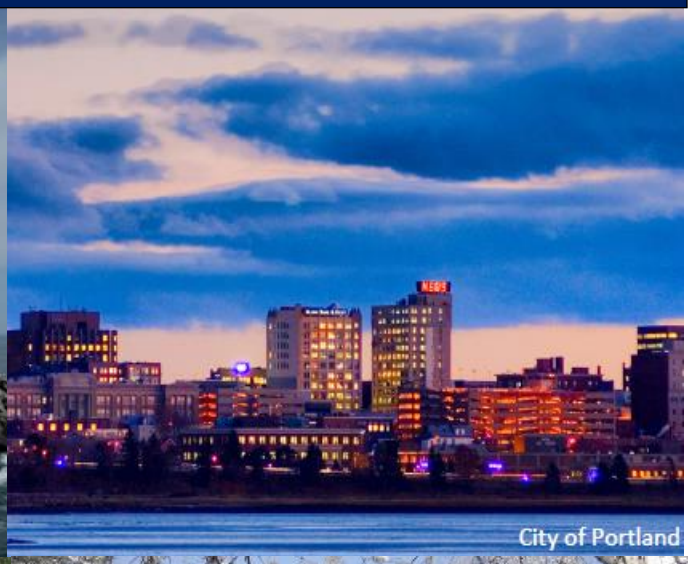
CUMBERLAND COUNTY, MAINE
HAZARD MITIGATION PLAN UPDATE
2017

Portland Head Light, Cape Elizabeth


City of Portland

New Meadows River, Brunswick

Panther Run, Raymond

Prepared by:
Cumberland County Emergency Management Agency

SECTION I – OVERVIEW OF JURISDICTION

This plan, originally produced and updated by the Cumberland County Soil and Water Conservation District (CCSWCD) and under contract to the Cumberland County Emergency Management Agency (CCEMA), is in its third update cycle. It is a multi-jurisdictional plan covering the entire County and has been done in accordance with the most recent Federal Emergency Management Agency guidelines thereby reflecting the most recent research, analysis and mitigation planning. The objectives of producing a multi-jurisdictional plan are:

- Increased efficiency in the development of the plan,
- Identification of county-wide mitigation measures, and
- Identification of opportunities for inter-municipal cooperation and coordination.

The plan includes the following sections:

1) Overview of Jurisdiction
2) Prerequisites
3) Planning Process
4) Risk Assessment
5) Mitigation Strategies
6) Plan Maintenance Procedures

Cumberland County's geology and climate exert great influence on the occurrence and severity of the County's natural hazards. Although the County is usually able to handle these hazards, overwhelming events have sometimes required federal assistance.

The number one hazard for Cumberland County is flooding. A brief climate description at the beginning of the Risk Assessment section of the plan gives an overview of why flooding is a possibility during any season. Therefore, the primary mitigation efforts identified in the plan concentrate on the causes and effects of flooding. As such, the plan supports the on-going efforts of the individual communities within the County as they prioritize the mitigation actions within their comprehensive plans and identify budgets (or shortfalls) to implement their projects. The Risk Assessment section also presents a discussion of Cumberland County's other potential hazards and associated mitigation measures. This third update includes a section on climate change and its effects on the County.

Cumberland County was incorporated in 1760 and was named after William, Duke of Cumberland, son of George II. Cumberland County consists of a mix of municipality types, ranging from Portland, Maine's largest city, to the rural towns in the northern end of the county, and the Islands of Casco Bay. From civil-war era Fort Georges, at the head of the Fore River in Casco Bay to the centuries old inns and mills in the upper county, Cumberland County is rich in history.

Today, Portland is one of the largest oil and seaports on the East Coast and commercial cruise ships are a common sight in the harbor as Portland continues to grow in popularity as a cruise ship port-of-call. From Pine Point at the southern end of the County to Small Point at the north and the islands in between, fishing and lobster boats continue to play a role in the county's economy and cultural heritage. The Lakes Region of the County is a popular vacation destination and continues to see development as the activity and population of Portland and its surrounding suburbs spread north and west. Though threatened by development as less expensive land and housing is sought, farming and forest-based economies still viably operate throughout the County.

Portland Head Light, Cape Elizabeth

Inland features include Sebago Lake, Maine's second largest lake, which serves as the drinking water supply for almost a fifth of the state's population and as the premiere freshwater recreational resource in the state. The Sebago Lake watershed has significant development pressure on its riparian, private forests important for protecting drinking water supply and flood mitigation. Land uses that tend to dramatically alter natural hydro-geological and biological processes have the greatest potential to negatively impact the quality of the watershed. As such, watershed protection and hazard mitigation are integral components of municipal comprehensive plans and zoning ordinances throughout the County, along with policies and procedures by Portland Water District.

As of, May 2015, the County had a population of 287,797residents living in 138,657 housing units, as estimated in the U.S. Census QuickFacts. The population density of the is approximately 337.2 persons per square mile as reported in County QuickFacts. The County has an overall area of 1,217.46 square miles with land area totaling 835.24 square miles and water area totaling 381.4 square miles. Cumberland County has 1,289-miles of shoreline, including the coastlines of the island communities, of which approximately 126 miles is publically owned.

Governance:
Cumberland County has two types of government. The following is based in part on the Maine Municipal Association's report "Local Government in Maine."

Cities: Portland, South Portland, and Westbrook are the only cities in Cumberland County. All cities in Maine have local charters granted by the Maine legislature that provide for a representative form of government – meaning they have a city council that serves as the legislative body. The city council is elected and answerable to the citizens. The office of mayor varies considerably from city to city, with only a few acting as chief executive officer. Some mayors are elected by the vote of the people, while others are elected by a vote of their fellow councilors. In general, city councils have the authority to enact ordinances.

Towns: There are 25 towns in Cumberland County. Towns remain the cornerstone of local government. A Maine community becomes a town when it is incorporated by a special act of the legislature. At that time, it is given certain privileges and responsibilities. Under Home Rule, towns make take any action or change their form of government in any way not denied or precluded by state or federal law. The voters of the town constitute its legislative body. Day to day governance of towns has expanded from the original board of selectmen to include town managers, town councils, budget committees, municipal departments and various professions managers. In a

small number of mostly larger towns, the council exerts legislative control without a town meeting. In others, a ballot vote is used to approve the budget rather than the open town meeting.

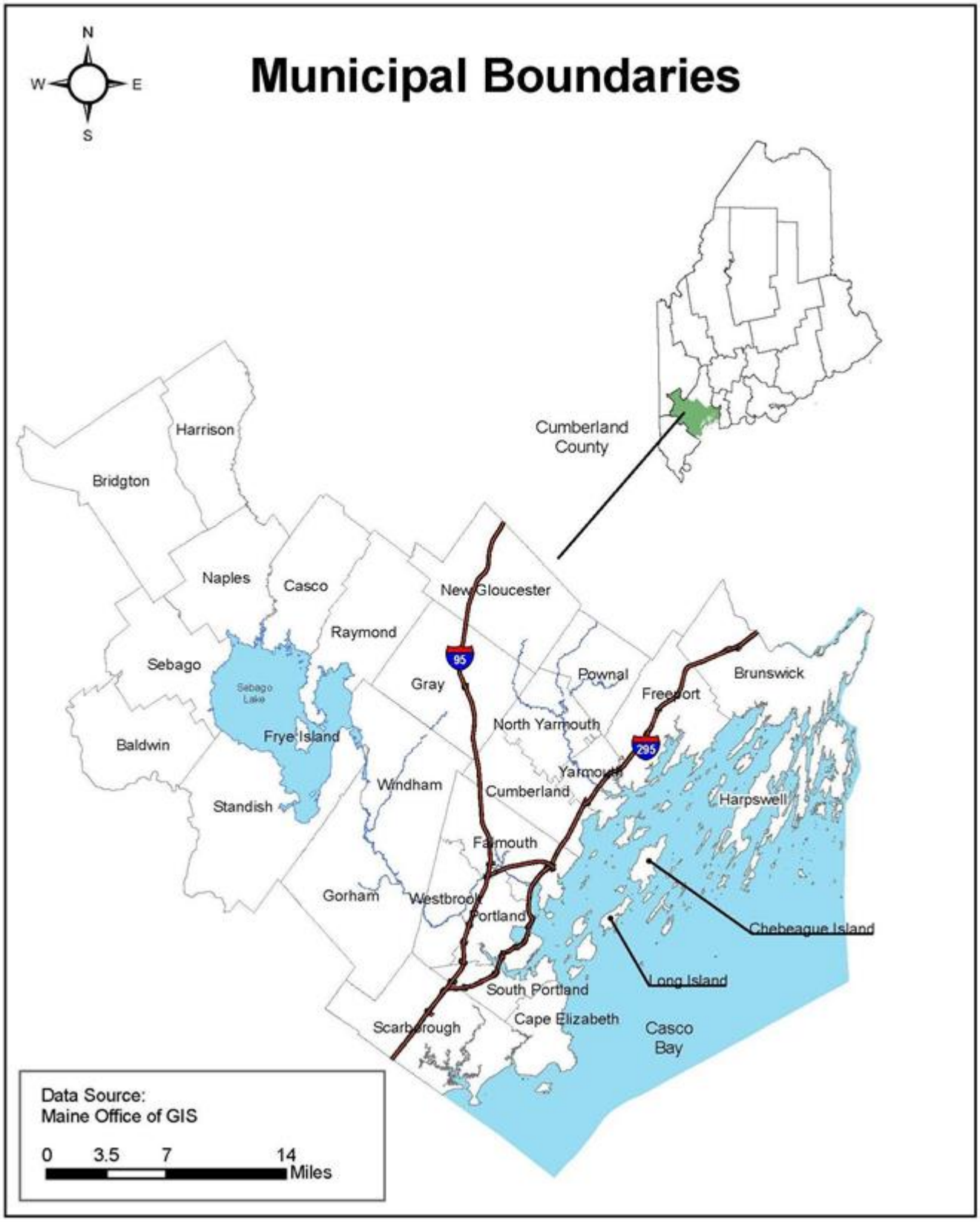
Cumberland County is part of the Portland-South Portland-Biddeford Metropolitan Statistical Area. The County Government includes Community Development, Sheriff's Department, Finance and Treasurer's Office, Registry of Deeds, Probate Court, District Attorney, Violence Intervention Partnership, Regional Assessing, Regional Communication Center, and Emergency Management Agency.

