0.00	0.00	0.00	0.00
	Industrial	46.27	11.52	1.59	3.12
	Other-Residential	527.61	115.98	15.66	30.68
	Single Family	224.25	32.17	3.08	5.98
	Total	**828**	**167**	**21**	**42**
2 PM	Commercial	1717.98	412.25	55.46	107.77
	Commuting	0.79	1.01	1.76	0.34
	Educational	643.43	160.50	23.58	45.81
	Hotels	0.00	0.00	0.00	0.00
	Industrial	341.34	84.99	11.84	22.93
	Other-Residential	108.00	23.87	3.29	6.21
	Single Family	43.43	6.48	0.66	1.23
	Total	**2,855**	**689**	**97**	**184**
5 PM	Commercial	1216.05	292.10	39.72	76.01
	Commuting	15.53	19.88	34.56	6.64
	Educational	76.15	18.40	2.64	5.15
	Hotels	0.00	0.00	0.00	0.00
	Industrial	213.33	53.12	7.40	14.33
	Other-Residential	206.57	45.79	6.33	11.94
	Single Family	87.21	13.07	1.34	2.48
	Total	**1,815**	**442**	**92**	**117**

Economic Loss

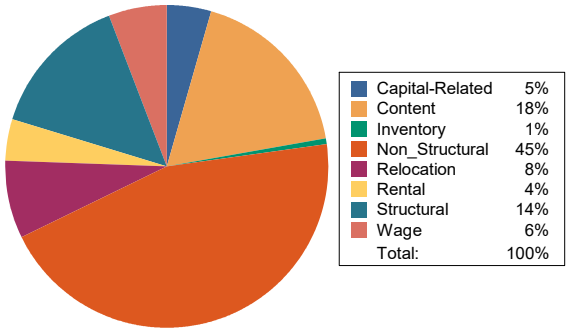
The total economic loss estimated for the earthquake is 8,495.00 (millions of dollars), which includes building and lifeline related losses based on the region's available inventory. The following three sections provide more detailed information about these losses.

Building-Related Losses

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

The total building-related losses were 7,837.43 (millions of dollars); 22 % of the estimated losses were related to the business interruption of the region. By far, the largest loss was sustained by the residential occupancies which made up over 38 % of the total loss. Table 11 below provides a summary of the losses associated with the building damage.

Earthquake Losses by Loss Type ($ millions)



Earthquake Losses by Occupancy Type ($ millions)

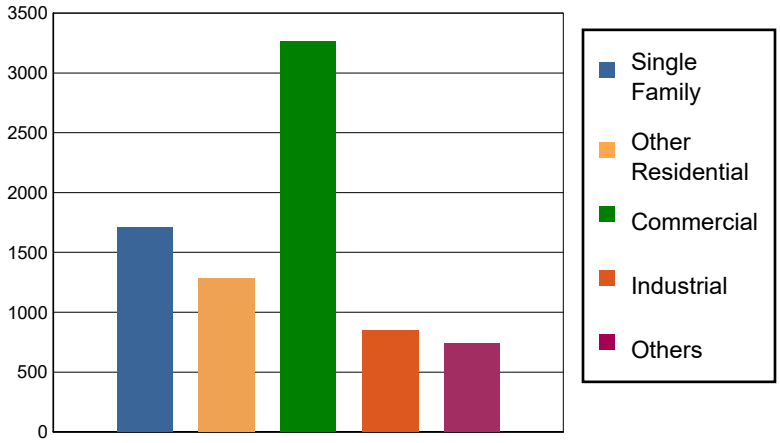


Table 11: Building-Related Economic Loss Estimates

(Millions of dollars)

Category	Area	Single Family	Other Residential	Commercial	Industrial	Others	Total
Income Losses							
	Wage	0.0000	42.5901	367.9616	18.6038	31.3045	460.4600
	Capital-Related	0.0000	18.0643	320.1739	11.9704	8.9404	359.1490
	Rental	24.7029	95.9203	186.8340	7.0455	14.3840	328.8867
	Relocation	86.6965	59.2214	297.8701	36.9994	124.4514	605.2388
	Subtotal	**111.3994**	**215.7961**	**1172.8396**	**74.6191**	**179.0803**	**1753.7345**
Capital Stock Losses							
	Structural	210.2742	181.3948	490.1430	141.5750	109.7377	1,133.1247
	Non_Structural	1021.9054	716.0130	1108.7402	370.2164	313.8321	3,530.7071
	Content	366.9109	166.4541	477.9250	226.3853	137.3384	1,375.0137
	Inventory	0.0000	0.0000	10.4348	33.3854	1.0319	44.8521
	Subtotal	**1599.0905**	**1063.8619**	**2087.2430**	**771.5621**	**561.9401**	**6083.6976**
	Total	**1710.49**	**1279.66**	**3260.08**	**846.18**	**741.02**	**7837.43**

Transportation and Utility Lifeline Losses

For the transportation and utility lifeline systems, Hazus computes the direct repair cost for each component only. There are no losses computed by Hazus for business interruption due to lifeline outages. Tables 12 & 13 provide a detailed breakdown in the expected lifeline losses.

Table 12: Transportation System Economic Losses
(Millions of dollars)

System	Component	Inventory Value	Economic Loss	Loss Ratio (%)
Highway	Segments	5055.2822	0.0000	0.00
	Bridges	4223.1292	132.5841	3.14
	Tunnels	47.1700	0.1063	0.23
	Subtotal	**9325.5814**	**132.6904**	
Railways	Segments	368.4724	0.0000	0.00
	Bridges	377.1875	2.7060	0.72
	Tunnels	0.0000	0.0000	0.00
	Facilities	13.3150	1.8697	14.04
	Subtotal	**758.9749**	**4.5757**	
Light Rail	Segments	53.6656	0.0000	0.00
	Bridges	0.0000	0.0000	0.00
	Tunnels	0.0000	0.0000	0.00
	Facilities	17.0000	2.6407	15.53
	Subtotal	**70.6656**	**2.6407**	
Bus	Facilities	5.1000	0.4601	9.02
	Subtotal	**5.1000**	**0.4601**	
Ferry	Facilities	0.0000	0.0000	0.00
	Subtotal	**0.0000**	**0.0000**	
Port	Facilities	97.3675	11.8185	12.14
	Subtotal	**97.3675**	**11.8185**	
Airport	Facilities	32.0875	4.2016	13.09
	Runways	203.3986	0.0000	0.00
	Subtotal	**235.4861**	**4.2016**	
	Total	**10,493.18**	**156.39**	

Table 13: Utility System Economic Losses

(Millions of dollars)

System	Component	Inventory Value	Economic Loss	Loss Ratio (%)
Potable Water	Pipelines	0.0000	0.0000	0.00
	Facilities	268.0650	20.6891	7.72
	Distribution Lines	277.4073	7.1992	2.60
	Subtotal	**545.4723**	**27.8883**	
Waste Water	Pipelines	0.0000	0.0000	0.00
	Facilities	4862.0000	231.2276	4.76
	Distribution Lines	166.4444	3.6163	2.17
	Subtotal	**5028.4444**	**234.8439**	
Natural Gas	Pipelines	117.9090	0.0000	0.00
	Facilities	3.7187	0.0894	2.40
	Distribution Lines	110.9629	1.2389	1.12
	Subtotal	**232.5906**	**1.3283**	
Oil Systems	Pipelines	0.0000	0.0000	0.00
	Facilities	0.0000	0.0000	0.00
	Subtotal	**0.0000**	**0.0000**	
Electrical Power	Facilities	5572.8125	236.8899	4.25
	Subtotal	**5572.8125**	**236.8899**	
Communication	Facilities	3.5650	0.2246	6.30
	Subtotal	**3.5650**	**0.2246**	
	Total	**11,382.88**	**501.18**	

Appendix A: County Listing for the Region

New Haven,CT

Appendix B: Regional Population and Building Value Data

State	County Name	Population	Building Value (millions of dollars)		
			Residential	Non-Residential	Total
Connecticut					
	New Haven	862,477	94,153	35,014	129,167
Total Region		**862,477**	**94,153**	**35,014**	**129,167**

Hazus: Flood Global Risk Report

Region Name: SCROG_FLD_multi

Flood Scenario: Multi-Freq

Print Date: Tuesday, August 2, 2022

Disclaimer:
This version of Hazus utilizes 2010 Census Data.
Totals only reflect data for those census tracts/blocks included in the user's study region.

The estimates of social and economic impacts contained in this report were produced using Hazus loss estimation methodology software which is based on current scientific and engineering knowledge. There are uncertainties inherent in any loss estimation technique. Therefore, there may be significant differences between the modeled results contained in this report and the actual social and economic losses following a specific Flood. These results can be improved by using enhanced inventory data and flood hazard information.

FEMA

RiskMAP
Increasing Resilience Together

Table of Contents

General Description of the Region

Hazus is a regional multi-hazard loss estimation model that was developed by the Federal Emergency Management Agency (FEMA) and the National Institute of Building Sciences (NIBS). The primary purpose of Hazus is to provide a methodology and software application to develop multi-hazard losses at a regional scale. These loss estimates would be used primarily by local, state and regional officials to plan and stimulate efforts to reduce risks from multi-hazards and to prepare for emergency response and recovery.

The flood loss estimates provided in this report were based on a region that included 1 county(ies) from the following state(s):

- Connecticut

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

The geographical size of the region is approximately 376 square miles and contains 8,992 census blocks. The region contains over 223 thousand households and has a total population of 570,001 people (2010 Census Bureau data). The distribution of population by State and County for the study region is provided in Appendix B.

There are an estimated 183,793 buildings in the region with a total building replacement value (excluding contents) of 88,668 million dollars. Approximately 89.60% of the buildings (and 71.52% of the building value) are associated with residential housing.

Building Inventory

General Building Stock

Hazus estimates that there are 183,793 buildings in the region which have an aggregate total replacement value of 88,668 million dollars. Table 1 and Table 2 present the relative distribution of the value with respect to the general occupancies by Study Region and Scenario respectively. Appendix B provides a general distribution of the building value by State and County.

Table 1
Building Exposure by Occupancy Type for the Study Region

Occupancy	Exposure ($1000)	Percent of Total
Residential	63,417,388	71.5%
Commercial	16,156,577	18.2%
Industrial	4,143,620	4.7%
Agricultural	205,951	0.2%
Religion	1,095,314	1.2%
Government	381,243	0.4%
Education	3,268,112	3.7%
Total	**88,668,205**	**100%**

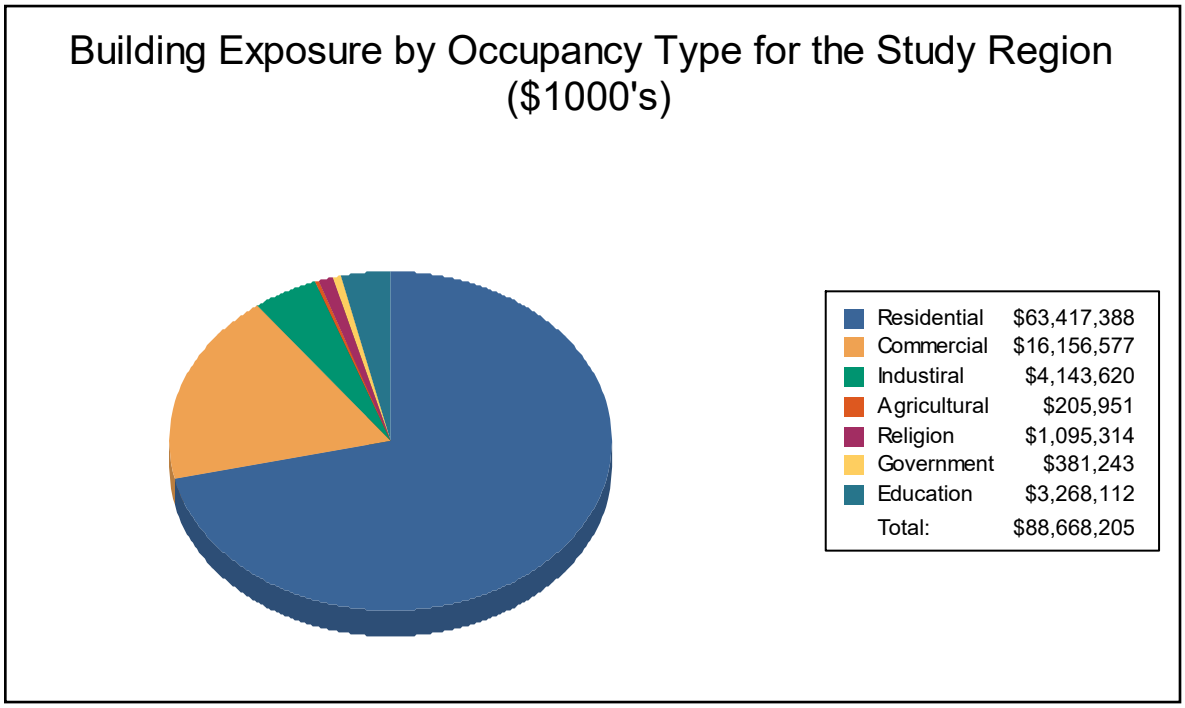
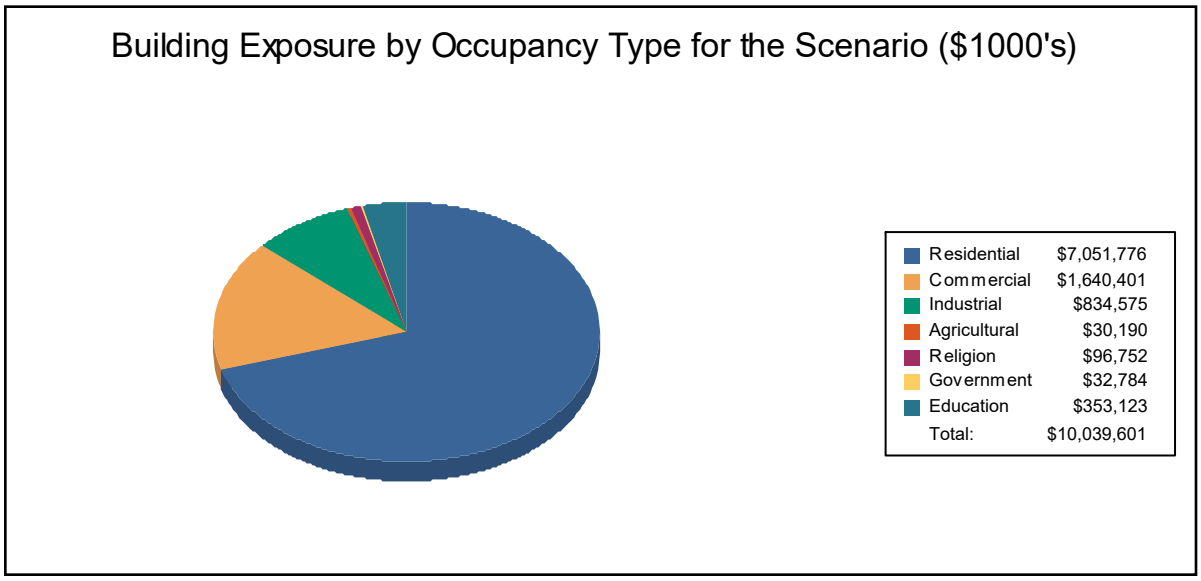


Table 2
Building Exposure by Occupancy Type for the Scenario

Occupancy	Exposure ($1000)	Percent of Total
Residential	7,051,776	70.2%
Commercial	1,640,401	16.3%
Industrial	834,575	8.3%
Agricultural	30,190	0.3%
Religion	96,752	1.0%
Government	32,784	0.3%
Education	353,123	3.5%
Total	**10,039,601**	**100%**



Essential Facility Inventory

For essential facilities, there are 9 hospitals in the region with a total bed capacity of 2,360 beds. There are 294 schools, 73 fire stations, 22 police stations and 15 emergency operation centers.

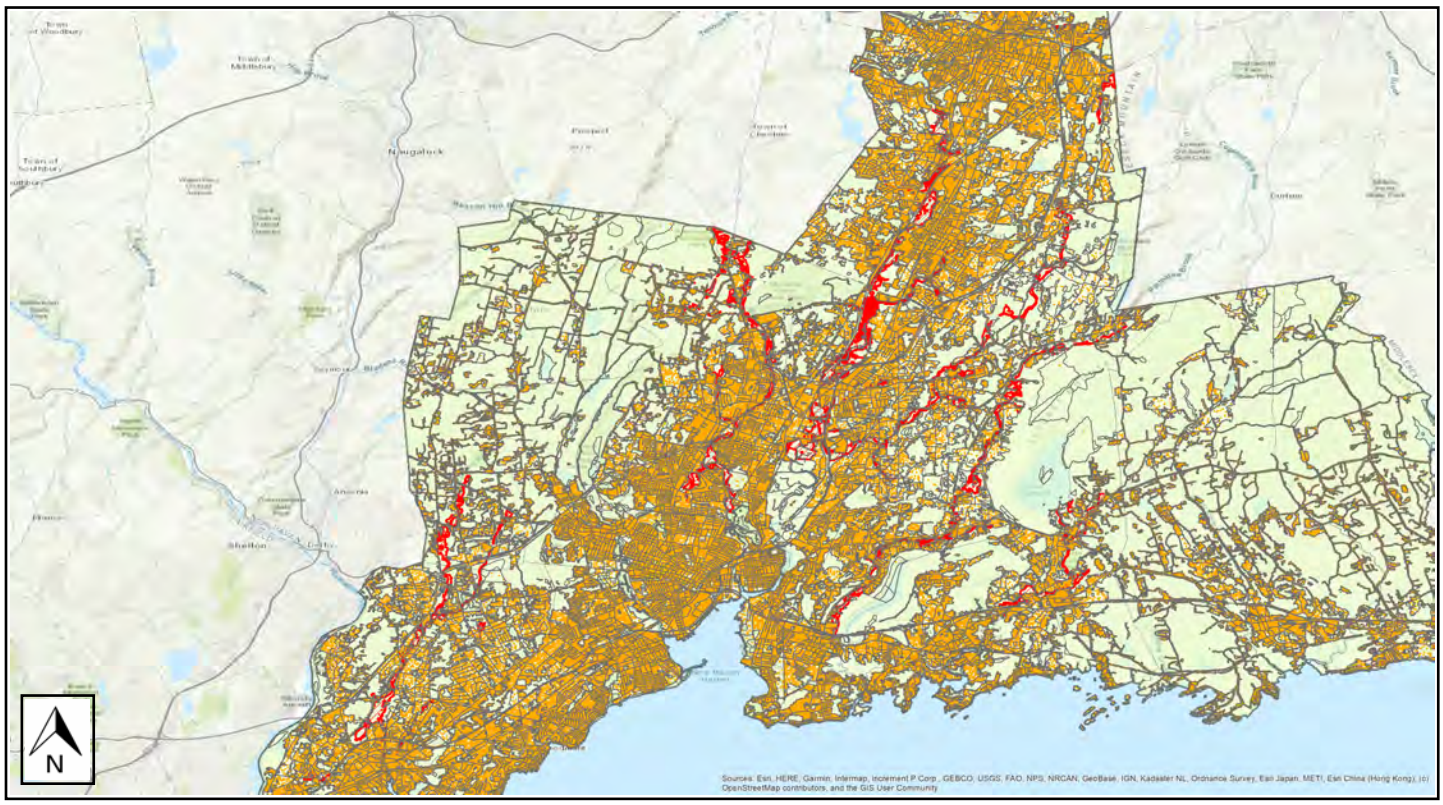
Flood Scenario Parameters

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

Study Region Name:	SCROG_FLD_multi
Scenario Name:	Multi-Freq
Return Period Analyzed:	10
Analysis Options Analyzed:	No What-Ifs

Study Region Overview Map

Illustrating scenario flood extent, as well as exposed essential facilities and total exposure



Building Damage

General Building Stock Damage

Hazus estimates that about 135 buildings will be at least moderately damaged. This is over 92% of the total number of buildings in the scenario. There are an estimated 0 buildings that will be completely destroyed. The definition of the 'damage states' is provided in the Hazus Flood Technical Manual. Table 3 below summarizes the expected damage by general occupancy for the buildings in the region. Table 4 summarizes the expected damage by general building type.

Total Economic Loss (1 dot = $300K) Overview Map

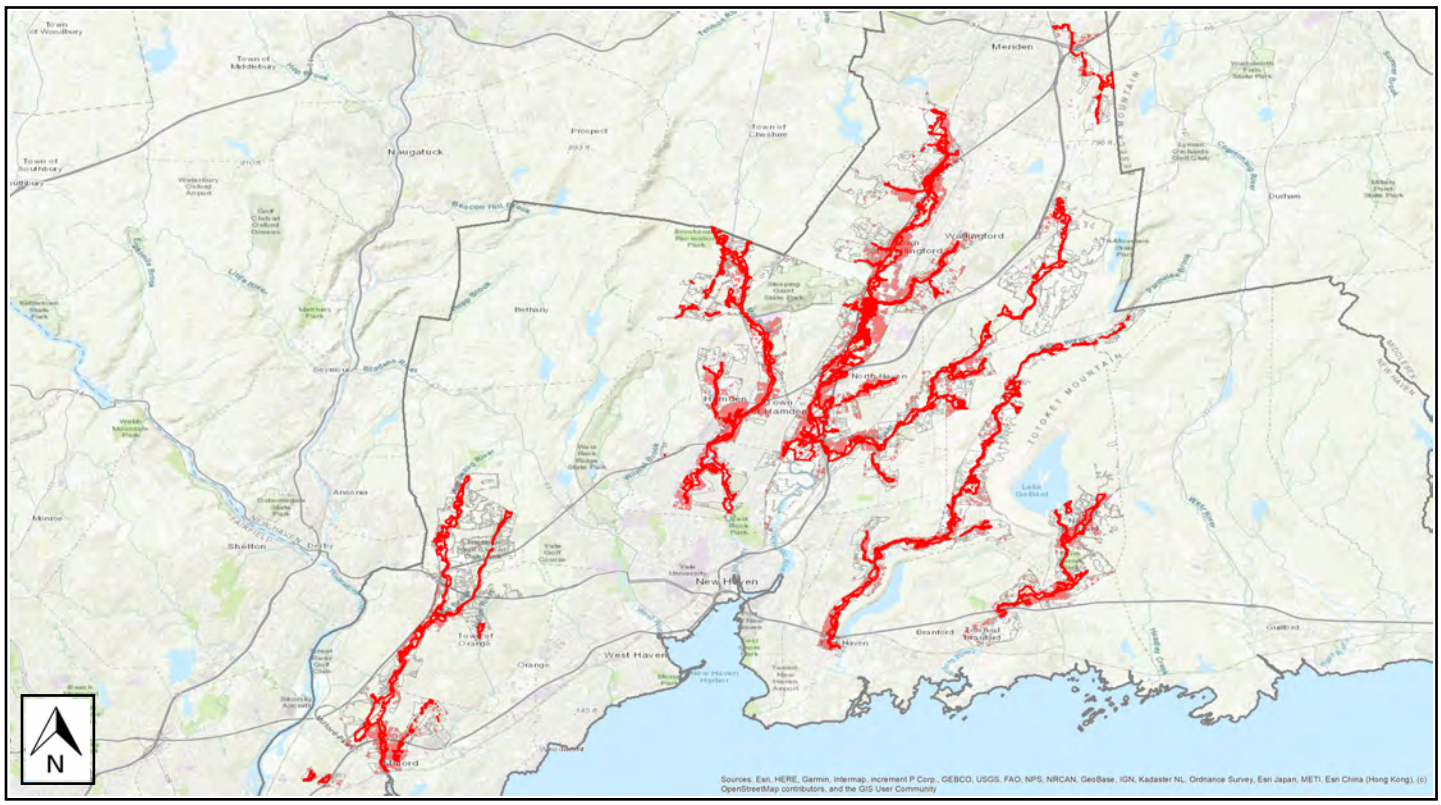


Table 3: Expected Building Damage by Occupancy

	1-10		11-20		21-30		31-40		41-50		>50	
Occupancy	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**
Agriculture	0	0	0	0	0	0	0	0	0	0	0	0
Commercial	1	25	3	75	0	0	0	0	0	0	0	0
Education	0	0	0	0	0	0	0	0	0	0	0	0
Government	0	0	0	0	0	0	0	0	0	0	0	0
Industrial	0	0	0	0	0	0	0	0	0	0	0	0
Religion	0	0	0	0	0	0	0	0	0	0	0	0
Residential	176	57	113	37	19	6	0	0	0	0	0	0
Total	**177**		**116**		**19**		**0**		**0**		**0**	

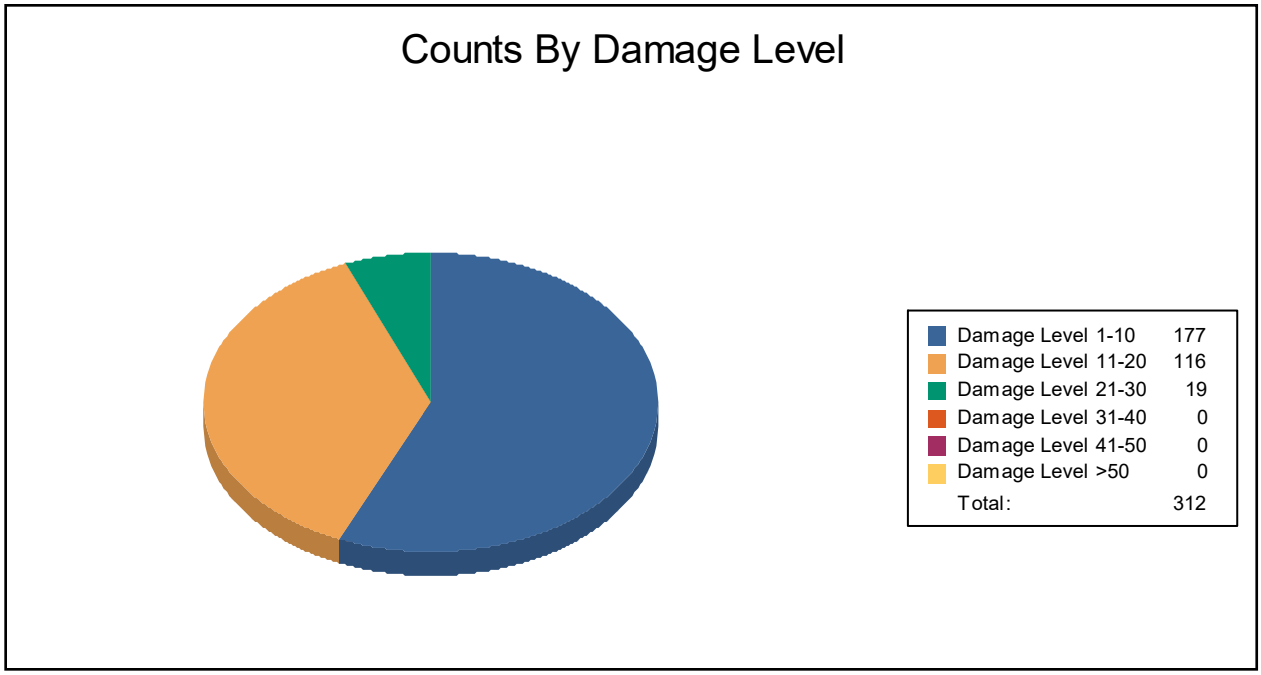


Table 4: Expected Building Damage by Building Type

Building Type	1-10		11-20		21-30		31-40		41-50		>50	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Concrete	0	0	0	0	0	0	0	0	0	0	0	0
ManufHousing	0	0	0	0	0	0	0	0	0	0	0	0
Masonry	0	0	1	100	0	0	0	0	0	0	0	0
Steel	0	0	1	100	0	0	0	0	0	0	0	0
Wood	176	57	114	37	19	6	0	0	0	0	0	0

Essential Facility Damage

Before the flood analyzed in this scenario, the region had 2,360 hospital beds available for use. On the day of the scenario flood event, the model estimates that 2,360 hospital beds are available in the region.

Table 5: Expected Damage to Essential Facilities

		# Facilities		
Classification	Total	At Least Moderate	At Least Substantial	Loss of Use
Emergency Operation Centers	15	0	0	0
Fire Stations	73	0	0	0
Hospitals	9	0	0	0
Police Stations	22	0	0	0
Schools	294	0	0	0

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

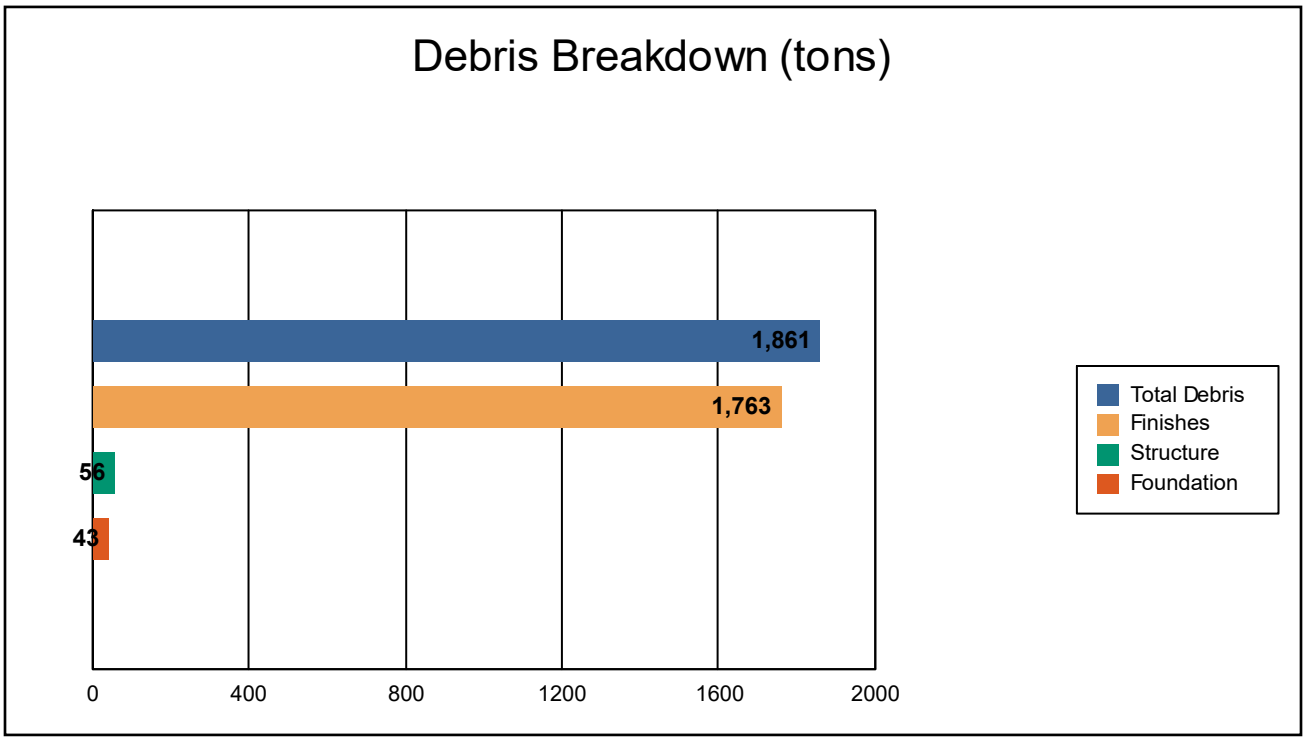
(1) None of your facilities were flooded. This can be checked by mapping the inventory data on the depth grid.

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

Induced Flood Damage

Debris Generation

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

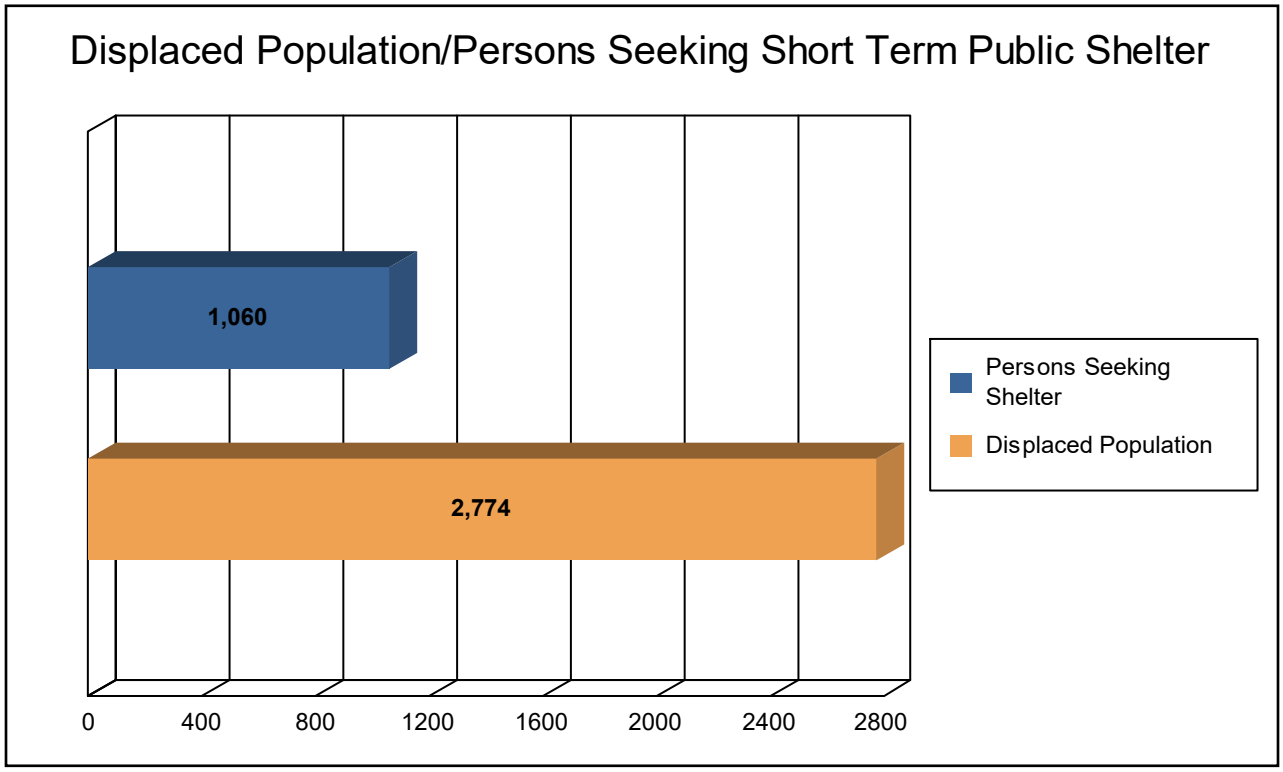


The model estimates that a total of 1,861 tons of debris will be generated. Of the total amount, Finishes comprises 95% of the total, Structure comprises 3% of the total, and Foundation comprises 2%. If the debris tonnage is converted into an estimated number of truckloads, it will require 75 truckloads (@25 tons/truck) to remove the debris generated by the flood.

Social Impact

Shelter Requirements

Hazus estimates the number of households that are expected to be displaced from their homes due to the flood and the associated potential evacuation. Hazus also estimates those displaced people that will require accommodations in temporary public shelters. The model estimates 925 households (or 2,774 of people) will be displaced due to the flood. Displacement includes households evacuated from within or very near to the inundated area. Of these, 1,060 people (out of a total population of 570,001) will seek temporary shelter in public shelters.



Economic Loss

The total economic loss estimated for the flood is 241.33 million dollars, which represents 2.40 % of the total replacement value of the scenario buildings.

Building-Related Losses

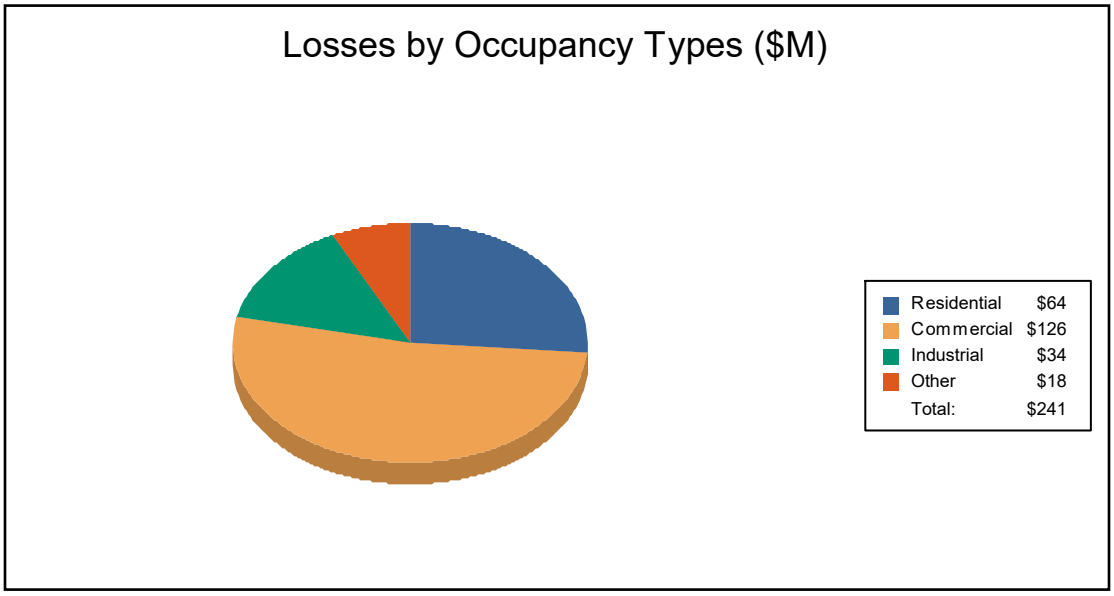
The building losses are broken into two categories: direct building losses and business interruption losses. The direct building losses are the estimated costs to repair or replace the damage caused to the building and its contents. The business interruption losses are the losses associated with inability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

The total building-related losses were 129.89 million dollars. 46% of the estimated losses were related to the business interruption of the region. The residential occupancies made up 26.48% of the total loss. Table 6 below provides a summary of the losses associated with the building damage.

Table 6: Building-Related Economic Loss Estimates

(Millions of dollars)

Category	Area	Residential	Commercial	Industrial	Others	Total
Building Loss						
	Building	31.68	11.64	8.16	0.70	52.18
	Content	15.18	34.40	20.18	4.69	74.45
	Inventory	0.00	0.48	2.74	0.05	3.27
	Subtotal	**46.86**	**46.52**	**31.08**	**5.43**	**129.89**
Business Interruption						
	Income	0.48	33.23	0.87	2.46	37.04
	Relocation	11.15	6.90	0.80	0.56	19.42
	Rental Income	4.29	4.96	0.16	0.04	9.45
	Wage	1.14	34.14	1.15	9.11	45.53
	Subtotal	**17.05**	**79.23**	**2.98**	**12.18**	**111.44**
ALL	**Total**	**63.91**	**125.75**	**34.06**	**17.61**	**241.33**



Appendix A: County Listing for the Region

Connecticut

- New Haven

Appendix B: Regional Population and Building Value Data

	Population	Building Value (thousands of dollars)		
		Residential	Non-Residential	Total
Connecticut				
New Haven	570,001	63,417,388	25,250,817	88,668,205
Total	**570,001**	**63,417,388**	**25,250,817**	**88,668,205**
Total Study Region	**570,001**	**63,417,388**	**25,250,817**	**88,668,205**

Hazus: Flood Global Risk Report

Region Name: SCROG_FLD_multi

Flood Scenario: Multi-Freq

Print Date: Tuesday, August 2, 2022

Disclaimer:
This version of Hazus utilizes 2010 Census Data.
Totals only reflect data for those census tracts/blocks included in the user's study region.

The estimates of social and economic impacts contained in this report were produced using Hazus loss estimation methodology software which is based on current scientific and engineering knowledge. There are uncertainties inherent in any loss estimation technique. Therefore, there may be significant differences between the modeled results contained in this report and the actual social and economic losses following a specific Flood. These results can be improved by using enhanced inventory data and flood hazard information.

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General Description of the Region

Hazus is a regional multi-hazard loss estimation model that was developed by the Federal Emergency Management Agency (FEMA) and the National Institute of Building Sciences (NIBS). The primary purpose of Hazus is to provide a methodology and software application to develop multi-hazard losses at a regional scale. These loss estimates would be used primarily by local, state and regional officials to plan and stimulate efforts to reduce risks from multi-hazards and to prepare for emergency response and recovery.

The flood loss estimates provided in this report were based on a region that included 1 county(ies) from the following state(s):

- Connecticut

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

The geographical size of the region is approximately 376 square miles and contains 8,992 census blocks. The region contains over 223 thousand households and has a total population of 570,001 people (2010 Census Bureau data). The distribution of population by State and County for the study region is provided in Appendix B.

There are an estimated 183,793 buildings in the region with a total building replacement value (excluding contents) of 88,668 million dollars. Approximately 89.60% of the buildings (and 71.52% of the building value) are associated with residential housing.

Building Inventory

General Building Stock

Hazus estimates that there are 183,793 buildings in the region which have an aggregate total replacement value of 88,668 million dollars. Table 1 and Table 2 present the relative distribution of the value with respect to the general occupancies by Study Region and Scenario respectively. Appendix B provides a general distribution of the building value by State and County.

Table 1
Building Exposure by Occupancy Type for the Study Region

Occupancy	Exposure ($1000)	Percent of Total
Residential	63,417,388	71.5%
Commercial	16,156,577	18.2%
Industrial	4,143,620	4.7%
Agricultural	205,951	0.2%
Religion	1,095,314	1.2%
Government	381,243	0.4%
Education	3,268,112	3.7%
Total	**88,668,205**	**100%**

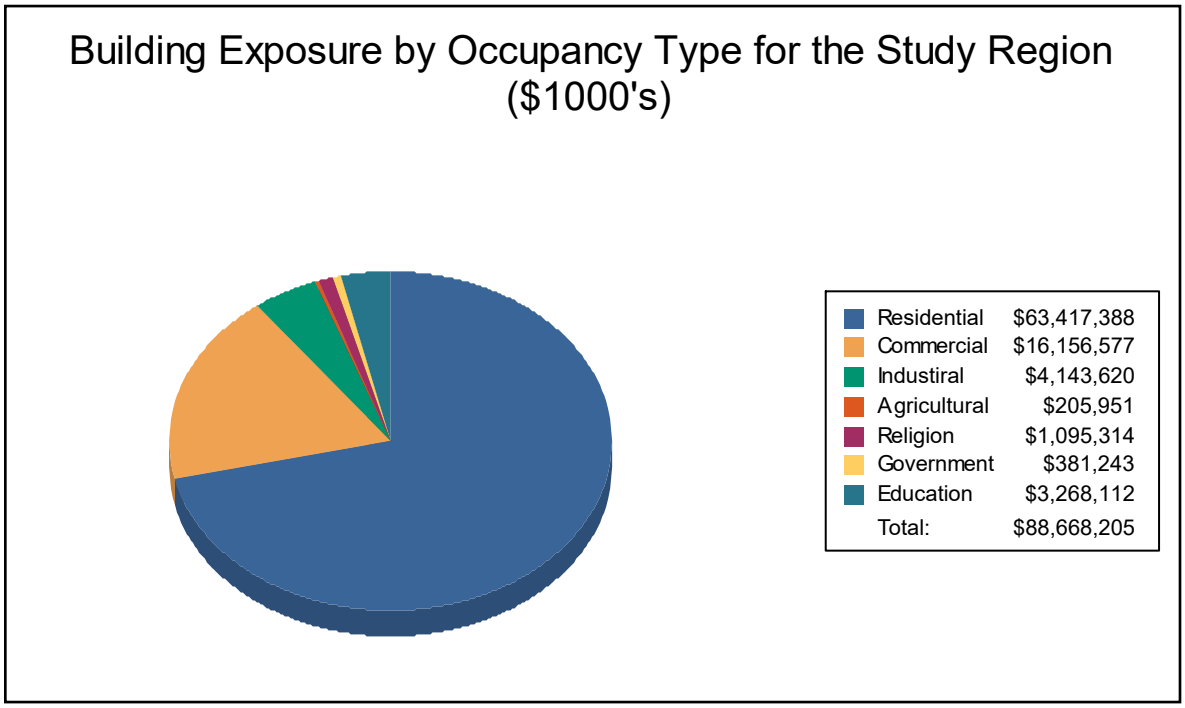
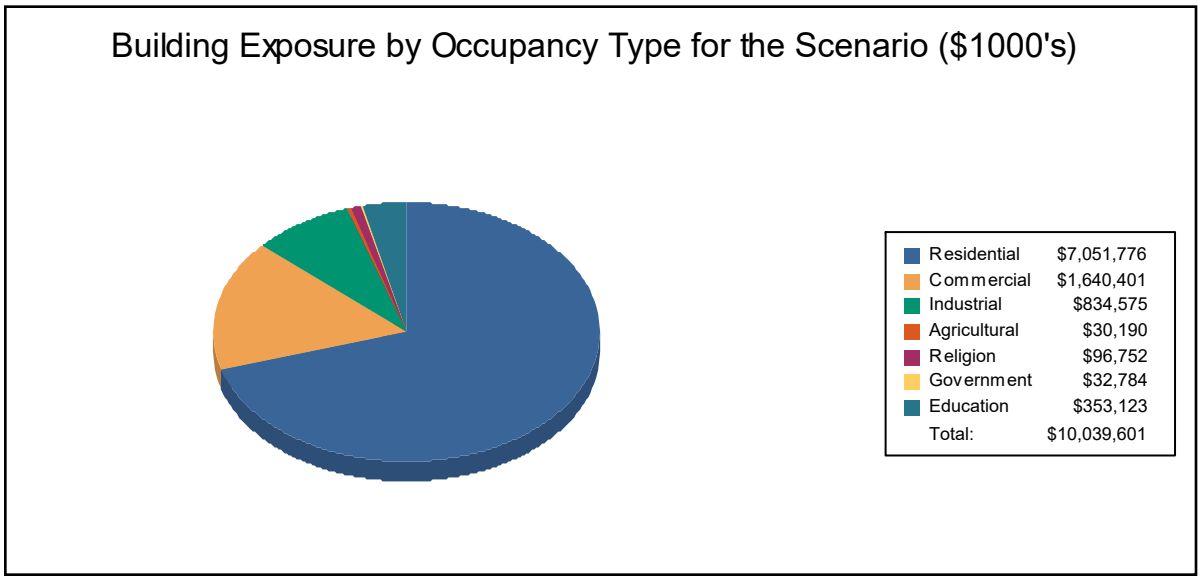


Table 2
Building Exposure by Occupancy Type for the Scenario

Occupancy	Exposure ($1000)	Percent of Total
Residential	7,051,776	70.2%
Commercial	1,640,401	16.3%
Industrial	834,575	8.3%
Agricultural	30,190	0.3%
Religion	96,752	1.0%
Government	32,784	0.3%
Education	353,123	3.5%
Total	**10,039,601**	**100%**



Essential Facility Inventory

For essential facilities, there are 9 hospitals in the region with a total bed capacity of 2,360 beds. There are 294 schools, 73 fire stations, 22 police stations and 15 emergency operation centers.

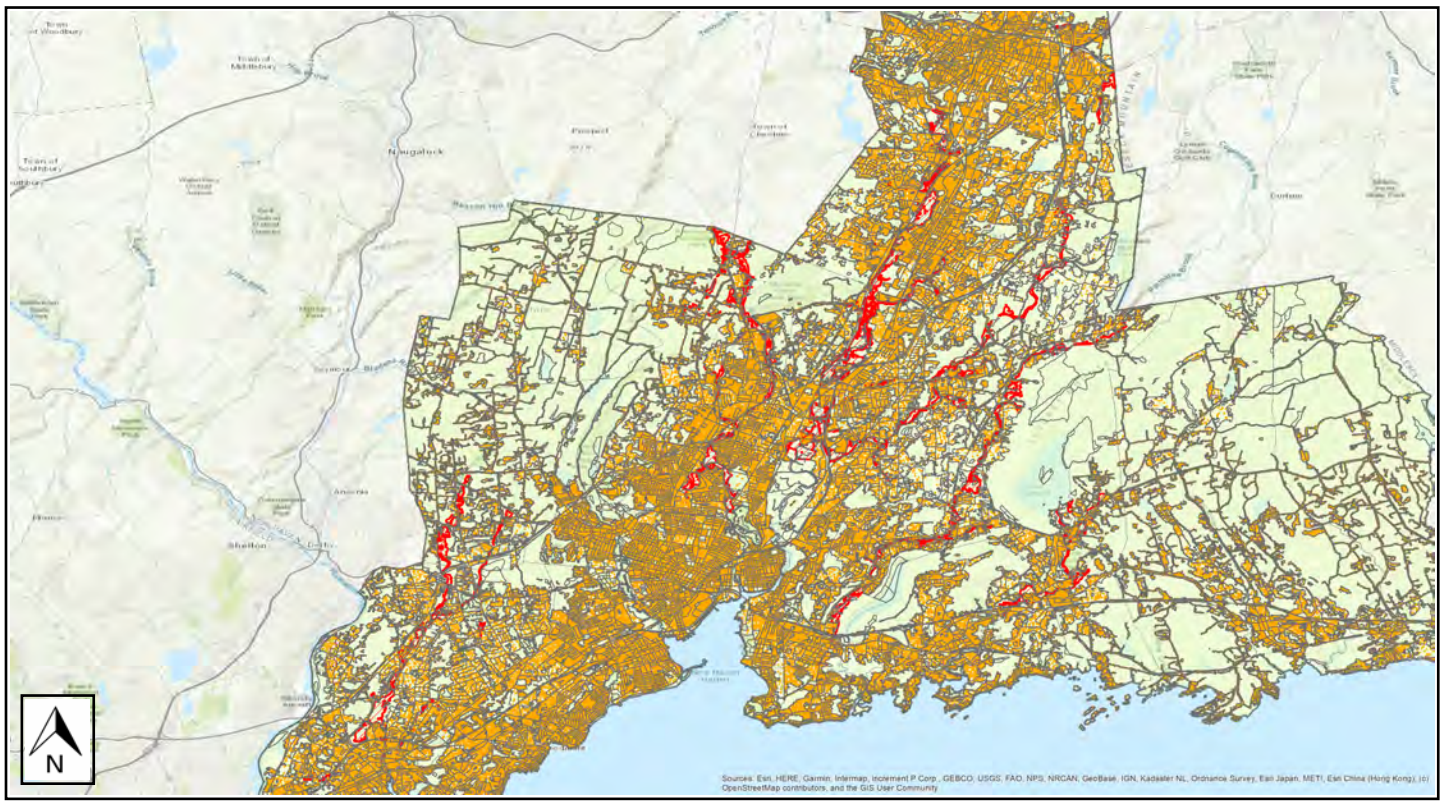
Flood Scenario Parameters

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

Study Region Name:	SCROG_FLD_multi
Scenario Name:	Multi-Freq
Return Period Analyzed:	25
Analysis Options Analyzed:	No What-Ifs

Study Region Overview Map

Illustrating scenario flood extent, as well as exposed essential facilities and total exposure



Building Damage

General Building Stock Damage

Hazus estimates that about 232 buildings will be at least moderately damaged. This is over 90% of the total number of buildings in the scenario. There are an estimated 0 buildings that will be completely destroyed. The definition of the 'damage states' is provided in the Hazus Flood Technical Manual. Table 3 below summarizes the expected damage by general occupancy for the buildings in the region. Table 4 summarizes the expected damage by general building type.

Total Economic Loss (1 dot = $300K) Overview Map

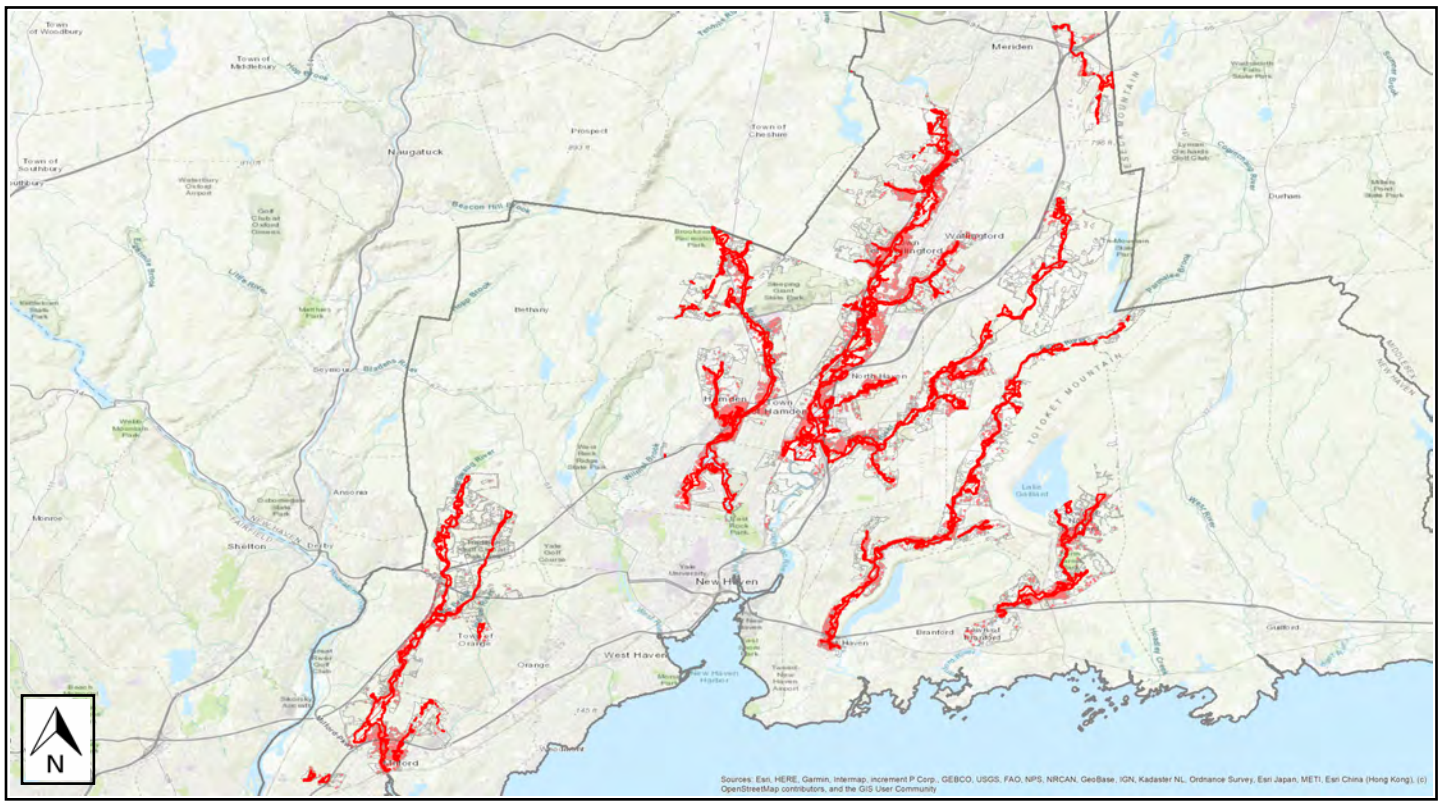


Table 3: Expected Building Damage by Occupancy

	1-10		11-20		21-30		31-40		41-50		>50	
Occupancy	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**
Agriculture	0	0	0	0	0	0	0	0	0	0	0	0
Commercial	0	0	4	100	0	0	0	0	0	0	0	0
Education	0	0	0	0	0	0	0	0	0	0	0	0
Government	0	0	0	0	0	0	0	0	0	0	0	0
Industrial	0	0	0	0	0	0	0	0	0	0	0	0
Religion	0	0	0	0	0	0	0	0	0	0	0	0
Residential	216	49	178	40	45	10	5	1	0	0	0	0
Total	**216**		**182**		**45**		**5**		**0**		**0**	

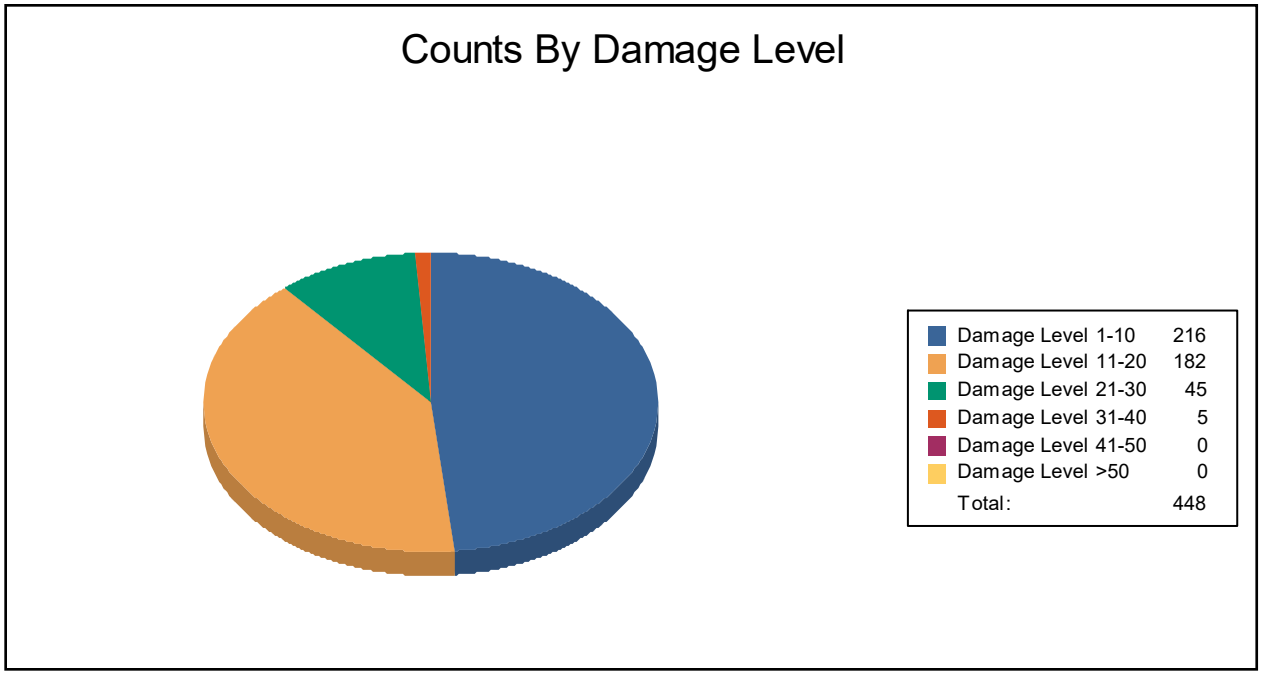


Table 4: Expected Building Damage by Building Type

Building Type	1-10		11-20		21-30		31-40		41-50		>50	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Concrete	0	0	0	0	0	0	0	0	0	0	0	0
ManufHousing	0	0	0	0	0	0	0	0	0	0	0	0
Masonry	0	0	2	100	0	0	0	0	0	0	0	0
Steel	0	0	2	100	0	0	0	0	0	0	0	0
Wood	216	49	178	40	45	10	5	1	0	0	0	0

Essential Facility Damage

Before the flood analyzed in this scenario, the region had 2,360 hospital beds available for use. On the day of the scenario flood event, the model estimates that 2,360 hospital beds are available in the region.

Table 5: Expected Damage to Essential Facilities

		# Facilities		
Classification	Total	At Least Moderate	At Least Substantial	Loss of Use
Emergency Operation Centers	15	0	0	0
Fire Stations	73	0	0	0
Hospitals	9	0	0	0
Police Stations	22	0	0	0
Schools	294	0	0	0

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

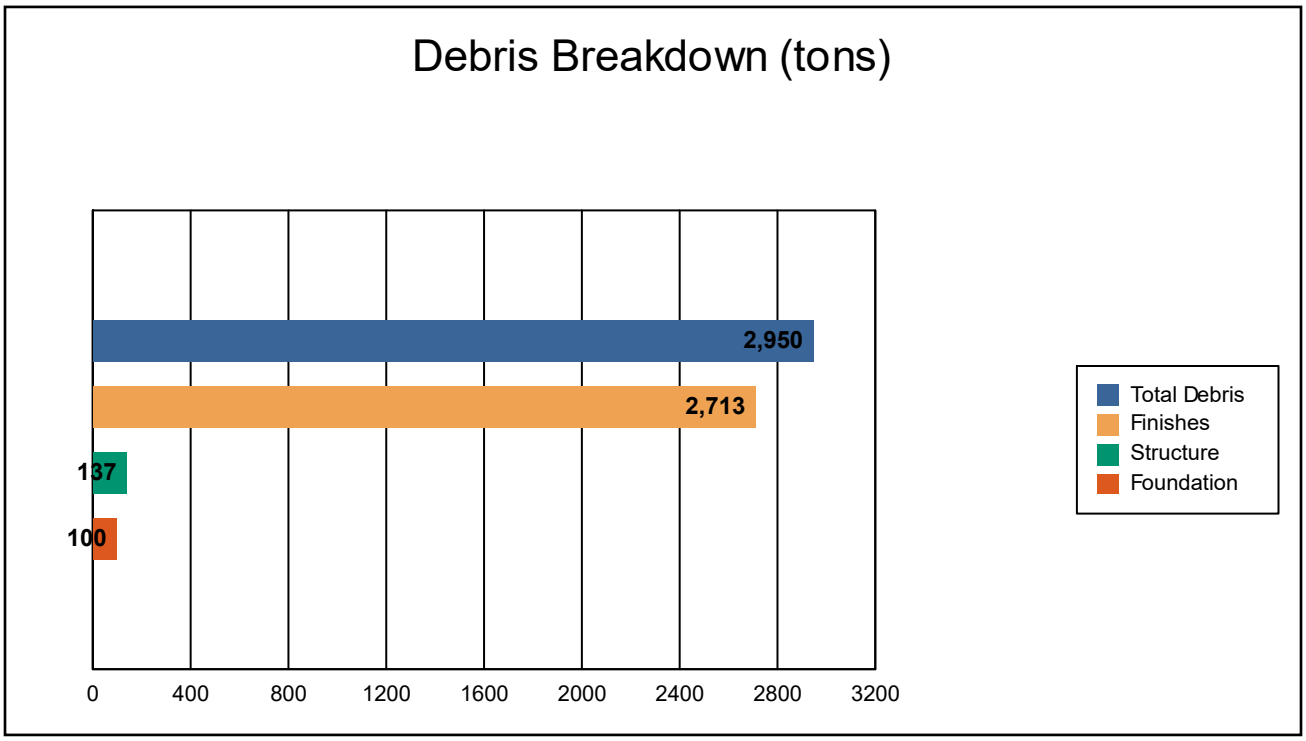
(1) None of your facilities were flooded. This can be checked by mapping the inventory data on the depth grid.

