Multi-Hazard Mitigation Plan Update 2021

City of Somersworth, NH

Adopted 2004
Updated February 3, 2011
Updated June 17, 2016
Updated 2021

Submitted to the New Hampshire Homeland Security & Emergency Management

By the City of Somersworth, NH

with Strafford Regional Planning Commission

This project was funded from the fiscal year 2021 Pre-Disaster Mitigation Competitive (PDMC) Grant Program, which was awarded to the Department of Safety, Division of Homeland Security and Emergency Management (HSEM) from the Federal Emergency Management Agency (FEMA).

Cover: Salmon Falls Road, Somersworth, NH – 2007 Mother's Day Flooding Event
Photo credit: Strafford Regional Planning Commission

Acknowledgements

This plan was created through a grant from New Hampshire Homeland Security Emergency Management (HSEM).

The following organizations have contributed invaluable assistance and support for this project:

The 2004, 2010, 2016, and 2021 Somersworth Hazard Mitigation Committees
New Hampshire Homeland Security Emergency Management (HSEM)
City of Somersworth

The 2021 City of Somersworth Multi-Hazard Mitigation Planning Team

Sixteen people have attended meetings and/or been instrumental in completing this plan:

- George Kramlinger — Emergency Management Director, City of Somersworth
- Karl Ingoldsby — Facilities Director, City of Somersworth
- Paul Robidas — Senior Vice President Stewarts Ambulance Service
- Scott Smith — Deputy City Manager/Director of Finance, City of Somersworth
- Mike Bobinksy — Director of Public Works and Utilities, City of Somersworth
- Tim McLin — Captain of Police, City of Somersworth
- Robert M. Belmore — City Manager, City of Somersworth
- David Kretschmar — Chief of Police, City of Somersworth
- Michelle Mears — Director of Planning, City of Somersworth
- Deborah Evans — Director of Housing Authority, City of Somersworth
- Matthew Duval — Lieutenant Police Department, City of Somersworth
- Robert Gadomski — Superintendent of Schools – SAU 56, City of Somersworth
- Amber Ferland — City Engineer, City of Somersworth
- Courtney De Oliveira Valarese — Fire Secretary, City of Somersworth
- James Burdin — Senior Regional Planner, SRPC
- Stephen Geis — Planning Technician, SRPC

Plan Prepared and Authored By
James Burdin, Senior Regional Planner
Stephen Geis, Planning Technician
Strafford Regional Planning Commission
150 Wakefield Street, Suite 12
Rochester, NH 03867
603-994-3500
www.strafford.org

Date of Conditional Approval from FEMA: 12/16/2021
Date of Adoption by City: 2/7/2022
Date of Final Approval from FEMA: 2/17/2022

Table of Contents

Executive Summary

This Plan was revised and updated to meet statutory requirements and to assist the City of Somersworth in reducing and mitigating future losses from natural and man-made hazardous events. An initial edition of this Plan was developed and presented to FEMA in 2004. The plan was revised in 2010 and 2016, but it was updated in 2021 to reflect the most recent information obtained through the evolution of the hazard mitigation program at the State. This update was developed by Strafford Regional Planning Commission (SRPC) and participants from the Multi-Hazard Mitigation Planning Team, which was made up by the Emergency Management Director, City Manager, Chief of Police, Director of Development Services, Director of Housing Authority, Lt. Somersworth Police, and Superintendent of Schools. The Plan references historical events, as well as identifies specific vulnerabilities that are likely to impact the City.

This plan addresses the following hazards that affect the City:

- Flooding
- Ice Jam
- Dam Failure
- Drought
- Extreme Temperatures
- Wildfire
- Earthquake
- Landslide
- Tornado & Downburst
- Hurricane & Tropical Storms
- Severe Thunderstorms
- Severe Winter Weather
- Hazardous Materials
- Public Health Threats

This plan also provides an updated list of Critical Infrastructure and Key Resources (CI/KR) categorized as follows: Emergency Response Services (ERS), Non-Emergency Response Facilities (NERS), Facilities and Populations to Protect (FPP) and Potential Resources (PR). In addition, this plan addresses the City's involvement in The National Flood Insurance Program (NFIP).

The revision process included reviewing other City Hazard Plans, technical manuals, federal and state laws, the State Hazard Mitigation Plan, research data, and other available mitigation documents from multiple sources. Combining elements from these sources, the Team was able to produce this integrated multi-hazards plan and recognizes that such a plan must be considered a work in progress. In addition to periodic reviews there are three specific situations, which require a formal review of the plan. The plan will be reviewed:

- ***Annually*** *to assess whether the existing and suggested mitigation strategies have been successful and remain current in light of any changes in federal state and local regulations and statutes. This review will address the Plan's effectiveness, accuracy and completeness in regard to the implementation strategy. The review will address any recommended improvements to the Plan, and address any weaknesses identified that the Plan did not adequately address. This report will be filed with the City Council.*
- ***Every Five Years*** *the Plan will be thoroughly reviewed, revised and updated using the same criteria outlined above. At that time it is expected to be thoroughly reviewed and updated as necessary. The public will be allowed and encouraged to participate in that five year revision process.*
- ***After any declared emergency event****, the EMD using the same criteria outlined above.*
- *If the City adopts any major modifications to its land use planning documents, the jurisdiction will conduct a Plan review and make changes as applicable.*

Public involvement is encouraged throughout this process and will continue to be stressed in future revisions. In the pre-meeting, City officials were given a recommended list of people to invite and participate in the process. A press release was issued which encouraged public involvement and it was also stressed that public attendance was recommended. The City of Somersworth received conditional approval on 12/16/2021. A public meeting was held and the plan was adopted by the City Council on 2/7/2021. The Plan received formal approval from FEMA on 2/17/2022. The public will have the opportunity for future involvement as the Plan will be periodically reviewed and the public will be invited to participate in all future reviews and updates to this plan. Public notice was and will be given by such means as: press releases in local papers, posting meeting information on the City website, sending letters to federal, state, and local organizations impacted by the Plan, and posting notices in public places in the City, on the SRPC website and noticed to the County commission. There will also be a public meeting before each formal review and before any change/update is sent to FEMA.

Once final approval by FEMA has been received, copies of the Plan will be distributed to the relevant City Departments and personnel, HSEM, and FEMA and other state and local governmental entities; the Plan

will then be distributed by these entities per requirements. Copies of the Plan will remain on file at the Strafford Regional Planning Commission (SRPC) in both digital and paper format.

Chapter I: Multi-Hazard Planning Process

Authority

Somersworth's original Plan was prepared pursuant to Section 322, Mitigation Planning, of the Robert T. Stafford Disaster Relief and Emergency Assistance Act (the Act), herein enacted by Section 104 of the Disaster Mitigation Act of 2000 (DMA) (P.L. 106-390). This Act provides new and revitalized approaches to mitigation planning. Section 322 of DMA 2000 emphasizes the need for State, local and tribal entities to closely coordinate mitigation planning and implementation efforts. This revised multi-hazard plan will be referred to as the "Plan". Somersworth's Plan has been prepared by the Multi-Hazard Mitigation Planning Team with the assistance and professional services of Strafford Regional Planning Commission (SRPC) under contract with New Hampshire Homeland Security Emergency Management (HSEM) operating under the guidance of Section 206.405 of 44 CFR Chapter 1 (10-1-2010 Edition). This plan is funded, in part, by HSEM through grants from FEMA (Federal Emergency Management Agency). Funds from city dues and matching funds for team member's time are also part of the funding formula.

Purpose & History of the FEMA Mitigation Planning Process

The ultimate purpose of Disaster Mitigation Act of 2000 (DMA) is to:

- "establish a national disaster hazard mitigation program –
- Reduce the loss of life and property, human suffering, economic disruption and disaster assistance costs resulting from natural disasters; and
- Provide a source of pre-disaster hazard mitigation funding that will assist States and local governments (including Indian tribes) in implementing effective hazard mitigation measures that are designed to ensure the continued functionality of critical services and facilities after a natural disaster."

DMA 2000 amends the Robert T. Stafford Disaster Relief and Emergency Assistance Act by, among other things, adding a new section "322 – Mitigation Planning" which states:

"As a condition of a receipt of an increased Federal share for hazard mitigation measures under subsection (e), a State, local, or tribal government shall develop and submit for approval to the President a mitigation plan that outlines processes for identifying the natural hazards, risks, and vulnerabilities of the area under the jurisdiction of the government."

HSEM's goal is to have all New Hampshire communities complete a local multi-hazard plan as a means to reduce future losses from natural and man-made events before, during, or after they occur. HSEM has outlined a process whereby communities throughout the state may become eligible for grants and other assistance upon completion of this multi-hazard plan. The state's regional planning commissions are charged with providing assistance to selected communities to help develop local plans.

Somersworth's Multi-Hazard Mitigation Plan is a planning tool for reducing future losses from natural and man-made disasters as required by the Disaster Mitigation Act of 2000; this plan will be adopted but kept separate from the city's master plan. The Multi-Hazard Mitigation planning process results in significant cross talk regarding all types of natural and man-made hazards by team members.

The DMA places new emphasis on local mitigation planning. It requires local jurisdiction must have a FEMA approved Hazard Mitigation Plan as a condition for receiving all hazard mitigation grants and some other federal grants. Local governments must review the plan yearly and update their plans every five years to continue program eligibility.

Jurisdiction

This plan addresses only one jurisdiction – the City of Somersworth, NH. Once approved by the Planning Team, the Plan will be forwarded to HSEM and FEMA for Conditional Approval. Upon review and conditional approval by HSEM and FEMA, the City Council will hold a public meeting, to consider public comments and must promulgate a signed Resolution to Adopt the Plan.

Scope of Plan

A community's multi-hazard mitigation plan often identifies a vast number of natural hazards and is somewhat broad in scope and outline. The scope and effects of this plan were assessed based on the impact of hazards on: *Critical Infrastructure and Key Resources (CI/KR); current residential buildings; other structures within the City; future development; administrative, technical and physical capacity of emergency response services; and response coordination between federal, state and local entities.*

Multi-Hazard Planning Process

The planning process consists of ten specific steps. Many factors affect the ultimate sequence of the planning process: length of meetings, community preparation and attendance, and other community needs. All steps are included but not necessarily in the numerical sequence listed.

The steps are:

1. Establish and Orient a Hazard Mitigation Planning Team
2. Identify Past and Potential Hazards
3. Identify Hazards and Critical Facilities
4. Assess Vulnerability – Estimating Potential Losses
5. Analyze Development Trends
6. Review Existing Mitigation Strategies and Proposed Improvements
7. Develop Specific Mitigation Measures
8. Prioritize Mitigation Measures
9. Develop Mitigation Action Plan
10. Adopt and Implement the Plan

Public Involvement

The Public, Neighboring Communities, Agencies, Non-profits, and other interested parties

Public involvement has been and continues to be stressed starting with the initial meeting; community officials were given a list of potential team members before the first review meetings were held. These included the city council, administrative staff, the conservation commission, the planning board, the police department, the fire department, and the highway department. Local business owners, interested organizations, and residents of Somersworth were also invited to participate. Community officials were urged to contact as many people as they could to participate in the planning process. A public notice, stressing the public nature of the process, was sent to Fosters newspaper, posted on the Strafford Regional Planning Commission website, the City's website, and notices were hung at the City Hall. The neighboring communities of Rochester, Dover, Rollinsford, and Berwick (ME) all had the opportunity to participate as each planning meeting was open to the public. There was no participation from surrounding communities. There was participation from one member of the business community, who is currently the General Manager for American Ambulance Service of New England (AANE). AANE is the Emergency Medical Services provider for the City of Somersworth, as well as the Towns of Berwick, Eliot, and Kittery Maine. AANR also contracts with multiple seacoast hospitals and skilled nursing facilities. There was no other public participation in the plan update process. All feedback from participants of the planning committee was incorporated into the Plan.

Public Announcement
City of Somersworth Multi-Hazards Mitigation Planning Update

Strafford Regional Planning Commission has begun the process to update Somersworth's Multi-Hazard Mitigation Plan and the first meeting with the Hazard Mitigation Planning Committee has been scheduled for October 28th at 10:30AM in the City Hall. The first meeting will include: a review of community impacts from presidentially declared disasters and emergency declarations since the adoption of the previous plan, completion of a vulnerability and risk analysis, specific input about each identified hazard, and feedback on how the City has remained in NFIP compliance.

All citizens, businesses, municipal officials and interested parties are invited. If you are unavailable to attend, please forward any ideas or concerns to: Kyle Pimental, Principal Planner, Strafford Regional Planning Commission at 603-994-3500 or kpimental@strafford.org or to Keith Hoyle, Fire Chief/EMD at 603-692-3131 or khoyle@somersworth.com.

This update of the 2011 Plan is funded by FEMA under contract to Strafford Regional Planning Commission and is a collaborative planning process with the City.

Chapter II: Hazard Identification and Analysis

Hazard Analysis

Somersworth is prone to a variety of man-made and natural hazards. These include: dam failures, riverine and ice jam flooding, severe wind events, wildfire, drought, ice storms and severe winter storms.

Flooding, whether from heavy rains or ice jams, carries the greatest risk for Somersworth. The Salmon Falls River floods occasionally. However, in 2006, 2007 and 2010 the entire coastal region was subjected to severe spring flooding events. The 2006 Mother's Day flood resulted from record breaking amounts of rainfall in a very short duration. The 2007 Patriot's Day flood was a combination of heavy rainfall and rapid snowmelt as up to seven inches of rain fell April 16 –18 from a storm that stalled off the coast of New England. The peak discharges during this flood event were the highest recorded at five long-term stream gage sites – the New Hampshire Salmon Falls River at Milton (north of Somersworth), Cocheco River near Rochester, Oyster River near Durham, Contoocook River at Peterborough, and South Branch Piscataguog River near Goffstown. In addition, peak discharges equaled or exceeded a 100 year recurrence interval at ten stream gages and a 50 year recurrence interval at 16 stream gages. The most severe flooding occurred in Strafford, Rockingham, Merrimack and Hillsborough Counties.[1] The latest flooding event occurred in March 2010 when two separate storm events occurred in mid and late March.

Severe wind events, hurricane residuals, and downbursts have caused damage to Somersworth. The City is fairly wooded and forested in many areas, which carries the potential for major tree damage from high-wind events. In February 2010 there was severe windstorm that affected trees and power lines. In 2008 there was a tornado that passed through the region to the west and north causing severe damage along its path. In December 2008 there was a record breaking ice storm in New Hampshire that disrupted power and communication services for weeks in some locations as well as extensive damage to infrastructure, trees and property. Somersworth received damage but not to the extent that other locations received.

Table's 2.1 and 2.2 list all the presidentially declared and emergency declarations from 1990-2020 that have impacted the City.

[1] USGS Scientific Investigations Report 2008-5120

Table 2.1: Presidentially Declared Disasters (DR) 1990-2021 impacting the City of Somersworth

Date Declared	Event	Amount/ Program/ Source	Remarks
September 9, 1991	Hurricane Bob	$2,293,449 PA FEMA 917-DR	One of the costliest storms to ever hit New England, damages totaling approximately $1.5 billion. There were seventeen reported fatalities and extensive damage as a result of high winds and rough seas. New Hampshire experienced strong winds (Pease reported 60 mph gusts) and widespread flooding due to heavy rains. There were two reported deaths and power outages statewide from downed trees and power lines.
October 29, 1996	Severe Storms & Flooding	$2,341,273 PA FEMA 1144-DR	Fall nor'easter rainstorm that took place on October 20-23. There was significant damage and flooding throughout the region.
January 15, 1998	Ice Storm	$12,446,202 PA/IA FEMA 1199-DR	This storm produced ice several inches thick on trees, power lines, and other exposed surfaces causing massive power outages. Statewide, the storm knocked out power to about 55,000 customers (an estimated 125,000 people). For many residents, no electrical power meant no heat, no running water, and any means for cooking food. There were no reported fatalities, but carbon monoxide poisoning was a problem and many residents were treated at area hospitals.
May 25, 2006	Severe Storm & Flooding	$17,691,586 PA/IA FEMA 1643-DR	Low pressure system that resulted in over 12 inches of rain in some locations in a 72-hour period. Homes and businesses were damaged extensively. Two dams on the Salmon Falls River were being monitored as it was feared they may fail.
April 27, 2007	Severe Storm & Flooding	$27,000,000 PA/IA FEMA 1695-DR	This storm brought heavy rain which, when combined with snow melt, produced widespread flooding. Strong winds resulted in downed trees and power outages, especially near the coast, and numerous road closures.
August 11, 2008	Severe Storms, Tornado, & Flooding	$1,691,240 PA FEMA 1782-DR	An F1 tornado touched down in southern and central New Hampshire, resulting in one fatality and damage to over 100 structures. No major impacts were experienced in Somersworth.

January 2, 2009	Severe Winter Storm	$19,789,657 DFA/PA FEMA 1812-DR	A major winter storm that brought a mixture of snow, sleet, and freezing rain. In southern New Hampshire, there was about a half inch to about an inch of ice accretion on trees and wires. Power outages impacted approximately 400,000 customers, some for 2 weeks.
March 29, 2010	Severe Winter Storm	$9,103,138 PA FEMA 1892-DR	This violent storm left more than 330,000 residents in the state without power and 1 million across the Northeast after high winds and rain hit the region.
September 3, 2011	Tropical Storm Irene	$11,101,752 PA/IA FEMA 4026-DR	This storm produced strong winds and rain. The rain was heavy at times. However, there was no major damage experienced within the City. There may have been sporadic power outages and tree limbs down.
March 19, 2013	Severe Snow and Blizzard	$6,153,471 PA FEMA 4105-DR	Known as "NEMO", this storm brought heavy snow, however there was no major damage. There may have been some minor power outages for short periods of time. Clean-up and snow removal took more time and resources than smaller storms. The City received $49,278 in disaster relief funding for reimbursement costs for snow removal.
March 25, 2015	Severe Snow & Snowstorm	$4,799,125 PA FEMA 4209-DR	Known as "JUNO" this storm was much more problematic than the winter storm in 2013. At the time of the event, there was an abundance of snow already on the ground. Snow removal was slower and more costly. The City is currently awaiting $33,476 in disaster relief funding for reimbursement costs for snow clean-up and removal. The School is currently awaiting $36,340 in disaster relief funding for reimbursement costs for snow clean-up and removal.

June 8, 2018	Severe Winter Storm & Snowstorm	$1,981,453 PA FEMA 4371-DR	This March 13-14 storm brought over 20 inches of snow to Somersworth. This resulted in the city deploying several snow removal trucks and drivers working overtime to finish remove all the snow removal and haul it out of dense areas. The City of Somersworth received $38,503 in federal share funds to supplement the high costs.
April 3, 2020	Coronavirus Pandemic	$126,892,512 PA FEMA 4516-DR	The pandemic brought closures of non-essential businesses and a transition to remote learning for schools K-12 until the Summer. Public Assistance federal funding were available to the state and eligible local governments and certain private nonprofit organizations on a cost-sharing basis for emergency protective measures, including direct federal assistance under Public Assistance, for all areas in the state of New Hampshire affected by COVID-19 at a federal cost share of 75 percent.

12 declarations totaling approximately $241,303,405

Program Key: **PA**: Public Assistance, **IA**: Individual Assistance, **DFA**: Direct Federal Assistance

Table 2.2: Emergency Declaration (EM) 1990-2021 impacting the City of Somersworth

Date Declared	Event	Amount	Remarks
March 16, 1993	Heavy Snow	$832,396 PA FEMA 3101-EM	Known as the "Storm of the Century", this large superstorm was unique for its intensity and massive size. The southeastern part of the U.S. was hit particularly hard (Alabama had isolated reports of 16 inches of snow). Lincoln, NH reported 35 inches of snow.
March 28, 2001	Snow Emergency	$4,500,000 PA FEMA 3166-EM	Late winter storm that occurred from March 5-7, which brought heavy snowfall.
March 11, 2003	Snow Emergency	$3,000,000 PA FEMA 3177-EM	Known as the "President's Day" storm, over $1.5 million dollars was allocated for snow removal costs to the five New England states.
March 30, 2005	Snow Emergency	$4,654,738 PA FEMA 3207-EM	Winter storm that occurred from February 10-11, which resulted in over $1.1 million to help pay for costs of heavy snow and high winds.
December 13, 2008	Severe Winter Storm	$900,000 DFA/PA FEMA 3297-EM	An ice storm that struck most of New England, which left several million people without power. Shelters were opened in four states to house those without power and no alternative means of heating their residence.
November 1, 2011	Severe Winter Storm	Data not available PA FEMA 3344-EM	This storm was known as the "Halloween Storm". Due to heavy, wet snow and leaf-on conditions there was sporadic power outages, as well as damage to trees and telephone wires.
October 30, 2012	Hurricane Sandy	$643,660 PA FEMA 3360-EM	During this storm, the Emergency Operations Center was opened and staffed by municipal staff. This storm produced some strong winds and rain. The rain was heavy at times. However, there was no major damage experienced within the City. There may have been sporadic power outages and tree limbs down.
March 17, 2020	Coronavirus Pandemic	Data not available PA FEMA 3445-EM	The World Health Organization declared COVID-19 a pandemic in March 2020. The city followed the Governor's state of emergency that required all non-essential businesses to close and required K-12 schools to transition to remote learning. The city of Somersworth continued to follow CDC guidelines throughout 2020/2021.

8 emergency declarations totaling approximately $14,530,794
Program Key: **PA**: Public Assistance, **DFA**: Direct Federal Assistance

Rating Probability, Severity, and Overall Risk of Future Disasters

The nature of each hazard type and the quality and availability of corresponding data made the evaluation of hazard potential difficult. The Multi-Hazard Planning Team considered what data was at hand and used its collective experience to formulate statements of impact or potential. Each hazard type was rated using a hazard vulnerability assessment tool [refer to Table 2.3]. This tool estimates the probability of occurrence, severity, and overall risk of an event using a projected number system answering questions, which answer High (3), Moderate (2), and Low (1). A zero (0) score meant that there is no likelihood the hazard would impact the City in the next 25 years. The ranges established for the average to determine severity were:

- High = >3
- Moderate = 2
- Low = 1 or below

The overall risk is a numeric indication developed by multiplying the total numbers of the probability and the severity.

Probability of Occurrence

Probability is based on a limited objective appraisal of a hazard's probability using information provided by relevant sources, observations and trends. The Planning Team came together and broke down each hazard and the City's subsequent vulnerability.

- High: There is 66.1-100% likelihood that Somersworth will experience a hazardous event within the next 25 years. Score = 3
- Moderate: There is 33.1-66% likelihood that Somersworth will experience a hazardous event within the next 25 years. Score = 2
- Low: There is 0-33% likelihood that Somersworth will experience a hazardous event within the next 25 years. Score = 1

Severity

Severity is an estimate generally based on a hazard's impact human, property and business. The Planning Team came together and broke down the City's impact to these hazards. The severity was calculated by the average of human, property and business.

- **High:** The total population, property, commerce, infrastructure and services of the City are uniformly exposed to the effects of a hazard of potentially great magnitude. In a worst case scenario there could be a disaster of major to catastrophic proportions. Score = 3

- **Moderate:** The total population, property, commerce, infrastructure and services of the City are exposed to the effects of a hazard of moderate influence; or the total population, property, commerce, infrastructure and services of the community is exposed to the effects of a hazard, but not all to the same degree; or an important segment of population, property, commerce, infrastructure or service is exposed to the effects of a hazard. In a worst case scenario there could be a disaster of moderate to major, though not catastrophic, proportions. Score = 2

- **Low:** A limited area or segment of population, property, commerce, infrastructure or service is exposed to the effects of a hazard. In a worst case scenario there could be a disaster of minor to moderate proportions. Score = 1

Overall Risk

The risk number is one, which can help the City weigh the hazards against one another to determine which hazard is most detrimental. This is calculated by multiplying the ***Probability of Occurrence*** score by the average of the ***Severity*** score (human, property, and business impacts).

- **High:** There is a great risk of this hazard in Somersworth. Score = 4 or greater

- **Moderate:** There is moderate risk of this hazard in Somersworth. Score = 2-3

- **Low:** There is little risk of this hazard in Somersworth. = 1 or less

Hazard Ratings in Somersworth, NH

The Team determined that the hazards are distributed as follows:

- **1** hazard rated as having a **high** overall risk in Somersworth is: Severe Winter Weather

- **12** hazards rated as having a **moderate** overall risk in Somersworth are: Flooding, Hurricane and Tropical Storms, Wildfire, Urban Conflagration, Earthquakes, Tornado and Downbursts, Severe Thunderstorms, Public Health threats, Hazardous Materials, Dam Failure, Ice Jam, Extreme Temperatures.

- **4** hazards rated as having a **low** overall risk in Somersworth are: Landslides, Drought, Civil Unrest, Solar Storms/Space weather.

Table 2.3 is the City's vulnerability assessment tool, which provides more information on the multi-hazard threat analysis that was completed during a brainstorming session with the Planning Team.

Table 2.3: Hazard Vulnerability Assessment Tool – City of Somersworth

0 – N/a 1-Low 2-Moderate 3-High	**Human Impact** *Probability of death or injury*	**Property Impact** *Physical losses and damages*	**Business Impact** *Interruption of service*	**Severity** *Average of human, property, and business impacts*	**Probability** *Likelihood this will occur within 25 years*	**Overall Threat** *Low = 0-1* *Moderate = 2-3* *High = > 4* **Severity x probability**
Hazard Event						
Flooding	1.3	2.1	1.4	1.6	2.1	3.4
Ice Jam	1	1.1	1.2	1.2	1.3	1.4
Dam Failure	1.4	1.3	1.5	1.4	1	1.4
Hurricane & Tropical Storms	1.6	2	1.7	1.8	1.9	3.4
Extreme Temps	1	1	0.9	1	1.6	1.6
Wildfire	1	2	1	1.3	1.5	2
Urban Conflagration	1.5	1.7	1.6	1.6	1.7	2.7
Earthquake	1.4	2	1.9	1.8	1.1	1.9
Landslide	0.6	0.9	0.6	0.7	0.4	0.3
Severe Winter Weather	2.1	1.7	1.7	1.8	2.6	4.8
Tornado & Downburst	1.7	1.9	1.9	1.8	1.6	2.9
Drought	0.7	0.7	0.7	0.7	1.3	0.9
Severe Thunderstorms	1.4	1.6	1.4	1.5	2.3	3.4
Public Health	1.5	1	1.8	1.4	1.7	2.4
Hazardous Materials	1.7	1.6	1.7	1.7	1.6	2.7
Civil Unrest	0.6	1.3	1.7	1.2	0.9	1.1
Solar Storm/Space Weather	0.3	0.4	0.3	0.3	0.3	0.9

Description of Hazards

This section describes the location and extent of hazards that could impact the City of Somersworth, presents past hazard events in the City or elsewhere in New Hampshire, and discusses their rank order placement. The Multi-Hazard Planning Team investigated past and potential hazards using a variety of sources and techniques, including but not necessarily limited to interviewing City historians and other citizens; researching historical records archived at the City Library; scanning old newspapers; reading published City histories; consulting various hazard experts; and extracting data from the NH Hazard Mitigation Plan and other state and federal databases. Where spatial data was available, past and potential hazards were mapped.

Hazard Type	Flooding
Location/Extent	Along the Salmon falls river and dam inundation areas.
Vulnerability	
Severity	1.6
Probability	2.1
Overall Threat	3.4
Potential Loss	$8,609,627 to $43,048,139

Flooding

Description of the Hazard

Riverine flooding is the most common natural disaster to impact New Hampshire. Riverine flooding occurs when surface water runoff introduced into streams and rivers exceeds the capacity of the natural or constructed channels to accommodate the flow. As a result, water overflows the river banks and spills out into adjacent low lying areas.[8] Floods are most likely to occur in the spring due to the increase in rainfall and the melting of snow; however, floods can occur at any time of the year because of heavy rains, hurricane, or a Nor'easter. Coastal flooding is not expected to apply to Somersworth because the tidal portions of the Salmon Falls River end at a dam in Rollinsford downstream. It is possible that removal of this dam in the future could lead to coastal flooding in Somersworth but there are currently no plans to do so; it is therefore expected that all flooding on the Salmon Falls River and elsewhere in Somersworth would be typical of riverine or inland flooding patterns for the duration of this plan.