There are significant transportation thoroughfares through the County. These include US Route 95 from north to south and Maine State Route 302 from east to west. Rail transport and Amtrak traverses the county from north to south from Brunswick through Scarborough. Portland is also home to the Portland International Jetport. Significant employers in the county include Maine Medical Center, L.L. Bean, UNUM, Hannaford Bros. and Mercy Hospital.

The table below shows the municipal populations based on the 2010 U.S. Census data. A map showing the municipality boundaries and a table of county demographics follows.

MUNICIPAL POPULATIONS (from 2010 U.S. Census data)

Town/City	Total Population	Total Area	Land Area	Population Density	Housing Units	Seasonal Homes	Median Age	Housing Unit Density
Baldwin	1,525	36.35	35.32	41.9	700	76	42.4	19.8
Bridgton	5210	64.24	56.79	91.7	4051	1581	46.8	71.3
Brunswick	20,278	54.33	46.73	433.9	9599	295	41.4	205.4
Cape Elizabeth	9015	45.92	14.7	613.3	3963	193	46.8	269.6
Casco	3742	38.01	31.24	119.8	2944	1267	42.6	94.2
Chebeague Is	341	24.56	3.56	95.8	525	334	57.9	147.5
Cumberland	7211	26.25	22.88	315.2	2902	104	45	126.8
Falmouth	11185	36.34	29.38	380.7	4751	207	45.3	161.7
Freeport	7879	46.47	34.7	227.1	3690	309	43	106.3
Frye Island	5	1.59	1.33	3.8	481	476	30.8	361.7
Gorham	16381	51.28	50.62	323.6	5972	34	38	118
Gray	7761	45.99	43.27	179.4	3841	574	40.6	88.8
Harpswell	4740	127.69	24.18	196	4208	1746	52.9	174
Harrison	2730	36.8	33.19	82.3	1761	582	45.3	53.1
Long Island	230	33.53	1.42	162	381	262	52	268.3
Naples	3872	37.25	31.82	121.7	3004	1226	42.9	94.4
New Gloucester	5542	47.8	47.12	117.6	2295	109	39.5	48.7
N. Yarmouth	3565	21.42	21.22	168	1354	14	42.5	21.4
Portland	66194	69.44	21.31	3106.2	33836	1322	36.7	1587.8
Pownal	1474	22.87	22.86	64.5	613	1	44.6	26.8
Raymond	4436	44.76	33.18	133.7	2852	994	44.6	86
Scarborough	18919	70.62	47.61	397.4	8617	741	44.5	181
Sebago	1719	48.93	32.75	52.5	1464	675	44.7	44.7
South Portland	25002	14.01	11.99	2085.2	11484	166	39.4	957.8
Standish	9874	80.59	59.03	167.3	4425	742	38.8	75
Westbrook	17494	17.33	17.12	1021.8	7989	26	39.4	466.6
Windham	17001	50.15	46.56	365.1	7136	469	39.9	153.3
Yarmouth	8349	22.95	13.35	625.4	3819	151	45.9	286.1
*(Census) Total	*281674	*1217.46	*835.24	*337.2	*138657	*14676	*41	*166


Municipal Boundaries
N
W
E
S
Cumberland County
Harrison
Bridgton
Naples
Casco
Raymond
New Gloucester
Sebago
Sebago Lake
Gray
Pownal
Brunswick
Freeport
North Yarmouth
Frye Island
Baldwin
Yarmouth
Windham
Cumberland
Harpswell
Standish
Falmouth
Gorham
Westbrook
Portland
Chebeague Island
Long Island
South Portland
Cape Elizabeth
Scarborough
Casco Bay
95
295
Data Source:
Maine Office of GIS
0 3.5 7 14
Miles

COUNTY DEMOGRAPHIC PROFILE – Cumberland County, State of Maine (From 2010-2013 Census Data)

Measure	2010-2013-County	2000 – County	2010-2013-State	2010-2013 US
Total Population	281,674	265,612	1,328,361	308,745,538
% White	92.80%	96.70%	95.22%	77.70%
% Black	2.40%	1.40%	1.18%	13.20%
% American Indian	0.32%	0.70%	0.65%	1.20%
% Asian	2%	1.70%	1.02%	5.30%
% Native Hawaiian or other Pacific Islander	0.03%	0.00%	0.03%	0.20%
% Other	0.55%	0.70%	0.32%	---
% Persons reporting two or more races	1.84%	---	1.58%	2.40%
% Hispanic Origin	1.80%	1.00%	1.27%	17.10%
Total Households	117,614	107,989	553,208	115,226,802
Avg. Household Size	11.1	2.38	2.34	2.61
Median Household Income ($)	$57,159.00	44,048	$48,219.00	$53,046.00
Persons below poverty, % 1999	11.10%	7.90%	13.30%	14.90%
% Female	51.50%	51.60%	51.10%	50.08%
% Male	48.50%	48.40%	49.00%	49.20%
% Under 18 years	20.90%	23.30%	21.08%	23.30%
% 18 years to 64 years	79.10%	63.40%	79.30%	62.60%
% 65 years and over	14.26%	13.30%	15.90%	14.10%
Population density (per sq. mile)	43.1	235.5	37.55	87.4

SECTION II - PREREQUISITES

RESOLUTION

Whereas, natural and man-made disasters may occur at any time, we recognize that to lessen the impacts of these disasters we will save resources, property, and lives in Cumberland County;

And whereas the creation of a multi-jurisdictional Hazard Mitigation Plan is necessary for the development of a risk assessment and effective mitigation strategy;

And whereas, this multi-jurisdictional county of 3 cities and 25 towns towns is committed to the mitigation goals and measures as presented in this plan;

Therefore the City Councils and Boards of Selectmen hereby adopt the Cumberland County Hazard Mitigation Plan – 2017 Update; and

Therefore, the Cumberland County Commissioners, acting on behalf of the county, hereby adopt the Cumberland County Hazard Mitigation Plan – 2017 Update.

AUTHORIZING SIGNATURES for Cumberland County Commissioners

Print name	Signature	Title	Date
SUSAN E. WITONIS	Susan E. Witonis	Commissioner	3-20-17

Cumberland County Offices: 142 Federal St. Portland, ME 04101 207-871-8380
Contact person_____

SECTION III – PLANNING PROCESS

MULTI-JURISDICTIONAL PLANNING PARTICIPATION

Requirement §201.6(a)(3):	Multi-jurisdictional plans (e.g. watershed plans) may be accepted, as appropriate, as long as each jurisdiction has participated in the process.

The Cumberland County Hazard Mitigation Plan (HMP), a multi-jurisdictional plan originally prepared and updated by a Hazard Mitigation Planning Team coordinated by the Cumberland County Soil and Water Conservation District and the Cumberland County Emergency Management Agency, has been updated by CCEMA for the 2017 Plan (See Appendix for revision schedule). Representatives participated from state, county, and municipal governments, and utilities. The plan development and update process included representatives from all 28 municipalities.- Each provided input regarding prioritization of hazards, assessment of vulnerabilities and risks, and the identification and prioritization of mitigation goals and measures.

A list of participants for the 2017 Plan is included in Table 1 below.