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

Induced Flood Damage

Debris Generation

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

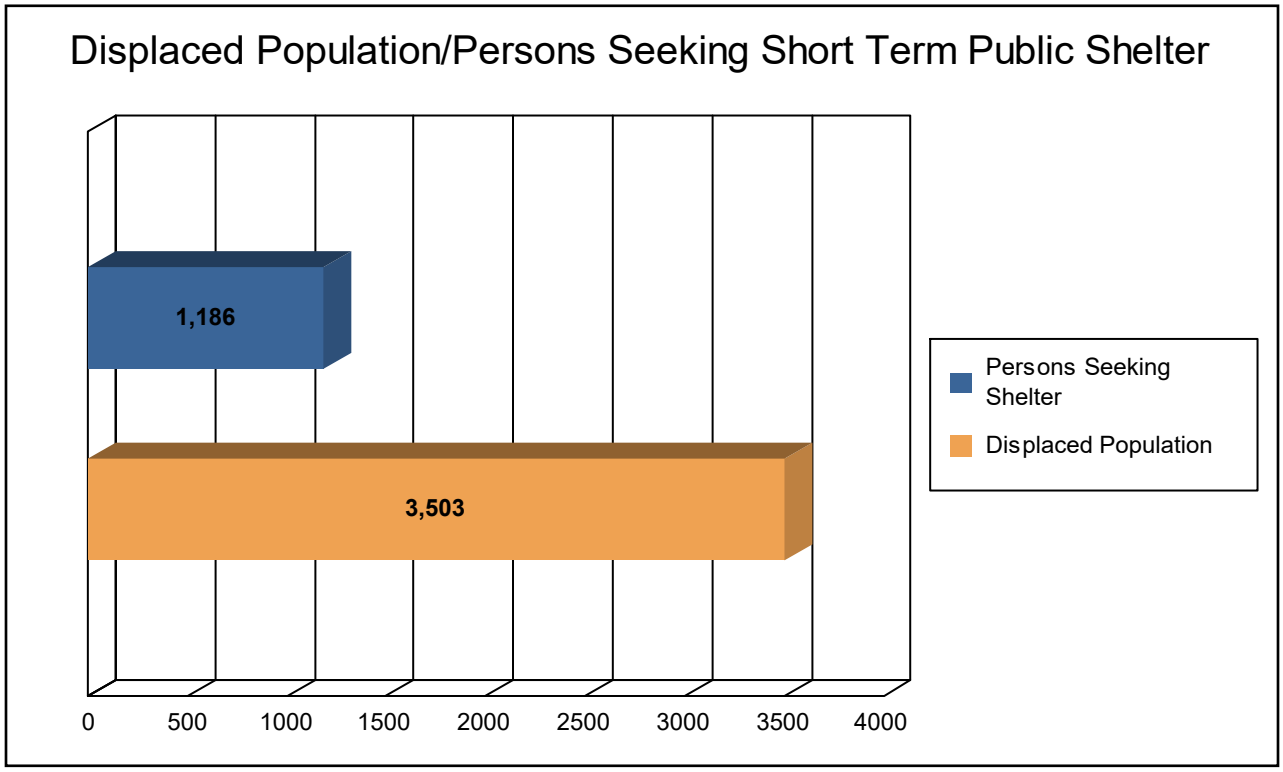


The model estimates that a total of 2,950 tons of debris will be generated. Of the total amount, Finishes comprises 92% of the total, Structure comprises 5% of the total, and Foundation comprises 3%. If the debris tonnage is converted into an estimated number of truckloads, it will require 119 truckloads (@25 tons/truck) to remove the debris generated by the flood.

Social Impact

Shelter Requirements

Hazus estimates the number of households that are expected to be displaced from their homes due to the flood and the associated potential evacuation. Hazus also estimates those displaced people that will require accommodations in temporary public shelters. The model estimates 1,168 households (or 3,503 of people) will be displaced due to the flood. Displacement includes households evacuated from within or very near to the inundated area. Of these, 1,186 people (out of a total population of 570,001) will seek temporary shelter in public shelters.



Economic Loss

The total economic loss estimated for the flood is 331.69 million dollars, which represents 3.30 % of the total replacement value of the scenario buildings.

Building-Related Losses

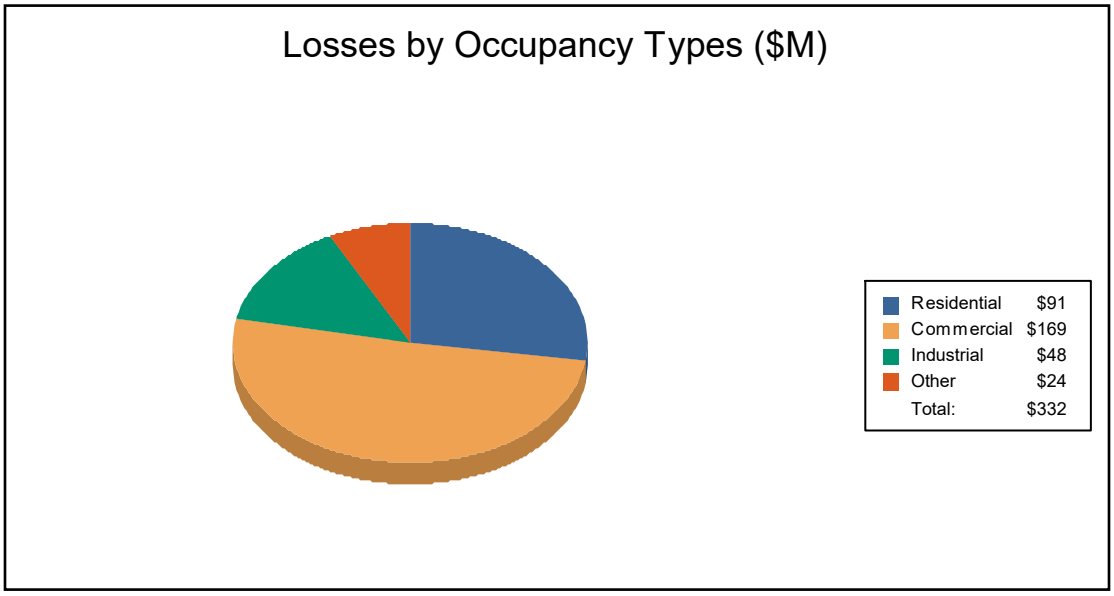
The building losses are broken into two categories: direct building losses and business interruption losses. The direct building losses are the estimated costs to repair or replace the damage caused to the building and its contents. The business interruption losses are the losses associated with inability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

The total building-related losses were 185.28 million dollars. 44% of the estimated losses were related to the business interruption of the region. The residential occupancies made up 27.48% of the total loss. Table 6 below provides a summary of the losses associated with the building damage.

Table 6: Building-Related Economic Loss Estimates

(Millions of dollars)

Category	Area	Residential	Commercial	Industrial	Others	Total
Building Loss						
	Building	45.84	16.26	11.46	1.07	74.63
	Content	22.06	48.63	28.29	7.00	105.98
	Inventory	0.00	0.73	3.89	0.06	4.68
	Subtotal	**67.89**	**65.62**	**43.64**	**8.13**	**185.28**
Business Interruption						
	Income	0.71	42.71	1.14	3.34	47.90
	Relocation	14.83	9.11	1.04	0.87	25.84
	Rental Income	6.04	6.56	0.22	0.06	12.88
	Wage	1.68	44.58	1.47	12.06	59.80
	Subtotal	**23.25**	**102.97**	**3.86**	**16.33**	**146.41**
ALL	**Total**	**91.15**	**168.59**	**47.50**	**24.46**	**331.69**



Appendix A: County Listing for the Region

Connecticut

- New Haven

Appendix B: Regional Population and Building Value Data

	Population	Building Value (thousands of dollars)		
		Residential	Non-Residential	Total
Connecticut				
New Haven	570,001	63,417,388	25,250,817	88,668,205
Total	**570,001**	**63,417,388**	**25,250,817**	**88,668,205**
Total Study Region	**570,001**	**63,417,388**	**25,250,817**	**88,668,205**

Hazus: Flood Global Risk Report

Region Name: SCROG_FLD_multi

Flood Scenario: Multi-Freq

Print Date: Tuesday, August 2, 2022

Disclaimer:
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Note:
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General Building Stock

Hazus estimates that there are 183,793 buildings in the region which have an aggregate total replacement value of 88,668 million dollars. Table 1 and Table 2 present the relative distribution of the value with respect to the general occupancies by Study Region and Scenario respectively. Appendix B provides a general distribution of the building value by State and County.

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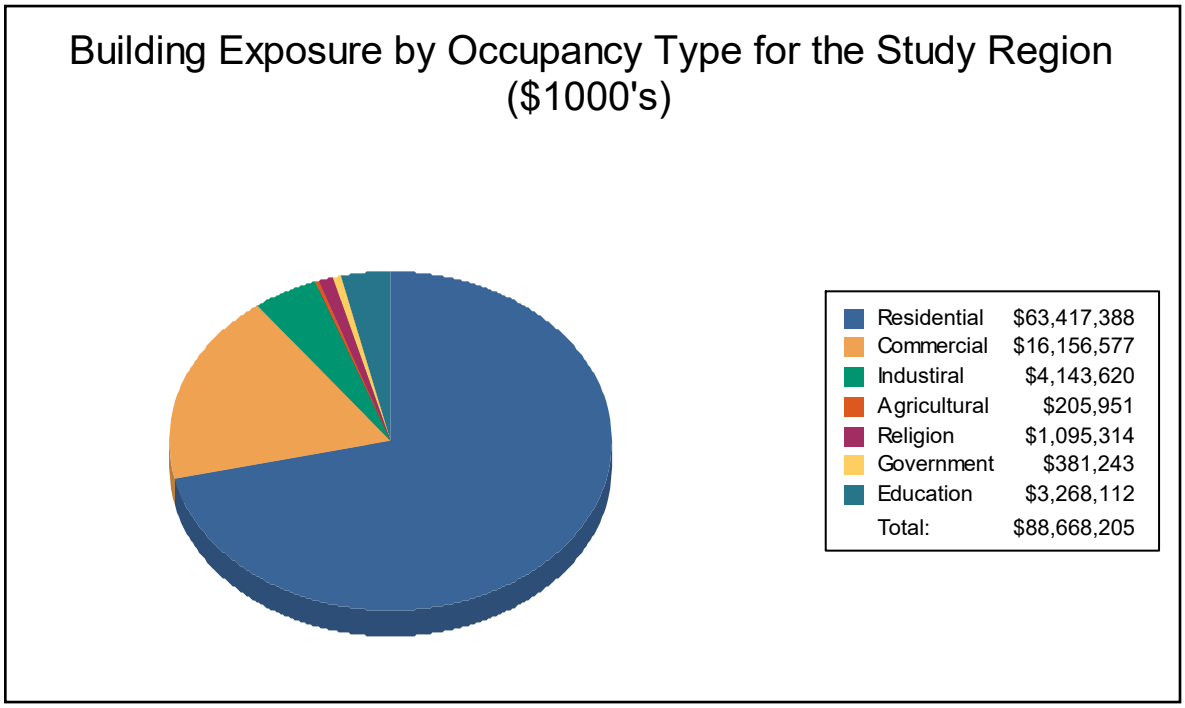

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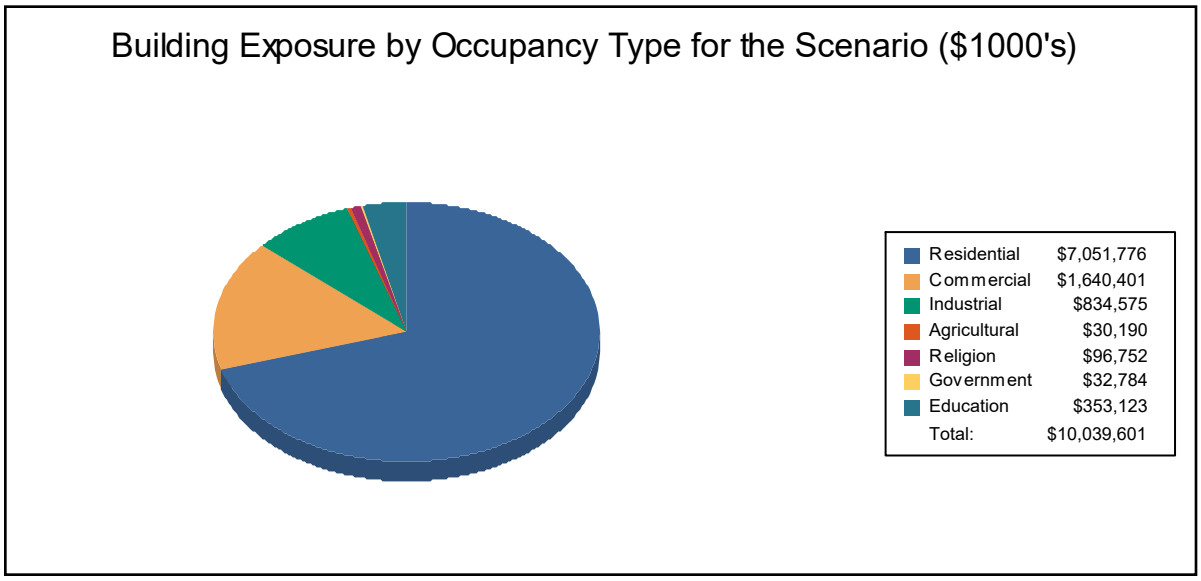


Essential Facility Inventory

For essential facilities, there are 9 hospitals in the region with a total bed capacity of 2,360 beds. There are 294 schools, 73 fire stations, 22 police stations and 15 emergency operation centers.

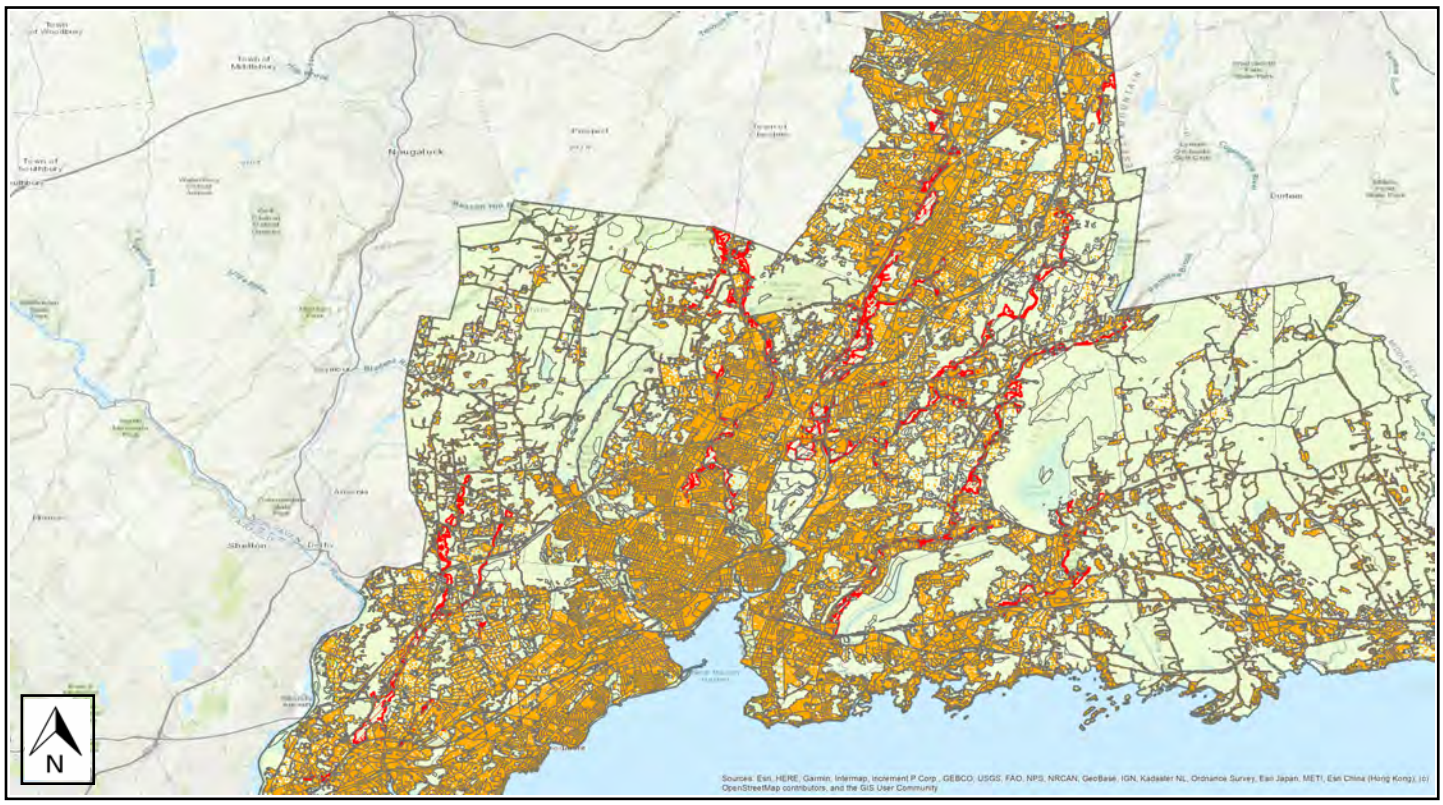
Flood Scenario Parameters

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

Study Region Name:	SCROG_FLD_multi
Scenario Name:	Multi-Freq
Return Period Analyzed:	50
Analysis Options Analyzed:	No What-Ifs

Study Region Overview Map

Illustrating scenario flood extent, as well as exposed essential facilities and total exposure



Building Damage

General Building Stock Damage

Hazus estimates that about 317 buildings will be at least moderately damaged. This is over 88% of the total number of buildings in the scenario. There are an estimated 0 buildings that will be completely destroyed. The definition of the 'damage states' is provided in the Hazus Flood Technical Manual. Table 3 below summarizes the expected damage by general occupancy for the buildings in the region. Table 4 summarizes the expected damage by general building type.

Total Economic Loss (1 dot = $300K) Overview Map

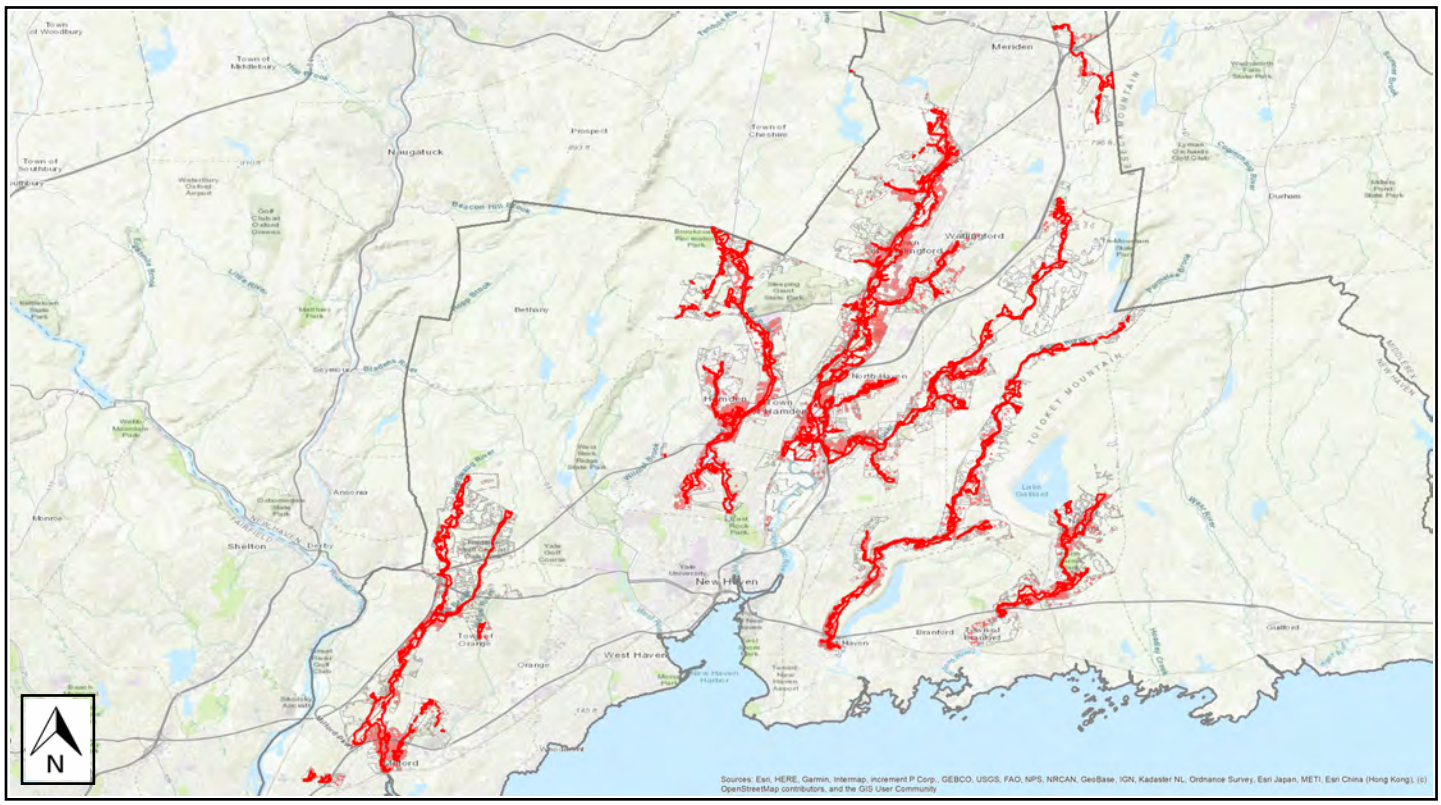


Table 3: Expected Building Damage by Occupancy

	1-10		11-20		21-30		31-40		41-50		>50	
Occupancy	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**
Agriculture	0	0	0	0	0	0	0	0	0	0	0	0
Commercial	0	0	4	100	0	0	0	0	0	0	0	0
Education	0	0	0	0	0	0	0	0	0	0	0	0
Government	0	0	0	0	0	0	0	0	0	0	0	0
Industrial	0	0	0	0	0	0	0	0	0	0	0	0
Religion	0	0	0	0	0	0	0	0	0	0	0	0
Residential	230	42	226	42	68	13	16	3	3	1	0	0
Total	**230**		**230**		**68**		**16**		**3**		**0**	

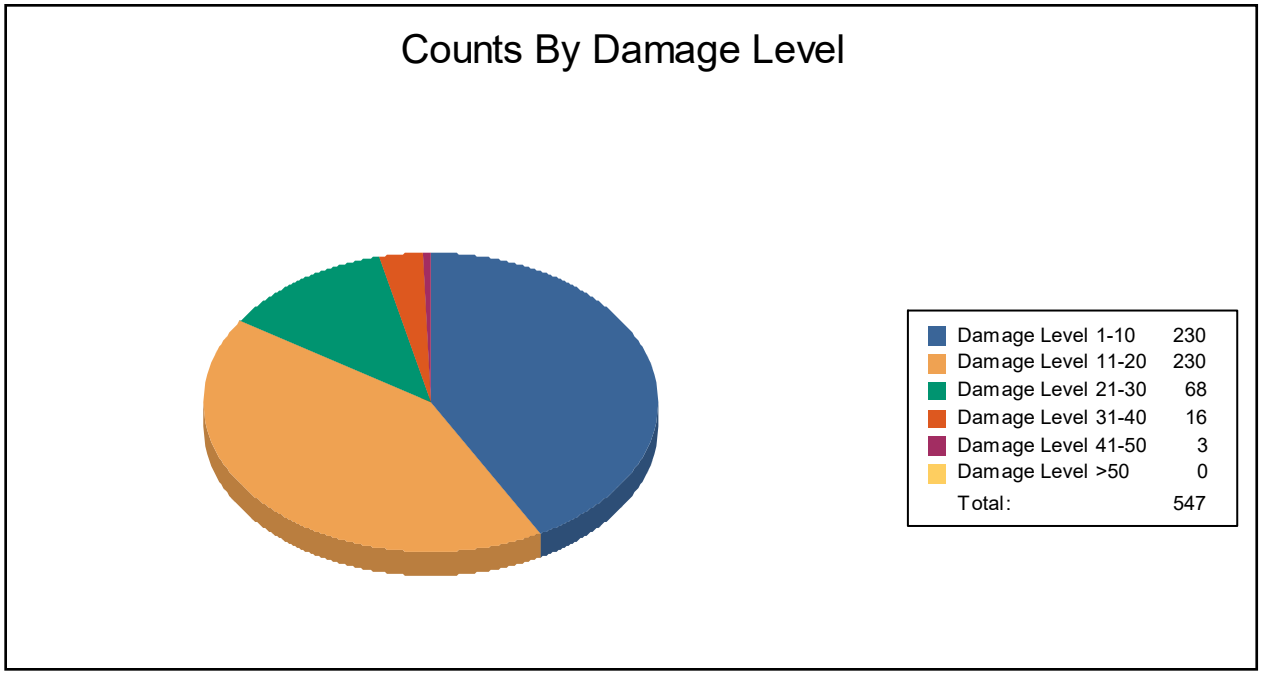


Table 4: Expected Building Damage by Building Type

Building Type	1-10		11-20		21-30		31-40		41-50		>50	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Concrete	0	0	0	0	0	0	0	0	0	0	0	0
ManufHousing	0	0	0	0	0	0	0	0	0	0	0	0
Masonry	1	33	2	67	0	0	0	0	0	0	0	0
Steel	0	0	2	100	0	0	0	0	0	0	0	0
Wood	229	42	226	42	68	13	16	3	3	1	0	0

Essential Facility Damage

Before the flood analyzed in this scenario, the region had 2,360 hospital beds available for use. On the day of the scenario flood event, the model estimates that 2,360 hospital beds are available in the region.

Table 5: Expected Damage to Essential Facilities

		# Facilities		
Classification	Total	At Least Moderate	At Least Substantial	Loss of Use
Emergency Operation Centers	15	0	0	0
Fire Stations	73	0	0	0
Hospitals	9	0	0	0
Police Stations	22	0	0	0
Schools	294	0	0	0

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

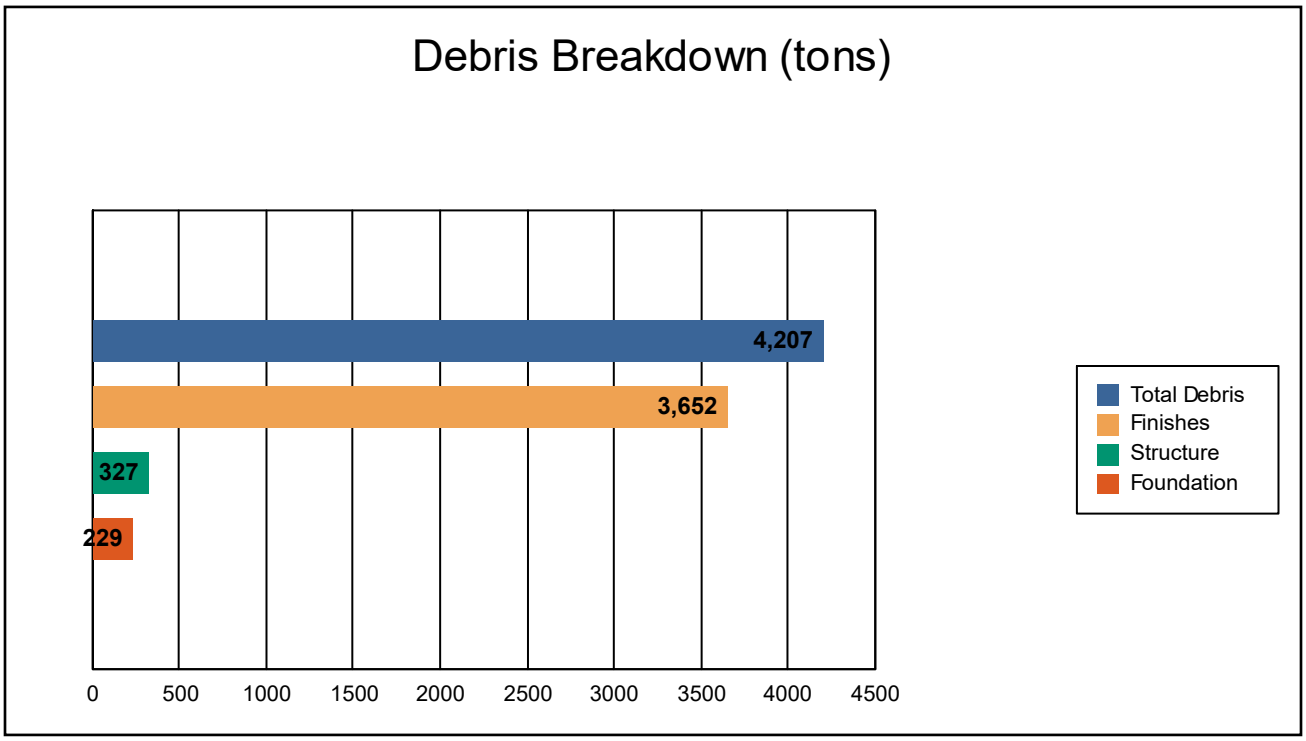
(1) None of your facilities were flooded. This can be checked by mapping the inventory data on the depth grid.

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

Induced Flood Damage

Debris Generation

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

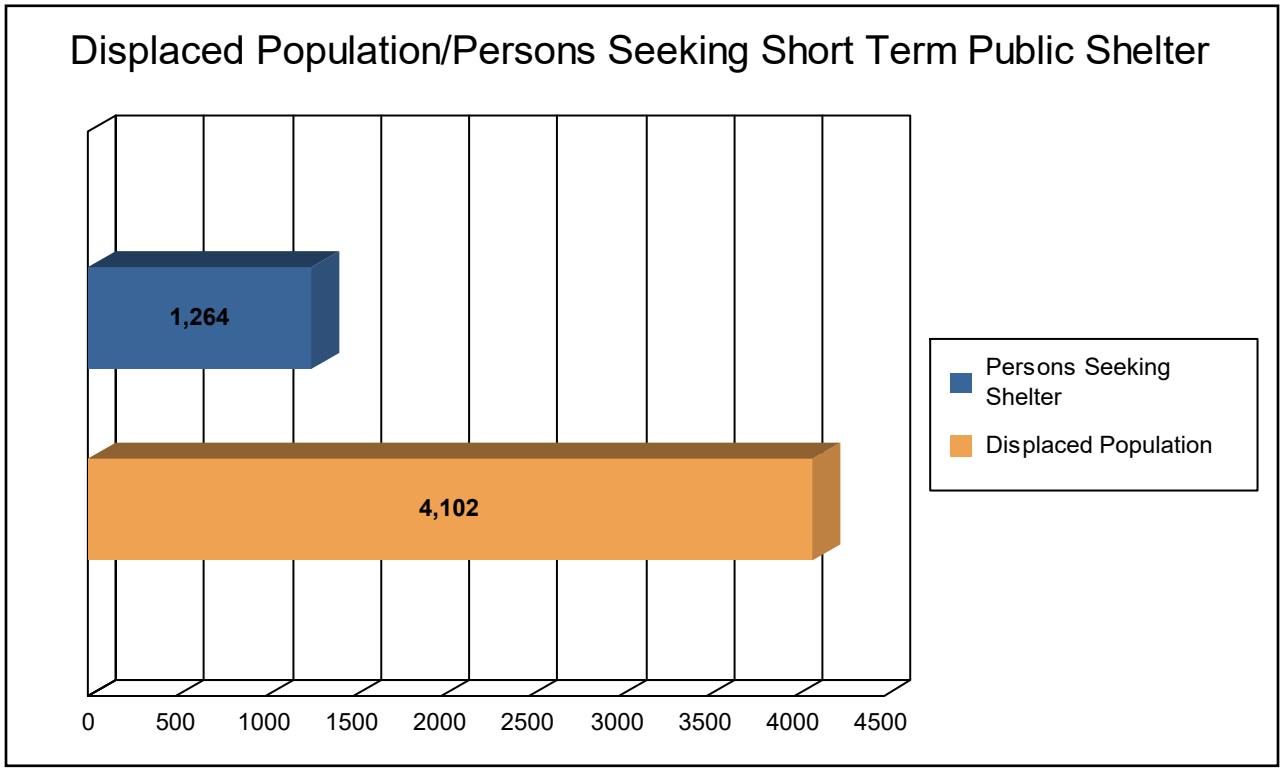


The model estimates that a total of 4,207 tons of debris will be generated. Of the total amount, Finishes comprises 87% of the total, Structure comprises 8% of the total, and Foundation comprises 5%. If the debris tonnage is converted into an estimated number of truckloads, it will require 169 truckloads (@25 tons/truck) to remove the debris generated by the flood.

Social Impact

Shelter Requirements

Hazus estimates the number of households that are expected to be displaced from their homes due to the flood and the associated potential evacuation. Hazus also estimates those displaced people that will require accommodations in temporary public shelters. The model estimates 1,367 households (or 4,102 of people) will be displaced due to the flood. Displacement includes households evacuated from within or very near to the inundated area. Of these, 1,264 people (out of a total population of 570,001) will seek temporary shelter in public shelters.



Economic Loss

The total economic loss estimated for the flood is 413.75 million dollars, which represents 4.12 % of the total replacement value of the scenario buildings.

Building-Related Losses

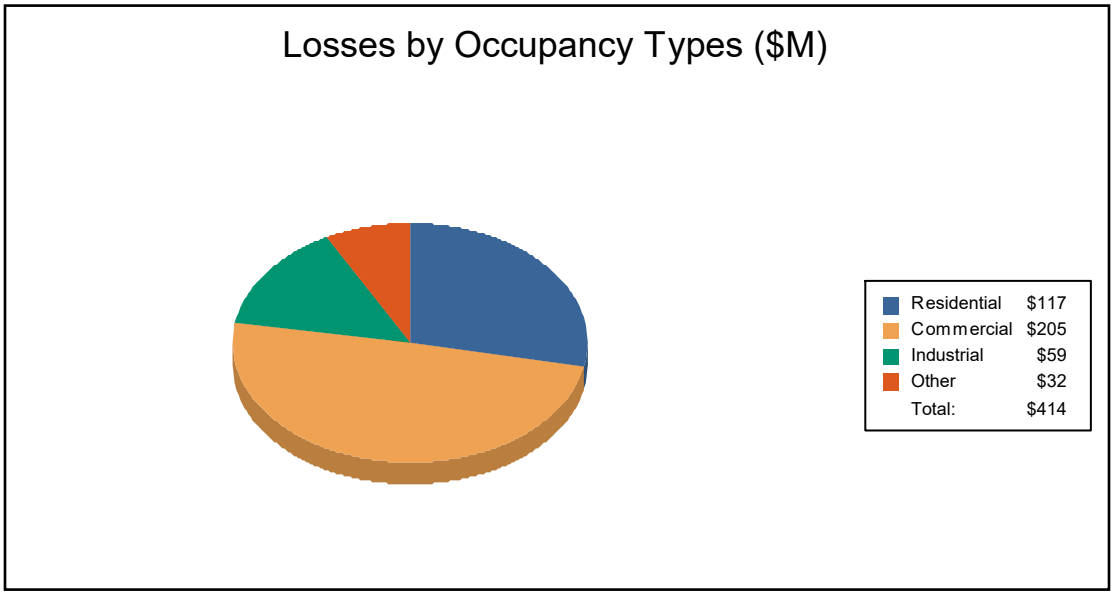
The building losses are broken into two categories: direct building losses and business interruption losses. The direct building losses are the estimated costs to repair or replace the damage caused to the building and its contents. The business interruption losses are the losses associated with inability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

The total building-related losses were 234.77 million dollars. 43% of the estimated losses were related to the business interruption of the region. The residential occupancies made up 28.29% of the total loss. Table 6 below provides a summary of the losses associated with the building damage.

Table 6: Building-Related Economic Loss Estimates

(Millions of dollars)

Category	Area	Residential	Commercial	Industrial	Others	Total
Building Loss						
	Building	59.21	20.37	14.33	1.42	95.32
	Content	28.65	60.47	35.28	9.15	133.55
	Inventory	0.00	0.94	4.87	0.09	5.90
	Subtotal	**87.86**	**81.77**	**54.48**	**10.66**	**234.77**
Business Interruption						
	Income	1.07	51.03	1.36	4.19	57.66
	Relocation	17.98	11.10	1.20	1.17	31.45
	Rental Income	7.59	8.01	0.25	0.09	15.95
	Wage	2.55	53.34	1.73	16.31	73.93
	Subtotal	**29.19**	**123.48**	**4.55**	**21.76**	**178.98**
ALL	**Total**	**117.05**	**205.25**	**59.03**	**32.42**	**413.75**



Appendix A: County Listing for the Region

Connecticut

- New Haven

Appendix B: Regional Population and Building Value Data

	Population	Building Value (thousands of dollars)		
		Residential	Non-Residential	Total
Connecticut				
New Haven	570,001	63,417,388	25,250,817	88,668,205
Total	**570,001**	**63,417,388**	**25,250,817**	**88,668,205**
Total Study Region	**570,001**	**63,417,388**	**25,250,817**	**88,668,205**

Hazus: Flood Global Risk Report

Region Name: SCROG_FLD_multi

Flood Scenario: Multi-Freq

Print Date: Tuesday, August 2, 2022

Disclaimer:
This version of Hazus utilizes 2010 Census Data.
Totals only reflect data for those census tracts/blocks included in the user's study region.

The estimates of social and economic impacts contained in this report were produced using Hazus loss estimation methodology software which is based on current scientific and engineering knowledge. There are uncertainties inherent in any loss estimation technique. Therefore, there may be significant differences between the modeled results contained in this report and the actual social and economic losses following a specific Flood. These results can be improved by using enhanced inventory data and flood hazard information.

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General Description of the Region

Hazus is a regional multi-hazard loss estimation model that was developed by the Federal Emergency Management Agency (FEMA) and the National Institute of Building Sciences (NIBS). The primary purpose of Hazus is to provide a methodology and software application to develop multi-hazard losses at a regional scale. These loss estimates would be used primarily by local, state and regional officials to plan and stimulate efforts to reduce risks from multi-hazards and to prepare for emergency response and recovery.

The flood loss estimates provided in this report were based on a region that included 1 county(ies) from the following state(s):

- Connecticut

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

The geographical size of the region is approximately 376 square miles and contains 8,992 census blocks. The region contains over 223 thousand households and has a total population of 570,001 people (2010 Census Bureau data). The distribution of population by State and County for the study region is provided in Appendix B.

There are an estimated 183,793 buildings in the region with a total building replacement value (excluding contents) of 88,668 million dollars. Approximately 89.60% of the buildings (and 71.52% of the building value) are associated with residential housing.

Building Inventory

General Building Stock

Hazus estimates that there are 183,793 buildings in the region which have an aggregate total replacement value of 88,668 million dollars. Table 1 and Table 2 present the relative distribution of the value with respect to the general occupancies by Study Region and Scenario respectively. Appendix B provides a general distribution of the building value by State and County.

Table 1
Building Exposure by Occupancy Type for the Study Region

Occupancy	Exposure ($1000)	Percent of Total
Residential	63,417,388	71.5%
Commercial	16,156,577	18.2%
Industrial	4,143,620	4.7%
Agricultural	205,951	0.2%
Religion	1,095,314	1.2%
Government	381,243	0.4%
Education	3,268,112	3.7%
Total	**88,668,205**	**100%**

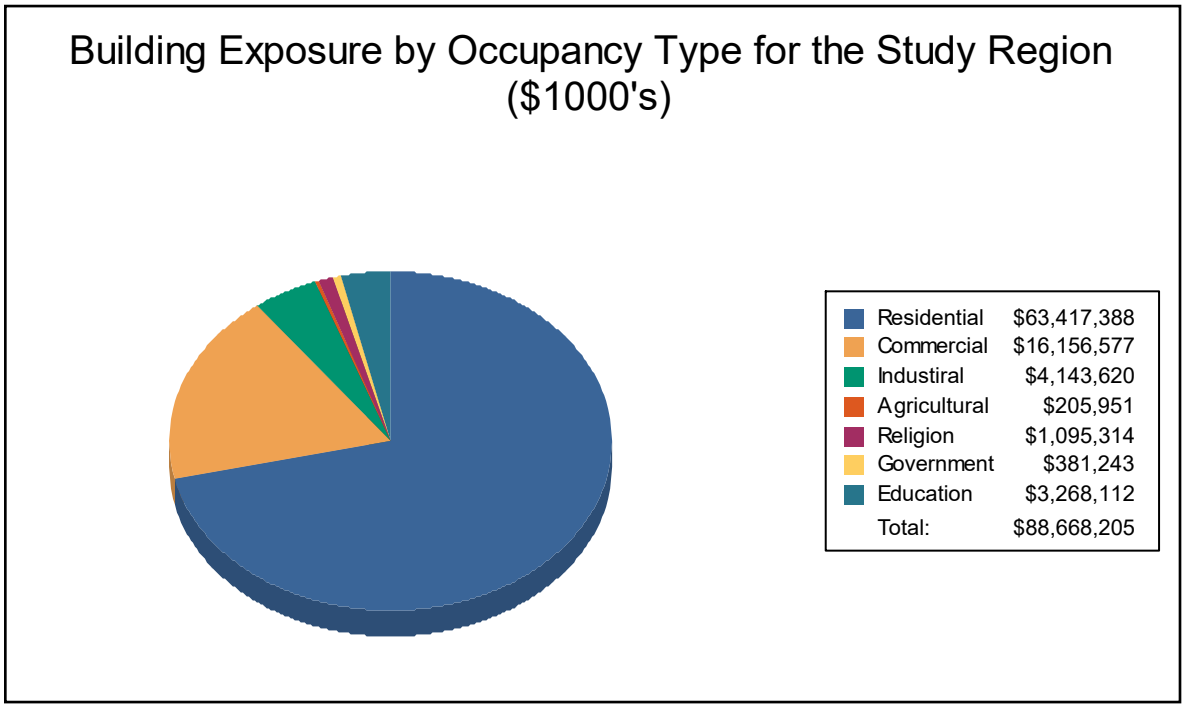
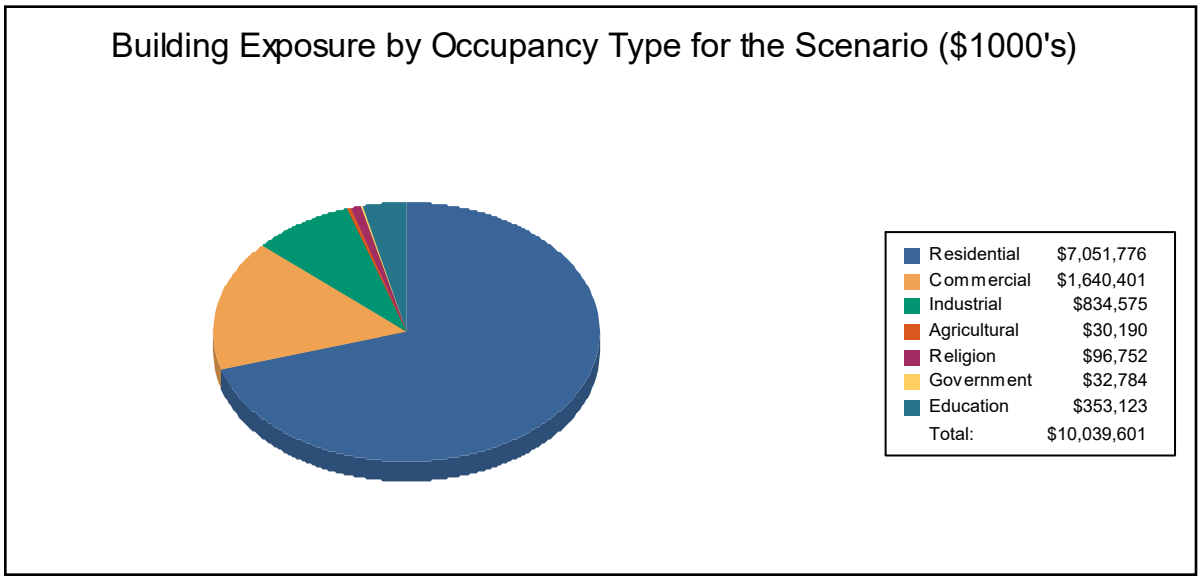


Table 2
Building Exposure by Occupancy Type for the Scenario

Occupancy	Exposure ($1000)	Percent of Total
Residential	7,051,776	70.2%
Commercial	1,640,401	16.3%
Industrial	834,575	8.3%
Agricultural	30,190	0.3%
Religion	96,752	1.0%
Government	32,784	0.3%
Education	353,123	3.5%
Total	**10,039,601**	**100%**



Essential Facility Inventory

For essential facilities, there are 9 hospitals in the region with a total bed capacity of 2,360 beds. There are 294 schools, 73 fire stations, 22 police stations and 15 emergency operation centers.

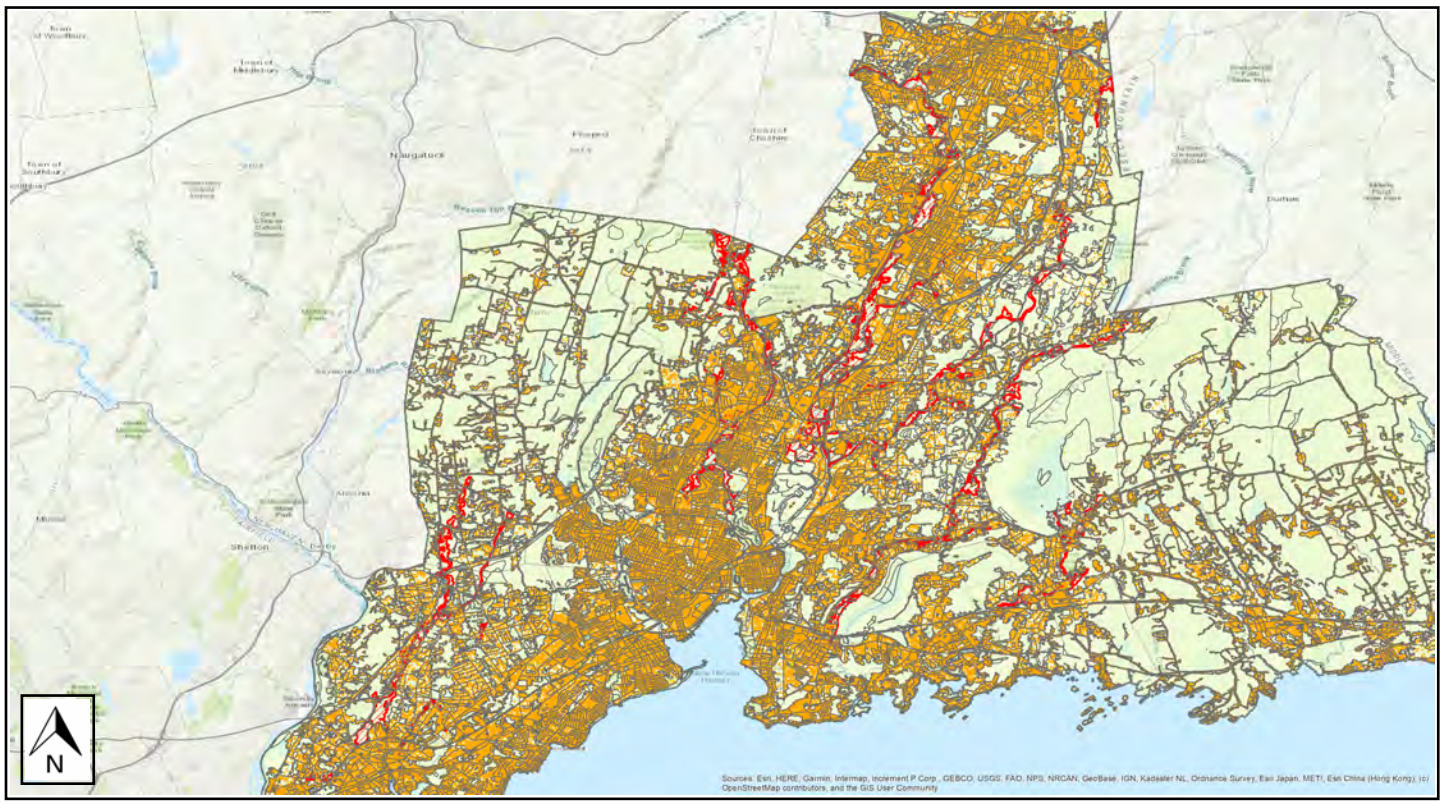
Flood Scenario Parameters

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

Study Region Name:	SCROG_FLD_multi
Scenario Name:	Multi-Freq
Return Period Analyzed:	100
Analysis Options Analyzed:	No What-Ifs

Study Region Overview Map

Illustrating scenario flood extent, as well as exposed essential facilities and total exposure



Building Damage

General Building Stock Damage

Hazus estimates that about 403 buildings will be at least moderately damaged. This is over 87% of the total number of buildings in the scenario. There are an estimated 0 buildings that will be completely destroyed. The definition of the 'damage states' is provided in the Hazus Flood Technical Manual. Table 3 below summarizes the expected damage by general occupancy for the buildings in the region. Table 4 summarizes the expected damage by general building type.

Total Economic Loss (1 dot = $300K) Overview Map

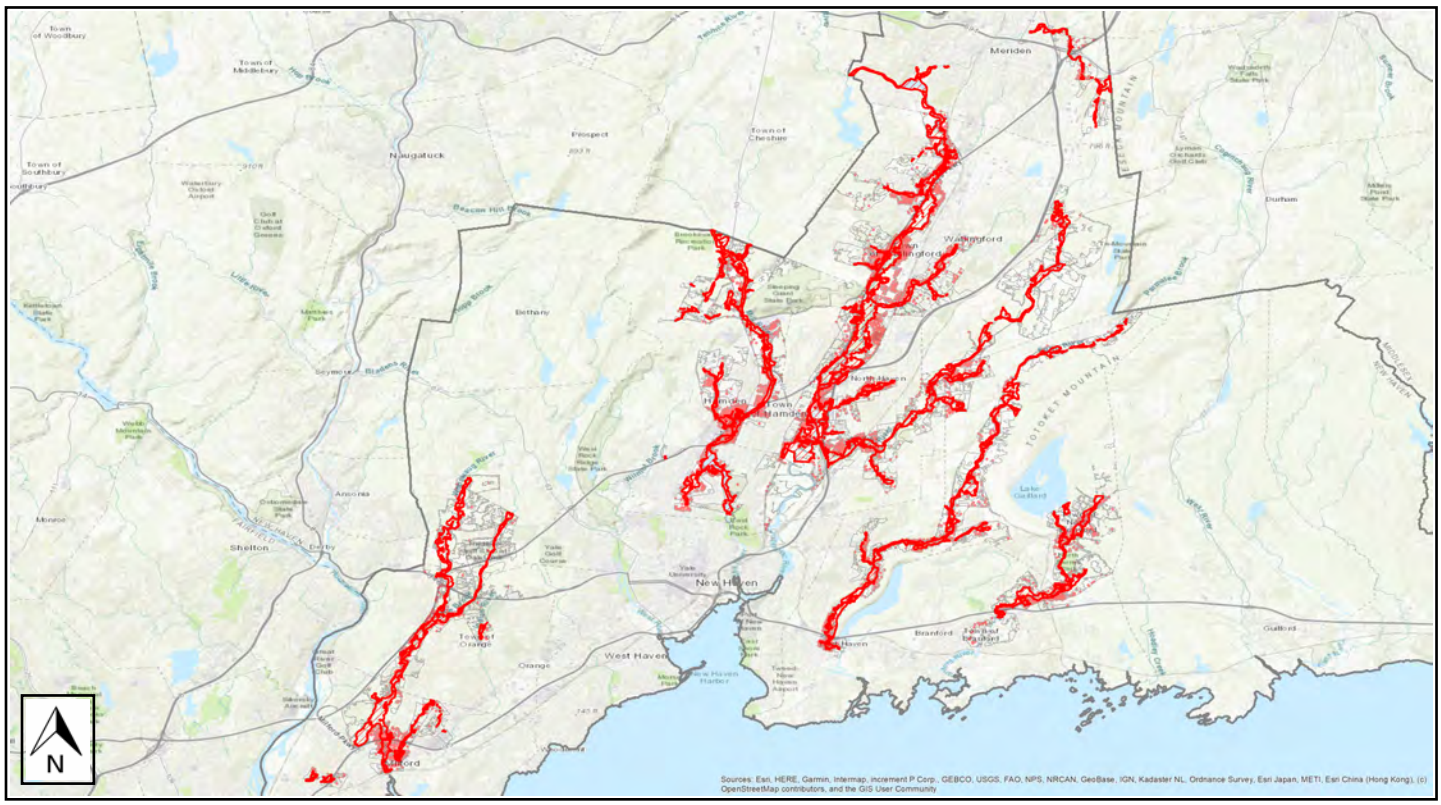


Table 3: Expected Building Damage by Occupancy

	1-10		11-20		21-30		31-40		41-50		>50	
Occupancy	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**
Agriculture	0	0	0	0	0	0	0	0	0	0	0	0
Commercial	0	0	4	100	0	0	0	0	0	0	0	0
Education	0	0	0	0	0	0	0	0	0	0	0	0
Government	0	0	0	0	0	0	0	0	0	0	0	0
Industrial	0	0	0	0	0	0	0	0	0	0	0	0
Religion	0	0	0	0	0	0	0	0	0	0	0	0
Residential	269	40	265	40	100	15	28	4	6	1	0	0
Total	**269**		**269**		**100**		**28**		**6**		**0**	

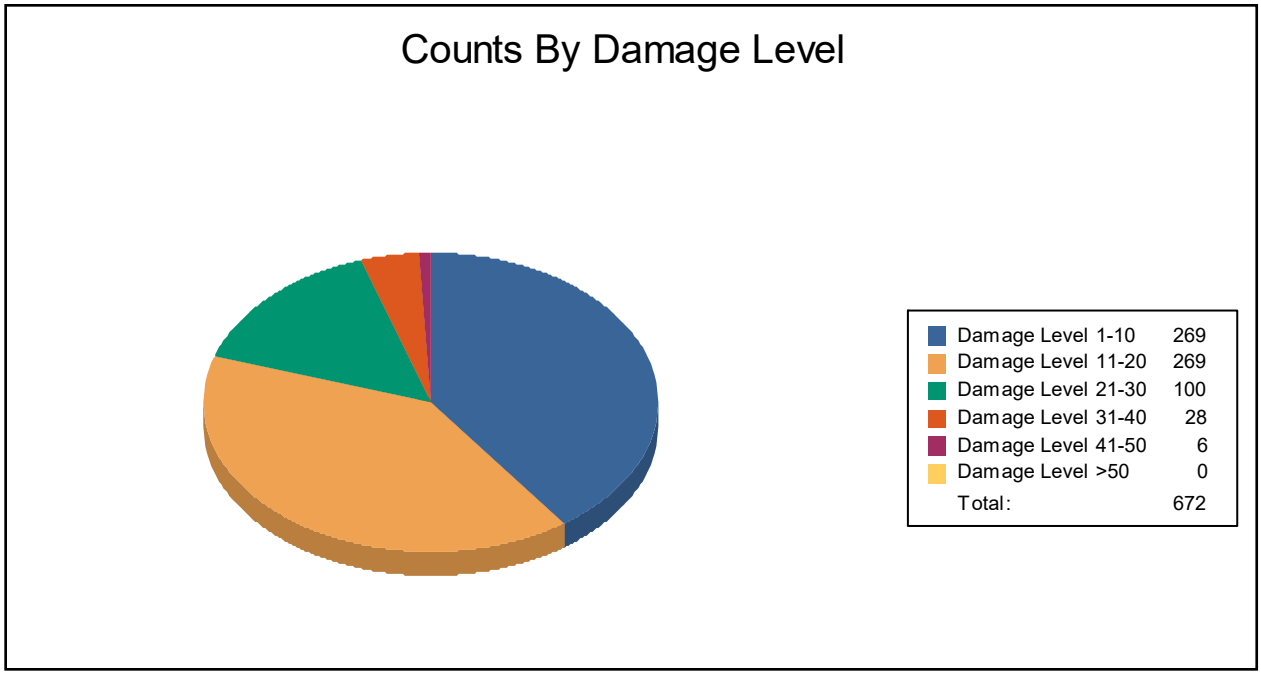


Table 4: Expected Building Damage by Building Type

Building Type	1-10		11-20		21-30		31-40		41-50		>50	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Concrete	0	0	0	0	0	0	0	0	0	0	0	0
ManufHousing	0	0	0	0	0	0	0	0	0	0	0	0
Masonry	1	33	2	67	0	0	0	0	0	0	0	0
Steel	0	0	2	100	0	0	0	0	0	0	0	0
Wood	268	40	265	40	100	15	28	4	6	1	0	0

Essential Facility Damage

Before the flood analyzed in this scenario, the region had 2,360 hospital beds available for use. On the day of the scenario flood event, the model estimates that 2,360 hospital beds are available in the region.

Table 5: Expected Damage to Essential Facilities

		# Facilities		
Classification	Total	At Least Moderate	At Least Substantial	Loss of Use
Emergency Operation Centers	15	0	0	0
Fire Stations	73	0	0	0
Hospitals	9	0	0	0
Police Stations	22	0	0	0
Schools	294	0	0	0

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

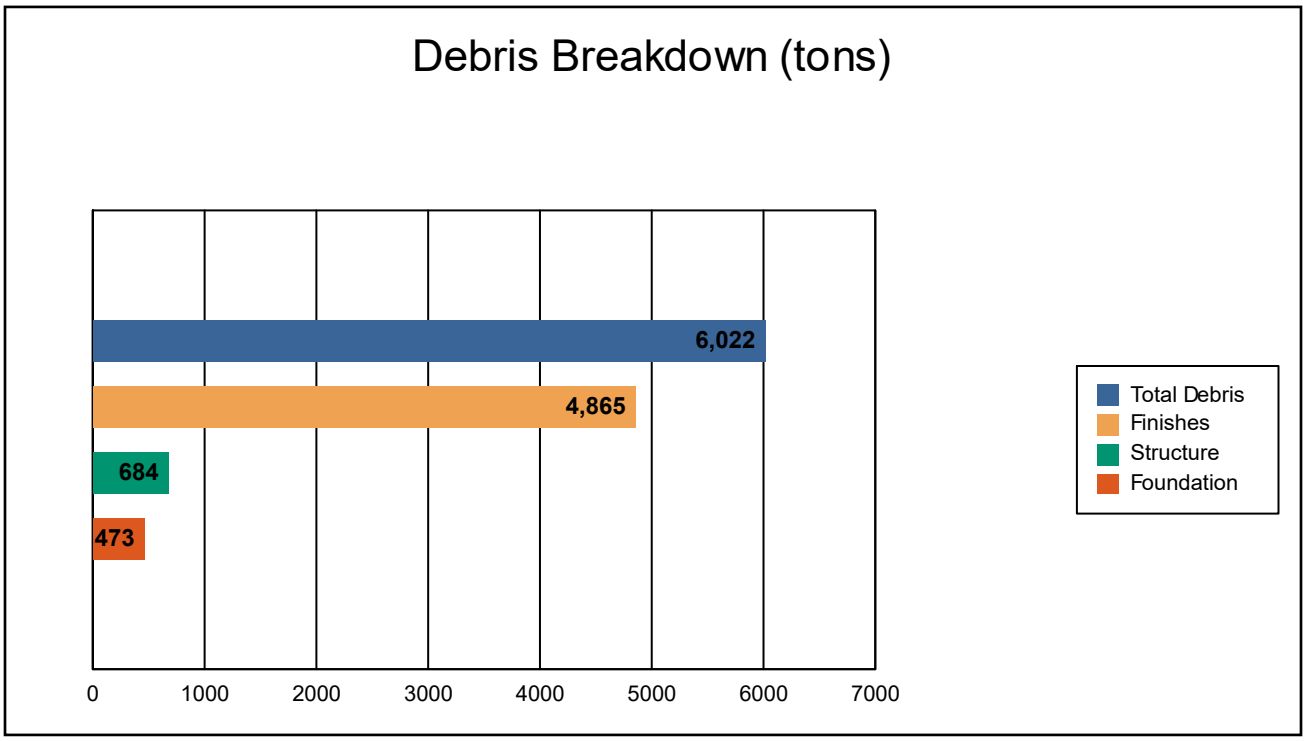
(1) None of your facilities were flooded. This can be checked by mapping the inventory data on the depth grid.

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

Induced Flood Damage

Debris Generation

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

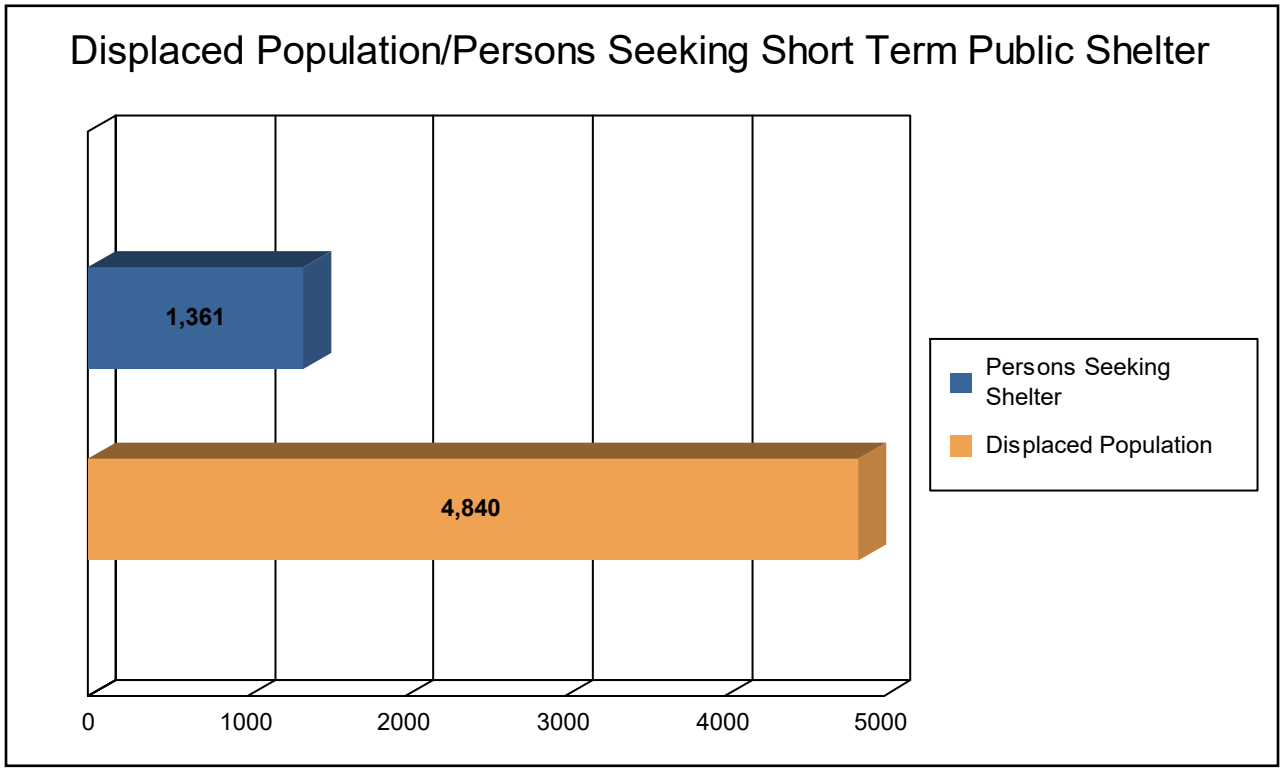


The model estimates that a total of 6,022 tons of debris will be generated. Of the total amount, Finishes comprises 81% of the total, Structure comprises 11% of the total, and Foundation comprises 8%. If the debris tonnage is converted into an estimated number of truckloads, it will require 241 truckloads (@25 tons/truck) to remove the debris generated by the flood.