New Hampshire's climate ranges from moderate coastal to severe continental, with annual precipitation ranging from about 35 inches in the Connecticut and Merrimack River valleys, to about 90 inches on top of Mount Washington. Localized street flooding occasionally results from severe thundershowers, or over larger areas, from more general rain such as tropical cyclones and coastal "nor'easters." More general and disastrous floods are rare, but some occur in the spring from large rainfall quantities combined with warm, humid winds that rapidly release water from the snowpack.
Causes of flooding that could potentially affect Somersworth include:

- 100-year rainstorm.
- Severe tropical storm (hurricane or

tropical storm) that can bring torrential rainfall in excess of that from a 500-year storm.

- Rapid snowpack melt in spring can be a significant potential flooding source, given the northern, relatively cold location and climate of Somersworth and has occurred multiple times in the past.
- River ice jams, which could occur although there are no records of ice jams in Somersworth recorded in the USACE Ice Jam Database as of May 2021
- Erosion and mudslide in steep slope areas or riverbanks resulting from heavy rainfall that can alter Topology
- Dam breach or failure. There is one "high" hazard dam in Somersworth that could cause significant flooding around the Salmon Fall River.
- Inland flooding is a concern as well along Tates Brook to Willand Pond.

The "100-year flood" Term:

The "100-year flood" is a term often used to describe a flood that has a 1% chance of occurring in any year. But the phrase is misleading, and often causes people to believe these floods happen every 100 years on average. The truth is, these floods can happen quite close together, or not for long stretches of time, but the risk of such a flood remains constant from year to year. The 100-year-flood term was originated to delineate areas on a map to determine what properties are subject to the National Flood Insurance Program. Properties within the 100-year-floodplain, as defined by the Federal Emergency Management Agency, have special requirements and mortgage holders will require owners to carry flood insurance on these properties.

[Source: The Nurture Nature Center: Focus on Floods]

Extent of the Hazard

Based on the floodplain extent of the Flood Insurance Rate Map – dated May 17, 2005/September 30, 2015, Somersworth has flooding potential along Tates Brooks, Peters Marsh Brook, and the Salmon Falls River. There is also limited floodplain along a smaller stream feeding into Lily Pond. Somersworth has approximately 10.8% (692.7 acres) of its area in 100-yr. floodplain. However, it should be noted that a large portion of the floodplain is delineated over open water along the Salmon Falls, Lily Pond, and Willand Pond, which influences the total acreage. If the floodplain was removed from open water, the amount of floodplain impacting the City would be smaller.

Although flooding of the full extent of this floodplain by definition would require a 100-yr. storm, smaller storms with a higher annual probability of occurrence could still flood significant portions of that floodplain. Some of the structures that would be impacted by a 100-yr. storm could also be affected by smaller, more frequent flooding.

Instances of ice jam flooding on the Salmon Falls River have been rare to non-existent. The Army Corps of Engineers Ice Jam Database contains no record of ice jams in Somersworth, and the Committee did not encounter any record or reference to ice jamming in the City. Although some anecdotal information indicates that ice formation and ice flows do occur on the Salmon Falls River, the Hazard Mitigation Planning Committee referenced an ice dam in 1974-1975 that required blasting using dynamite.

There have been no instances of dam failure in Somersworth, but the Salmon Falls Dam could cause flooding downtown along the Salmon Falls River. There also has been no instance of significant inland flooding.

Past Impacts and Events

Wastewater Treatment Facility – 2006 Flooding Event

Somersworth was hit the hardest during the severe weather events in 2006, 2007, and 2010. During the 2006 and 2007 storms, the City saw major flooding along Salmon Falls Road, Blackwater Road, West High Street, and Maple Street that caused major damage, road closures, and general erosion. During each of these events the wastewater treatment facility was impacted by flooding, which included loss of power and additional equipment (pumps, blowers, generator, etc.), fuel oil loss, and debris carried throughout entire facility. The City has since taken numerous preventative measures and made significant upgrades to the plant, which include: new clear well hatches that are elevated and sealed, a new generator to be self-contained with raised fuel storage, upgrades to storm windows and doors, the propane tanks are strapped to cement pads, and the installation of flood gates for entranceways.

Potential Future Impacts on Community

Overall, flooding potential is high and flood conditions will continue to affect the City of Somersworth. Both seasonal flooding and flooding due to extreme weather events have the potential to occur during all seasons.

Estimated Loss: $8,609,627 to $43,048,139

Dam Failure

Hazard Type	Dam Failure
Location/Extent	Along the Salmon falls river and dam inundation areas.
Vulnerability	
Severity	1.4
Probability	1
Overall Threat	1.4
Potential Loss	$0 to $8,609,627

Description of the Hazard

Dam failure is s defined as the sudden, rapid, and uncontrolled release of impounded water oftentimes resulting from an unusually heavy rain event or a rain event that produces significant discharge through spillways and outlets and causes related erosion to adjacent embankment sections or discharge channels. The most likely failure mechanism is related to overtopping – when the runoff produced from a storm event exceeds the maximum capacity of a dam's outlet works. The hazard could also occur due to poor construction/maintenance or improper manipulation of the dams' discharge or outlet works.

The potential for catastrophic flooding from dam breach or failure does exist in Somersworth. The Lower Great Falls Dam (Code #218.01) is classified as a High Hazard Dam, which means that the dam has a high hazard potential because it is in a location and of a size that failure or misoperation of the dam would result in probable loss of human life. According to the dam inundation mapping that was completed for the region, if the Lower Great Falls dam either failed or was breached there would be approximately 36 acres of inundation in Somersworth along the Salmon Falls River.

According to the NHDES Dam Bureau, the Lower Great Falls dam was last inspected on 7/30/2019 by the Federal Energy Regulatory Commission (FERC) with assistance from NHDES. FERC has the primary authority of inspection (FERC's has determined the dam's hazard class as significant) due to the dam's license to produce hydropower.

Table 5.5 Dams in Somersworth by Classification

Dam Classification	Classification Definition	Number of Dams in Somersworth	Inspection Interval (Years)
High	Dam that has a high hazard potential because it is in a location and of a size that failure or misoperation of the dam would result in probable loss of human life.	1	2
Significant	Dam that has a significant hazard potential because it is in a location and of a size that failure or misoperation of the dam would result in no probable loss of lives but major economic loss to structures or property.	0	4

Low	Dam that has a low hazard potential because it is in a location and of a size that failure or misoperation of the dam would result in no possible loss of life and low economic loss to structures/property.	1	6
Non-Menace	Dam that is not a menace because it is in a location and of a size that failure of misoperation of the dam would not result in probable loss of life or loss to property.	1	6

Past Impacts and Events

There have been no known dam failures in Somersworth in the past or since the prior plan.

Potential Future Impacts on Community

Due to the Lower Great Falls dam being classified as a "high-hazard", the impact that a dam breach could make would flood several areas of Somersworth along the Salmon River to the East of Main Street and to the North of Buffumsville Road.

Estimated Loss: $0 to $8,609,627

Severe Winter Weather

Hazard Type	Severe Winter Weather
Location/Extent	City-wide
Vulnerability	
Severity	1.8
Probability	2.6
Overall Threat	4.8
Potential Loss	$43,048,139 to $86,096,278

Description of the Hazard

Winter snow and ice events are common in New Hampshire. Heavy snow typically brings significant snow removal costs along with delays in transportation schedules. Wet snow can result in major infrastructure damage from heavy snow loads and has been the cause of human harm during long periods of shoveling, including back injuries and in some cases heart attacks to older individuals. The most severe damage, though, often comes from ice storms and winter nor'easters.

- The State's Multi-Hazard Mitigation Plan Update 2018 identifies four types of winter storms:
- ***Heavy snowstorms****:* A storm that deposits four or more inches of snow (or 10 cm) in a twelve-hour period
- ***Blizzards:*** A violent snowstorm with winds blowing at a minimum speed of 35 miles (56 kilometers) per hour and visibility of less than one-quarter mile (400 meters) for three hours
- ***Nor'easter:*** A large weather system traveling from south to north, passing along the coast. As the storm's intensity increases, the resulting counterclockwise winds which impact the coast and inland areas in a Northeasterly direction. Winds from a Nor'easter can meet or exceed hurricane force winds.
- ***Ice Storms****:* An event that occurs when a mass of warm, moist air collides with a mass of cold, arctic air. The less dense warm air will rise and the moisture may precipitate out in the form of rain. When this rain falls through the colder, denser air and comes in contact with cold surfaces, ice will form and may continue to form until the ice is as
thick as several inches.

NOAA Storm Event Database (https://www.ncdc.noaa.gov/stormevents/)

Extent of the Hazard

Snow and ice storms are a city-wide hazard.

The Sperry–Piltz Ice Accumulation Index, or SPIA Index, is a forward-looking, ice accumulation and ice damage prediction index that uses an algorithm of researched parameters that, when combined with National Weather Service forecast data, predicts the projected footprint, total ice accumulation, and resulting potential damage from approaching ice storms. It is a tool to be used for risk management and/or winter weather preparedness.

The Sperry-Piltz Ice Accumulation Index, or "SPIA Index" – Copyright, February, 2009

ICE DAMAGE INDEX	* AVERAGE NWS ICE AMOUNT (in inches) *Revised-October, 2011	WIND (mph)	DAMAGE AND IMPACT DESCRIPTIONS
0	< 0.25	< 15	Minimal risk of damage to exposed utility systems; no alerts or advisories needed for crews, few outages.
1	0.10 – 0.25	15 - 25	Some isolated or localized utility interruptions are possible, typically lasting only a few hours. Roads and bridges may become slick and hazardous.
	0.25 – 0.50	< 15	
2	0.10 – 0.25	25 - 35	Scattered utility interruptions expected, typically lasting 12 to 24 hours. Roads and travel conditions may be extremely hazardous due to ice accumulation.
	0.25 – 0.50	15 - 25	
	0.50 – 0.75	< 15	
3	0.10 – 0.25	> = 35	Numerous utility interruptions with some damage to main feeder lines and equipment expected. Tree limb damage is excessive. Outages lasting 1 – 5 days.
	0.25 – 0.50	25 - 35	
	0.50 – 0.75	15 - 25	
	0.75 – 1.00	< 15	
4	0.25 – 0.50	> = 35	Prolonged & widespread utility interruptions with extensive damage to main distribution feeder lines & some high voltage transmission lines/structures. Outages lasting 5 – 10 days.
	0.50 – 0.75	25 - 35	
	0.75 – 1.00	15 - 25	
	1.00 – 1.50	< 15	
5	0.50 – 0.75	> = 35	Catastrophic damage to entire exposed utility systems, including both distribution and transmission networks. Outages could last several weeks in some areas. Shelters needed.
	0.75 – 1.00	> = 25	
	1.00 – 1.50	> = 15	
	> 1.50	Any	

(Categories of damage are based upon combinations of precipitation totals, temperatures and wind speeds/directions.)

Past Impacts and Events

The National Climatic Data Center (NCDC) Storm Events database reports 60 heavy snow events, 2 blizzards, 1 ice storm, and 8 winter storms (nor'easters) among large winter weather events impacting Strafford County from January, 1 2008 to December 31, 2020.

Three events of those listed in the NCDC database are of particular note for their severity:

1. **The Ice Storm of 2008** (December 11th – 12th) was a major winter storm that brought a mixture of snow, sleet, and freezing rain. The greatest impact in the state was in southern and central New Hampshire where a significant ice storm occurred. Following the ice storm, recovery and restoration efforts were negatively impacted by additional winter weather events that passed through the state. The freezing rain and sleet ranged from 1 to 3 inches, ice accretion to trees and wires in these areas generally ranged from about a half inch to about an inch. The weight of the ice caused branches to snap, and trees to either snap or uproot, and brought down power lines and poles across the region. About 400 thousand utility customers lost power during the event, with some customers without power for two weeks. Property damage across northern, central and southeastern NH was estimated at over $5 million.

2. **The Blizzard of 2013 – NEMO** (February 8th-9th) was an area of low pressure developed rapidly off the Carolina coast late on the 7th and early on the 8th. The storm moved very slowly northeast during the 8th and 9th as it continued to intensify. By the morning of the 10th, the storm was located just to the east of Nova Scotia. The storm brought heavy snow, high winds, and blizzard conditions to the southeastern part of the state. Snowfall amounts were generally 18 inches or

more in the southeast where blizzard conditions caused considerable blowing and drifting snow. In western and northern sections, snowfall amounts were in the 4 to 18 inch range. Southeastern New Hampshire had blizzard conditions for about 3 to 10 hours. This storm brought heavy snow, however there was no major damage. There may have been some minor power outages and school closures for short periods of time. Clean-up and snow removal took more time and resources than smaller storms.

3. **The Blizzard of 2015 – JUNO** (January 26th – 28th) was area of low pressure developed off the Delmarva peninsula on Monday, January 26th, and intensified rapidly as it moved slowly northward through the 27th. Snow spread northward across the region Monday night and became heavy on Tuesday, the 27th. Winds became strong during the day Tuesday leading to blizzard conditions at times along and inland from the coast. The snow persisted into Tuesday night in many areas with blowing and drifting snow. Along the coast, large waves combined with a storm surge produced coastal flooding and splash over. In Hampton, the Tuesday morning tide was 1.43 feet above flood levels (see graph below), inundating many streets on the bay side of town. Snowfall amounts ranged from 10 to more than 30 inches across much of the southeastern part of the state. Heavy snow also resulted in localized power outages in the downtown along Main Street and Washington Street. The Flanagan Center was open for one night as a warming station; the City Hall was closed. This storm was much more problematic than the winter storm in 2013. At the time of the event, there was an abundance of snow already on the ground. Snow removal was slower and more costly.

The committee also identified one other winter storm, which was not considered a FEMA declaration. The pre-Thanksgiving Day snow event in late November, 2014 resulted in heavy wet snow, which produced scattered power outages across the city for two full days. Along with school closures and some municipal building closures, this storm disrupted many travel plans for the holiday weekend including major delays at airports and hazardous travel by car on local and state roads. There have been no additional severe winter weather events since 2015.

Potential Future Impacts on Community

Somersworth will continue regularly to receive impacts from severe, regional winter weather events. Due to its heavily forested nature, the City is most highly exposed in terms of damage to forest resources and the secondary impacts of those damages.

Estimated Loss: $43,048,139 to $86,096,278

Wildfire

Hazard Type	Wildfire
Location/Extent	City-wide, especially in densely wooded rural areas during a drought.
Vulnerability	
Severity	1.3
Probability	1.5
Overall Threat	2
Potential Loss	$8,609,627 to $43,048,139

Description of the Hazard

According to the State of New Hampshire Multi-Hazard Mitigation Plan (2018), New Hampshire is a heavily forested state and is therefore vulnerable to this hazard, particularly during periods of drought and/or large-scale natural disturbances causing unusual fuel buildup. The proximity of many populated areas to the State's forested lands exposes these areas and their populations to the potential impact of wildfire. Somersworth, meanwhile, is covered 40% by forests with a significant urban center. Due to a larger urban center, wildfire risk is reduced in Somersworth similarly to surrounding communities of Rochester, Dover and Portsmouth which all have urban centers.

The Granite State is the second most forested state in the United States (trailing only Maine). Forests occupy 84 percent, or 4.8 million acres. The southern portion of the State has seen rapid commercial and residential development which has extended into previously forested areas. Although this development has slowed, this sprawl has created its own concerns regarding the increased risk of damage in the wildland-urban interface. In a study conducted by the United States Forest Service in 2006, New Hampshire was ranked as having the highest percentage of homes in the wildland-urban interface of any state in the nation.

Extent of the Hazard

Somersworth is an array of urban, suburban, and rural area with large tracts of forested area and open space with natural vegetation. Potential wildfire areas are in the north central section of the City surrounding Tates Brook and in the southeast of the City in the area around Twombley Brook. The latter area, though not large, is of particular note, because it is contiguous with the large, undeveloped woodland in Rollinsford known as the Scoutlands. Exposure to natural factors, such as lightning, that start wildfires is consequently high. Wildfires in New Hampshire historically have tended to run in 50-yr cycles, which can be observed starting from the 1800s. This 50-year cycle is partially based upon human activities and, therefore, may not prove to be accurate into the future.[2]

[2] New Hampshire Department of Safety. State of NH Natural Hazard Mitigation Plan 2013. Homeland Security and Emergency Management.

Past Impacts and Events

The peak in wildfires in the late 1940's and early 1950's is thought to be related to the increased fuel load from trees downed in the 1938 hurricane. Here, 60 years later, New Hampshire officials are again concerned about the high fuel load created by the 1998 and 2008 ice storms that hit New Hampshire.

The National Wildfire Coordinating Group (NWCG) defines the size of a wildfire as:

Class A - one-fourth acre or less;
Class B - more than one-fourth acre, but less than 10 acres;
Class C - 10 acres or more, but less than 100 acres;
Class D - 100 acres or more, but less than 300 acres;
Class E - 300 acres or more, but less than 1,000 acres;
Class F - 1,000 acres or more, but less than 5,000 acres;
Class G - 5,000 acres or more.

The NCDC Storm Events database lists 0 reported wildfires in Strafford County from January 1, 2010 to December 31, 2020. The committee concluded that here have been no wildfires in Somersworth since the last plan.

Potential Future Impacts on Community

The probability of occurrence of wildfires in the future is effectively impossible for the Hazard Mitigation Committee to predict due to the dependence of wildfire on the occurrence of the causal hazards and the variability of numerous factors that affect the severity of a wildland fire. Geographically specific information is unavailable or unfeasible and this hazard can impact the entire jurisdiction equally.

Estimated Loss: $8,609,627 to $43,048,139

Urban Conflagration

Table 5.17 Hazard Overview

Hazard Type	Conflagration
Location/Extent	City-wide; densely developed areas, especially of older construction, may be more vulnerable
Vulnerability	
Severity	1.6
Probability	1.7
Overall Threat	2.7
Potential Loss	$8,609,627 to $43,048,139

Description of the Hazard

The New Hampshire State Hazard Mitigation Plan defines a conflagration as "a large and destructive fire that threatens human life, animal life, health, and/or property." These fires could begin naturally (e.g. due to a lightning strike or combustion of dry brush), accidentally (e.g. a kitchen fire, vehicle accident, mechanical malfunction, or poorly-tended fire pit), or intentionally (arson). Urban conflagrations are more likely to begin as a result of human activity or mechanical malfunction associated within a building. Therefore, the severity of the fire and subsequent impacts to life, safety, and property, will be heavily dependent upon the building involved.

Modern fire and building codes are intended to slow the spread of fires within the building and ensure multiple points of egress in an emergency. Older construction, especially dense timber-framed construction, poses a higher threat for rapid spread. In industrial development or older construction, the presence of Tier II controlled substances or potentially hazardous building materials could result in release of those materials into the environment during a conflagration or direct exposure to victims and first-responders.

The State Hazard Mitigation Plan includes wildfires within its definition of conflagration; the Somersworth hazard mitigation committee prefers to analyze wildfires and urban conflagrations as distinct hazard types with distinct causes, impacted areas, and strategies for mitigation and response. However, it is noted that fires that begin as either wildfires or urban conflagrations can spread to other areas and any fire could take on the characteristics of both a wildfire and urban conflagration if it became sufficiently large or spread through the Wildland Urban Interface ("WUI"). The National Forest Service defines the WUI as any location where "humans and their development meet or intermix with wildland fuel".[3] According to the US Forest Service Northern Research Station, in 2010 490,791 of New Hampshire's 614,754 houses (78.8%) were located within the WUI.[4]

[3] https://www.fs.fed.us/openspace/fote/reports/GTR-299.pdf
[4] https://www.nrs.fs.fed.us/data/wui/state_summary/

Extent of the Hazard

Conflagrations are a city-wide hazard that could impact all locations, though for the purposes of this plan they are presumed to originate within buildings or urban areas to distinguish them from the "wildfire" hazard. Conflagrations are frequently measured in terms of the area impacted or the level of response required. This could include the area measured in square (city) blocks or estimated value of fire damage, or in the case of response levels, may be described by a number of "alarms" indicating units or jurisdictions that contributed to the response.

Past Impacts and Events

Local cases of urban conflagration in Somersworth are typically single-event fires that have not spread from building to building.

- Noteworthy large fires in Somersworth or elsewhere since the prior plan:
  - 2015 3-alarm house fire, one person killed[5]
  - 2019 2-alarm fire in Main Street mill building[6]
  - 2020 3-alarm fire at Hilltop Chevrolet[7]

The NCDC Storm Events database does not have a hazard category for urban conflagration.

Potential Future Impacts on Community

The density of wood frame buildings within Somersworth, particularly in the vicinity of downtown, poses a risk because many older buildings have not been upgraded to current fire codes. Current development is subject to the 2015 International Building Code and other fire, health, and safety codes. This means that new buildings are less likely to catch fire, or fire will spread more slowly, but adding new development to previously-vacant property may still increase the overall risk of conflagration, especially in close proximity to older development. Redevelopment of existing older structures, on the other hand, would significantly reduce the risk that those structures pose by upgrading them to meet current codes.

Estimated Loss: $8,609,627 to $43,048,139

[5] https://www.fosters.com/article/20150522/NEWS/150529651
[6] https://www.wmur.com/article/2-alarm-fire-burns-abandoned-mill-building-in-somersworth/25784003#
[7] https://www.fosters.com/story/news/2020/08/21/fire-strikes-hilltop-chevrolet-in-somersworth/42406417/

Severe Thunderstorms

Hazard Type	Severe Thunderstorms
Location/Extent	City-wide
Vulnerability	
Severity	1.5
Probability	2.3
Overall Threat	3.4
Potential Loss	$8,609,627 to $43,048,139

Description of the Hazard

Thunderstorm related hazards that could impact Somersworth include: high winds and downburst, lightning, hail, and, torrential rainfall. Thunderstorms are common in New Hampshire but can be considered generally less severe than in other areas of the country, such as the Great Plains states. Severe thunderstorms do occur in New Hampshire, though.

Lightning is a visible electric discharge produced by a thunderstorm. The discharge may occur within or between clouds, between a cloud and the air, between a cloud and the ground, or between the ground and a cloud. As lightning passes through the air, it heats the air to a temperature of 18,000-60,000 degrees Fahrenheit. This causes the air to rapidly expand and contract creating a sound wave known as thunder.

Lightning can cause significant, sometimes severe, damage. Lightning strikes can cause direct damage to structures and serious injury or death to people and animals. Extensive damage also commonly results from secondary effects of lightning, such as electrical power surges, wildfire, and shockwave. According to lightning fatality data collected by the National Oceanic and Atmospheric Administration (NOAA), there were 322 fatalities in the United States from 2005-2014. There were no reported deaths in NH. The Somersworth Hazard Mitigation committee identified instances where lightning had caused small fires and roof damage since 2015 that caused minimal damage to properties. There were no injuries reported.

Extent of the Hazard

The National Climatic Data Center Storm Events database (NCDC 2021) lists 0 reports of lightning events in Strafford County from January 1, 2010 to December 31, 2020. However, localized events have occurred, including lightning damage to homes and City facilities which caused minor electrical issues. The planning committee discussed past challenges with lightning strikes at the old police station. The City has since installed a more adequate grounding system. Overall damage is most likely to be done through secondary effects like wildfire or tree felling. Direct strikes of people and buildings, however, remain a distinct possibility. Loss of life is generally not likely, but the opening of a new golf course in Somersworth might significantly increase the likelihood of direct strikes on people, as do outdoor events, such as the Somersworth International Children's Festival.

Table 5.10: Lightning Activity Scale

Lightning Activity Level (LAL)	Conditions
LAL1	No thunderstorms activity
LAL2	Isolated thunderstorms
LAL3	Widely scattered thunderstorms
LAL4	Scattered thunderstorms
LAL5	Numerous thunderstorms
LAL6	Widely scattered, scattered, or numerous DRY thunderstorms

Past Impacts and Events

Thunderstorms are common in New Hampshire but can be considered generally less severe than in other areas of the country, such as the Great Plains states. Severe thunderstorms do occur in New Hampshire, though. The National Climatic Data Center Storm Events database (NCDC 2021) lists 48 reported events (over 26 different days) of severe thunderstorm winds in Strafford County from January 1, 2010 to December 31, 2020. During that time period, there were 3 reported events in Somersworth, all of which caused power outages due to downed trees.

Hail is a fairly common part of thunderstorms in New Hampshire, but damaging hail is apparently not. The damage that can result from hail is mostly to cars and windows. The NCDC Storm Events database lists 17 reported hailstorms in Strafford County from January 1, 2010 to December 31, 2020; none of which occurred in Somersworth.

Potential Future Impacts on Community

The annual recurrence probability of thunderstorms in general is effectively 100% with damaging ones occurring less often. Somersworth will continue to experience thunderstorms and should expect to sustain significant damage periodically. Overall the recurrence probability for thunderstorms is high. Geographically specific information is unavailable or unfeasible and this hazard can impact the entire jurisdiction equally.

Estimated Loss: $8,609,627 to $43,048,139

Earthquake

Hazard Type	Earthquake
Location/Extent	City-wide
Vulnerability	
Severity	1.8
Probability	1.1
Overall Threat	1.9
Potential Loss	$8,609,627 to $43,048,139

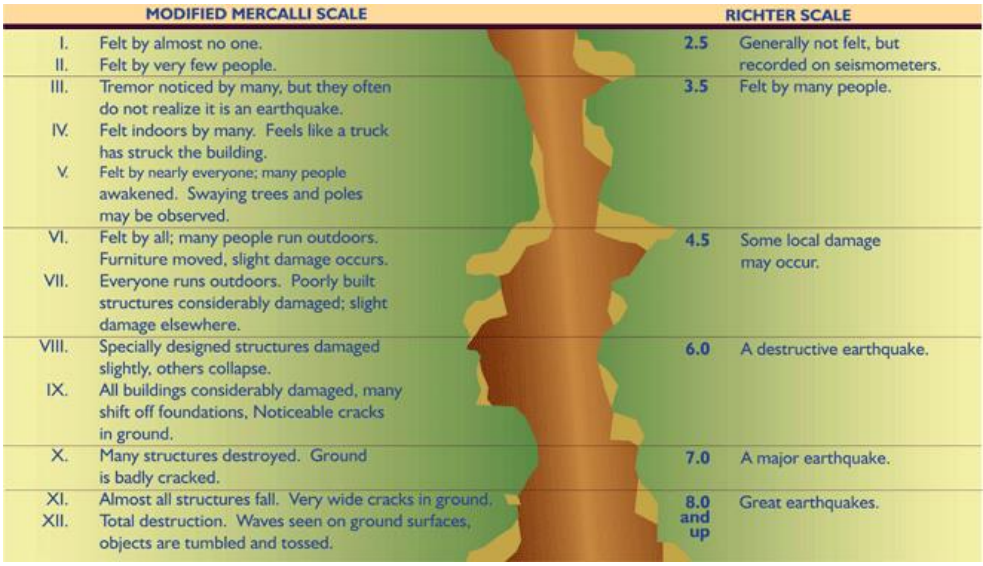
Description of the Hazard

The USGS defines an earthquake as a term used to describe both sudden slip on a fault, and the resulting ground shaking and radiated seismic energy caused by the slip, or by volcanic or magmatic activity, or other sudden stress changes in the earth. Earthquakes can cause buildings and bridges to collapse, disrupt gas, electric and phone lines, and often cause landslides, flash floods, fires, avalanches, and tsunamis. 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.[7] Earthquakes in the Northeast are not associated with specific known faults.