Table 1: 2017 Update - Municipal Hazard Mitigation Planning Participants

Name	Municipal Position	Municipality
Jim Budway	Director CCEMA	Cumberland County EMA
Mary McElman	Deputy Director CCEMA	Cumberland County EMA
Diane Eastwood	Planner CCEMA	Cumberland County EMA
Margaret Cushing	Planner CCEMA	Cumberland County EMA
JoAnn Mooney	State Hazard Mitigation Officer	ME Emergency Management Agency
Robert Flint	Selectman	Baldwin
Olin Thomas	Selectman	Baldwin
Gary W. McNeil	Selectman	Baldwin
Danielle Taylor	Selectmen Assistant	Baldwin
Todd Perreault	Local EMA Director	Bridgton
Ken Brilliant	Fire Chief/Local EMA Director	Brunswick
John Foster	Town Engineer/Public Works Director	Brunswick
Charlie Kennedy	Fire Chief/Local EMA Director	Cape Elizabeth
Robert C. Malley	Public Works Director	Cape Elizabeth
David Morton	Town Administrator/Road Commissioner	Casco
Marjorie Stratton	Town Administrator	Chebeague Island
Dan Small	Fire Chief/Local EMA Director	Cumberland
Howard Rice, Jr.	Fire Chief/Local EMA Director	Falmouth
Jay Reynolds	Public Works Director	Falmouth
Paul Conley	Fire Chief/Local EMA Director	Freeport
John Crosby	Public Works Director	Frye Island
Robert Lefebvre	Fire Chief/Local EMA Director	Gorham
Bob Burns	Public Works Director	Gorham
Steve LaVallee	Public Works Director	Gray
Kristi Eiane	Town Administrator	Harpswell
Robert MacAleer	EMA Director	Harpswell
Raymond LaPlante	EMA Director	Harrison
Melissa St. John	Clerk	Harrison
Brian Dudley	Town Administrator	Long Island
Christopher Papkee	Fire Chief/Local EMA Director	Long Island
Ephrem Paraschak	Town Manager/Local EMA Director	Naples
Tim Joy	Fire Captain/Local EMA Director	New Gloucester
Paul R. First	Town Manager	New Gloucester
Gregory Payson	Fire Chief/Local EMA Director	North Yarmouth

Terry Walsh	Deputy Fire Chief	Portland
Bob Wassick	Training & Safety Administrator	Portland
Jesse Peters	Fire Chief/Local EMA Director	Pownal
Calvin Beaumier	Road Commissioner	Pownal
Bruce Tupper	Fire Chief/EMA Director	Raymond
B. Michael Thurlow	Fire Chief/Local EMA Director	Scarborough
Mike Shaw	Public Works Director	Scarborough
James Smith	Town Manager	Sebago
James Wilson	Deputy Fire Chief	South Portland
Roger Mosley	Public Works Director	Standish
Rob Caron	Public Safety Director	Standish
Greg Hamilton	EMA Director	Westbrook
Brent Libby	Fire Chief/Local EMA Director	Windham
Richard Kindelan	Deputy Chief/Local EMA Director	Yarmouth
Mike Koza	Regulations and Security Advisor	Portland Water District

DOCUMENTATION OF THE PLANNING PROCESS

Requirement §201.6(b):	In order to develop a more comprehensive approach to reducing the effects of natural disasters, the planning process shall include: (1) An opportunity for the public to comment on the plan during the drafting stage and prior to plan approval; (2) An opportunity for neighboring communities, local and regional agencies involved in hazard mitigation activities, and agencies that have the authority to regulate development, as well as businesses, academia and other private and non-profit interests to be involved in the planning process; (3) Review and incorporation, if appropriate, of existing plans, studies, reports, and technical information.
Requirement §201.6(c)(1):	[The plan shall document] the planning process used to develop the plan, including how it was prepared, who was involved in the process, and how the public was involved.

Table 2: 2017 Update – Summary of Local Hazard Mitigation Planning Participation:

Municipality	Survey Questionnaire Response	HMP Project Meeting Participation	Email Correspondence	Phone Conversations
Baldwin	x	x	x	x
Bridgton	x	x	x	x
Brunswick	x	x	x	
Cape Elizabeth	x	x	x	
Casco	x	x	x	x
Chebeague	x	x	x	x
Cumberland	x	x	x	x
Falmouth	x	x	x	
Freeport	x	x	x	x
Frye Island	x	x	x	
Gorham	x	x	x	
Gray	x	x	x	
Harpswell	x	x	x	x
Harrison	x	x	x	
Long Island	x	x	x	x

Naples	x	x	x	
New Gloucester	x	x	x	
North Yarmouth	x	x	x	
Portland	x	x	x	x
Pownal	x	x	x	x
Raymond	x	x	x	
Scarborough	x	x	x	x
Sebago	x	x	x	x
South Portland	x	x	x	
Standish	x	x	x	
Westbrook	x	x	x	x
Windham	x	x	x	
Yarmouth	x	x	x	

The lead agency in the preparation of the 2017 update of the Cumberland County HMP was the Cumberland County Emergency Management Agency (CCEMA). For this update, a county EMA staff position was dedicated to the plan process. At the staff level (Planning Team), development of the 2017 update was facilitated by Mr. James Budway (Director, CCEMA) with county EMA staff providing data collection and report updating support.

The goal of the update planning team was to review and analyze each section of the HMP and provide revision as part of the update process. In order to help determine what was important to update, the planning team used the following input:

- The 2012 Cumberland County Hazard Mitigation Plan
- The 2013 State of Maine Hazard Mitigation Plan
- The FEMA Local Mitigation Plan Checklist
- Guidelines for Preparing County Hazard Mitigation Plans
- Disaster Declarations since completion of the 2012 plan
- Information obtained from plans, reports and studies completed since the 2012 plan
- Information obtained from the local EMA directors and Public Works Directors
- Information obtained from the public during the drafting of the update

The HMP Update process began, in August 2015. A detailed review of the status of projects listed in the 2012 HMP was conducted, and a Hazard Mitigation Project Survey and questionnaire were emailed to every municipality in Cumberland County as well as handed out at the face-to-face meetings.(a sample of each is included in the Appendix). The survey was conducted in preparation for the 2017 Cumberland County HMP Review, in an effort to examine the list of mitigation measures identified by each municipality and access the progress on the mitigation goals and objectives. The Questionnaire was an effort to expand on some of the information on specific hazards.

CCEMA met with and interviewed representatives from each municipality. Summary of Local Planning meeting participation can be found in Table 1. Local EMA Directors were contacted by CCEMA to establish a meeting time with appropriate municipal officials to explain the plan update and to gather data supporting their mitigation projects (See Appendix). This data includes photographs of projects and some historical data. In many instances, site visits to project locations were conducted. -Consideration was given to new mitigation projects for incorporation in the 2017 HMP update.

The planning team met several times in August 2015 to kick-off the update effort. County staff continued to meet regularly for coordination meetings throughout the 2015-16 update planning period to review the existing plan, assess the project schedule, and revise 2012 plan sections. The update planning process included the review and

analysis of each section of the original plan and revisions to each section as necessary. Each section of the updated plan was also reviewed against the Plan Review Checklist provided by FEMA and MEMA.

Municipal officials have provided detailed project descriptions for the update that enhance the plan's discussion by providing status on their projects from the 2012 Plan. For the purposes of Section V – Mitigation Strategy, the existing projects for each municipality from the 2012 Plan are defined as "Retained from 2012 Plan" if they are still valid, necessary and possible within the time period covered by the Five year Plan. New and completed projects are listed as such in the status column.

Recent Disaster Declarations for the County declared since the 2012 publication of the HMP are as follows:

DATE	DISASTER #	DISASTER NAME/TYPE
21-26 Dec 13	"IceMass"	Declaration denied, but significant power outages
8-9 Feb 13	DR 4108	Winter Storm, Snow Storm, Flooding
26-28 Jan 15	DR 4208	Severe Winter Storm, Snowstorm and Flooding

In addition, in October 2015, the U.S. Department of Agriculture declared Cumberland and York Counties in Maine as "primary natural disaster areas" due to damages and losses caused by drought that began in May 2015. This was an "economic injury" disaster. Increasing possibilities of drought will be covered in the Climate Change section of this document.

The updating of the HMP began with an email to all 28 local EMA directors in August 2015 (an example is included in the Appendix. It requested that recipients review the mitigation measures presented in the 2012 HMP and provide information on the progress of meeting the mitigation goals and objectives stated. In addition, it requested a list of any new projects the municipalities would like inserted into the 2017 HMP.

Follow-up e-mails were then sent to each municipality, explaining the HMP update process and requesting a kickoff meeting (example in the Appendix. A Yes/No Eligibility sheet, BCA explanation and URL, and Stream/Road Crossing EPA permit flow chart were attached to the emails and also included in the information presented at the face-to-face meetings. These meetings began in August 2015 and continued through December 2015. At the face-to-face meetings, explanations of the process, and a time line were reviewed with the participants. The data collected from each municipality was then used to update the risk assessment and mitigation measures sections of the HMP.

Updates on the progress of the HMP update have been included in the County Manager Updates (see Appendix) and monthly Local EMA Directors meetings (meeting agendas and attendees included in Appendix) conducted by Jim Budway, County EMA Director. Information on the update process has been chronicled in the CCEMA monthly newsletter and the CCEMA website (Appendix).

Throughout the process, the public had the opportunity to comment on the updated plan during the drafting stage and prior to plan approval, by issuing press releases and posting the draft plan on the County website. Since there are many new EMA directors, Public Works directors and selectmen/councilors who have taken office since the last update, outreach was intensive to educate and assist the appropriate people about the content and value of the plan. This outreach continued to be provided as necessary by CCEMA during the scheduled project planning meetings.