Social Impact

Shelter Requirements

Hazus estimates the number of households that are expected to be displaced from their homes due to the flood and the associated potential evacuation. Hazus also estimates those displaced people that will require accommodations in temporary public shelters. The model estimates 1,613 households (or 4,840 of people) will be displaced due to the flood. Displacement includes households evacuated from within or very near to the inundated area. Of these, 1,361 people (out of a total population of 570,001) will seek temporary shelter in public shelters.



Economic Loss

The total economic loss estimated for the flood is 520.66 million dollars, which represents 5.19 % of the total replacement value of the scenario buildings.

Building-Related Losses

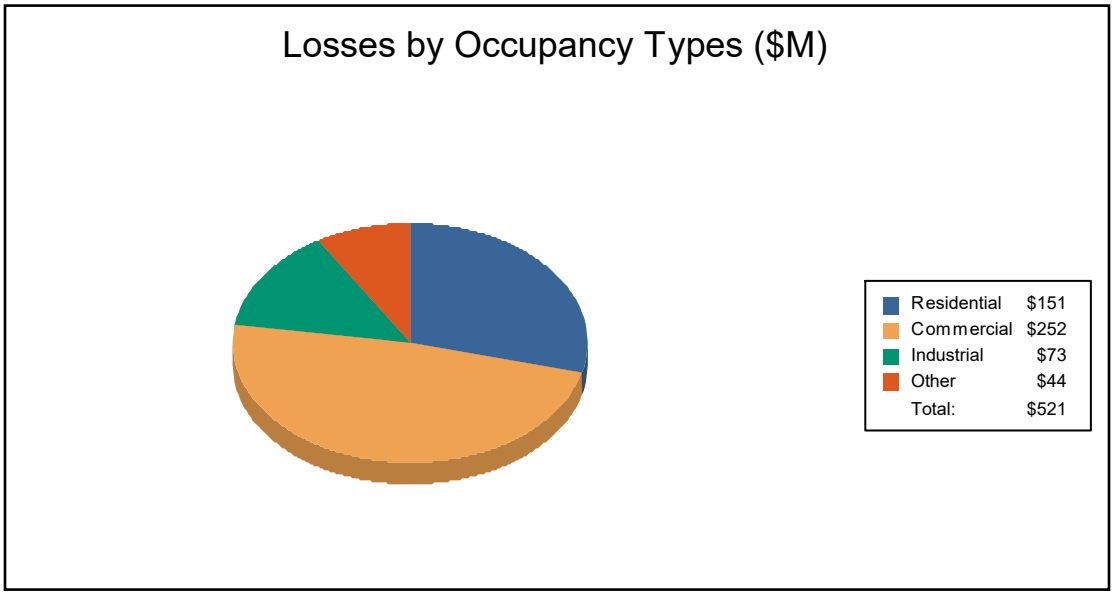
The building losses are broken into two categories: direct building losses and business interruption losses. The direct building losses are the estimated costs to repair or replace the damage caused to the building and its contents. The business interruption losses are the losses associated with inability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

The total building-related losses were 298.53 million dollars. 43% of the estimated losses were related to the business interruption of the region. The residential occupancies made up 28.98% of the total loss. Table 6 below provides a summary of the losses associated with the building damage.

Table 6: Building-Related Economic Loss Estimates

(Millions of dollars)

Category	Area	Residential	Commercial	Industrial	Others	Total
Building Loss						
	Building	76.67	25.92	17.93	1.91	122.43
	Content	37.41	75.45	43.78	12.08	168.72
	Inventory	0.00	1.23	6.03	0.11	7.38
	Subtotal	**114.09**	**102.61**	**67.74**	**14.10**	**298.53**
Business Interruption						
	Income	1.63	61.77	1.65	5.19	70.23
	Relocation	21.85	13.80	1.45	1.64	38.74
	Rental Income	9.45	10.00	0.31	0.13	19.90
	Wage	3.85	63.92	2.07	23.43	93.26
	Subtotal	**36.78**	**149.49**	**5.48**	**30.38**	**222.13**
ALL	**Total**	**150.86**	**252.10**	**73.22**	**44.48**	**520.66**



Appendix A: County Listing for the Region

Connecticut

- New Haven

Appendix B: Regional Population and Building Value Data

	Population	Building Value (thousands of dollars)		
		Residential	Non-Residential	Total
Connecticut				
New Haven	570,001	63,417,388	25,250,817	88,668,205
Total	**570,001**	**63,417,388**	**25,250,817**	**88,668,205**
Total Study Region	**570,001**	**63,417,388**	**25,250,817**	**88,668,205**

Hazus: Flood Global Risk Report

Region Name: SCROG_FLD_multi

Flood Scenario: Multi-Freq

Print Date: Tuesday, August 2, 2022

Disclaimer:
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Note:
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General Building Stock

Hazus estimates that there are 183,793 buildings in the region which have an aggregate total replacement value of 88,668 million dollars. Table 1 and Table 2 present the relative distribution of the value with respect to the general occupancies by Study Region and Scenario respectively. Appendix B provides a general distribution of the building value by State and County.

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Government	381,243	0.4%
Education	3,268,112	3.7%
Total	**88,668,205**	**100%**

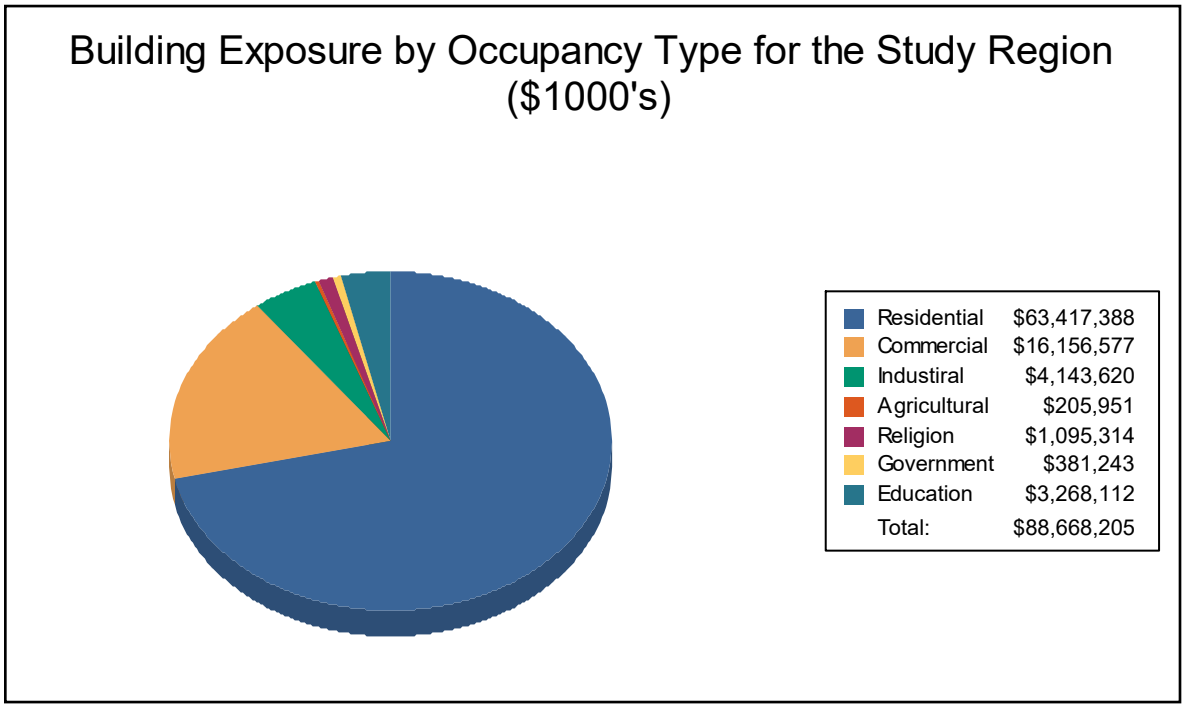

Table 2
Building Exposure by Occupancy Type for the Scenario

Occupancy	Exposure ($1000)	Percent of Total
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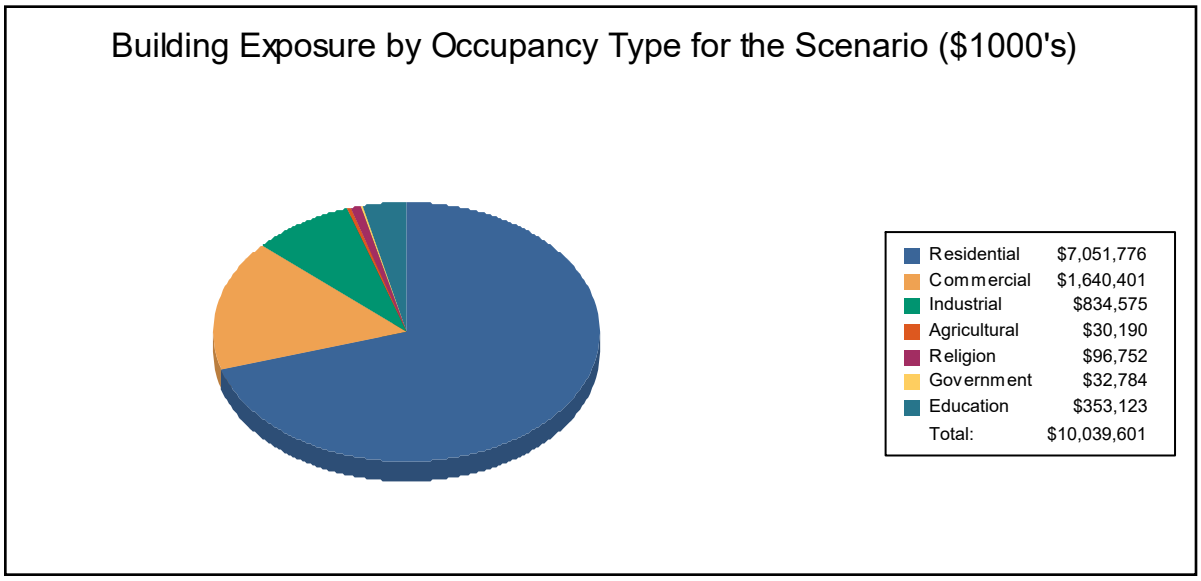
Total	**10,039,601**	**100%**



Essential Facility Inventory

For essential facilities, there are 9 hospitals in the region with a total bed capacity of 2,360 beds. There are 294 schools, 73 fire stations, 22 police stations and 15 emergency operation centers.

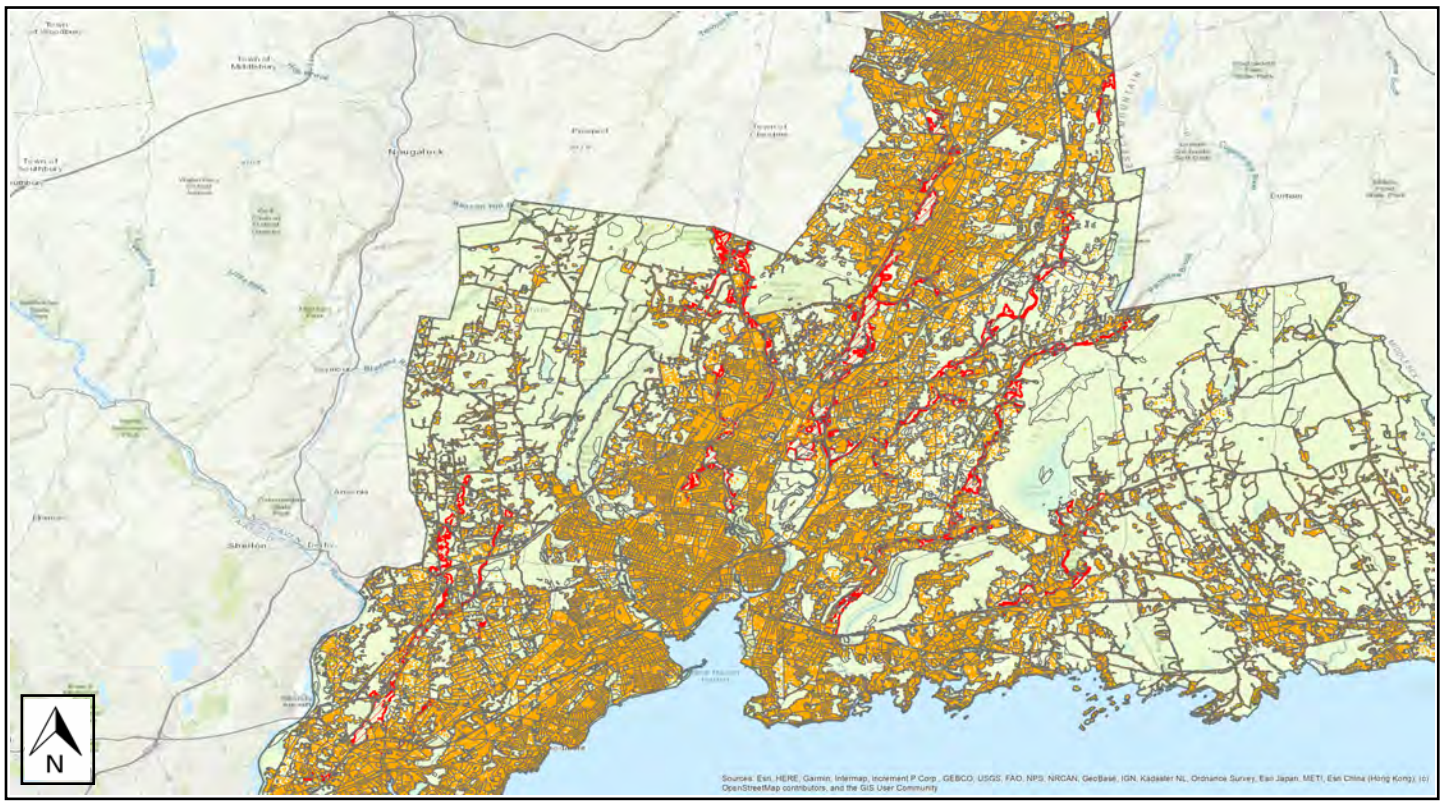
Flood Scenario Parameters

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

Study Region Name:	SCROG_FLD_multi
Scenario Name:	Multi-Freq
Return Period Analyzed:	500
Analysis Options Analyzed:	No What-Ifs

Study Region Overview Map

Illustrating scenario flood extent, as well as exposed essential facilities and total exposure



Building Damage

General Building Stock Damage

Hazus estimates that about 630 buildings will be at least moderately damaged. This is over 83% of the total number of buildings in the scenario. There are an estimated 11 buildings that will be completely destroyed. The definition of the 'damage states' is provided in the Hazus Flood Technical Manual. Table 3 below summarizes the expected damage by general occupancy for the buildings in the region. Table 4 summarizes the expected damage by general building type.

Total Economic Loss (1 dot = $300K) Overview Map

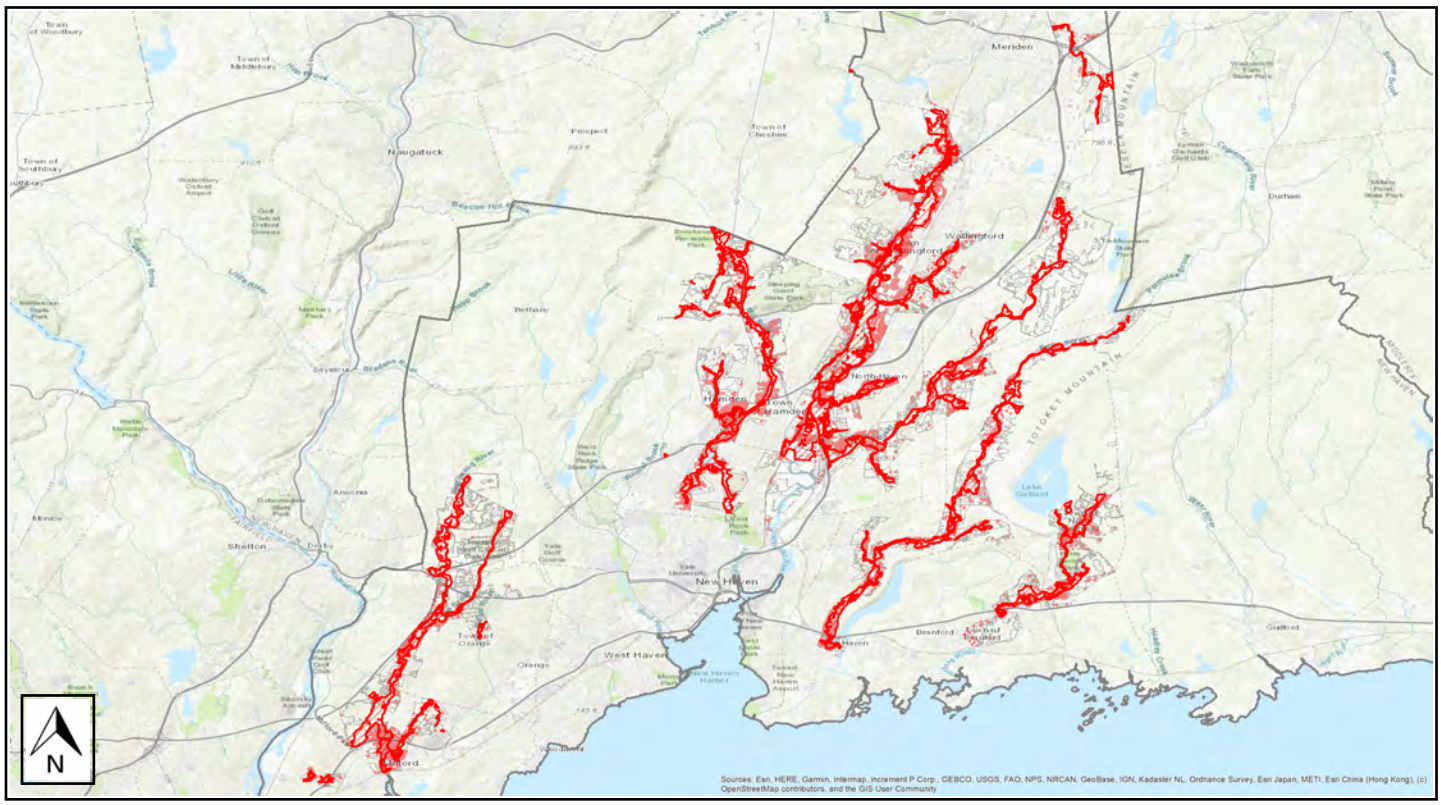


Table 3: Expected Building Damage by Occupancy

	1-10		11-20		21-30		31-40		41-50		>50	
Occupancy	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**
Agriculture	0	0	0	0	0	0	0	0	0	0	0	0
Commercial	1	14	5	71	1	14	0	0	0	0	0	0
Education	0	0	0	0	0	0	0	0	0	0	0	0
Government	0	0	0	0	0	0	0	0	0	0	0	0
Industrial	0	0	0	0	0	0	0	0	0	0	0	0
Religion	0	0	0	0	0	0	0	0	0	0	0	0
Residential	337	35	359	37	162	17	65	7	27	3	11	1
Total	**338**		**364**		**163**		**65**		**27**		**11**	

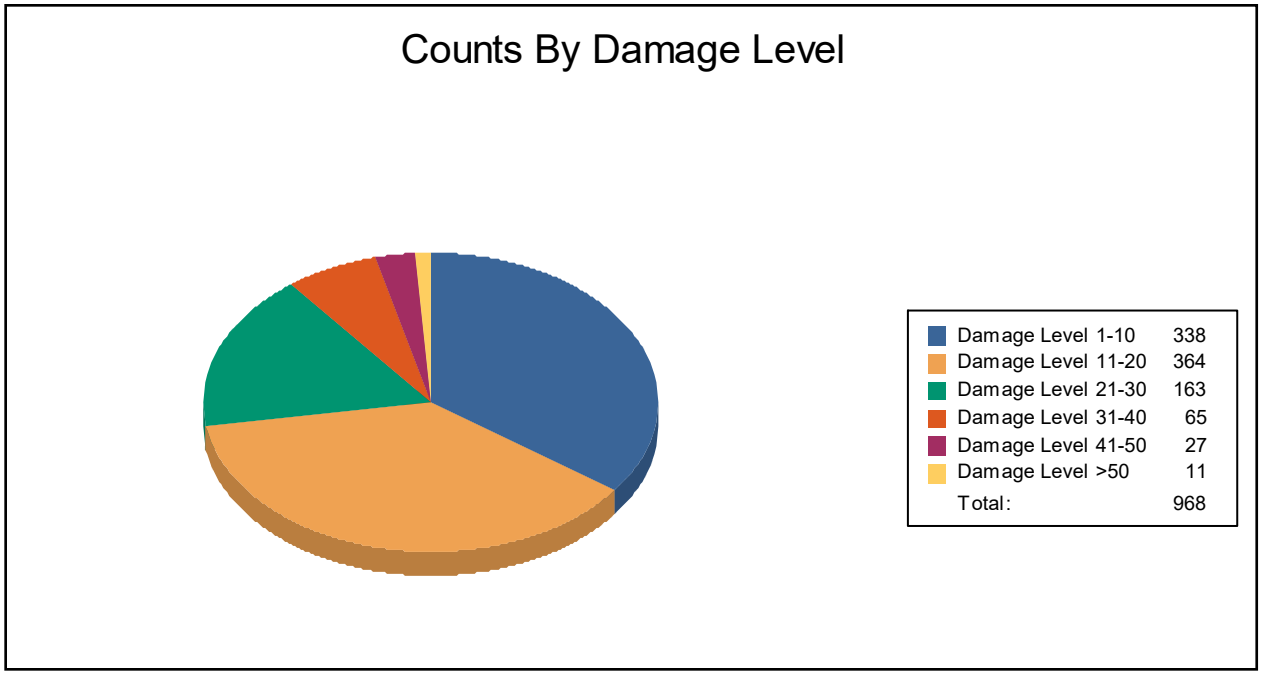


Table 4: Expected Building Damage by Building Type

Building Type	1-10		11-20		21-30		31-40		41-50		>50	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Concrete	0	0	0	0	0	0	0	0	0	0	0	0
ManufHousing	0	0	0	0	0	0	0	0	0	0	0	0
Masonry	1	33	2	67	0	0	0	0	0	0	0	0
Steel	0	0	3	100	0	0	0	0	0	0	0	0
Wood	336	35	359	37	162	17	65	7	27	3	11	1

Essential Facility Damage

Before the flood analyzed in this scenario, the region had 2,360 hospital beds available for use. On the day of the scenario flood event, the model estimates that 2,360 hospital beds are available in the region.

Table 5: Expected Damage to Essential Facilities

		# Facilities		
Classification	Total	At Least Moderate	At Least Substantial	Loss of Use
Emergency Operation Centers	15	0	0	0
Fire Stations	73	0	0	0
Hospitals	9	0	0	0
Police Stations	22	0	0	0
Schools	294	0	0	0

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

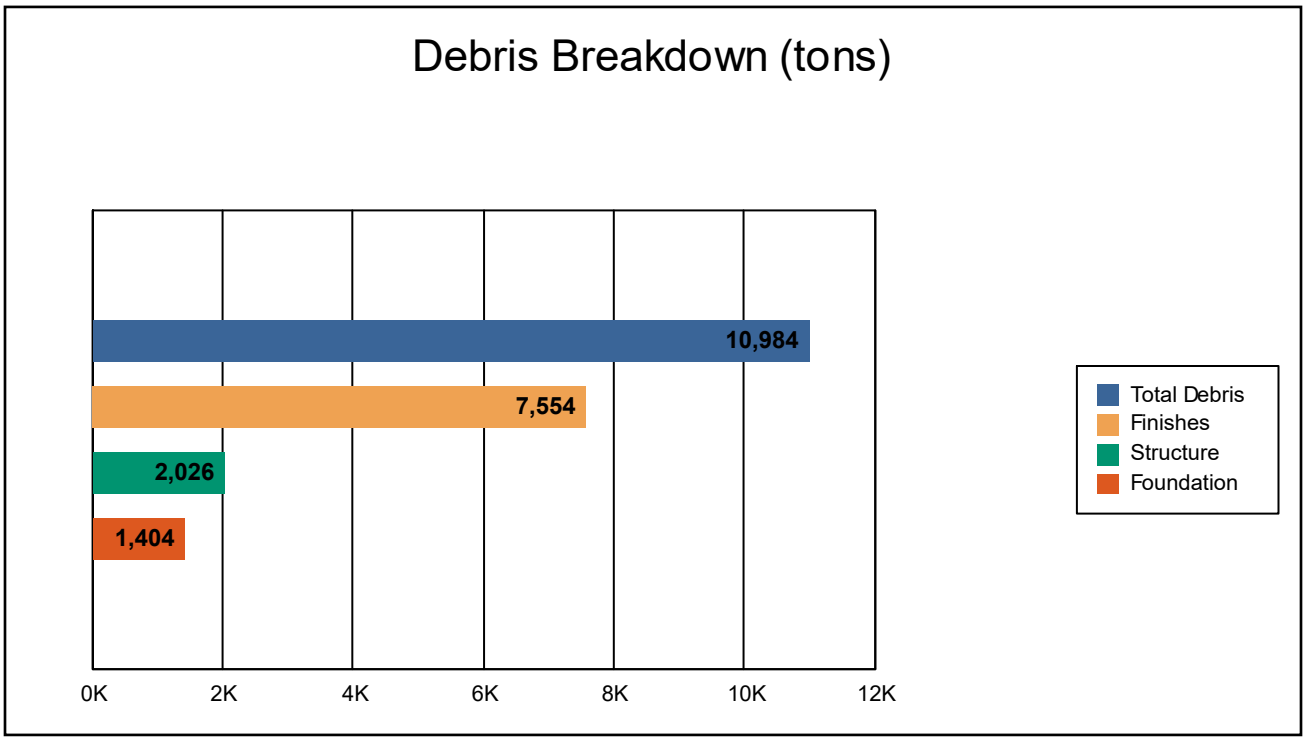
(1) None of your facilities were flooded. This can be checked by mapping the inventory data on the depth grid.

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

Induced Flood Damage

Debris Generation

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

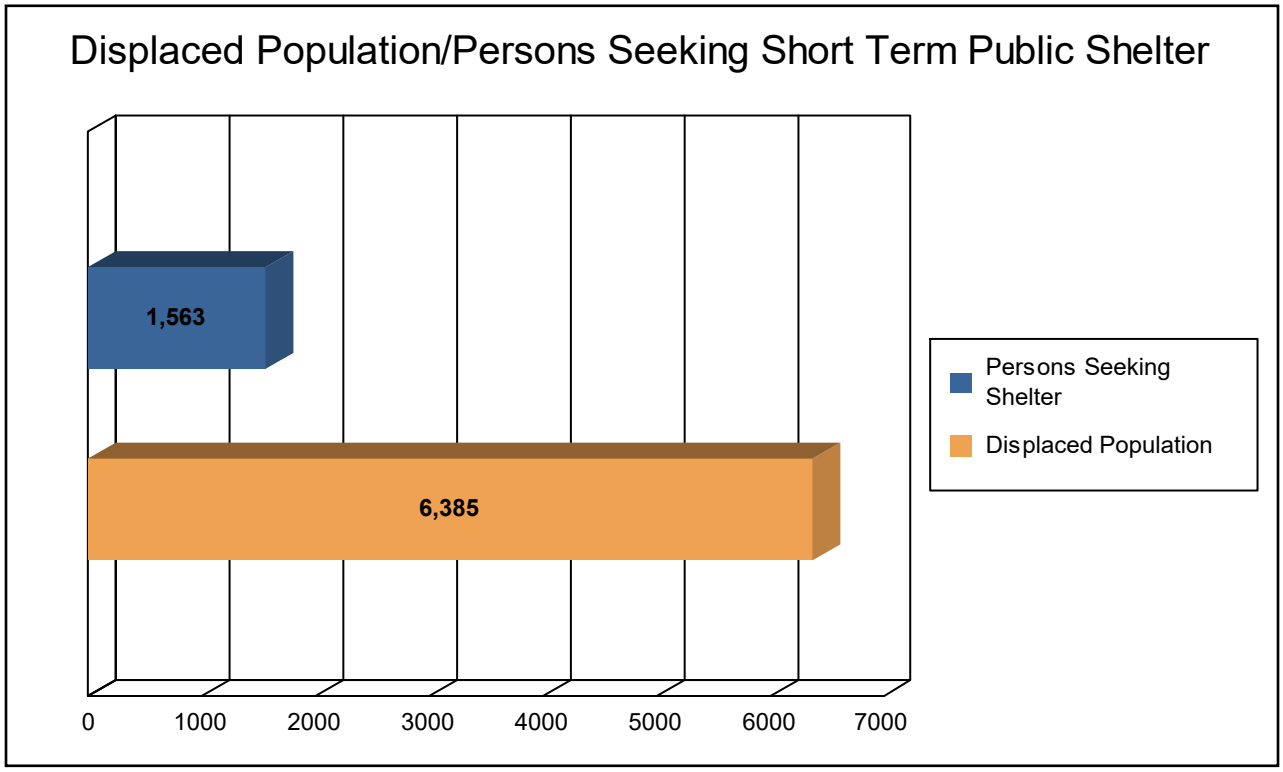


The model estimates that a total of 10,984 tons of debris will be generated. Of the total amount, Finishes comprises 69% of the total, Structure comprises 18% of the total, and Foundation comprises 13%. If the debris tonnage is converted into an estimated number of truckloads, it will require 440 truckloads (@25 tons/truck) to remove the debris generated by the flood.

Social Impact

Shelter Requirements

Hazus estimates the number of households that are expected to be displaced from their homes due to the flood and the associated potential evacuation. Hazus also estimates those displaced people that will require accommodations in temporary public shelters. The model estimates 2,128 households (or 6,385 of people) will be displaced due to the flood. Displacement includes households evacuated from within or very near to the inundated area. Of these, 1,563 people (out of a total population of 570,001) will seek temporary shelter in public shelters.



Economic Loss

The total economic loss estimated for the flood is 757.43 million dollars, which represents 7.54 % of the total replacement value of the scenario buildings.

Building-Related Losses

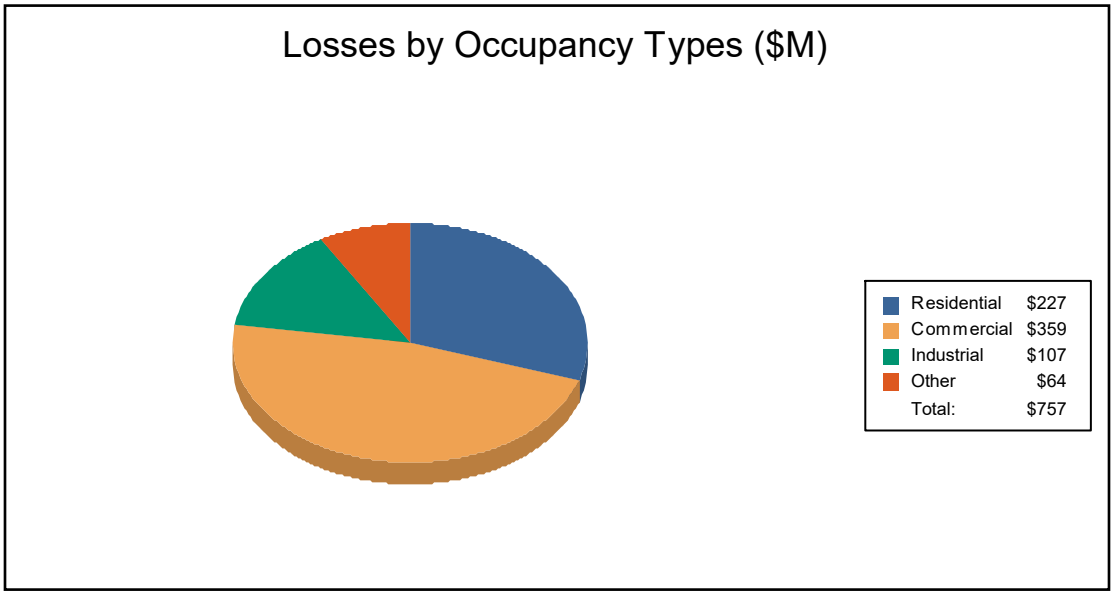
The building losses are broken into two categories: direct building losses and business interruption losses. The direct building losses are the estimated costs to repair or replace the damage caused to the building and its contents. The business interruption losses are the losses associated with inability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

The total building-related losses were 450.41 million dollars. 41% of the estimated losses were related to the business interruption of the region. The residential occupancies made up 30.03% of the total loss. Table 6 below provides a summary of the losses associated with the building damage.

Table 6: Building-Related Economic Loss Estimates

(Millions of dollars)

Category	Area	Residential	Commercial	Industrial	Others	Total
Building Loss						
	Building	117.59	39.54	26.66	3.10	186.89
	Content	58.45	111.37	64.14	18.49	252.46
	Inventory	0.00	1.96	8.89	0.21	11.06
	Subtotal	**176.05**	**152.87**	**99.69**	**21.79**	**450.41**
Business Interruption						
	Income	2.30	84.14	2.28	7.13	95.84
	Relocation	30.31	19.46	2.04	2.36	54.16
	Rental Income	13.34	14.10	0.44	0.20	28.09
	Wage	5.43	88.05	2.87	32.58	128.93
	Subtotal	**51.38**	**205.75**	**7.64**	**42.26**	**307.03**
ALL	**Total**	**227.42**	**358.63**	**107.33**	**64.05**	**757.43**



Appendix A: County Listing for the Region

Connecticut

- New Haven

Appendix B: Regional Population and Building Value Data

	Population	Building Value (thousands of dollars)		
		Residential	Non-Residential	Total
Connecticut				
New Haven	570,001	63,417,388	25,250,817	88,668,205
Total	**570,001**	**63,417,388**	**25,250,817**	**88,668,205**
Total Study Region	**570,001**	**63,417,388**	**25,250,817**	**88,668,205**

Hazus: Flood Global Risk Report

Region Name: SCROG_FLD_multi

Flood Scenario: Multi-Freq

Print Date: Tuesday, August 2, 2022

Disclaimer:
This version of Hazus utilizes 2010 Census Data.
Totals only reflect data for those census tracts/blocks included in the user's study region.

The estimates of social and economic impacts contained in this report were produced using Hazus loss estimation methodology software which is based on current scientific and engineering knowledge. There are uncertainties inherent in any loss estimation technique. Therefore, there may be significant differences between the modeled results contained in this report and the actual social and economic losses following a specific Flood. These results can be improved by using enhanced inventory data and flood hazard information.

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Table of Contents

General Description of the Region

Hazus is a regional multi-hazard loss estimation model that was developed by the Federal Emergency Management Agency (FEMA) and the National Institute of Building Sciences (NIBS). The primary purpose of Hazus is to provide a methodology and software application to develop multi-hazard losses at a regional scale. These loss estimates would be used primarily by local, state and regional officials to plan and stimulate efforts to reduce risks from multi-hazards and to prepare for emergency response and recovery.

The flood loss estimates provided in this report were based on a region that included 1 county(ies) from the following state(s):

- Connecticut

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

The geographical size of the region is approximately 376 square miles and contains 8,992 census blocks. The region contains over 223 thousand households and has a total population of 570,001 people (2010 Census Bureau data). The distribution of population by State and County for the study region is provided in Appendix B.

There are an estimated 183,793 buildings in the region with a total building replacement value (excluding contents) of 88,668 million dollars. Approximately 89.60% of the buildings (and 71.52% of the building value) are associated with residential housing.

Building Inventory

General Building Stock

Hazus estimates that there are 183,793 buildings in the region which have an aggregate total replacement value of 88,668 million dollars. Table 1 and Table 2 present the relative distribution of the value with respect to the general occupancies by Study Region and Scenario respectively. Appendix B provides a general distribution of the building value by State and County.

Table 1
Building Exposure by Occupancy Type for the Study Region

Occupancy	Exposure ($1000)	Percent of Total
Residential	63,417,388	71.5%
Commercial	16,156,577	18.2%
Industrial	4,143,620	4.7%
Agricultural	205,951	0.2%
Religion	1,095,314	1.2%
Government	381,243	0.4%
Education	3,268,112	3.7%
Total	**88,668,205**	**100%**

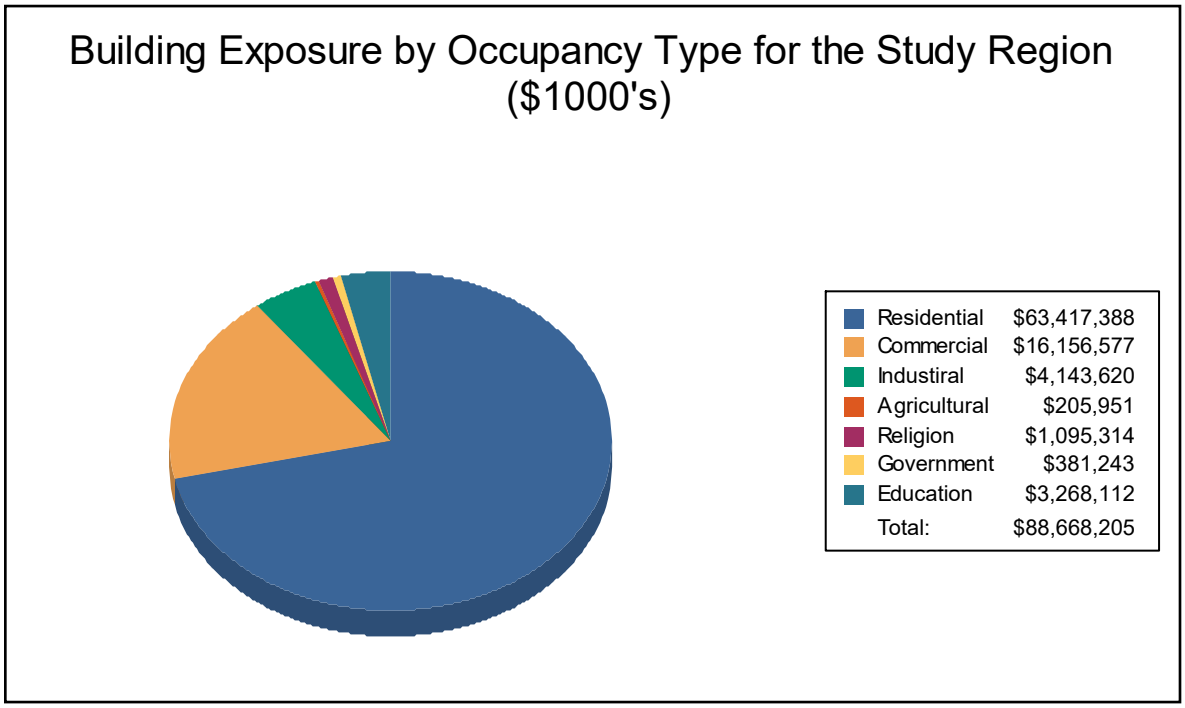
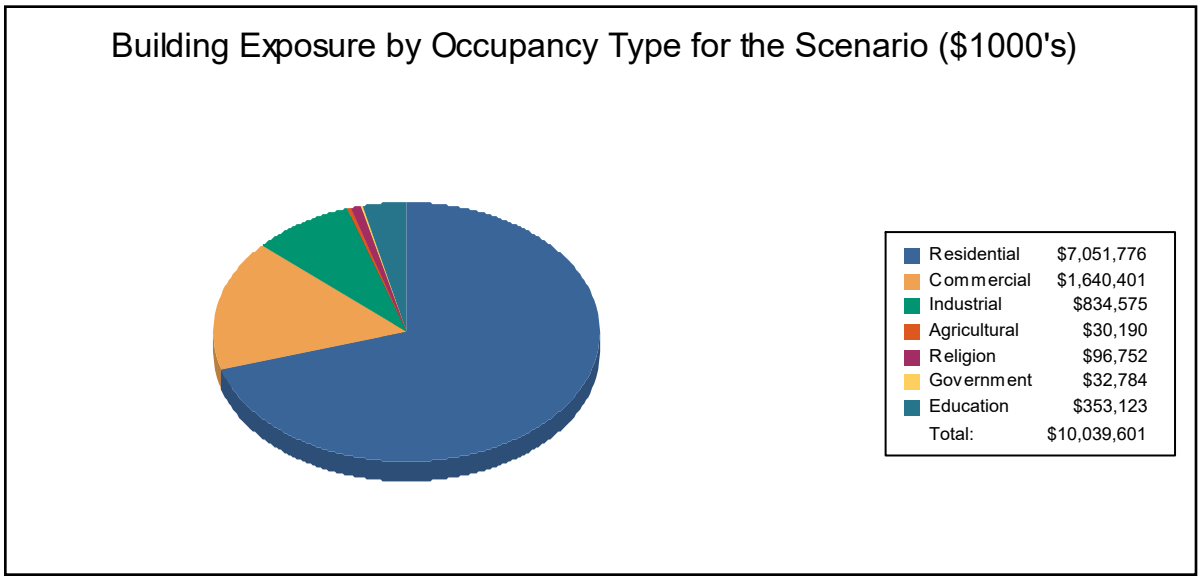


Table 2
Building Exposure by Occupancy Type for the Scenario

Occupancy	Exposure ($1000)	Percent of Total
Residential	7,051,776	70.2%
Commercial	1,640,401	16.3%
Industrial	834,575	8.3%
Agricultural	30,190	0.3%
Religion	96,752	1.0%
Government	32,784	0.3%
Education	353,123	3.5%
Total	**10,039,601**	**100%**



Essential Facility Inventory

For essential facilities, there are 9 hospitals in the region with a total bed capacity of 2,360 beds. There are 294 schools, 73 fire stations, 22 police stations and 15 emergency operation centers.

Flood Scenario Parameters

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

Study Region Name:	SCROG_FLD_multi
Scenario Name:	Multi-Freq
Return Period Analyzed:	Annual
Analysis Options Analyzed:	No What-Ifs

Study Region Overview Map

Illustrating scenario flood extent, as well as exposed essential facilities and total exposure

Analysis has not been performed for this Scenario.
AAL results are not available for Essential Facilities. Please select a return period to view Essential Facilities results.

Building Damage

General Building Stock Damage

Analysis has not been performed for this Scenario.

Table 3: Expected Building Damage by Occupancy

	1-10		11-20		21-30		31-40		41-50		>50	
Occupancy	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Analysis has not been performed for this Scenario.												

Table 4: Expected Building Damage by Building Type

Building Type	1-10		11-20		21-30		31-40		41-50		>50	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Analysis has not been performed for this Scenario.												

Essential Facility Damage

Before the flood analyzed in this scenario, the region had 2,360 hospital beds available for use. On the day of the scenario flood event, the model estimates that 2,360 hospital beds are available in the region.

Table 5: Expected Damage to Essential Facilities

		# Facilities		
Classification	Total	At Least Moderate	At Least Substantial	Loss of Use
Emergency Operation Centers	15	0	0	0
Fire Stations	73	0	0	0
Hospitals	9	0	0	0
Police Stations	22	0	0	0
Schools	294	0	0	0

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

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

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

Induced Flood Damage

Debris Generation

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

Analysis has not been performed for this Scenario.

Social Impact

Shelter Requirements

Analysis has not been performed for this Scenario.

Economic Loss

The total economic loss estimated for the flood is 35.10 million dollars, which represents 0.35 % of the total replacement value of the scenario buildings.

Building-Related Losses

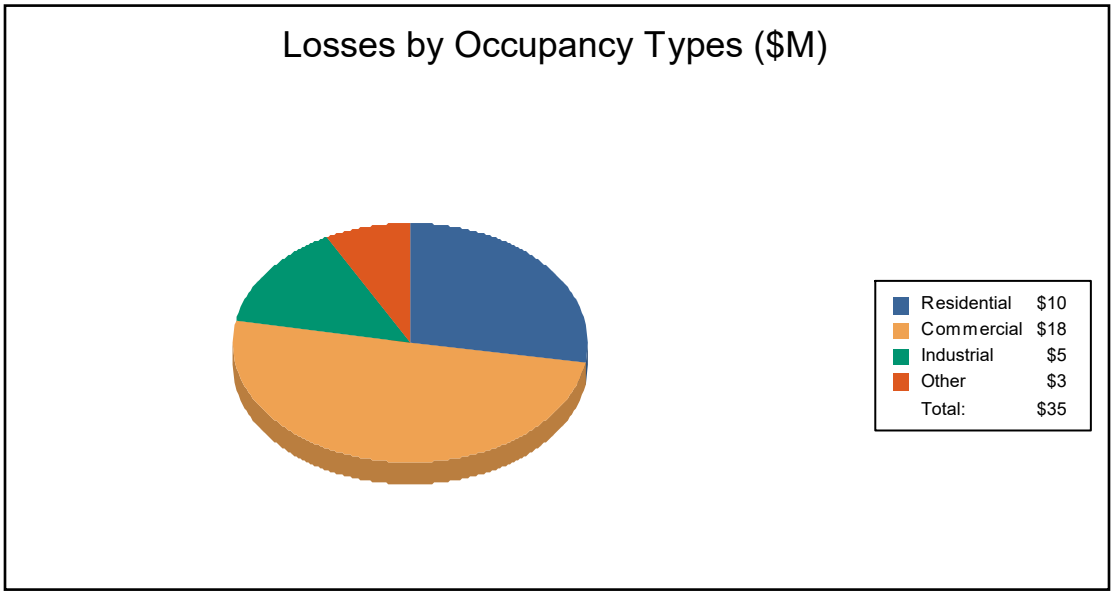
The building losses are broken into two categories: direct building losses and business interruption losses. The direct building losses are the estimated costs to repair or replace the damage caused to the building and its contents. The business interruption losses are the losses associated with inability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

The total building-related losses were 19.76 million dollars. 44% of the estimated losses were related to the business interruption of the region. The residential occupancies made up 27.89% of the total loss. Table 6 below provides a summary of the losses associated with the building damage.

Table 6: Building-Related Economic Loss Estimates

(Millions of dollars)

Category	Area	Residential	Commercial	Industrial	Others	Total
Building Loss						
	Building	4.98	1.69	1.20	0.11	7.98
	Content	2.39	5.15	3.02	0.76	11.32
	Inventory	0.00	0.06	0.39	0.01	0.46
	Subtotal	**7.37**	**6.90**	**4.62**	**0.87**	**19.76**
Business Interruption						
	Income	0.09	4.44	0.11	0.33	4.97
	Relocation	1.54	0.96	0.10	0.09	2.70
	Rental Income	0.59	0.69	0.01	0.01	1.30
	Wage	0.20	4.65	0.14	1.39	6.38
	Subtotal	**2.42**	**10.75**	**0.36**	**1.82**	**15.34**
ALL	**Total**	**9.79**	**17.65**	**4.98**	**2.69**	**35.10**



Appendix A: County Listing for the Region

Connecticut

- New Haven

Appendix B: Regional Population and Building Value Data

	Population	Building Value (thousands of dollars)		
		Residential	Non-Residential	Total
Connecticut				
New Haven	570,001	63,417,388	25,250,817	88,668,205
Total	**570,001**	**63,417,388**	**25,250,817**	**88,668,205**
Total Study Region	**570,001**	**63,417,388**	**25,250,817**	**88,668,205**

Hazus: Flood Global Risk Report

Region Name: SCRCOG_FLD_Cst100y

Flood Scenario: Coastal100YR

Print Date: Tuesday, August 2, 2022

Disclaimer:
This version of Hazus utilizes 2010 Census Data.
Totals only reflect data for those census tracts/blocks included in the user's study region.

The estimates of social and economic impacts contained in this report were produced using Hazus loss estimation methodology software which is based on current scientific and engineering knowledge. There are uncertainties inherent in any loss estimation technique. Therefore, there may be significant differences between the modeled results contained in this report and the actual social and economic losses following a specific Flood. These results can be improved by using enhanced inventory data and flood hazard information.

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Table of Contents

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The flood loss estimates provided in this report were based on a region that included 1 county(ies) from the following state(s):

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Note:
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There are an estimated 183,793 buildings in the region with a total building replacement value (excluding contents) of 88,668 million dollars. Approximately 89.60% of the buildings (and 71.52% of the building value) are associated with residential housing.

Building Inventory

General Building Stock

Hazus estimates that there are 183,793 buildings in the region which have an aggregate total replacement value of 88,668 million dollars. Table 1 and Table 2 present the relative distribution of the value with respect to the general occupancies by Study Region and Scenario respectively. Appendix B provides a general distribution of the building value by State and County.

Table 1
Building Exposure by Occupancy Type for the Study Region

Occupancy	Exposure ($1000)	Percent of Total
Residential	63,417,388	71.5%
Commercial	16,156,577	18.2%
Industrial	4,143,620	4.7%
Agricultural	205,951	0.2%
Religion	1,095,314	1.2%
Government	381,243	0.4%
Education	3,268,112	3.7%
Total	**88,668,205**	**100%**

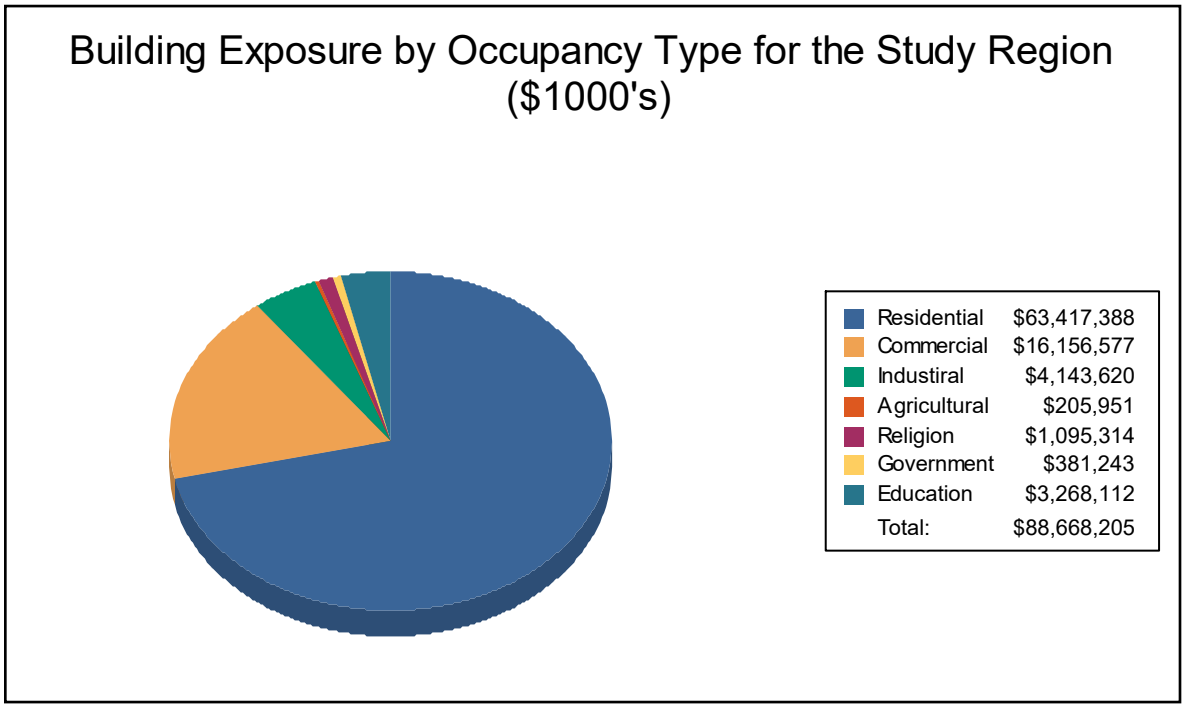
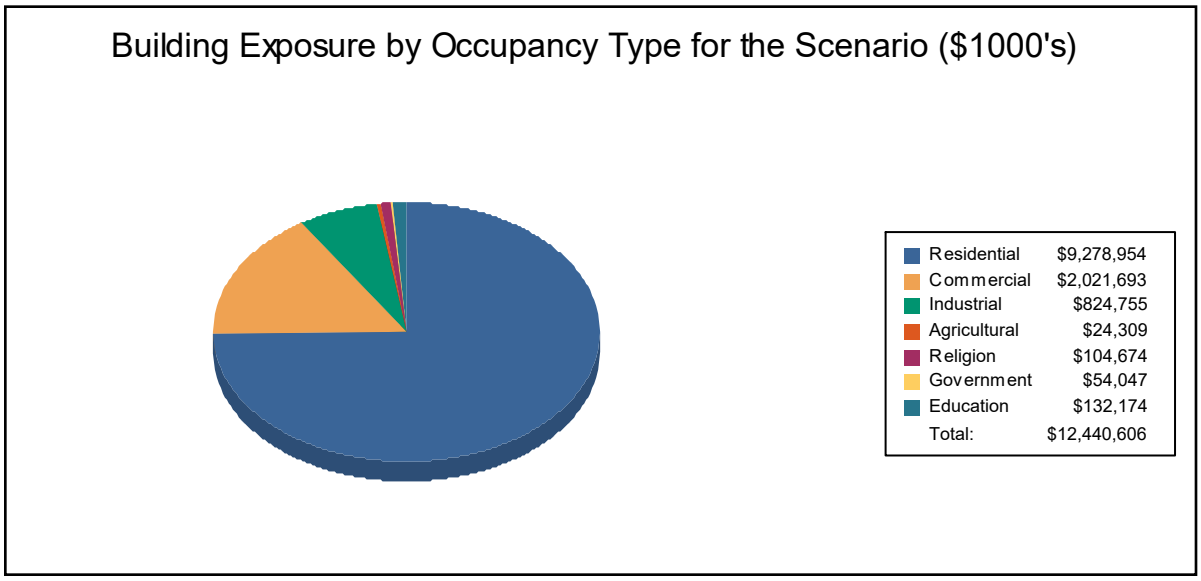


Table 2
Building Exposure by Occupancy Type for the Scenario

Occupancy	Exposure ($1000)	Percent of Total
Residential	9,278,954	74.6%
Commercial	2,021,693	16.3%
Industrial	824,755	6.6%
Agricultural	24,309	0.2%
Religion	104,674	0.8%
Government	54,047	0.4%
Education	132,174	1.1%
Total	**12,440,606**	**100%**



Essential Facility Inventory

For essential facilities, there are 9 hospitals in the region with a total bed capacity of 2,360 beds. There are 294 schools, 73 fire stations, 22 police stations and 15 emergency operation centers.

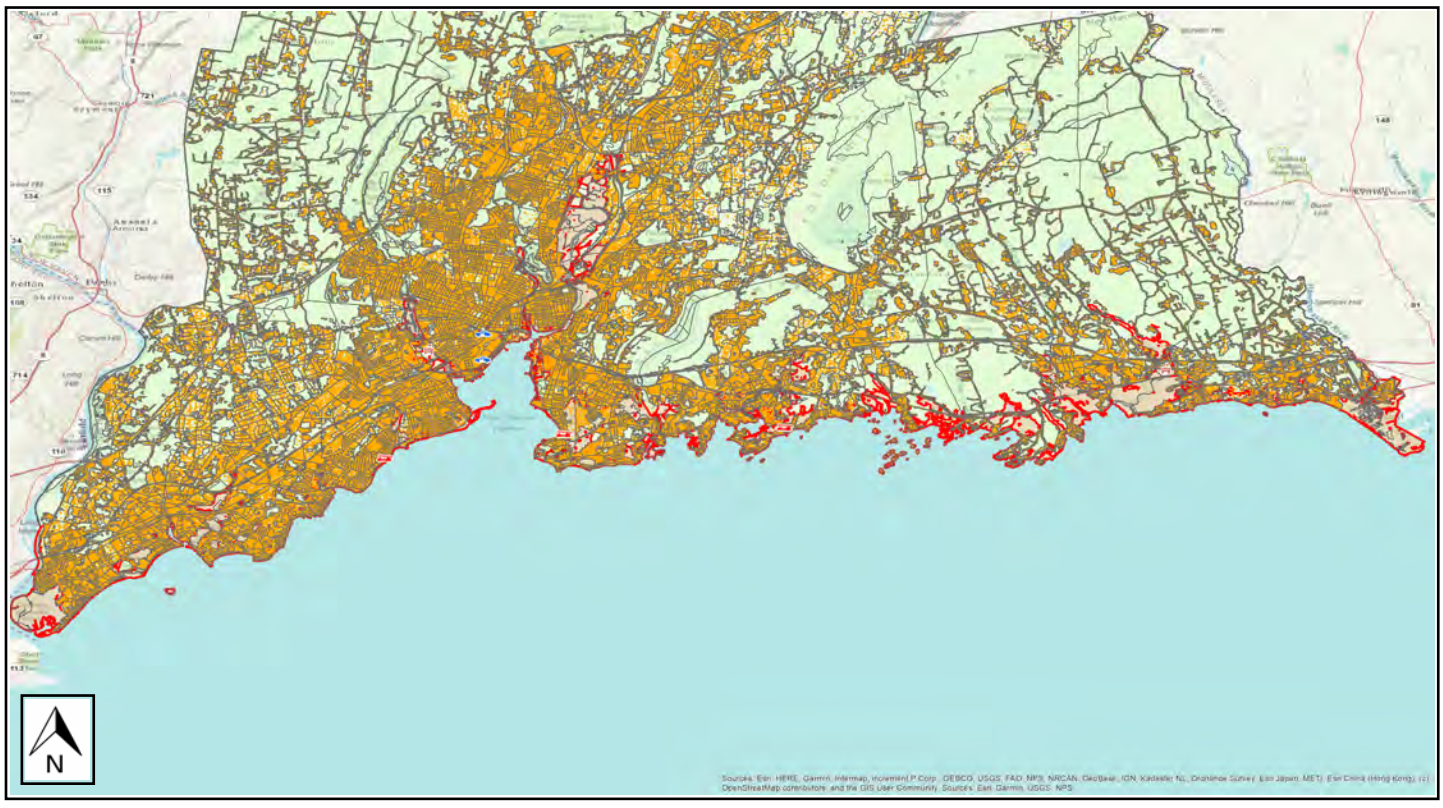
Flood Scenario Parameters

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

Study Region Name:	SCRCOG_FLD_Cst100y
Scenario Name:	Coastal100YR
Return Period Analyzed:	100
Analysis Options Analyzed:	No What-Ifs

Study Region Overview Map

Illustrating scenario flood extent, as well as exposed essential facilities and total exposure



Building Damage

General Building Stock Damage

Hazus estimates that about 2,756 buildings will be at least moderately damaged. This is over 41% of the total number of buildings in the scenario. There are an estimated 388 buildings that will be completely destroyed. The definition of the 'damage states' is provided in the Hazus Flood Technical Manual. Table 3 below summarizes the expected damage by general occupancy for the buildings in the region. Table 4 summarizes the expected damage by general building type.