The magnitude and intensity of an earthquake is measured by the Richter scale and the Modified Mercalli Intensity (MMI) scale, respectively. The Richter magnitude scale was developed in 1935 by Charles F. Richter of the California Institute of Technology as a mathematical device to compare the size of earthquakes. The magnitude of an earthquake is determined from the logarithm of the amplitude of waves recorded by seismographs. Adjustments are included for the variation in the distance between the various seismographs and the epicenter of the earthquakes.[8]

[8] USGS. Earthquake Hazard Program. http://earthquake.usgs.gov/learn/glossary/?term=Richter%20scale., http://pubs.usgs.gov/gip/earthq4/severitygip.html.

The Modified Mercalli Intensity (MMI) scale was developed in 1931 by the American seismologists Harry Wood and Frank Neumann. This scale, composed of 12 increasing levels of intensity that range from imperceptible shaking to catastrophic destruction, is designated by Roman numerals. It does not have a mathematical basis; instead it is an arbitrary ranking based on observed effects actually experienced at a given place and therefore has a more meaningful measure of severity.



MODIFIED MERCALLI SCALE		RICHTER SCALE	
I.	Felt by almost no one.	2.5	Generally not felt, but recorded on seismometers.
II.	Felt by very few people.		
III.	Tremor noticed by many, but they often do not realize it is an earthquake.	3.5	Felt by many people.
IV.	Felt indoors by many. Feels like a truck has struck the building.		
V.	Felt by nearly everyone; many people awakened. Swaying trees and poles may be observed.		
VI.	Felt by all; many people run outdoors. Furniture moved, slight damage occurs.	4.5	Some local damage may occur.
VII.	Everyone runs outdoors. Poorly built structures considerably damaged; slight damage elsewhere.		
VIII.	Specially designed structures damaged slightly, others collapse.	6.0	A destructive earthquake.
IX.	All buildings considerably damaged, many shift off foundations, Noticeable cracks in ground.		
X.	Many structures destroyed. Ground is badly cracked.	7.0	A major earthquake.
XI.	Almost all structures fall. Very wide cracks in ground.	8.0 and up	Great earthquakes.
XII.	Total destruction. Waves seen on ground surfaces, objects are tumbled and tossed.		

Figure 5.8 Measuring the magnitude and intensity of Error! Bookmark not defined.

Extent of the Hazard

Due to the geology of the region, the area impacted by an earthquake in the Northeast can be up to 40 times greater than the same magnitude event occurring on the West coast. Earthquakes can occur at any time without warning. An earthquake can impact all areas of the jurisdiction. People at greatest risk from earthquakes are those who live in unreinforced masonry buildings build on filled land or unstable soil.[9]

Land subsidence, the loss of surface elevation due to removal of subsurface support, occurs in nearly every state in the United States. Subsidence is one of the most diverse forms of ground failure, ranging from small or local collapses to broad regional lowering of the earth's surface. The causes (mostly due to human activities) of subsidence are as diverse as the forms of failure, and include dewatering of peat or organic soils, dissolution in limestone aquifers, first-time wetting of moisture-deficient, low-density soils (hydrocompaction), natural compaction, liquefaction, crystal deformation, subterranean mining, and withdrawal of fluids (ground water, petroleum, geothermal). Subsidence poses a greater risk to property than to life. Damage consists of direct structural damage, property loss, and depreciation of land values.

Past Impacts and Events

[9] http://nesec.org/earthquakes-hazards/

Due to the state's location in an area of moderate seismic activity earthquakes are a common event in New Hampshire, but significantly damaging earthquakes are not. The Northeast States Emergency Consortium (NESEC, 2016) website presents a history of earthquake in the Northeast and documents that New Hampshire is an area of high earthquake probability. Over Three hundred and sixty earthquakes occurred in New Hampshire from 1638 to 2020. Approximately 40-50 earthquakes are detected in the Northeast annually.**Error! Bookmark not defined.** However, New Hampshire has only experienced n ine earthquakes of significant magnitude (Richter Magnitude 4.0 or greater) in that time period. Somersworth has experienced no major earthquakes in recent years. Earthquakes are on average an annual occurrence but significant quakes have an annual probability of occurrence (based on the 1638 to 2020 period) of about 2.4%.

Earthquakes could readily cause landslides, as could ground saturation from extended heavy precipitation events. Given seismic or precipitation events that could initiate landslide, landslide hazard is likely in steep slope areas. However, these areas are extremely limited in scale. No local impacts of earthquakes or landslides have been reported for Somersworth.

Table 5.15 Notable Historic Earthquakes in NH 1638-2007 (Magnitude 4.0 or Greater)

Location	Date	*Intensity MMI Scale*	Magnitude *Richter Scale*
Central New Hampshire	June 11, 1638	-	6.5
Portsmouth	November 10, 1810	V	4.0
Near Hampton	July 23, 1823	IV	4.1
Ossipee	October 9, 1925	VI	4.0
Ossipee	December 20, 1940	VII	5.5
Ossipee	December 24, 1940	VII	5.5
West of Laconia	January 19, 1982	-	4.7
Northeast of Berlin	October 20, 1988	-	4.0
Southeast of Berlin	April 6, 1989	-	4.1

Potential Future Impacts on Community

Due to the state's location in an area of moderate seismic activity earthquakes are a common event in New Hampshire, but significantly damaging earthquakes are not. The Northeast States Emergency Consortium (NESEC, 2015) website presents a history of earthquake in the Northeast and documents that New Hampshire is an area of high earthquake probability. Three hundred and sixty earthquakes occurred in New Hampshire from 1638 to 2007. However, New Hampshire has only experienced nine earthquakes of significant magnitude (Richter Magnitude 4.0 or greater) in that time period.

This data would suggest, then, that earthquakes are on average an annual occurrence but that significant quakes have an annual probability of occurrence (based on the 1638 to 2007 period) of about 2.4%.

Estimated Loss: $8,609,627 to $43,048,139

Drought

Hazard Type	Drought
Location/Extent	City-wide
Vulnerability	
Severity	0.7
Probability	1.3
Overall Threat	0.9
Potential Loss	$0 to $8,609,627

Description of the Hazard

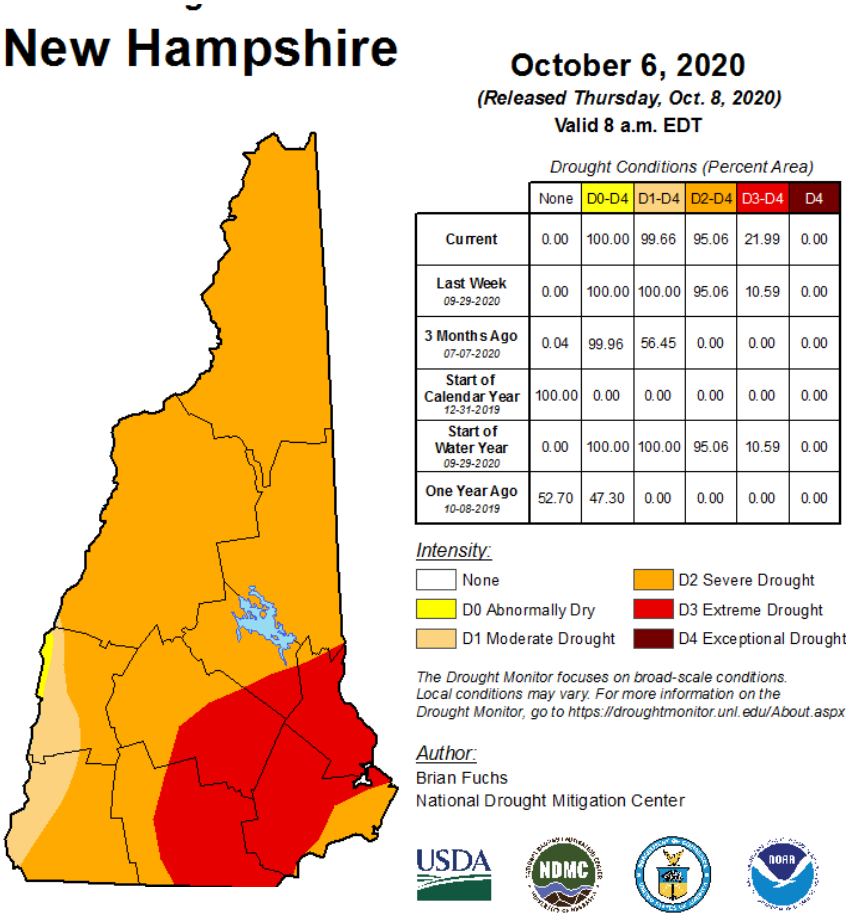
A drought is defined as a long period of abnormally low precipitation, especially one that adversely affects growing or living conditions. The impacts of droughts are indicated through measurements of soil moisture, groundwater levels, and stream flow. The effect of drought on these indicators is variable during any particular event. For example, frequent minor rainstorms can replenish the soil moisture without raising groundwater levels or increasing streamflow. Low streamflow also correlates with low ground-water levels because ground water discharge to streams and rivers maintains streamflow during extended dry periods. Low streamflow and low ground-water levels commonly cause diminished water supply.

Extent of the Hazard

The National Drought Monitor classifies the duration and severity of the drought using precipitation, stream flow, and soil moisture data coupled with information provided on a weekly basis from local officials. There are five magnitudes of drought outlined in the New Hampshire State Drought Management Plan: Exceptional, Extreme, Severe, Moderate, and Abnormally Dry. Drought is a regional hazard and can impact the entire jurisdiction. Agricultural land and residents who use dug, shallower wells may be more vulnerable to the effects of drought.

Past Impacts and Events

While the impacts of drought are typically not as damaging and disruptive as floods or storm events, the impacts of long term drought or near drought conditions can impact crops and the water supply. Periods of drought have occurred historically in New Hampshire. Six droughts of significant extent and duration were evident in the 20th century as noted below in Table 2.5. The most severe drought recorded in New Hampshire occurred from 1960 to 1969. This drought encompassed most of the northeastern United States (1956-1966). The drought of 1929-1936 was the second worst and coincided with severe drought conditions in large areas of the central and eastern United States. The drought of 2001-2002 was the third worst on record.[10]



In more recent years, drought has again become a problem in New Hampshire. In 1999, a drought warning was issued by the Governor's Office. In March 2002, all counties in New Hampshire with the exception of Coos County were declared in Drought Emergency. This was the first time that low-water conditions had progressed beyond the Level Two, Drought Warning Stage. With extreme variation in environmental conditions due to global warming possibly on the rise, drought probability may grow in the future. Currently, drought possibility seems moderate. The large amount of water resources and relatively sparse population in New Hampshire have tended to minimize the impacts of drought events in the region, but this regional protection may be endangered in the future with increases in drought frequency or severity.

Normal precipitation for the state averages 40 inches per year. During the summer of 2020, nearly all of New Hampshire experienced its most recent drought, similar to the 2001 – 2002 drought (was the 3rd worst on record, exceeded only by the national droughts of 1956-1966 and 1941-1942). While many communities experienced record snowfall totals in recent winters (2014-2015), the lack of rainfall and higher-than-average temperatures resulted in

[10] NHDES. Drought Management Program. Publications. *NH Drought Historical Events*. Viewed on 8/10/15. http://des.nh.gov/organization/divisions/water/dam/drought/documents/historical.pdf

river and groundwater levels to be lower than average. This resulted in the implementation of local water conservation plans throughout the region.[11]

Drought conditions continued and intensified into 2020 in New Hampshire and in Southeast New Hampshire in particular. As of October 11, 2016, nearly 20% of the state was categorized as being in extreme drought, including Somersworth. Hundreds of community water systems reported implementing a water restriction or ban, and several towns reported implementing voluntary or mandatory outdoor use bans in the state during the peak drought conditions. Conditions in New Hampshire largely returned to normal in the first half of 2021, but dry conditions have persisted into the spring.

The City of Somersworth has not reported any instances of dry wells as a result of drought. Water conservation protocols were enacted in response to the drought of 2020. However, Somersworth has few agricultural or other intensive water users, so the overall local impacts of this drought were limited.

Table 5.13 New Hampshire Drought History & Conditions

Dates	Area Affected	Magnitude	Remarks
1929 – 1936	Statewide	-	Regional; recurrence interval 10 to > 25 years
1939 – 1944	Statewide	Severe Moderate	Severe in southeast NH and moderate elsewhere in the State. Recurrence interval 10 to > 25 years.
1947 – 1950	Statewide	Moderate	Recurrence interval 10 to >25 years
1960 – 1969	Statewide	Extreme	Longest recorded continuous spell of less than normal precipitation. Encompassed most of the northeast US. Recurrence interval >25 years.
2001 – 2002	Statewide	Severe	Recurrence interval 10 to >25 years
2015	Central & Southern NH	Moderate	Recurrence interval cannot yet be determined
2020	Statewide	Severe	Recurrence interval cannot yet be determined

Potential Future Impacts on Community

The National Drought Mitigation Center website (NDMC 2004) emphasizes that reliable drought prediction for regions above 30°N latitude is effectively impossible. With extreme variation in environmental conditions due to climate change possibly on the rise, drought probability may grow in the future. Currently, drought possibility seems moderate. The large amount of water resources and relatively sparse population in New Hampshire have tended to minimize the impacts of drought events in the region, but this regional protection may be endangered in the future with increases in drought frequency or severity.

[11] See: http://des.nh.gov/organization/divisions/water/dwgb/water_conservation/documents/waterban.pdf.

Historically, droughts in New Hampshire have had limited effect because of the plentiful water resources and sparse population. Since 1960, the population has more than doubled, which has increased demand for the State's water resources. Further droughts may have considerable effect on the State's densely populated areas along the seacoast and in the south-central area.

Estimated Loss: $0 to $8,609,627

Hurricanes and Tropical Storms

Hazard Type	Hurricanes and Tropical storms
Location/Extent	City-wide
Vulnerability	
Severity	1.8
Probability	1.9
Overall Threat	3.4
Potential Loss	$8,609,627 to $43,048,139

Description of the Hazard

According to the State Hazard Mitigation Plan (2018) tropical cyclones with maximum sustained winds of less than 39 mph are called tropical depressions. Once the tropical cyclone reaches winds of at least 39 mph, they are typically called a tropical storm and assigned a name. If the winds reach 74 mph or greater, they are upgraded and called a hurricane. The Saffir-Simpson Hurricane Wind Scale is a 1 to 5 rating system based on a hurricane's sustained wind speed. This scale estimates potential property damage. Hurricanes reaching Category 3 and higher are considered major hurricanes because of their potential for significant loss of life and damage. Category 1 and 2 storms are still dangerous, however, and require preventative measures.

These severe tropical storms may occur anytime from early spring to late fall, and in general are less common than other storms, e.g. nor'easters. As wind events, historically hurricanes have caused damage in Somersworth, most notably in 1938 and 1954 (Hurricane Carol). Quite a few other hurricanes have impacted the City, including Hurricane Donna, Gloria, and Bob, with high winds but relatively little damage.

Scale Number (Category)	Sustained Winds (MPH)	Damage	Storm Surge
1	74-95	**Minimal:** Unanchored mobile homes, vegetation and signs.	4-5 feet
2	96-110	**Moderate:** All mobile homes, roofs, small crafts, flooding.	6-8 feet
3	111-130	**Extensive:** Small buildings, low-lying roads cut off.	9-12 feet
4	131-155	**Extreme:** Roofs destroyed, trees down, roads cut off, mobile homes destroyed. Beach homes flooded.	13-18 feet
5	More than 155	**Catastrophic:** Most buildings destroyed. Vegetation destroyed. Major roads cut off. Homes flooded.	Greater than 18 feet

Extent of the Hazard

These severe tropical storms may occur anytime from early spring to late fall, and in general are less common than other storms, e.g. nor'easters. As wind events, historically hurricanes have caused damage in Somersworth, most notably in 1938 and 1954 (Hurricane Carol). Quite a few other hurricanes have impacted the City, including Hurricane Donna, Gloria, and Bob, with high winds but relatively little damage.

Past Impacts and Events

The NOAA National Climatic Data Center's Storm Events database (NCDC 2021) does not list any Hurricanes as directly affecting Strafford County from January 1, 2010 to May 14, 2021. The database does report two tropical storm event, which is detailed as follows:

1. **Tropical Storm Irene** (August 28, 2011) - brought a prolonged period of strong and gusty winds and heavy rain to the state. The high winds snapped or uprooted numerous trees throughout the state causing more than 160,000 customers to lose electrical and/or communication services. The heavy rains caused rivers and streams throughout the state to flood causing damage to bridges, roads, and property. The strongest winds across the state began Sunday morning in southern areas and spread northward during the day. Winds continued to be gusty overnight as the storm moved away from the area. Observed maximum wind gusts included 63 mph at Portsmouth, 52 mph at Concord, and 51 mph at Manchester. On the top of Mt. Washington, winds gusted to 104 mph as the storm approached and 120 mph as it moved away. The combination of wet soil and the prolonged period of strong and gusty winds brought down numerous trees throughout the state. One person was killed and three people were injured across the state due to falling trees or branches. Rainfall amounts across the state ranged from 1.5 to 3 inches across southeastern New Hampshire.
2. **Tropical Storm Isaias** (August 4, 2020) - was the first tropical storm to impact New Hampshire since 2011. The center of the storm tracked west of the state, keeping the flooding rain associated with the storm across New York. The primary impacts the storm brought to New Hampshire were gusty winds with widespread reports of wind gusts in the mid to upper 40s. Numerous trees and branches were brought down with scattered power outages across the state. An area of

enhanced damage was concentrated in Carroll County as a squall line pushed through the region. Concentrated tree damage toppled 100s of trees with one fatality being reported as a large crash into a home. Overall storm impacts were brief with a period of gusty winds from the south to southeast on the evening of August 4th causing most of the damage. There was no coastal flooding reported as the relatively minor storm surge of around a foot coincided at the time of low tide on the New Hampshire coast.

The another hurricane to hit the region was Hurricane Sandy during the period of October 26 to November 8, 2012. During the storm, the City experienced a number of road closures due to downed trees and other debris. The Emergency Operations Center was opened for emergency responders and municipal staff. Declaration FEMA-4095 requested funds for debris removal and emergency protective measures.

Based on historical data and statistical predictors, the Atlantic Basin averages approximately 12 total named storms per year. Six of those storms will become hurricanes with three becoming a category three or higher. With variability in sea-level pressure and sea-surface temperatures in the Atlantic Ocean, it is difficult to predict with certainty the number of storms in any given year. It is even more difficult to determine which of those storms will make landfall. Because Somersworth is considerably inland from the New Hampshire coast, wind speeds may be diminished from their coastal strength, and significant impact on the City would be dependent on the exact track of these concentrated storms. However, the community remains vulnerable to flooding from both high amounts of precipitation and coastal surge along the Salmon Falls River. There have been no other instances of high wind events since the prior plan.

Potential Future Impacts on Community

Hurricanes and tropical storms will continue to affect Somersworth and recurrence potential of hurricane and tropical storm hazards is, therefore, moderate. From 1938-2012 there have been twelve significant hurricanes or tropical storms that have impacted the community and the surrounding region. It is likely that the region will be impacted by a significant storm of tropical origin within the foreseeable future. Geographically specific information is unavailable or unfeasible and this hazard can impact the entire jurisdiction equally.

Estimated Loss: $8,609,627 to $43,048,139

Hazardous Materials

Hazard Type	Hazardous Materials
Location/Extent	Mainly within the area of the train tracks
Vulnerability	
Severity	1.7
Probability	1.6
Overall Threat	2.7

Potential Loss	$8,609,627 to $43,048,139

Description of the Hazard

Hazardous materials in various forms can cause death, serious injury, long-lasting health effects, and damage to buildings, homes, and other property. Many products containing hazardous chemicals are used and stored in homes routinely. These products are also shipped daily on the nation's highways, railroads, waterways, and pipelines. Chemical manufacturers are one source of hazardous materials, but there are many others, including service stations, hospitals, hazardous materials waste sites, as well as residential basements and garages. Hazardous materials continue to evolve as new chemical formulas are created.

The NH North Coast rail line runs through Somersworth in the densely developed and populated downtown area, mostly carrying sand/gravel and Liquid Propane Gas "LPG" to Eastern Propane & Oil terminal in North Rochester. Transportation of chemicals and bio-hazardous materials to and from Canada or Maine by railroad or truck is a concern. The potential for derailments and accidents at rail crossings always exists. Three major roads also pose significant hazards for the City. The Spaulding Turnpike (Route 16) is a main highway from southern New Hampshire to the Lakes Region and the White Mountains. Traffic accidents occur on this highway regularly, and hazardous materials are routinely carried on this road. State Route 9 (High Street) connects the Spaulding Turnpike with the Berwicks in Maine, passing directly through downtown Somersworth, crossing both the Salmon Falls River and the New Hampshire North Coast railroad line, and continuing eastward into Berwick, Maine. Though probably not as frequently, hazardous materials are carried on this roadway. Traffic congestion is a common problem on this route. Finally, state Route 108 is a major alternative road to the Spaulding Turnpike in western Somersworth, connecting Dover and Rochester, New Hampshire. It is a major commercial corridor.

Extent of the Hazard

Hazardous materials that are released during transport are most likely to impact the transportation system, with the corridors described above being at highest risk, but this hazard could conceivably impact all locations within the city.

Past Impacts and Events

No disastrous accidents on either the highway or rail system in Somersworth have been recorded. Safety regulations and enforcement are fairly strict, so the likelihood of an accidental and seriously damaging release of harmful chemicals in Somersworth is small. If an accident does occur, though, especially close to downtown, the percentage of the population exposed to the hazard could be large.

Potential Future Impacts on Community

Safety regulations and enforcement are fairly strict, so the likelihood of an accidental and seriously damaging release of harmful chemicals in Somersworth is small. If an accident does occur, though, especially close to downtown, the percentage of the population exposed to the hazard could be large.

The Somersworth fire department is a member of the Seacoast Chief Fire Officers Mutual Aid District (SCFOMAD) which provides an emergency hazardous materials response team known as the Seacoast Technical Assistance and Response Team (START).

Estimated Loss: $8,609,627 to $43,048,139

Tornado and Downburst

Hazard Type	Tornado and Downburst
Location/Extent	City-wide
Vulnerability	
Severity	1.8
Probability	1.6
Overall Threat	2.9
Potential Loss	$8,609,627 to $43,048,139

Description of the Hazard

A tornado is a violent windstorm characterized by a twisting, funnel shaped cloud with winds in excess of 200 mph, often accompanied by violent lightening, peripheral high winds, severe hail, and severe rain. Tornadoes develop when cool air overrides a layer of warm air, causing the warm air to rise rapidly. The atmospheric conditions required for the formation of a tornado include great thermal instability, high humidity, and the convergence of warm, moist air at low levels with cooler, drier air aloft. Most tornadoes remain suspended in the atmosphere, but if they touch down they become a force of destruction.

Tornadoes produce the most violent winds on earth, at speeds of 280 mph or more. In addition, tornadoes can travel at a forward speed of up to 70 mph. Damage paths can be in excess of one mile wide and 50 miles long. Violent winds and debris slamming into buildings cause the most structural damage. The Enhanced Fujita Scale is the standard scale for rating the severity of a tornado as measured by the damage it causes. A tornado is usually accompanied by thunder, lightning, heavy rain, and a loud "freight train" noise. In comparison to a hurricane, a tornado covers a much smaller area but can be more violent and destructive.

A downburst is a severe localized wind blasting down from a thunderstorm. These "straight line" winds are distinguishable from tornadic activity by the pattern of destruction and debris. Downbursts fall into two categories: microburst, which covers an area less than 2.5 miles in diameter and macroburst, which covers an area at least 2.5 miles in diameter.

Extent of the Hazard

Tornadoes produce the most violent winds on earth, at speeds of 280 mph or more. In addition, tornadoes can travel at a forward speed of up to 70 mph. Damage paths can be in excess of one mile wide and 50 miles long. Violent winds and debris slamming into buildings cause the most structural damage. The Enhanced Fujita Scale is the standard scale for rating the severity of a tornado as measured by the damage it causes. A tornado is usually accompanied by thunder, lightning, heavy rain, and a loud "freight train" noise. In comparison to a hurricane, a tornado covers a much smaller area but can be more violent and destructive.

Enhanced Fujita Scale	
EF–0	65–85 mph winds
EF–1	86–110 mph
EF–2	111–135 mph
EF–3	136–165 mph
EF–4	166–200 mph
EF–5	>200 mph

Past Impacts and Events

Between 1991 and 2010, the average annual number of tornadoes in New Hampshire was one.[12] The severity and overall risk of tornado/downburst activities in the state is two. Though the frequency of tornado events in New Hampshire is not great, the state has experienced large tornados throughout its history. An early example is the tornado that stuck the state in September 1821. This tornado was reported to have tracked from the Connecticut River, near Cornish, and terminating near Boscawen. When the skies cleared, 6 people were dead, hundreds injured and thousands homeless.

In 1998 an F2 tornado in Antrim, N.H. blew down a 45-foot by 12-foot section of the Great Brook Middle School. Witnesses reported seeing a funnel cloud, and the weather service, after an inspection, confirmed it was a tornado. According to the June 2, 1998 edition of the Eagle Tribune, John Jensenius from the National Weather Service in Gray, Maine estimated that the twister cut a path half a mile long, up to 100 yards wide, and was on the ground for several minutes.

In July 2008, an F2 tornado and high winds created a path of destruction through five New Hampshire counties that destroyed homes, displaced families, downed trees and forest lands and closed major state roadways. The impact to residents was extensive, with over 100 homes rendered uninhabitable. Phone and electric service was cut off to over 12,500 customers. One fatality is attributed to a building collapse, and local hospitals reported numerous physical injuries

[12] NOAA. U.S. Tornado Climatology (https://www.ncdc.noaa.gov/climate-information/extreme-events/us-tornado-climatology)

associated with this severe storm.[13] An E-F1 tornado, moving north northeast out of Belknap County entered Strafford County approximately 2.2 mile north northwest of New Durham and skipped along for more than eight miles before exiting into Carroll County. The intensity of the tornado varied between F0 and F2 and numerous trees were blow down along the path of the storm.[14] Sustained winds of 86 to 110 mph were recorded. The tornado's path was centrally located over undeveloped land and forested areas, however at least 20 buildings were damaged in the town. Since the July 2008 tornado (through September 2021), seven tornados have hit New Hampshire, however none have hit Strafford County.

Downburst activity is very prevalent throughout the State. However, the majority downburst activity is mostly unrecognized unless a large amount of damage has occurred. Several of the more significant and recent events are highlighted below:

1. Central, NH – July 6, 1999 – Damages: Two roofs blown off structures, downed trees, widespread power outages, and damaged utility poles and wires; two fatalities.
2. Stratham, NH – August 18, 1991 – Damages: $2,498,974 worth of damages; five fatalities.
3. Moultonborough, NH – July 26, 1994 – Damages: Downed trees, utility poles and wires. Approximately 1,800 homes without power and 50-60 homes damages.
4. Bow, NH – September, 6, 2011 – Damages: City Auto in Bow had 15 campers damaged and estimated $200,000 in damage.

There has not been any notable high-wind events in Somersworth since the last plan.

Potential Future Impacts on Community

Considering the great dependence of impact upon the actual track of any tornado, the likelihood of a large tornado hitting Somersworth is fairly low. The tornado recurrence probability for Somersworth, therefore, is also low. A downburst may be higher. Geographically specific information is unavailable or unfeasible and this hazard can impact the entire jurisdiction equally.