CCEMA staff reviewed the 2012 HMP and the 2013 State Hazard Mitigation Plan and incorporated them as appropriate. In addition, since the severity of winter and summer storms appears to continue to increase, CCEMA staff reviewed recent findings from the Fifth Intergovernmental Panel on Climate Change and Maine Climate Change Institute's "Maine's Climate Future 2015 Update." These studies provide information on climate change issues that could affect future precipitation and temperature trends and other flood related hazards associated with sea level rise. Provided within Section IV – Risk Assessment is a more detailed summary of these studies findings and how they may relate to mitigation planning.

Other press releases, letters and memos relating to participation by the municipalities and the public in the update of the 2017 HMP can be found in the Appendix. As evidenced above, every opportunity was provided for involvement in the planning and updating process by neighboring communities, local and regional agencies involved in hazard mitigation activities, and agencies that have the authority to regulate development, as well as businesses, academia and other private and non-profit interests.

In addition, a "final public review and comment session" was conducted during the final draft review phase. CCEMA hosted a session for public comment at the CCEMA bunker. A press release was issued identifying the time and date for the meeting. The meeting was conducted on August 16, 2016. A power point presentation summarizing the plan was conducted and the sign-in sheet is in the Appendix. Two members of the public attended this meeting to review the plan, but there were no comments leading to changes.

Section IV Risk Assessment

INTRODUCTION

The Risk Assessment evaluates Cumberland County's vulnerability to natural hazards and provides sufficient information to identify and prioritize appropriate mitigation actions to reduce losses. The section starts with a brief overview of scientific research on climate variation and the possible effects on Cumberland County.

Climate Variation

The purpose of this part of the plan is to provide an overview of how climate has changed over time, as documented in various scientific studies, and how that change may be impacting the occurrence and severity of natural hazards in Cumberland County. Projecting future climate change can be problematic because, as stated in the document "Maine's Climate Future, 2015 Update" by the University of Maine, climate projections are uncertain for several reasons: natural climate variability, incomplete descriptions of the climate system in computer models, and difficulty in predicting future greenhouse gas emissions (page 6).

Table 1 provides a listing of resources used in researching the effects of climate variations in Cumberland County.

Table 1 Resources

Resources used in Planning	
Climate Change 2014: Impacts, Adaptation, and Vulnerability Fifth Assessment Report	November 2014 Intergovernmental Panel on Climate Change
Sebago Lake Watershed, Maine Climate Adaptation Plan	May 2013 Manomet Center for Conservation Sciences
Maine's Climate Future - 2015 Update	February 2015 University of Maine Climate Change Institute
York Adaptation to Sea Level Rise Chapter of Town of York Emergency Plan	November 2013 Southern Maine Regional Planning Commission
FEMA Mitigation Planning Toolkit	FEMA
National Flood Insurance Program Community Rating System Coordinator's Manual	2013 FEMA
Flood Insurance Manual, Effective October 1, 2014	2014 FEMA
Sea Level Rise and Casco Bay's Wetlands (individual reports on eight Cumberland County towns)	2013 Casco Bay Estuary Partnership/ University of Maine
2013 State Hazard Mitigation Plan	2013 MEMA
People and Nature: Adapting to Climate Change	2010 Maine EPA
Climate Change and Biodiversity in Maine: A Climate Change Exposure Summary for Species and Key Habitats	2013 Manomet Center for Conservation Sciences
Exercises and Trainings in Preparation	
Maine Climate Change Adaptation Tabletop Exercise (Regional Resiliency Assessment Program)	February 2015 FEMA Region 1
Maine Climate, Adaptation and Sustainability Conference	October 2014 University Of Maine Climate Change Institute

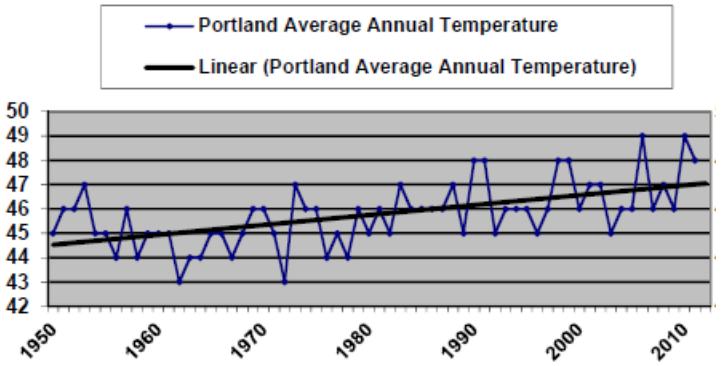
Temperature Changes: Excerpts from the report "Maine's Climate Future, 2015 Update," prepared by the University of Maine, include the following:

> "Average annual temperature across Maine warmed by about 3.0 degrees F between 1895 and 2014….Although the overall warming trend…is clear, Maine's temperature signal also features significant year to year fluctuations superimposed on a distinct pattern with periods of relative cold…and warmth…" (page 2).
>
> "Numerical models of the global atmosphere and ocean have been in development for over three decades. The most sophisticated of these models, such as those used by the Intergovernmental Panel on Climate Change (IPCC)…predict that annual temperature will increase another 3.0-5.0°F…across Maine between now and 2050" (page 3).

"Maine's warm season…increased by two weeks from the early 1900s to the 2000s. Global climate models predict that the warm season will increase by an additional two weeks over the next 50 years. Winter is warming at a faster rate than summer." (page 3)

The following is an excerpt from the Maine State Hazard Mitigation Plan 2013 Update: "The National Weather Service in Gray, Maine, has compiled monthly average and annual average temperatures for a long period of time at three locations in Maine: The Portland International Jetport (1940-present); the Bangor International Airport (1953-1994 and 1999-present), and the Caribou Airport. The data from all three measuring stations show that annual average temperatures have gradually increased at all three locations…although the increase has been greatest at the Portland Jetport station" (page 3-4).

The chart below, taken from the State's Hazard Mitigation Plan, page 3-5, shows how temperature has changed at the Portland Jetport between 1950 and 2010.



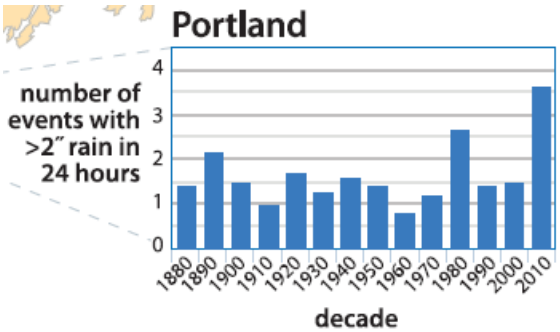
Precipitation Changes: Excerpts from the report "Maine's Climate Future, 2015 Update," include the following:

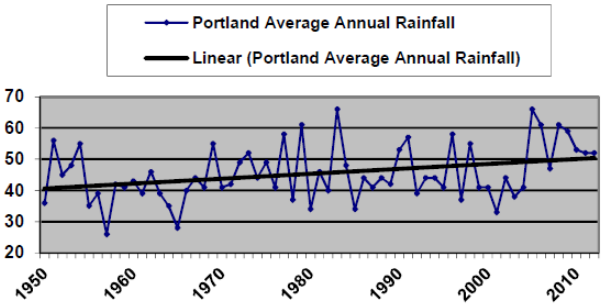
> "Since 1895, total annual precipitation has increased by about six inches…or 13%, with most of the additional amount falling in summer and fall. IPCC models predict that precipitation will continue to increase across the Northeast by 5-10% between now and 2050, although the distribution is likely to vary across the climate zones. Model predictions show greater increases in precipitation in interior Maine…whereas measurements to date from the weather stations across the Maine landscape show that precipitation has increased most along the coast" (page 8).

"A significant increase in extreme precipitation events (more frequent and intense storms) has been observed across Maine and other parts of the eastern U.S….we define an extreme precipitation event for this analysis as one in which two or more inches (five or more cm) of precipitation falls within a 24-hour period. Historical measurements show that extreme events vary across the state, occurring most often in the coastal zone and western mountains... Higher total precipitation and a higher frequency of extreme precipitation events in coastal Maine are related to the zone's proximity to Atlantic storm tracks. (page 9).

The following is an excerpt from the Maine State Hazard Mitigation Plan 2013 Update: "The National Weather Service has also compiled monthly average and annual average precipitation at the Portland Jetport, the Bangor International Airport and the Caribou Municipal Airport. The data from all three measuring stations show that average annual precipitation …has gradually increased at all three locations…The increase has been greatest at the Portland Jetport and the Caribou Municipal Airport" (page 3-5).

The figure on the left below (from Maine's Climate Future 2015 Update p.9) shows extreme precipitation events from 1880-2010. The chart on the right, taken from the State's Hazard Mitigation Plan – 2013 Update, page 3-6, shows how precipitation has changed at the Portland Jetport between 1950 and 2010.