Total Economic Loss (1 dot = $300K) Overview Map

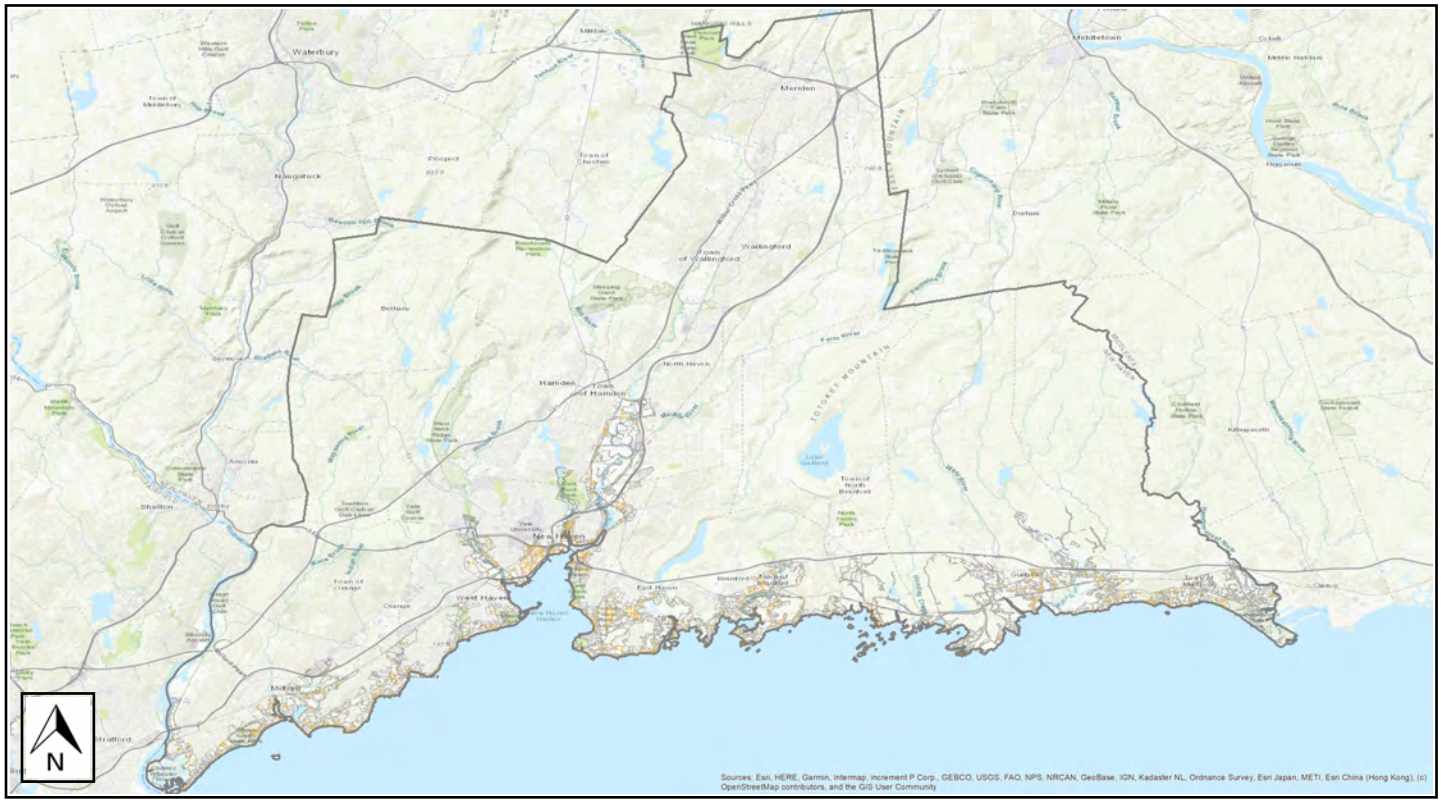


Table 3: Expected Building Damage by Occupancy

	1-10		11-20		21-30		31-40		41-50		>50	
Occupancy	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**
Agriculture	0	0	0	0	0	0	0	0	0	0	0	0
Commercial	5	33	9	60	1	7	0	0	0	0	0	0
Education	0	0	0	0	0	0	0	0	0	0	0	0
Government	0	0	0	0	0	0	0	0	0	0	0	0
Industrial	0	0	0	0	0	0	1	100	0	0	0	0
Religion	0	0	0	0	0	0	0	0	0	0	0	0
Residential	410	13	1,178	37	828	26	260	8	91	3	388	12
Total	**415**		**1,187**		**829**		**261**		**91**		**388**	

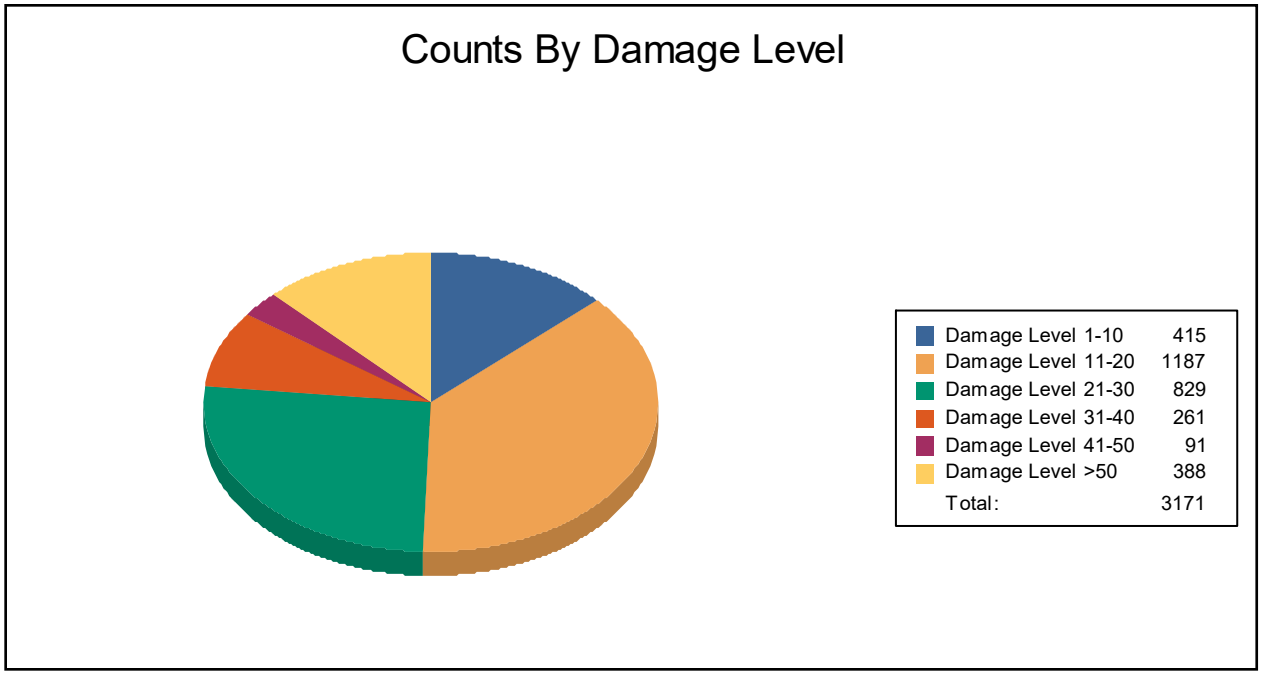


Table 4: Expected Building Damage by Building Type

Building Type	1-10		11-20		21-30		31-40		41-50		>50	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Concrete	0	0	0	0	0	0	0	0	0	0	0	0
ManufHousing	0	0	0	0	0	0	0	0	0	0	9	100
Masonry	3	7	26	60	10	23	1	2	0	0	3	7
Steel	3	33	5	56	0	0	1	11	0	0	0	0
Wood	407	13	1,151	37	815	26	259	8	91	3	376	12

Essential Facility Damage

Before the flood analyzed in this scenario, the region had 2,360 hospital beds available for use. On the day of the scenario flood event, the model estimates that 2,360 hospital beds are available in the region.

Table 5: Expected Damage to Essential Facilities

		# Facilities		
Classification	Total	At Least Moderate	At Least Substantial	Loss of Use
Emergency Operation Centers	15	0	0	0
Fire Stations	73	3	0	3
Hospitals	9	0	0	0
Police Stations	22	2	0	2
Schools	294	2	0	2

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

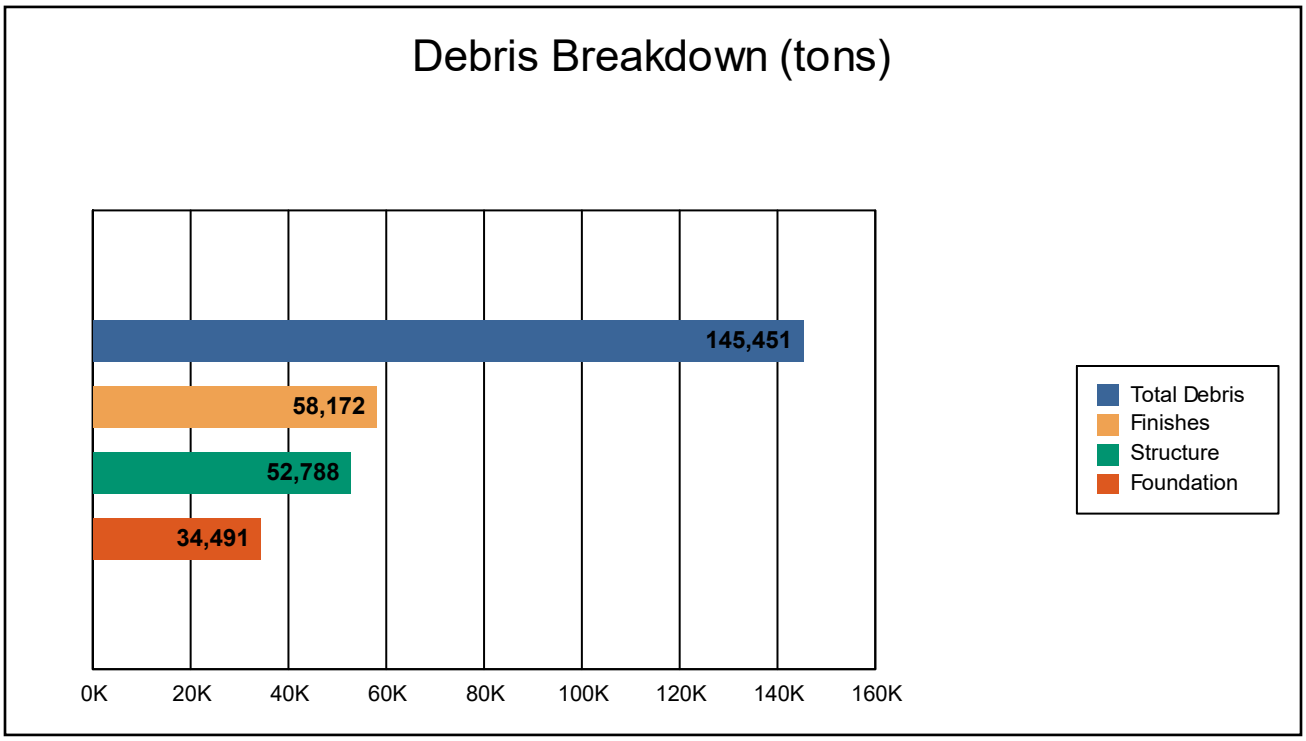
(1) None of your facilities were flooded. This can be checked by mapping the inventory data on the depth grid.

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

Induced Flood Damage

Debris Generation

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

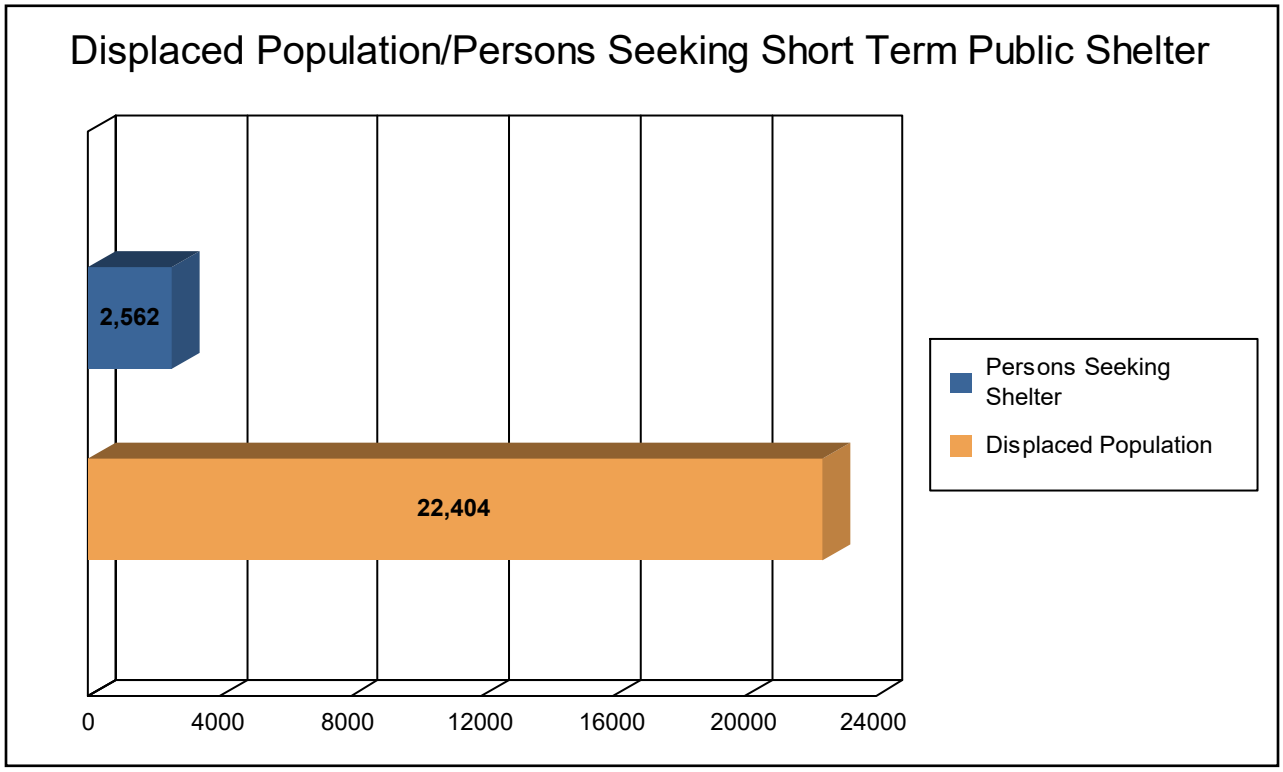


The model estimates that a total of 145,451 tons of debris will be generated. Of the total amount, Finishes comprises 40% of the total, Structure comprises 36% of the total, and Foundation comprises 24%. If the debris tonnage is converted into an estimated number of truckloads, it will require 5819 truckloads (@25 tons/truck) to remove the debris generated by the flood.

Social Impact

Shelter Requirements

Hazus estimates the number of households that are expected to be displaced from their homes due to the flood and the associated potential evacuation. Hazus also estimates those displaced people that will require accommodations in temporary public shelters. The model estimates 7,468 households (or 22,404 of people) will be displaced due to the flood. Displacement includes households evacuated from within or very near to the inundated area. Of these, 2,562 people (out of a total population of 570,001) will seek temporary shelter in public shelters.



Economic Loss

The total economic loss estimated for the flood is 2,650.09 million dollars, which represents 21.30 % of the total replacement value of the scenario buildings.

Building-Related Losses

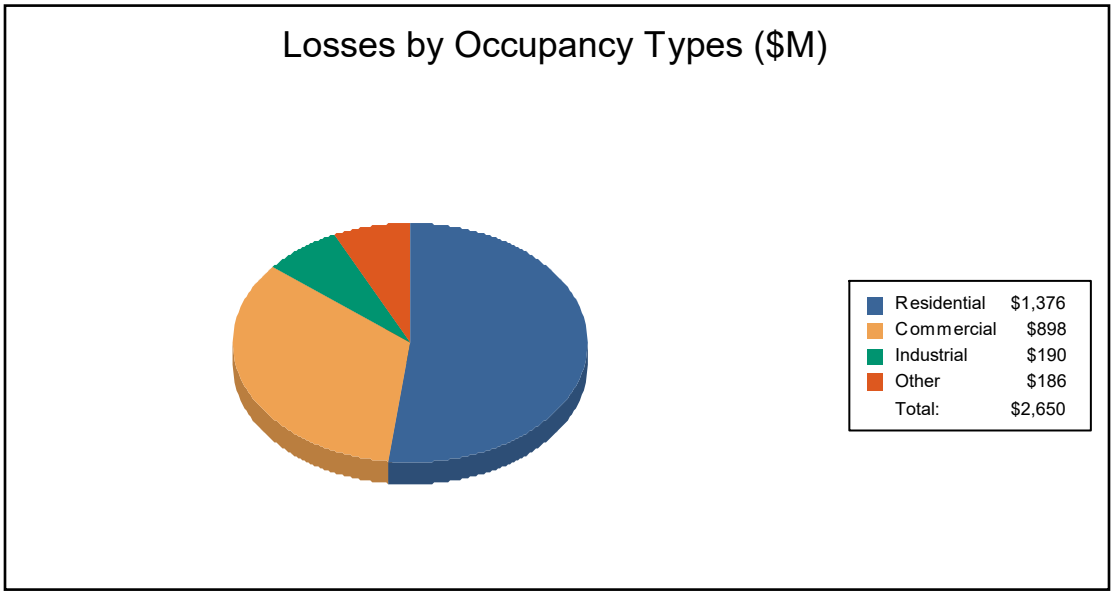
The building losses are broken into two categories: direct building losses and business interruption losses. The direct building losses are the estimated costs to repair or replace the damage caused to the building and its contents. The business interruption losses are the losses associated with inability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

The total building-related losses were 1,731.93 million dollars. 35% of the estimated losses were related to the business interruption of the region. The residential occupancies made up 51.91% of the total loss. Table 6 below provides a summary of the losses associated with the building damage.

Table 6: Building-Related Economic Loss Estimates

(Millions of dollars)

Category	Area	Residential	Commercial	Industrial	Others	Total
Building Loss						
	Building	611.59	93.89	47.86	8.22	761.56
	Content	543.66	249.08	111.39	47.35	951.48
	Inventory	0.00	4.73	13.85	0.31	18.89
	Subtotal	**1,155.25**	**347.70**	**173.09**	**55.89**	**1,731.93**
Business Interruption						
	Income	2.63	229.54	4.74	18.51	255.42
	Relocation	147.88	56.67	4.62	7.70	216.87
	Rental Income	63.78	42.07	1.09	1.02	107.95
	Wage	6.21	221.79	6.85	103.08	337.93
	Subtotal	**220.50**	**550.06**	**17.30**	**130.31**	**918.16**
ALL	**Total**	**1,375.75**	**897.76**	**190.39**	**186.19**	**2,650.09**



Appendix A: County Listing for the Region

Connecticut

- New Haven

Appendix B: Regional Population and Building Value Data

	Population	Building Value (thousands of dollars)		
		Residential	Non-Residential	Total
Connecticut				
New Haven	570,001	63,417,388	25,250,817	88,668,205
Total	**570,001**	**63,417,388**	**25,250,817**	**88,668,205**
Total Study Region	**570,001**	**63,417,388**	**25,250,817**	**88,668,205**

Quick Assessment Report

August 2, 2022

Study Region : SCROG_FLD_multi
Scenario : Multi-Freq
Return Period: 10
Analysis Option: 0

Regional Statistics

Area (Square Miles)	376
Number of Census Blocks	8,992
Number of Buildings	
Residential	164,672
Total	183,793
Number of People in the Region (x 1000)	570
Building Exposure ($ Millions)	
Residential	63,417
Total	88,668

Scenario Results

Shelter Requirements

Displaced Population (# Households)	925
Short Term Shelter (# People)	1,060

Economic Loss

Residential Property (Capital Stock) Losses ($ Millions)	47
Total Property (Capital Stock) Losses ($ Millions)	130
Business Interruption (Income) Losses ($ Millions)	111

Disclaimer:

Totals only reflect data for those census tracts/blocks included in the user's study region.

The estimates of social and economic impacts contained in this report were produced using Hazus loss estimation methodology software which is based on current scientific and engineering knowledge. There are uncertainties inherent in any loss estimation technique. Therefore, there may be significant differences between the modeled results contained in this report and the actual social and economic losses following a specific flood. These results can be improved by using enhanced inventory data and flood hazard information.

Quick Assessment Report

August 2, 2022

Study Region : SCROG_FLD_multi
Scenario : Multi-Freq
Return Period: 25
Analysis Option: 0

Regional Statistics

Area (Square Miles)	376
Number of Census Blocks	8,992
Number of Buildings	
Residential	164,672
Total	183,793
Number of People in the Region (x 1000)	570
Building Exposure ($ Millions)	
Residential	63,417
Total	88,668

Scenario Results

Shelter Requirements

Displaced Population (# Households)	1,168
Short Term Shelter (# People)	1,186

Economic Loss

Residential Property (Capital Stock) Losses ($ Millions)	68
Total Property (Capital Stock) Losses ($ Millions)	185
Business Interruption (Income) Losses ($ Millions)	146

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Quick Assessment Report

August 2, 2022

Study Region : SCROG_FLD_multi
Scenario : Multi-Freq
Return Period: 50
Analysis Option: 0

Regional Statistics

Area (Square Miles)	376
Number of Census Blocks	8,992
Number of Buildings	
Residential	164,672
Total	183,793
Number of People in the Region (x 1000)	570
Building Exposure ($ Millions)	
Residential	63,417
Total	88,668

Scenario Results

Shelter Requirements

Displaced Population (# Households)	1,367
Short Term Shelter (# People)	1,264

Economic Loss

Residential Property (Capital Stock) Losses ($ Millions)	88
Total Property (Capital Stock) Losses ($ Millions)	235
Business Interruption (Income) Losses ($ Millions)	179

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Quick Assessment Report

August 2, 2022

Study Region : SCROG_FLD_multi
Scenario : Multi-Freq
Return Period: 100
Analysis Option: 0

Regional Statistics

Area (Square Miles)	376
Number of Census Blocks	8,992
Number of Buildings	
Residential	164,672
Total	183,793
Number of People in the Region (x 1000)	570
Building Exposure ($ Millions)	
Residential	63,417
Total	88,668

Scenario Results

Shelter Requirements

Displaced Population (# Households)	1,613
Short Term Shelter (# People)	1,361

Economic Loss

Residential Property (Capital Stock) Losses ($ Millions)	114
Total Property (Capital Stock) Losses ($ Millions)	299
Business Interruption (Income) Losses ($ Millions)	222

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Quick Assessment Report

August 2, 2022

Study Region : SCROG_FLD_multi
Scenario : Multi-Freq
Return Period: 500
Analysis Option: 0

Regional Statistics

Area (Square Miles)	376
Number of Census Blocks	8,992
Number of Buildings	
Residential	164,672
Total	183,793
Number of People in the Region (x 1000)	570
Building Exposure ($ Millions)	
Residential	63,417
Total	88,668

Scenario Results

Shelter Requirements

Displaced Population (# Households)	2,128
Short Term Shelter (# People)	1,563

Economic Loss

Residential Property (Capital Stock) Losses ($ Millions)	176
Total Property (Capital Stock) Losses ($ Millions)	450
Business Interruption (Income) Losses ($ Millions)	307

Disclaimer:

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Quick Assessment Report

August 2, 2022

Study Region : SCROG_FLD_multi
Scenario : Multi-Freq
Return Period: Annual
Analysis Option: 0

Regional Statistics

Area (Square Miles)	376
Number of Census Blocks	8,992
Number of Buildings	
Residential	164,672
Total	183,793
Number of People in the Region (x 1000)	570
Building Exposure ($ Millions)	
Residential	63,417
Total	88,668

Scenario Results

Shelter Requirements

Displaced Population (# Households)	
Short Term Shelter (# People)	

Economic Loss

Residential Property (Capital Stock) Losses ($ Millions)	7
Total Property (Capital Stock) Losses ($ Millions)	20
Business Interruption (Income) Losses ($ Millions)	15

Disclaimer:

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Quick Assessment Report

August 2, 2022

Study Region : SCRCOG_FLD_Cst100y
Scenario : Coastal100YR
Return Period: 100
Analysis Option: 0

Regional Statistics

Area (Square Miles)	376
Number of Census Blocks	8,992
Number of Buildings	
Residential	164,672
Total	183,793
Number of People in the Region (x 1000)	570
Building Exposure ($ Millions)	
Residential	63,417
Total	88,668

Scenario Results

Shelter Requirements

Displaced Population (# Households)	7,468
Short Term Shelter (# People)	2,562

Economic Loss

Residential Property (Capital Stock) Losses ($ Millions)	1,155
Total Property (Capital Stock) Losses ($ Millions)	1,732
Business Interruption (Income) Losses ($ Millions)	918

Disclaimer:

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Hazus: Hurricane Global Risk Report

Region Name: SCRCOG_HUR

Hurricane Scenario: Probabilistic 10-year Return Period

Print Date: Tuesday, July 12, 2022

Disclaimer:
This version of Hazus utilizes 2010 Census Data.
Totals only reflect data for those census tracts/blocks included in the user's study region.

The estimates of social and economic impacts contained in this report were produced using Hazus loss estimation methodology software which is based on current scientific and engineering knowledge. There are uncertainties inherent in any loss estimation technique. Therefore, there may be significant differences between the modeled results contained in this report and the actual social and economic losses following a specific Hurricane. These results can be improved by using enhanced inventory data.

Table of Contents

General Description of the Region

Hazus is a regional multi-hazard loss estimation model that was developed by the Federal Emergency Management Agency and the National Institute of Building Sciences. The primary purpose of Hazus is to provide a methodology and software application to develop multi-hazard losses at a regional scale. These loss estimates would be used primarily by local, state and regional officials to plan and stimulate efforts to reduce risks from multi-hazards and to prepare for emergency response and recovery.

The hurricane loss estimates provided in this report are based on a region that includes 1 county(ies) from the following state(s):

- Connecticut

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

The geographical size of the region is 375.86 square miles and contains 127 census tracts. There are over 222 thousand households in the region and a total population of 570,001 people (2010 Census Bureau data). The distribution of population by State and County is provided in Appendix B.

There are an estimated 183 thousand buildings in the region with a total building replacement value (excluding contents) of 88,668 million dollars (2014 dollars). Approximately 90% of the buildings (and 72% of the building value) are associated with residential housing.

Building Inventory

General Building Stock

Hazus estimates that there are 183,793 buildings in the region which have an aggregate total replacement value of 88,668 million (2014 dollars). Table 1 presents the relative distribution of the value with respect to the general occupancies. Appendix B provides a general distribution of the building value by State and County.

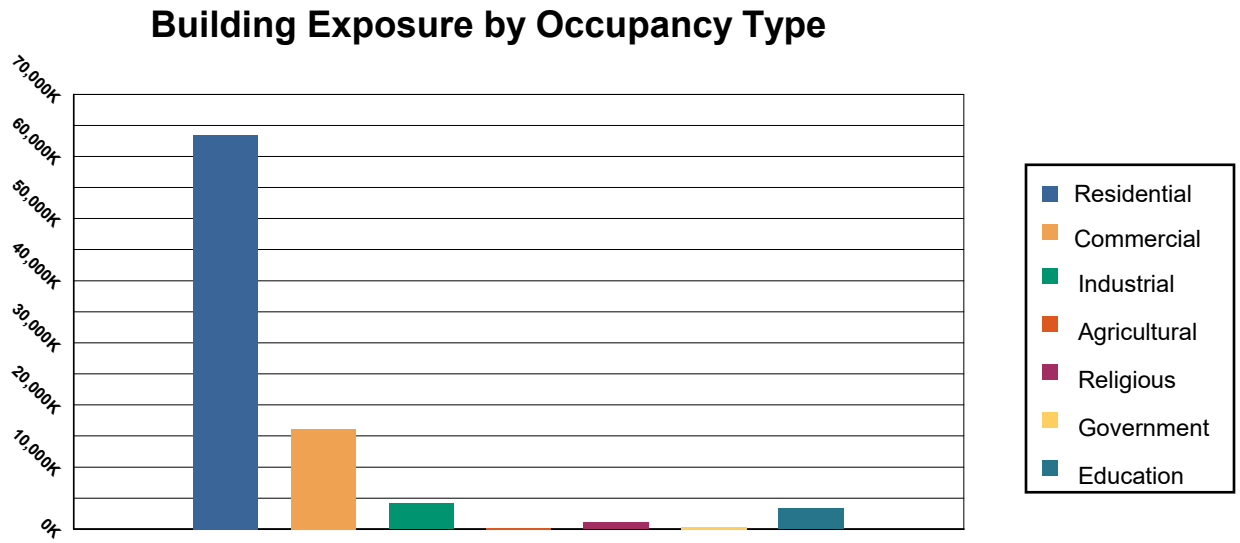


Table 1: Building Exposure by Occupancy Type

Occupancy	Exposure ($1000)	Percent of Tot
Residential	63,417,388	71.52%
Commercial	16,156,577	18.22%
Industrial	4,143,620	4.67%
Agricultural	205,951	0.23%
Religious	1,095,314	1.24%
Government	381,243	0.43%
Education	3,268,112	3.69%
Total	**88,668,205**	**100.00%**

Essential Facility Inventory

For essential facilities, there are 9 hospitals in the region with a total bed capacity of 2,360 beds. There are 294 schools, 73 fire stations, 22 police stations and 15 emergency operation facilities.

Hurricane Scenario

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

Scenario Name:	Probabilistic
Type:	Probabilistic

Building Damage

General Building Stock Damage

Hazus estimates that about 0 buildings will be at least moderately damaged. This is over 0% of the total number of buildings in the region. There are an estimated 0 buildings that will be completely destroyed. The definition of the 'damage states' is provided in the Hazus Hurricane technical manual. Table 2 below summarizes the expected damage by general occupancy for the buildings in the region. Table 3 summarizes the expected damage by general building type.

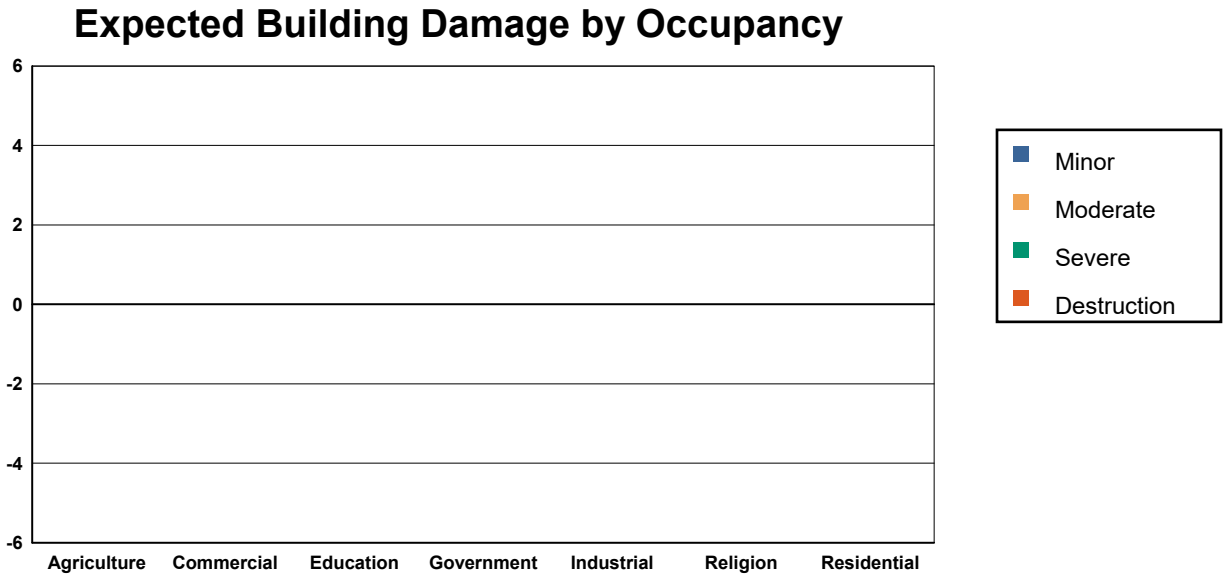


Table 2: Expected Building Damage by Occupancy : 10 - year Event

	None		Minor		Moderate		Severe		Destruction	
Occupancy	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**
Agriculture	554.00	100.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Commercial	12,634.00	100.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Education	709.00	100.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Government	273.00	100.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Industrial	3,936.00	100.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Religion	1,015.00	100.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Residential	164,672.00	100.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	**183,793.00**		**0.00**		**0.00**		**0.00**		**0.00**	

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

Building Type	None		Minor		Moderate		Severe		Destruction	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Concrete	2,815	100.00	0	0.00	0	0.00	0	0.00	0	0.00
Masonry	17,622	100.00	0	0.00	0	0.00	0	0.00	0	0.00
MH	1,312	100.00	0	0.00	0	0.00	0	0.00	0	0.00
Steel	9,253	100.00	0	0.00	0	0.00	0	0.00	0	0.00
Wood	152,737	100.00	0	0.00	0	0.00	0	0.00	0	0.00

Essential Facility Damage

Before the hurricane, the region had no hospital beds available for use. On the day of the hurricane, the model estimates that 2360 hospital beds (0%) are available for use by patients already in the hospital and those injured by the hurricane. After one week, none of the beds will be in service. By 30 days, none will be operational.

Thematic Map of Essential Facilities with greater than 50% moderate

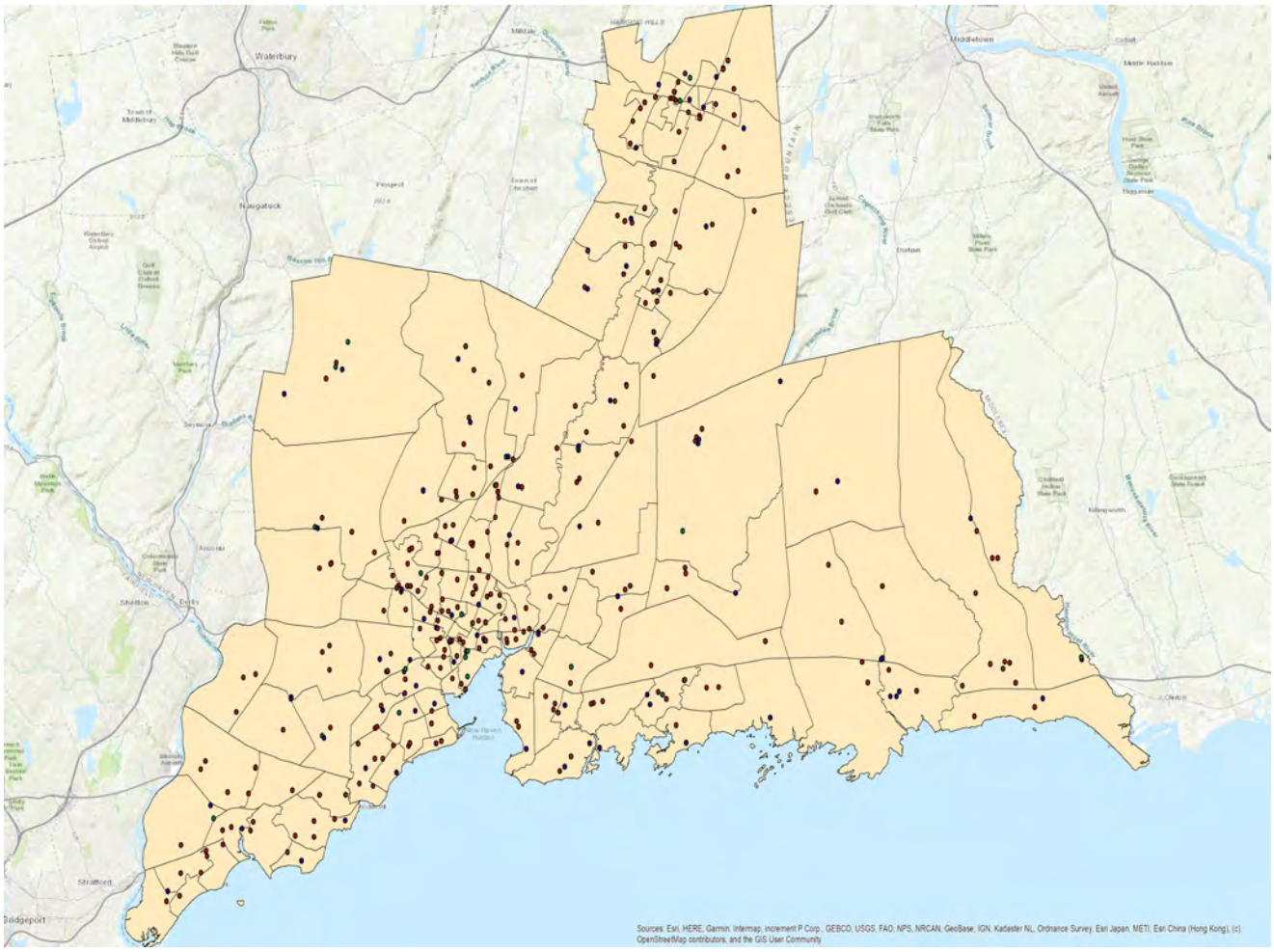
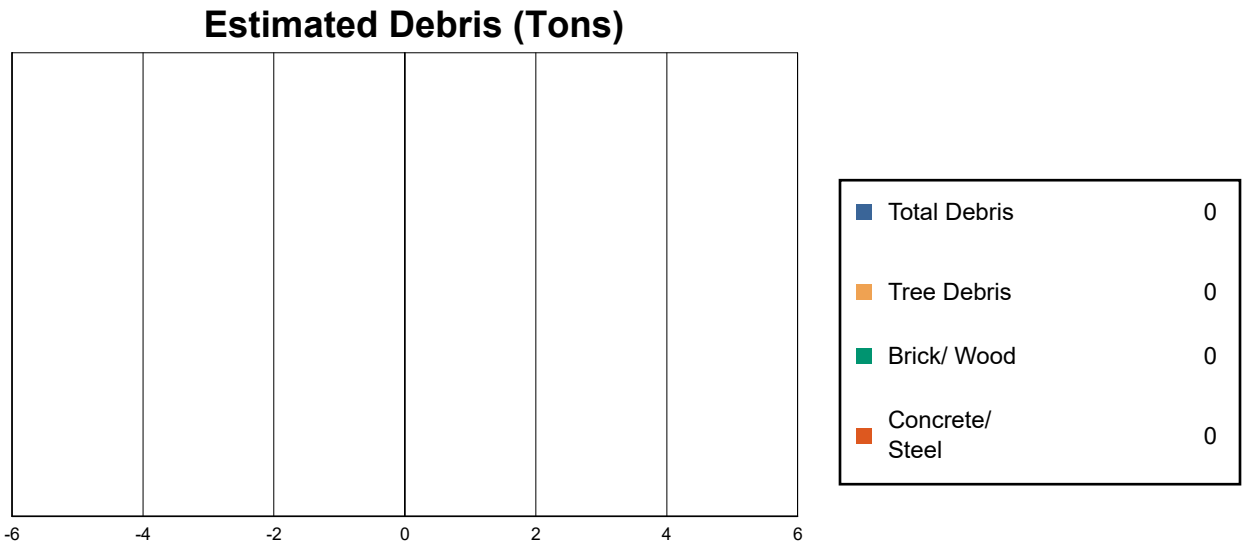


Table 4: Expected Damage to Essential Facilities

		# Facilities		
Classification	**Total**	**Probability of at Least Moderate Damage > 50%**	**Probability of Complete Damage > 50%**	**Expected Loss of Use < 1 day**
EOCs	15	0	0	15
Fire Stations	73	0	0	73
Hospitals	9	0	0	9
Police Stations	22	0	0	22
Schools	294	0	0	294

Induced Hurricane Damage

Debris Generation

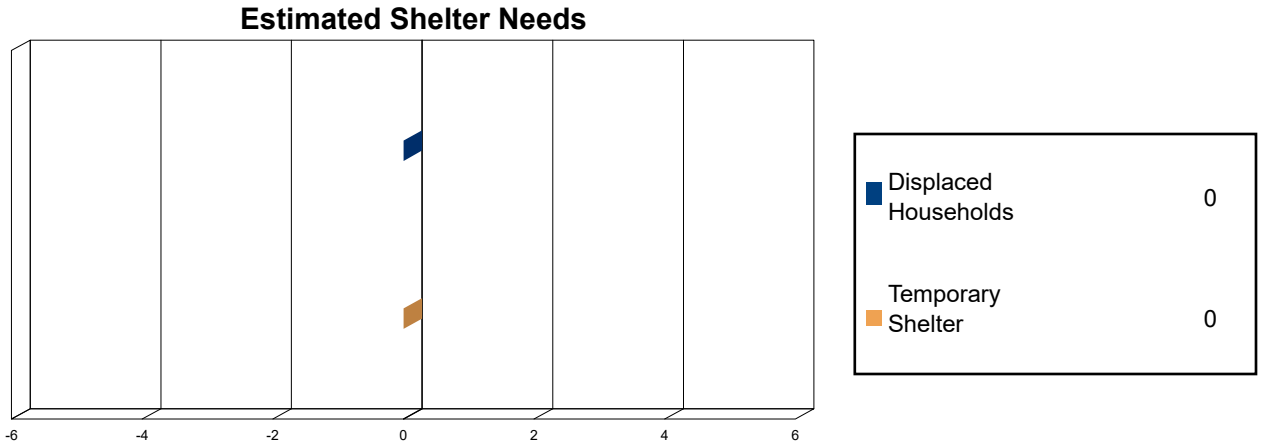


Hazus estimates the amount of debris that will be generated by the hurricane. The model breaks the debris into four general categories: a) Brick/Wood, b) Reinforced Concrete/Steel, c) Eligible Tree Debris, and d) Other Tree Debris. This distinction is made because of the different types of material handling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

The model estimates that a total of 0 tons of debris will be generated. Of the total amount, 0 tons (0%) is Other Tree Debris. Of the remaining 0 tons, Brick/Wood comprises 0% of the total, Reinforced Concrete/Steel comprises of 0% of the total, with the remainder being Eligible Tree Debris. If the building debris tonnage is converted to an estimated number of truckloads, it will require 0 truckloads (@25 tons/truck) to remove the building debris generated by the hurricane. The number of Eligible Tree Debris truckloads will depend on how the 0 tons of Eligible Tree Debris are collected and processed. The volume of tree debris generally ranges from about 4 cubic yards per ton for chipped or compacted tree debris to about 10 cubic yards per ton for bulkier, uncompacted debris.

Social Impact

Shelter Requirement



Hazus estimates the number of households that are expected to be displaced from their homes due to the hurricane and the number of displaced people that will require accommodations in temporary public shelters. The model estimates 0 households to be displaced due to the hurricane. Of these, 0 people (out of a total population of 570,001) will seek temporary shelter in public shelters.

Economic Loss

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

Building-Related Losses

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

The total property damage losses were 0 million dollars. 0% of the estimated losses were related to the business interruption of the region. By far, the largest loss was sustained by the residential occupancies which made up over 0% of the total loss. Table 5 below provides a summary of the losses associated with the building damage.

**Loss by Business Interruption Type (left)
and Building Damage Type (right)**

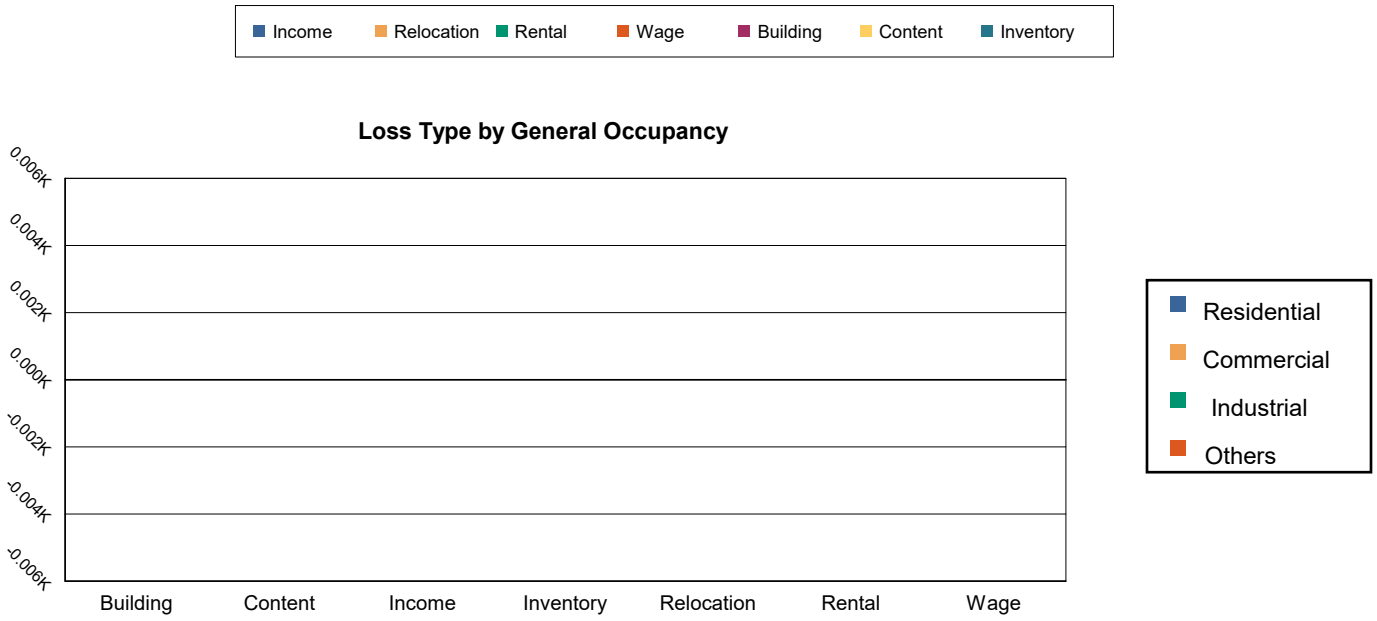


Table 5: Building-Related Economic Loss Estimates

(Thousands of dollars)

Category	Area	Residential	Commercial	Industrial	Others	Total
Property Damage						
	Building	0.00	0.00	0.00	0.00	0.00
	Content	0.00	0.00	0.00	0.00	0.00
	Inventory	0.00	0.00	0.00	0.00	0.00
	Subtotal	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**
Business Interruption Loss						
	Income	0.00	0.00	0.00	0.00	0.00
	Relocation	0.00	0.00	0.00	0.00	0.00
	Rental	0.00	0.00	0.00	0.00	0.00
	Wage	0.00	0.00	0.00	0.00	0.00
	Subtotal	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

Total

Total	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

Appendix A: County Listing for the Region

Connecticut
- New Haven

Appendix B: Regional Population and Building Value Data

		Building Value (thousands of dollars)		
	Population	Residential	Non-Residential	Total
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New Haven	570,001	63,417,388	25,250,817	88,668,205
Total	**570,001**	**63,417,388**	**25,250,817**	**88,668,205**
Study Region Total	**570,001**	**63,417,388**	**25,250,817**	**88,668,205**

Hazus: Hurricane Global Risk Report

Region Name: SCRCOG_HUR

Hurricane Scenario: Probabilistic 20-year Return Period

Print Date: Tuesday, July 12, 2022

Disclaimer:
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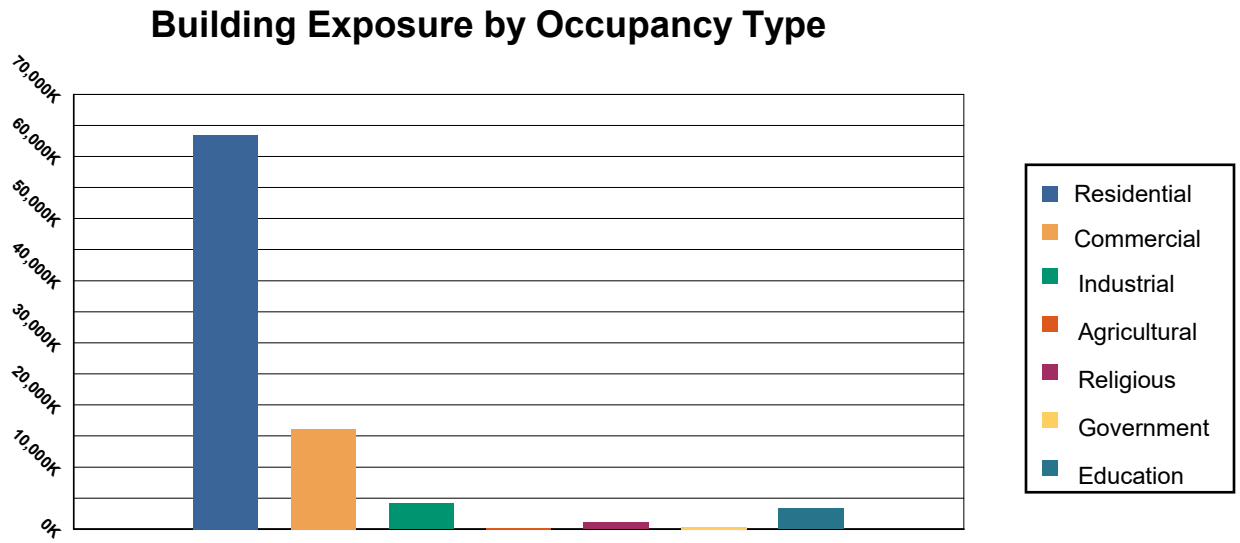
There are an estimated 183 thousand buildings in the region with a total building replacement value (excluding contents) of 88,668 million dollars (2014 dollars). Approximately 90% of the buildings (and 72% of the building value) are associated with residential housing.

Building Inventory

General Building Stock

Hazus estimates that there are 183,793 buildings in the region which have an aggregate total replacement value of 88,668 million (2014 dollars). Table 1 presents the relative distribution of the value with respect to the general occupancies. Appendix B provides a general distribution of the building value by State and County.



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Government	381,243	0.43%
Education	3,268,112	3.69%
Total	**88,668,205**	**100.00%**

Essential Facility Inventory

For essential facilities, there are 9 hospitals in the region with a total bed capacity of 2,360 beds. There are 294 schools, 73 fire stations, 22 police stations and 15 emergency operation facilities.

Hurricane Scenario

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

Scenario Name:	Probabilistic
Type:	Probabilistic

Building Damage

General Building Stock Damage

Hazus estimates that about 7 buildings will be at least moderately damaged. This is over 0% of the total number of buildings in the region. There are an estimated 0 buildings that will be completely destroyed. The definition of the 'damage states' is provided in the Hazus Hurricane technical manual. Table 2 below summarizes the expected damage by general occupancy for the buildings in the region. Table 3 summarizes the expected damage by general building type.

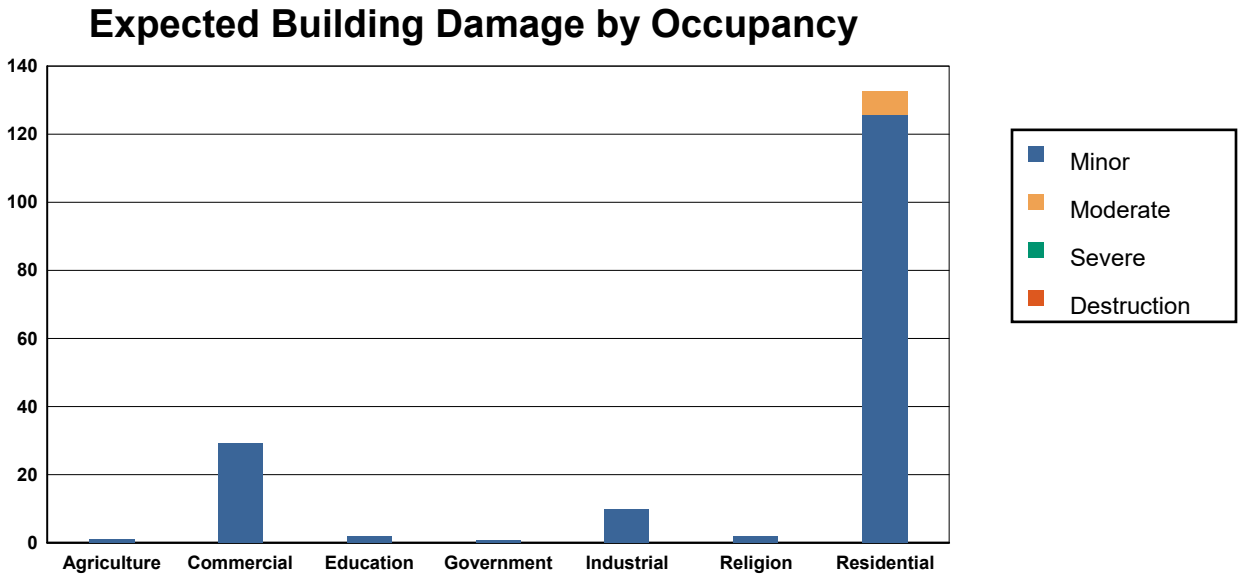


Table 2: Expected Building Damage by Occupancy : 20 - year Event

	None		Minor		Moderate		Severe		Destruction	
Occupancy	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**
Agriculture	553.07	99.83	0.93	0.17	0.00	0.00	0.00	0.00	0.00	0.00
Commercial	12,604.88	99.77	29.11	0.23	0.01	0.00	0.00	0.00	0.00	0.00
Education	707.16	99.74	1.84	0.26	0.00	0.00	0.00	0.00	0.00	0.00
Government	272.29	99.74	0.71	0.26	0.00	0.00	0.00	0.00	0.00	0.00
Industrial	3,926.05	99.75	9.95	0.25	0.00	0.00	0.00	0.00	0.00	0.00
Religion	1,013.03	99.81	1.97	0.19	0.00	0.00	0.00	0.00	0.00	0.00
Residential	164,539.36	99.92	125.62	0.08	6.98	0.00	0.03	0.00	0.00	0.00
Total	**183,615.85**		**170.12**		**6.99**		**0.03**		**0.00**	

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

Building Type	None		Minor		Moderate		Severe		Destruction	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Concrete	2,806	99.68	9	0.32	0	0.00	0	0.00	0	0.00
Masonry	17,557	99.63	63	0.36	2	0.01	0	0.00	0	0.00
MH	1,312	100.00	0	0.00	0	0.00	0	0.00	0	0.00
Steel	9,228	99.73	25	0.27	0	0.00	0	0.00	0	0.00
Wood	152,698	99.97	35	0.02	4	0.00	0	0.00	0	0.00

Essential Facility Damage

Before the hurricane, the region had no hospital beds available for use. On the day of the hurricane, the model estimates that 2360 hospital beds (0%) are available for use by patients already in the hospital and those injured by the hurricane. After one week, none of the beds will be in service. By 30 days, none will be operational.

Thematic Map of Essential Facilities with greater than 50% moderate

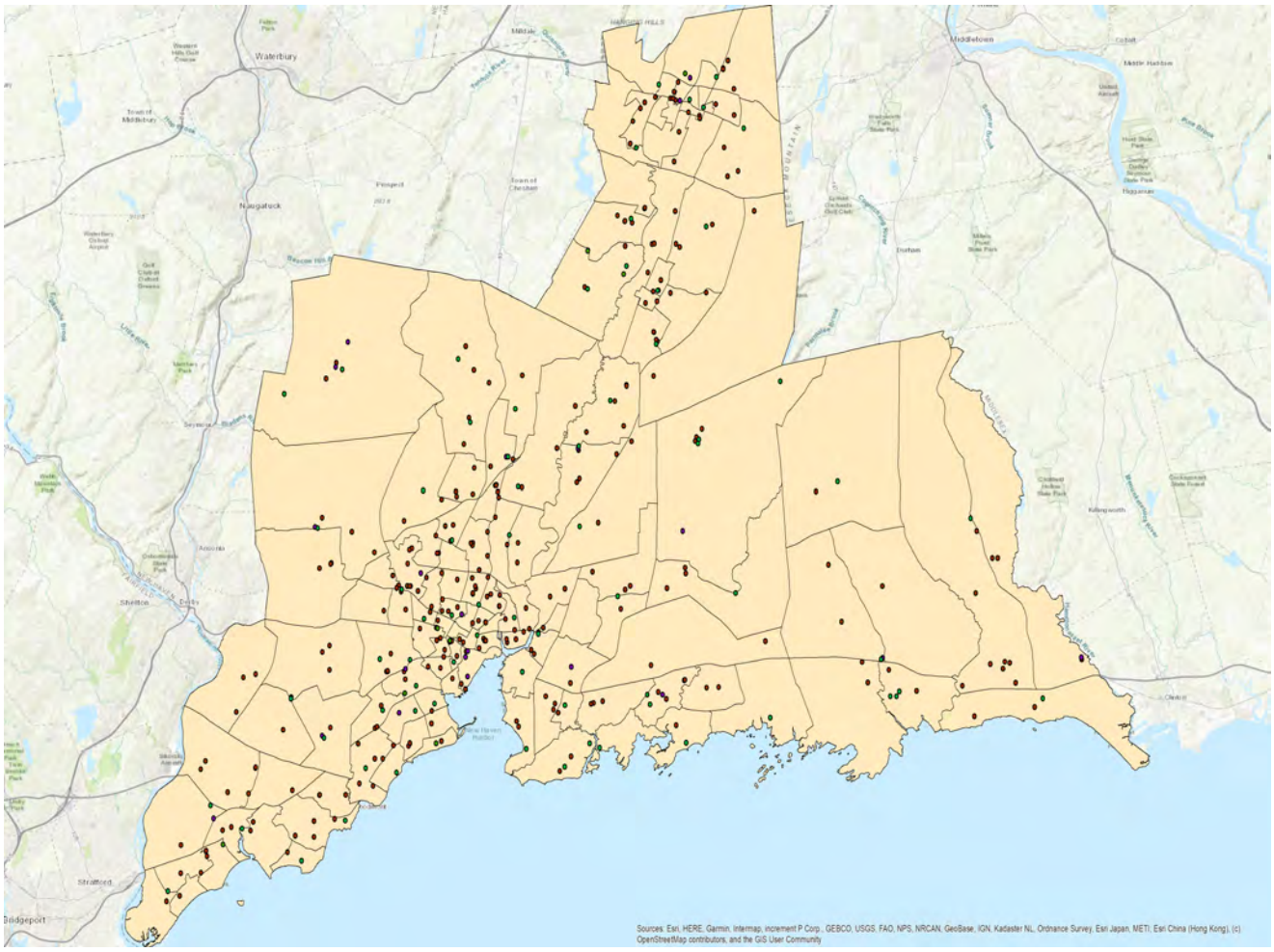
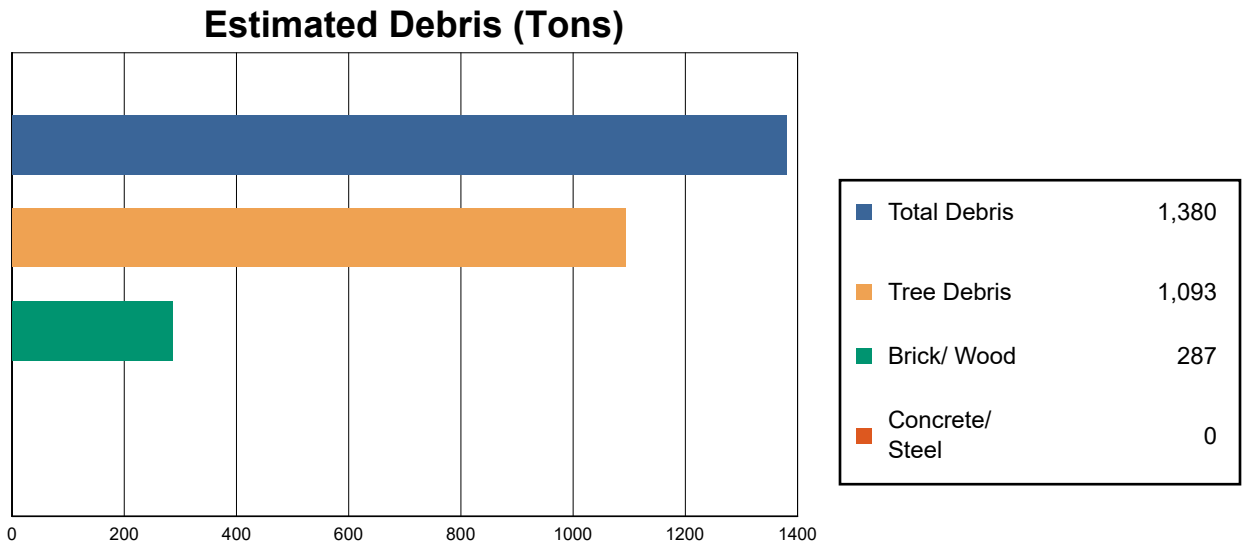


Table 4: Expected Damage to Essential Facilities

		# Facilities		
Classification	**Total**	**Probability of at Least Moderate Damage > 50%**	**Probability of Complete Damage > 50%**	**Expected Loss of Use < 1 day**
EOCs	15	0	0	15
Fire Stations	73	0	0	73
Hospitals	9	0	0	9
Police Stations	22	0	0	22
Schools	294	0	0	294

Induced Hurricane Damage

Debris Generation

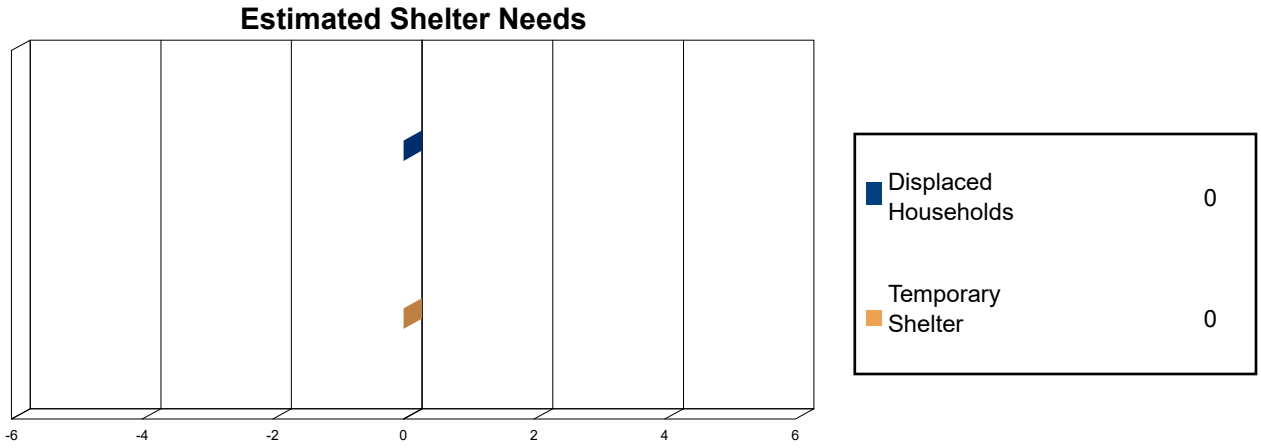


Hazus estimates the amount of debris that will be generated by the hurricane. The model breaks the debris into four general categories: a) Brick/Wood, b) Reinforced Concrete/Steel, c) Eligible Tree Debris, and d) Other Tree Debris. This distinction is made because of the different types of material handling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

The model estimates that a total of 1,380 tons of debris will be generated. Of the total amount, 345 tons (25%) is Other Tree Debris. Of the remaining 1,035 tons, Brick/Wood comprises 28% of the total, Reinforced Concrete/Steel comprises of 0% of the total, with the remainder being Eligible Tree Debris. If the building debris tonnage is converted to an estimated number of truckloads, it will require 11 truckloads (@25 tons/truck) to remove the building debris generated by the hurricane. The number of Eligible Tree Debris truckloads will depend on how the 748 tons of Eligible Tree Debris are collected and processed. The volume of tree debris generally ranges from about 4 cubic yards per ton for chipped or compacted tree debris to about 10 cubic yards per ton for bulkier, uncompacted debris.

Social Impact

Shelter Requirement



Hazus estimates the number of households that are expected to be displaced from their homes due to the hurricane and the number of displaced people that will require accommodations in temporary public shelters. The model estimates 0 households to be displaced due to the hurricane. Of these, 0 people (out of a total population of 570,001) will seek temporary shelter in public shelters.

Economic Loss

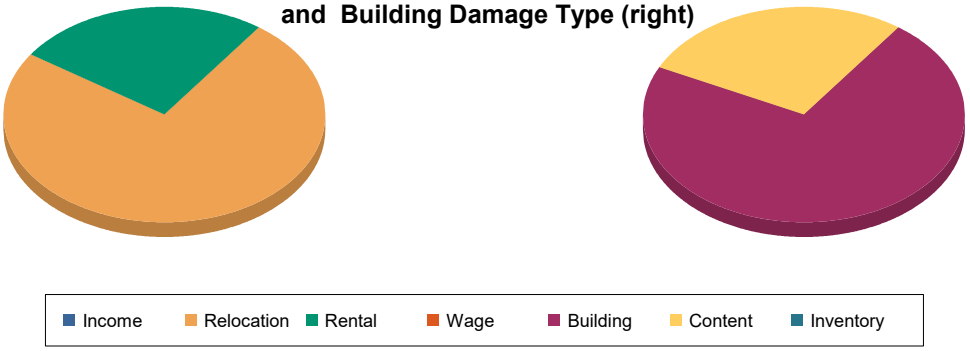
The total economic loss estimated for the hurricane is 5.4 million dollars, which represents 0.01 % of the total replacement value of the region's buildings.

Building-Related Losses

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

The total property damage losses were 5 million dollars. 1% of the estimated losses were related to the business interruption of the region. By far, the largest loss was sustained by the residential occupancies which made up over 100% of the total loss. Table 5 below provides a summary of the losses associated with the building damage.