Estimated Loss: $8,609,627 to $43,048,139

Extreme Temperatures (Low/High)

Hazard Type	Extreme Temperatures
Location/Extent	City-wide
Vulnerability	
Severity	1
Probability	1.6

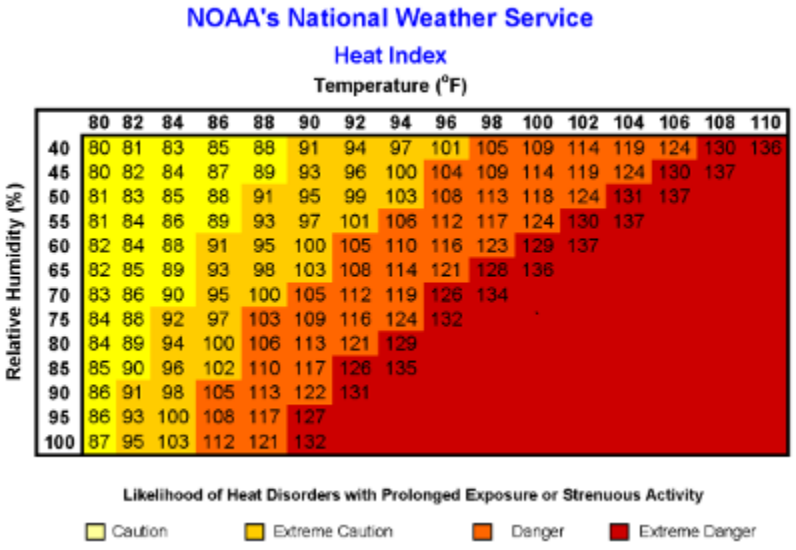
[13] New Hampshire Department of Safety. State of NH Natural Hazard Mitigation Plan 2013. Homeland Security and Emergency Management.
[14] NOAA National Climatic Data Center. Storm Events Database. (https://www.ncdc.noaa.gov/stormevents/eventdetails.jsp?id=123355)

Overall Threat	1.6
Potential Loss	$8,609,627 to $43,048,139

Description of the Hazard

Extreme temperatures can be described as heat waves. A *heat wave* is a prolonged period of excessively hot and sometimes also humid weather relative to normal climate patterns of a certain region. Heat kills by pushing the human body beyond its limits. In extreme heat and high humidity, evaporation is slowed and the body must work extra hard to maintain a normal temperature. Most heat disorders occur because the victim has been overexposed to heat or has over-exercised for his or her age and physical condition. Older adults, young children, and those who are sick or overweight are more likely to succumb to extreme heat. Conditions that can induce heat-related illnesses include stagnant atmospheric conditions and poor air quality. Consequently, people living in urban areas may be at greater risk from the effects of a prolonged heat wave than those living in rural areas. Also, asphalt and concrete store heat longer and gradually release heat at night, which can produce higher nighttime temperatures known as the "urban heat island effect."[15]

Figure 5.2 National Weather Service Heat Index



What constitutes extreme cold varies by region. Characteristics of an extreme cold event in northern states include temperatures at or below zero for an extended period of time. According to the National Weather Service (NWS), extreme cold is a daily concern during the winter months for northern states.

Extent of the Hazard

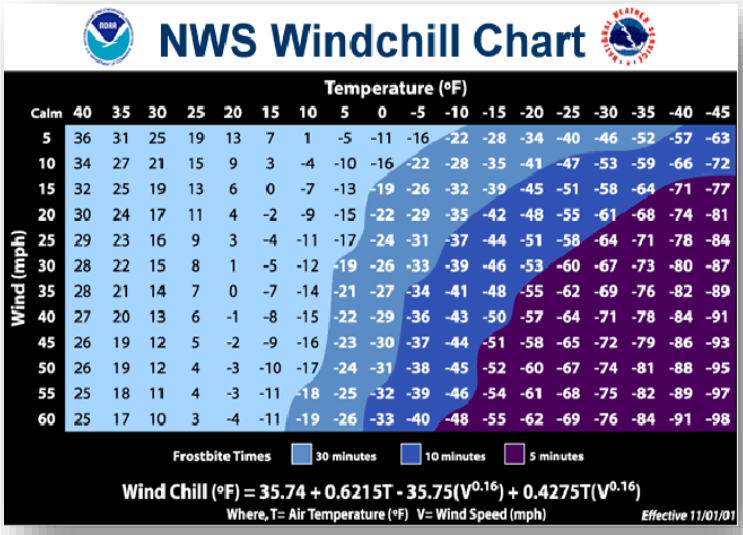
Extreme heat events can be described as periods with high temperatures of 90°F or above. Figure 5.2 above displays the likelihood of heat disorders with prolonged exposure or strenuous activity. Extreme heat is a city-wide hazard.

Extreme cold events can be described as periods with low temperatures below 0°F. Extreme cold is a city-wide hazard, but with many homes owning generators and fire places, the cold primarily affects the homeless.

[15] International Federation of Red Cross and Red Crescent Societies. Climatological hazards: extreme temperatures. http://www.ifrc.org/en/what-we-do/disaster-management/about-disasters/definition-of-hazard/extreme-temperatures/

Past Impacts and Events

According to a 2014 study of climate change by Climate Solutions New England, Climate Change in Southern New Hampshire, from 1970 to 1999, southern New Hampshire experienced an average of seven days per year above 90°F each year. This is projected to increase to 22 days per year under a low emissions scenario to nearly 50 days per year under a high emissions scenario. Between 1980 and 2009, an average of one day per year reached 95°F in southern New Hampshire. By the end of the century, the number of days per year over 95°F is expected to increase as much as six to 22 days per year. Additionally, the average daytime maximum temperature on the hottest day is expected to increase to as much as 98°F to 102°F (depending on the emissions scenario), compared to the historical average of 93°F.[16] Between 1960 and 2012, there was an average of 8.3 days per year (or 0.8 days/decade) greater than 90°F recorded in Somersworth. During this time the hottest day of the year averaged 95.0°F.[17]



The NWS Wildchill Temperature index calculates the dangers from winter winds and freezing temperatures (Source: NWS)

Between 1960 and 2012, the average temperature of the coldest day of the year was -14.5°F in Durham (the closest of four stations to Somersworth included in the study).[18] Between 1980 and 2009, there were an average of 164 days per year under 32°F and 16 days per year under 0°F in southern New Hampshire. Under sub-zero conditions, frostbite is likely to set in very quickly as exhibited in the Windchill chart to the right. Combined effects of wind and cold can create dangerous scenarios where hypothermia can set in, cause frost bite, and death.

Since the last 2016, Somersworth has experienced near-record heat and cold temperatures. In 2017, according to the Rochester Skyhaven Airport, an airport on the border of Somersworth, experienced a day low of -12 degrees.[19] In 2021, according to the same weather station, Somersworth experienced 97 degrees. With each of these temperatures approaching record-breaking territory, it points to the fact that more volatile temperature fluctuations will be more common, exacerbated by Rossby waves' variation in recent years.

[16] Wake, C. et al. "Climate Change in Southern New Hampshire; Past, Present, and Future." Climate Solutions of New England. 2014
[17] Wake, C. et al. "Climate Change in Southern New Hampshire; Past, Present, and Future." Climate Solutions of New England. 2014
[18] Ibid
[19] National Weather Service, NOAA (https://www.weather.gov/wrh/Climate?wfo=gyx)

The Somersworth hazard mitigation committee identified that cooling locations have been provided at town hall during office hours. They also created a splash pad in 2019 to assist cooling on hot days. Somersworth has also worked with the Tri-city task force to create a warming center at 30 Willand Drive in 2020/2021 that ran for several weeks to combat life-threatening cold temperatures during the winter.

Potential Future Impacts on Community

Annual average temperatures may increase on average by 3-5°F by 2050 and 4-8°F by 2100.[19]This rise in annual temperatures is likely to coincide with a rise in days per year above 90°F.

By the end of the century, southern New Hampshire is expected to see 20 fewer days below 32°F and only about 2 to 5 days per year under 0°F.[19] The likelihood of extreme cold temperatures is going to become less and less common as the planet warms up. However, the increase of polar vortexes in recent years may cause those extreme cold days to persist.

Estimated Loss: $8,609,627 to $43,048,139

Public Health Threats

Hazard Type	Public Health Threats
Location/Extent	City-wide
Vulnerability	
Severity	1.4
Probability	1.7
Overall Threat	2.4
Potential Loss	$8,609,627 to $43,048,139

Description of the Hazard

The City of Somersworth is an active member of the Strafford County Public Health Network (SCPHN): a collaborative of local governments and health and human service agencies preparing for and responding to public health emergencies on a regional level. A public health emergency is broadly defined as the occurrence of an event that affects the public's health and can be caused by a variety of communicable disease outbreaks or contaminants.

[19] Wake, C. et al. "Climate Change in Southern New Hampshire; Past, Present, and Future." Climate Solutions of New England. 2014

Epidemic/Pandemic Disease

As defined by the CDC, and epidemic is "the occurrence of more cases of disease than expected in a given area or among a specific group of people over a particular period of time."[20] In addition to being categorized by the type of transmission (point-source or propagated), epidemics may occur as outbreaks or pandemics. As defined in the State Hazard Mitigation Plan, an outbreak is a sudden increase of disease that is a type of epidemic focused to a specific area or group of individuals. A pandemic is an epidemic that spreads worldwide, or throughout a large geographic area. A recent example of this would be COVID-19.

Epidemics may be caused by infectious diseases, which can be transmitted through food, water, the environment or person-to-person or animal-to-person (zoonoses), and noninfectious diseases, such as a chemical exposure that causes increased rates of illness. Infectious disease that may cause an epidemic can be broadly categorized into the following groups[21]:

- Person-to-Person (TB, Aseptic meningitis, COVID-19)
- Foodborne (Salmonellosis, Ecoli)
- Water and Foodborne (Cholera, Giardiasis)
- Vaccine Preventable (Measles, Mumps)
- Sexually Transmitted (HIV, Syphilis)
- Arthropodborne (Lyme, West Nile Virus)
- Zoonotic (Rabies, Psittacosis)
- Opportunistic fungal and fungal infections (Candidiasis).

An epidemic may also result from a bioterrorist event in which an infectious agent is released into a susceptible population, often through an enhanced mode of transmission, such as aerosolization (inhalation of small infectious disease particles).[22] The Multi-Agency Coordinating Entity plan is responsible for emergency vaccination planning. For the purposes of this Plan, widespread drug and substance abuse may also be considered epidemics. New Hampshire continues to experience an opioid epidemic that has impacted communities across the state.

Tick-Borne Diseases

Lyme disease, which is spread to humans by the bite of an infected tick, is a growing threat in New Hampshire. New Hampshire has one of the highest rates of Lyme disease in the

[20] Slate; http://www.slate.com/id/2092969/
[21] New Hampshire Department of Safety. State of NH Natural Hazard Mitigation Plan 2013. Homeland Security and Emergency Management.
[22] Ibid.

U.S. Other tick-borne illnesses that could impact New Hampshire include Babesiosis, Anaplasmosis, and Rocky Mountain Spotted Fever.

Radon

Radon is a radioactive gas which is naturally occurring as a result of the typical decay of uranium commonly found in soil and rock (especially granite). Radon has carcinogenic properties and is a common problem in many states; New Hampshire has some isolated areas that are among the highest levels of radon in the United States according to the US Environmental Protection Agency (EPA). Whether or not a particular type of granite emanates radon is dependent on the geochemistry of that particular granite, some types are a problem and some are not. In other parts of the country, radon is associated with certain black shales, sandstones, and even limestones. The EPA has estimated that radon in indoor air is responsible for about 13,600 lung cancer deaths in this country each year (EPA document, EPA 811-R-94-001, 1994).[23]

Arsenic

Arsenic is a semi-metal element that is odorless and tasteless. Arsenic is a hazard because it can enter drinking water supplies, either from natural deposits in the earth or from agricultural and industrial practices.[24]

Wells drilled into New Hampshire's bedrock fractures have about a 1 in 5 probability of containing naturally occurring arsenic above 10 parts per billion. In addition, wells within short distances (~50 feet) can present very different water quality because of our highly fractured bedrock. Arsenic in water has no color or odor, even when present at elevated levels. Therefore, the only way to determine the arsenic level in your well water is by testing.

Extent of the Hazard

Public health threats are events or disasters that can affect an entire community. The extent of a public health event is typically measured in terms of the number of cases associated with the incident (e.g. active or cumulative cases of Covid-19). Where there is a need to compare geographies of different sizes, these impacts may be expressed as a ratio (e.g. cases per 100,000 residents). Environmental contaminants such as radon or arsenic

[23] New Hampshire Department of Safety. State of NH Natural Hazard Mitigation Plan 2013. Homeland Security and Emergency Management.
[24] EPA. Arsenic in Drinking Water. (http://water.epa.gov/lawsregs/rulesregs/sdwa/arsenic/index.cfm)

may also be measured by their impact on facilities (e.g. a number of contaminated wells).

New Hampshire 2019 Novel Coronavirus (COVID-19) Summary Report
(data updated as of March 24 2021- 9:00 AM)

Number of Persons with COVID-19 [1]	81,521
Recovered	77,703 (95%)
Deaths Attributed to COVID-19	1,228 (2%)
Total Current COVID-19 Cases	2,590
Current Hospitalizations	70
Total Persons Tested at Selected Laboratories, Polymerase Chain Reaction (PCR)[2]	651,684
Total Persons Tested at Selected Laboratories, Antibody Laboratory Tests[2]	38,481
Persons with Specimens Submitted to NH PHL	70,033
Persons with Test Pending at NH PHL[3]	335

[1] Includes specimens positive at any laboratory and those confirmed by CDC confirmatory testing.
[2] Includes specimens tested at the NH Public Health Laboratories (PHL), LabCorp, Quest, Dartmouth-Hitchcock Medical Center, Mako, certain hospital laboratories, the University of New Hampshire and their contracted laboratory, and those sent to CDC prior to NH PHL testing capacity.
[3] Includes specimens received and awaiting testing at NH PHL. Does not include tests pending at commercial laboratories.

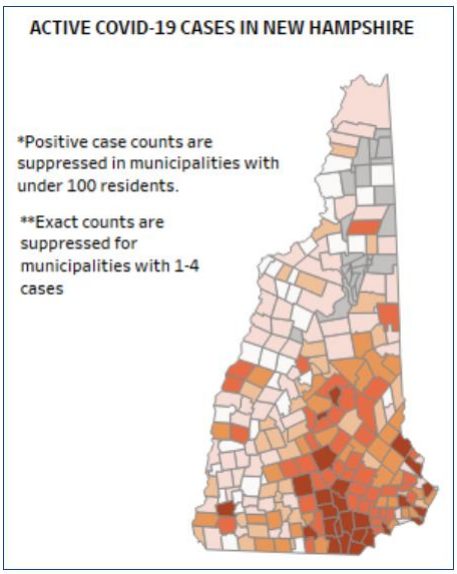
Past Impacts and Events

Epidemic/Pandemic Disease

With the occurrence of worldwide pandemics such as SARS, H1N1, Coronavirus and Avian Flu, Somersworth could be susceptible to an epidemic and subsequent quarantine. While all individuals are potentially vulnerable to the hazard of an epidemic, epidemics often occur among a specific age group or a group of individuals with similar risk factors and exposure.[23]

Coronavirus:

In 2020/2021, the coronavirus epidemic began to spread across the United States causing over 500,000 US deaths in a single year. COVID-19 was announced as a presidentially declared disaster for the county on April 3, 2020 and is on-going at the tiem of this plan. While the virus mainly killed people over the age of 50 (95% of deaths), transmission amongst younger populations allowed the disease to spread, especially in schools/indoor settings. As of March 24, 2021, Somersworth has 30 active cases and 669 cumulative cases of COVID-19 since the beginning of the pandemic.



New Hampshire has 2,476 active cases and 81,132 cumulative cases as of the same date.

Somersworth Business Impacts from COVID-19
Paralyzed our business - Need money for payroll and operations.
In every way - my business was almost 109% craft fairs and all craft fairs were cancelled in 2020.
Cut down on appointments due to less efficient curbside service

Tick-Borne Diseases

The number of New Hampshire residents diagnosed with Lyme disease has increased over the past 15 years, with significant increases occurring since 2005.[25] In 2009, the rate of cases of Lyme disease reported in New Hampshire residents was 108 cases per 100,000 persons, which is significantly higher than the Healthy People 2010 science-based 10-year national objective for improving the health of all Americans objective of 9.7 cases per 100,000 persons.[26] From 2009 to 2013, reported cases of Lyme disease in New Hampshire increased by approximately 20% from 1416 cases per year to 1691 cases per year.[27] This increase has leveled off from 2014-2019 with no year eclipsing 1700 cases in NH. In 2019, there were 159 reported cases of Lyme disease in Strafford County.[25]

Radon

Exposure is a significant hazard in New Hampshire. According to a NH Bureau of Environmental & Occupational Health (BEOH) study looking at >15,000 indoor radon test results in single-family dwellings, households in northern, eastern, and southeastern regions of New Hampshire especially tend to have nominally high concentrations of radon in air or water (BEOH 2004); however, values in excess of the US Environmental Protection Agency's 4.0 picocurie per liter (pCi/L) action guideline have been found in nearly every community in New Hampshire. Values exceeding 100 pCi/L have been recorded in at least eight of New Hampshire's ten counties. The highest indoor radon reading in New Hampshire known to NHDES is greater than 1200 pCi/L; higher values probably exist. The probability of significant radon exposure is apparently quite high. In the BEOH study, 44.0% of tests in Strafford County exceeded the 4.0 pCi/L action level and 13.0% even exceeded 12.0 pCi/L.

[25] 2020 New Hampshire State Health Profile; Improving Health, Preventing Disease, Reducing Costs for All. NH Division of Public Health Services Department of Health and Human Services. http://www.dhhs.nh.gov/dphs/documents/2011statehealthprofile.pdf
[26] HealthyPeople.gov. About Healthy People. Accessed April 2014. Available at: http://healthypeople.gov/2020/about/default.aspx
[27] NHDHHS. State of New Hampshire Tickborne Disease Prevention Plan. March 31, 2015. http://www.dhhs.state.nh.us/dphs/cdcs/lyme/documents/tbdpreventionplan.pdf)

In Somersworth, between 30 and 39.9% of homes tested by homeowners from 1987 to 2011 tested at or above the radon action level of 4.0 pCi/L. The probability of significant radon exposure is fairly high.[28]

Arsenic

From 1975 until 2001, the federal maximum contaminant limit (MCL) for arsenic in water supplied by public water systems was 50 parts per billion, because the health effects of exposure to lower concentrations was not recognized. Based on an exhaustive review of the new information about arsenic's health effects, in January 2001 EPA established a goal of zero arsenic in drinking water. At the same time, EPA adopted an enforceable MCL of 10 parts per billion (ppb) based on balancing treatment costs and public health benefits. Studies have shown that chronic or repeated ingestion of water with arsenic over a person's lifetime is associated with increased risk of cancer (of the skin, bladder, lung, kidney, nasal passages, liver or prostate) and non-cancerous effects (diabetes, cardiovascular, immunological and neurological disorders). The same studies found that dermal absorption (skin exposure) of arsenic is not a significant exposure path; therefore, washing and bathing do not pose a known risk to human health.[29]

Potential Future Impacts on Community

Exposure to radon and arsenic will continue to be a concern in Somersworth and throughout the state. It is likely that exposure to tick-borne diseases will increase in the future due to warmer temperatures. Epidemics are also a concern for elderly residents as variants of the coronavirus continue to spread across the world.

Estimated Loss: $8,609,627 to $43,048,139

Civil Unrest

Table 5.17 Hazard Overview

Hazard Type	Civil Unrest
Location/Extent	City-wide; likely more common in public places
Vulnerability	
Severity	1.2
Probability	0.9
Overall Threat	1.1
Potential Loss	$0 to $8,609,627

Description of the Hazard

[28]NHHS https://www.dhhs.nh.gov/dphs/radon/documents/radon-map-nh.pdf
[29] New Hampshire Environmental Services. Drinking Water and Groundwater Bureau. Arsenic in Drinking Water Fact Sheet.

For the purposes of this plan, Civil Unrest refers to any gathering of people which, due to its size or the intent of its participants, has the potential to require higher-than-usual levels of preparedness and/or response from emergency services, or which places lives, safety, or property at higher risk. The NH State Hazard Mitigation Plan does not address Civil Unrest but does contain hazard descriptions of Mass Casualty Events and Terrorism, both of which are incorporated by reference as extreme examples of Civil Unrest. Examples of this hazard type include the following:

- **Protests/rallies**: Demonstrations that are intended to promote or oppose a particular social or political cause. These events can be either pre-planned, including applications for special event permits, or spontaneous events in response to current events. Either form is generally protected by the first amendment right to assemble, though municipalities do have varying authority to regulate the time, location, and manner of such protests.[30] [31] The threat level associated with a protest will vary depending upon the number and attitude of attendees, and internal or external actions that may escalate or de-escalate tensions. Protests over particularly divisive issues may also draw counter-protests, and otherwise-peaceful protests can be coopted or targeted by bad faith actors.
- **Festival/ celebration**: Many planned community events have the opportunity to disrupt regular operations, particularly if they involve closure of streets or a particularly large number of participants. These events are unlikely to result in civil unrest on their own, but the large concentrations of people they draw could result in more severe consequences if they were to coincide with other forms of civil unrest or other hazards. Nearby Durham, NH frequently experiences civil unrest around certain holidays (e.g. Halloween) or events (e.g. the superbowl) due to their large concentration of college-aged residents; neighboring municipalities may see heightened preparedness on these days, especially if they anticipate a need for mutual aid, though the degree of unrest seen in Durham for these events is unique within the seacoast.
- **Terrorism**: The NH State Hazard Mitigation Plan defines Terrorism as premeditated, politically motivated violence perpetrated against noncombatant targets by subnational groups or clandestine agents and notes that terrorism is a tactic that may be employed by both international organizations and domestic extremists.

Extent of the Hazard

Civil Unrest is a community-wide hazard that could impact any location. However, the political nature of this hazard means that public infrastructure or facilities may be more

[30] https://www.wmur.com/article/what-you-need-to-know-about-your-rights-if-youre-planning-to-take-part-in-protests/32742959
[31] https://www.nhmunicipal.org/town-city-article/special-event-permits-useful-tool

likely targets. Public facilities such as City Hall, Police Department, and schools are the most likely public areas for unrest to occur. Furthermore, the first amendment right to assemble typically only protects gatherings on public property or with landowner permission on private property, making it easier to predict where such protests are likely to occur.

Past Impacts and Events

There have been no periods of civil unrest in Somersworth other than small corporate strikes that do not often involve the city.

Potential Future Impacts on Community

It is extremely likely that Somersworth will be affected by some degree of civil unrest in the future. Because Somersworth is a city with a city council form of government, some residents may feel the need to use protest as a way to encourage elected officials to act on certain issues. Additionally, New Hampshire's First in the Nation primary election means it is a frequent campaign location for presidential candidates. This further increases the likelihood of activism related to national issues within New Hampshire communities, especially during presidential primary and general elections. Extreme civil unrest such as terrorism may be more difficult to predict, and is more likely to require coordination with federal, state, and/or other local law enforcement agencies.

Estimated Loss: $0 to $8,609,627

Solar Storms and Space Weather

Table 5.27 Hazard Overview

Hazard Type	Solar Storms and Space Weather
Location/Extent	City-wide
Vulnerability	
Severity	0.3
Probability	0.3
Overall Threat	0.3
Potential Loss	**$0 to $8,609,627**

Description of the Hazard

Solar storms or solar activity refer to solar flares, coronal mass ejections, and other solar emissions that interact with the earth's upper atmosphere. These events typically involve release of gas and/or electromagnetic fields, and they may impact the earth for a period of several minutes to several hours, with potential for extreme releases to last for up to several days or weeks. "Space weather" is a recent term, and describes conditions in the

earth's upper atmosphere and outer space environment, similar to how the terms "climate" and "weather" are used to describe conditions in the earth's lower atmosphere.

Extent of the Hazard

This is a town-wide hazard that could impact any location. Because the hazard involves electromagnetic emissions, electrical and telecommunications infrastructure (e.g. cell towers, radio communications) are most vulnerable to this hazard. Severity of this hazard is measured by the NOAA Space Weather Scales, which have been reproduced below as they relate to Geomagnetic Storms, Solar Radiation Storms, and Radio Blackouts.

Geomagnetic Storms

Scale	Description	Effect	Physical measure	Average Frequency (1 cycle = 11 years)
G 5	Extreme	**Power systems:** Widespread voltage control problems and protective system problems can occur, some grid systems may experience complete collapse or blackouts. Transformers may experience damage. **Spacecraft operations:** May experience extensive surface charging, problems with orientation, uplink/downlink and tracking satellites. **Other systems:** Pipeline currents can reach hundreds of amps, HF (high frequency) radio propagation may be impossible in many areas for one to two days, satellite navigation may be degraded for days, low-frequency radio navigation can be out for hours, and aurora has been seen as low as Florida and southern Texas (typically 40° geomagnetic lat.).	Kp = 9	4 per cycle (4 days per cycle)
G 4	Severe	**Power systems:** Possible widespread voltage control problems and some protective systems will mistakenly trip out key assets from the grid. **Spacecraft operations:** May experience surface charging and tracking problems, corrections may be needed for orientation problems. **Other systems:** Induced pipeline currents affect preventive measures, HF radio propagation sporadic, satellite navigation degraded for hours, low-frequency radio navigation disrupted, and aurora has been seen as low as Alabama and northern California (typically 45° geomagnetic lat.).	Kp = 8, including a 9-	100 per cycle (60 days per cycle)
G 3	Strong	**Power systems:** Voltage corrections may be required, false alarms triggered on some protection devices. **Spacecraft operations:** Surface charging may occur on satellite components, drag may increase on low-Earth-orbit satellites, and corrections may be needed for orientation problems. **Other systems:** Intermittent satellite navigation and low-frequency radio navigation problems may occur, HF radio may be intermittent, and aurora has been seen as low as Illinois and Oregon (typically 50° geomagnetic lat.).	Kp = 7	200 per cycle (130 days per cycle)
G 2	Moderate	**Power systems:** High-latitude power systems may experience voltage alarms, long-duration storms may cause transformer damage. **Spacecraft operations:** Corrective actions to orientation may be required by ground control; possible changes in drag affect orbit predictions. **Other systems:** HF radio propagation can fade at higher latitudes, and aurora has been seen as low as New York and Idaho (typically 55° geomagnetic lat.).	Kp = 6	600 per cycle (360 days per cycle)
G 1	Minor	**Power systems:** Weak power grid fluctuations can occur. **Spacecraft operations:** Minor impact on satellite operations possible. **Other systems:** Migratory animals are affected at this and higher levels; aurora is commonly visible at high latitudes (northern Michigan and Maine).	Kp = 5	1700 per cycle (900 days per cycle)

Solar Radiation Storms

Scale	Description	Effect	Physical measure (Flux level of >= 10 MeV particles)	Average Frequency (1 cycle = 11 years)
S 5	Extreme	**Biological:** Unavoidable high radiation hazard to astronauts on EVA (extra-vehicular activity); passengers and crew in high-flying aircraft at high latitudes may be exposed to radiation risk. **Satellite operations:** Satellites may be rendered useless, memory impacts can cause loss of control, may cause serious noise in image data, star-trackers may be unable to locate sources; permanent damage to solar panels possible. **Other systems:** Complete blackout of HF (high frequency) communications possible through the polar regions, and position errors make navigation operations extremely difficult.	10^5	Fewer than 1 per cycle
S 4	Severe	**Biological:** Unavoidable radiation hazard to astronauts on EVA; passengers and crew in high-flying aircraft at high latitudes may be exposed to radiation risk. **Satellite operations:** May experience memory device problems and noise on imaging systems; star-tracker problems may cause orientation problems, and solar panel efficiency can be degraded. **Other systems:** Blackout of HF radio communications through the polar regions and increased navigation errors over several days are likely.	10^4	3 per cycle
S 3	Strong	**Biological:** Radiation hazard avoidance recommended for astronauts on EVA; passengers and crew in high-flying aircraft at high latitudes may be exposed to radiation risk. **Satellite operations:** Single-event upsets, noise in imaging systems, and slight reduction of efficiency in solar panel are likely. **Other systems:** Degraded HF radio propagation through the polar regions and navigation position errors likely.	10^3	10 per cycle
S 2	Moderate	**Biological:** Passengers and crew in high-flying aircraft at high latitudes may be exposed to elevated radiation risk. **Satellite operations:** Infrequent single-event upsets possible. **Other systems:** Small effects on HF propagation through the polar regions and navigation at polar cap locations possibly affected.	10^2	25 per cycle
S 1	Minor	**Biological:** None. **Satellite operations:** None. **Other systems:** Minor impacts on HF radio in the polar regions.	10	50 per cycle

Radio Blackouts

Scale	Description	Effect	Physical measure	Average Frequency (1 cycle = 11 years)
R 5	Extreme	**HF Radio:** Complete HF (high frequency) radio blackout on the entire sunlit side of the Earth lasting for a number of hours. This results in no HF radio contact with mariners and en route aviators in this sector. **Navigation:** Low-frequency navigation signals used by maritime and general aviation systems experience outages on the sunlit side of the Earth for many hours, causing loss in positioning. Increased satellite navigation errors in positioning for several hours on the sunlit side of Earth, which may spread into the night side.	X20 (2×10^{-3})	Less than 1 per cycle
R 4	Severe	**HF Radio:** HF radio communication blackout on most of the sunlit side of Earth for one to two hours. HF radio contact lost during this time. **Navigation:** Outages of low-frequency navigation signals cause increased error in positioning for one to two hours. Minor disruptions of satellite navigation possible on the sunlit side of Earth.	X10 (10^{-3})	8 per cycle (8 days per cycle)
R 3	Strong	**HF Radio:** Wide area blackout of HF radio communication, loss of radio contact for about an hour on sunlit side of Earth. **Navigation:** Low-frequency navigation signals degraded for about an hour.	X1 (10^{-4})	175 per cycle (140 days per cycle)
R 2	Moderate	**HF Radio:** Limited blackout of HF radio communication on sunlit side, loss of radio contact for tens of minutes. **Navigation:** Degradation of low-frequency navigation signals for tens of minutes.	M5 (5×10^{-5})	350 per cycle (300 days per cycle)
R 1	Minor	**HF Radio:** Weak or minor degradation of HF radio communication on sunlit side, occasional loss of radio contact. **Navigation:** Low-frequency navigation signals degraded for brief intervals.	M1 (10^{-5})	2000 per cycle (950 days per cycle)

Past Events and Impacts

Since the last plan (2016), Somersworth has no known historical impacts from this hazard.