"In general, the snow season has declined on average across Maine since the late 1800s…On a simplified linear trend, the snowfall has declined by about 15%....although the amount and duration of snow may decline in the future, extreme snowfall events with significant accumulation – strong nor'easters – are likely to increase in frequency" (page 10).

"The Northeast has experienced a greater recent increase in extreme precipitation than any other region in the U.S.; between 1958 and 2010, the Northeast saw more than a 70% increase in the amount of precipitation falling in very heavy events, taxing an already stressed and aging infrastructure" (page 11).

Description of Hazards	
Requirement §201.6(c)(2)(i): (The plan shall include) a description of the type, location and extent of all natural hazards that can affect the jurisdiction. The plan shall include information on previous occurrences of hazard events and on the probability of future hazard events.	
Element	B1. Does the Plan include a description of the type, location and extent of all natural hazards that can affect each jurisdiction?
	B2. Does the plan include information on previous occurrences of hazard events and on the probability of future hazard events for each jurisdiction?

Table 2 below examines each hazard that may threaten Cumberland County. Rating their priority was accomplished through the 2013 County hazard vulnerability assessment and review of the State Mitigation Plan, as well as through discussions with town/city officials. CCEMA also reviewed past disaster declarations and other historical records. The first four High priority hazards that this plan targets remain the same as in the 2012 Plan: flooding (including dam failure/breach), severe summer storms (thunderstorms, hurricanes and tornados), severe winter storms (snowstorms, blizzards, nor'easters, ice storms), and wildfire. The fifth High priority hazard, coastal erosion, has been added as the coastal towns have begun to recognize increasing erosion from more intense and more frequent coastal storms.

Table 2 Hazards Profiled in 2017 Plan

Summary of Hazards Profiled in the Plan		
Hazard	**How Identified**	**Why Identified**
Flooding (includes riverine, spring and stormwater runoff, ice jams, heavy rains) Includes dam failure/breach, as end result is flooding)	Review of FIRM maps Review of SLOSH maps Review of past disaster declarations (FEMA) Maine's Floodplain Management Coordinator CCEMA/MEMA records Review of repetitive loss properties Input from municipal staff	Cumberland County has suffered repeatedly from flood hazard events. These events have resulted in significant damage to property, economic disruption, reduced access for emergency vehicles, injury, and loss of life (at least three deaths).
Severe Summer Storms	Review of past disaster declarations Input from municipal staff Review of NOAA records	All of Cumberland County is subject to periodic severe summer storms. Summer storms have caused damage and injury from microbursts and tornado-like events in recent history (e.g., 2008 EF0 tornado in Gorham).
Severe Winter Storms	Review of past disaster declarations Input from municipal staff Review of NOAA records	All of Cumberland County is subject to periodic winter storms. Ice storms in 1998, 2008, and 2013 caused significant damage in Maine. The last two disaster declarations (DR-4108 in 2013, DR-4208 in 2015) that included Cumberland County were for winter storms/flooding
Wildfire	Review of Maine Forest Service records	Outside of the urbanized areas of the county, much of the land area is still forested, and while it puts the area at high risk of wildfire, it would depend on factors such as drought, humidity, or firefighting accessibility. Some areas in the county have a recent history of experiencing very small wildfires (<100 acres).

Coastal Erosion	Input from municipal staff Review of Maine Geological Survey maps Review of "Maine's Climate Future" (2015 – University of Maine Climate Change institute) Review of Fifth Intergovernmental Panel on Climate Change (IPCC) Review of Maine State Hazard Mitigation Plan.	Coastal communities have identified coastal erosion as an ongoing problem at specific locations. This hazard has been moved to high priority in recognition of rising sea levels, more intense storms predicted by climate change experts, and community concerns.

Table 3 identifies the hazards that were eliminated from further consideration in the 2017 plan, due to lack of historical evidence or lack of overall countywide severity. Although these disaster events are not profiled in the HMP, it does not mean that any of these events will not or could not occur and cause great damage. As the climate of Maine changes, the hazards may be added to the high priority list in the future. For this Plan, CCEMA's goal is to keep the plan relevant by profiling only the top five hazards.

Table 3 Table 3 Hazards Not Included in 2017 Plan

Hazard	How Identified	Reason for Non-Inclusion
Dam Failure	CCEMA dam records and files MEMA Dam Safety Program	Cumberland County has a number of high and significant hazard dams. Dam breach can cause rapid downstream flooding. Included under Flooding in the Priority Hazards section
Hurricanes	MEMA records National Weather Service NOAA website	Coastal communities are most at risk from tropical events. While hurricanes can produce heavy rains, intense winds, storm surges resulting in flooding and coastal erosion, they remain a rare event in Cumberland County. Extra-tropical events, such as nor'easters tend to cause more frequent damages (see Winter Storms). However, if hurricane probability were to increase, it would be included in future updates of the plan.
Avalanche	Review of USGS maps	There are no mountains in the county with topographic and vegetative characteristics that result in avalanches.
Blight/Infestation	MEMA data Input from stakeholders	Data indicates that there is limited history of damage, injury, or death resulting from blight and infestation in the county.
Drought	Review of NOAA records	Droughts have occurred in Cumberland County in the recent past. Thus far, the impacts of drought have been felt in limited areas. This is one hazard that will continue to bear scrutiny for the next plan revision due to the effects of climate variances.

Hazard	How Identified	Reason for Non-Inclusion
Earthquake	Review of MEMA and FEMA data.	Maine has a steady rate of low magnitude earthquake occurrence (<4.0 and with little damage). No significant amount of motion has been shown for any fault since the last Ice Age, about 20,000 years ago, and geologic evidence demonstrates that many faults have been inactive since the formation of the Appalachians, over 300,000,000 years ago.
Ground Subsidence	Review of Maine Geological Survey records	There have been no reported incidences of sudden land subsidence occurring in Cumberland County.
Landslide	Review of Maine Geological Survey Coastal Bluffs Maps and Coastal Landslide Hazards Maps	Although landslides do occur in the county, they are localized and it is unknown as of this writing if they might pose a more widespread risk.

HAZARD PROFILES

The high priority hazards are profiled below.

HAZARD: FLOODING

Flooding is defined as a temporary inundation of normally dry land because of: the overflow of inland or tidal waters, or the unusual and rapid accumulation or runoff of surface waters from any source. The nature of Maine's geography, geology and hydrology is such that flooding is usually fast rising, but short in duration. Severe flooding in Cumberland County can cause loss of life, property damage, disruption of communications, transportation, electric service and community services, crop and livestock damage, health issues from contaminated water supplies, molds and mildew within structural components, and loss and interruption of business

In most years, Cumberland County receives a fairly high level of precipitation year round, as evidenced in Table 4 below. Widespread flooding occurs regularly in the spring and fall. Localized flooding occurs during the summer as a result of short high-intensity rainfall from thunderstorms.

Table 4 Average precipitation By Month in Cumberland County

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Average Precipitation In Inches	3.39	3.27	4.25	4.33	4.02	3.78	3.62	3.15	3.7	4.88	4.92	4.02
Average Snowfall in Inches	19	12	13	3	0	0	0	0	0	0	2	13

- Average annual Precipitation rain 47.33" Average annual snowfall 62"
  http://www.usclimatedata.com/climate/portland/maine/united-states/usme0328

At least once in every decade, Cumberland County can expect a major flood event resulting in damage, primarily to roads.

Numerous types of floods have the potential to affect areas of Cumberland County. The flood types include: Dam Failure/Breach, Flash Flood, Ice Jam, Lacustrine (Lake Flooding), Riverine/Riparian, and Urban. Drafts of updated Floodplain boundaries (FIRM Maps) have recently been released. They are not yet finalized, so the older maps have been used in the Plan update

Generous precipitation contributes to the flood potential. The low-pressure system over the seaboard and the tendency for some storms to follow one another in rapid succession provide heavy, combined moisture. The documented gradual sea rise, as evidenced in the graph below from NOAA, coupled with wave action generated by winter storms, particularly nor'easters, have a profound effect on the nature of coastal flooding. Hurricanes occur far less frequently than severe winter storms, but could be just as, if not more, devastating depending on variables such as the tourist season.