Loss by Business Interruption Type (left) and Building Damage Type (right)



Loss Type by General Occupancy

Table 5: Building-Related Economic Loss Estimates

(Thousands of dollars)

Category	Area	Residential	Commercial	Industrial	Others	Total
Property Damage						
	Building	3,879.79	7.87	2.15	2.43	3,892.23
	Content	1,498.86	0.00	0.00	0.00	1,498.86
	Inventory	0.00	0.00	0.00	0.00	0.00
	Subtotal	**5,378.65**	**7.87**	**2.15**	**2.43**	**5,391.09**
Business Interruption Loss						
	Income	0.00	0.00	0.00	0.00	0.00
	Relocation	20.62	0.03	0.00	0.01	20.65
	Rental	7.08	0.00	0.00	0.00	7.08
	Wage	0.00	0.00	0.00	0.00	0.00
	Subtotal	**27.70**	**0.03**	**0.00**	**0.01**	**27.74**

Total

Total	5,406.35	7.90	2.15	2.43	5,418.83

Appendix A: County Listing for the Region

Connecticut
- New Haven

Appendix B: Regional Population and Building Value Data

		Building Value (thousands of dollars)		
	Population	Residential	Non-Residential	Total
Connecticut				
New Haven	570,001	63,417,388	25,250,817	88,668,205
Total	**570,001**	**63,417,388**	**25,250,817**	**88,668,205**
Study Region Total	**570,001**	**63,417,388**	**25,250,817**	**88,668,205**

Hazus: Hurricane Global Risk Report

Region Name: SCRCOG_HUR

Hurricane Scenario: Probabilistic 50-year Return Period

Print Date: Tuesday, July 12, 2022

Disclaimer:
This version of Hazus utilizes 2010 Census Data.
Totals only reflect data for those census tracts/blocks included in the user's study region.

The estimates of social and economic impacts contained in this report were produced using Hazus loss estimation methodology software which is based on current scientific and engineering knowledge. There are uncertainties inherent in any loss estimation technique. Therefore, there may be significant differences between the modeled results contained in this report and the actual social and economic losses following a specific Hurricane. These results can be improved by using enhanced inventory data.

Table of Contents

General Description of the Region

Hazus is a regional multi-hazard loss estimation model that was developed by the Federal Emergency Management Agency and the National Institute of Building Sciences. The primary purpose of Hazus is to provide a methodology and software application to develop multi-hazard losses at a regional scale. These loss estimates would be used primarily by local, state and regional officials to plan and stimulate efforts to reduce risks from multi-hazards and to prepare for emergency response and recovery.

The hurricane loss estimates provided in this report are based on a region that includes 1 county(ies) from the following state(s):

- Connecticut

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

The geographical size of the region is 375.86 square miles and contains 127 census tracts. There are over 222 thousand households in the region and a total population of 570,001 people (2010 Census Bureau data). The distribution of population by State and County is provided in Appendix B.

There are an estimated 183 thousand buildings in the region with a total building replacement value (excluding contents) of 88,668 million dollars (2014 dollars). Approximately 90% of the buildings (and 72% of the building value) are associated with residential housing.

Building Inventory

General Building Stock

Hazus estimates that there are 183,793 buildings in the region which have an aggregate total replacement value of 88,668 million (2014 dollars). Table 1 presents the relative distribution of the value with respect to the general occupancies. Appendix B provides a general distribution of the building value by State and County.

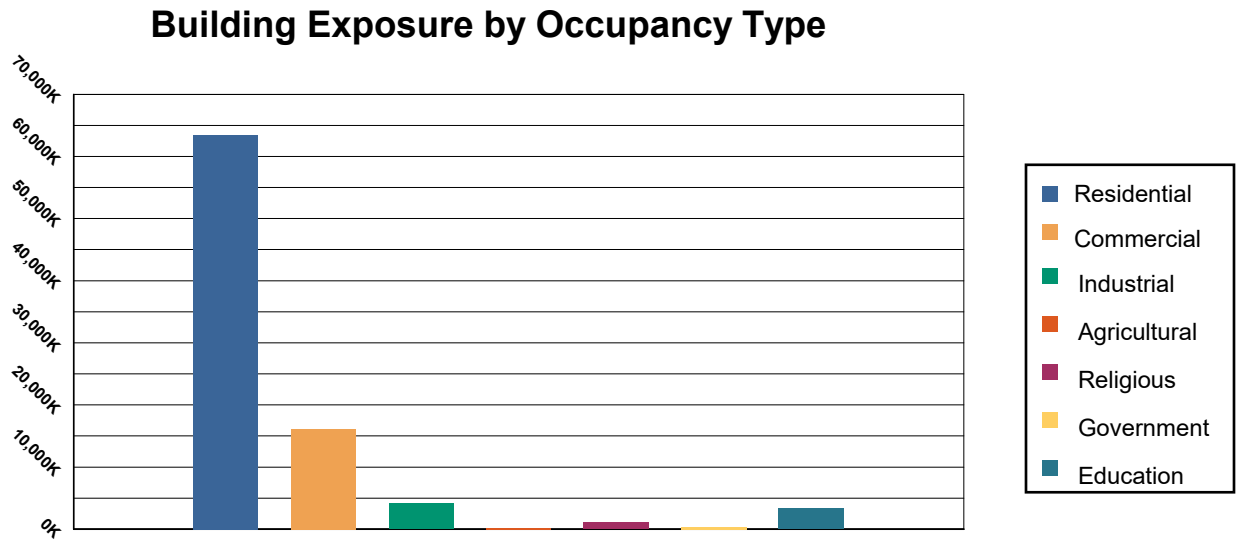


Table 1: Building Exposure by Occupancy Type

Occupancy	Exposure ($1000)	Percent of Tot
Residential	63,417,388	71.52%
Commercial	16,156,577	18.22%
Industrial	4,143,620	4.67%
Agricultural	205,951	0.23%
Religious	1,095,314	1.24%
Government	381,243	0.43%
Education	3,268,112	3.69%
Total	**88,668,205**	**100.00%**

Essential Facility Inventory

For essential facilities, there are 9 hospitals in the region with a total bed capacity of 2,360 beds. There are 294 schools, 73 fire stations, 22 police stations and 15 emergency operation facilities.

Hurricane Scenario

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

Scenario Name:	Probabilistic
Type:	Probabilistic

Building Damage

General Building Stock Damage

Hazus estimates that about 91 buildings will be at least moderately damaged. This is over 0% of the total number of buildings in the region. There are an estimated 0 buildings that will be completely destroyed. The definition of the 'damage states' is provided in the Hazus Hurricane technical manual. Table 2 below summarizes the expected damage by general occupancy for the buildings in the region. Table 3 summarizes the expected damage by general building type.

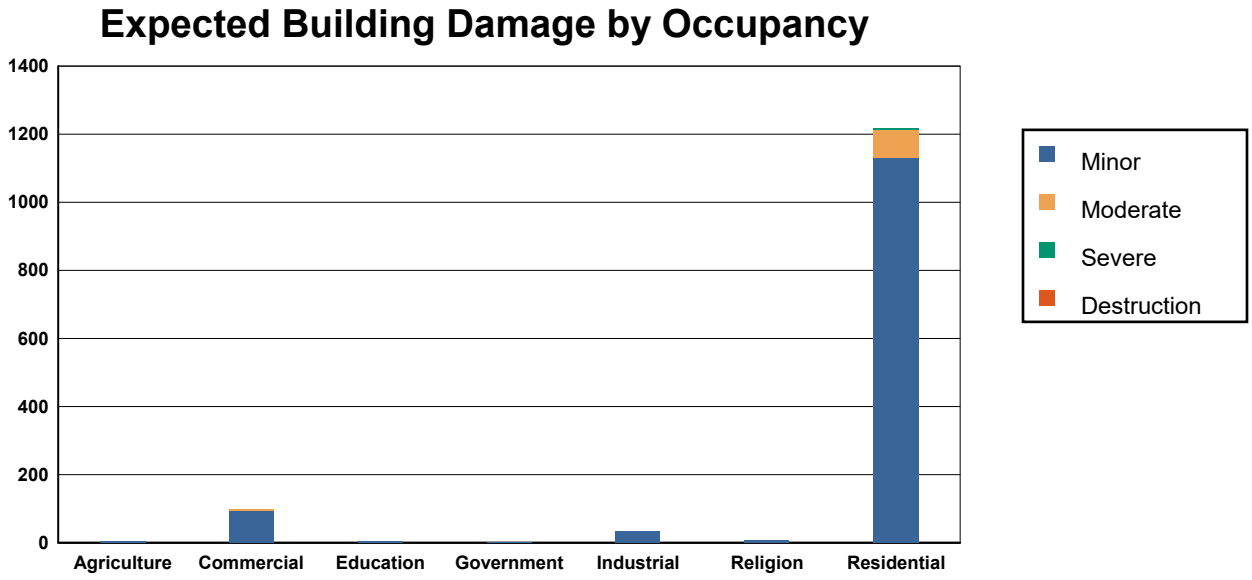


Table 2: Expected Building Damage by Occupancy : 50 - year Event

	None		Minor		Moderate		Severe		Destruction	
Occupancy	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**
Agriculture	549.81	99.24	3.91	0.71	0.23	0.04	0.05	0.01	0.00	0.00
Commercial	12,535.36	99.22	94.10	0.74	4.51	0.04	0.03	0.00	0.00	0.00
Education	703.50	99.22	5.49	0.77	0.01	0.00	0.00	0.00	0.00	0.00
Government	270.73	99.17	2.26	0.83	0.01	0.00	0.00	0.00	0.00	0.00
Industrial	3,903.29	99.17	32.12	0.82	0.52	0.01	0.07	0.00	0.00	0.00
Religion	1,008.49	99.36	6.33	0.62	0.18	0.02	0.00	0.00	0.00	0.00
Residential	163,455.41	99.26	1,130.73	0.69	81.48	0.05	4.37	0.00	0.01	0.00
Total	**182,426.59**		**1,274.94**		**86.95**		**4.52**		**0.01**	

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

Building Type	None		Minor		Moderate		Severe		Destruction	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Concrete	2,786	98.97	29	1.03	0	0.01	0	0.00	0	0.00
Masonry	17,329	98.34	259	1.47	33	0.18	1	0.01	0	0.00
MH	1,312	99.97	0	0.02	0	0.01	0	0.00	0	0.00
Steel	9,175	99.16	75	0.81	2	0.03	0	0.00	0	0.00
Wood	151,964	99.49	744	0.49	27	0.02	3	0.00	0	0.00

Essential Facility Damage

Before the hurricane, the region had no hospital beds available for use. On the day of the hurricane, the model estimates that 2360 hospital beds (0%) are available for use by patients already in the hospital and those injured by the hurricane. After one week, none of the beds will be in service. By 30 days, none will be operational.

Thematic Map of Essential Facilities with greater than 50% moderate

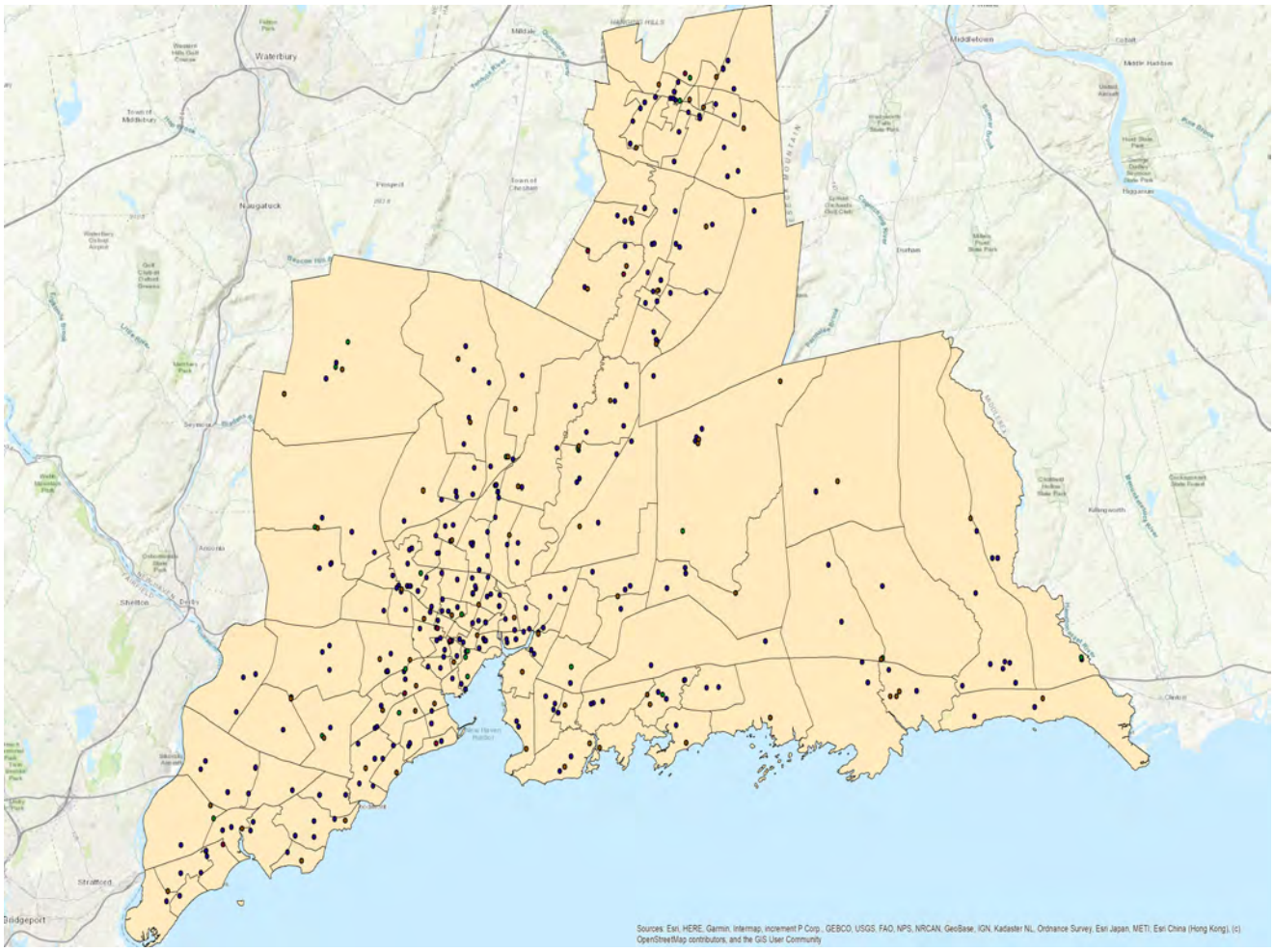
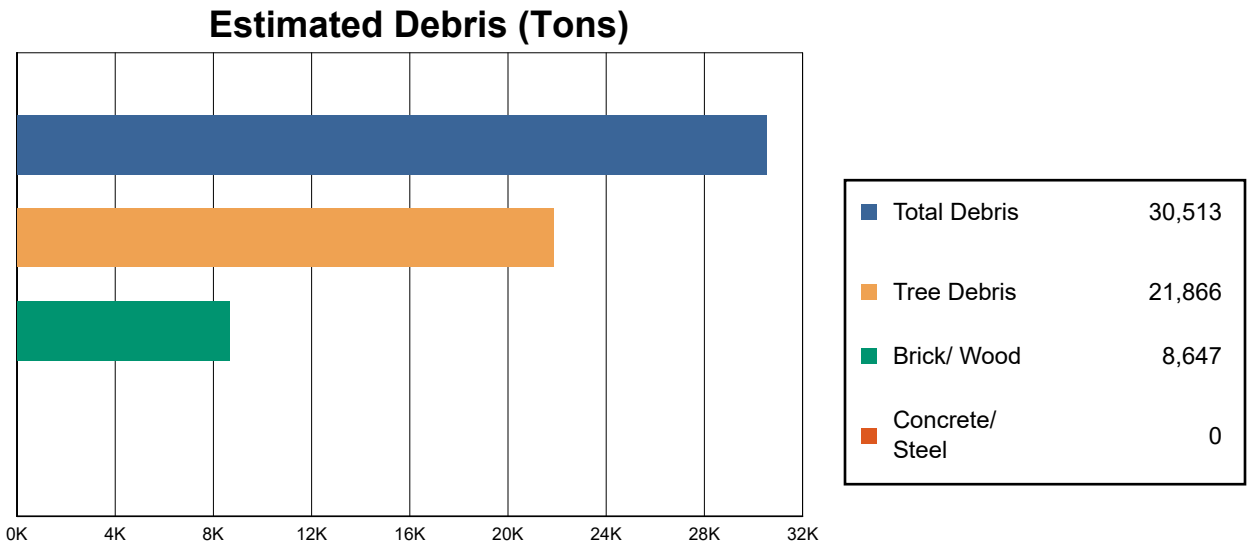


Table 4: Expected Damage to Essential Facilities

		# Facilities		
Classification	**Total**	**Probability of at Least Moderate Damage > 50%**	**Probability of Complete Damage > 50%**	**Expected Loss of Use < 1 day**
EOCs	15	0	0	15
Fire Stations	73	0	0	73
Hospitals	9	0	0	9
Police Stations	22	0	0	22
Schools	294	0	0	294

Induced Hurricane Damage

Debris Generation

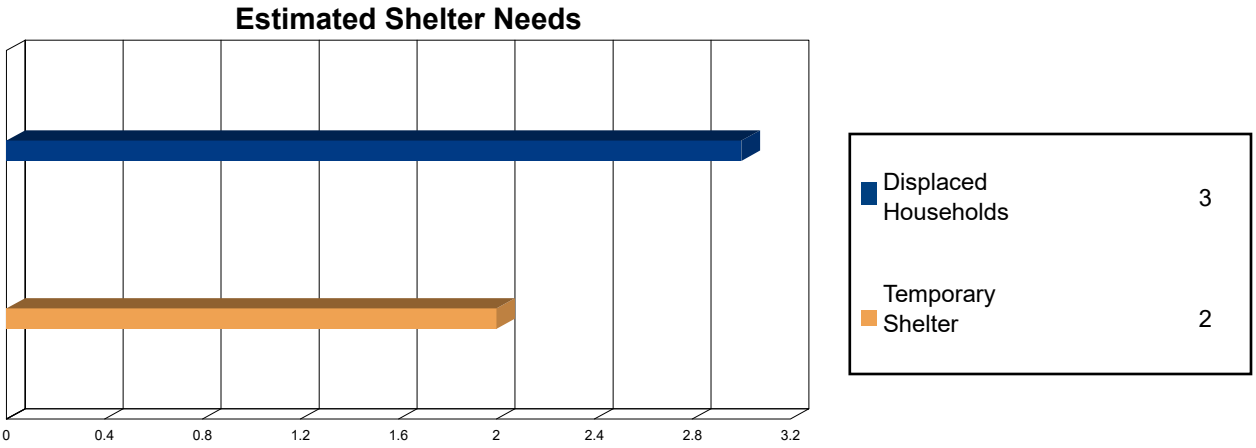


Hazus estimates the amount of debris that will be generated by the hurricane. The model breaks the debris into four general categories: a) Brick/Wood, b) Reinforced Concrete/Steel, c) Eligible Tree Debris, and d) Other Tree Debris. This distinction is made because of the different types of material handling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

The model estimates that a total of 30,513 tons of debris will be generated. Of the total amount, 11,920 tons (39%) is Other Tree Debris. Of the remaining 18,593 tons, Brick/Wood comprises 47% of the total, Reinforced Concrete/Steel comprises of 0% of the total, with the remainder being Eligible Tree Debris. If the building debris tonnage is converted to an estimated number of truckloads, it will require 346 truckloads (@25 tons/truck) to remove the building debris generated by the hurricane. The number of Eligible Tree Debris truckloads will depend on how the 9,946 tons of Eligible Tree Debris are collected and processed. The volume of tree debris generally ranges from about 4 cubic yards per ton for chipped or compacted tree debris to about 10 cubic yards per ton for bulkier, uncompacted debris.

Social Impact

Shelter Requirement



Hazus estimates the number of households that are expected to be displaced from their homes due to the hurricane and the number of displaced people that will require accommodations in temporary public shelters. The model estimates 3 households to be displaced due to the hurricane. Of these, 2 people (out of a total population of 570,001) will seek temporary shelter in public shelters.

Economic Loss

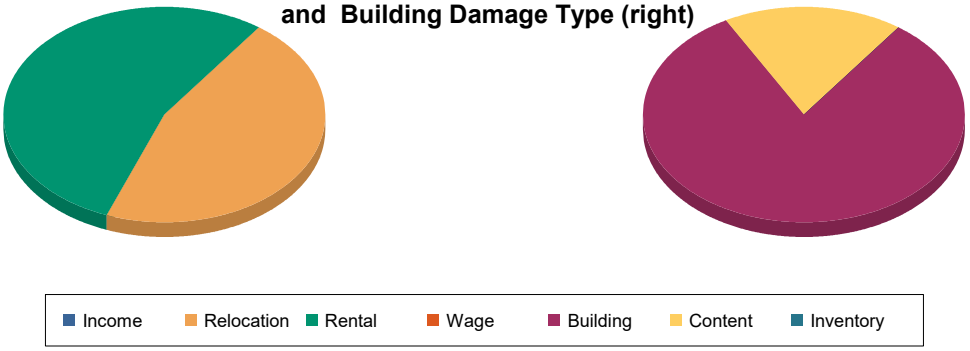
The total economic loss estimated for the hurricane is 135.2 million dollars, which represents 0.15 % of the total replacement value of the region's buildings.

Building-Related Losses

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

The total property damage losses were 135 million dollars. 2% of the estimated losses were related to the business interruption of the region. By far, the largest loss was sustained by the residential occupancies which made up over 96% of the total loss. Table 5 below provides a summary of the losses associated with the building damage.

Loss by Business Interruption Type (left) and Building Damage Type (right)



Loss Type by General Occupancy

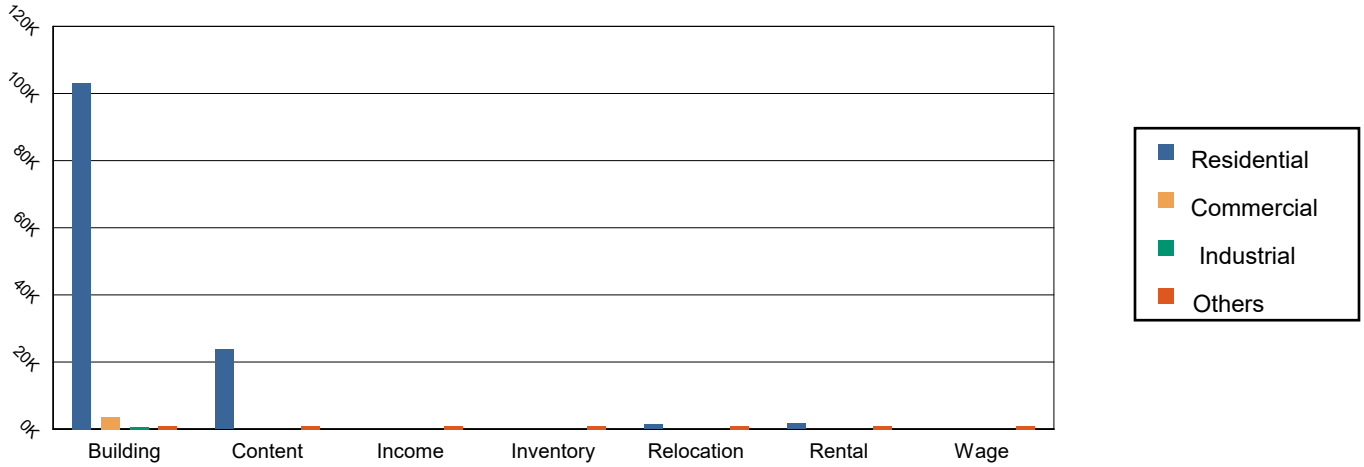


Table 5: Building-Related Economic Loss Estimates

(Thousands of dollars)

Category	Area	Residential	Commercial	Industrial	Others	Total
Property Damage						
	Building	103,105.62	3,681.27	645.80	953.24	108,385.93
	Content	23,796.16	31.97	6.09	3.72	23,837.94
	Inventory	0.00	0.37	1.07	0.36	1.81
	Subtotal	**126,901.78**	**3,713.61**	**652.96**	**957.32**	**132,225.68**
Business Interruption Loss						
	Income	0.00	0.00	0.00	0.00	0.00
	Relocation	1,342.40	38.19	1.17	2.13	1,383.89
	Rental	1,629.74	0.00	0.00	0.00	1,629.74
	Wage	0.00	0.00	0.00	0.00	0.00
	Subtotal	**2,972.14**	**38.19**	**1.17**	**2.13**	**3,013.63**

Total

Total	129,873.93	3,751.80	654.13	959.45	135,239.30

Appendix A: County Listing for the Region

Connecticut
- New Haven

Appendix B: Regional Population and Building Value Data

		Building Value (thousands of dollars)		
	Population	Residential	Non-Residential	Total
Connecticut				
New Haven	570,001	63,417,388	25,250,817	88,668,205
Total	**570,001**	**63,417,388**	**25,250,817**	**88,668,205**
Study Region Total	**570,001**	**63,417,388**	**25,250,817**	**88,668,205**

Hazus: Hurricane Global Risk Report

Region Name: SCRCOG_HUR

Hurricane Scenario: Probabilistic 100-year Return Period

Print Date: Tuesday, July 12, 2022

Disclaimer:
This version of Hazus utilizes 2010 Census Data.
Totals only reflect data for those census tracts/blocks included in the user's study region.

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- Connecticut

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

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There are an estimated 183 thousand buildings in the region with a total building replacement value (excluding contents) of 88,668 million dollars (2014 dollars). Approximately 90% of the buildings (and 72% of the building value) are associated with residential housing.

Building Inventory

General Building Stock

Hazus estimates that there are 183,793 buildings in the region which have an aggregate total replacement value of 88,668 million (2014 dollars). Table 1 presents the relative distribution of the value with respect to the general occupancies. Appendix B provides a general distribution of the building value by State and County.

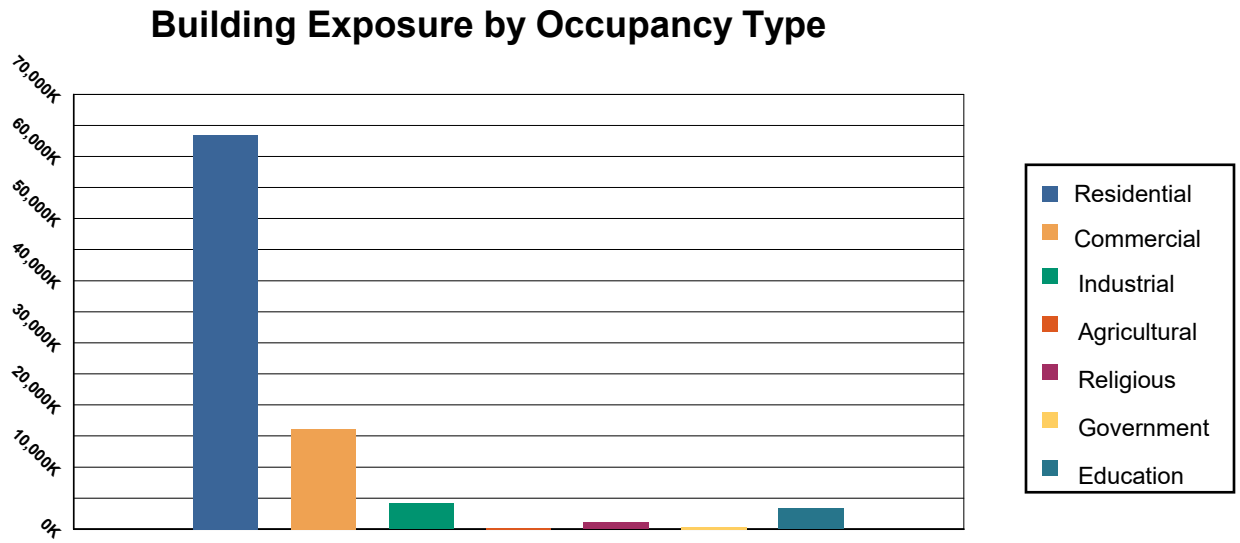


Table 1: Building Exposure by Occupancy Type

Occupancy	Exposure ($1000)	Percent of Tot
Residential	63,417,388	71.52%
Commercial	16,156,577	18.22%
Industrial	4,143,620	4.67%
Agricultural	205,951	0.23%
Religious	1,095,314	1.24%
Government	381,243	0.43%
Education	3,268,112	3.69%
Total	**88,668,205**	**100.00%**

Essential Facility Inventory

For essential facilities, there are 9 hospitals in the region with a total bed capacity of 2,360 beds. There are 294 schools, 73 fire stations, 22 police stations and 15 emergency operation facilities.

Hurricane Scenario

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

Scenario Name:	Probabilistic
Type:	Probabilistic

Building Damage

General Building Stock Damage

Hazus estimates that about 704 buildings will be at least moderately damaged. This is over 0% of the total number of buildings in the region. There are an estimated 2 buildings that will be completely destroyed. The definition of the 'damage states' is provided in the Hazus Hurricane technical manual. Table 2 below summarizes the expected damage by general occupancy for the buildings in the region. Table 3 summarizes the expected damage by general building type.

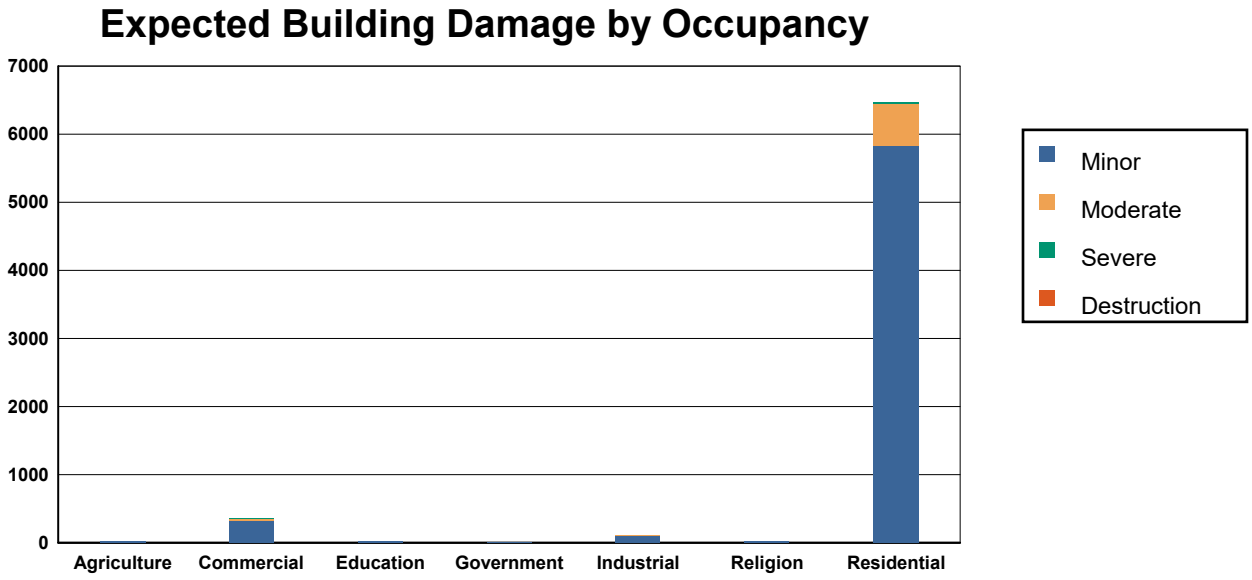


Table 2: Expected Building Damage by Occupancy : 100 - year Event

	None		Minor		Moderate		Severe		Destruction	
Occupancy	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**
Agriculture	534.73	96.52	16.07	2.90	2.33	0.42	0.84	0.15	0.03	0.01
Commercial	12,274.19	97.15	318.55	2.52	38.28	0.30	2.98	0.02	0.00	0.00
Education	690.48	97.39	17.84	2.52	0.68	0.10	0.00	0.00	0.00	0.00
Government	265.61	97.29	7.08	2.59	0.31	0.11	0.00	0.00	0.00	0.00
Industrial	3,824.56	97.17	101.32	2.57	8.28	0.21	1.79	0.05	0.05	0.00
Religion	989.58	97.50	24.31	2.40	1.04	0.10	0.07	0.01	0.00	0.00
Residential	158,203.05	96.07	5,821.69	3.54	628.04	0.38	17.07	0.01	2.15	0.00
Total	**176,782.19**		**6,306.85**		**678.96**		**22.75**		**2.24**	

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

Building Type	None		Minor		Moderate		Severe		Destruction	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Concrete	2,722	96.69	89	3.15	4	0.16	0	0.00	0	0.00
Masonry	16,630	94.37	760	4.31	224	1.27	7	0.04	0	0.00
MH	1,305	99.44	5	0.41	1	0.11	0	0.00	1	0.04
Steel	8,995	97.21	228	2.47	27	0.29	3	0.03	0	0.00
Wood	147,602	96.64	4,881	3.20	240	0.16	12	0.01	2	0.00

Essential Facility Damage

Before the hurricane, the region had no hospital beds available for use. On the day of the hurricane, the model estimates that 2360 hospital beds (0%) are available for use by patients already in the hospital and those injured by the hurricane. After one week, none of the beds will be in service. By 30 days, none will be operational.

Thematic Map of Essential Facilities with greater than 50% moderate

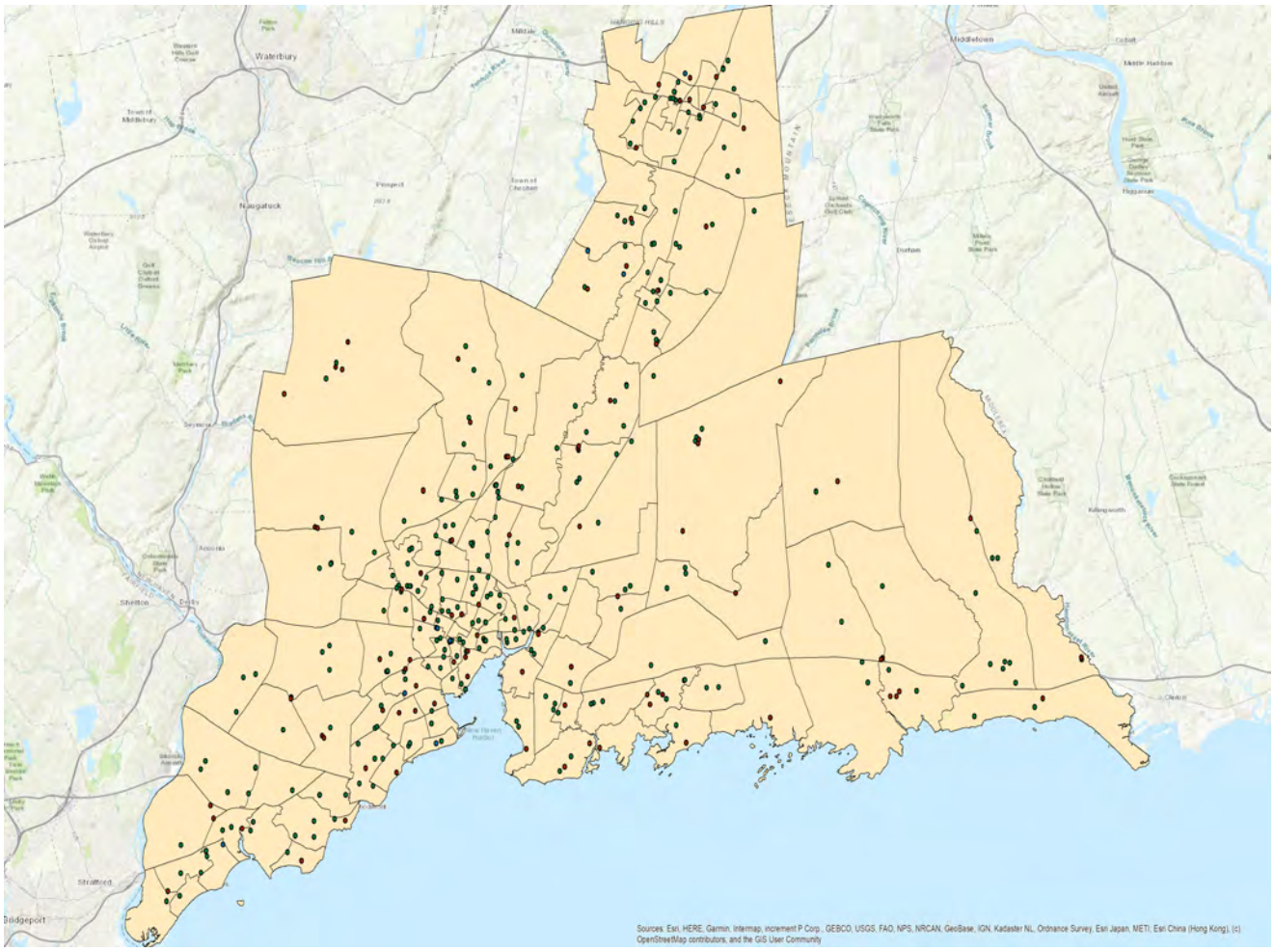
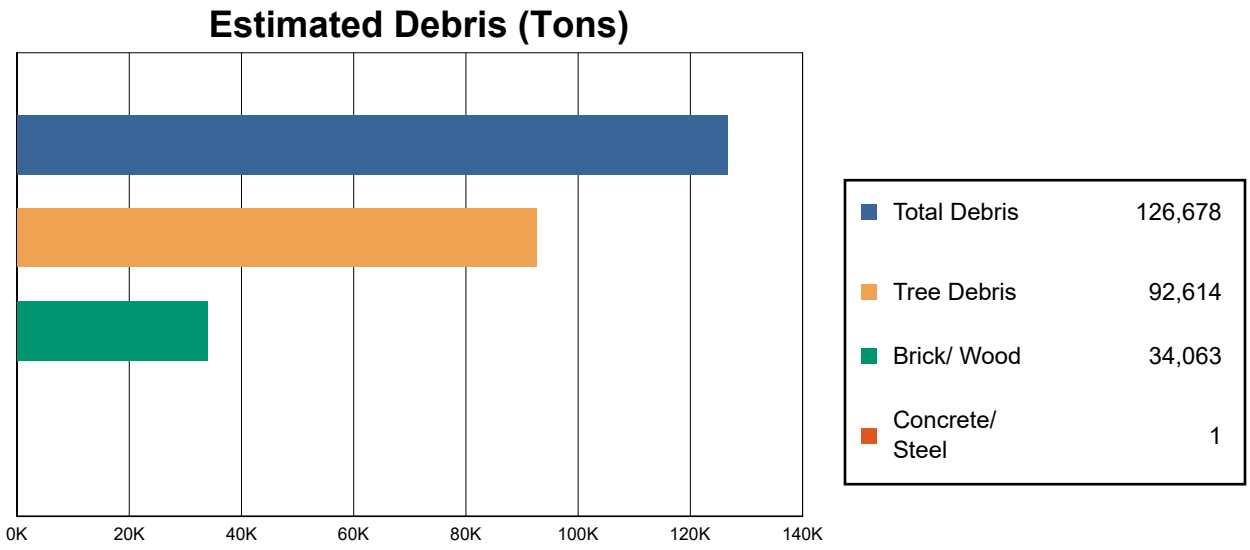


Table 4: Expected Damage to Essential Facilities

		# Facilities		
Classification	**Total**	**Probability of at Least Moderate Damage > 50%**	**Probability of Complete Damage > 50%**	**Expected Loss of Use < 1 day**
EOCs	15	0	0	15
Fire Stations	73	0	0	73
Hospitals	9	0	0	9
Police Stations	22	0	0	22
Schools	294	0	0	294

Induced Hurricane Damage

Debris Generation

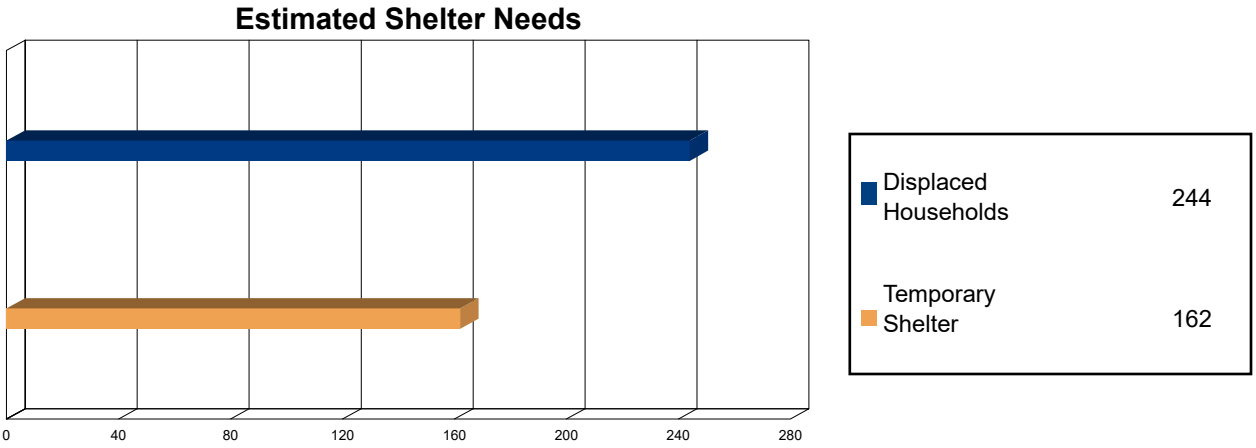


Hazus estimates the amount of debris that will be generated by the hurricane. The model breaks the debris into four general categories: a) Brick/Wood, b) Reinforced Concrete/Steel, c) Eligible Tree Debris, and d) Other Tree Debris. This distinction is made because of the different types of material handling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

The model estimates that a total of 126,678 tons of debris will be generated. Of the total amount, 55,196 tons (44%) is Other Tree Debris. Of the remaining 71,482 tons, Brick/Wood comprises 48% of the total, Reinforced Concrete/Steel comprises of 0% of the total, with the remainder being Eligible Tree Debris. If the building debris tonnage is converted to an estimated number of truckloads, it will require 1363 truckloads (@25 tons/truck) to remove the building debris generated by the hurricane. The number of Eligible Tree Debris truckloads will depend on how the 37,418 tons of Eligible Tree Debris are collected and processed. The volume of tree debris generally ranges from about 4 cubic yards per ton for chipped or compacted tree debris to about 10 cubic yards per ton for bulkier, uncompacted debris.

Social Impact

Shelter Requirement



Hazus estimates the number of households that are expected to be displaced from their homes due to the hurricane and the number of displaced people that will require accommodations in temporary public shelters. The model estimates 244 households to be displaced due to the hurricane. Of these, 162 people (out of a total population of 570,001) will seek temporary shelter in public shelters.

Economic Loss

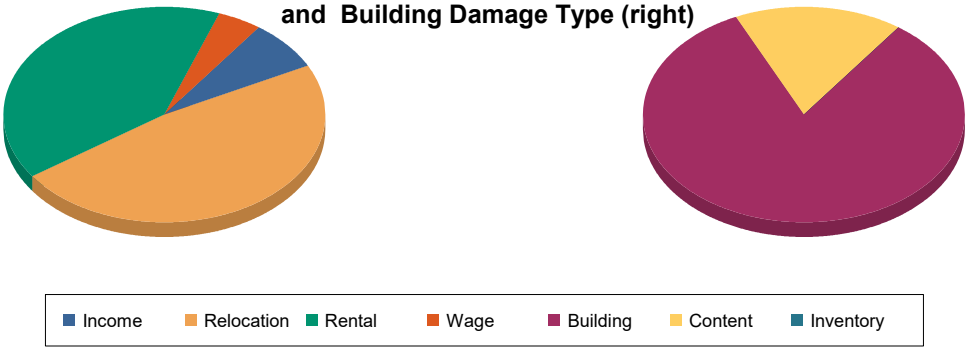
The total economic loss estimated for the hurricane is 429.2 million dollars, which represents 0.48 % of the total replacement value of the region's buildings.

Building-Related Losses

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

The total property damage losses were 429 million dollars. 5% of the estimated losses were related to the business interruption of the region. By far, the largest loss was sustained by the residential occupancies which made up over 93% of the total loss. Table 5 below provides a summary of the losses associated with the building damage.

Loss by Business Interruption Type (left) and Building Damage Type (right)



Loss Type by General Occupancy

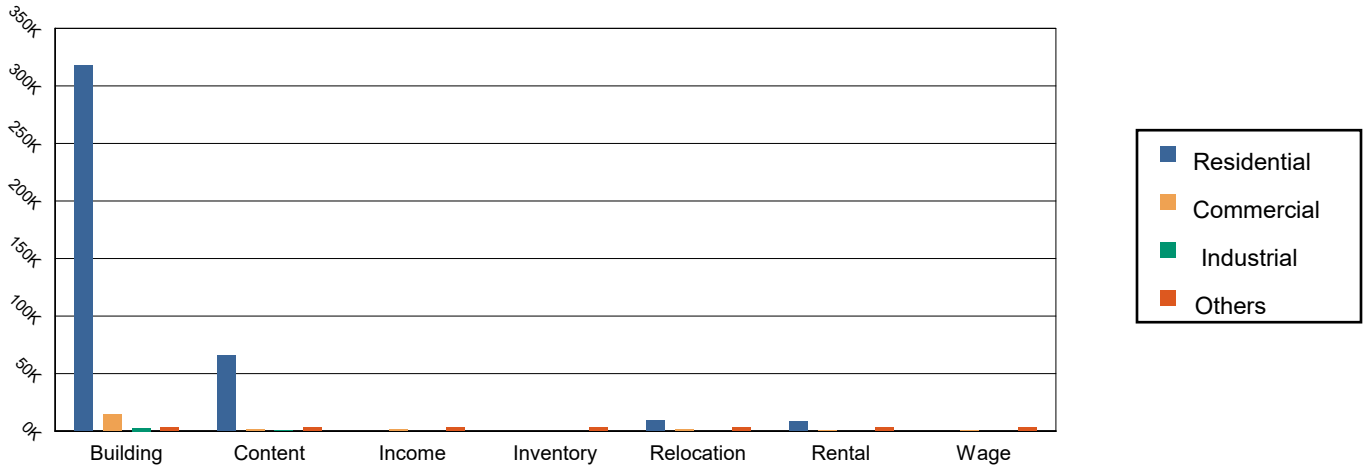


Table 5: Building-Related Economic Loss Estimates

(Thousands of dollars)

Category	Area	Residential	Commercial	Industrial	Others	Total
Property Damage						
	Building	317,680.62	14,464.73	2,827.43	2,948.66	337,921.44
	Content	65,821.12	1,728.24	724.28	188.52	68,462.15
	Inventory	0.00	28.70	108.95	7.76	145.41
	Subtotal	**383,501.74**	**16,221.67**	**3,660.66**	**3,144.94**	**406,529.01**
Business Interruption Loss						
	Income	0.00	1,611.67	5.88	64.41	1,681.96
	Relocation	9,377.05	1,317.52	45.91	90.76	10,831.24
	Rental	8,366.11	784.97	4.88	5.25	9,161.22
	Wage	0.00	816.53	9.71	150.96	977.21
	Subtotal	**17,743.16**	**4,530.70**	**66.39**	**311.38**	**22,651.63**

Total

Total	**401,244.91**	**20,752.37**	**3,727.04**	**3,456.31**	**429,180.63**

Appendix A: County Listing for the Region

Connecticut
- New Haven

Appendix B: Regional Population and Building Value Data

		Building Value (thousands of dollars)		
	Population	Residential	Non-Residential	Total
Connecticut				
New Haven	570,001	63,417,388	25,250,817	88,668,205
Total	**570,001**	**63,417,388**	**25,250,817**	**88,668,205**
Study Region Total	**570,001**	**63,417,388**	**25,250,817**	**88,668,205**

Hazus: Hurricane Global Risk Report

Region Name: SCRCOG_HUR

Hurricane Scenario: Probabilistic 200-year Return Period

Print Date: Tuesday, July 12, 2022

Disclaimer:
This version of Hazus utilizes 2010 Census Data.
Totals only reflect data for those census tracts/blocks included in the user's study region.

The estimates of social and economic impacts contained in this report were produced using Hazus loss estimation methodology software which is based on current scientific and engineering knowledge. There are uncertainties inherent in any loss estimation technique. Therefore, there may be significant differences between the modeled results contained in this report and the actual social and economic losses following a specific Hurricane. These results can be improved by using enhanced inventory data.

Table of Contents

General Description of the Region

Hazus is a regional multi-hazard loss estimation model that was developed by the Federal Emergency Management Agency and the National Institute of Building Sciences. The primary purpose of Hazus is to provide a methodology and software application to develop multi-hazard losses at a regional scale. These loss estimates would be used primarily by local, state and regional officials to plan and stimulate efforts to reduce risks from multi-hazards and to prepare for emergency response and recovery.

The hurricane loss estimates provided in this report are based on a region that includes 1 county(ies) from the following state(s):

- Connecticut

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

The geographical size of the region is 375.86 square miles and contains 127 census tracts. There are over 222 thousand households in the region and a total population of 570,001 people (2010 Census Bureau data). The distribution of population by State and County is provided in Appendix B.

There are an estimated 183 thousand buildings in the region with a total building replacement value (excluding contents) of 88,668 million dollars (2014 dollars). Approximately 90% of the buildings (and 72% of the building value) are associated with residential housing.

Building Inventory

General Building Stock

Hazus estimates that there are 183,793 buildings in the region which have an aggregate total replacement value of 88,668 million (2014 dollars). Table 1 presents the relative distribution of the value with respect to the general occupancies. Appendix B provides a general distribution of the building value by State and County.

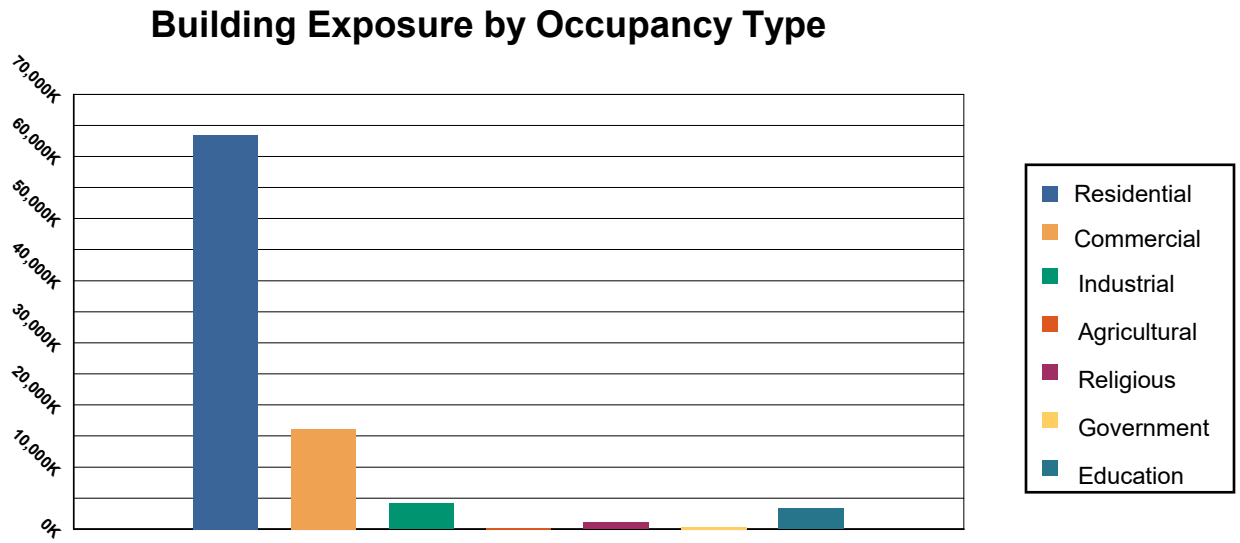


Table 1: Building Exposure by Occupancy Type

Occupancy	Exposure ($1000)	Percent of Tot
Residential	63,417,388	71.52%
Commercial	16,156,577	18.22%
Industrial	4,143,620	4.67%
Agricultural	205,951	0.23%
Religious	1,095,314	1.24%
Government	381,243	0.43%
Education	3,268,112	3.69%
Total	**88,668,205**	**100.00%**

Essential Facility Inventory

For essential facilities, there are 9 hospitals in the region with a total bed capacity of 2,360 beds. There are 294 schools, 73 fire stations, 22 police stations and 15 emergency operation facilities.

Hurricane Scenario

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

Scenario Name:	Probabilistic
Type:	Probabilistic

Building Damage

General Building Stock Damage

Hazus estimates that about 2,751 buildings will be at least moderately damaged. This is over 1% of the total number of buildings in the region. There are an estimated 27 buildings that will be completely destroyed. The definition of the 'damage states' is provided in the Hazus Hurricane technical manual. Table 2 below summarizes the expected damage by general occupancy for the buildings in the region. Table 3 summarizes the expected damage by general building type.

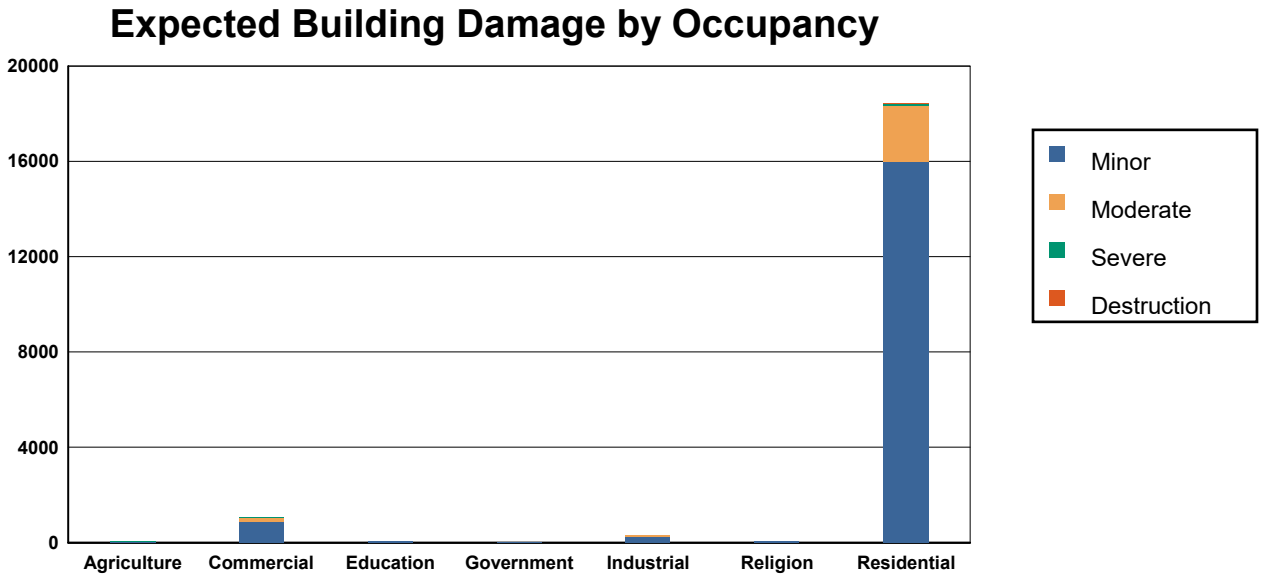


Table 2: Expected Building Damage by Occupancy : 200 - year Event

	None		Minor		Moderate		Severe		Destruction	
Occupancy	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**
Agriculture	497.70	89.84	43.17	7.79	8.94	1.61	3.90	0.70	0.29	0.05
Commercial	11,574.78	91.62	867.77	6.87	169.80	1.34	21.64	0.17	0.02	0.00
Education	654.04	92.25	48.73	6.87	6.07	0.86	0.16	0.02	0.00	0.00
Government	251.99	92.30	18.52	6.78	2.42	0.89	0.07	0.02	0.00	0.00
Industrial	3,614.16	91.82	263.01	6.68	47.70	1.21	10.54	0.27	0.59	0.01
Religion	934.73	92.09	72.65	7.16	7.30	0.72	0.32	0.03	0.00	0.00
Residential	146,236.00	88.80	15,964.88	9.69	2,371.92	1.44	73.24	0.04	25.96	0.02
Total	**163,763.38**		**17,278.74**		**2,614.15**		**109.88**		**26.85**	

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

Building Type	None		Minor		Moderate		Severe		Destruction	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Concrete	2,547	90.47	230	8.18	37	1.33	1	0.02	0	0.00
Masonry	15,213	86.33	1,653	9.38	722	4.10	31	0.18	2	0.01
MH	1,278	97.44	23	1.72	8	0.60	0	0.01	3	0.23
Steel	8,503	91.90	596	6.44	133	1.44	20	0.22	0	0.00
Wood	137,108	89.77	14,393	9.42	1,152	0.75	59	0.04	25	0.02

Essential Facility Damage

Before the hurricane, the region had no hospital beds available for use. On the day of the hurricane, the model estimates that 2360 hospital beds (0%) are available for use by patients already in the hospital and those injured by the hurricane. After one week, none of the beds will be in service. By 30 days, none will be operational.

Thematic Map of Essential Facilities with greater than 50% moderate

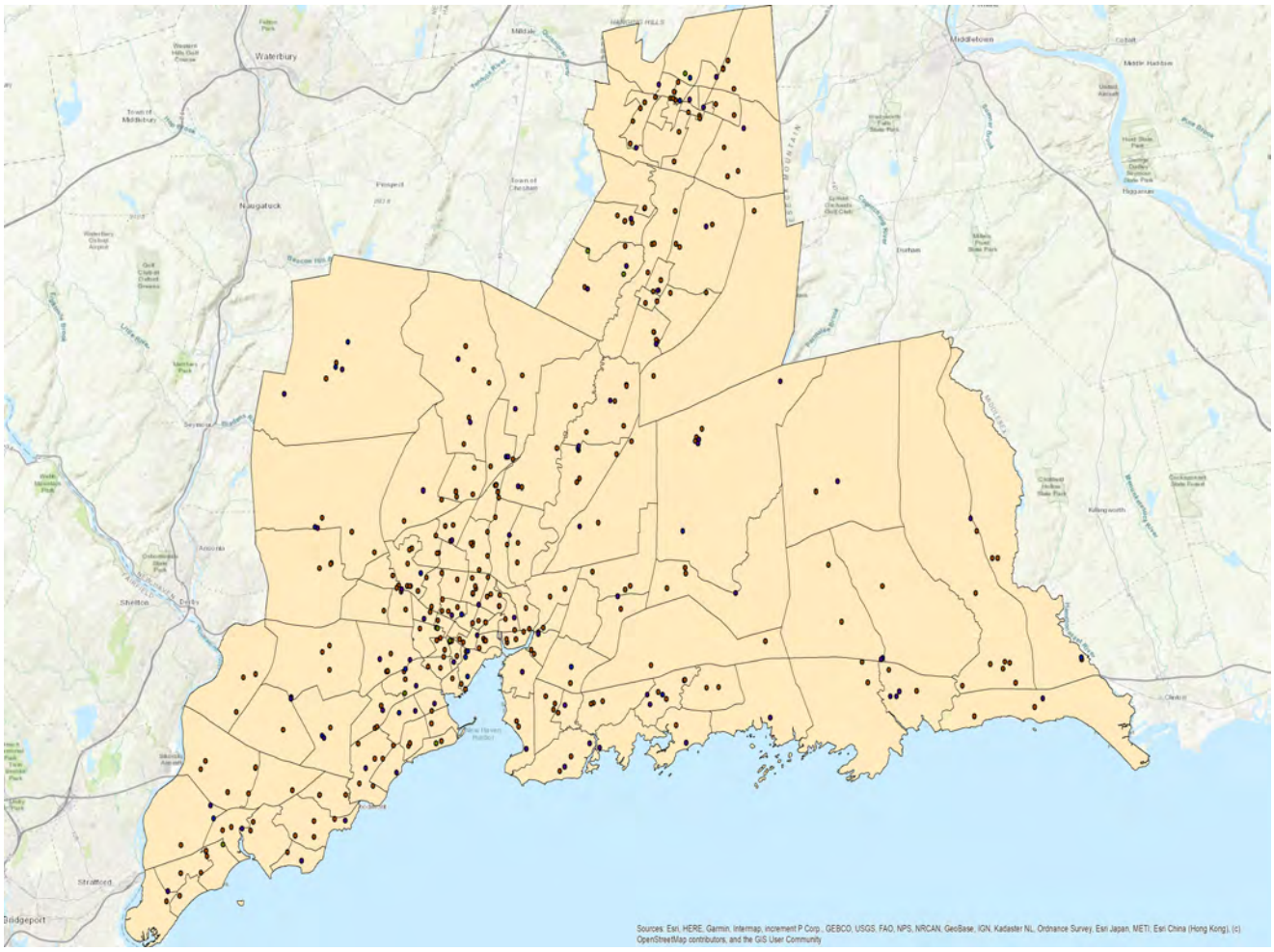
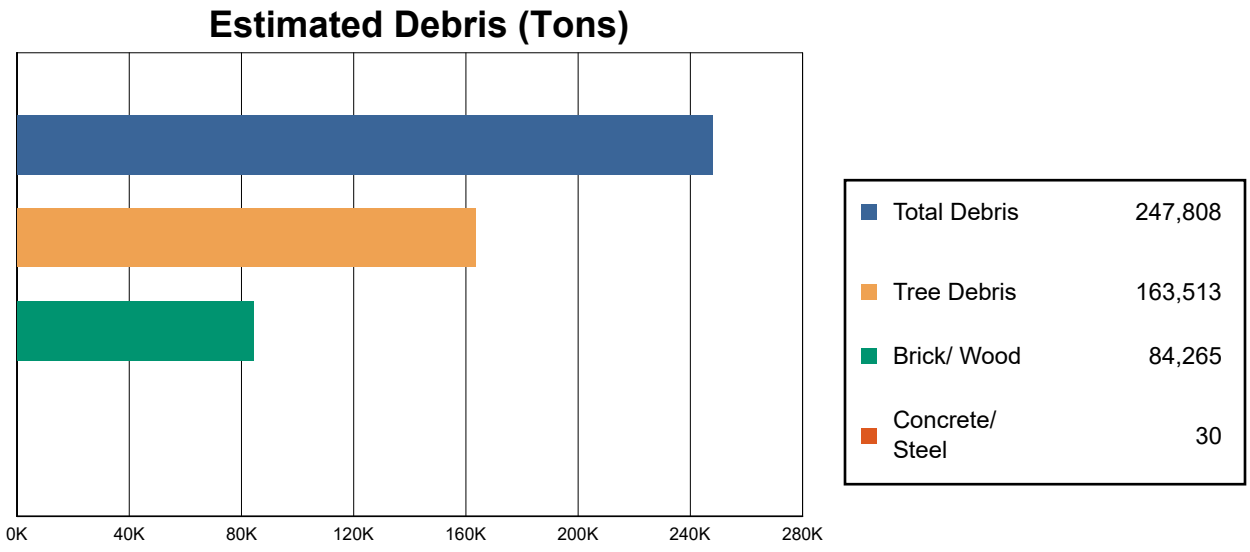


Table 4: Expected Damage to Essential Facilities

		# Facilities		
Classification	**Total**	**Probability of at Least Moderate Damage > 50%**	**Probability of Complete Damage > 50%**	**Expected Loss of Use < 1 day**
EOCs	15	0	0	15
Fire Stations	73	0	0	73
Hospitals	9	0	0	9
Police Stations	22	0	0	22
Schools	294	0	0	294

Induced Hurricane Damage

Debris Generation

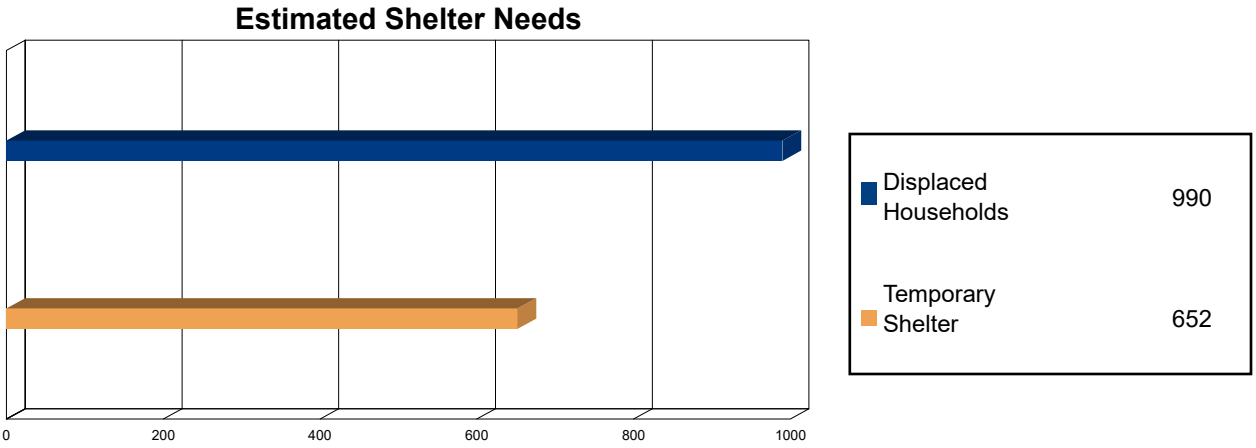


Hazus estimates the amount of debris that will be generated by the hurricane. The model breaks the debris into four general categories: a) Brick/Wood, b) Reinforced Concrete/Steel, c) Eligible Tree Debris, and d) Other Tree Debris. This distinction is made because of the different types of material handling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

The model estimates that a total of 247,808 tons of debris will be generated. Of the total amount, 94,467 tons (38%) is Other Tree Debris. Of the remaining 153,341 tons, Brick/Wood comprises 55% of the total, Reinforced Concrete/Steel comprises of 0% of the total, with the remainder being Eligible Tree Debris. If the building debris tonnage is converted to an estimated number of truckloads, it will require 3372 truckloads (@25 tons/truck) to remove the building debris generated by the hurricane. The number of Eligible Tree Debris truckloads will depend on how the 69,046 tons of Eligible Tree Debris are collected and processed. The volume of tree debris generally ranges from about 4 cubic yards per ton for chipped or compacted tree debris to about 10 cubic yards per ton for bulkier, uncompacted debris.