Potential Future Impacts on Community

The likelihood and scope of future impacts can be difficult to predict. Most solar emissions occur on a scale that is too small to dramatically impact humans or technology. However, as society in general, including municipal first responders, becomes increasingly reliant on technology for daily life and operations the likelihood of disruptions due to solar emissions increases. Since impacts as a result of this hazard are most likely to result in loss of

electrical or telecommunications service, this hazard is expected to be closely related to Extended Power Outages as described above, with similar potential impacts.

Estimated Loss: $0 to $8,609,627

Hazards Not Included in this Plan

The State of New Hampshire identifies avalanches as a hazard in the State Multi-Hazard Mitigation Plan Update of 2018. The 2021 planning committee decided not to include Avalanches in this Plan for the City of Somersworth. Avalanches were not identified by the present or past Planning Committee as a local hazard due to the fact that there are no significant mountains or topographical features where avalanches would be likely to occur.

The State of New Hampshire identifies landslides as a hazard in the State Multi-Hazard Mitigation Plan Update of 2018. The 2021 planning committee decided not to include landslides in this plan for the City of Somersworth. Landslides were identified in the past plan, but due to low risk and only a few small portions of the Hilltop having over 25 percent steep slope. The Town will re-evaluate the need to include additional hazards to this Plan during subsequent updates of the Plan.

National Flood Insurance Program (NFIP)

The Office of Strategic Initiatives administers and coordinates the State's role in the National Flood Insurance Program (NFIP). The NFIP is a Federal program administered by the Federal Emergency Management Agency (FEMA) that allows property owners in participating communities to purchase insurance protection against losses from flooding. Communities can voluntarily participate in the NFIP by making an agreement with FEMA and adopting and enforcing floodplain regulations to reduce the flood risks of new construction in FEMA's designated special flood hazard areas.

Currently 217 communities (92 percent) that participate in the NFIP have adopted at least the minimum standards of the NFIP, which regulate development in the 100-year floodplain. The regulations mitigate flood damage by requiring new and substantially improved structures to be built or flood proofed to, or

Somersworth Flood Insurance Program (NFIP) Status

Somersworth has been a member of the National Flood Insurance Program (NFIP) since August 16, 1982. The City does have portions of land in the 100-year floodplain along Tates Brooks, Peters Marsh Brook, and the Salmon Falls River. There is also limited floodplain along a smaller stream feeding into Lily Pond and around Willand Pond. There are limited structures within this floodplain according to available GIS Flood Insurance Rate Map (FIRM – dated May 17, 2005 and September 30, 2015) data and aerial imagery.

According to FEMA's Community Information System (as of 3/16/2021) Somersworth is listed as having 8 total policies (four are single family homes, two are 2-4 family, one is all other residential, and one non-residential) in the floodplain hazard area and has had 2 repetitive loss claims. The two repetitive loss claims were from the same residential building. Two of those policies are preferred risk and are not required. Preferred risk offers policies for buildings that are located in moderate-to-low areas (B, C, and X Zones).

	Policies in Force	Premium	Insurance in Force	Number of Closed Paid Losses	$ of Closed Paid Losses	Adjustment Expense
By Occupancy						
Single Family	4	$4,130	$812,000	2	$256,601.00	$6,362.00
2-4 Family	2	$884	$700,000	0	0	0
All Other Residential	1	$898	$500,000	0	0	0
Non-Residential	1	$5,722	$500,000	0	0	0
Total	**8**	**$11,634**	**$2,512,000**	**2**	**$256,601.00**	**$6,362.00**
By Zones						
AE Zones	3	$9,791	$1,100,000	2	$256,601.38	$6,362.00
B, C & X Zone – Preferred	5	$1,843	$1,412,000	0	0	0
Total	**8**	**$11,634**	**$2,512,000**	**2**	**$256,601.38**	**$6,362.00**

The Strafford County Flood Insurance Study (FIS) investigates the existence and severity of flood hazards, which was revised countrywide FIS effective date: September 30, 2015.

NFIP COMPLIANT ACTIONS FROM MUNICIPALITY

In order to remain NFIP compliant, Somersworth has implemented a number actions including:

- Culvert maintenance.
  - Repair of Rocky Hill Road culvert (Summer/Fall 2021)
- Plans to replace the Maple Street culvert, which would include the replacement of the existing stone box culvert that conveys an unnamed stream under Maple Street. The culvert is in poor condition and will be replaced with a new corrugated metal pipe arch culvert. This project will also include the replacement of sections of existing utilities, installation of guard rails, and site restoration.
- Upgrades to drainage system in the downtown
- Using the culvert inventory developed by Strafford Regional Planning Commission to assist in the City's replacement and prioritization process
- The city is currently working with FEMA on updating their existing floodplain maps as part of FEMA Discovery project, which will officially be adopted by the City Council in the next few years.

Road Damage during flood event
Photo Credit: Bob Belmore, City of Somersworth

The NH Office of Environmental Protection conduced a CAV visit on 8/15/2017. Upon inspection, Somersworth's floodplain management regulation had a few minor problems. The CAV Report recommended that Somersworth "amend the subdivision regulations existing language to incorporate all of the required NFIP language. Amend the site plan review regulations to include the required NFIP language, which was not included in the regulations. The city has made these policy changes to adhere to regulations.

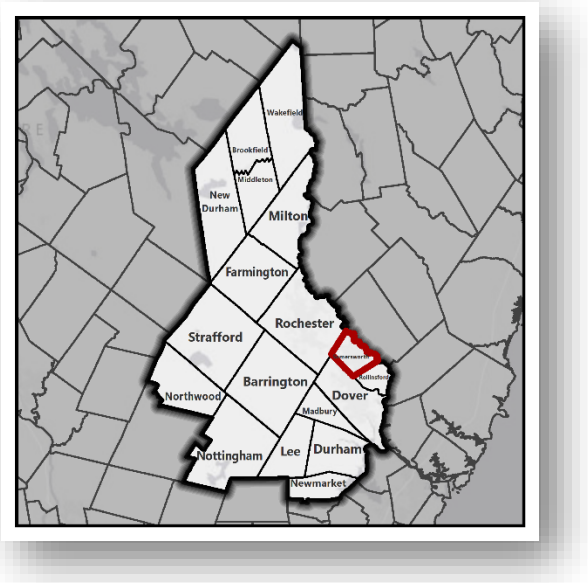
Somersworth entered the NFIP Regular Program on August 16, 1982. A CAV was selected in Somersworth due to it being last visited in 2005. The city's most recent flooding occurred in 2010. One of the areas that flooded was Salmon Falls Road. Somersworth's floodplain regulations are included in the Zoning Ordinance, Chapter 19, Section 12.

The city keeps as-built elevation documentation on file and requires the FEMA Elevation Certificate. The Office of Strategic Initiatives informed city officials of the substantial improvement requirements for interior renovations and additions and that substantial damage is of any origin. The Office of Strategic Initiatives explained the process of substantial improvement determinations and gave examples of what may be needed to be done to existing structures if found to be substantially improved. The total number of permits issued for development in the floodplain in the last five years is zero.

Chapter III: History and Demographics

Introduction

This territory was first settled about 1650 when it was part of Dover. It was made a separate parish in 1729, called Somersworth. In 1753, residents petitioned Governor Benning Wentworth for a separate township. The town was incorporated as Somersworth in 1754. In 1849, the town was divided nearly in half when the southern portion was incorporated as Rollinsford. Somersworth was incorporated as a city in 1893. Situated on the Salmon River, Somersworth has been home to many gristmills, sawmills, and cotton and woolen making establishments.

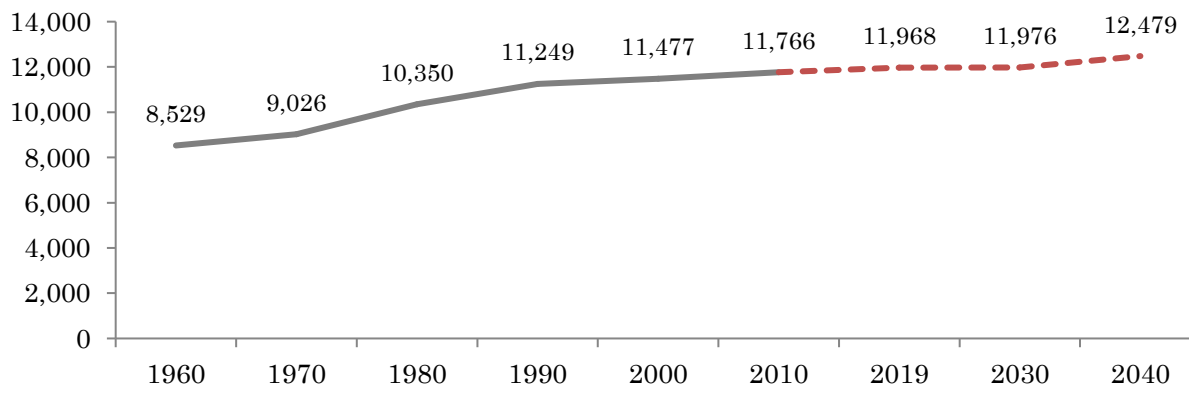


According to the Economic & Labor Market Information Bureau, population change for Somersworth totaled 2,942 over 49 years, from 9,026 in 1970 to 11,968 in 2019. The largest decennial percent change was a 15 percent increase between 1970 and 1980; the smallest, a two percent increase between 2000 and 2010. The 2019 5-year Census estimate for Somersworth was 11,968 residents, which ranked 25th among New Hampshire's incorporated cities and towns.

Historical Population Growth

Historically, Somersworth (and much of the Strafford Planning Region and New Hampshire) experienced rapid population growth beginning in the 1960s and continuing through 1990. In the past two decades however, population growth rate has slowed. In fact, Somersworth's population saw a growth of only about 500 residents in the two decades between 1990 and 2010. In the three decades between 1960 and 1990, Somersworth's population grew at an average rate of 11%. In the two decades between 1990 and 2010, the rate of change was just 2%.

Somersworth Historic and Projected Population
Source: Census Bureau, NHOSI



Project Population Change

National population projections by the Census Bureau suggest that the United States will reach a population of approximately 380 million by 2040 (an 18% overall population growth). Although the Stafford Planning Region is not expected to grow on pace with the national rate, it is expected to grow by close to 10%, a significantly higher rate than projected for the state of New Hampshire(7.2%). Population projections completed by the New Hampshire Office of Strategic Initiatives and the state's Regional Planning Commissions, suggest that the city of Somersworth can expect an overall growth in population of 4% in the 30-year period between 2010 and 2040.

Migration

Data suggest that fewer New Hampshire residents are leaving the State of New Hampshire. Since 2005, the peak year of outmigration between 2000 and 2010, there has been a 17% decrease in residents exiting the state. Unfortunately, New Hampshire is also experiencing a declining rate of in-migration, meaning that fewer individuals are coming into the state.

Aging

Somersworth, like so many communities in the region, experienced a significant increase in its 65 and older population between 2000 and 2010. This trend, dubbed the 'silver tsunami' by many demographers, is occurring across both the state and much of the New England and is a product of aging Baby-Boom and Generation X populations.

In the whitepaper series *The Two New Hampshires: What does it mean?,* Ross Gittell addresses the aging population, and how concentrations of older age cohorts vary across the state. In the report Gittell defines two New Hampshires, rural and metro. Rural NH includes Cheshire, Sullivan, Belknap, Carroll, Grafton, and Coos Counties, while Metro NH includes Rockingham, Hillsborough, Strafford and Merrimack Counties. As Gittell notes, Rural NH has a far older population (median age) than Metro NH, and if this was its own state it would be the second oldest in the nation. Even Metro NH, if considered by itself, would be older than Massachusetts, Connecticut, Rhode Island, and Vermont.

Population and Age

While data show the region growing at a faster rate than the state over the next 25 years, the slowed growth rate beginning in 1990 has, and will continue to have, an effect on the region. As the regional population ages, and in-migration continues to decrease, the percentage of school age children is declining. Out of the 161 districts in the state, 130 experienced a decline in enrollment between 2000 and 2010.

The aging population, combined with a decrease in population ages 18 to 55, may result in a labor force shortage in coming years. Additionally, a trend known as 'brain drain', the emigration of highly skilled or trained individuals to other states, could have potentially negative impacts on local, regional and state economic systems.

With the expected increase in demand for health care, assisted living facilities, and nursing home capacity, and the potential for a smaller labor force, a care-provider shortage may emerge. Local governments will likely need to create programs and strategies in order to provide adequate health and social services for increased numbers of aging seniors.

Housing

In the period between 1990 and 2010, Somersworth experienced an increase of approximately 250 total housing units. Occupancy rates have decreased over time, ranging from 93% in 1990, up to 97% in 2000, and down slightly to 95% in 2010.

As of 2010, Somersworth's occupied housing units are roughly 60% owner-occupied and 40% renter occupied. Somersworth offers a significant amount of lower-cost rental housing options. The city exhibits a 5% vacancy rate, which is comparable to other adjacent communities. With moderate population growth projected over the coming 3 decades, limited new housing unit development is expected. The 2020 census was not made available at the time of writing this plan, so we used the 2019 census estimates which points to a growing city.

Table 3.1: Somersworth Housing Trends

	Total Housing Units	Occupied Housing Units	Owner-Occupied Housing Units	Renter-Occupied Housing Units	Vacant Housing Units	Occupancy Rate
1990	4719	4374	2549	1825	345	93%
2000	4841	4687	2659	2028	154	97%
2010	4970	4739	2797	1942	231	95%
2019	~5501	~5127	~2795	~2332	~374	~94%

Source: 2019 ACS 5-year Estimate, US Census Bureau

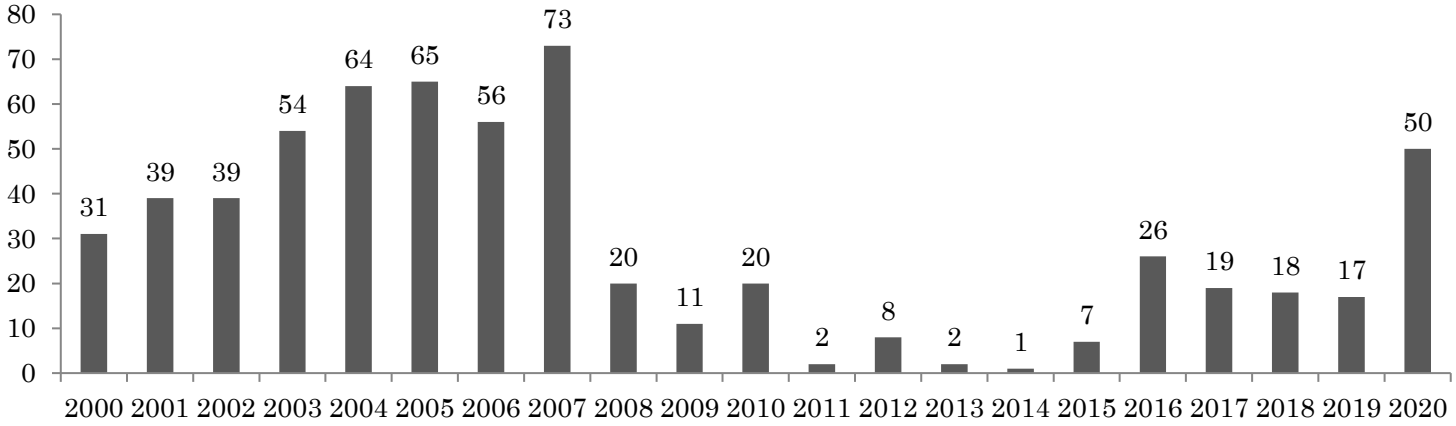
Building permit trend data suggest that Somersworth was particularly heavily impacted by the recession of the 2000's. In the 7 year period between 2000 and 2007, the City granted 421 net building permits. In the 11 years following, only 151 total permits were given. This is a sign of not only the economic implications of the recession, but also stagnating population growth that has affected nearly all New Hampshire communities. However, during the COVID-19 pandemic/recession, Somersworth's building permits rebounded to levels prior to the 2008 recession with evidence that this trend will continue onto 2021. 2020 and 2021 have had the more residential units added as well, adding nearly 200 units in 2020, more than the last 5 years combined.

Over the course of the last thirteen years, Somersworth has seen steady and significant growth, development includes residential, commercial, and industrial expansion. Growth has occurred largely around a few growth centers. Most residential development is occurring along the Dover border near the Spaulding Turnpike, although other areas of development include the area of Rocky Hill Road near the

Rochester border. Commercial and industrial development has been centered downtown and along the Route 108 and Route 9 (High Street) corridors.

To the best of the committee's knowledge, development in hazard prone areas has not increased the overall vulnerability of the community to hazards and the city will use this Plan as a guide to determine where past hazards have been documented and try to steer potential development away from these hazard areas. The planning committee used the best available data to describe historic, current, and future development

Somersworth Net Annual Building Permits 2000-2020
Source: NHOEP, SRPC



trends.

Chapter IV: Critical Infrastructure & Key Resources (CI/KR)

With team brainstorming, Critical Facilities and Key Resources (CI/KR) within Somersworth were identified and mapped for the purposed of this plan. Facilities located in adjacent municipalities were not mapped.

Table 4.1: Emergency Response Facilities (ERF)

ERF's are primary facilities and resources that may be needed during an emergency response			
Facility	**Type of Facility**	**Address**	**Phone Number**
Police Station	Emergency Operations Center (EOC)	12 Lilac Lane	603-692-3131
Fire Station	Backup EOC	195 Maple Street	603-692-3457
City Hall	Emergency Response	1 Government Way	603-692-4262
Public Works	Emergency Response	18 Lilac Lane	603-692-4266
Stewart's Ambulance	Emergency Response	183 Route 108	603-480-5600
Irving Oil	Emergency Fuel	425 High St	603-692-4512
Monster Gas	Emergency Fuel	144 NH-108	603-343-1227
Monster Gas	Emergency Fuel	495 High St	603-343-1227
Cumberland Farms	Emergency Fuel	216 NH-108	603-740-0032
Cumberland Farms	Emergency Fuel	258 High St	603-692-3918
Walmart Fuel Station	Emergency Fuel	59 Walton Way	603-692-6346
Mobil	Emergency Fuel	196 Tri City Rd	603-474-0510
Gulf	Emergency Fuel	420 NH-108	603-692-6625
Circle K	Emergency Fuel	425 High St	603-692-3426
Evacuation Routes (localized only)			
High Street	Evacuation Route	High Street	N/a
West High Street	Evacuation Route	West High Street	N/a
Green Street	Evacuation Route	Green Street	N/a
Main Street	Evacuation Route	Main Street	N/a
Route 108	Evacuation Route	Route 108	N/a
Old Rochester Road	Evacuation Route	Old Rochester Road	N/a
Telephone Facilities			
Cell Tower	Communication Function	120 Route 108	N/a
Cell Tower	Communication Function	High Street	N/a

Cell Tower	Communication Function	Hamilton/Grand Street	N/a
	Bridges		
Somersworth #078/124 (Somersworth)	Transportation	Salmon Falls Road over Salmon Fall River	N/a
Somersworth #101/114 (Somersworth)	Transportation	NH9/NH236 over Salmon Falls River	N/a
Somersworth #130/099 (Somersworth)	Transportation	Buffumsville Road over Salmon Falls River	N/a

Table 4.2: Non-Emergency Response Facilities (NERF)

NERF's are facilities that although critical, not necessary for the immediate emergency response effort; some hazardous material facilities are also included

Facility	Type of Facility	Address	Phone Number
Wastewater Plan	Sewage Treatment Plant	99 Buffumsville Road	603-692-2418
Water Treatment Plant	Water Treatment Plant	9 Wells Street	603-692-2268
City Well	Secondary Water Supply	Rocky Hill Road	N/a
Water Storage Tower	Water Tower	Rocky Hill Road	N/a
Water Storage Tower	Water Tower	Hamilton/Grand Street	N/a
Eversource Electric Transformer	Power Substation	352 Main Street	N/a
Eversource Electric Transformer	Power Substation	Tates Brook	N/a
Eversource Electric Transformer	Power Substation	High Street/Walmart	N/a
Sanitary Sewer Pump Station	Pump Station	445 Main Street	N/a
Sanitary Sewer Pump Station	Pump Station	50 Blackwater Road	N/a
Sanitary Sewer Pump Station	Pump Station	102 West High Road	N/a
Sanitary Sewer Pump Station	Pump Station	31 Hawthorne Circle	N/a

Table 4.3: Facilities and Populations to Protect (FPP)

FPP's are facilities that need to be protected because of their importance to the City and to residents who may need help during a hazardous event

Facility	Type of Facility	Address	Phone Number
	Schools, Churches, and Daycare Facilities		

SAU #56 Building	School District Office	51 West High Street	603-692-4450
Idlehurst Elementary	School	46 Stackpole Road	603-692-2435
Maplewood Elementary	School	184 Maple Street	603-692-3331
High School	School	11 Memorial Drive	603-692-2431
Career Technical Center	School	18 Cemetery Road	603-692-2242
Middle School	School	7 Memorial Drive	603-692-2126
Tri-City Christian Academy	School	150 West High Street	603-692-2093
Tri-City Christian Academy	School	12 Rocky Hill	603-692-4737
Holy Trinity	Religious Facility	404 High Street	603-692-2172
St. Martin Church	Religious Facility	120 Maple Street	603-692-2172
First Parish Congressional	Religious Facility	176 West High Street	603-692-2057
Tri-City Covenant	Religious Facility	150 West High Street	603-692-2093
Church of Latter Day Saints	Religious Facility	35 Tate's Brook Road	603-692-5325
Faith Baptist Church	Religious Facility	25 Cemetery Road	603-692-2332
Greek Orthodox Church	Religious Facility	45 Tate's Brook Road	N/a
Next Level Church	Religious Facility	436 Route 108	603-841-3301
Kid's Culture	Daycare Facility	233 Route 108	603-841-7374
Little Folks School and Day Care	Daycare Facility	29 Lil-Nor Avenue	603-692-4706
Little Hands Learning Center	Daycare Facility	48-2 Wildflower Circle	603-692-5946
Little Steps Early Learning Center	Daycare Facility	7 Works Way	603-692-1845
The Works After School	Daycare Facility	23 Works Way	603-742-2163
Somersworth Early Learning Center	Daycare Facility	15 Bartlett Avenue	603-692-2081
	Elderly & Disabled Housing Facilities		
Robert Filion Terrace	Elderly Housing	70-84 Washington Street/120-122 and 146 High Street	N/a
Queensbury Mill	Elderly Housing	1 Market Street	N/a
Preservation Park	Elderly Housing	163,185,195 Main Street	N/a
Edward Charpentier Apartments	Elderly Housing	28 Franklin Street	N/a
Albert Jack LaBonte Apartments (Maple Street Complex)	Elderly Housing	191 Maple Street	N/a
Albert J Nadeau Homes	Elderly Housing	Bartlett/Verona Street	N/a

Historic Resources			
Public Library	Historic Facility	25 Main Street	603-692-4587
US Post Office	Historic Facility	2 Government Way	603-692-4267
Somersworth Historical Museum	Historic Facility	157 Main Street	N/a
Somersworth High School	Historic Facility	17 Grand Street	603-692-2435
Green Street School	Historic Facility	104 Green Street	N/a
Lehoullier Building	Historic Facility	161-169 Main Street	N/a
Queensbury Mill	Historic Facility	1 Market Street	N/a

Table 4.4: Potential Resources (PR)

PR's are potential resources that could be helpful for emergency response in case of a hazardous event

Facility	Type of Facility	Address	Phone Number
Commercial & Economic Impact Area			
Alcara	Industrial	130 Main Street	603-692-2100
Velcro USA Inc.	Industrial	330 Route 108	603-692-0398
WalMart	Retail	59 Walton's Way	603-692-6346
Favorite Foods	Retail	Interstate Drive	603-692-4990
Target	Retail	11 Andrews Road	603-692-6750
Home Depot	Retail	12 Commercial Drive	603-692-0007
Dead River Energy	Propane Fuel Distribution	216 Green Street	603-692-3595
Townsend Energy	Propane Fuel Distribution	35 Centre Road	603-692-3022
Turgeon's Inc.	Construction Company	37 Indigo Hill Road	603-692-4962
Miscellaneous Facilities			
National Guard Armory	Armory	15 Blackwater Road	N/a
US Army Reserve	Army Reserve	Route 108	N/a
Somersworth School District (SAU 56)	Bus Transportation	51 West High Street	603-692-4450
First Student	Bus Transportation	121 Whitehouse Road	603-692-4406
Medical Facilities			
Seacoast Redi-care	Medical Office	396 High Street	603-692-6066
Somersworth Health Center	Medical Office	85 Main Street	603-692-6676
Rehab 3 at Marsh Brook	Medical Office	7 Marsh Brook Drive	603-749-6686
Avis Goodwin	Medical Office	311 Route 108	603-332-4249

Wentworth Surgery Center	Medical Office	6 Works Way	603-285-9288
Recreational Facilities (Indoor and Outdoor)			
Martin Flanagan Community Center	Community Center	9 Bartlett Avenue	603-692-2864
The Works	Health Club	23 Works Way	603-742-2163

Table 4.5: Water Resources (PR)

WR's are additional resources that could be helpful for emergency response in case of a hazardous event			
Facility	**Type of Facility**	**Address**	**Phone Number**
*Active Dams – As identified by the NHDES, Water Division			
Salmon Falls River Dam II	Non-Menacing	Salmon Falls River (Aclara Property)	N/a
Great Falls Upper Dam	Low Hazard	Salmon Falls River (Berwick/Somersworth Bridge)	N/a
Lower Great Falls Dam	High Hazard	Salmon Falls River (Somersworth Hydro Location)	N/a

* A **Non-Menace Structure** means a dam that is not a menace because it is in a location and of a size that failure of misoperation of the dam would not result in probable loss of life or loss to property.