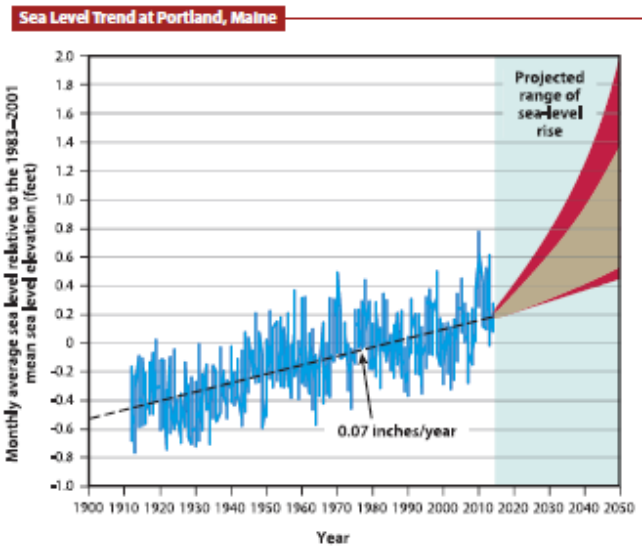
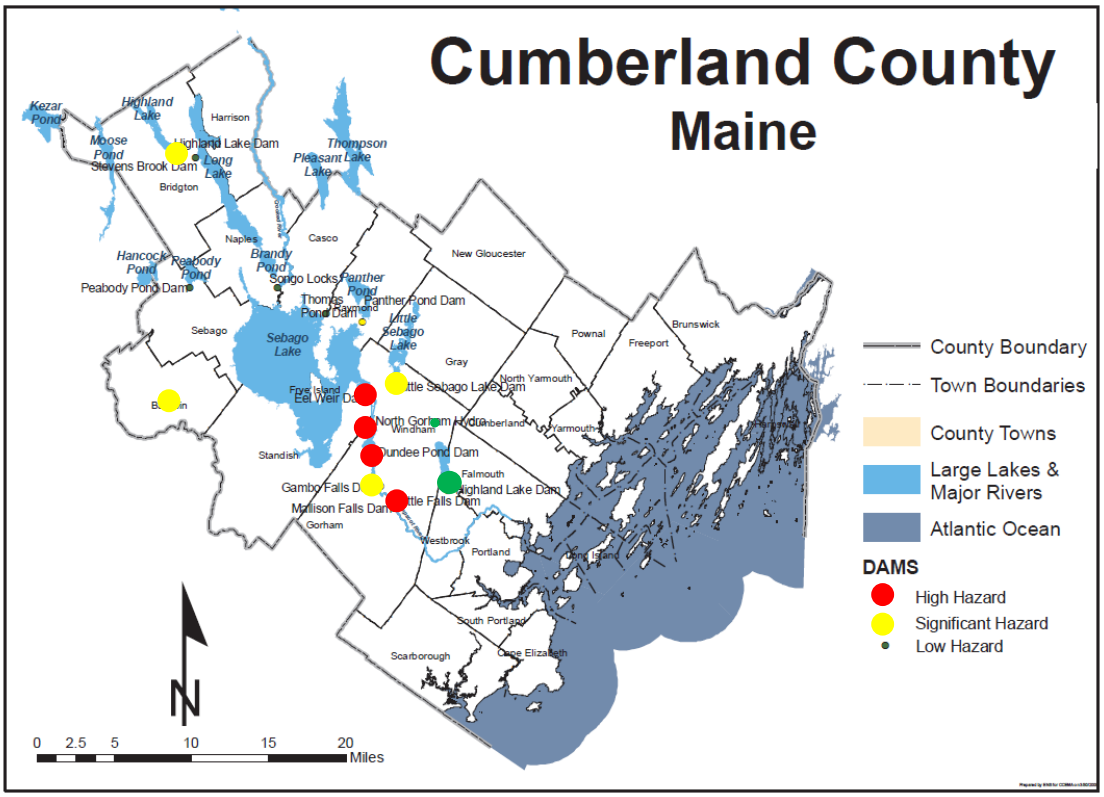


Figure 14. Sea level at Portland provided by the National Oceanic and Atmospheric Administration Center for Operational Oceanographic Products and Services (*tidesandcurrents.noaa.gov/sltrends/sltrends_station.shtml?stnid=8418150*). The mean sea level trend is 0.07 inches per year (1.9 mm/year) with a 95% confidence interval of +/- 0.006 in/yr (0.16 mm/yr) based on monthly mean sea level data from 1912 to 2013, which is equivalent to a change of 0.62 feet in 100 years. The plotted values are relative to the most recent 19-year mean hourly sea level elevation established by NOAA (1983–2001).[2] Monthly sea level varies due to weather and the changing orbits of the earth and moon. The projected range of sea-level rise is from the latest National Climate Assessment and figure 2.26 therein from the NASA Jet Propulsion Laboratory.[3] The projections reflect the range of possible scenarios based on other scientific studies. The currently projected range of sea-level rise of 0.5 to 2.0 feet by 2050 (1.0 to 4.0 feet by 2100) falls within a larger range that incorporates uncertainty about how glaciers and ice sheets will react to the warming ocean, the warming atmosphere, and changing winds and currents. The high end of these scenarios is provided for use by decision makers with a low tolerance for risk.

Dam failure/breach also has adverse effects related to the nature of flooding within the County. Many dams through the County are now aged (over 100-years old), and beyond typical design life. Maine law classifies the hazard potential of dams as follows:

- High - could cause loss of life
- Significant - could cause significant property damage
- low generally cause damage only to the owner's property -

In Cumberland County, there are four high hazard dams and four significant hazard dams, as shown in Table 5. The high-hazard dams are all regulated by the Federal Emergency Regulatory Commission, while the significant hazard dams are regulated by MEMA. The eight high and significant hazard dams all have Emergency Action Plans to mitigate the effects of failure. (One dam was reclassified from significant to low hazard as a result of road mitigation work.)The County also has 54 low hazard dams that are not included in the table. In Maine, High and Significant Hazard Dams must be inspected every six years.



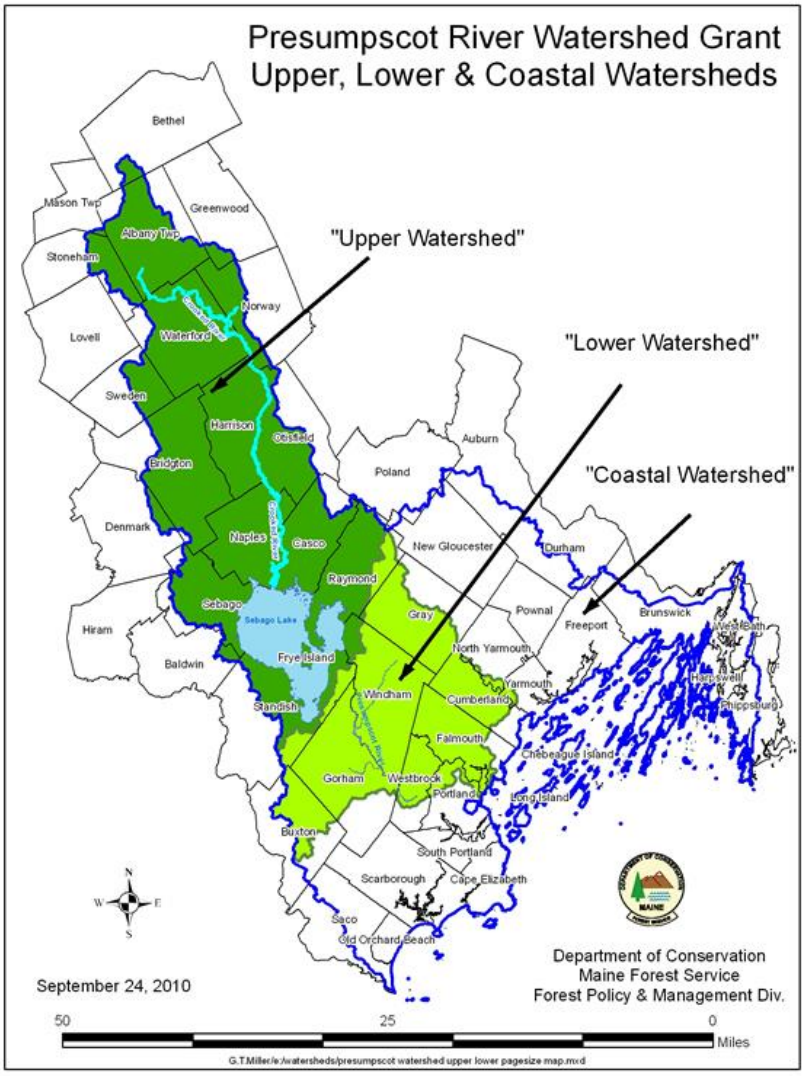
High and Significant Hazard Dams in Cumberland County.
The Dam marked with a large green dot was downgraded from Significant Hazard in 2014

Table 5 High and Significant Dams

CUMBERLAND COUNTY HIGH & SIGNIFICANT HAZARD DAMS					
MEMA ID	**DAM NAME**	**OTHER NAME**	**DAM OWNER**	**MUNICIPALITY**	**RIVER/LAKE**
High Hazard Dams					
417	Dundee Falls	Dundee Pond	SAPPI	Windham	Presumpscot
128	Eel Weir	Sebago Lake Dam	SAPPI	Windham	Presumpscot
123	Mallison Falls		SAPPI	Windham	Presumpscot
495	N. Gorham Hydro Station		FPLE Energy Maine Hydro	Windham	Presumpscot
Significant Hazard Dams					
117	Highland Lake		Bill Morrisseau	Bridgton	Highland Lake
1007	Sanborn Pond		Joel Sanborn and Daniel and Betsy Harrington	Baldwin	Pigeon Brook
127	Little Sebago Lake	Hopkins Dam	Bruce Micucci	Windham	Little Sebago
122	Panther Pond	Raymond Dam	IFW	Raymond	Panther Pond