Social Impact

Shelter Requirement



Hazus estimates the number of households that are expected to be displaced from their homes due to the hurricane and the number of displaced people that will require accommodations in temporary public shelters. The model estimates 990 households to be displaced due to the hurricane. Of these, 652 people (out of a total population of 570,001) will seek temporary shelter in public shelters.

Economic Loss

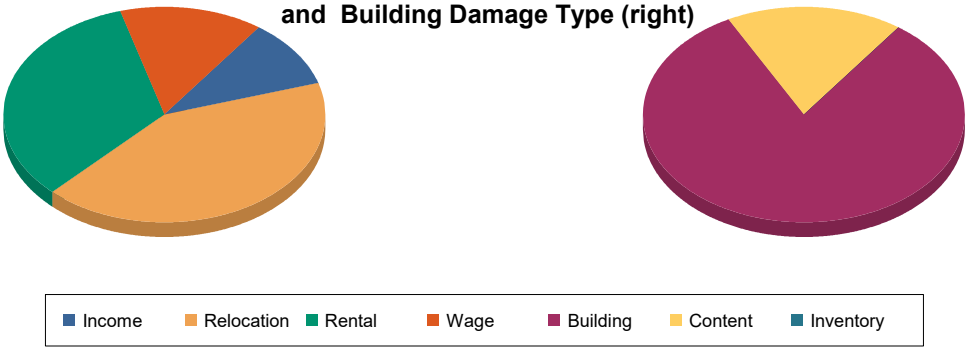
The total economic loss estimated for the hurricane is 978.1 million dollars, which represents 1.10 % of the total replacement value of the region's buildings.

Building-Related Losses

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

The total property damage losses were 978 million dollars. 7% of the estimated losses were related to the business interruption of the region. By far, the largest loss was sustained by the residential occupancies which made up over 89% of the total loss. Table 5 below provides a summary of the losses associated with the building damage.

Loss by Business Interruption Type (left) and Building Damage Type (right)



Loss Type by General Occupancy

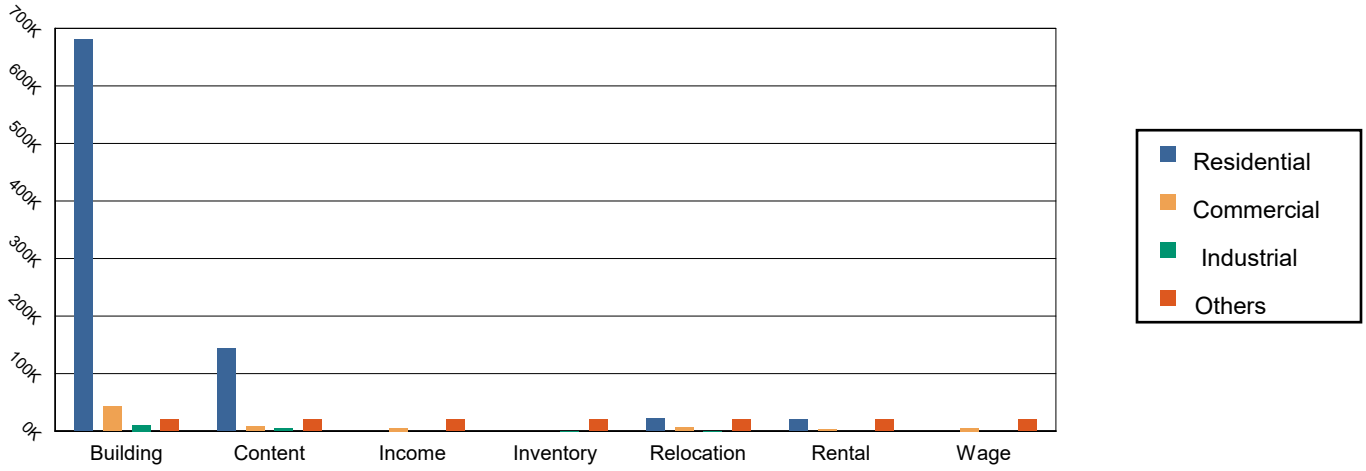


Table 5: Building-Related Economic Loss Estimates

(Thousands of dollars)

Category	Area	Residential	Commercial	Industrial	Others	Total
Property Damage						
	Building	680,866.80	43,428.13	10,821.24	9,619.37	744,735.54
	Content	143,950.16	8,576.58	5,106.62	1,816.99	159,450.35
	Inventory	0.00	158.25	722.84	33.22	914.30
	Subtotal	**824,816.96**	**52,162.96**	**16,650.70**	**11,469.58**	**905,100.20**
Business Interruption Loss						
	Income	0.00	5,780.64	108.02	1,667.02	7,555.68
	Relocation	22,245.05	6,152.33	512.44	1,601.67	30,511.49
	Rental	20,735.14	3,328.48	84.59	149.43	24,297.63
	Wage	0.00	5,455.21	172.70	4,963.14	10,591.04
	Subtotal	**42,980.19**	**20,716.65**	**877.75**	**8,381.26**	**72,955.85**

Total

Total	**867,797.14**	**72,879.61**	**17,528.46**	**19,850.84**	**978,056.04**

Appendix A: County Listing for the Region

Connecticut
- New Haven

Appendix B: Regional Population and Building Value Data

		Building Value (thousands of dollars)		
	Population	Residential	Non-Residential	Total
Connecticut				
New Haven	570,001	63,417,388	25,250,817	88,668,205
Total	**570,001**	**63,417,388**	**25,250,817**	**88,668,205**
Study Region Total	**570,001**	**63,417,388**	**25,250,817**	**88,668,205**

Hazus: Hurricane Global Risk Report

Region Name: SCRCOG_HUR

Hurricane Scenario: Probabilistic 500-year Return Period

Print Date: Tuesday, July 12, 2022

Disclaimer:
This version of Hazus utilizes 2010 Census Data.
Totals only reflect data for those census tracts/blocks included in the user's study region.

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The hurricane loss estimates provided in this report are based on a region that includes 1 county(ies) from the following state(s):

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Note:
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There are an estimated 183 thousand buildings in the region with a total building replacement value (excluding contents) of 88,668 million dollars (2014 dollars). Approximately 90% of the buildings (and 72% of the building value) are associated with residential housing.

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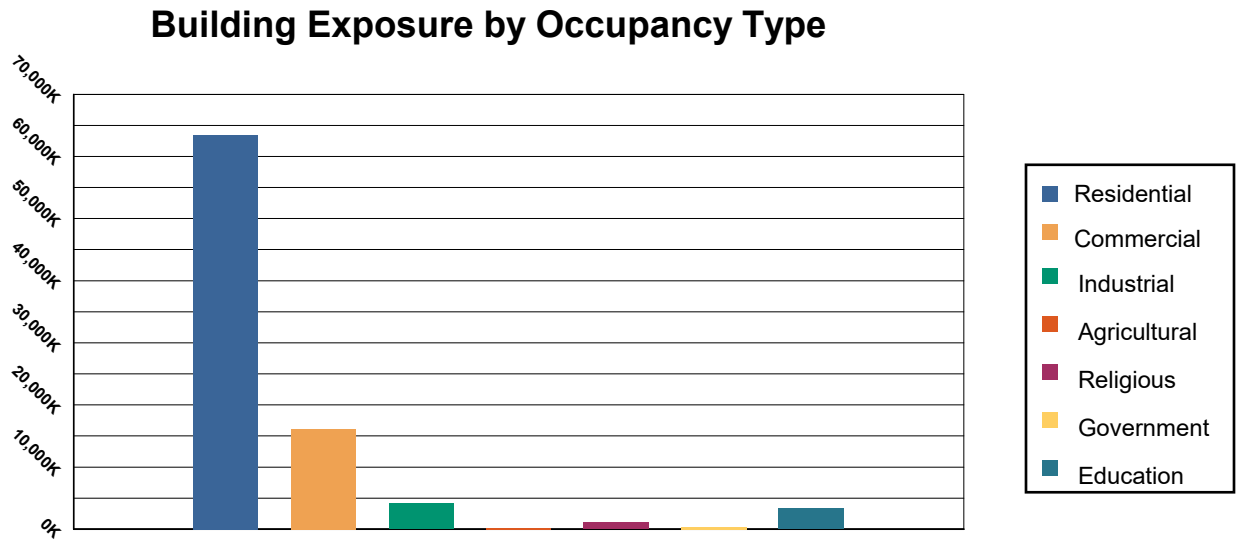
General Building Stock

Hazus estimates that there are 183,793 buildings in the region which have an aggregate total replacement value of 88,668 million (2014 dollars). Table 1 presents the relative distribution of the value with respect to the general occupancies. Appendix B provides a general distribution of the building value by State and County.



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Government	381,243	0.43%
Education	3,268,112	3.69%
Total	**88,668,205**	**100.00%**

Essential Facility Inventory

For essential facilities, there are 9 hospitals in the region with a total bed capacity of 2,360 beds. There are 294 schools, 73 fire stations, 22 police stations and 15 emergency operation facilities.

Hurricane Scenario

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

Scenario Name:	Probabilistic
Type:	Probabilistic

Building Damage

General Building Stock Damage

Hazus estimates that about 9,803 buildings will be at least moderately damaged. This is over 5% of the total number of buildings in the region. There are an estimated 314 buildings that will be completely destroyed. The definition of the 'damage states' is provided in the Hazus Hurricane technical manual. Table 2 below summarizes the expected damage by general occupancy for the buildings in the region. Table 3 summarizes the expected damage by general building type.

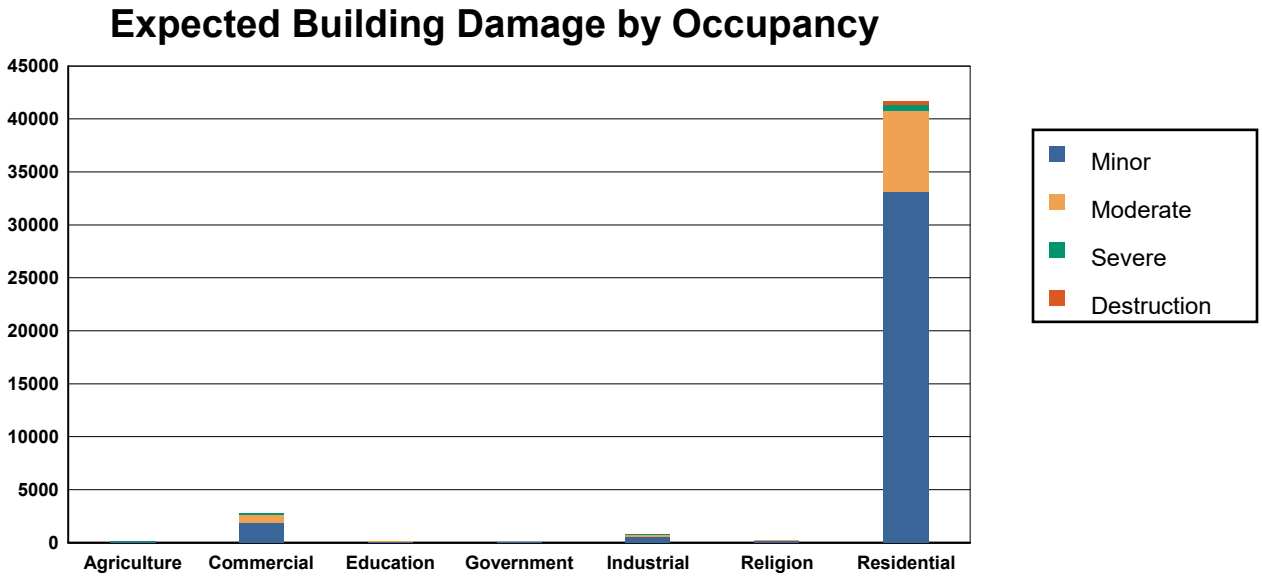


Table 2: Expected Building Damage by Occupancy : 500 - year Event

	None		Minor		Moderate		Severe		Destruction	
Occupancy	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**
Agriculture	416.74	75.22	92.71	16.74	28.83	5.20	13.90	2.51	1.81	0.33
Commercial	9,892.83	78.30	1,911.66	15.13	703.69	5.57	124.94	0.99	0.87	0.01
Education	557.74	78.67	110.31	15.56	37.42	5.28	3.52	0.50	0.00	0.00
Government	215.66	78.99	41.14	15.07	14.60	5.35	1.61	0.59	0.00	0.00
Industrial	3,099.23	78.74	562.18	14.28	217.59	5.53	52.94	1.34	4.07	0.10
Religion	805.36	79.35	164.43	16.20	41.28	4.07	3.93	0.39	0.00	0.00
Residential	123,036.29	74.72	33,083.97	20.09	7,741.37	4.70	502.74	0.31	307.62	0.19
Total	**138,023.85**		**35,966.41**		**8,784.79**		**703.58**		**314.37**	

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

Building Type	None		Minor		Moderate		Severe		Destruction	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Concrete	2,141	76.04	465	16.53	197	6.98	13	0.45	0	0.00
Masonry	12,652	71.80	2,970	16.86	1,852	10.51	134	0.76	14	0.08
MH	1,183	90.17	68	5.19	41	3.16	2	0.17	17	1.31
Steel	7,285	78.73	1,276	13.79	571	6.18	119	1.29	1	0.01
Wood	115,981	75.94	31,109	20.37	4,923	3.22	435	0.29	288	0.19

Essential Facility Damage

Before the hurricane, the region had no hospital beds available for use. On the day of the hurricane, the model estimates that 2360 hospital beds (0%) are available for use by patients already in the hospital and those injured by the hurricane. After one week, none of the beds will be in service. By 30 days, none will be operational.

Thematic Map of Essential Facilities with greater than 50% moderate

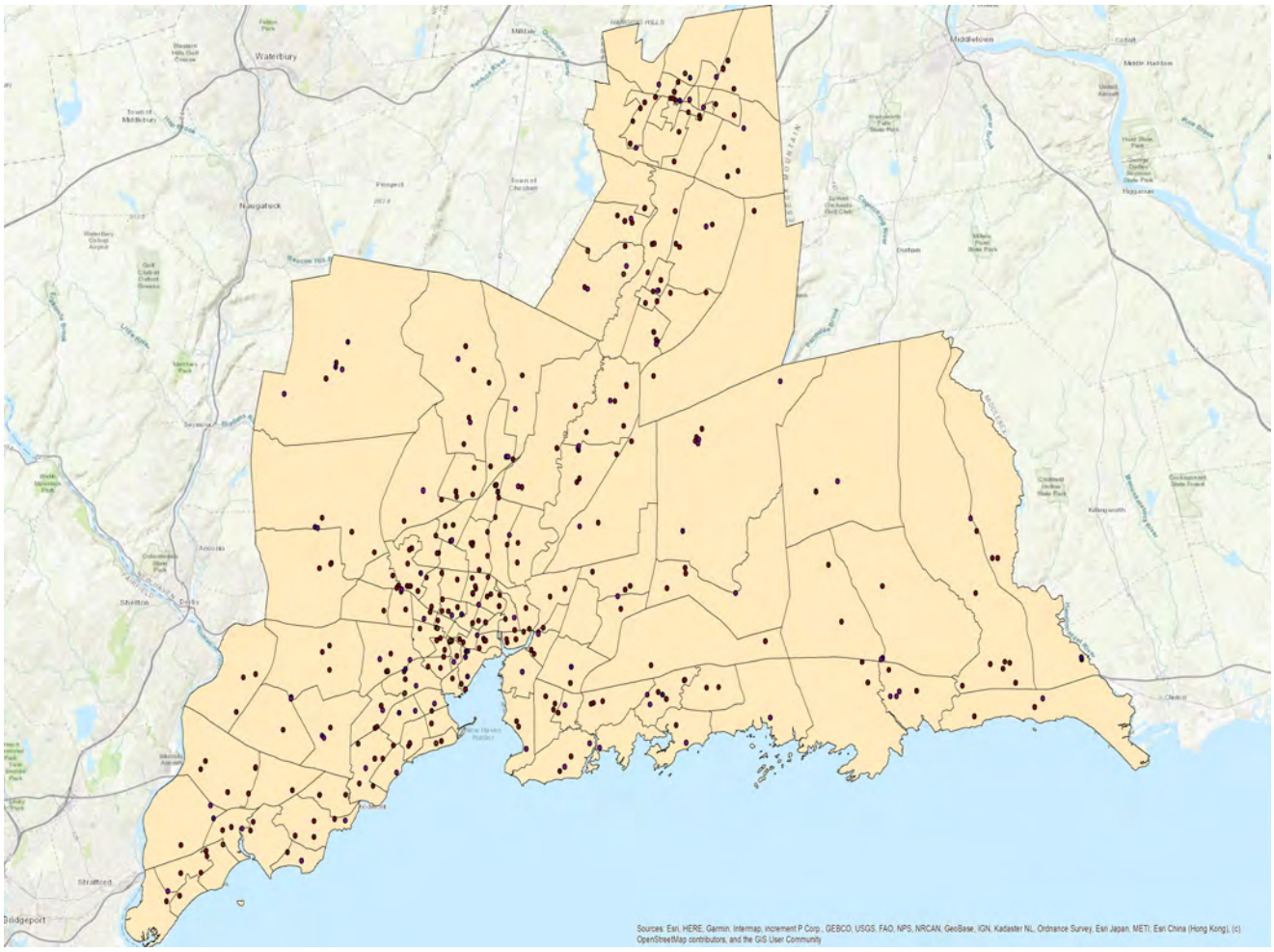
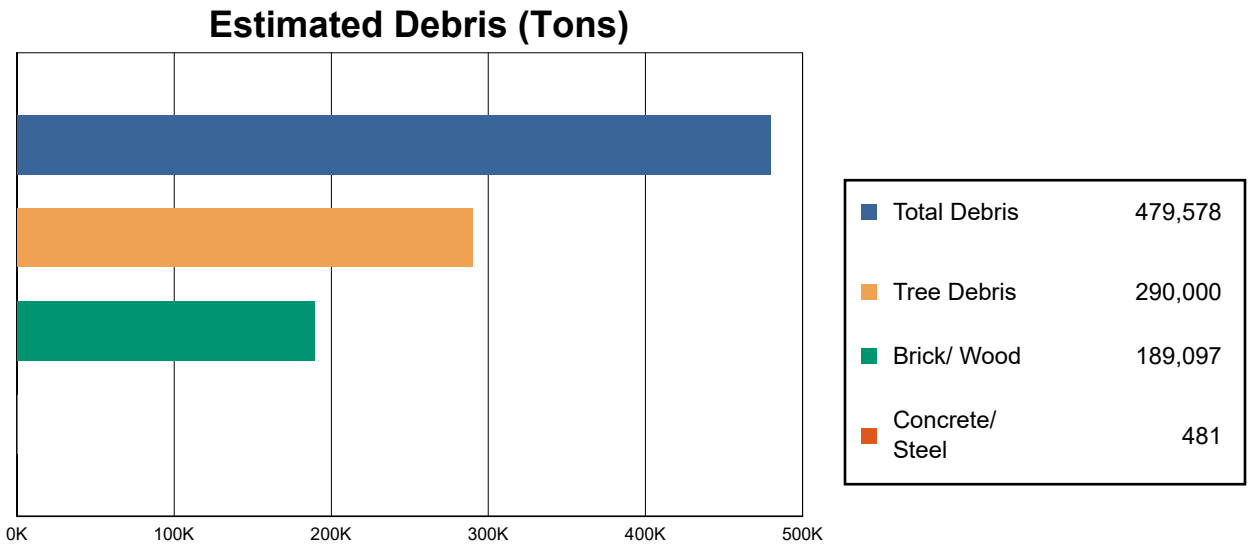


Table 4: Expected Damage to Essential Facilities

		# Facilities		
Classification	**Total**	**Probability of at Least Moderate Damage > 50%**	**Probability of Complete Damage > 50%**	**Expected Loss of Use < 1 day**
EOCs	15	0	0	15
Fire Stations	73	0	0	73
Hospitals	9	0	0	8
Police Stations	22	0	0	22
Schools	294	3	0	96

Induced Hurricane Damage

Debris Generation

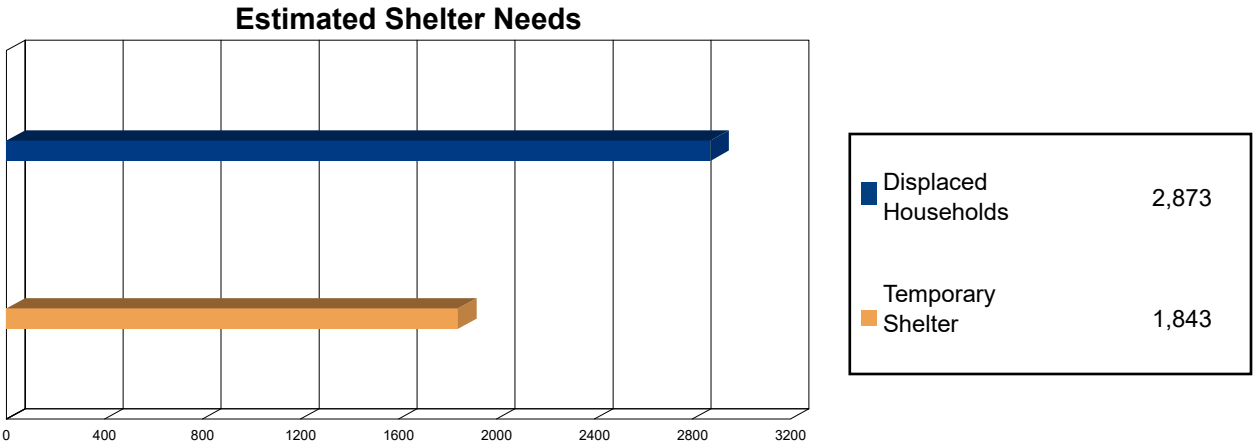


Hazus estimates the amount of debris that will be generated by the hurricane. The model breaks the debris into four general categories: a) Brick/Wood, b) Reinforced Concrete/Steel, c) Eligible Tree Debris, and d) Other Tree Debris. This distinction is made because of the different types of material handling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

The model estimates that a total of 479,578 tons of debris will be generated. Of the total amount, 170,437 tons (36%) is Other Tree Debris. Of the remaining 309,141 tons, Brick/Wood comprises 61% of the total, Reinforced Concrete/Steel comprises of 0% of the total, with the remainder being Eligible Tree Debris. If the building debris tonnage is converted to an estimated number of truckloads, it will require 7583 truckloads (@25 tons/truck) to remove the building debris generated by the hurricane. The number of Eligible Tree Debris truckloads will depend on how the 119,563 tons of Eligible Tree Debris are collected and processed. The volume of tree debris generally ranges from about 4 cubic yards per ton for chipped or compacted tree debris to about 10 cubic yards per ton for bulkier, uncompacted debris.

Social Impact

Shelter Requirement



Hazus estimates the number of households that are expected to be displaced from their homes due to the hurricane and the number of displaced people that will require accommodations in temporary public shelters. The model estimates 2,873 households to be displaced due to the hurricane. Of these, 1,843 people (out of a total population of 570,001) will seek temporary shelter in public shelters.

Economic Loss

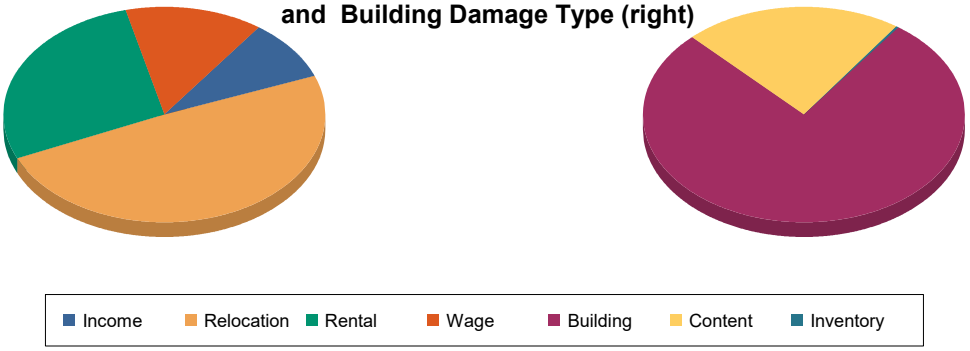
The total economic loss estimated for the hurricane is 2463.7 million dollars, which represents 2.78 % of the total replacement value of the region's buildings.

Building-Related Losses

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

The total property damage losses were 2,464 million dollars. 10% of the estimated losses were related to the business interruption of the region. By far, the largest loss was sustained by the residential occupancies which made up over 83% of the total loss. Table 5 below provides a summary of the losses associated with the building damage.

Loss by Business Interruption Type (left) and Building Damage Type (right)



Loss Type by General Occupancy

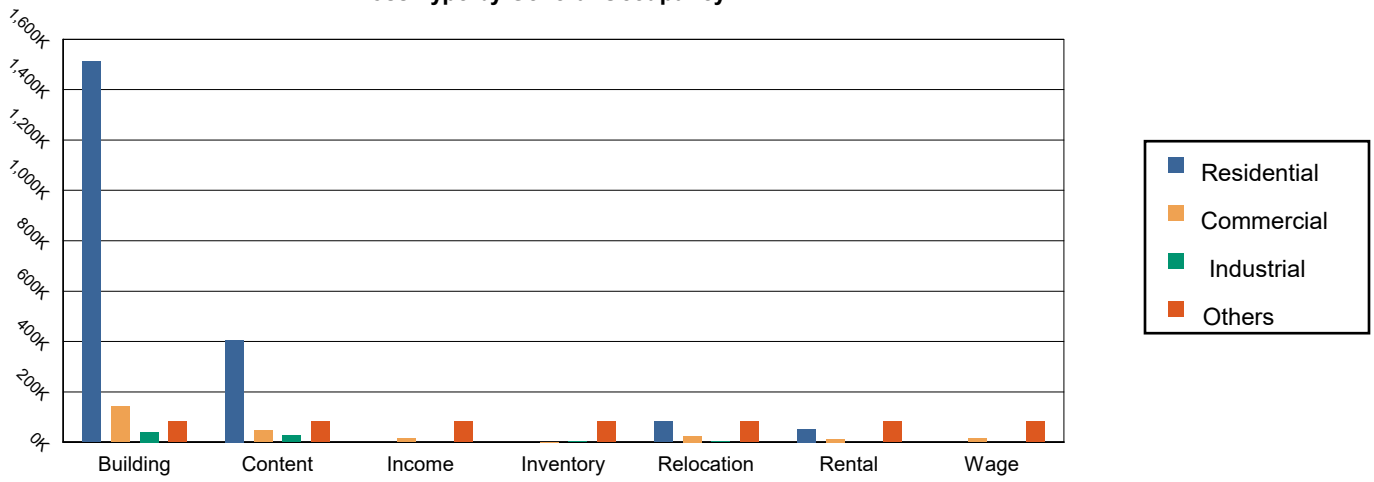


Table 5: Building-Related Economic Loss Estimates

(Thousands of dollars)

Category	Area	Residential	Commercial	Industrial	Others	Total
Property Damage						
	Building	1,512,668.25	141,153.19	40,386.31	35,473.36	1,729,681.11
	Content	406,263.16	46,723.02	26,064.75	14,015.93	493,066.86
	Inventory	0.00	867.40	3,429.91	154.14	4,451.45
	Subtotal	**1,918,931.41**	**188,743.61**	**69,880.97**	**49,643.43**	**2,227,199.42**
Business Interruption Loss						
	Income	1.73	15,791.46	475.11	5,369.72	21,638.02
	Relocation	82,156.43	23,944.75	2,735.03	7,673.13	116,509.34
	Rental	51,883.66	12,752.26	418.96	675.41	65,730.28
	Wage	4.05	14,401.52	750.15	17,516.96	32,672.68
	Subtotal	**134,045.86**	**66,889.99**	**4,379.25**	**31,235.22**	**236,550.32**

Total

Total	**2,052,977.27**	**255,633.59**	**74,260.22**	**80,878.65**	**2,463,749.74**

Appendix A: County Listing for the Region

Connecticut
- New Haven

Appendix B: Regional Population and Building Value Data

		Building Value (thousands of dollars)		
	Population	Residential	Non-Residential	Total
Connecticut				
New Haven	570,001	63,417,388	25,250,817	88,668,205
Total	**570,001**	**63,417,388**	**25,250,817**	**88,668,205**
Study Region Total	**570,001**	**63,417,388**	**25,250,817**	**88,668,205**

Hazus: Hurricane Global Risk Report

Region Name: SCRCOG_HUR

Hurricane Scenario: Probabilistic 1000-year Return Period

Print Date: Tuesday, July 12, 2022

Disclaimer:
This version of Hazus utilizes 2010 Census Data.
Totals only reflect data for those census tracts/blocks included in the user's study region.

The estimates of social and economic impacts contained in this report were produced using Hazus loss estimation methodology software which is based on current scientific and engineering knowledge. There are uncertainties inherent in any loss estimation technique. Therefore, there may be significant differences between the modeled results contained in this report and the actual social and economic losses following a specific Hurricane. These results can be improved by using enhanced inventory data.

Table of Contents

General Description of the Region

Hazus is a regional multi-hazard loss estimation model that was developed by the Federal Emergency Management Agency and the National Institute of Building Sciences. The primary purpose of Hazus is to provide a methodology and software application to develop multi-hazard losses at a regional scale. These loss estimates would be used primarily by local, state and regional officials to plan and stimulate efforts to reduce risks from multi-hazards and to prepare for emergency response and recovery.

The hurricane loss estimates provided in this report are based on a region that includes 1 county(ies) from the following state(s):

- Connecticut

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

The geographical size of the region is 375.86 square miles and contains 127 census tracts. There are over 222 thousand households in the region and a total population of 570,001 people (2010 Census Bureau data). The distribution of population by State and County is provided in Appendix B.

There are an estimated 183 thousand buildings in the region with a total building replacement value (excluding contents) of 88,668 million dollars (2014 dollars). Approximately 90% of the buildings (and 72% of the building value) are associated with residential housing.

Building Inventory

General Building Stock

Hazus estimates that there are 183,793 buildings in the region which have an aggregate total replacement value of 88,668 million (2014 dollars). Table 1 presents the relative distribution of the value with respect to the general occupancies. Appendix B provides a general distribution of the building value by State and County.

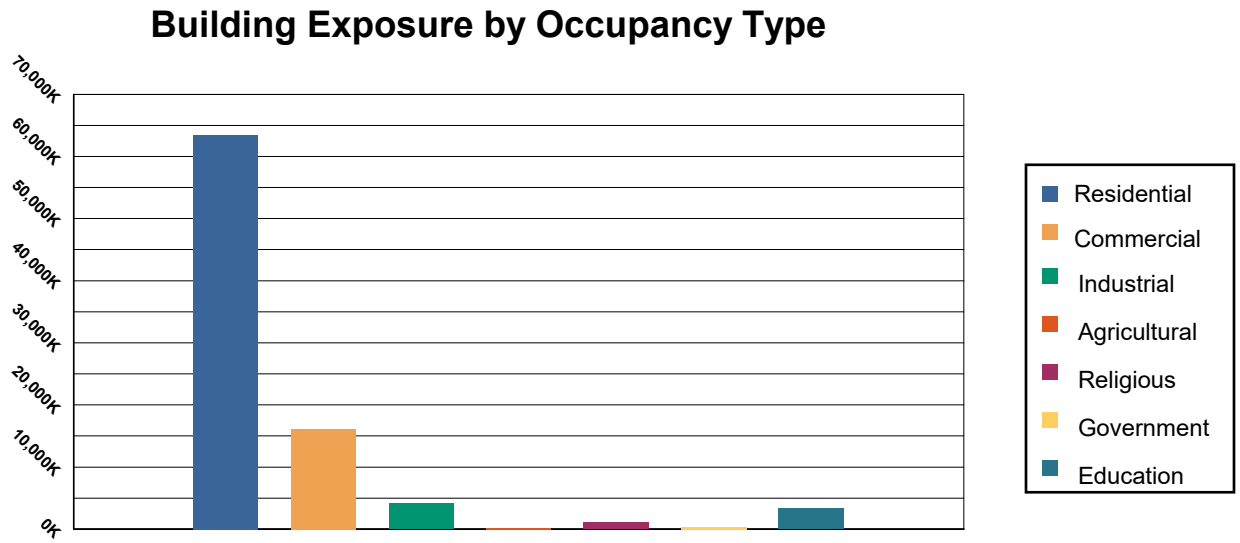


Table 1: Building Exposure by Occupancy Type

Occupancy	Exposure ($1000)	Percent of Tot
Residential	63,417,388	71.52%
Commercial	16,156,577	18.22%
Industrial	4,143,620	4.67%
Agricultural	205,951	0.23%
Religious	1,095,314	1.24%
Government	381,243	0.43%
Education	3,268,112	3.69%
Total	**88,668,205**	**100.00%**

Essential Facility Inventory

For essential facilities, there are 9 hospitals in the region with a total bed capacity of 2,360 beds. There are 294 schools, 73 fire stations, 22 police stations and 15 emergency operation facilities.

Hurricane Scenario

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

Scenario Name:	Probabilistic
Type:	Probabilistic

Building Damage

General Building Stock Damage

Hazus estimates that about 20,662 buildings will be at least moderately damaged. This is over 11% of the total number of buildings in the region. There are an estimated 1,001 buildings that will be completely destroyed. The definition of the 'damage states' is provided in the Hazus Hurricane technical manual. Table 2 below summarizes the expected damage by general occupancy for the buildings in the region. Table 3 summarizes the expected damage by general building type.

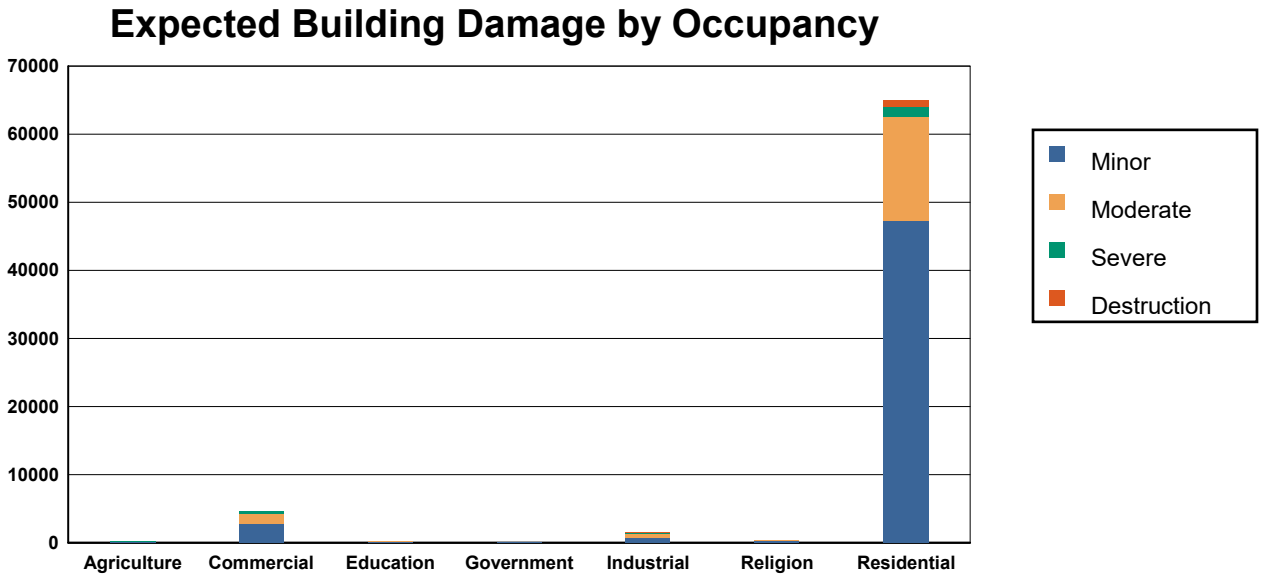


Table 2: Expected Building Damage by Occupancy : 1000 - year Event

	None		Minor		Moderate		Severe		Destruction	
Occupancy	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**
Agriculture	336.59	60.76	133.37	24.07	52.93	9.55	26.70	4.82	4.41	0.80
Commercial	7,994.86	63.28	2,753.17	21.79	1,504.05	11.90	378.44	3.00	3.47	0.03
Education	448.65	63.28	154.87	21.84	88.03	12.42	17.45	2.46	0.00	0.00
Government	177.22	64.91	57.43	21.03	31.87	11.67	6.49	2.38	0.00	0.00
Industrial	2,522.75	64.09	792.84	20.14	464.56	11.80	144.84	3.68	11.00	0.28
Religion	650.70	64.11	247.57	24.39	99.78	9.83	16.94	1.67	0.00	0.00
Residential	99,632.08	60.50	47,229.10	28.68	15,257.80	9.27	1,570.47	0.95	982.56	0.60
Total	**111,762.85**		**51,368.35**		**17,499.03**		**2,161.33**		**1,001.44**	

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

Building Type	None		Minor		Moderate		Severe		Destruction	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Concrete	1,676	59.54	624	22.16	454	16.14	61	2.16	0	0.00
Masonry	10,024	56.88	3,932	22.31	3,263	18.51	364	2.06	40	0.22
MH	1,064	81.07	116	8.83	88	6.69	6	0.47	38	2.93
Steel	5,886	63.61	1,784	19.28	1,226	13.25	353	3.81	4	0.04
Wood	94,431	61.83	45,427	29.74	10,575	6.92	1,362	0.89	942	0.62

Essential Facility Damage

Before the hurricane, the region had no hospital beds available for use. On the day of the hurricane, the model estimates that 2273 hospital beds (0%) are available for use by patients already in the hospital and those injured by the hurricane. After one week, none of the beds will be in service. By 30 days, none will be operational.

Thematic Map of Essential Facilities with greater than 50% moderate

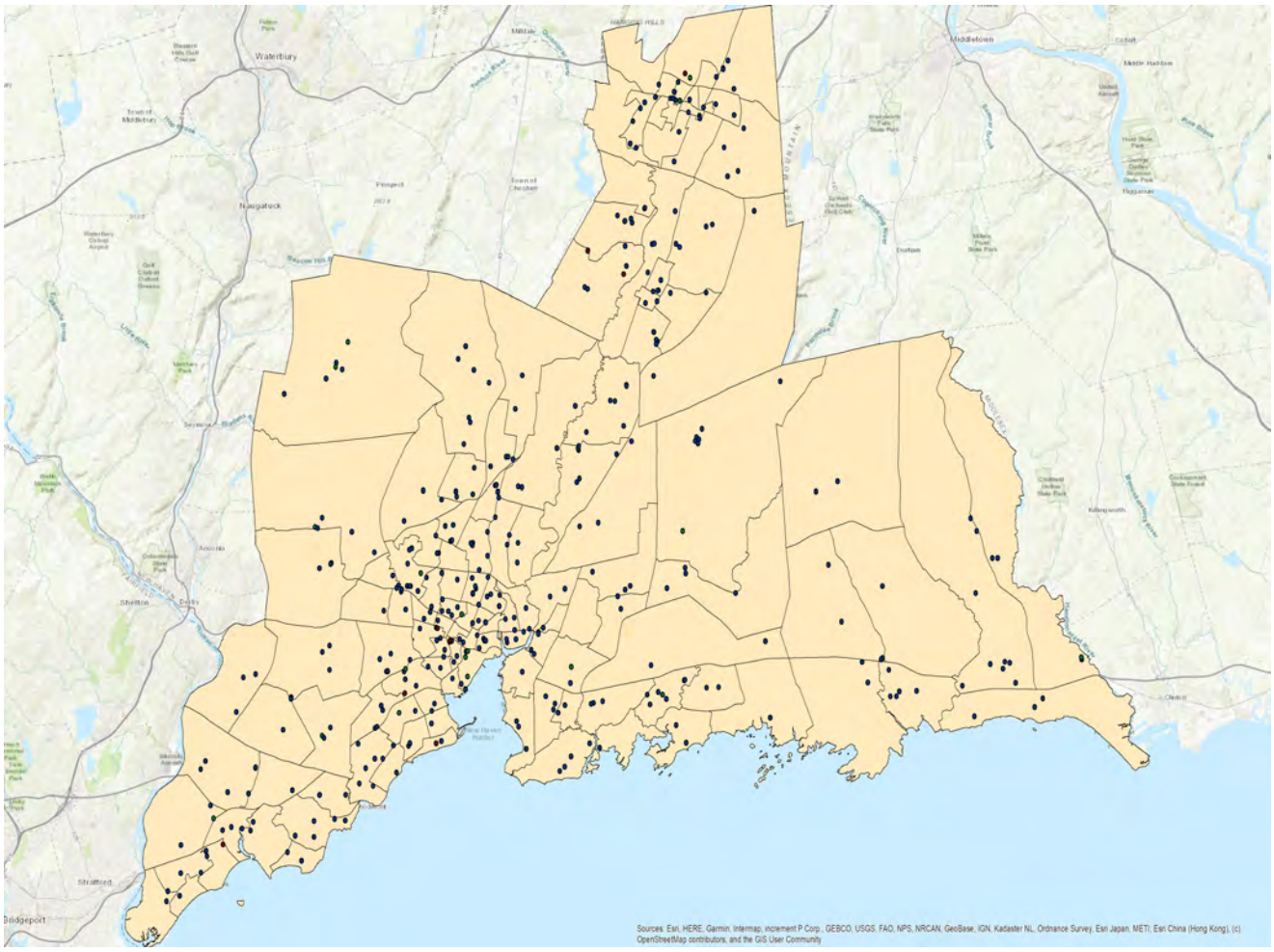
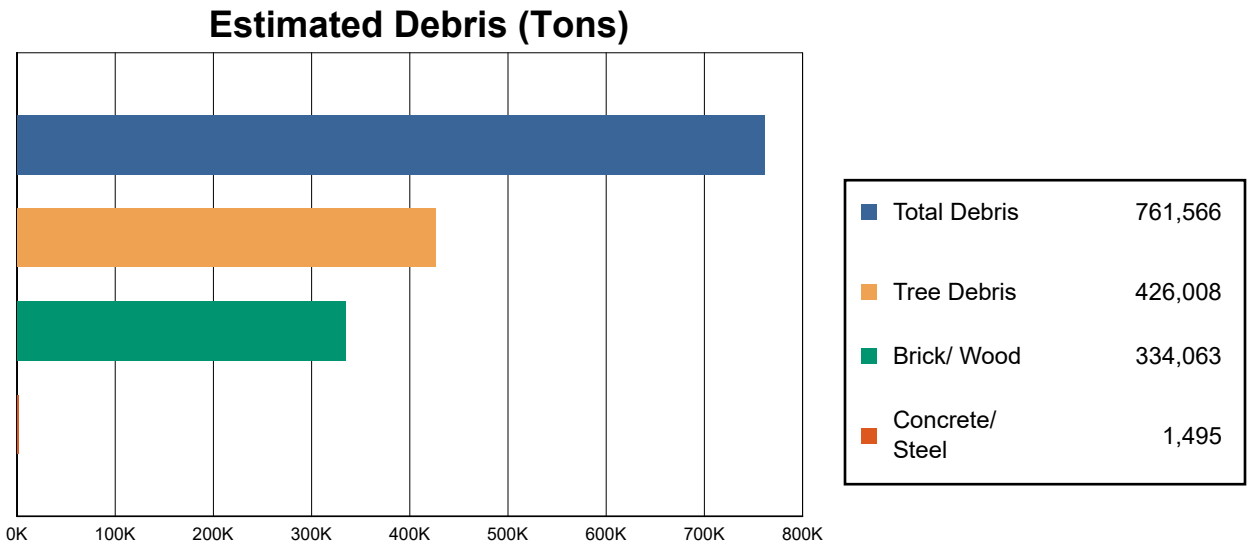


Table 4: Expected Damage to Essential Facilities

		# Facilities		
Classification	**Total**	**Probability of at Least Moderate Damage > 50%**	**Probability of Complete Damage > 50%**	**Expected Loss of Use < 1 day**
EOCs	15	0	0	15
Fire Stations	73	0	0	73
Hospitals	9	0	0	5
Police Stations	22	0	0	22
Schools	294	7	0	22

Induced Hurricane Damage

Debris Generation

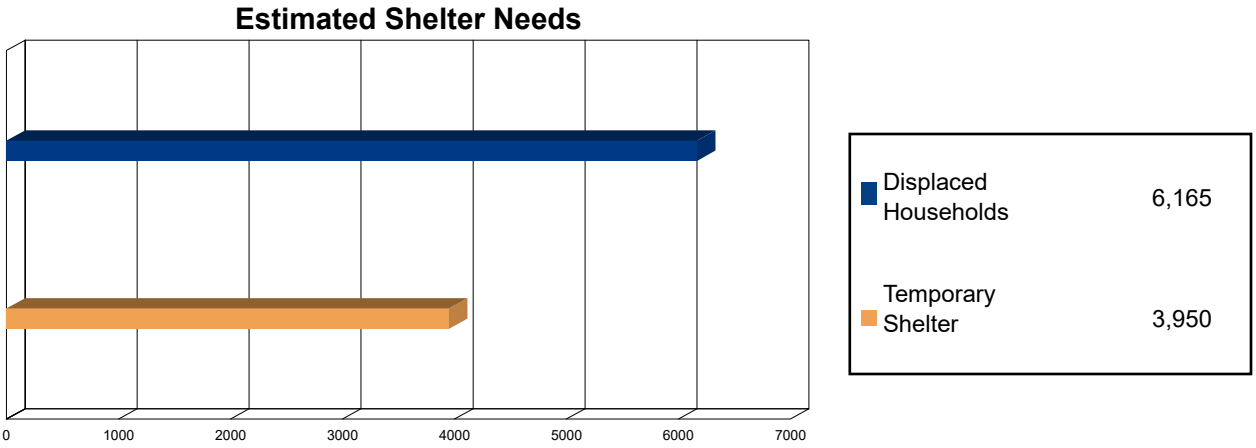


Hazus estimates the amount of debris that will be generated by the hurricane. The model breaks the debris into four general categories: a) Brick/Wood, b) Reinforced Concrete/Steel, c) Eligible Tree Debris, and d) Other Tree Debris. This distinction is made because of the different types of material handling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

The model estimates that a total of 761,566 tons of debris will be generated. Of the total amount, 248,939 tons (33%) is Other Tree Debris. Of the remaining 512,627 tons, Brick/Wood comprises 65% of the total, Reinforced Concrete/Steel comprises of 0% of the total, with the remainder being Eligible Tree Debris. If the building debris tonnage is converted to an estimated number of truckloads, it will require 13422 truckloads (@25 tons/truck) to remove the building debris generated by the hurricane. The number of Eligible Tree Debris truckloads will depend on how the 177,069 tons of Eligible Tree Debris are collected and processed. The volume of tree debris generally ranges from about 4 cubic yards per ton for chipped or compacted tree debris to about 10 cubic yards per ton for bulkier, uncompacted debris.

Social Impact

Shelter Requirement



Hazus estimates the number of households that are expected to be displaced from their homes due to the hurricane and the number of displaced people that will require accommodations in temporary public shelters. The model estimates 6,165 households to be displaced due to the hurricane. Of these, 3,950 people (out of a total population of 570,001) will seek temporary shelter in public shelters.

Economic Loss

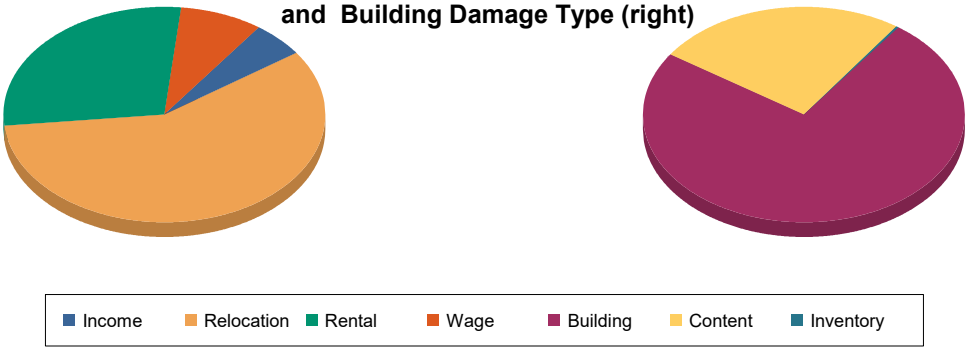
The total economic loss estimated for the hurricane is 4828.0 million dollars, which represents 5.45 % of the total replacement value of the region's buildings.

Building-Related Losses

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

The total property damage losses were 4,828 million dollars. 10% of the estimated losses were related to the business interruption of the region. By far, the largest loss was sustained by the residential occupancies which made up over 80% of the total loss. Table 5 below provides a summary of the losses associated with the building damage.

Loss by Business Interruption Type (left) and Building Damage Type (right)



Loss Type by General Occupancy

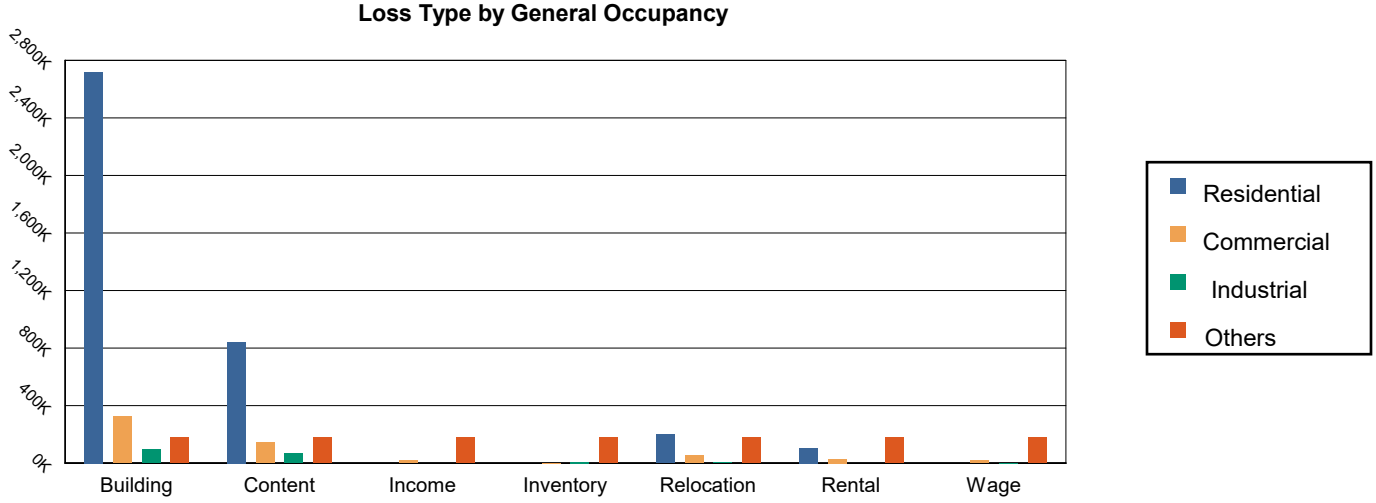


Table 5: Building-Related Economic Loss Estimates

(Thousands of dollars)

Category	Area	Residential	Commercial	Industrial	Others	Total
Property Damage						
	Building	2,719,844.47	327,936.62	96,936.88	87,891.22	3,232,609.20
	Content	843,126.11	141,405.52	70,308.34	45,329.00	1,100,168.97
	Inventory	0.00	2,474.53	8,878.61	294.94	11,648.08
	Subtotal	**3,562,970.59**	**471,816.67**	**176,123.82**	**133,515.16**	**4,344,426.25**
Business Interruption Loss						
	Income	57.81	18,551.69	1,020.94	5,728.24	25,358.68
	Relocation	198,393.15	56,172.43	6,774.34	19,294.73	280,634.64
	Rental	104,794.88	29,251.75	1,010.32	1,723.02	136,779.97
	Wage	135.43	18,994.73	1,610.88	20,047.05	40,788.09
	Subtotal	**303,381.27**	**122,970.60**	**10,416.49**	**46,793.04**	**483,561.39**

Total

Total	**3,866,351.86**	**594,787.27**	**186,540.31**	**180,308.20**	**4,827,987.64**

Appendix A: County Listing for the Region

Connecticut
- New Haven

Appendix B: Regional Population and Building Value Data

		Building Value (thousands of dollars)		
	Population	Residential	Non-Residential	Total
Connecticut				
New Haven	570,001	63,417,388	25,250,817	88,668,205
Total	**570,001**	**63,417,388**	**25,250,817**	**88,668,205**
Study Region Total	**570,001**	**63,417,388**	**25,250,817**	**88,668,205**

Quick Assessment Report

July 12, 2022

Study Region : SCRCOG_HUR

Scenario : Probabilistic

Regional Statistics

Area (Square Miles)	376
Number of Census Tracts	127
Number of People in the Region	570,001

General Building Stock

Occupancy	*Building Count*	*Dollar Exposure ($ K)*
Residential	164,672	63,417,388
Commercial	12,634	16,156,577
Other	6,487	9,094,240
Total	183,793	88,668,205

Scenario Results

Number of Residential Buildings Damaged

Return Period	*Minor*	*Moderate*	*Severe*	*Destruction*	*Total*
10	0	0	0	0	0
20	126	7	0	0	133
50	1,131	81	4	0	1,217
100	5,822	628	17	2	6,469
200	15,965	2,372	73	26	18,436
500	33,084	7,741	503	308	41,636
1000	47,229	15,258	1,570	983	65,040

Number of Buildings Damaged

Return Period	*Minor*	*Moderate*	*Severe*	*Destruction*	*Total*
10	0	0	0	0	0
20	170	7	0	0	177
50	1,275	87	5	0	1,366
100	6,307	679	23	2	7,011
200	17,279	2,614	110	27	20,030
500	35,966	8,785	704	314	45,769
1000	51,368	17,499	2,161	1,001	72,030

Shelter Requirements

Return Period	*Displaced Households (#Households)*	*Short Term Shelter (#People)*
10	0	0
20	0	0
50	3	2
100	244	162
200	990	652
500	2,873	1,843
1000	6,165	3,950

Economic Loss (x 1000)

	Property Damage (Capital Stock) Losses		***Business Interruption***
ReturnPeriod	***Residential***	***Total***	***(Income) Losses***
10	0	0	0
20	5,379	5,391	28
50	126,902	132,226	3,014
100	383,502	406,529	22,652
200	824,817	905,100	72,956
500	1,918,931	2,227,199	236,550
1000	3,562,971	4,344,426	483,561
Annualized	20,259	23,645	2,194

Disclaimer:

Totals only reflect data for those census tracts/blocks included in the user's study region.

The estimates of social and economic impacts contained in this report were produced using HAZUS loss estimation methodology software which is based on current scientific and engineering knowledge. There are uncertainties inherent in any loss estimation technique. Therefore, there may be significant differences between the modeled results contained in this report and the actual social and economic losses following a specific Hurricane. These results can be improved by using enhanced inventory data.

Hazus: Flood Global Risk Report

Region Name: SCRCOG_SLOSH_MOM_1

Flood Scenario: Category 1

Print Date: Wednesday, July 27, 2022

Disclaimer:
This version of Hazus utilizes 2010 Census Data.
Totals only reflect data for those census tracts/blocks included in the user's study region.

The estimates of social and economic impacts contained in this report were produced using Hazus loss estimation methodology software which is based on current scientific and engineering knowledge. There are uncertainties inherent in any loss estimation technique. Therefore, there may be significant differences between the modeled results contained in this report and the actual social and economic losses following a specific Flood. These results can be improved by using enhanced inventory data and flood hazard information.

FEMA

RiskMAP
Increasing Resilience Together

Table of Contents

General Description of the Region

Hazus is a regional multi-hazard loss estimation model that was developed by the Federal Emergency Management Agency (FEMA) and the National Institute of Building Sciences (NIBS). The primary purpose of Hazus is to provide a methodology and software application to develop multi-hazard losses at a regional scale. These loss estimates would be used primarily by local, state and regional officials to plan and stimulate efforts to reduce risks from multi-hazards and to prepare for emergency response and recovery.

The flood loss estimates provided in this report were based on a region that included 1 county(ies) from the following state(s):

- Connecticut

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

The geographical size of the region is approximately 376 square miles and contains 8,992 census blocks. The region contains over 223 thousand households and has a total population of 570,001 people (2010 Census Bureau data). The distribution of population by State and County for the study region is provided in Appendix B.

There are an estimated 183,793 buildings in the region with a total building replacement value (excluding contents) of 88,668 million dollars. Approximately 89.60% of the buildings (and 71.52% of the building value) are associated with residential housing.

Building Inventory

General Building Stock

Hazus estimates that there are 183,793 buildings in the region which have an aggregate total replacement value of 88,668 million dollars. Table 1 and Table 2 present the relative distribution of the value with respect to the general occupancies by Study Region and Scenario respectively. Appendix B provides a general distribution of the building value by State and County.