* A **Low Hazard Structure** means a dam that has a low hazard potential because it is in a location and of a size that failure or misoperation of the dam would result in no possible loss of life and low economic loss to structures/property.

***** A **High Hazard Structure** means a dam that has a high hazard potential because it is in a location and of a size that failure or misoperation of the dam would result in probable loss of human life.

Chapter V: Multi-Hazard Effects in Somersworth

Identifying Vulnerable Structures

It is important to identify the critical facilities and other structures that are most likely to be damaged by hazards. In Somersworth, there was 14 CI/KR within the potential and past flood areas (PPFA) that were identified in the risk assessment for a potential loss value estimate of **$59,224,700** at 100%.

Table 5.1: Critical Infrastructure & Key Resources

Facility	Type of Hazard	100% of Structure/Building Value	
Dams			
Great Falls Upper Dam (Low Hazard)	Flooding; Dam Breach Salmon Falls River	The Dam Bureau at NHDES has looked into assessing values for state-owned dams with marginal success. They considered bond ratings, market value, and construction costs. They also developed a formula that calculated the cubic feet of water impounded as a monetary value. Because dams serve different purposes (recreational, hydro-power), assessed values are hard to estimate and cannot be determined accurately.	
Lower Great Falls Dam (High Hazard)	Flooding; Dam Breach Salmon Falls River		
Bridges[32]			
Salmon Falls Road over Salmon Falls River	Flooding	(120 x 34 x $1,000)	$4,080,000
NH9/NH236 over Salmon Falls River	Flooding	(114 x 56 x $1,000)	$6,384,000
Buffumsville Road over Salmon Falls River	Flooding & Dam Failure	(118 X 35 x $1,000)	$4,130,000
Emergency Response Facilities			
Police Station	Flooding		$4,286,700
Public Works/Highway Division	Flooding		$2,011,100

[32] The approximate assessed value for the bridges was calculated by multiplying $1,000.00 per square foot of bridge. This estimate was provided by the Bridge Design Bureau at NHDOT and includes all cost (engineering, consulting and in-house design, construction, etc.) to build a new bridge.

Non-Emergency Response Facilities		
City Well	Flooding	$61,800
Water Treatment Facility	Flooding	$9,290,600
Wastewater Treatment Facility	Flooding	$25,323,100
Pump Station (Blackwater Road)	Flooding	$1,075,000
Potential Resources		
Home Depot	Flooding	$6,764,800
Target	Flooding	$8,882,000
Facilities and Populations to Protect		
Tri-City Christian Academy/Covenant	Flooding	$1,529,600
	TOTAL	**$59,224,700**

Note: The assessed value for each structure was provides by the city's assessing department

Calculating Potential Loss

It is difficult to ascertain the amount of damage that could be caused by a natural or man-made hazard because the damage will depend on the hazard's extent and severity, making each hazard event somewhat unique. Therefore, we have used the assumption that hazards that impact structures could result in damage **0-1%**, **1-5%**, or **5-10%** of Somersworth's structures, depending on the nature of the hazard, whether or not the hazard is localized, and its economic impact.

Table 5.2: Assessed Value of All Structures

Economic Loss 2020		Low 1% damage	Medium 5% damage	High 10% damage
Residential	$614,944,687	$6,149,446	$30,747,234	$61,494,468
Manufactured	$20,840,700	$208,407	$1,042,035	$2,084,070
Commercial	$207,105,603	$2,071,056	$10,355,280	$20,710,560
Gas/Oil Utilities	$7,697,800	$76,978	$384,890	$769,780
Electric Utilities	$10,374,000	$103,740	$518,700	$1,037,400
Total	$860,962,790	$8,609,627	$43,048,139	$86,096,278

Source: Source: Department of Revenue Administration; 2020 Annual Report
*Total assessed value takes into account land and property value, except for manufactured.

Based on this assumption, the potential loss from any of the identified hazards would range from **$0 to $8,609,627** or **$8,609,627 to $43,048,139** or **$43,048,139 to $86,096,278** based on the 2020 Somersworth City valuation, which lists the assessed value of all structures in Somersworth to be **$860,962,790** (see chart above).

In order to stay consistent, the planning committee made the decision to use the results derived from the hazard vulnerability assessment tool (Table 2.3). There was consensus that the overall threat rankings (severity x probability) associated with each hazard were an equal indicator to the percentage of damage and were therefore used to determine the potential loss.

Human loss of life was not included in the potential loss estimates, but could be expected to occur, depending on the severity and type of the hazard.

Flooding (Heavy Rains and Inland/Riverine Flooding).....$8,609,627 to $43,048,139

Inland floods are most likely to occur in the spring due to the increase in rainfall and melting of snow; however floods can occur at any time of year. A sudden thaw in the winter or a major downpour in the summer can cause flooding because there is suddenly a large amount of water in one place with nowhere for it to go. Although Somersworth has limited structures within the 100-year floodplain zone, it was discussed that there are areas in the city that have experienced repeated flooding with significant damage to both residential properties and critical infrastructure.

Ice Jam.....$0 to $8,609,627

An ice jam is an accumulation of ice in a river that restricts water flow and may cause backwater that floods low-lying areas upstream from the jam. Areas below the ice jam can also be affected when the jam releases, sending water and ice downstream. Damages resulting from ice jams can affect homes, buildings, roads, and riverine structures; block hydropower and water supply intakes; and decrease downstream discharge.[33]

Dam Failure (Breach at Lower Great Falls Dam)……..$0 to $8,609,627

Most of the dams in Somersworth are non-menacing; there is only one low hazard and one high hazard dam, which means they have a relatively low/medium hazard potential because of the size and location. Failure or misoperation of any number of these dams would represent a significant hazard potential and economic loss to structures and property but no probable loss of lives. The Lower Great Falls has a high hazard potential that would result in probable loss of human life due to water levels and velocity, including damage to the downtown area.

Hurricane & Tropical Storms…..…….$8,609,627 to $43,048,139

Somersworth will likely experience impact from a storm of tropical origin in the foreseeable future, but the level of losses would vary with the exact track of such a storm. Somersworth is considered an inland community, however may be vulnerable to storm surge in some areas. High winds from a storm would be the factor most likely to cause damage. The Hurricane of 1938, Hurricane Carol, Hurricane Diane, and Hurricane Sandy all caused some damage occurring to the utilities and municipal infrastructure. These storms caused power outages, damage to residential structures from high winds, and heavy rain. Hurricanes are rare in New Hampshire, but they should not be ruled out as a potential hazard. With projected sea level rise and the increased frequency of severe storm events, the impacts from these kinds of events have the potential to cause major issues the city will need to address moving forward.

Extreme Temperatures……..……..$8,609,627 to $43,048,139

In New England, temperature extremes are quite common. Extreme heat events can be described as periods with high temperatures of 90°F or above. Elderly and very young populations are particularly susceptible to these events, even those of only single-day duration. Also, roads, railroads and other infrastructure can suffer significant damage during extended events. Characteristics of an extreme cold event in northern states include temperatures at or below zero for an extended period of time. According to the National Weather Service (NWS), extreme cold is a daily concern during the winter months for northern states. Losses would stem mostly from impacts to life safety—illness or death.

Wildfire……..……..$8,609,627 to $43,048,139

Wildfire is defined as an uncontrolled and rapidly spreading fire. They often occur during drought and when woody debris on the forest floor is readily available to fuel the fire. Between the storm events experienced since 2006, land use changes, and population growth, fire load conditions are similar to the conditions seen right before the 1947 forest fire (Rochester, NH) and thus a potential high threat. Currently, there is an

[33] US Army Corps of Engineers. Ice Jams in New Hampshire. U.S. Army Cold Regions Research and Engineering Laboratory, Hanover, New Hampshire. October, 2000.

abundance of limbs and branches on the forest floor and the city may be susceptible to wildfire during drought; causes include but aren't limited to: arson, lightning, and burning of debris.

Earthquake……..……..$8,609,627 to $43,048,139

An earthquake is a rapid shaking of the earth caused by the breaking and shifting of rock beneath the earth's surface. Earthquakes can cause buildings and bridges to collapse, disrupt gas, electric and phone lines, and often cause landslides, flash floods, fires, and avalanches. There have been just three earthquakes that registered a 5.50 or higher on the Richter scale in New Hampshire's history. It is well documented that there are fault lines running throughout New Hampshire, but high magnitude earthquakes have not been frequent in New Hampshire history.

Severe Winter Weather……..……$43,048,139 to $86,096,278

Heavy snowstorms typically occur from December through April. New England usually experiences at least one or two heavy snowstorms with varying degrees of severity each year. Power outages, extreme cold and impacts to infrastructure are all effects of winter storms that have been felt in Somersworth in the past. All of these impacts are a risk to the community, including isolation, especially of the elderly, and increased traffic accidents. Damage caused as a result of this type of hazard varies according to wind velocity, snow accumulation, duration and moisture content. Seasonal accumulation can also be as significant as an individual snowstorm. Winter snow and ice storms often cause trees to fall creating widespread power outages by downing power lines. Road closures are also often a result of snow accumulations, ice storms and downed power lines, although municipal staff is able to keep the city's roads clear most of the time. Heavy snow and ice storms can also cause widespread damage to forested areas. The December 2008 ice storm knocked out power for as many as 400,000 customers throughout the State (five times larger than those who lost power in the ice storm of 1998, which was previously the most devastating storm on record). Ice storms could be expected to cause damage ranging from a few thousand dollars to several million, depending on the severity of the storm.

Tornado & Downburst…..……..……..$8,609,627 to $43,048,139

Tornadoes are relatively uncommon natural hazards in New Hampshire; on average, about six touch down each year. Damage largely depends on where the tornado strikes. If it were to strike an inhabited area, the impact could be severe. The probability that any highly valuable asset in particular would be hit is low; and the general magnitude of a tornado would likely be F2 or less, damages would be expected to be relatively low, with several assets of significant value impacted. Downburst activity is very prevalent throughout the State. However, the majority downburst activity is mostly unrecognized unless a large amount of damage has occurred.

Drought……..……$0 to $8,609,627

A drought is defined as a long period of abnormally low precipitation, especially one that adversely affects growing or living conditions. They generally are not as damaging and disruptive as floods and are more difficult to define. A potential economic impact is the loss of revenue from the hydro-plant along the Salmon

Falls River. The social and economic impact of a long-term drought has the potential to have a larger impact than in other communities in the Seacoast.

Drought effects in New Hampshire have tended to be moderated by the state's relatively large water supply and by its relatively sparse population; therefore, risk from drought, for now, seems low, even with a moderate probability of drought recurrence. The cost of drought is difficult to calculate, as any cost would primarily result from an associated fire risk and diminished water supply.

Severe Thunderstorms……..……..$8,609,627 to $43,048,139

Severe lightning as a result of summer storms or as a residual effect from hurricanes have occurred in Somersworth. Due to the possibility of trees being toppled by lightning onto power lines and creating sparks and the fact that many of the buildings in Somersworth are considerably old, lightning is a significant disaster threat. Lightning could do damage to specific structures, injure or kill an individual but the direct damage would not be widespread. Power outages, high winds, train sparks, flash flooding, and other utility interruptions are common in thunderstorms in the region, so losses should be expected to occur relatively frequently.

Public Health Threats……..…$8,609,627 to $43,048,139

Public health threats not only include the possibility of an epidemic or pandemic, but also include problems such as radon, arsenic, and Lyme disease which could present a possible threat to the community. With the occurrence of worldwide pandemics such as SARS, H1N1, Avian Flu and COVID-19, Somersworth could be susceptible to an epidemic and subsequent quarantine once again as seen in 2020-2021. Whether the threat is naturally occurring or not, the city will have to address potential long-term health impacts in their future planning efforts.

Hazardous Material…..……..$8,609,627 to $43,048,139

The possibility of vehicular accidents involving hazardous materials is identified as a hazard in Somersworth. The Spaulding Turnpike (Route 16) is a main highway from southern New Hampshire to the Lakes Region and the White Mountains. Traffic accidents occur on this highway regularly, and hazardous materials are routinely carried on this road. State Route 9 (High Street) connects the Spaulding Turnpike with the Berwicks in Maine, passing directly through downtown Somersworth, crossing both the Salmon Falls River and the New Hampshire North Coast railroad line, and continuing eastward into Berwick, Maine. Finally, state Route 108 is a major alternative road to the Spaulding Turnpike in western Somersworth, connecting Dover and Rochester, New Hampshire. It is a major commercial corridor.

The NH North Coast rail line runs through Somersworth in the densely developed and populated downtown area, mostly carrying freight and Liquid Propane Gas “LPG” to Eastern Propane & Oil terminal in North Rochester. Transportation of chemicals and bio-hazardous materials to and from Canada or Maine by railroad or truck is a concern. The potential for derailments and accidents at rail crossings always exists.

Urban Conflagration……..…..$8,609,627 to $43,048,139

Fires in densely populated areas can cause a tremendous amount of damage and cause loss of life if they move quickly. Due to Somersworth not having a large downtown or urban center, the likelihood of a large fire across the city is very unlikely. The main concern lies within the aging wooden infrastructure around the city that may be susceptible to burn. Typical instances of urban conflagration in Somersworth in recent years have been small localized fires that have not spread from building to building.

Civil Unrest……..……..$0 to $8,609,627

Civil unrest has been identified as a hazard in Somersworth due to recent events of social unrest in 2020. While Somersworth does not have any ongoing protests, it is important to note to protect government buildings for large events such as Election Day. While the risk overall is low, there may be instances where additional police presence is needed for periods of social/political change.

Solar/Space weather……..……$0 to $8,609,627

Threats from Solar weather and space weather remain a concern for Somersworth despite being extremely unpredictable. Electromagnetic pulses, without proper surge protections, can knock out all technological services in an instant. This could have effects that could cause other hazards such as extreme heat/cold, civil unrest, hazardous materials, and urban conflagration. It is impossible to predict what would occur after a total blackout as it has not happened before, but it would cause a great amount of damage.

Chapter VI: Multi-Hazard Goals and Existing Mitigation Strategies

All Hazard Mitigation Goals

Before identifying new mitigation actions to be implemented, the Team updated the following multi-hazard goals. These goals were based on the State of New Hampshire Multi-Hazard Mitigation Plan (2013) that was prepared and is maintained by HSEM.

Before identifying new mitigation actions to be implemented, the Team updated the following multi-hazard goals in order to stay consistent with State goals. These goals include:

- *Ensure the protection of the general population, citizens and guests of Somersworth, New Hampshire, before during and after a hazard.*
- *Protect existing properties and structures through mitigation activities.*
- *Provide resources to residents of Somersworth, when needed, to become more resilient to hazards that impact the city's critical support services, critical facilities, infrastructure, economy, environment, historical & cultural treasures and private property.*
- *Support the Presidential Policy Directive (PPD-8) through prevention, mitigation, preparedness, response and recovery actions*
- *Work regionally to identify, introduce and implement cost effective hazard mitigation measures in order to accomplish the city's goals.*
- *Develop and implement programs to promote hazard mitigation to protect infrastructure throughout the city to reduce liability with respect to natural and human-caused hazards generally.*
- *To address the challenges posed by climate change as they pertain to increasing risks in the city's infrastructure and natural environment.*

Types of Mitigation Strategies Developed

The Hazard Mitigation Committee established an initial list of mitigation actions by conducting a brainstorming session. The Committee reviewed these objectives and concluded that, with some modification, the objectives would constitute a usable framework for identifying and categorizing potential mitigation actions.

The following list of mitigation categories and possible strategy ideas was compiled from a number of sources including FEMA, other Planning Commissions, and past Hazard Mitigation Plans. This list was used during a brainstorming session to discuss what issues there may be in City. Team involvement and the brainstorming sessions proved helpful in bringing out new ideas, better relationships and a more in depth knowledge of the community.

Gaps in Existing Measures

The planning committee identified a number of redundancies and gaps within their existing mitigation activities. When reviewing the 2011 Plan, the planning committee made the following revisions:

1. The NFPA 101 Life Safety and Fire Codes were updated from 2003 to 2009.
2. The enforcement responsibilities were all updated.
3. Two programs and policies were removed, including: a) information on minimum lot sizes found in the city's zoning ordinance and b) state standards for building codes in manufactured homes and parks. The committees felt as though these were too specific and were no longer needed to be referenced in this plan.

Summary of Recommended Improvements

1. Whenever the state adopts the 2016 State Building Code, Somersworth will do the same. This also pertains to the Fire Codes (NFPA 2016).
2. Work with FEMA and NHOEP to ensure new FEMA floodplain maps are delineated over the course of the next 5 years.
3. Implement stormwater management strategies to help satisfy the new MS4 requirements.
4. Install emergency back-up generators at the public works facility and City Hall.

Existing Protection Matrix

The Somersworth Hazard Mitigation Planning Committee has developed the following table of existing programs, regulations, laws, etc. that are currently in place and either directly or indirectly provide loss prevention from natural hazards. This matrix, a summary of the preceding information, includes the type of existing program or activity (Column 1), a description of the existing strategy (Column 2), the type of hazard (Column 3), type of activity (Column 4), the area of city impacted (Column 5), the enforcement of the strategy (Column 6), the effectiveness of the strategy (Column 7), any changes in priority (Column 8), and the 2021 Update (Column 9).

Table 6.1: Existing Mitigation Strategies Matrix and Proposed Improvements

Existing Program	Description	Type of Hazard	Type of Activity	Area of City impacted	Enforcement	Effectiveness	2021 Update
Building Code/ Permits	Requires builder to obtain all permits prior to action.	Multi-hazard	Prevention	City-wide	Code Enforcement Officer(s)	Excellent	Somersworth follows the State Building Code (2009)
Life Safety Codes	NFPA 101 2009 Edition	Multi-hazard	Emergency Preparedness	City-wide	Fire Department	Excellent	Somersworth considering the State NFPA 101 (2016)
Fire Standards	NFPA 1 2009 Edition	Multi-hazard	Emergency Preparedness	City-wide	Fire Department	Excellent	The NH Fire Marshal is considering the NFPA 101 (2016)
Elevation Certificates	An administrative tool of the NFIP, used by communities to verify and document building compliance with the community's floodplain management regulations	Multi-hazard	Prevention	Potential Flood Areas	In order to be rated properly for flood insurance, a State-licensed professional is required to certify the elevation information	Excellent	This program continues to be administered to ensure that elevation certificates are properly filed, certified, and implemented.
Flood Hazard District	Local ordinance to regulate development in the FEMA floodplain.	Flooding	Policy	Potential flood areas per FIRM maps	Planning Board	Good	Somersworth is in need of updated FEMA maps. The effective maps are dated May 17, 2005 and September 30, 2015
Groundwater Resource Protection District	Protect existing and potential groundwater supply and groundwater recharge areas	Drought	Policy	Aquifer areas	Planning Board	Excellent	Local regulations are reviewed and updated as necessary

Riparian Buffer Ordinance	Protection of vegetation and soil in vicinity of wetlands	Flooding	Policy	Wetland areas	Planning Board	Excellent	Somersworth updated this ordinance in 2021 to include expanded setbacks on streams and brooks
Shoreland Protection Act	Establishes minimum standards for the subdivision, use, and development along the State's larger water bodies	Flooding	Policy	Willand and Lily Ponds; Salmon Falls River with urban exemption	Planning Board	Good	Local regulations need to be in agreement with State standards
MS4 Updates	Required by State for stormwater management, sedimentation erosion control, site alteration, timber management, etc.	Multi-hazard	Policy	City-wide	Planning Board	Excellent	Somersworth updated their stormwater regulations in 2014, complete in June 2021
Road Design Standards	State minimum standards with additional subdivision and site plan regulations.	Multi-hazard	Prevention	City-wide	Public Works	Good	Somersworth is currently developing new pavement management strategies
Mutual Aid	Mutual aid system with Police as authorized by RSA 48:11-A and 105:13.	Multi-hazard	Emergency Preparedness	1. Dover-Rochester-Rollinsford 2. S. Berwick-Berwick 3. Strafford County Dispatch Units, Tactical Response, and Technical Accident Reconstruction Team	Police Department	Excellent	Mutual aid is in place and agreements are renewed as necessary.

				4. State Police Units			
Mutual Aid	Mutual aid system with Fire as authorized by RSA 154:30.	Multi-hazard	Emergency Preparedness	1. Community Mutual Aid Association 2. Seacoast Chief Fire Officers Association	Fire Department	Excellent	Mutual aid is in place and agreements are renewed as necessary.
Mutual Aid	NH Public Works mutual aid program	Multi-hazard	Emergency Preparedness	UNH T-Squared	Highway Department	Excellent	Mutual aid is in place and agreements are renewed as necessary.
Local Emergency Operations Plan (LEOP)	Defined notification procedures and actions that should be taken in different emergency situations. This was last updated in 2014	Multi-hazard	Prevention	City-wide	Emergency Management Director	Excellent	The next update is scheduled for 2019.
Evacuation and Notification	Evacuation and notification procedures are defined in Somersworth's LEOP.	Multi-hazard	Emergency Preparedness	City-wide	Emergency Management Director	Excellent	Completed in 2014. The next update is scheduled for 2019.
Emergency Back-up Power	There is back-up power at the Police Station, Fire Department, Housing Authority, Water and Wastewater facilities. There is a need for back-up power at the public works facility and city hall	Multi-hazard	Emergency Preparedness	Police, Fire, Housing Authority, Public Works, and Water and Waste Facilities	Emergency Management Director	Good	Completed in 2020

Emergency Shelter	Share a regional shelter with Rochester during minor events. Update for the new changes surrounding the Tri-city task force. Willing Road is an emergency warming shelter.	Multi-hazard	Emergency Preparedness	Regional shelter locations	Emergency Management Director	Excellent	Somersworth also used the Flanagan Center and Idlehurst during emergency events
Tree Maintenance in Right of Way	Eversource have tree maintenance programs to clear trees and tree limbs from power lines and roadways	Multi-hazard	Prevention	City-wide	Eversource and Public Works	Good	NHDOT only removes tree limbs upon request.
Storm Drain Maintenance	Storm drains are maintained and upgraded on an "as needed" basis. Update MS4 permits	Flooding	Policy	City-wide	Public Works	Good	Somersworth has increased efforts of catch basin clean – twice a year during the spring and fall
Flood Gauge	Measures level of Salmon Falls River	Flooding	Prevention	Water facility on Salmon Falls River	Water Facilities Operator	Good	System is in place to assist during flooding events,
Flood Warning System	Computer linked to flood gauges notifies operator of water levels	Flooding	Prevention	Water facility on Salmon Falls River	Water Facilities Operator	Good	The EMD will look into whether or not the data is available by computer.
State Dam Program	Dam inspections completed by NHDES dam maintenance and safety program	Dam Failure & Flooding	Prevention	High hazard dams	State	Good	Receives notifications from the State. There is a need to develop a comprehensive list of dam inspection schedules.

Public Education	City newsletter, email blasts, website, blackboard connect, Nixel, reverse 911, and public access channel 22 & 95	Multi-hazard	Education & Outreach	City-wide	Emergency Management Director	Excellent	Somersworth added blackboard connect, Nixel, and reverse 911 to outreach
Manhole Cover Replacement	Department staff repairs/replaces broken manhole covers on designated streets that cause damage to plow trucks and plows during severe winter storms. The damaged plow trucks reduce the ability of the Department to be responsive 24/7. The city repairs uneven broken manhole covers in advance of winter season allows operators to avoid excessive damage and downtime.	Severe Winter Weather	Prevention	City-wide	Public Works	Excellent	The city continues to replace covers in anticipation of storms.

The 2021 Somersworth Hazard Mitigation Committee decided to not have mitigation actions for High Wind Events, Lightning and Tropical Cyclones since they are typically dealt with on a case-by-case basis and are relatively uncommon to Somersworth.

Effectiveness:

- Excellent – The existing program works as intended and is exceeding its goals
- Good – The existing program works as intended and meets its goals
- Average – The existing program does not work as intended and/or does not meet its goals
- Poor – this existing program is negatively impacting the community

Changes in Priority:

- Completed Action: This program continues to be an implemented mitigation action item since the last updated plan was developed
- Deferred Action – At the time of developing this plan, more time is required for completion
- Removed Action – This existing program is no longer a priority to the City

2021 Update:

- Recommendations for improvement

Prior Mitigation Plan(s)

Dates(s) of Prior Plan(s)

Somersworth participated in two prior mitigation plans that were developed by the Somersworth Hazard Mitigation Planning Committee and adopted by the City Council in 2004 and 2010. This Plan, the "Multi-Hazard Mitigation Plan Update "2021" is the most recent version.

All Committee members agreed that the ranking of the actions as presented below was valid as far as it went; however, they felt that this scoring scheme does not consider the practicality, relative cost, immediacy of need, or potential mitigation gain associated with each of the actions very well.

Table 6.2: Accomplishments since Prior Plan(s) Approval

Rank	Proposed Mitigation Action	2021 Update
1	Develop and adopt new pavement management strategies. Have completed an update to existing system, consultant used software model to re-assess the City and existing pavement	Complete. Developing new pavement management strategies will be a **moderate** cost of $1,000 -$5,000 of staff time.

2	Review current groundwater protection ordinance to ensure best available performance standards and BMPS are being utilized. Revise protection areas to include newly sited wells (Dover).	Completed The city has recognized the importance of protecting existing and future drinking water supplies to limit public health risks. This review would be have a relative **low cost** of <$1,000. Willand pond watershed and wellhead protection area are already in place, ditto superfund protections
4	Update Digital Orthophotography- integrate into city system	Completed. The most up-to-date digital orthophotography is from 2010. It has been integrated into Arc View. All municipal staff has access to the data, which is used for general planning purposes. New imagery integrated into the city's system.

5	Flood Prevention on Rocky Hill Road (3 culverts) and Blackwater Road (1 culvert) Raise road and replace four culverts to increase water flow and reduce flooding	Completed/Ongoing action. The city has replaced one culvert on Rocky Hill Road. This project included the removal of an existing 48" x 54" oval culvert and replaced it with a 103" x 71" x 47' pipe arch culvert within the same general footprint under an existing roadway. The city continues to investigate the cost and feasibility of replacing the other two culverts on Rocky Hill Road and the one identified on Blackwater Road. The committee stated that neither of these culverts would result in raising the road at any of these locations. The area identified that would need this type of engineering would be on Salmon Falls Road.
6	Sump pumps needed for structures during severe storms	It is unclear if this strategy was completed. The Fire Department does operate a few sump pumps purchased equipment between 2010 and 2015. However, the committee felt as though the city should invest in upgrades. There is also still a need for pumps at the Public Works Department and the Water Distribution Department.
7	Server needed for City Hall	Completed. Mainly driven by the need to update the city's MS Server and Exchange OS, the city invested approximately $20,000, of which approximately $7,000 was hardware; the balance was for a Windows 2012 server license and Exchange 2013 user license.
8	E911 Address Layer into GIS System	Completed. The city partnered with UNH and utilized a software program that allows the city to easily update GIS layers with current assessing data that includes all address changes made by the E911 Committee. The E911 Committee was set up by the mayor and comprised of fire, police, EMS, post office, and a city councilor. The city now updates their GIS layers every few months so all addresses are up to date.