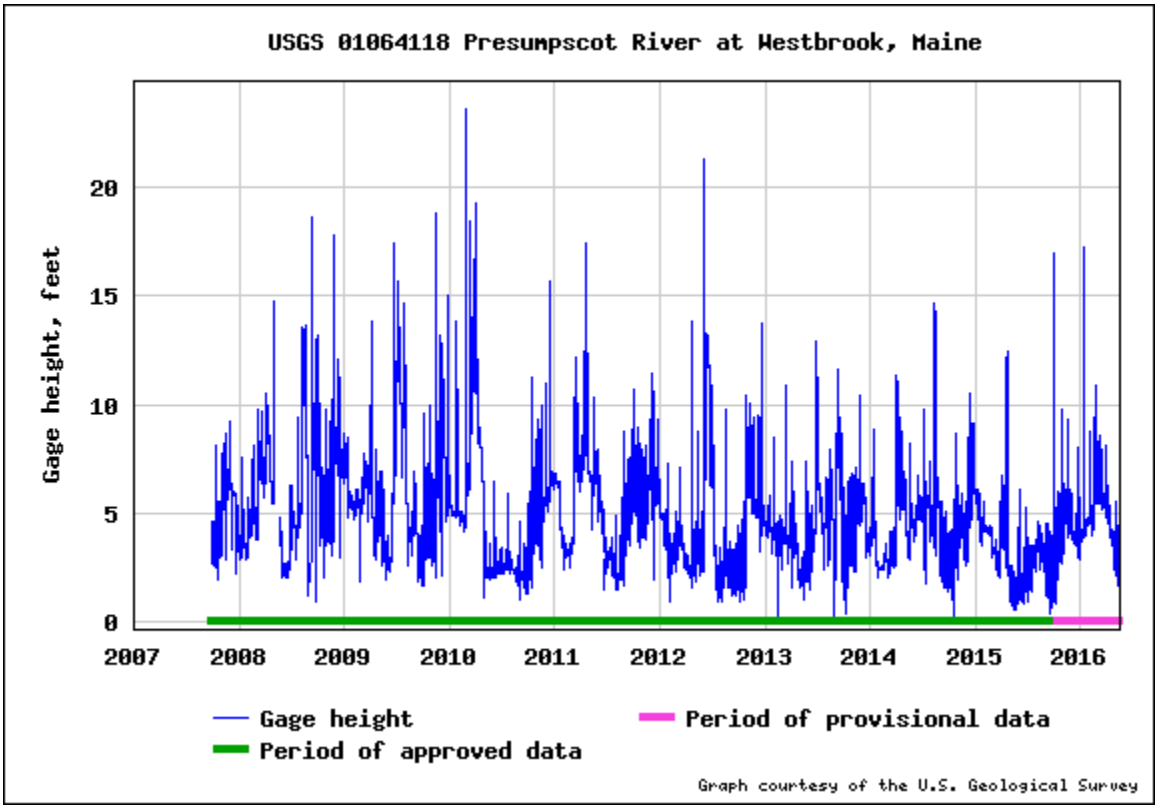
Location:

All of Cumberland County has areas that are susceptible to coastal and/or riverine flooding. Twelve of its 28 towns are located directly on the Atlantic Ocean. Several rivers and streams flow through portions of Cumberland County, the most predominant being the Presumpscot River. This river, with its tributary waters, extends from Sebago Lake through the towns of Naples, Casco (Crooked River), Standish, Windham, Gorham, Falmouth, and the cities of Westbrook and Portland before flowing into Casco Bay.



Extent:

The chart below demonstrates flood levels on the Presumpscot since 2008. In addition, urban flooding, particularly in Portland and Scarborough, has increasingly been a problem in the low lying areas.



U.S.G.S. Presumpscot River Gauge
http://nwis.waterdata.usgs.gov/usa/nwis/uv/?cb_00065=on&format=gif_default&site_no=01064118&period=&begin_date=2007-01-01&end_date=2016-05-17

Impact

Flood damages to roads, bridges and ditches continue to be the most common occurrence throughout Cumberland County, especially in heavy rain events (> 3-5" in 24 hours). Depending on the saturation level of the ground at the time of the event, and the duration of the storm, the extent of damages can vary from a few overwhelmed culverts to major road washouts throughout the county.
The extent of the flooding hazard under the various sea-level rise scenarios has not been determined for individual roads and culverts. This would have to be calculated on a case-by-case basis.

Flooding has been the most common hazard affecting Cumberland County in the past. Between 1987 and 2015, there were fourteen federally declared disasters in the County in which FEMA funds were utilized, eight of which were primarily flood events.

Probability:
Floods are described in local flood studies in terms of their extent, including the horizontal area affected, and the related probability of occurrence. Flood studies use historical records to determine the probability of occurrence for different extents of flooding. The most widely adopted design and regulatory standard for floods in the US is the 1-percent annual chance flood. This is the standard formally adopted by FEMA. The 1-percent annual flood, also known as the base flood, has a 1-percent chance of happening in any particular year. It is also referred to as the "100-year flood".

Table 7 below provides a~~n~~ historical summary of the flooding events affecting Cumberland County. (Data source: FEMA website.) Where damages are provided they reflect the damage estimate reported for Cumberland County only

Table 7 History of Occurrences

Date	Year	County Damages*	2015 Dollars	Event Type	Declaration
March 19	1936				n/a
August 28	1946				n/a
March 27 – 30	1953				n/a
February 12	1972	$90,836			n/a
May 8	1975				SBA
March 20	1977				SBA
June	1984				n/a
January	1986				n/a
April 1	1987	$45,757	63,082.47	Severe Storm/ Flooding	FEMA-788-DR-ME
May 5-13	1989	486,295	929,517	Severe Storms/Flooding	FEMA-830-DR-ME
August 18-21	1991	2,344,567	4,080,046	Hurricane Bob	FEMA-915-DR-ME
October 30 – November 2	1991	200,365	348,678	Severe Coastal Storm	FEMA-921-DR-ME
March 27	1992	$185,600	313,544.94	Flooding/Heavy Rain	FEMA-940-DR-ME
April	1993	$13,220	21,684.19	Flooding/Heavy Rain/Snowmelt	FEMA-988-DR-ME
April 16 -17	1996	$535,046	808,253.65	Severe Storm/ Flooding	FEMA-1114-DR-ME
October 20 - 21	1996	$4,924,698	7,439,369.95	Severe Storm/ Flooding	FEMA-1143-DR-ME
October 8 – 11	1998	$852,759	1,239,990.06	Severe Storm/ Flooding/High Wind/Coastal Erosion	FEMA-1263-DR-ME
September 16-19	1999	83,703.45	119,082.48	Hurricane Floyd	FEMA-1308-DR-ME
April 25	2007	$7,246,244	8,283,333.88	Severe Storms/Inland, Coastal Flooding	FEMA-1693-DR-ME
July 18 – Aug. 16	2008	$819,201	901,820.06	Severe Storms/Flooding/Tornadoes	FEMA-1788-DR-ME

*County damages are cost in the year of the event.

There have been no flooding declarations since 2008 in Cumberland County.

Table 8 Federally Declared Disaster Costs by Municipality

	DR 788 April 1987	DR 830 May 1989	DR 915 August 1991	DR 921 November 1991	DR 940 March 1992	DR 988 April 1993	DR 1114 April 1996	DR 1143 October 1996	DR 1263 October 1998	DR 1308 September 1999	DR 1693 April 2007	DR 1788 July 2008
Baldwin	---	5,864	3,224	---	28,368	---	24,231	---	---	---	263,760	---
Bridgton	3,697	8,860	5,249	---	20,002	---	198,387	---	---	---	93,511	---
Brunswick	---	---	27,845	---	---	---	27,211	---	---	---	52,550	83,034
Cape Elizabeth	---	1,934	29,062	2,379	---	---	---	17,248	11,669	---	169,375	---
Casco	---	9,009	14,566	----	---	---	10,150	11,527	---	---	448,410	---
Chebeague Island*	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	---	N/A	---
Cumberland	---	8,813	75,744	412	---	---	---	---	74,078	1,157	499,073	15,067
Falmouth	---	34,434	199,465	---	---	---	26,825	85,387	23,881	---	108,650	---
Freeport	---	7,915	109,730	---	---	---	18,716	---	41,738	2,913	120,986	436,150
Frye Island*	N/A	N/A	N/A	---	N/A	N/A	N/A	1,162	6,462	---	8,854	---
Gorham	---	---	293,343	---	---	---	22,681	171,470	---	---	82,366	82,640
Gray	---	38,514	99,067	---	---	---	14,436	27,109	---	11,868	171,641	---
Harpswell	---	---	---	---	---	---	---	---	---	---	48,931	---
Harrison	4,904	28,434	---	---	62,047	---	4,839	---	---	---	139,326	---
Long Island*	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	2,265	---	326,377	---
Naples	13,557	1,297	1,297	---	15,666	---	---	5,754	---	---	252,876	---
New Gloucester	19,810	139,073	139,073	---	---	---	13,967	---	19,434	34,757	46,495	---
North Yarmouth	---	68,436	68,436	---	---	---	---	---	27,165	---	18,164	27,156
Portland	---	245,399	245,399	174,045	---	---	39,737	439,323	120,602		2,327,749	---
Pownal	3,789	64,691	64,691	---	---	---	23,385	---	452,008	4,203	20,024	75,658
Raymond	---	1,556	9,092	---	20,994	---	7,489	15,651	---	4,809	130,739	---
Scarborough	---	---	129,906	23,529	---	---	21,375	731,786	4,881	---	557,178	19,312
Sebago	---	6,290	16,105	---	38,523	13,220	4,928	---	---	23,993	139,276	---
South Portland	---	2,037	37,564	---	---	---	1,254	112,222	27,229	---	245,551	---
Standish	---	1,774	41,376	---	---	---	---	15,917	---	---	51,453	---