Table 1
Building Exposure by Occupancy Type for the Study Region

Occupancy	Exposure ($1000)	Percent of Total
Residential	63,417,388	71.5%
Commercial	16,156,577	18.2%
Industrial	4,143,620	4.7%
Agricultural	205,951	0.2%
Religion	1,095,314	1.2%
Government	381,243	0.4%
Education	3,268,112	3.7%
Total	**88,668,205**	**100%**

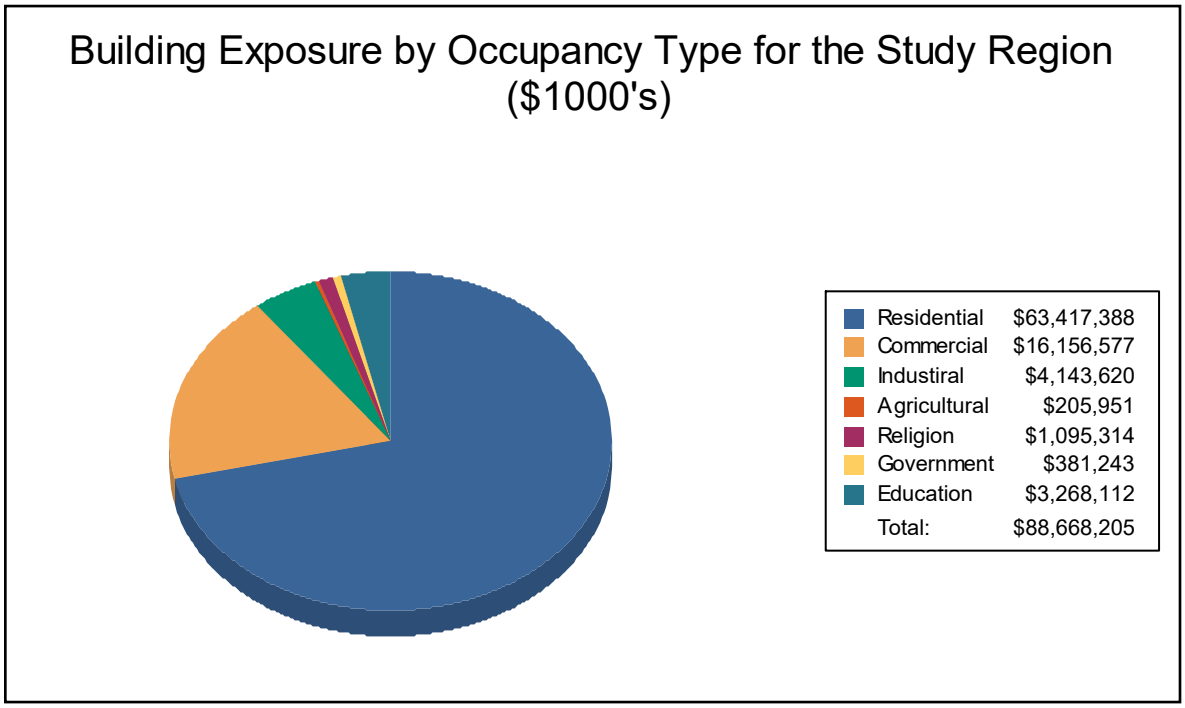
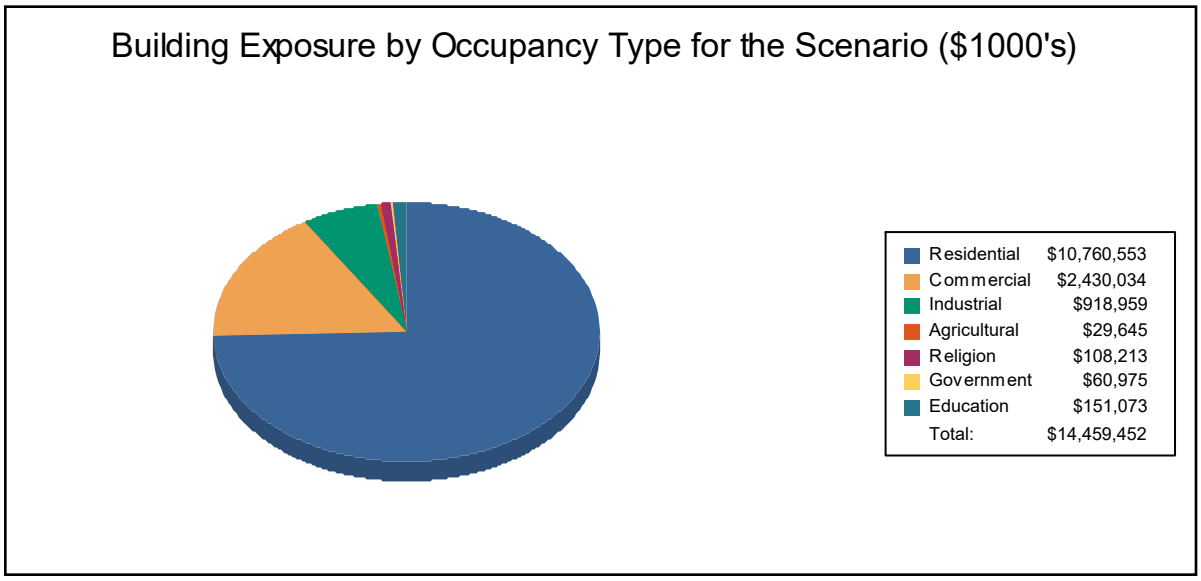


Table 2
Building Exposure by Occupancy Type for the Scenario

Occupancy	Exposure ($1000)	Percent of Total
Residential	10,760,553	74.4%
Commercial	2,430,034	16.8%
Industrial	918,959	6.4%
Agricultural	29,645	0.2%
Religion	108,213	0.7%
Government	60,975	0.4%
Education	151,073	1.0%
Total	**14,459,452**	**100%**



Essential Facility Inventory

For essential facilities, there are 9 hospitals in the region with a total bed capacity of 2,360 beds. There are 294 schools, 73 fire stations, 22 police stations and 15 emergency operation centers.

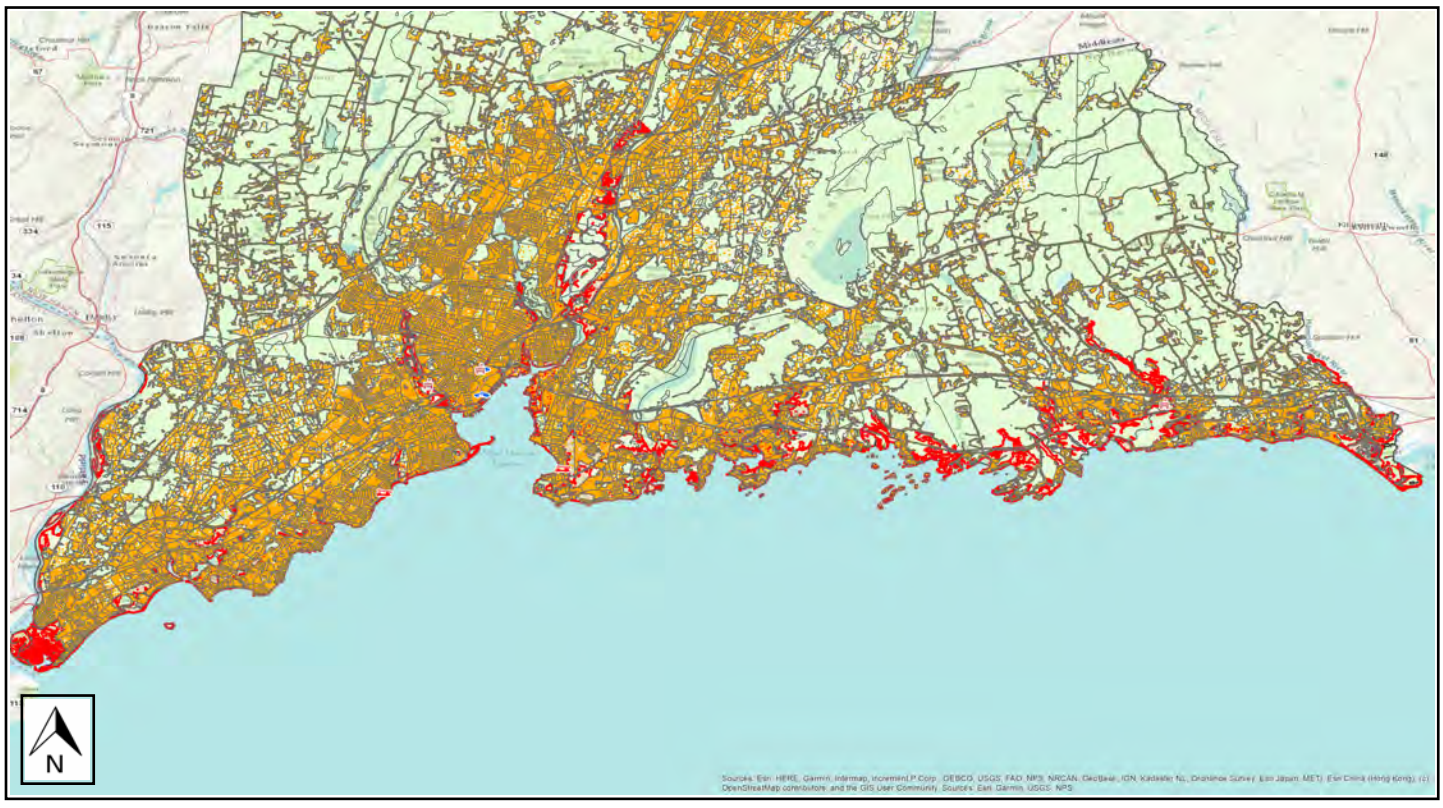
Flood Scenario Parameters

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

Study Region Name:	SCRCOG_SLOSH_MOM_1
Scenario Name:	Category 1
Return Period Analyzed:	NONE
Analysis Options Analyzed:	No What-Ifs

Study Region Overview Map

Illustrating scenario flood extent, as well as exposed essential facilities and total exposure



Building Damage

General Building Stock Damage

Hazus estimates that about 2,574 buildings will be at least moderately damaged. This is over 45% of the total number of buildings in the scenario. There are an estimated 271 buildings that will be completely destroyed. The definition of the 'damage states' is provided in the Hazus Flood Technical Manual. Table 3 below summarizes the expected damage by general occupancy for the buildings in the region. Table 4 summarizes the expected damage by general building type.

Total Economic Loss (1 dot = $300K) Overview Map

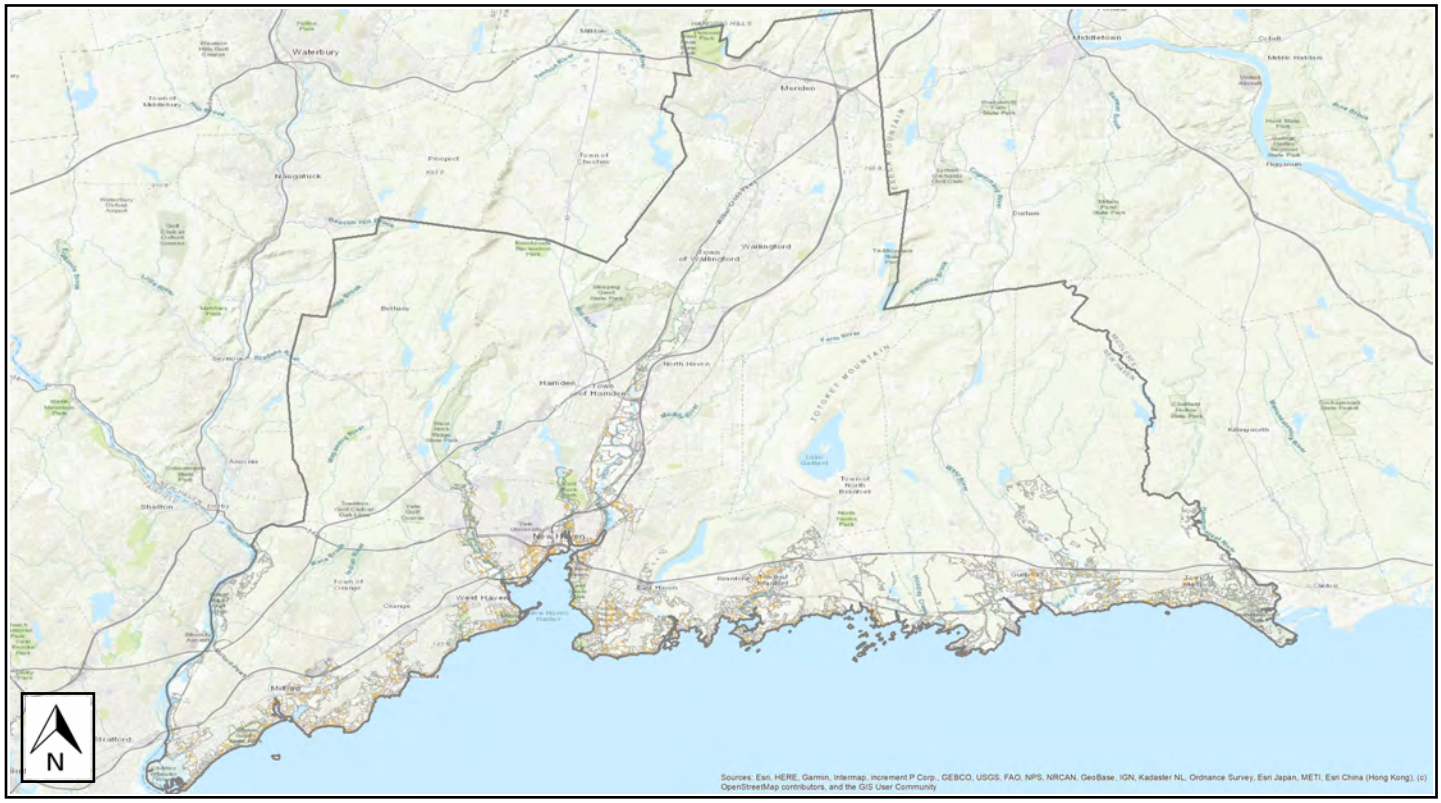


Table 3: Expected Building Damage by Occupancy

	1-10		11-20		21-30		31-40		41-50		>50	
Occupancy	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**
Agriculture	0	0	0	0	0	0	0	0	0	0	0	0
Commercial	3	14	17	81	1	5	0	0	0	0	0	0
Education	0	0	0	0	0	0	0	0	0	0	0	0
Government	0	0	1	100	0	0	0	0	0	0	0	0
Industrial	0	0	0	0	1	100	0	0	0	0	0	0
Religion	0	0	0	0	0	0	0	0	0	0	0	0
Residential	592	19	1,169	37	870	28	149	5	95	3	271	9
Total	**595**		**1,187**		**872**		**149**		**95**		**271**	

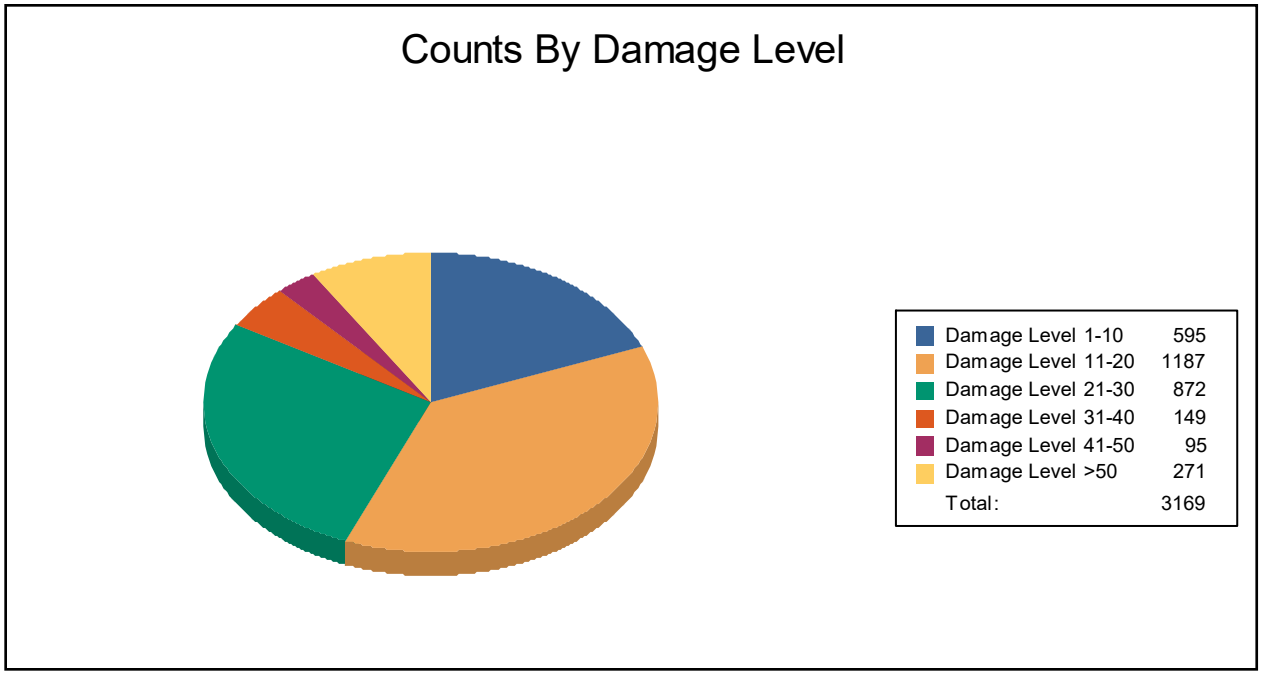


Table 4: Expected Building Damage by Building Type

Building Type	1-10		11-20		21-30		31-40		41-50		>50	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Concrete	0	0	1	100	0	0	0	0	0	0	0	0
ManufHousing	0	0	0	0	0	0	0	0	0	0	7	100
Masonry	3	5	35	63	15	27	1	2	0	0	2	4
Steel	3	23	9	69	1	8	0	0	0	0	0	0
Wood	589	19	1,134	37	854	28	148	5	95	3	262	9

Essential Facility Damage

Before the flood analyzed in this scenario, the region had 2,360 hospital beds available for use. On the day of the scenario flood event, the model estimates that 2,360 hospital beds are available in the region.

Table 5: Expected Damage to Essential Facilities

		# Facilities		
Classification	Total	At Least Moderate	At Least Substantial	Loss of Use
Emergency Operation Centers	15	0	0	0
Fire Stations	73	2	0	2
Hospitals	9	1	0	0
Police Stations	22	2	0	2
Schools	294	3	0	3

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

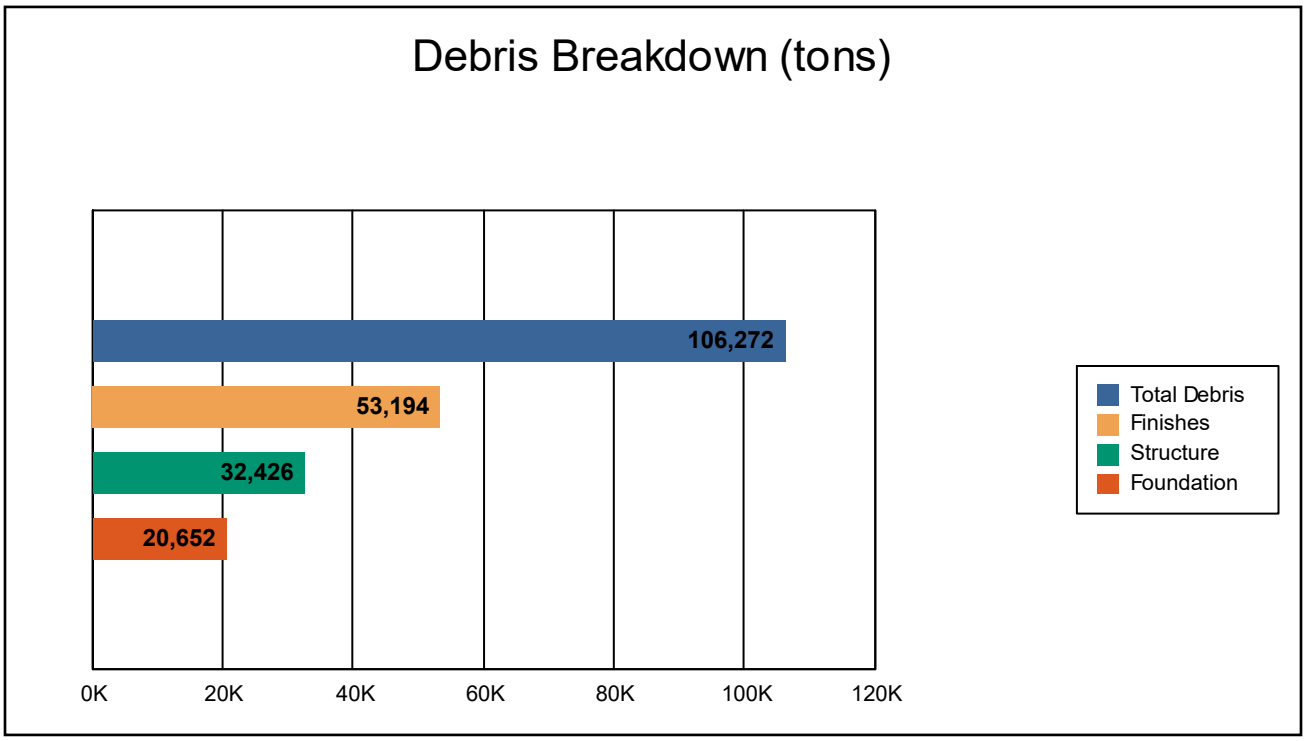
(1) None of your facilities were flooded. This can be checked by mapping the inventory data on the depth grid.

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

Induced Flood Damage

Debris Generation

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

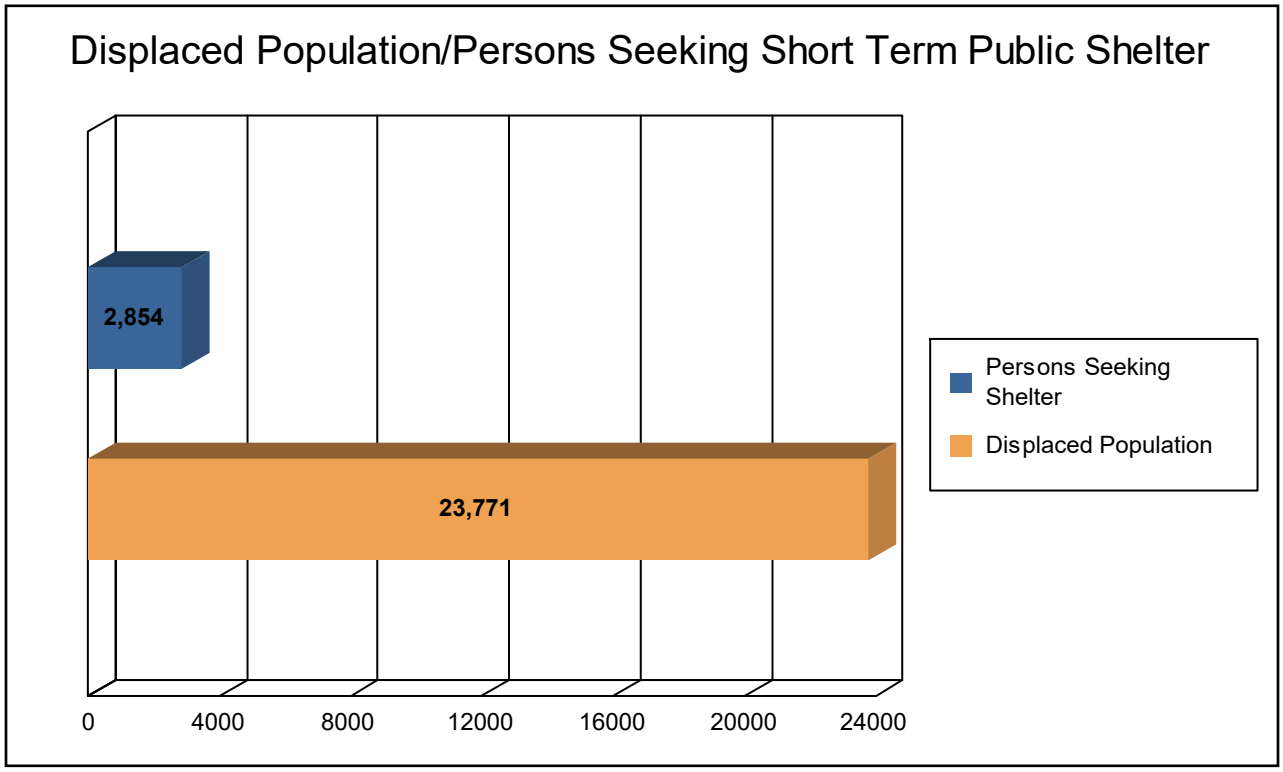


The model estimates that a total of 106,272 tons of debris will be generated. Of the total amount, Finishes comprises 50% of the total, Structure comprises 31% of the total, and Foundation comprises 19%. If the debris tonnage is converted into an estimated number of truckloads, it will require 4251 truckloads (@25 tons/truck) to remove the debris generated by the flood.

Social Impact

Shelter Requirements

Hazus estimates the number of households that are expected to be displaced from their homes due to the flood and the associated potential evacuation. Hazus also estimates those displaced people that will require accommodations in temporary public shelters. The model estimates 7,924 households (or 23,771 of people) will be displaced due to the flood. Displacement includes households evacuated from within or very near to the inundated area. Of these, 2,854 people (out of a total population of 570,001) will seek temporary shelter in public shelters.



Economic Loss

The total economic loss estimated for the flood is 2,617.97 million dollars, which represents 18.11 % of the total replacement value of the scenario buildings.

Building-Related Losses

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

The total building-related losses were 1,606.15 million dollars. 39% of the estimated losses were related to the business interruption of the region. The residential occupancies made up 46.45% of the total loss. Table 6 below provides a summary of the losses associated with the building damage.

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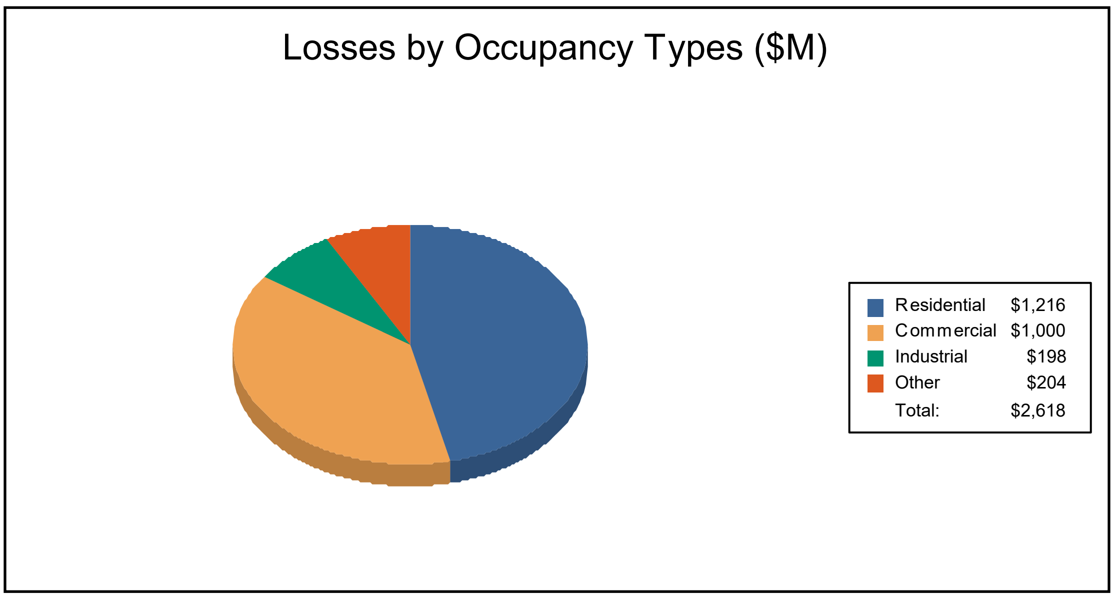
Table 6: Building-Related Economic Loss Estimates

(Millions of dollars)

Category	Area	Residential	Commercial	Industrial	Others	Total
Building Loss						
	Building	530.05	98.68	48.75	8.29	685.77
	Content	460.23	273.54	115.96	50.61	900.35
	Inventory	0.00	5.05	14.64	0.35	20.04
	Subtotal	**990.29**	**377.27**	**179.35**	**59.25**	**1,606.15**
Business Interruption						
	Income	2.64	253.97	4.93	19.86	281.40
	Relocation	148.14	70.74	5.20	10.05	234.12
	Rental Income	68.63	52.35	1.18	1.26	123.41
	Wage	6.25	245.72	7.17	113.74	372.88
	Subtotal	**225.66**	**622.76**	**18.48**	**144.90**	**1,011.81**
ALL	**Total**	**1,215.95**	**1,000.03**	**197.84**	**204.15**	**2,617.97**



Appendix A: County Listing for the Region

Connecticut

- New Haven

Appendix B: Regional Population and Building Value Data

	Population	Building Value (thousands of dollars)		
		Residential	Non-Residential	Total
Connecticut				
New Haven	570,001	63,417,388	25,250,817	88,668,205
Total	**570,001**	**63,417,388**	**25,250,817**	**88,668,205**
Total Study Region	**570,001**	**63,417,388**	**25,250,817**	**88,668,205**

Hazus: Flood Global Risk Report

Region Name: SCRCOG_SLOSH_MOM_2

Flood Scenario: Category 2

Print Date: Wednesday, July 27, 2022

Disclaimer:
This version of Hazus utilizes 2010 Census Data.
Totals only reflect data for those census tracts/blocks included in the user's study region.

The estimates of social and economic impacts contained in this report were produced using Hazus loss estimation methodology software which is based on current scientific and engineering knowledge. There are uncertainties inherent in any loss estimation technique. Therefore, there may be significant differences between the modeled results contained in this report and the actual social and economic losses following a specific Flood. These results can be improved by using enhanced inventory data and flood hazard information.

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Table of Contents

General Description of the Region

Hazus is a regional multi-hazard loss estimation model that was developed by the Federal Emergency Management Agency (FEMA) and the National Institute of Building Sciences (NIBS). The primary purpose of Hazus is to provide a methodology and software application to develop multi-hazard losses at a regional scale. These loss estimates would be used primarily by local, state and regional officials to plan and stimulate efforts to reduce risks from multi-hazards and to prepare for emergency response and recovery.

The flood loss estimates provided in this report were based on a region that included 1 county(ies) from the following state(s):

- Connecticut

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

The geographical size of the region is approximately 376 square miles and contains 8,992 census blocks. The region contains over 223 thousand households and has a total population of 570,001 people (2010 Census Bureau data). The distribution of population by State and County for the study region is provided in Appendix B.

There are an estimated 183,793 buildings in the region with a total building replacement value (excluding contents) of 88,668 million dollars. Approximately 89.60% of the buildings (and 71.52% of the building value) are associated with residential housing.

Building Inventory

General Building Stock

Hazus estimates that there are 183,793 buildings in the region which have an aggregate total replacement value of 88,668 million dollars. Table 1 and Table 2 present the relative distribution of the value with respect to the general occupancies by Study Region and Scenario respectively. Appendix B provides a general distribution of the building value by State and County.

Table 1
Building Exposure by Occupancy Type for the Study Region

Occupancy	Exposure ($1000)	Percent of Total
Residential	63,417,388	71.5%
Commercial	16,156,577	18.2%
Industrial	4,143,620	4.7%
Agricultural	205,951	0.2%
Religion	1,095,314	1.2%
Government	381,243	0.4%
Education	3,268,112	3.7%
Total	**88,668,205**	**100%**

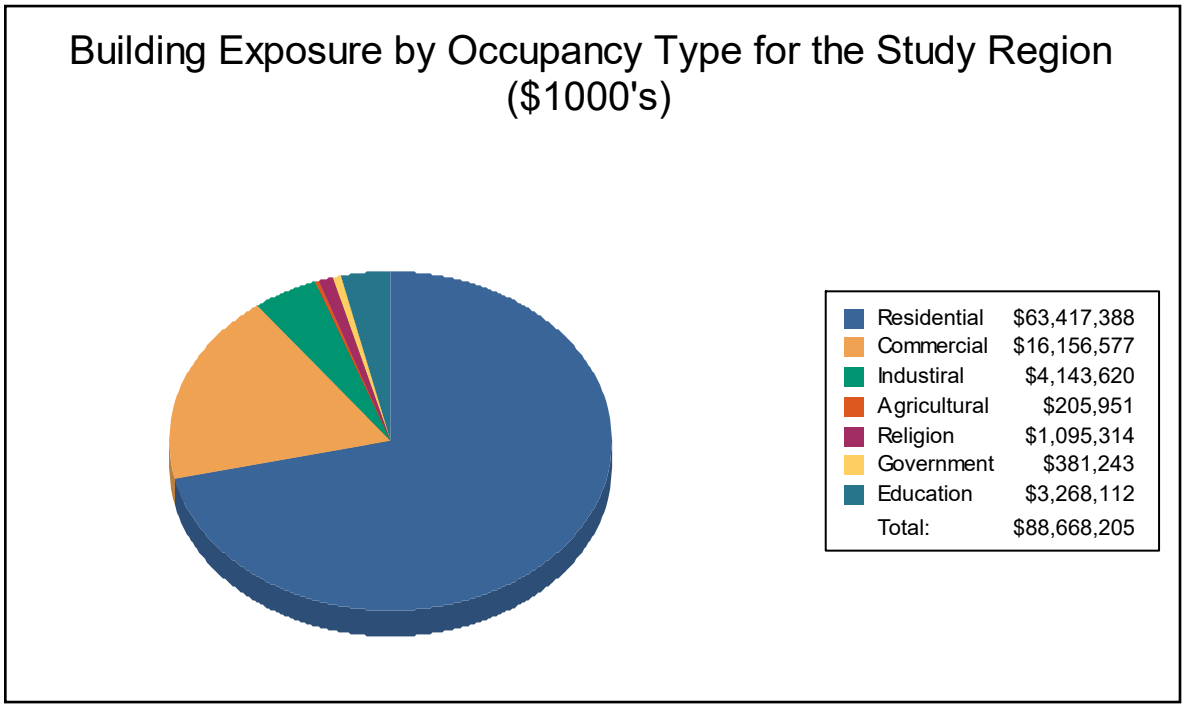
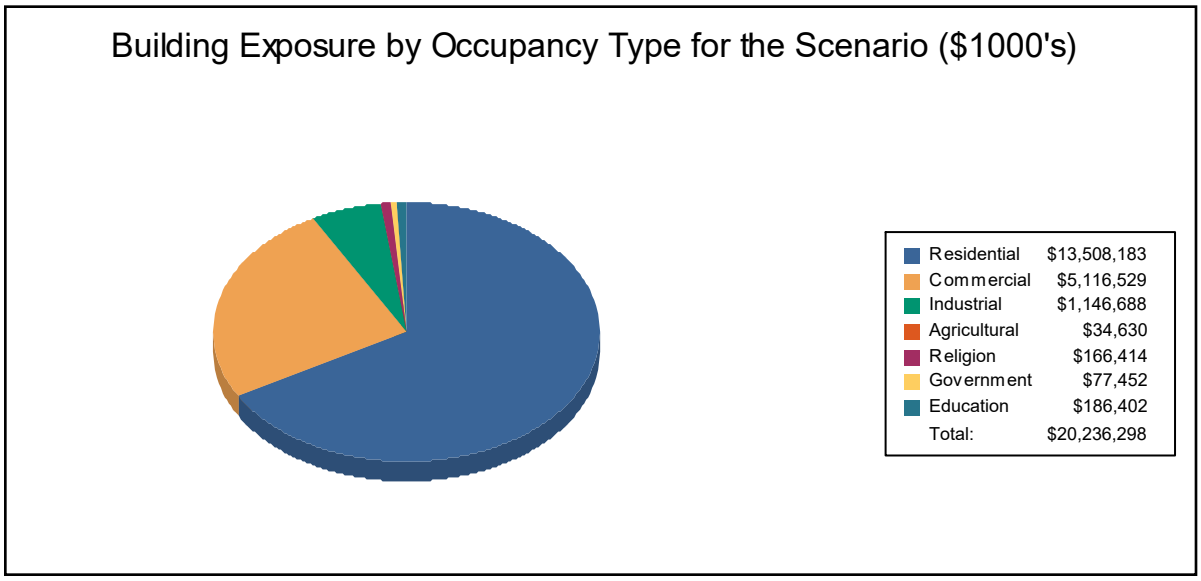


Table 2
Building Exposure by Occupancy Type for the Scenario

Occupancy	Exposure ($1000)	Percent of Total
Residential	13,508,183	66.8%
Commercial	5,116,529	25.3%
Industrial	1,146,688	5.7%
Agricultural	34,630	0.2%
Religion	166,414	0.8%
Government	77,452	0.4%
Education	186,402	0.9%
Total	**20,236,298**	**100%**



Essential Facility Inventory

For essential facilities, there are 9 hospitals in the region with a total bed capacity of 2,360 beds. There are 294 schools, 73 fire stations, 22 police stations and 15 emergency operation centers.

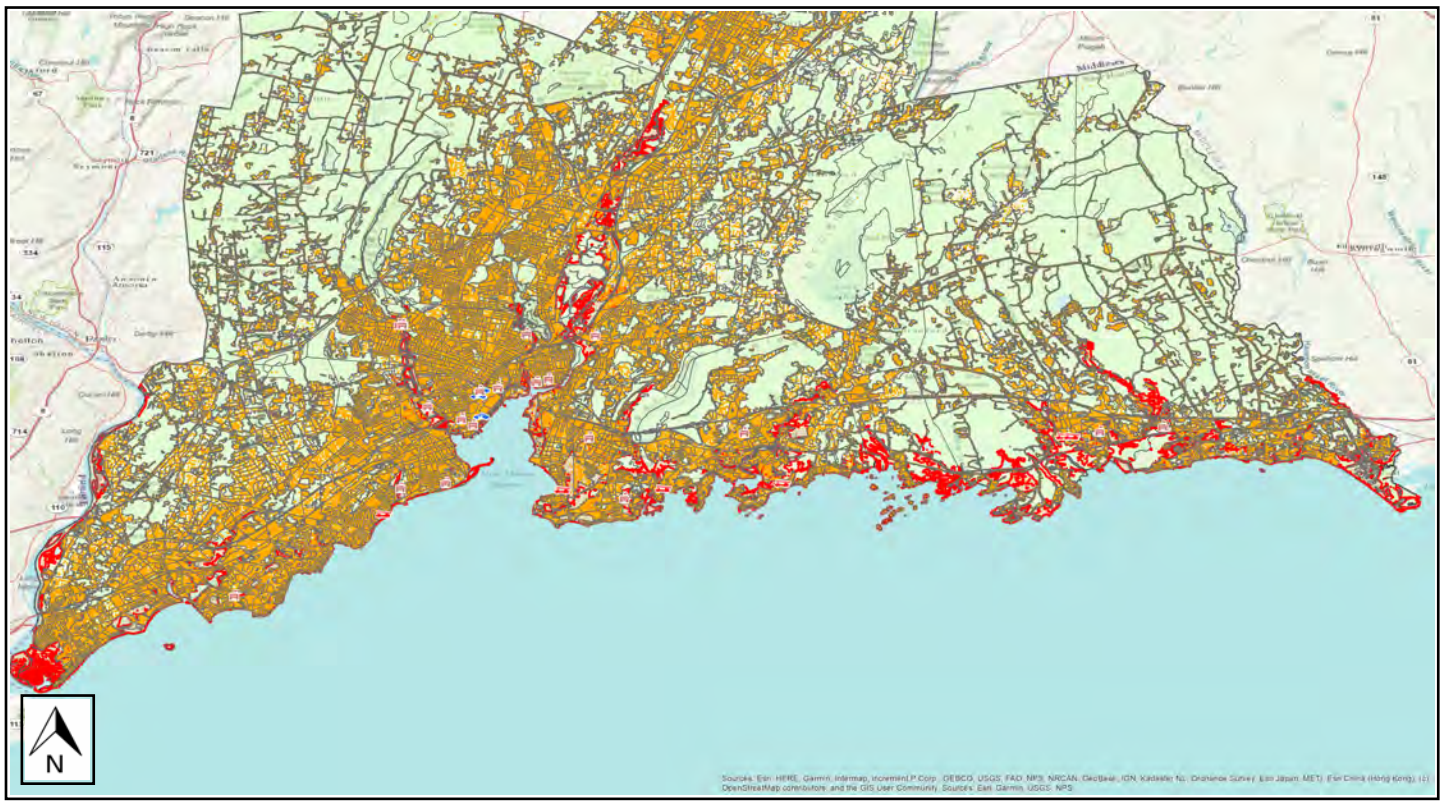
Flood Scenario Parameters

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

Study Region Name:	SCRCOG_SLOSH_MOM_2
Scenario Name:	Category 2
Return Period Analyzed:	NONE
Analysis Options Analyzed:	No What-Ifs

Study Region Overview Map

Illustrating scenario flood extent, as well as exposed essential facilities and total exposure



Building Damage

General Building Stock Damage

Hazus estimates that about 6,682 buildings will be at least moderately damaged. This is over 50% of the total number of buildings in the scenario. There are an estimated 1,205 buildings that will be completely destroyed. The definition of the 'damage states' is provided in the Hazus Flood Technical Manual. Table 3 below summarizes the expected damage by general occupancy for the buildings in the region. Table 4 summarizes the expected damage by general building type.

Total Economic Loss (1 dot = $300K) Overview Map

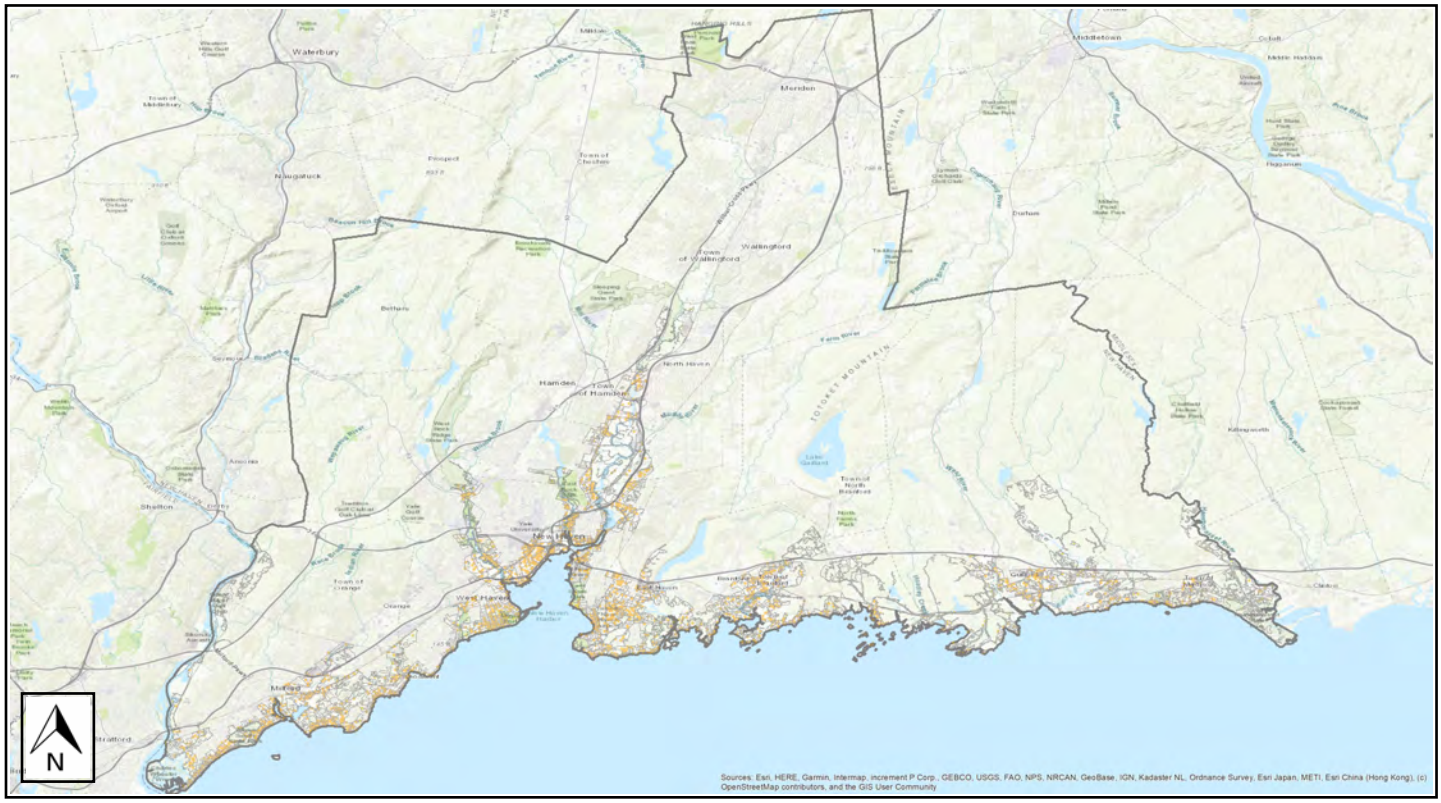


Table 3: Expected Building Damage by Occupancy

	1-10		11-20		21-30		31-40		41-50		>50	
Occupancy	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**
Agriculture	0	0	0	0	0	0	0	0	0	0	0	0
Commercial	7	8	64	76	11	13	2	2	0	0	0	0
Education	0	0	0	0	0	0	0	0	0	0	0	0
Government	1	33	2	67	0	0	0	0	0	0	0	0
Industrial	1	20	2	40	1	20	1	20	0	0	0	0
Religion	0	0	0	0	0	0	0	0	0	0	0	0
Residential	695	10	1,856	25	2,315	32	766	11	457	6	1,205	17
Total	**704**		**1,924**		**2,327**		**769**		**457**		**1,205**	

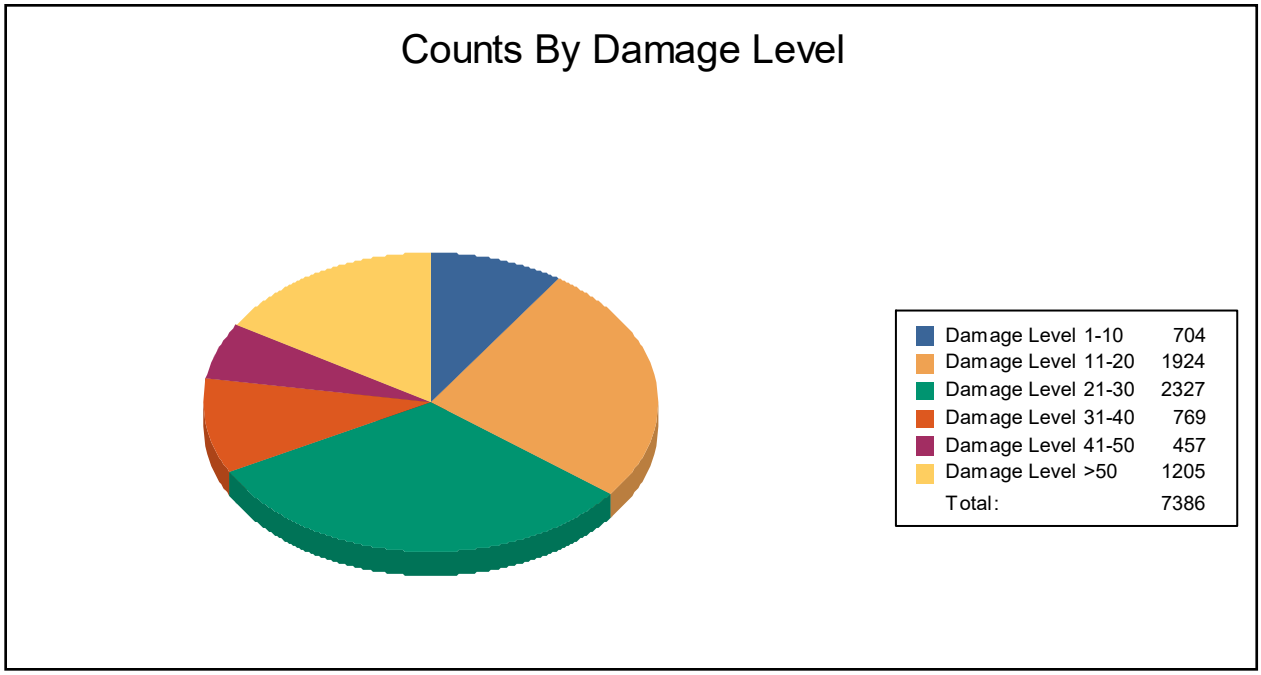


Table 4: Expected Building Damage by Building Type

Building Type	1-10		11-20		21-30		31-40		41-50		>50	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Concrete	0	0	2	100	0	0	0	0	0	0	0	0
ManufHousing	0	0	0	0	0	0	0	0	0	0	23	100
Masonry	2	1	80	42	64	33	17	9	13	7	16	8
Steel	7	13	42	76	5	9	1	2	0	0	0	0
Wood	694	10	1,786	25	2,250	32	748	11	443	6	1,164	16

Essential Facility Damage

Before the flood analyzed in this scenario, the region had 2,360 hospital beds available for use. On the day of the scenario flood event, the model estimates that 2,360 hospital beds are available in the region.

Table 5: Expected Damage to Essential Facilities

		# Facilities		
Classification	Total	At Least Moderate	At Least Substantial	Loss of Use
Emergency Operation Centers	15	0	0	0
Fire Stations	73	6	0	6
Hospitals	9	1	0	1
Police Stations	22	3	0	3
Schools	294	20	0	20

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

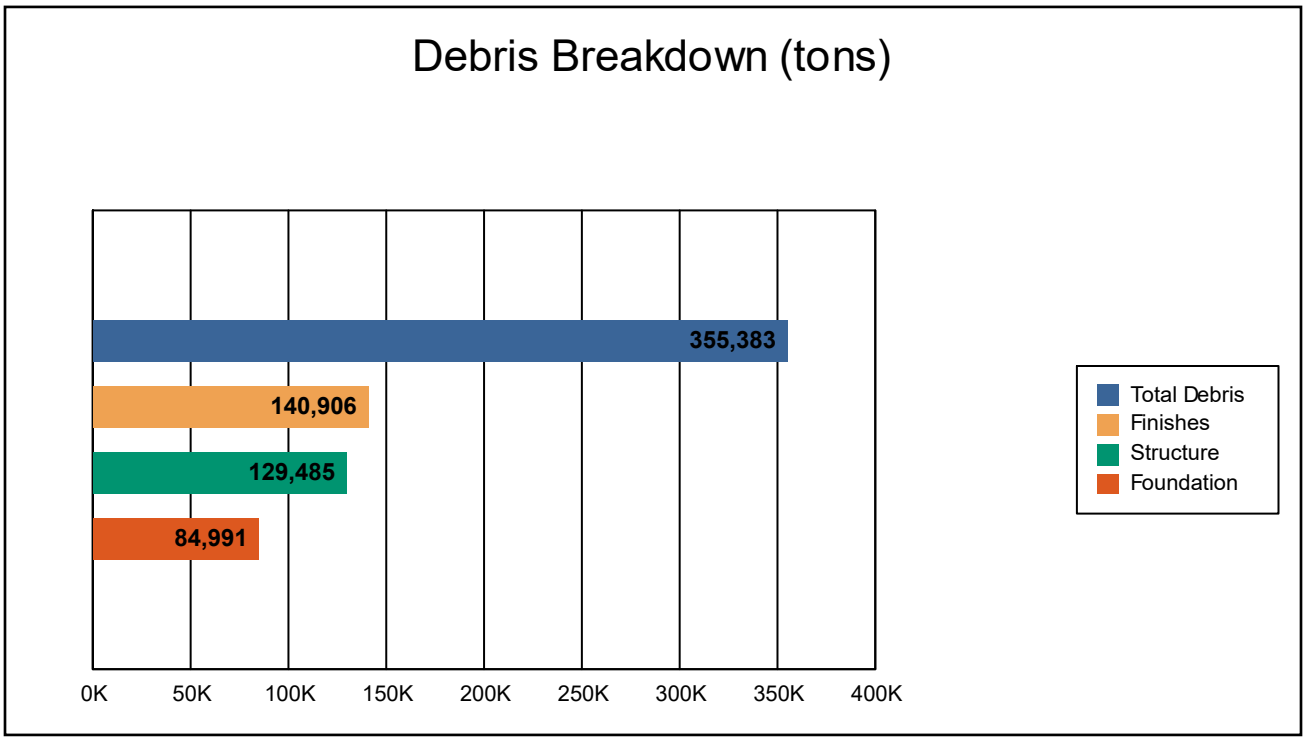
(1) None of your facilities were flooded. This can be checked by mapping the inventory data on the depth grid.

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

Induced Flood Damage

Debris Generation

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

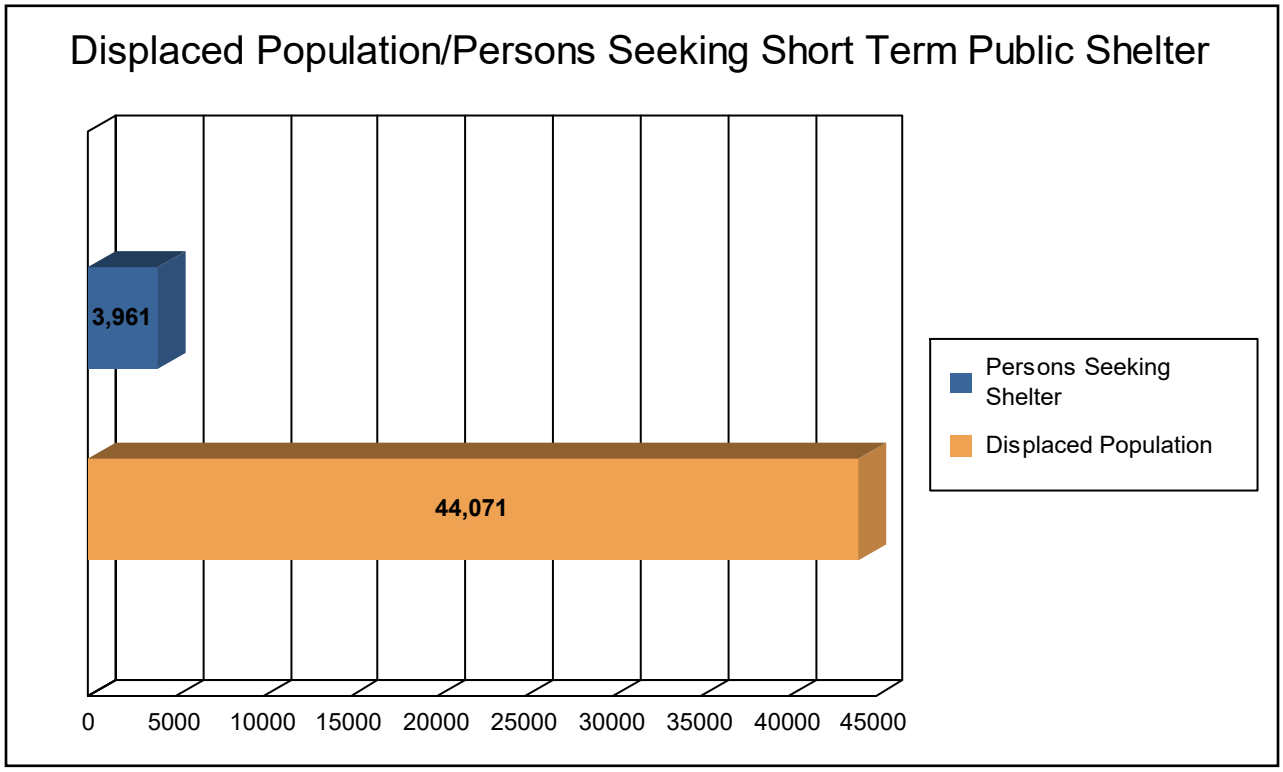


The model estimates that a total of 355,383 tons of debris will be generated. Of the total amount, Finishes comprises 40% of the total, Structure comprises 36% of the total, and Foundation comprises 24%. If the debris tonnage is converted into an estimated number of truckloads, it will require 14216 truckloads (@25 tons/truck) to remove the debris generated by the flood.

Social Impact

Shelter Requirements

Hazus estimates the number of households that are expected to be displaced from their homes due to the flood and the associated potential evacuation. Hazus also estimates those displaced people that will require accommodations in temporary public shelters. The model estimates 14,690 households (or 44,071 of people) will be displaced due to the flood. Displacement includes households evacuated from within or very near to the inundated area. Of these, 3,961 people (out of a total population of 570,001) will seek temporary shelter in public shelters.



Economic Loss

The total economic loss estimated for the flood is 6,493.58 million dollars, which represents 32.09 % of the total replacement value of the scenario buildings.

Building-Related Losses

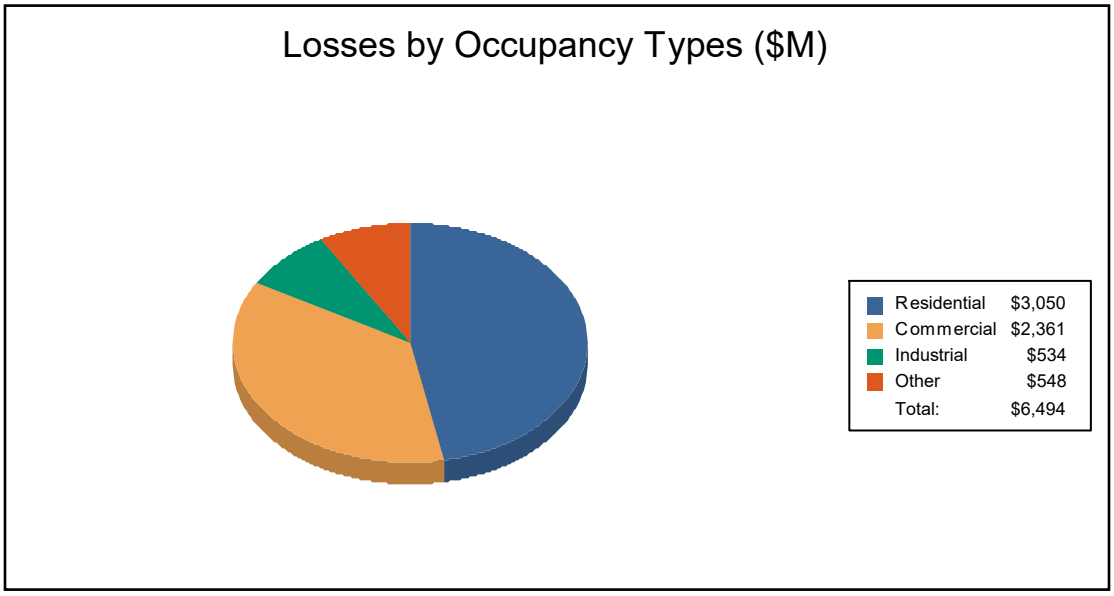
The building losses are broken into two categories: direct building losses and business interruption losses. The direct building losses are the estimated costs to repair or replace the damage caused to the building and its contents. The business interruption losses are the losses associated with inability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

The total building-related losses were 4,358.34 million dollars. 33% of the estimated losses were related to the business interruption of the region. The residential occupancies made up 46.97% of the total loss. Table 6 below provides a summary of the losses associated with the building damage.

Table 6: Building-Related Economic Loss Estimates

(Millions of dollars)

Category	Area	Residential	Commercial	Industrial	Others	Total
Building Loss						
	Building	1,430.38	307.17	136.36	25.18	1,899.08
	Content	1,179.47	762.72	324.25	136.27	2,402.71
	Inventory	0.00	14.23	41.35	0.98	56.55
	Subtotal	**2,609.84**	**1,084.12**	**501.95**	**162.43**	**4,358.34**
Business Interruption						
	Income	4.58	528.83	8.68	40.47	582.55
	Relocation	284.82	146.36	9.02	21.70	461.89
	Rental Income	140.24	109.38	2.07	2.78	254.46
	Wage	10.81	491.92	12.54	321.06	836.33
	Subtotal	**440.44**	**1,276.49**	**32.31**	**386.01**	**2,135.24**
ALL	**Total**	**3,050.28**	**2,360.61**	**534.26**	**548.43**	**6,493.58**



Appendix A: County Listing for the Region

Connecticut

- New Haven

Appendix B: Regional Population and Building Value Data

	Population	Building Value (thousands of dollars)		
		Residential	Non-Residential	Total
Connecticut				
New Haven	570,001	63,417,388	25,250,817	88,668,205
Total	**570,001**	**63,417,388**	**25,250,817**	**88,668,205**
Total Study Region	**570,001**	**63,417,388**	**25,250,817**	**88,668,205**

Hazus: Flood Global Risk Report

Region Name: SCRCOG_SLOSH_MOM_3

Flood Scenario: Category 3

Print Date: Wednesday, July 27, 2022

Disclaimer:
This version of Hazus utilizes 2010 Census Data.
Totals only reflect data for those census tracts/blocks included in the user's study region.

The estimates of social and economic impacts contained in this report were produced using Hazus loss estimation methodology software which is based on current scientific and engineering knowledge. There are uncertainties inherent in any loss estimation technique. Therefore, there may be significant differences between the modeled results contained in this report and the actual social and economic losses following a specific Flood. These results can be improved by using enhanced inventory data and flood hazard information.

FEMA

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Table of Contents

General Description of the Region

Hazus is a regional multi-hazard loss estimation model that was developed by the Federal Emergency Management Agency (FEMA) and the National Institute of Building Sciences (NIBS). The primary purpose of Hazus is to provide a methodology and software application to develop multi-hazard losses at a regional scale. These loss estimates would be used primarily by local, state and regional officials to plan and stimulate efforts to reduce risks from multi-hazards and to prepare for emergency response and recovery.

The flood loss estimates provided in this report were based on a region that included 1 county(ies) from the following state(s):

- Connecticut

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

The geographical size of the region is approximately 376 square miles and contains 8,992 census blocks. The region contains over 223 thousand households and has a total population of 570,001 people (2010 Census Bureau data). The distribution of population by State and County for the study region is provided in Appendix B.

There are an estimated 183,793 buildings in the region with a total building replacement value (excluding contents) of 88,668 million dollars. Approximately 89.60% of the buildings (and 71.52% of the building value) are associated with residential housing.

Building Inventory

General Building Stock

Hazus estimates that there are 183,793 buildings in the region which have an aggregate total replacement value of 88,668 million dollars. Table 1 and Table 2 present the relative distribution of the value with respect to the general occupancies by Study Region and Scenario respectively. Appendix B provides a general distribution of the building value by State and County.