9	Fluvial Erosion Hazard Mapping, Ordinance Development and Outreach	Deleted. The NHGS did not survey or map any waterbodies within the city's borders; therefore this is no data for the city to use. In the future, if there is a mapping study completed on the Salmon Falls River, the city may seek to develop a fluvial erosion hazard ordinance and subsequent outreach materials. Due to the unavailability of the data, this proposed action will be deleted from this plan update.
10	The VAC-truck Purchase	Completed. Purchase a VAC-truck to assist in cleaning the city's catch basins and various stormwater infrastructures. The city will also develop a maintenance schedule to ensure a more efficient way of limiting flooding, stormwater runoff, and reducing sedimentation and degradation to water quality. The VAC-truck would have a **high cost** between $250,000 and $275,000. However, developing a maintenance schedule would have a relative **low cost** of <$1,000.

New Mitigation Strategies and STAPLEE

Feasibility and Prioritization

Table 8.1 reflects the newly identified potential multi-hazard mitigation strategies as well as the results of the STAPLEE Evaluation as explained below. It should also be noted that although some areas are identified as "Multi-Hazard", many of these potential mitigation strategies overlap.

The goal of each proposed mitigation strategy is reduction or prevention of damage from a multi-hazard event. To determine their effectiveness in accomplishing this goal, a set of criteria was applied to each proposed strategy that was developed by the FEMA. The STAPLEE method analyzes the **S**ocial, **T**echnical, **A**dministrative, **P**olitical, **L**egal, **E**conomic and **E**nvironmental aspects of a project and is commonly used by public administration officials and planners for making planning decisions. The following questions were asked about the proposed mitigation strategies discussed in Table 8.1.

Social: ..... Is the proposed strategy socially acceptable to the community? Is there an equity issue involved that would result in one segment of the community being treated unfairly?

Technical: ..... Will the proposed strategy work? Will it create more problems than it solves?

Administrative: ..... Can the community implement the strategy? Is there someone to coordinate and lead the effort?

Political: ..... Is the strategy politically acceptable? Is there public support both to implement and to maintain the project?

Legal: ..... Is the community authorized to implement the proposed strategy? Is there a clear legal basis or precedent for this activity?

Economic: ..... What are the costs and benefits of this strategy? Does the cost seem reasonable for the size of the problem and the likely benefits?

Environmental: ..... How will the strategy impact the environment? Will it need environmental regulatory approvals?

Each proposed mitigation strategy was then evaluated and assigned a score based on the above criteria. Each of the STAPLEE categories were discussed and were awarded the following scores: Good = 3; Average = 2; Poor = 1. An evaluation chart with total scores for each new strategy is shown in Table 8.1.

The ranking of strategies with the scores displayed in the following pages was merely a guideline for further prioritizing. The team then prioritized the strategies and prepared the action plan using additional criteria:

- Does the action reduce damage?
- Does the action contribute to community objectives?
- Does the action meet existing regulations?
- Does the action protect historic structures?
- Can the action be implemented quickly?

The prioritization exercise helped the committee seriously evaluate the new hazard mitigation strategies that they had brainstormed throughout the multi-hazard mitigation planning process. While all actions would help improve the city's multi-hazard and responsiveness capability, funding availability will be a driving factor in determining what and when new mitigation strategies are implemented.

The Team's Understanding of Multi-Hazard Mitigation Strategies

The Team determined that any strategy designed to reduce personal injury or damage to property that could be done prior to an actual disaster would be listed as a potential mitigation strategy. This decision was made even though not all projects listed in Tables 8.1 and 9.1 (Implementation Plan) are fundable under FEMA pre-mitigation guidelines. The Team determined that this Plan was in large part a management document designed to assist the City Council and other city officials in all aspects of managing and tracking potential emergency planning strategies. For instance, the team was aware that some of these strategies are more properly identified as readiness issues. The Team did not want to "lose" any of the ideas discussed during these planning sessions and thought this method was the best way to achieve that objective.

When brainstorming mitigation strategies for the City of Somersworth, the Hazard Planning Committee reviewed and considered all hazards identified in this Plan. Due to the infrequency and relative low risks of some of the hazards (lighting, radon, etc.) effecting Somersworth, the Planning Committee came up with a comprehensive list of strategies that would address the most relevant needs and vulnerabilities. While not every hazard has a mitigation strategy, they were all considered and play a vital role as an identified potential hazard for the future and should not be removed from the plan. But in order to remain efficient and mindful of local resources, the strategies and mitigation actions were designed to address the greatest weaknesses in Somersworth.

Table 6.3: Potential Mitigation Strategies & STAPLEE

New Mitigation Project	Type of Hazard	Affected Location	Type of Activity	S	T	A	P	L	E	E	Total
Provide education and outreach on new delineated FEMA maps and information on NFIP options for residents.	Flooding	Residents in or in close proximity to the FEMA flood zones	Education & Outreach	3	3	3	3	3	3	3	21
Mitigate flooding and evacuation issues by raising parts of Salmon Falls Road at the Rochester / Berwick (ME) border. Significant upgrades to existing culverts would also be necessary to handle increased precipitation during storm events.	Flooding	Salmon Falls Road	Construction	3	2 There are questions as to the unintended consequences of raising the road	3	2 Will need the support of the City Council	3	1 Extremely high construction costs over a mile of roadway	2 May need environmental permits	16
Conduct a flood mitigation study at both the wastewater treatment and water treatment facilities to evaluate flooding scenarios along the	Flooding	Wastewater and Water Treatment Facilities along Salmon Falls River	Planning	3	3	3	2 Will need the support of the	3	1 High cost to hire a consultant to conduct the study	3	18

Salmon Falls River in that location.							City Council				
Review current groundwater protection ordinance to ensure best available performance standards and BMPS are being utilized. Revise protection areas to include newly sited wells (Dover).	Threats to Public Drinking Water Supplies	Groundwater protection district	Planning	3	3	3	2	3	3	3	20
							There may be push back with zoning changes				
Replace current fire station (same location) as it does not meet current seismic codes.	Earthquake	Fire Station	Construction	3	3	2	1	3	1	3	16
						May be a challenge	Support of the City Council		Very high cost of construction		
Replace snow removal equipment and review maintenance schedules to limit post storm impacts, including: the availability of public access (roadways, sidewalks, etc.) and ensuring the continuity of operation of schools and local businesses.	Severe Winter Weather Events	City-wide	Equipment Purchase & Planning	3	3	3	3	3	2	3	20
									Moderate cost to replace equipment over time		
Adopt updated FEMA DFIRM maps once they	Flooding	FEMA designated zones	Planning	3	3	3	3	3	3	3	21

become available (Risk mapping project).											
National Guard Center brownfields assessments and reuse (Phase I & II ESA to ID any contamination)	Hazardous materials	Brownfields Sites	Planning	3	3	3	3	3	3	3	21
Police Station Cleanup	Hazardous materials	Police Station	Planning	3	3	3	3	3	3	3	21
Fire Pumper Engine 2 replacement	Fires	Fire station	Equipment Purchase	3	3	3	3	3	3	3	21
Fire station training tower and equipment	Multi-hazard (especially fires)	Fire Station	Equipment Purchase & Planning	3	3	3	3	3	3	3	21

Main street and Constitutional Way complete streets - includes utility and stormwater upgrades (meeting MS4 requirements)	Multi-hazard (mostly water/stormwater/sewer)	Main Street and Constitutional Way	Construction	3	3	3	3	3	3	3	21
Cyber-security study of vulnerabilities	Multi-hazard (especially civil unrest)	City-wide	Planning	3	3	3	3	3	3	3	21
Permit Enforced Outdoor dining policy	Public health threats	Downtown	Planning	3	3	3	3	3	3	3	21
Temperature takers in doorways, PPE, dividers for desks/offices	Public health threats	Town offices/schools	Equipment Purchase	3	3	3	3	3	3	3	21
Disinfection (UV lights, sprayers	Public health threats	Town offices/schools	Equipment Purchase	3	3	3	3	3	3	3	21
Gen'l communications upgrades (Base station radio for SAU offices to communicate with schools, repeater antenna at high school, purchase of additional radios (14 in 2021), upgrade telephone	Multi (all)	SAU schools	Equipment Purchase	3	3	3	3	3	3	3	21

system, website improvements for communications and messaging.											
Feasibility study for a new stand pipe (water storage tank) to improve storage capacity	Drought	City-wide	Planning	3	3	3	3	3	3	3	21
Multi-agency table-top exercises for potential spill into water supply (salmon falls) - collaborate with Berwick, state of NH, state of ME as feasible/necessary	Hazardous materials	Salmon Falls Area	Planning	3	3	3	3	3	3	3	21
Fire boat practical exercises to ensure functionality	Multi (all)	City-wide	Planning	3	3	3	3	3	3	3	21
Active shooter trainings	Civil Unrest	City-wide	Training	3	3	3	3	3	3	3	21
Grant for ballistic equipment for firefighters and EMS equipment for active shooter environment	Civil Unrest	City-wide	Equipment Purchase	3	3	3	3	3	3	3	21

Sump pumps needed for structures during severe storms	Multi-hazard	City-wide	Equipment Purchase	3*	3*	3*	3*	3*	3*	3*	21*
Flood Prevention on Rocky Hill Road (3 culverts) and Blackwater Road (1 culvert) Raise road and replace four culverts to increase water flow and reduce flooding	Flooding	Rocky Hill oad/Blackwater Road	Construction	3*	3*	3*	3*	3*	3*	3*	21*
The City will continue to evaluate other mitigation measures such as use of snow fencing as a way to address drifting at certain locations of the City.	Severe Winter Weather	City-wide	Planning	3	3	3	3	3	3	3	21
DPW winter operations incorporates greater use of pretreatment application (liquid salt brine) prior to snow storm events to improve road conditions, reduce buildup of ice in early phase of snow events. Integrate into City SOP.	Severe Winter Weather	City-wide	Planning	3	3	3	3	3	3	3	21

***** = The committee decided to use the STAPLEE ratings from the 2016 mitigation actions carried over.

Implementation Schedule for Prioritized Strategies

After reviewing the finalized STAPLEE numerical ratings, the Team prepared to develop the Implementation Plan (Table 9.1). To do this, team members created four categories into which they would place all the potential mitigation strategies.

- **Category 0** was to include those items, which were "continuous", that is those that are being done and will continue to be done in the future.
- **Category 1** was to include those items under the direct control of city officials, within the financial capability of the city using only city funding, those already being done or planned, and those that could generally be completed within one year.
- **Category 2** was to include those items that the city did not have sole authority to act upon, those for which funding might be beyond the city's capability, and those that would generally take between 13—24 months.
- **Category 3** was to include those items that would take a major funding effort, those that the city had little control over the final decision, and those that would take in excess of 24 months to complete.

Each potential mitigation strategy was placed in one of the three categories and then those strategies were prioritized within each category.

Once this was completed, the Team developed an implementation plan that outlined who is responsible for implementing each strategy, as well as when and how the actions will be implemented. The following questions were asked in order to develop an implementation schedule for the identified priority mitigation strategies.

WHO? Who will lead the implementation efforts? Who will put together funding requests and applications?

WHEN? When will these actions be implemented, and in what order?

HOW? How will the community fund these projects? How will the community implement these projects? What resources will be needed to implement these projects?

In addition to the prioritized mitigation projects, Table 9.1, Implementation Plan, includes the responsible party (WHO), how the project will be supported (HOW), and what the timeframe is for implementation of the project (WHEN).

New Mitigation Project	Responsibility and/or Oversight	Funding and/or Support	Cost & Effectiveness Low = <$1,000 Medium = $1,000 - $5,000 High = > $5,000	Timeframe	STAPLEE Score (21 being the highest)
Review current groundwater protection ordinance to ensure best available performance standards and BMPS are being utilized. Revise protection areas to include newly sited wells (Dover).	Director of Planning & Community Development	City Funding & Technical Assistance from SRPC and NHDES	The city has recognized the importance of protecting existing and future drinking water supplies to limit public health risks. This review would be have a relative **low cost** of <$1,000.	1 – 2 years	20
Provide education and outreach on new delineated FEMA maps and information on NFIP options for residents.	Director of Planning & Community Development	City Funding & Technical Assistance from SRPC	There are existing outreach materials that could be tailored for the city's residents. This strategy would have a **low cost** of <$1,000.	2 – 3 years	21
Adopt updated FEMA DFIRM maps once they become available (Risk mapping project).	Director of Planning & Community Development & City Council	City Funding	The mapping effort will be completed by FEMA's Discovery Risk Mapping project. Somersworth will only need to adopt the maps and conduct outreach at a relatively low cost of >$1,000.	3 – 5 years	21
Mitigate flooding and evacuation issues by raising parts of Salmon Falls Road at the Rochester / Berwick (ME) border. Significant upgrades to existing culverts would also be necessary to handle increased precipitation during storm events.	Public Works Director & Contracted Engineering Firm	City & Grant Funding	This stretch of roadway is over a mile long and would have significant capital costs. The estimated cost for completion would be >$1,000,000, which is a very **high cost**.	4 – 5 years	16

Conduct a flood mitigation study at both the wastewater treatment and water treatment facilities to evaluate flooding scenarios along the Salmon Falls River in that location.	Public Works Director & Contracted Consulting Firm	City & Grant Funding	In order to complete this strategy, the city would need to hire an environmental consulting firm at a **high cost** of approximately $25,000 – $50,000.	4 – 5 years	18
Replace current fire station (same location) as it does not meet current seismic codes.	Fire Chief & Facility Manager	City Funding	The construction of a new fire station would have a very **high cost** of approximately $4,000,000.	4 – 5 years	16
Additional snow clearing equipment, especially sidewalk tractors	Public Works Director	City & Grant Funding	High = > $5,000 (could be $150-200k)	3 – 5 years	21
National Guard Center brownfields assessments and reuse (Phase I & II ESA to ID any contamination)	City Manager, DPW, SRPC	SRPC assessment grant	High = > $5,000	1 – 2 years	21
Police station cleanup	City Manager, DPW	NHDES grant (awarded), city funding	High = > $5,000	1 – 2 years	21

Fire Pumper Engine 2 replacement	Fire chief	City funding or potential federal funds	High = > $5,000	1 – 2 years	21
Fire station training tower and equipment	Fire Chief	City funding or potential federal funds	High = > $5,000	1 – 2 years	21
Main street and Constitutional Way complete streets - includes utility and stormwater upgrades (meeting MS4 requirements)	DPW	City funding and/or grant funding	High = > $5,000	1 – 2 years	21
Cyber-security study of vulnerabilities	Finance director	City funding	High = > $5,000	6 months – 1 year	21
Permit Enforced Outdoor dining policy	Planning Director	City Funding	Low = <$1,000	6 months – 1 year	21

Temperature takers in doorways, PPE, dividers for desks/offices	School and City Administrations	School district funding, state and federal aid	High = > $5,000	6 months – 1 year	21
Disinfection (UV lights, sprayers)	School Administrations	School district funding, state and federal aid	High = > $5,000	6 months – 1 year	21
Gen'l communications upgrades (Base station radio for SAU offices to communicate with schools, repeater antenna at high school, purchase of additional radios (14 in 2021), upgrade telephone system, website improvements for communications and messaging.	SAU administrations	School district and state/federal grants	High = > $5,000	6 months – 1 year	21
Feasibility study for a new stand pipe (water storage tank) to improve storage capacity.	DPW	City funds	High = > $5,000	6 months – 1 year	21

The City will continue to evaluate other mitigation measures such as use of snow fencing as a way to address drifting at certain locations of the City.	DPW	City funds	Low = <$1,000	6 months – 1 year	21
Multi-agency table-top exercises for potential spill into water supply (salmon falls) - collaborate with Berwick, state of NH, state of ME as feasible/necessary.	Public safety, DPW and other depts support as relevant	City/grant funds	Low = <$1,000	6 months – 1 year	21
Fire boat practical exercises to ensure functionality.	Fire Chief, dpw	City/grant funds	Low = <$1,000	6 months – 1 year	21
Active shooter trainings	Police and fire lead, all depts and multijurisdictional	City funds	Low = <$1,000	6 months – 1 year	21
Grant for ballistic equipment for firefighters and EMS equipment for active shooter environment	Police and fire	Grant funding	High = > $5,000	6 months – 1 year	21

DPW winter operations incorporates greater use of pretreatment application (liquid salt brine) prior to snow storm events to improve road conditions, reduce buildup of ice in early phase of snow events. Integrate into City SOP.	Public Works	City Funds	High = > $5,000	6 months – 1 year	21

Chapter VII: Monitoring, Evaluation, and Updating the Plan

Introduction

A good mitigation plan must allow for updates where and when necessary, particularly since communities may suffer budget cuts or experience personnel turnover during both the planning and implementation states. A good plan will incorporate periodic monitoring and evaluation mechanisms to allow for review of successes and failures or even just simple updates.

Multi-Hazard Plan Monitoring, Evaluation, and Updates

To track programs and update the mitigation strategies identified through this process, the city will review the multi-hazard mitigation plan annually or after a hazard event. Additionally, the Plan will undergo a formal review and update at least every five years and obtain FEMA approval for this update or any other major changes done in the Plan at any time. The Emergency Management Director is responsible for initiating the review and will consult with members of the multi-hazard mitigation planning team identified in this plan. The public will be encouraged to participate in any updates and will be given the opportunity to be engaged and provide feedback through such means as periodic presentations on the plan at city functions, annual questionnaires or surveys, and posting on social media/interactive websites. Public announcements will be made through advertisements in local papers, postings on the city website, and posters disseminated throughout the city. A formal public meeting will be held before reviews and updates are official.

Changes will be made to the Plan to accommodate projects that have failed or are not considered feasible after a review for their consistency with STAPLEE, the timeframe, the community's priorities or funding resources. Priorities that were not ranked high, but identified as potential mitigation strategies, will be reviewed as well during the monitoring and update of the plan to determine feasibility of future implementation. In keeping with the process of adopting this multi-hazard mitigation plan, a public meeting to receive public comment on plan maintenance and updating will be held during the annual review period and before the final product is adopted by the City Council. Chapter XI contains a representation of a draft resolution for Somersworth to use once a conditional approval is received from FEMA.

Integration with Other Plans

Both the 2004 and 2011 plans were used during periodic updates to the Somersworth Master Plan. Input on impacts to roads and other critical infrastructure from hazards was included in relevant master plan sections. Both plans were also used during capital improvements planning updates and

prioritization of municipal culverts and stream crossings for repair and replacement schedules. The 2016 and 2021 plans will be used to facilitate the update of the Master Plan in 2024 or sooner.

This multi-hazard plan will only enhance mitigation if balanced with all other city plans. Somersworth will take the necessary steps to incorporate the mitigation strategies and other information contained in this plan with other city activities, plans and mechanisms, such as comprehensive land use planning, capital improvements planning, site plan regulations, and building codes to guide and control development in the City of Somersworth, when appropriate. The local government will refer to this Plan and the strategies identified when updating the City's Master Plan, Capital Improvements Program, Zoning Ordinances and Regulations, and Emergency Action Plan. The City Council and the Hazard Mitigation Committee will work with city officials to incorporate elements of this Plan into other planning mechanisms, when appropriate. The Emergency Management Director along with other members of the Hazard Mitigation Committee will work with the Planning Board to suggest including the updated Hazard Mitigation Plan as a chapter in the City's Master Plan. In addition, the City will review and make note of instances when this has been done and include it as part of their annual review of the Plan.

Appendices

Appendix A: Bibliography

Appendix B: Planning Process Documentation

Appendix C: Summary of Possible Multi-Hazard Mitigation Strategies

Appendix D: List of Contacts

Appendix E: Technical and Financial Assistance for Multi-Hazard Mitigation

Hazard Mitigation Grant Program (HMGP)

Pre-Disaster Mitigation (PDM)

Flood Mitigation Assistance (FMA)

Appendix A: Bibliography

Documents

- Local Mitigation Plan Review Guide, FEMA, October 1, 2011
- Multi-Hazard Mitigation Plans
    - Town of Albany, 2010
    - Town of Lee, 2013
    - Town of Madbury, 2014
    - Town of Rollinsford, 2016
- State of New Hampshire Multi-Hazard Mitigation Plan (2013) - State Hazard Mitigation Goals
- Disaster Mitigation Act (DMA) of 2000, Section 101, b1 & b2 and Section 322a *http://www.fema.gov/library/viewRecord.do?id=1935*
- Economic & Labor Market Information Bureau, NH Employment Security, 2014; Census 2000 and Revenue Information
- NCDC [National Climatic Data Center, National Oceanic and Atmospheric Administration]. 2015. *Storm Events*

Photos

- Bob Belmore, City Manager, City of Somersworth

Appendix B: Planning Process Documentation

Agendas

City of Somersworth, New Hampshire

Hazard Mitigation Committee Meeting #1

March 10, 2021
1:00PM – 3:00PM

Zoom Meeting:
https://us02web.zoom.us/j/89531373525?pwd=TkpVcXFNaXdCeGY3c25zZzdFNFFSQT09
Zoom Call-in: +1 646 558 8656
Zoom Meeting ID: 89531373525
Zoom Password: 465959

MEETING AGENDA

1. Introductions
2. Discuss plan requirements, update process, and match requirements
3. Review 2016 Excerpt – Asset Inventory (attachment)
4. Review 2016 Excerpt – Past Mitigation Strategies (attachment)
    a. What is the current status of actions and strategies?
5. Review 2016 hazard types and 2018 State Hazard Mitigation Plan excerpt
6. Adjourn

City of Somersworth, New Hampshire

Hazard Mitigation Committee Meeting #2

March 31, 2021

10:00AM – 12:00PM

Zoom Meeting:

https://us02web.zoom.us/j/83331430498?pwd=b0JFQjlCeHFkZmlxRmdYOTd4cHFnUT09

Zoom Call-in: +1 646 558 8656

Zoom Meeting ID: 833 3143 0498

Zoom Password: 118511

1. Introductions
2. Review National Flood Insurance Program (NFIP) Chapter
3. Review Hazard Descriptions and update past/potential impacts of each hazard
4. Update Hazard Vulnerability Assessment Tool (Page 10 of Hazard Descriptions)
5. Homework for Meeting 3: Brainstorm Potential Mitigation Strategies
6. Adjourn

City of Somersworth, New Hampshire

Hazard Mitigation Committee Meeting #3

May 6, 2021

10:30AM – 12:30PM

Zoom Meeting:

https://us02web.zoom.us/j/83849528956?pwd=WUpEOXFBYkppMzJwN2hlZnJMZjlOZz09

Zoom Call-in: +1 646 558 8656

Zoom Meeting ID: 838 4952 8956

Passcode: 754786

1. Introductions
2. Review Table 8.1 – Discuss more potential mitigation strategies.
3. Review table 9.1 – Discuss methods and scoring.
4. Discuss missing items that have not been completed.
5. Homework – If you do not want to score the STAPLEE before the meeting or during the meeting, this will be homework.

Appendix C: Summary of Possible Multi-Hazard Mitigation Strategies

I. RIVERINE MITIGATION

A. Prevention

Prevention measures are intended to keep the problem from occurring in the first place, and/or keep it from getting worse. Future development should not increase flood damage. Building, zoning, planning, and/or code enforcement personnel usually administer preventative measures.

1. **Planning and Zoning[34] -** Land use plans are put in place to guide future development, recommending where - and where not - development should occur and where it should not. Sensitive and vulnerable lands can be designated for uses that would not be incompatible with occasional flood events - such as parks or wildlife refugees. A Capital Improvements Program (CIP) can recommend the setting aside of funds for public acquisition of these designated lands. The zoning ordinance can regulate development in these sensitive areas by limiting or preventing some or all development - for example, by designating floodplain overlay, conservation, or agricultural districts.

2. **Open Space Preservation -** Preserving open space is the best way to prevent flooding and flood damage. Open space preservation should not, however, be limited to the floodplain, since other areas within the watershed may contribute to controlling the runoff that exacerbates flooding. Land Use and Capital Improvement Plans should identify areas to be preserved by acquisition and other means, such as purchasing easements. Aside from outright purchase, open space can also be protected through maintenance agreements with the landowners, or by requiring developers to dedicate land for flood flow, drainage and storage.

3. **Floodplain Development Regulations -** Floodplain development regulations typically do not prohibit development in the special flood hazard area, but they do impose construction standards on what is built there. The intent is to protect roads and structures from flood damage and to prevent the development from aggravating the flood potential. Floodplain development regulations are generally incorporated into subdivision regulations, building codes, and floodplain ordinances.

    a. **Subdivision Regulations:** These regulations govern how land will be divided into separate lots or sites. They should require that any flood hazard areas be shown on the plat, and that every lot has a buildable area that is above the base flood elevation.

    b. **Building Codes**: Standards can be incorporated into building codes that address flood proofing for all new and improved or repaired buildings.

    c. **Floodplain Ordinances:** Communities that participate in the National Flood Insurance Program are required to adopt the minimum floodplain management regulations, as developed by FEMA. The regulations set minimum standards for subdivision regulations and building codes. Communities may adopt more stringent standards than those set forth by FEMA.

[34] All zoning should be carefully reviewed on a consistent basis by municipal officials to make sure guidelines are up-to-date and towns are acting in accordance with best management practices.

4. **Stormwater Management** - Development outside of a floodplain can contribute significantly to flooding by covering impervious surfaces, which increases storm water runoff. Storm water management is usually addressed in subdivision regulations. Developers are typically required to build retention or detention basins to minimize any increase in runoff caused by new or expanded impervious surfaces, or new drainage systems. Generally, there is a prohibition against storm water leaving the site at a rate higher than it did before the development. One technique is to use wet basins as part of the landscaping plan of a development. It might even be possible to site these basins based on a watershed analysis. Since detention only controls the runoff rates and not volumes, other measures must be employed for storm water infiltration - for example, swales, infiltration trenches, vegetative filter strips, and permeable paving blocks.

5. **Drainage System Maintenance -** Ongoing maintenance of channel and detention basins is necessary if these facilities are to function effectively and efficiently over time. A maintenance program should include regulations that prevent dumping in or altering water courses or storage basins; regrading and filling should also be regulated. Any maintenance program should include a public education component, so that the public becomes aware of the reasons for the regulations. Many people do not realize the consequences of filling in a ditch or wetland, or regrading.

B. Property Protection

Property protection measures are used to modify buildings subject to flood damage, rather than to keep floodwaters away. These may be less expensive to implement, as they are often carried out on a cost-sharing basis. In addition, many of these measures do not affect a building's appearance or use, which makes them particularly suitable for historical sites and landmarks.

1. **Relocation -** Moving structures out of the floodplain is the surest and safest way to protect against damage. Relocation is expensive, however, so this approach will probably not be used except in extreme circumstances. Communities that have areas subject to severe storm surges, ice jams, etc. might want to consider establishing a relocation program, incorporating available assistance.

2. **Acquisition -** Acquisition by a governmental entity of land in a floodplain serves two main purposes: 1) it ensures that the problem of structures in the floodplain will be addressed; and 2) it has the potential to convert problem areas into community assets, with accompanying environmental benefits. Acquisition is more cost effective than relocation in those areas that are subject to storm surges, ice jams, or flash flooding. Acquisition, followed by demolition, is the most appropriate strategy for those buildings that are simply too expensive to move, as well as for dilapidated structures that are not worth saving or protecting. Acquisition and subsequent relocation can be expensive, however, there are government grants and loans that can be applied toward such efforts.

3. **Building Elevation -** Elevating a building above the base flood elevation is the best on-site protection strategy. The building could be raised to allow water to run underneath it, or fill could be brought in to elevate the site on which the building sits. This approach is cheaper than relocation, and tends to be less disruptive to a neighborhood. Elevation is required by law for new and substantially improved residences in a floodplain, and is commonly practiced in flood hazard areas nationwide.

4. **Floodproofing -** If a building cannot be relocated or elevated, it may be floodproofed. This approach works well in areas of low flood threat. Floodproofing can be accomplished through barriers to flooding, or by treatment to the structure itself.

a. **Barriers:** Levees, floodwalls and berms can keep floodwaters from reaching a building. These are useful, however, only in areas subject to shallow flooding.
b. **Dry Floodproofing:** This method seals a building against the water by coating the walls with waterproofing compounds or plastic sheeting. Openings, such as doors, windows, etc. are closed either permanently with removable shields or with sandbags.
c. **Wet Floodproofing:** This technique is usually considered a last resort measure, since water is intentionally allowed into the building in order to minimize pressure on the structure. Approaches range from moving valuable items to higher floors to rebuilding the floodable area. An advantage over other approaches is that simply by moving household goods out of the range of floodwaters, thousands of dollars can be saved in damages.

5. **Sewer Backup Protection -** Storm water overloads can cause backup into basements through sanitary sewer lines. Houses that have any kind of connection to a sanitary sewer system - whether it is downspouts, footing drain tile, and/or sump pumps, can be flooded during a heavy rain event. To prevent this, there should be no such connections to the system, and all rain and ground water should be directed onto the ground, away from the building. Other protections include:

    a. Floor drain plugs and floor drain standpipe, which keep water from flowing out of the lowest opening in the house.
    b. Overhead sewer - keeps water in the sewer line during a backup.
    c. Backup valve - allows sewage to flow out while preventing backups from flowing into the house.

6. **Insurance** - Above and beyond standard homeowner insurance, there is other coverage a homeowner can purchase to protect against flood hazard. Two of the most common are National Flood Insurance and basement backup insurance.

    a. ***National Flood Insurance:*** When a community participates in the National Flood Insurance Program, any local insurance agent is able to sell separate flood insurance policies under rules and rates set by FEMA. Rates do not change after claims are paid because they are set on a national basis.
    b. ***Basement Backup Insurance:*** National Flood Insurance offers an additional deductible for seepage and sewer backup, provided there is a general condition of flooding in the area that was the proximate cause of the basement getting wet. Most exclude damage from surface flooding that would be covered by the NFIP.

C. Natural Resource Protection
Preserving or restoring natural areas or the natural functions of floodplain and watershed areas provide the benefits of eliminating or minimizing losses from floods, as well as improving water quality and wildlife habitats. Parks, recreation, or conservation agencies usually implement such activities. Protection can also be provided through various zoning measures that are specifically designed to protect natural resources.

1. **Wetlands Protection** - Wetlands are capable of storing large amounts of floodwaters, slowing and reducing downstream flows, and filtering the water. Any development that is proposed in a wetland is regulated by either federal and/or state agencies. Depending on the location, the project might fall under the jurisdiction of the U.S. Army Corps of Engineers, which in turn, calls upon several other agencies to review the proposal. In New Hampshire, the N.H. Wetlands Board must approve any project that impacts a wetland. Many communities in New Hampshire also have local wetland ordinances.

   Generally, the goal is to protect wetlands by preventing development that would adversely affect them. Mitigation techniques are often employed, which might consist of creating a wetland on another site to replace what would be lost through the development. This is not an ideal practice since it takes many years for a new wetland to achieve the same level of quality as an existing one, if it can at all.

2. **Erosion and Sedimentation Control -** Controlling erosion and sediment runoff during construction and on farmland is important, since eroding soil will typically end up in downstream waterways. Because sediment tends to settle where the water flow is slower, it will gradually fill in channels and lakes, reducing their ability to carry or store floodwaters.

3. **Best Management Practices -** Best Management Practices (BMPs) are measures that reduce non-point source pollutants that enter waterways. Non-point source pollutants are carried by storm water to waterways, and include such things as lawn fertilizers, pesticides, farm chemicals, and oils from street surfaces and industrial sites. BMPs can be incorporated into many aspects of new developments and ongoing land use practices. In New Hampshire, the Department of Environmental Services has developed Best Management Practices for a range of activities, from farming to earth excavations.

D. Emergency Services
Emergency services protect people during and after a flood. Many communities in New Hampshire have emergency management programs in place, administered by an emergency management director (very often the local police or fire chief).

1. **Flood Warning -** On large rivers, the National Weather Service handles early recognition. Communities on smaller rivers must develop their own warning systems. Warnings may be disseminated in a variety of ways, such as sirens, radio, television, mobile public address systems, or door-to-door contact. It seems that multiple or redundant systems are the most effective, giving people more than one opportunity to be warned.

2. **Flood Response -** Flood response refers to actions that are designed to prevent or reduce damage or injury, once a flood threat is recognized. Such actions and the appropriate parties include:

   a. Activating the emergency operations center (emergency director)

b. Sandbagging designated areas (Highway Department)
c. Closing streets and bridges (police department)
d. Shutting off power to threatened areas (public service)
e. Releasing children from school (school district)
f. Ordering an evacuation (municipal government/emergency director)
g. Opening evacuation shelters (churches, schools, Red Cross, municipal facilities)

These actions should be part of a flood response plan, which should be developed in coordination with the persons and agencies that share the responsibilities. Drills and exercises should be conducted so that the key participants know what they are supposed to do.

3. **Critical Facilities Protection -** Protecting critical facilities is vital, since expending efforts on these facilities can draw workers and resources away from protecting other parts of the city. Critical facilities fall into two categories:

   a. **Buildings or locations vital to the flood response effort:**
      i. Emergency operations centers
      ii. Police and fire stations
      iii. Highway garages
      iv. Selected roads and bridges
      v. Evacuation routes
   b. **Buildings or locations that, if flooded, would create disasters:**
      i. Hazardous materials facilities
      ii. Schools

   All such facilities should have their own flood response plan that is coordinated with the community's plan. Schools will typically be required by the state to have emergency response plans in place.

4. **Health and Safety Maintenance -** The flood response plan should identify appropriate measures to prevent danger to health and safety. Such measures include:

   a. Patrolling evacuated areas to prevent looting
   b. Vaccinating residents for tetanus
   c. Clearing streets
   d. Cleaning up debris

   The Plan should also identify which agencies will be responsible for carrying out the identified measures. A public information program can be helpful to educate residents on the benefits of taking health and safety precautions.

E. Structural Projects

Structural projects are used to prevent floodwaters from reaching properties. These are all man-made structures, and can be grouped into the six types discussed below. The shortcomings of structural approaches are:

- Can be very expensive
- Disturb the land, disrupt natural water flows, & destroy natural habitats.
- Are built to an anticipated flood event, and may be exceeded by a greater-than expected flood

- Can create a false sense of security.

1. **Diversions -** A diversion is simply a new channel that sends floodwater to a different location, thereby reducing flooding along an existing watercourse. Diversions can be surface channels, overflow weirs, or tunnels. During normal flows, the water stays in the old channel. During flood flows, the stream spills over the diversion channel or tunnel, which carries the excess water to the receiving lake or river. Diversions are limited by topography; they won't work everywhere. Unless the receiving water body is relatively close to the flood prone stream and the land in between is low and vacant, the cost of creating a diversion can be prohibitive. Where topography and land use are not favorable, a more expensive tunnel is needed. In either case, care must be taken to ensure that the diversion does not create a flooding problem somewhere else.

2. **Levees/Floodwalls -** Probably the best known structural flood control measure is either a levee (a barrier of earth) or a floodwall made of steel or concrete erected between the watercourse and the land. If space is a consideration, floodwalls are typically used, since levees need more space. Levees and floodwalls should be set back out of the floodway, so that they will not divert floodwater onto other properties.

3. **Reservoirs -** Reservoirs control flooding by holding water behind dams or in storage basins. After a flood peaks, water is released or pumped out slowly at a rate the river downstream can handle. Reservoirs are suitable for protecting existing development, and they may be the only flood control measure that can protect development close to a watercourse. They are most efficient in deeper valleys or on smaller rivers where there is less water to store. Reservoirs might consist of man-made holes dug to hold the approximate amount of floodwaters, or even abandoned quarries. As with other structural projects, reservoirs:

    a. are expensive
    b. occupy a lot of land
    c. require periodic maintenance
    d. may fail to prevent damage from floods that exceed their design levels
    e. may eliminate the natural and beneficial functions of the floodplain.

4. **Channel Modifications -** Channel modifications include making a channel wider, deeper, smoother, or straighter. These techniques will result in more water being carried away, but, as with other techniques mentioned, it is important to ensure that the modifications do not create or increase a flooding problem downstream.

5. **Dredging:** Dredging is often cost-prohibitive because the dredged material must be disposed of in another location; the stream will usually fill back in with sediment. Dredging is usually undertaken only on larger rivers, and then only to maintain a navigation channel.
6. **Drainage Modifications:** These include man-made ditches and storm sewers that help drain areas where the surface drainage system is inadequate or where underground drainage ways may be safer or more attractive. These approaches are usually designed to carry the runoff from smaller, more frequent storms.

7. **Storm Sewers -** Mitigation techniques for storm sewers include installing new sewers, enlarging small pipes, street improvements, and preventing back flow. Because drainage ditches and storm sewers convey water faster to other locations, improvements are only recommended for small local

problems where the receiving body of water can absorb the increased flows without increased flooding. In many developments, streets are used as part of the drainage system, to carry or hold water from larger, less frequent storms. The streets collect runoff and convey it to a receiving sewer, ditch, or stream. Allowing water to stand in the streets and then draining it slowly can be a more effective and less expensive measure than enlarging sewers and ditches.

F. Public Information

Public information activities are intended to advise property owners, potential property owners, and visitors about the particular hazards associated with a property, ways to protect people and property from these hazards, and the natural and beneficial functions of a floodplain.

1. **Map Information -** Flood maps developed by FEMA outline the boundaries of the flood hazard areas. These maps can be used by anyone interested in a particular property to determine if it is flood-prone. These maps are available from FEMA, the NH Homeland Security and Emergency Management (HSEM), the NH Office of Energy and Planning (OEP), or your regional planning commission.

2. **Outreach Projects -** Outreach projects are proactive; they give the public information even if they have not asked for it. Outreach projects are designed to encourage people to seek out more information and take steps to protect themselves and their properties. Examples of outreach activities include:

    a. Presentations at meetings of neighborhood groups
    b. Mass mailings or newsletters to all residents
    c. Notices directed to floodplain residents
    d. Displays in public buildings, malls, etc.
    e. Newspaper articles and special sections
    f. Radio and TV news releases and interview shows
    g. A local flood proofing video for cable TV programs and to loan to organizations
    h. A detailed property owner handbook tailored for local conditions. Research has shown that outreach programs work, although awareness is not enough. People need to know what they can do about the hazards, so projects should include information on protection measures. Research also shows that locally designed and run programs are much more effective than national advertising.

3. **Real Estate Disclosure -** Disclosure of information regarding flood-prone properties is important if potential buyers are to be in a position to mitigate damage. Federally regulated lending institutions are required to advise applicants that a property is in the floodplain. However, this requirement needs to be met only five days prior to closing, and by that time, the applicant is typically committed to the purchase. State laws and local real estate practice can help by making this information available to prospective buyers early in the process.

4. **Library -** Your local library can serve as a repository for pertinent information on flooding and flood protection. Some libraries also maintain their own public information campaigns, augmenting the activities of the various governmental agencies involved in flood mitigation.

5. **Technical Assistance -** Certain types of technical assistance are available from the NFIP Coordinator, FEMA, and the Natural Resources Conservation District. Community officials can also set up a service delivery program to provide one-on-one sessions with property owners.

   An example of technical assistance is the *flood audit*, in which a specialist visits a property. Following the visit, the owner is provided with a written report detailing the past and potential flood depths and recommending alternative protection measures.

6. **Environmental Education -** Education can be a great mitigating tool if people can learn what not to do before damage occurs. The sooner the education begins the better. Environmental education programs for children can be taught in the schools, park and recreation departments, conservation associations, or youth organizations. An activity can be as involved as course curriculum development or as simple as an explanatory sign near a river.

   Education programs do not have to be limited to children. Adults can benefit from knowledge of flooding and mitigation measures; decision makers, armed with this knowledge, can make a difference in their communities.

II. EARTHQUAKES

A. Preventive

1. Planning/zoning to keep critical facilities away from fault lines
2. Planning, zoning and building codes to avoid areas below steep slopes or soils subject to liquefaction
3. Building codes to prohibit loose masonry overhangs, etc.

B. Property Protection

1. Acquire and clear hazard areas
2. Retrofitting to add braces, remove overhangs
3. Apply Mylar to windows and glass surfaces to protect from shattering glass
4. Tie down major appliances, provide flexible utility connections
5. Earthquake insurance riders

C. Emergency Services

1. Earthquake response plans to account for secondary problems, such as fires and hazardous material spills

D. Structural Projects

1. Slope stabilization

III. DAM FAILURE

A. Preventive

1. Dam failure inundation maps
2. Planning/zoning/open space preservation to keep area clear
3. Building codes with flood elevation based on dam failure
4. Dam safety inspections
5. Draining the reservoir when conditions appear unsafe

B. Property Protection

1. Acquisition of buildings in the path of a dam breach flood
2. Flood insurance

C. Emergency Services

1. Dam condition monitoring
2. Warning and evacuation plans based on dam failure

D. Structural Projects

1. Dam improvements, spillway enlargements
2. Remove unsafe dams

IV. WILDFIRES

A. Preventive

1. Zoning districts to reflect fire risk zones
2. Planning and zoning to restrict development in areas near fire protection and water resources
3. Requiring new subdivisions to space buildings, provide firebreaks, on-site water storage, wide roads, multiple accesses
4. Building code standards for roof materials and spark arrestors
5. Maintenance programs to clear dead and dry brush, trees
6. Regulation on open fires

B. Property Protection

1. Retrofitting of roofs and adding spark arrestors
2. Landscaping to keep bushes and trees away from structures
3. Insurance rates based on distance from fire protection

C. Natural Resource Protection

1. Prohibit development in high-risk areas

D. **Emergency Services**

1. Fire Fighting

V. WINTER STORMS

A. Prevention

1. Building code standards for light frame construction, especially for wind-resistant roofs

B. Property Protection

1. Storm shutters and windows
2. Hurricane straps on roofs and overhangs
3. Seal outside and inside of storm windows and check seals in spring and fall
4. Family and/or company severe weather action plan & drills:

    a. include a **NOAA** Weather Radio
    b. designate a shelter area or location
    c. keep a disaster supply kit, including stored food and water
    d. keep snow removal equipment in good repair; have extra shovels, sand, rock, salt and gas
    e. know how to turn off water, gas, and electricity at home or work

C. Natural Resource Protection

1. Maintenance program for trimming trees and shrubs

D. Emergency Services

1. Early warning systems/NOAA Weather Radio
2. Evacuation plans

Appendix D: List of Contacts

NH Homeland Security & Emergency Management

Hazard Mitigation Section 271-2231

Federal Emergency Management Agency (Boston).....877-336-2734

NH Regional Planning Commissions:

Central NH Regional Planning Commission 226-6020
Lakes Region Planning Commission.....279-8171
Nashua Regional Planning Commission.....424-2240
North Country Council RPC.....444-6303
Rockingham Planning Commission.....778-0885
Southern New Hampshire Planning Commission.....669-4664
Southwest Region Planning Commission.....357-0557
Strafford Regional Planning Commission 742-2523
Upper Valley Lake Sunapee RPC 448-1680

NH Executive Department:
New Hampshire Office Energy & Planning 271-2155

NH Department of Cultural Affairs.....271-2540
Division of Historical Resources 271-3483

NH Department of Environmental Services.....271-3503
Air Resources 271-1370
Waste Management 271-2900
Water Resources.....271-3406
Water Supply and Pollution Control.....271-3434
Rivers Management and Protection Program.....271-8801
Bureau of Dams.....271-3503

NH Fish and Game Department 271-3421

NH DRED.....271-2411
Natural Heritage Inventory 271-3623
Division of Forests and Lands 271-2214
Division of Parks and Recreation 271-3556

NH Department of Transportation 271-3734

US Department of Commerce:

National Oceanic and Atmospheric Administration:
National Weather Service; Gray, Maine.....207-688-3216

US Department of Interior:
US Fish and Wildlife Service.....223-2541
.
US Geological Survey.....225-4681

US Department of Agriculture:
Natural Resource Conservation Service.....868-7581

New Hampshire State Police 846-3333

Additional Websites of Interest

Natural Hazards
Research Center, U. of Colorado
http://www.colorado.edu/hazards/

National Emergency Management Association
http://nemaweb.org

NASA-Earth Observatory
http://earthobservatory.nasa.gov/NaturalHazards/category.php?cat_id=12

NASA Natural Disaster Reference
Reference of worldwide natural disasters
http://gcmd.nasa.gov/records/NASA-NDRD.html

National Weather Service
Weather Warnings, 60 Second Updates
http://nws.noaa.gov

FEMA, National Flood Insurance Program, Community Status Books
http://fema.gov/business/nfip/

Florida State & NWS University Atlantic
Hurricane Site
http://www.met.fsu.edu/orgs/explores/

National Lightning Safety Institute
List of Lightning Safety Publications
http://lightningsafety.com

NASA Optical Transient Detector
Space-based sensor of lightning strikes
http://www.gr.ssr.upm.es/~jambrina/rayos/thunder.msfc.nasa.gov/otd.html

LLNL Geologic & Atmospheric Hazards
General Hazard Information
https://www.llnl.gov/

The Tornado Project Online
Recent tornado information & details
http://www.tornadoproject.com/

National Severe Storms Laboratory
Information & tracking of severe storms
Http://www.nssl.noaa.gov/
USDA Forest Service

Forest Fire & Land Management Information
http://www.fs.fed.us/fire

Appendix E: Technical and Financial Assistance for Multi-Hazard Mitigation

This section discusses the authorization and appropriation of funding for each of the HMA programs. Together, these programs provide significant opportunities to reduce or eliminate potential losses to State, territories, federally-recognized tribes, and local assets through hazard mitigation planning and project grant funding. Each HMA program was authorized by separate legislative action, and as such, each program differs slightly in scope and intent. More information about each of the HMA programs can be found on the FEMA HMA website at https://www.fema.gov/hazard-mitigation-assistance.

A. Hazard Mitigation Grant Program (HMGP)

HMGP is authorized by Section 404 of the Stafford Act, 42 U.S.C. 5170c. The key purpose of HMGP is to ensure that the opportunity to take critical mitigation measures to reduce the risk of loss of life and property from future disasters is not lost during the reconstruction process following a disaster.

HMGP funding is available, when authorized under a Presidential major disaster declaration, in the areas of the State requested by the Governor. Federally-recognized tribes may also submit a request for a Presidential major disaster declaration within their impacted areas (see http://www.fema.gov/media-library/assets/documents/85146). The amount of HMGP funding available to the Applicant is based on the estimated total Federal assistance, subject to the sliding scale formula outlined in Title 44 of the Code of Federal Regulations (CFR) Section 206.432(b) that FEMA provides for disaster recovery under Presidential major disaster declarations. The formula provides for up to 15 percent of the first $2 billion of estimated aggregate amounts of disaster assistance, up to 10 percent for amounts between $2 billion and $10 billion, and up to 7.5 percent for amounts between $10 billion and $35.333 billion. For States with enhanced plans, the eligible assistance is up to 20 percent for estimated aggregate amounts of disaster assistance not to exceed $35.333 billion.

The Period of Performance (POP) for HMGP begins with the opening of the application period and ends no later than 36 months from the close of the application period.

HMGP assists in implementing long-term hazard mitigation measures following Presidential disaster declarations. Funding is available to implement projects in accordance with State, Tribal, and local priorities.

B. Pre-Disaster Mitigation

PDM is authorized by the Stafford Act, 42 U.S.C. 5133. PDM is designed to assist States, territories, federally-recognized tribes, and local communities to implement a sustained predisaster natural hazard mitigation program to reduce overall risk to the population and structures from future hazard events, while also reducing reliance on Federal funding in future disasters. Congressional appropriations provide the funding for PDM. Part I. The total amount of funds distributed for PDM is determined once the appropriation is provided for a given fiscal year. It can be used for mitigation projects and planning activities.

The POP for PDM begins with the opening of the application period and ends no later than 36 months from the date of subapplication selection.

C. Flood Mitigation Assistance

The FMA program is authorized by Section 1366 of the National Flood Insurance Act of 1968, as amended with the goal of reducing or eliminating claims under the National Flood Insurance Program (NFIP). FMA provides funding to States, Territories, federally-recognized tribes and local communities for projects that reduce or eliminate long-term risk of flood damage to structures insured under the NFIP. FMA funding is available for flood hazard mitigation projects, plan development and management costs. Funding is appropriated by Congress annually.

Please refer to the current program guidance for detail information on the Flood Mitigation Program: https://www.fema.gov/flood-mitigation-assistance-grant-program

Appendix F: City Approval

Ordinance No. 7-22 will remain in first read until call of the Chair. Public Hearing scheduled for next City Council meeting.

OTHER

A. Vote to adopt of the City of Somersworth's Updated Hazardous Mitigation Plan of 2021

The Vote to Adopt the City of Somersworth's Updated Hazardous Mitigation Plan of 2021 passed 9-0.

COMMENTS BY VISITORS

There were no closing comments from visitors.

I hereby certify the foregoing to be
A TRUE COPY
ATTEST: _____
City Clerk, Somersworth, NH

CLOSING COMMENTS BY COUNCIL MEMBERS

Councilor Pepin said the warming center on Willand is a great thing that has been utilized frequently over the past couple months, but questioned the statistical data in CAP's reports. He outlined the differences in numbers of service calls to the warming center compared to what the City calculates and what CAP sends. Pepin said there are a lot of calls requesting police, fire, and ambulance going to the facility which is taking a significant amount of manpower and time away from the City's first responders. Pepin expressed concerns about the City's crime rates being skewed due to these calls which could ultimately end up negatively affecting the housing market in Somersworth.

Councilor Vincent stated the Lion's Club approached him about a possible donation of the metal building located on the former National Guard property. He said they would take it down and relocate it.

Councilor Dumont thanked Councilor Pepin for his remarks on the warming center. He acknowledged a disconnect from the reports coming from CAP and the numbers the City has. He stated the little league field is one of the more historic examples of construction for the benefit of children. He hopes at least a portion of that property can still be utilized for recreation. Dumont recommended extending the parking ban during emergency weather events.

Councilor Austin had no closing comments.

Councilor Michaud mentioned the Lion's Club skating rink and saw a video of a large number of kids utilizing the pond for hockey. He thanked them for doing a great job at keeping that property going. He congratulated Mark Segal, owner of Gravy, who celebrated his second anniversary in Somersworth. He also urged people to get out Anatolia Restaurant who serves delicious Mediterranean food.

Councilor Witham thanked Public Works for their snow removal efforts. He said the foreman said this past storm was the worst he has ever dealt with. He said when listening to his police scanner, he hears many calls going to the warming center. He stated CAP does not seem to be completely transparent in their reporting to the City and mentioned the initial weekly reports used to outline where the individuals utilizing the warming center were coming from, but do not anymore. Witham asked that at the conclusion of the season, a sum total of all the statistics the City Police, Fire, and ambulance have accumulated. He would then like to see a dollar number of what the calls of service have cost the City. Witham stated he fears the Council will find itself in a quagmire regarding what to do with the National Guard property. He said he hopes he is wrong, but thinks that property will remain urban blight in ten years.

Councilor Gerding thanked Public Works for their efforts during the difficult storm. Regarding the warming center, he wonders if there is a way to determine calls for service are actually increasing in the City due to the warming center, or rather, if they are just more concentrated at that location.

7

Appendix G: FEMA Conditional Approval

Somersworth, NH – Local Hazard Mitigation Plan – Approvable Pending Adoption

DOS: Hazard Mitigation Planning <hazmitplanning@DOS.NH.GOV>
Thu 12/16/2021 8:55 AM
To: Stephen Geis <sgeis@strafford.org>
Cc: James Burdin <jburdin@strafford.org>; gkramlinger@somersworth.com <gkramlinger@somersworth.com>

Good Morning!

The Department of Safety, Division of Homeland Security & Emergency Management (HSEM) has completed its review of the Somersworth, NH Hazard Mitigation Plan and found it approvable pending adoption. Congratulations on a job well done!

With this approval, the jurisdiction meets the local mitigation planning requirements under 44 CFR 201 **pending HSEM's receipt of electronic copies of the adoption documentation and the final plan**.

Acceptable electronic formats include Word or PDF files and must be submitted to us via email at HazardMitigationPlanning@dos.nh.gov. Upon HSEM's receipt of these documents, notification of formal approval will be issued, along with the final Checklist and Assessment.

The approved plan will be submitted to FEMA on the same day the community receives the formal approval notification from HSEM. FEMA will then issue a Letter of Formal Approval to HSEM for dissemination that will confirm the jurisdiction's eligibility to apply for mitigation grants administered by FEMA and identify related issues affecting eligibility, if any. If the plan is not adopted within one calendar year of HSEM's Approval Pending Adoption, the jurisdiction must update the entire plan and resubmit it for HSEM review.

If you have questions or wish to discuss this determination further, please reply to this email or call 603-223-3650.

Thank you for submitting the Somersworth, NH Hazard Mitigation Plan and again, congratulations on your successful community planning efforts.

Sincerely,

Hazard Mitigation (JM)
New Hampshire Department of Safety, Division of Homeland Security & Emergency Management
Brian Eaton, State Hazard Mitigation Officer / Brian.E.Eaton@dos.nh.gov / (603) 227-8724
John Marcel, State Hazard Mitigation Planner / John.E.Marcel@dos.nh.gov / (603) 223-3650

Appendix H: FEMA Final Approval

U.S. Department of Homeland Security
FEMA Region I
99 High Street, Sixth Floor
Boston, MA 02110-2132

FEMA

Brian Eaton, State Hazard Mitigation Officer
New Hampshire Department of Safety, Homeland Security and Emergency Management
33 Hazen Drive
Concord, New Hampshire 03303

Dear Mr. Eaton:

As outlined in the FEMA-State Agreement for FEMA-DR-4457, your office has been delegated the authority to review and approve local mitigation plans under the Program Administration by States Pilot Program. Our Agency has been notified that your office completed its review of the Multi-Hazard Mitigation Plan Update 2021, City of Somersworth, NH and approved it effective **February 17, 2022** through **February 16, 2027** in accordance with the planning requirements of the Robert T. Stafford Disaster Relief and Emergency Assistance Act (Stafford Act), as amended, the National Flood Insurance Act of 1968, as amended, and Title 44 Code of Federal Regulations (CFR) Part 201.

With this plan approval, the jurisdiction is eligible to apply to New Hampshire Homeland Security and Emergency Management for mitigation grants administered by FEMA. Requests for funding will be evaluated according to the eligibility requirements identified for each of these programs. A specific mitigation activity or project identified in this community's plan may not meet the eligibility requirements for FEMA funding; even eligible mitigation activities or projects are not automatically approved.

The plan must be updated and resubmitted to the FEMA Region I Mitigation Division for approval every five years to remain eligible for FEMA mitigation grant funding.

Thank you for your continued commitment and dedication to risk reduction demonstrated by preparing and adopting a strategy for reducing future disaster losses. Should you have any questions, please contact Jay Neiderbach at (617) 832-4926 or Josiah.Neiderbach@fema.dhs.gov.

Sincerely,

PAUL F FORD
Digitally signed by PAUL F FORD
Date: 2022.02.18 19:32:33 -05'00'

Paul F. Ford
Acting Regional Administrator
DHS, FEMA Region I

PFF:jn

cc: Fallon Reed, Chief of Planning, New Hampshire