Table 1
Building Exposure by Occupancy Type for the Study Region

Occupancy	Exposure ($1000)	Percent of Total
Residential	63,417,388	71.5%
Commercial	16,156,577	18.2%
Industrial	4,143,620	4.7%
Agricultural	205,951	0.2%
Religion	1,095,314	1.2%
Government	381,243	0.4%
Education	3,268,112	3.7%
Total	**88,668,205**	**100%**

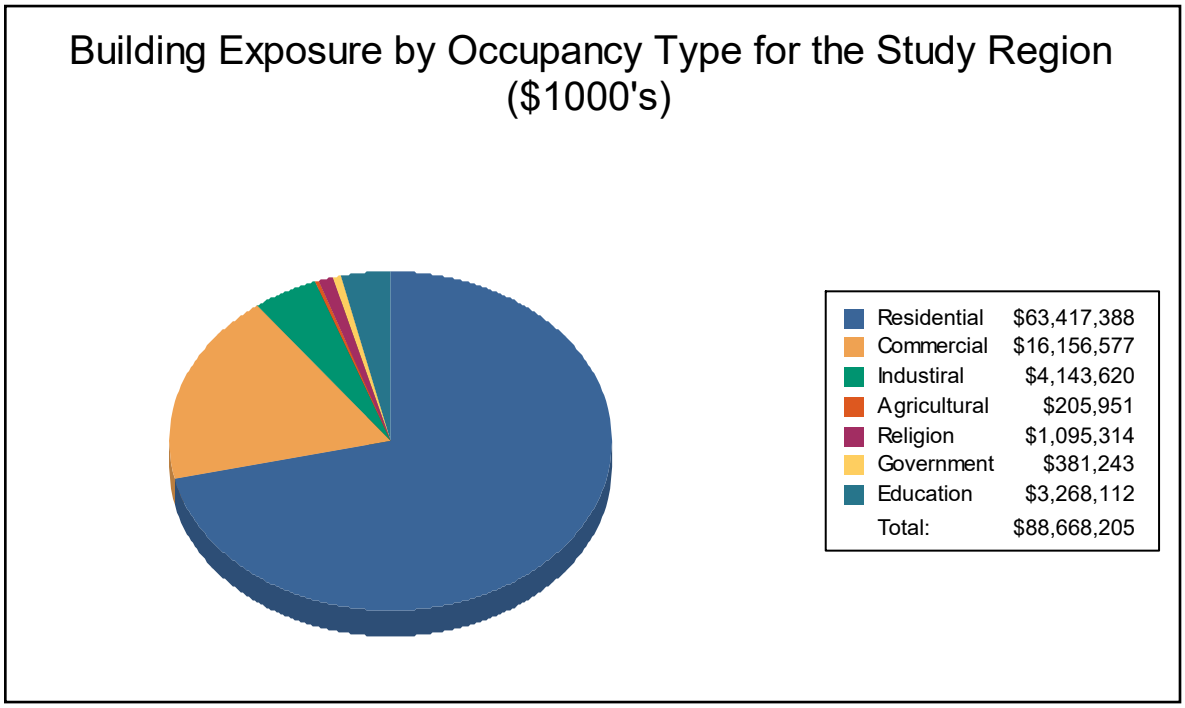
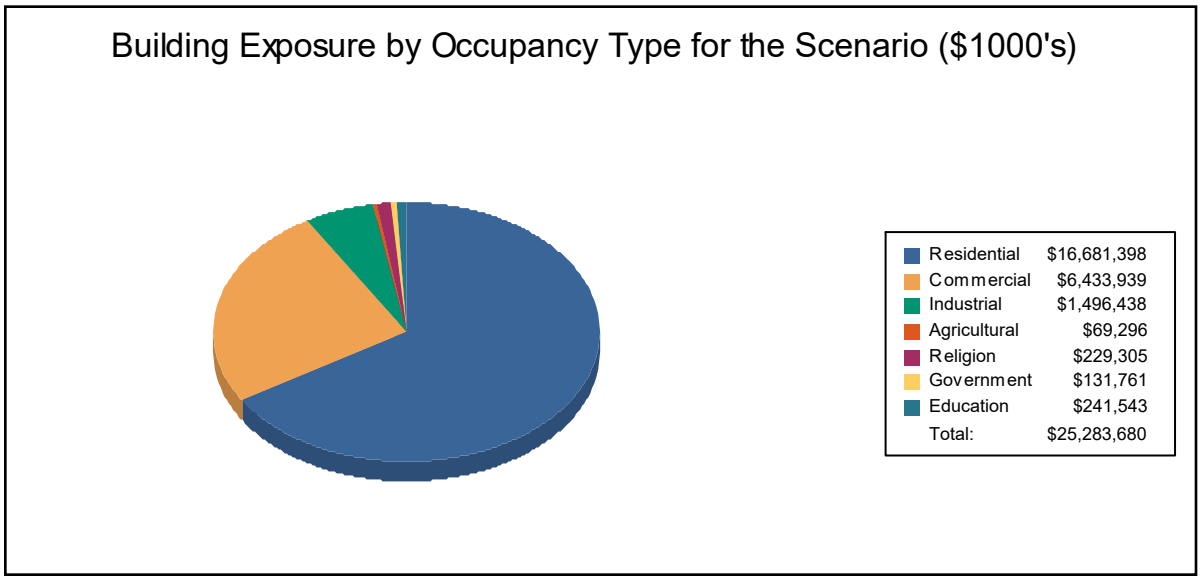


Table 2
Building Exposure by Occupancy Type for the Scenario

Occupancy	Exposure ($1000)	Percent of Total
Residential	16,681,398	66.0%
Commercial	6,433,939	25.4%
Industrial	1,496,438	5.9%
Agricultural	69,296	0.3%
Religion	229,305	0.9%
Government	131,761	0.5%
Education	241,543	1.0%
Total	**25,283,680**	**100%**



Essential Facility Inventory

For essential facilities, there are 9 hospitals in the region with a total bed capacity of 2,360 beds. There are 294 schools, 73 fire stations, 22 police stations and 15 emergency operation centers.

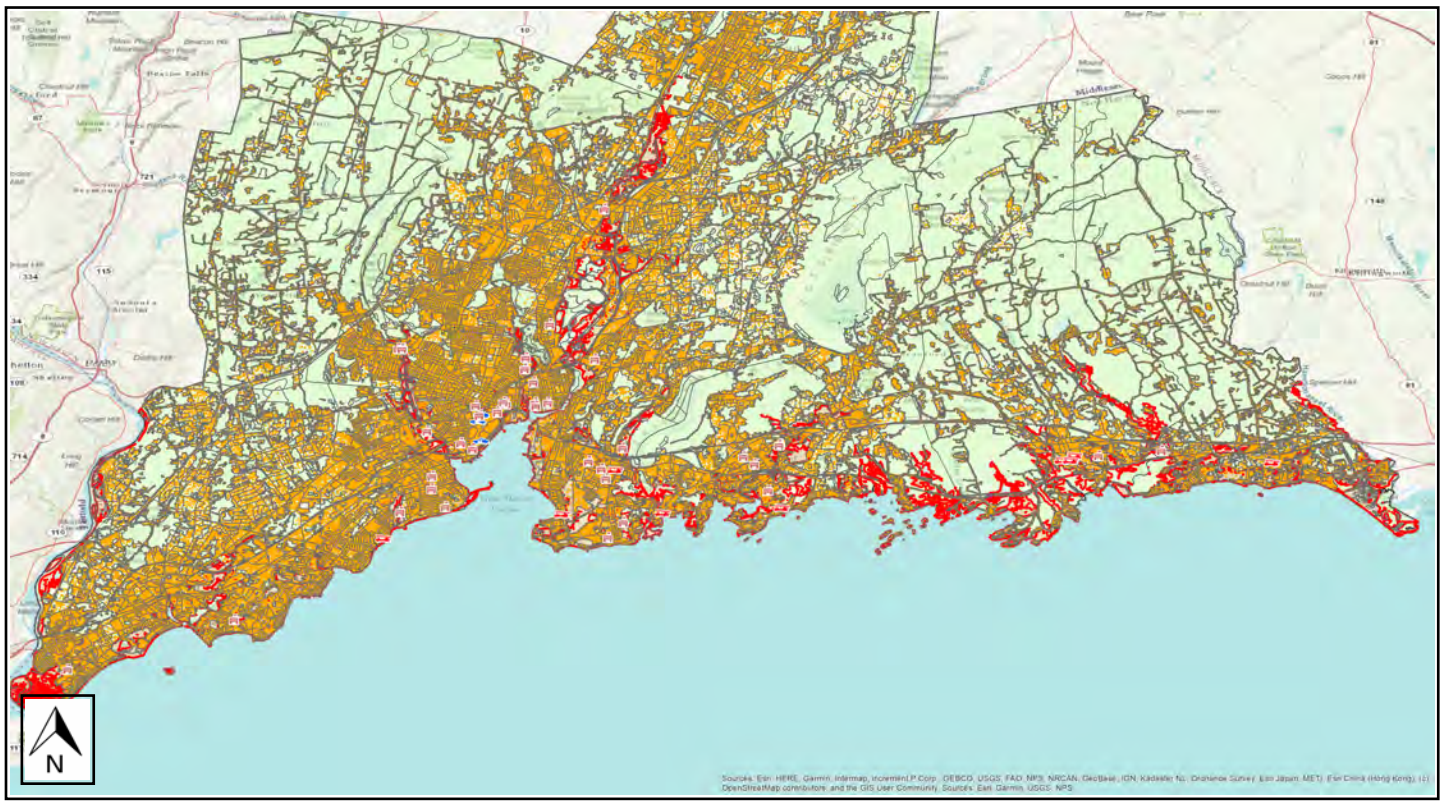
Flood Scenario Parameters

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

Study Region Name:	SCRCOG_SLOSH_MOM_3
Scenario Name:	Category 3
Return Period Analyzed:	NONE
Analysis Options Analyzed:	No What-Ifs

Study Region Overview Map

Illustrating scenario flood extent, as well as exposed essential facilities and total exposure



Building Damage

General Building Stock Damage

Hazus estimates that about 12,144 buildings will be at least moderately damaged. This is over 38% of the total number of buildings in the scenario. There are an estimated 3,299 buildings that will be completely destroyed. The definition of the 'damage states' is provided in the Hazus Flood Technical Manual. Table 3 below summarizes the expected damage by general occupancy for the buildings in the region. Table 4 summarizes the expected damage by general building type.

Total Economic Loss (1 dot = $300K) Overview Map

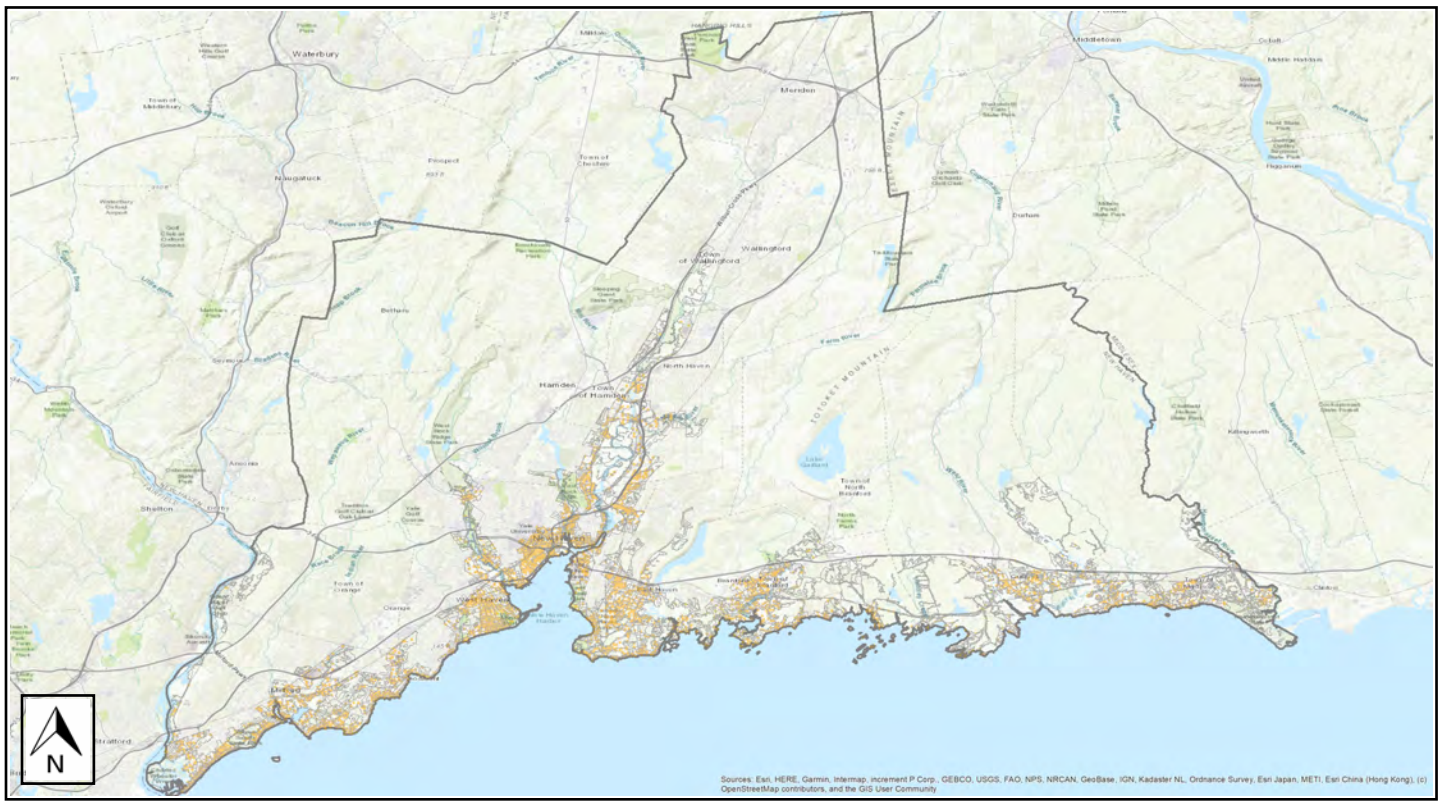


Table 3: Expected Building Damage by Occupancy

	1-10		11-20		21-30		31-40		41-50		>50	
Occupancy	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**
Agriculture	0	0	0	0	0	0	0	0	0	0	0	0
Commercial	2	1	100	48	59	29	24	12	19	9	3	1
Education	1	100	0	0	0	0	0	0	0	0	0	0
Government	2	25	4	50	1	13	0	0	0	0	1	13
Industrial	0	0	0	0	5	26	3	16	6	32	5	26
Religion	0	0	0	0	0	0	0	0	0	0	0	0
Residential	479	4	1,920	15	3,191	26	1,753	14	1,760	14	3,290	27
Total	**484**		**2,024**		**3,256**		**1,780**		**1,785**		**3,299**	

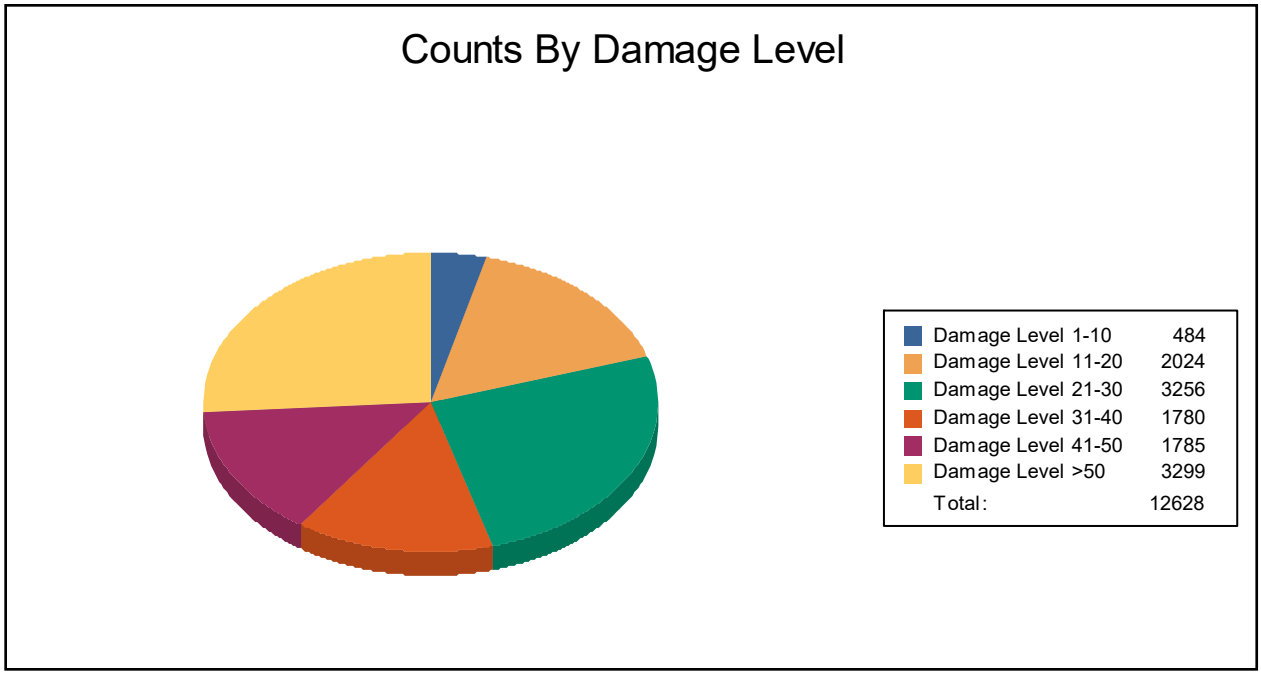


Table 4: Expected Building Damage by Building Type

Building Type	1-10		11-20		21-30		31-40		41-50		>50	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Concrete	0	0	3	30	4	40	1	10	1	10	1	10
ManufHousing	0	0	0	0	0	0	0	0	0	0	48	100
Masonry	1	0	99	22	112	25	52	12	93	21	94	21
Steel	3	2	59	47	31	25	12	10	12	10	8	6
Wood	478	4	1,839	15	3,100	26	1,710	14	1,663	14	3,137	26

Essential Facility Damage

Before the flood analyzed in this scenario, the region had 2,360 hospital beds available for use. On the day of the scenario flood event, the model estimates that 2,360 hospital beds are available in the region.

Table 5: Expected Damage to Essential Facilities

		# Facilities		
Classification	Total	At Least Moderate	At Least Substantial	Loss of Use
Emergency Operation Centers	15	1	0	1
Fire Stations	73	8	1	9
Hospitals	9	1	0	1
Police Stations	22	2	1	3
Schools	294	42	0	42

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

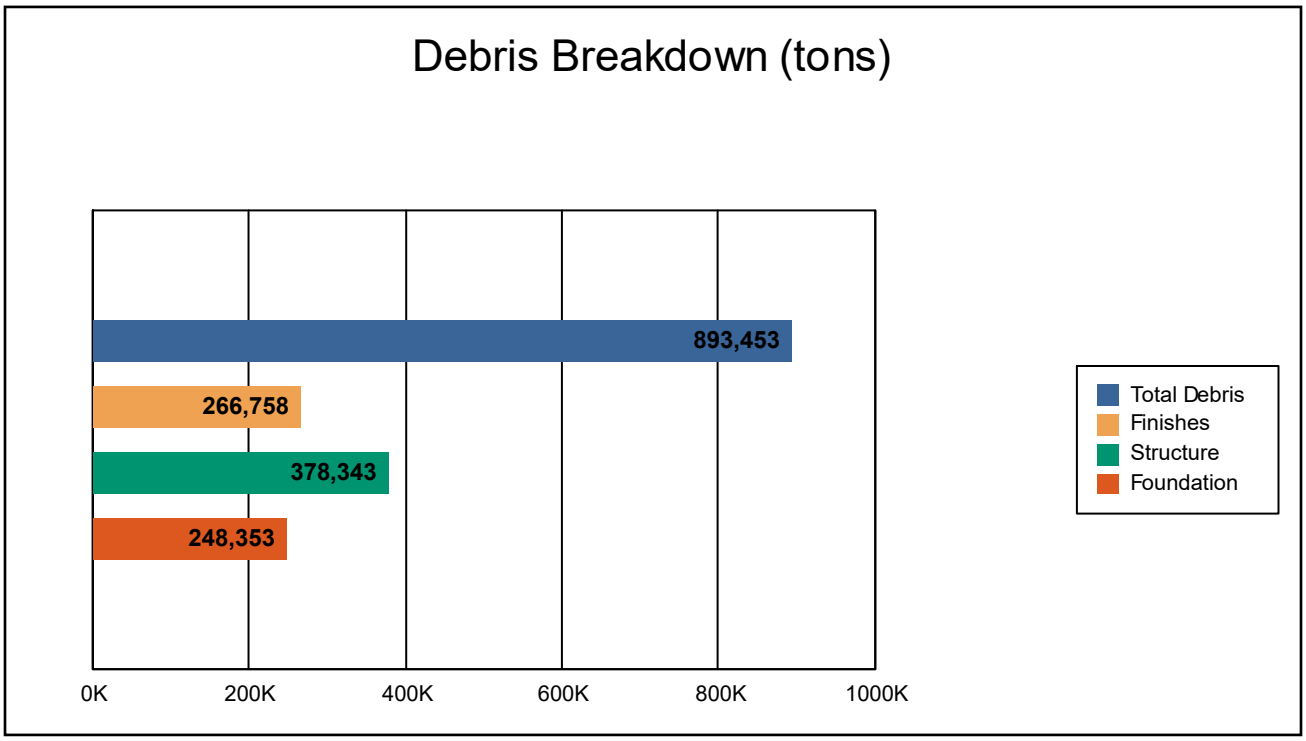
(1) None of your facilities were flooded. This can be checked by mapping the inventory data on the depth grid.

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

Induced Flood Damage

Debris Generation

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

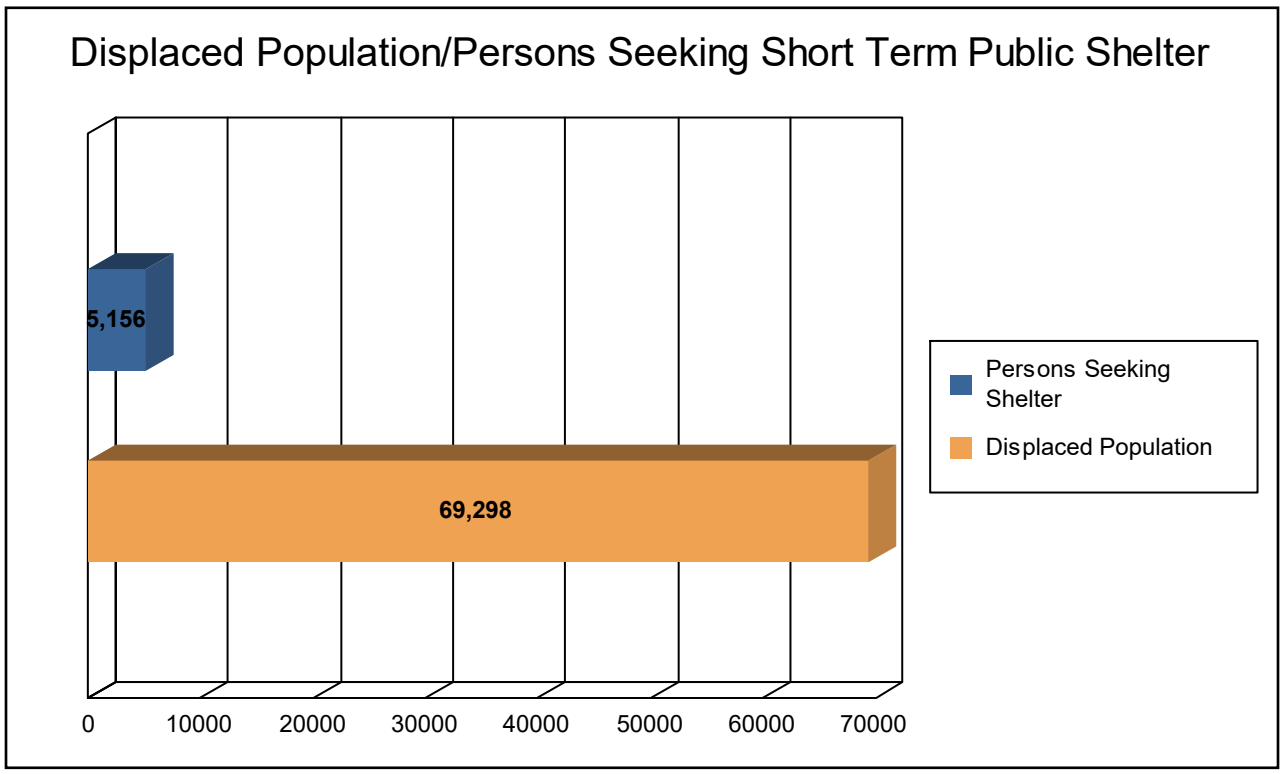


The model estimates that a total of 893,453 tons of debris will be generated. Of the total amount, Finishes comprises 30% of the total, Structure comprises 42% of the total, and Foundation comprises 28%. If the debris tonnage is converted into an estimated number of truckloads, it will require 35739 truckloads (@25 tons/truck) to remove the debris generated by the flood.

Social Impact

Shelter Requirements

Hazus estimates the number of households that are expected to be displaced from their homes due to the flood and the associated potential evacuation. Hazus also estimates those displaced people that will require accommodations in temporary public shelters. The model estimates 23,099 households (or 69,298 of people) will be displaced due to the flood. Displacement includes households evacuated from within or very near to the inundated area. Of these, 5,156 people (out of a total population of 570,001) will seek temporary shelter in public shelters.



Economic Loss

The total economic loss estimated for the flood is 13,603.98 million dollars, which represents 53.81 % of the total replacement value of the scenario buildings.

Building-Related Losses

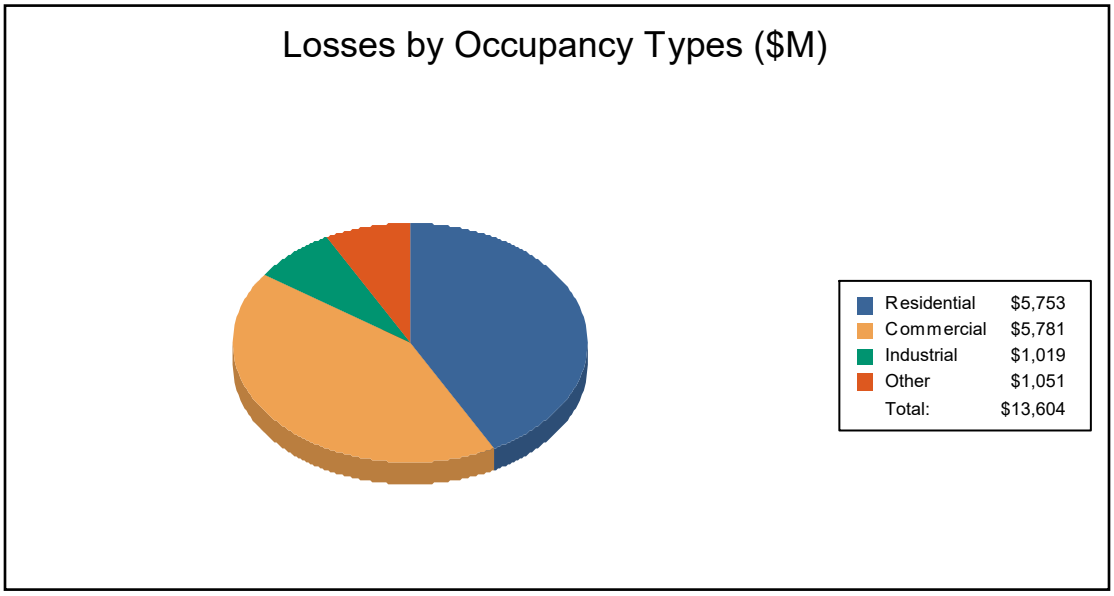
The building losses are broken into two categories: direct building losses and business interruption losses. The direct building losses are the estimated costs to repair or replace the damage caused to the building and its contents. The business interruption losses are the losses associated with inability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

The total building-related losses were 9,191.13 million dollars. 32% of the estimated losses were related to the business interruption of the region. The residential occupancies made up 42.29% of the total loss. Table 6 below provides a summary of the losses associated with the building damage.

Table 6: Building-Related Economic Loss Estimates

(Millions of dollars)

Category	Area	Residential	Commercial	Industrial	Others	Total
Building Loss						
	Building	2,831.03	941.27	274.19	64.37	4,110.87
	Content	2,178.26	1,896.18	619.49	280.46	4,974.39
	Inventory	0.00	28.14	76.03	1.71	105.87
	Subtotal	**5,009.29**	**2,865.59**	**969.71**	**346.54**	**9,191.13**
Business Interruption						
	Income	9.52	1,275.03	13.43	77.80	1,375.78
	Relocation	466.91	356.03	13.77	41.96	878.65
	Rental Income	244.82	268.37	3.15	5.53	521.87
	Wage	22.47	1,016.34	19.03	578.70	1,636.55
	Subtotal	**743.72**	**2,915.77**	**49.37**	**704.00**	**4,412.85**
ALL	**Total**	**5,753.01**	**5,781.36**	**1,019.07**	**1,050.54**	**13,603.98**



Appendix A: County Listing for the Region

Connecticut

- New Haven

Appendix B: Regional Population and Building Value Data

	Population	Building Value (thousands of dollars)		
		Residential	Non-Residential	Total
Connecticut				
New Haven	570,001	63,417,388	25,250,817	88,668,205
Total	**570,001**	**63,417,388**	**25,250,817**	**88,668,205**
Total Study Region	**570,001**	**63,417,388**	**25,250,817**	**88,668,205**

Hazus: Flood Global Risk Report

Region Name: SCRCOG_SLOSH_MOM_4

Flood Scenario: Category 4

Print Date: Wednesday, July 27, 2022

Disclaimer:
This version of Hazus utilizes 2010 Census Data.
Totals only reflect data for those census tracts/blocks included in the user's study region.

The estimates of social and economic impacts contained in this report were produced using Hazus loss estimation methodology software which is based on current scientific and engineering knowledge. There are uncertainties inherent in any loss estimation technique. Therefore, there may be significant differences between the modeled results contained in this report and the actual social and economic losses following a specific Flood. These results can be improved by using enhanced inventory data and flood hazard information.

FEMA

RiskMAP
Increasing Resilience Together

Table of Contents

General Description of the Region

Hazus is a regional multi-hazard loss estimation model that was developed by the Federal Emergency Management Agency (FEMA) and the National Institute of Building Sciences (NIBS). The primary purpose of Hazus is to provide a methodology and software application to develop multi-hazard losses at a regional scale. These loss estimates would be used primarily by local, state and regional officials to plan and stimulate efforts to reduce risks from multi-hazards and to prepare for emergency response and recovery.

The flood loss estimates provided in this report were based on a region that included 1 county(ies) from the following state(s):

- Connecticut

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

The geographical size of the region is approximately 376 square miles and contains 8,992 census blocks. The region contains over 223 thousand households and has a total population of 570,001 people (2010 Census Bureau data). The distribution of population by State and County for the study region is provided in Appendix B.

There are an estimated 183,793 buildings in the region with a total building replacement value (excluding contents) of 88,668 million dollars. Approximately 89.60% of the buildings (and 71.52% of the building value) are associated with residential housing.

Building Inventory

General Building Stock

Hazus estimates that there are 183,793 buildings in the region which have an aggregate total replacement value of 88,668 million dollars. Table 1 and Table 2 present the relative distribution of the value with respect to the general occupancies by Study Region and Scenario respectively. Appendix B provides a general distribution of the building value by State and County.

Table 1
Building Exposure by Occupancy Type for the Study Region

Occupancy	Exposure ($1000)	Percent of Total
Residential	63,417,388	71.5%
Commercial	16,156,577	18.2%
Industrial	4,143,620	4.7%
Agricultural	205,951	0.2%
Religion	1,095,314	1.2%
Government	381,243	0.4%
Education	3,268,112	3.7%
Total	**88,668,205**	**100%**

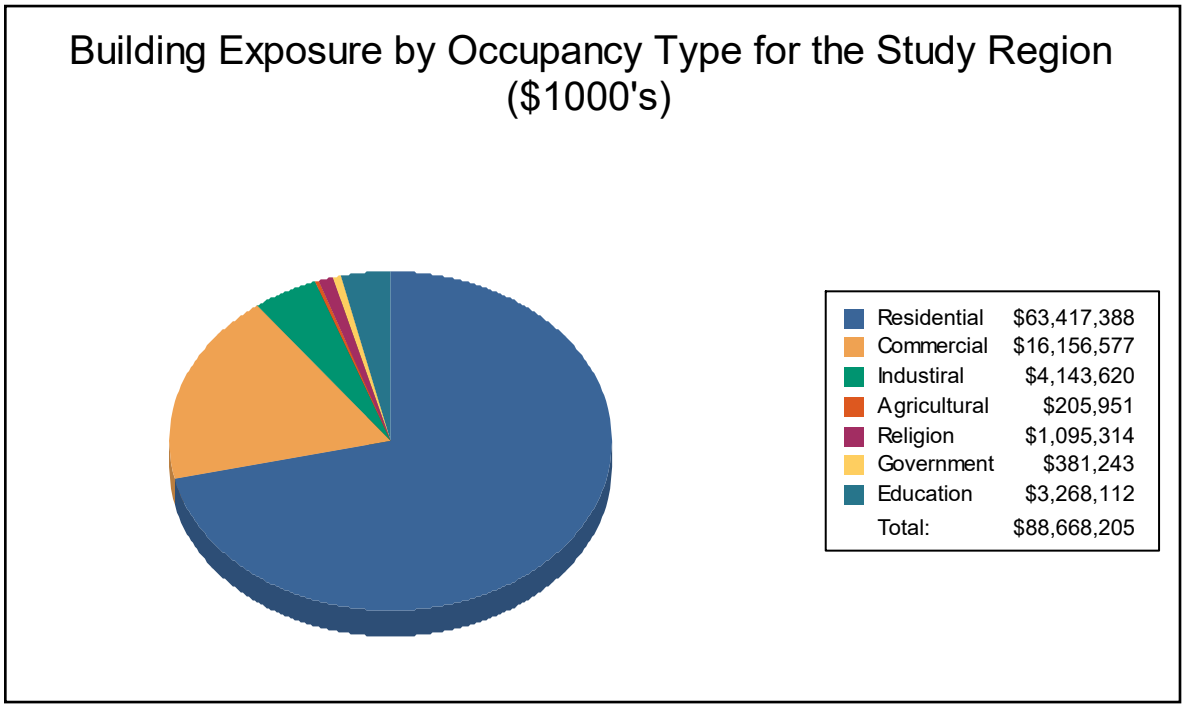
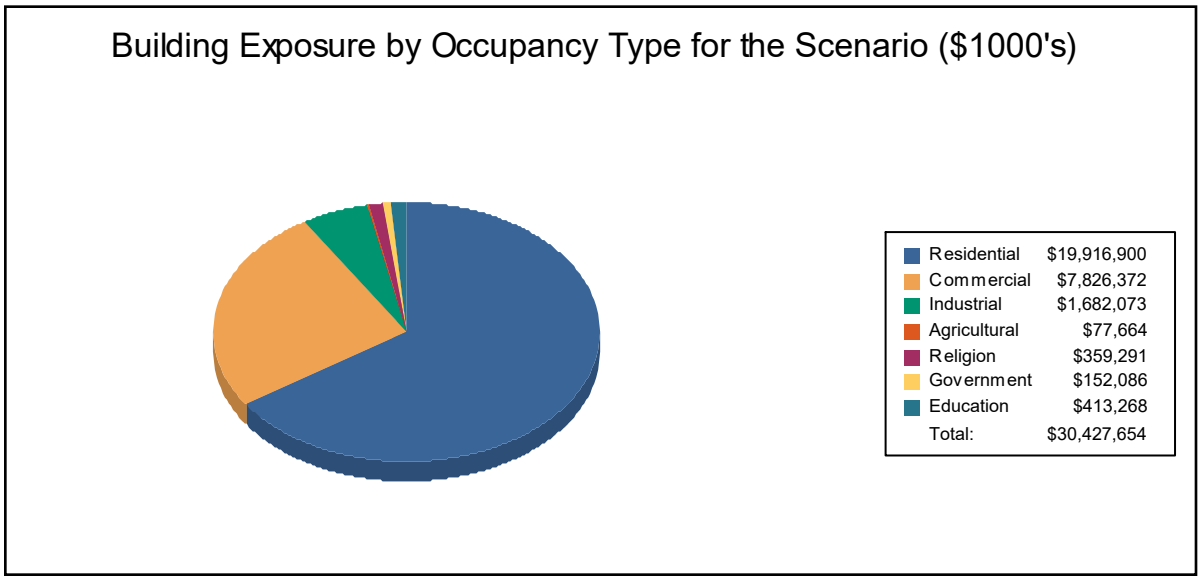


Table 2
Building Exposure by Occupancy Type for the Scenario

Occupancy	Exposure ($1000)	Percent of Total
Residential	19,916,900	65.5%
Commercial	7,826,372	25.7%
Industrial	1,682,073	5.5%
Agricultural	77,664	0.3%
Religion	359,291	1.2%
Government	152,086	0.5%
Education	413,268	1.4%
Total	**30,427,654**	**100%**



Essential Facility Inventory

For essential facilities, there are 9 hospitals in the region with a total bed capacity of 2,360 beds. There are 294 schools, 73 fire stations, 22 police stations and 15 emergency operation centers.

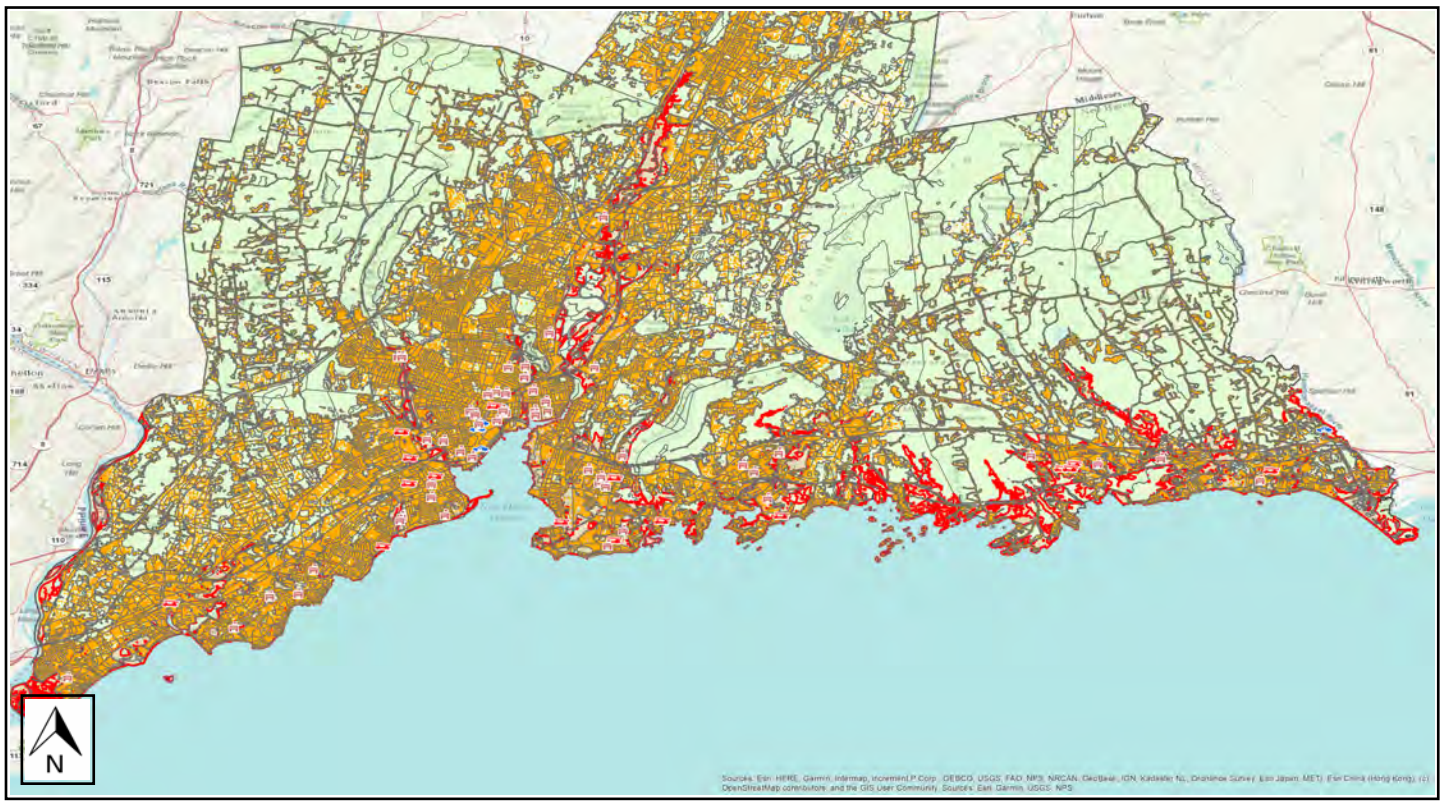
Flood Scenario Parameters

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

Study Region Name:	SCRCOG_SLOSH_MOM_4
Scenario Name:	Category 4
Return Period Analyzed:	NONE
Analysis Options Analyzed:	No What-Ifs

Study Region Overview Map

Illustrating scenario flood extent, as well as exposed essential facilities and total exposure



Building Damage

General Building Stock Damage

Hazus estimates that about 19,475 buildings will be at least moderately damaged. This is over 24% of the total number of buildings in the scenario. There are an estimated 8,273 buildings that will be completely destroyed. The definition of the 'damage states' is provided in the Hazus Flood Technical Manual. Table 3 below summarizes the expected damage by general occupancy for the buildings in the region. Table 4 summarizes the expected damage by general building type.

Total Economic Loss (1 dot = $300K) Overview Map

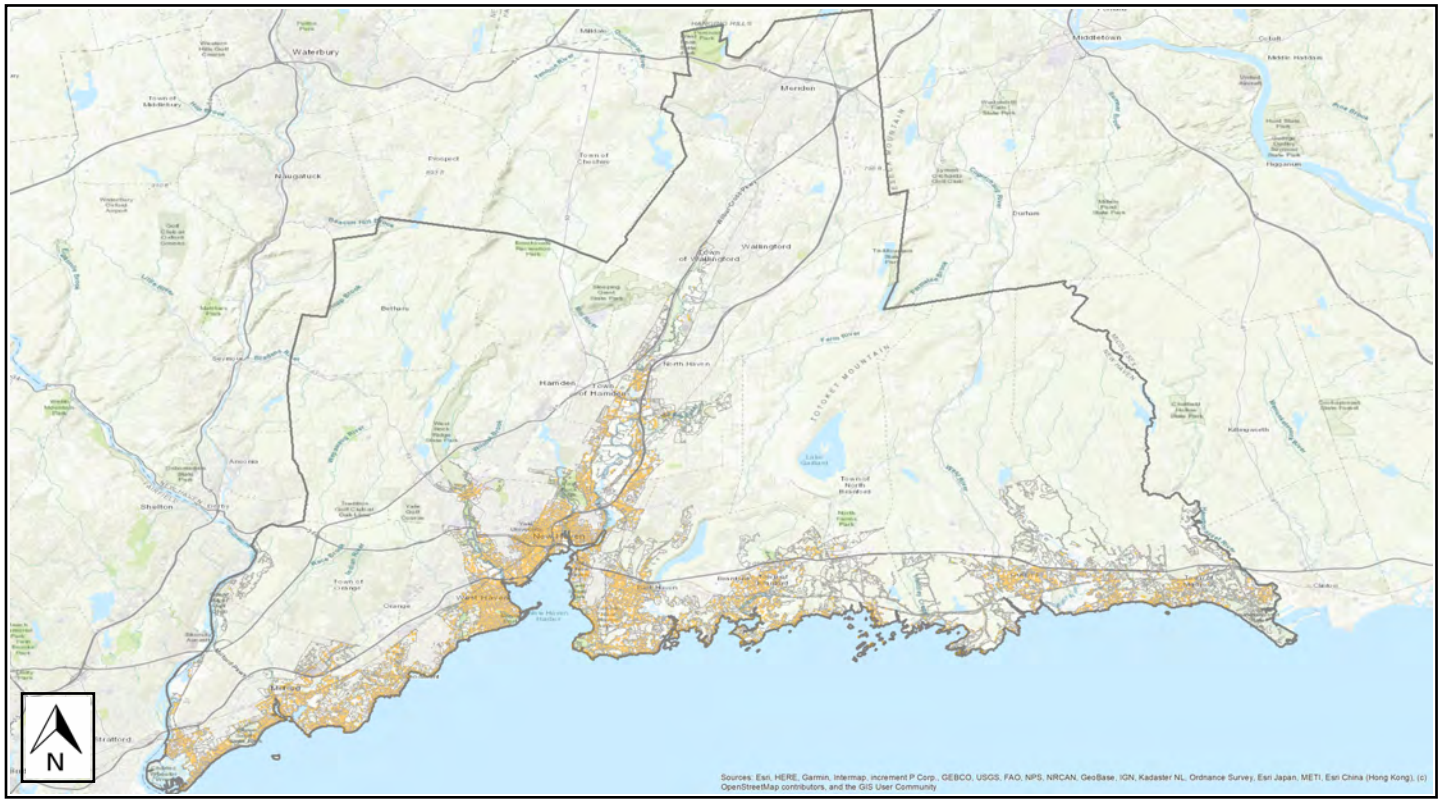


Table 3: Expected Building Damage by Occupancy

	1-10		11-20		21-30		31-40		41-50		>50	
Occupancy	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**
Agriculture	0	0	1	100	0	0	0	0	0	0	0	0
Commercial	0	0	139	41	49	14	19	6	82	24	51	15
Education	0	0	0	0	0	0	0	0	0	0	0	0
Government	0	0	12	80	0	0	0	0	0	0	3	20
Industrial	0	0	1	3	2	5	4	10	9	23	24	60
Religion	0	0	10	100	0	0	0	0	0	0	0	0
Residential	303	2	1,816	9	2,890	15	2,147	11	4,021	21	8,195	42
Total	**303**		**1,979**		**2,941**		**2,170**		**4,112**		**8,273**	

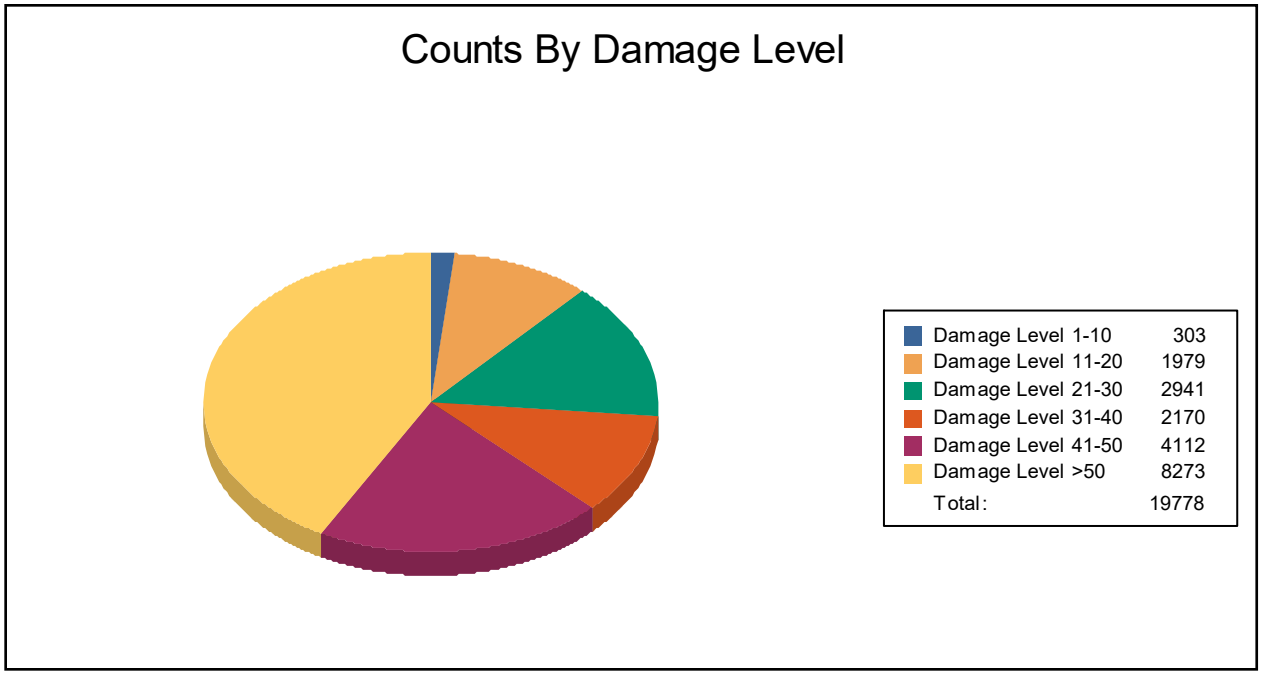


Table 4: Expected Building Damage by Building Type

Building Type	1-10		11-20		21-30		31-40		41-50		>50	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Concrete	0	0	16	52	1	3	0	0	7	23	7	23
ManufHousing	0	0	0	0	0	0	0	0	0	0	80	100
Masonry	0	0	198	20	132	14	68	7	221	23	349	36
Steel	0	0	79	37	26	12	11	5	47	22	49	23
Wood	302	2	1,656	9	2,763	15	2,073	11	3,807	21	7,746	42

Essential Facility Damage

Before the flood analyzed in this scenario, the region had 2,360 hospital beds available for use. On the day of the scenario flood event, the model estimates that 2,360 hospital beds are available in the region.

Table 5: Expected Damage to Essential Facilities

		# Facilities		
Classification	Total	At Least Moderate	At Least Substantial	Loss of Use
Emergency Operation Centers	15	4	0	4
Fire Stations	73	15	2	17
Hospitals	9	0	1	1
Police Stations	22	1	3	4
Schools	294	53	5	58

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

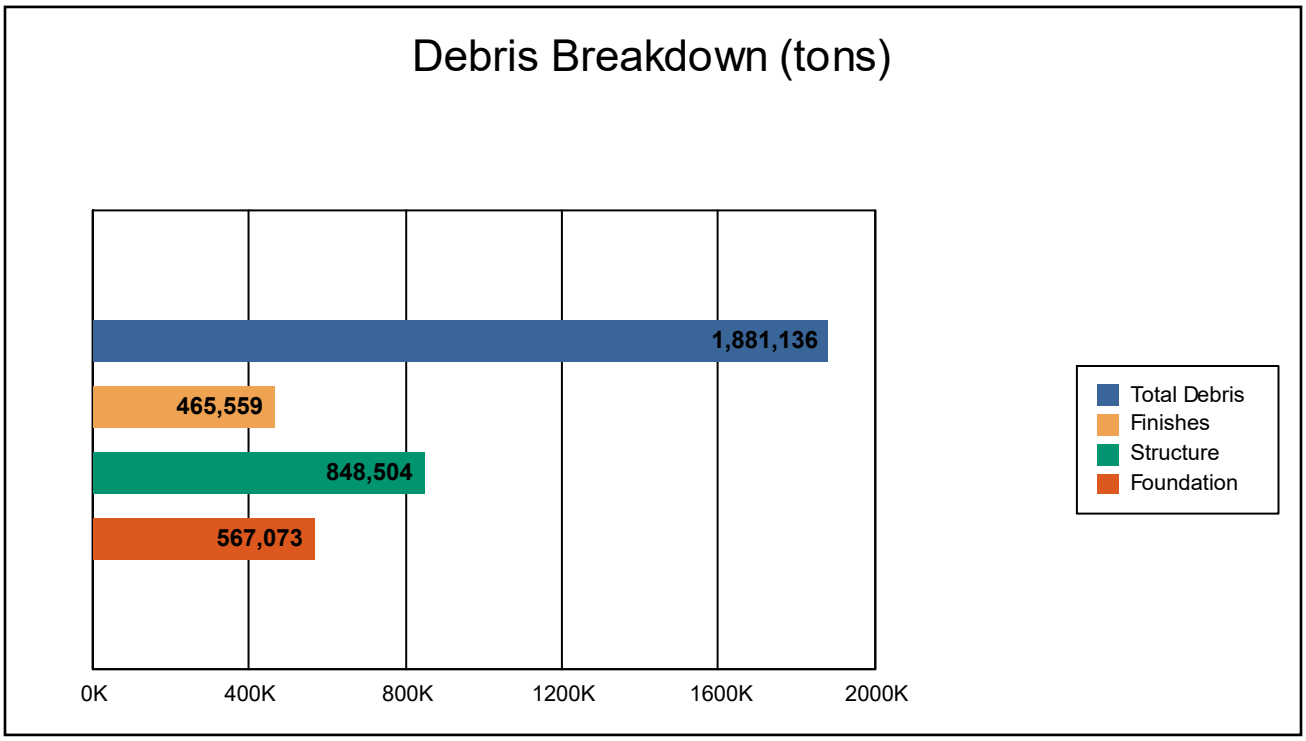
(1) None of your facilities were flooded. This can be checked by mapping the inventory data on the depth grid.

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

Induced Flood Damage

Debris Generation

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

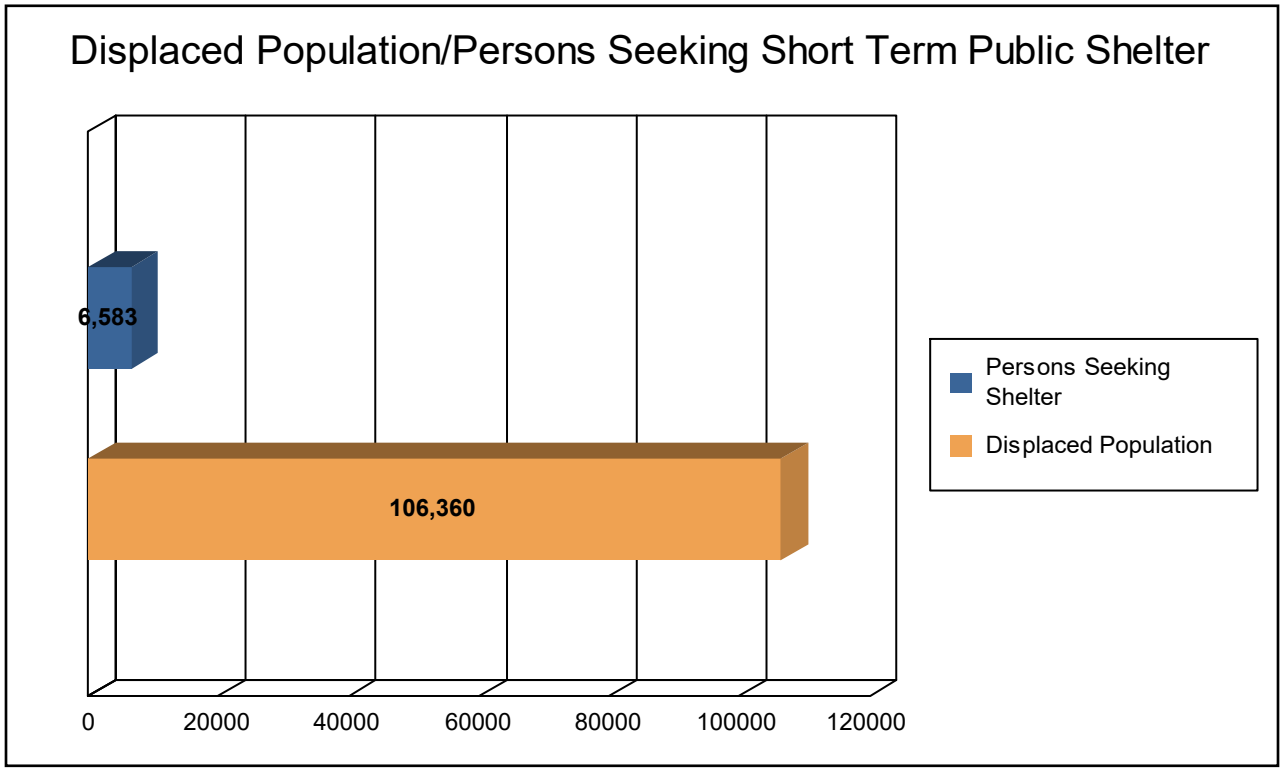


The model estimates that a total of 1,881,136 tons of debris will be generated. Of the total amount, Finishes comprises 25% of the total, Structure comprises 45% of the total, and Foundation comprises 30%. If the debris tonnage is converted into an estimated number of truckloads, it will require 75246 truckloads (@25 tons/truck) to remove the debris generated by the flood.

Social Impact

Shelter Requirements

Hazus estimates the number of households that are expected to be displaced from their homes due to the flood and the associated potential evacuation. Hazus also estimates those displaced people that will require accommodations in temporary public shelters. The model estimates 35,453 households (or 106,360 of people) will be displaced due to the flood. Displacement includes households evacuated from within or very near to the inundated area. Of these, 6,583 people (out of a total population of 570,001) will seek temporary shelter in public shelters.



Economic Loss

The total economic loss estimated for the flood is 23,366.59 million dollars, which represents 76.79 % of the total replacement value of the scenario buildings.

Building-Related Losses

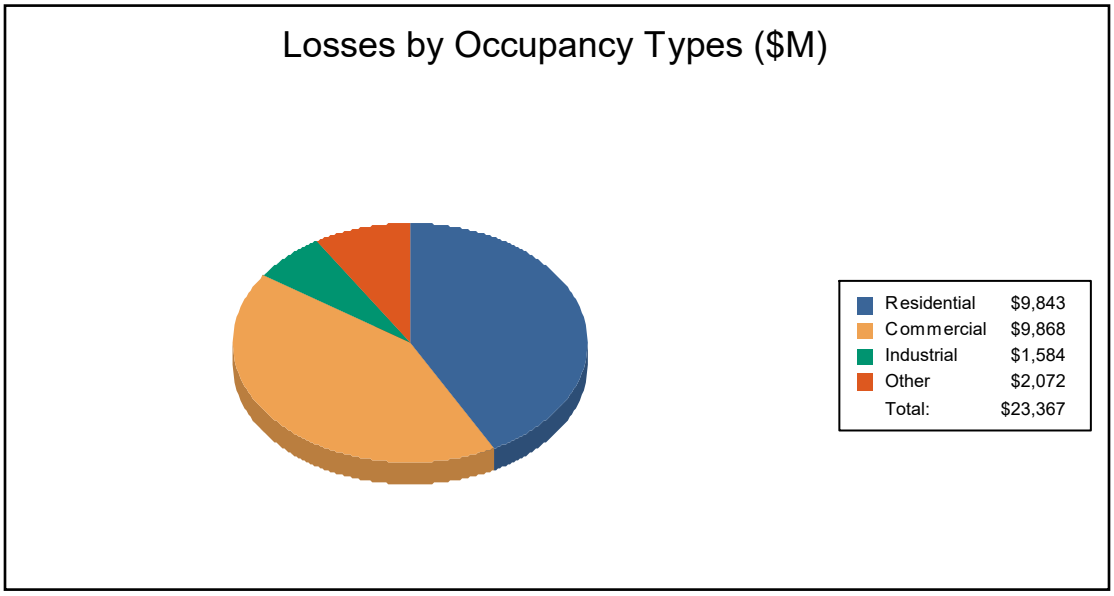
The building losses are broken into two categories: direct building losses and business interruption losses. The direct building losses are the estimated costs to repair or replace the damage caused to the building and its contents. The business interruption losses are the losses associated with inability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

The total building-related losses were 16,099.15 million dollars. 31% of the estimated losses were related to the business interruption of the region. The residential occupancies made up 42.13% of the total loss. Table 6 below provides a summary of the losses associated with the building damage.

Table 6: Building-Related Economic Loss Estimates

(Millions of dollars)

Category	Area	Residential	Commercial	Industrial	Others	Total
Building Loss						
	Building	5,096.89	1,867.50	454.76	165.54	7,584.69
	Content	3,578.76	3,276.32	951.83	545.33	8,352.24
	Inventory	0.00	47.03	111.61	3.58	162.22
	Subtotal	**8,675.66**	**5,190.85**	**1,518.20**	**714.45**	**16,099.15**
Business Interruption						
	Income	18.76	2,021.57	17.73	146.69	2,204.74
	Relocation	705.58	569.25	18.27	80.76	1,373.86
	Rental Income	399.10	425.99	4.07	10.87	840.04
	Wage	44.21	1,659.88	25.34	1,119.37	2,848.80
	Subtotal	**1,167.65**	**4,676.70**	**65.41**	**1,357.69**	**7,267.44**
ALL	**Total**	**9,843.31**	**9,867.54**	**1,583.61**	**2,072.14**	**23,366.59**



Appendix A: County Listing for the Region

Connecticut

- New Haven

Appendix B: Regional Population and Building Value Data

	Population	Building Value (thousands of dollars)		
		Residential	Non-Residential	Total
Connecticut				
New Haven	570,001	63,417,388	25,250,817	88,668,205
Total	**570,001**	**63,417,388**	**25,250,817**	**88,668,205**
Total Study Region	**570,001**	**63,417,388**	**25,250,817**	**88,668,205**

Quick Assessment Report

July 27, 2022

Study Region : SCRCOG_SLOSH_MOM_1
Scenario : Category 1
Return Period: NONE
Analysis Option: 0

Regional Statistics

Area (Square Miles)	376
Number of Census Blocks	8,992
Number of Buildings	
Residential	164,672
Total	183,793
Number of People in the Region (x 1000)	570
Building Exposure ($ Millions)	
Residential	63,417
Total	88,668

Scenario Results

Shelter Requirements

Displaced Population (# Households)	7,924
Short Term Shelter (# People)	2,854

Economic Loss

Residential Property (Capital Stock) Losses ($ Millions)	990
Total Property (Capital Stock) Losses ($ Millions)	1,606
Business Interruption (Income) Losses ($ Millions)	1,012

Disclaimer:

Totals only reflect data for those census tracts/blocks included in the user's study region.

The estimates of social and economic impacts contained in this report were produced using Hazus loss estimation methodology software which is based on current scientific and engineering knowledge. There are uncertainties inherent in any loss estimation technique. Therefore, there may be significant differences between the modeled results contained in this report and the actual social and economic losses following a specific flood. These results can be improved by using enhanced inventory data and flood hazard information.

Quick Assessment Report

July 27, 2022

Study Region : SCRCOG_SLOSH_MOM_2
Scenario : Category 2
Return Period: NONE
Analysis Option: 0

Regional Statistics

Area (Square Miles)	376
Number of Census Blocks	8,992
Number of Buildings	
Residential	164,672
Total	183,793
Number of People in the Region (x 1000)	570
Building Exposure ($ Millions)	
Residential	63,417
Total	88,668

Scenario Results

Shelter Requirements	
Displaced Population (# Households)	14,690
Short Term Shelter (# People)	3,961
Economic Loss	
Residential Property (Capital Stock) Losses ($ Millions)	2,610
Total Property (Capital Stock) Losses ($ Millions)	4,358
Business Interruption (Income) Losses ($ Millions)	2,135

Disclaimer:

Totals only reflect data for those census tracts/blocks included in the user's study region.

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Quick Assessment Report

July 27, 2022

Study Region : SCRCOG_SLOSH_MOM_3
Scenario : Category 3
Return Period: NONE
Analysis Option: 0

Regional Statistics

Area (Square Miles)	376
Number of Census Blocks	8,992
Number of Buildings	
Residential	164,672
Total	183,793
Number of People in the Region (x 1000)	570
Building Exposure ($ Millions)	
Residential	63,417
Total	88,668

Scenario Results

Shelter Requirements	
Displaced Population (# Households)	23,099
Short Term Shelter (# People)	5,156
Economic Loss	
Residential Property (Capital Stock) Losses ($ Millions)	5,009
Total Property (Capital Stock) Losses ($ Millions)	9,191
Business Interruption (Income) Losses ($ Millions)	4,413

Disclaimer:

Totals only reflect data for those census tracts/blocks included in the user's study region.

The estimates of social and economic impacts contained in this report were produced using Hazus loss estimation methodology software which is based on current scientific and engineering knowledge. There are uncertainties inherent in any loss estimation technique. Therefore, there may be significant differences between the modeled results contained in this report and the actual social and economic losses following a specific flood. These results can be improved by using enhanced inventory data and flood hazard information.

Quick Assessment Report

July 27, 2022

Study Region : SCRCOG_SLOSH_MOM_4
Scenario : Category 4
Return Period: NONE
Analysis Option: 0

Regional Statistics

Area (Square Miles)	376
Number of Census Blocks	8,992
Number of Buildings	
Residential	164,672
Total	183,793
Number of People in the Region (x 1000)	570
Building Exposure ($ Millions)	
Residential	63,417
Total	88,668

Scenario Results

Shelter Requirements	
Displaced Population (# Households)	35,453
Short Term Shelter (# People)	6,583
Economic Loss	
Residential Property (Capital Stock) Losses ($ Millions)	8,676
Total Property (Capital Stock) Losses ($ Millions)	16,099
Business Interruption (Income) Losses ($ Millions)	7,267

Disclaimer:

Totals only reflect data for those census tracts/blocks included in the user's study region.

The estimates of social and economic impacts contained in this report were produced using Hazus loss estimation methodology software which is based on current scientific and engineering knowledge. There are uncertainties inherent in any loss estimation technique. Therefore, there may be significant differences between the modeled results contained in this report and the actual social and economic losses following a specific flood. These results can be improved by using enhanced inventory data and flood hazard information.