Westbrook	---	10,909	186,771	---	---	---	7,297	1,860,507	4,098	---	98,500	---
Windham	---	5,301	119,306	---	---	---	12,296	1,206,477	2,294	---	149,401	---
Yarmouth	---	43,841	332,390	---	---	---	51,540	3,867	32,000	---	63,679	67,373
County	---	---	26,249	---	---	---	---	7,720	1,598	---	9,295	---
Portland Water District	---	---	62,801	---	---	---	4,302	193,433	1,357	---	104,327	12,812
Freeport Sewer District	---	---	6,801	---	---	---	----	---	---	---	---	---
PNP's	---	1,981	---	---	---	---	---	18,168	---		225,433	---
TOTAL	**45,757**	**486,295**	**2,344,567**	**200,365**	**185,600**	**13,220**	**535,046**	**4,924,698**	**852,759**	**83,703**	**7,145,955**	**819,202**
In 2015 Dollars	**95,468**	**929,517**	**4,080,046**	**348,678**	**313,545**	**21,684**	**808,254**	**7,439,370**	**1,239,990**	**19,082**	**8,168,691**	**901,821**

Note[1] Figures derived from MEMA and Cumberland County documents
Note[2] 2015 dollars figured from Bureau of Labor CPI calculator http://data.bls.gov/cgi-bin/cpicalc.pl
* Long Island seceded from Portland 1993; Frye Island from Standish in 1998; Chebeague Island from Cumberland in 2007

HAZARD – SEVERE SUMMER STORMS

A severe summer storm is a violent weather phenomenon producing winds in excess of 50 knots (57.6 mph), heavy rains, lightning, and hail that can cause injuries, and destruction of property, crops and livestock. Severe summer storms include hurricanes, lightning, thunderstorms, microbursts and tornadoes.

Location

The entire County is vulnerable to one or more severe summer storms each year, usually in the form of thunderstorms.

Extent:

The damage from most of these storms is generally localized. As storms typically move from west to east, they may weaken so that a severe storm in the western communities may become a less severe storm as it reaches the coastal communities, but this is dependent on atmospheric conditions.

Impact:

When severe summer storms arrive in the County, high winds can fell trees and branches onto power lines causing power and communication outages. Heavy rains that often accompany thunderstorms can result in flash flooding or erosion. Hail can cause crop damage for farmers and backyard gardeners, lightning strikes can start fires. Any of these weather events can cause personal injury or property damage. The impact of these summer storms is usually restricted to power outages and to flooding caused by large amounts of moisture these storms can carry.

Probability:

The past thirty year history of summer storms indicates that Cumberland County will continue to experience storms on a regular basis. . According to the NOAA National Climactic Data Center "there are slightly more than 20 days a year with thunderstorms on average…" There are no probability studies available on summer storm occurrence. However, based on experience, as demonstrated above, the County can expect thunder and lightning every year, particularly in the summer months. Less frequently, the County will experience more damaging storms. Although microbursts or even small tornado-like events may occur periodically, these events typically affect fairly small localized areas. According NOAA data, Maine can expect an F0 or F1 tornado twice a year on average, but location is not predictable. The table below shows the Enhanced Fujita scale indicating wind speeds.

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

Table 9 Tornados in Cumberland County Maine 1962 through 2014

Location	County/Zone	St.	Date	Time	T.Z.	Type	Mag	Dth	Inj
Totals:								0	1
CUMBERLAND CO.	CUMBERLAND CO.	ME	07/09/1962	10:55	CST	Tornado	F1	0	0
CUMBERLAND CO.	CUMBERLAND CO.	ME	10/03/1970	17:00	CST	Tornado		0	0
CUMBERLAND CO.	CUMBERLAND CO.	ME	08/11/1971	11:45	CST	Tornado	F1	0	0
CUMBERLAND CO.	CUMBERLAND CO.	ME	06/22/1974	13:30	CST	Tornado	F1	0	1
SEBAGO LAKE	CUMBERLAND CO.	ME	08/08/2004	17:00	EST	Tornado	F0	0	0
BRUNSWICK	CUMBERLAND CO.	ME	11/24/2005	13:16	EST	Tornado	F0	0	0
WEST GORHAM	CUMBERLAND CO.	ME	07/21/2010	17:48	EST-5	Tornado	EF0	0	0
THOMPSON PT	CUMBERLAND CO.	ME	07/27/2014	16:05	EST-5	Tornado	EF0	0	0
Totals:								0	1

Mag': Magnitude, 'Dth': Deaths, 'Inj': Injuries
Source: NOAA National Climactic Data center

Hurricanes are associated with flooding in this plan as the majority of storm damage is usually because of excessive rain.

Table 10 Hurricanes Affecting Cumberland County

Hurricane	Year	Category	Wind Speed In mph Sustained/gusts	Rainfall in Inches in Portland	Deaths/ Injuries Statewide
Carol	1954	Cat 1	60/74		7/3
Edna	1954	Cat 1	70	7.49	8
Bob	1991	TS	40/61	7.83	3/2
Floyd	1999	TS	50	4.4	---
Irene	2008	TS	52	1.13	---

Saffir–Simpson Hurricane Scale		
Category	Wind speed mph (km/h)	Storm surge ft (m)
Five	≥156 (≥250)	>18 (>5.5)
Four	131–155 (210–249)	13–18 (4.0–5.5)
Three	111–130 (178–209)	9–12 (2.7–3.7)
Two	96–110 (154–177)	6–8 (1.8–2.4)
One	74–95 (119–153)	4–5 (1.2–1.5)
Additional classifications		
Tropical storm	39–73 (63–117)	0–3 (0–0.9)
Tropical depression	0–38 (0–62)	0 (0)

http://serc.carleton.edu/download/images/10713/saffir-simpson-sm.gif

HAZARD – SEVERE WINTER STORMS

Severe winter weather conditions are distinguished by low temperatures, strong winds, and often large quantities of snow. The types of winter storms in Maine are blizzards, ice storms, nor'easters, sleet, and heavy snowstorms.

Location

The entire County is subject to severe storms every winter, but historically, northern and western portions of the County receive more snowfall while coastal areas are more likely to have freezing rain, sleet, tide surges and flood damage.

Impact

Loss of electrical power and communication services can occur when utility lines yield under the weight of ice and snow, which can also cause road closures. These conditions can impede the response time of emergency services. Roof structures can collapse. The melting of snow pack in March and April is often gradual enough to prevent serious flooding, although there have been times when a quick melt has led to disastrous flood conditions.

Extent

During the winter months, Cumberland County often has heavy snowfall, or snow combined with high winds, freezing rain or ice storms. Winter storm precipitation amounts can exceed several inches of water equivalent (20-30 inches of snow), while wind speeds can be equal to or greater than those of a hurricane. Total seasonal snowfall ranges between 50 and 90 inches. The snowfall season usually runs from November to April.

Previous Occurrences

The following is a summary of some of the most severe winter storms in Cumberland County in the past 20 years, as reflected in Presidential Disaster Declarations and Emergency Declarations. Note that in several instances, flooding accompanied the winter storms. In addition to those listed, multiple other severe storms occurred during the same period that did not reach the level of a disaster or emergency declaration.

FEMA-DR-4208 Commercial St. Portland, ME
Picture: Shawn Patrick Ouellette/Staff Photographer Portland Press Herald

Table 11 Disaster and Emergency Declarations 1998-2015

Date	Year	County Damages	2015 Dollars	Event Type	Declaration
Jan 5-25	1998	4,465,694	6,493,530.03	Ice Storm	FEMA-1198-DR
March	2001			Severe Winter Storm	EM-1364
Dec. 17 – January 1	2003	$396,919	511,285.60	Extreme Winter Weather	FEMA-1468-DR-ME
December	2004			Severe Winter Storm	EM-3190
January	2005			Severe Winter Storm	EM-3205
February	2005			Severe Winter Storm	EM-3206
March	2005			Severe Winter Storm	EM-3209
March	2005			Severe Winter Storm	EM-3210
December	2008			Severe Winter Storm	EM-3298
January 1	2009	$4,439,697	4,825,749.64	Severe winter Storm/Flooding	FEMA-1815-DR-ME

April 10	2010	$1,379,492	1,499,445.35	Severe winter Storm/Flooding	FEMA-1891-DR-ME
March 25	2013	1,458,799.92	1,484,224.04	Winter Storm/Flooding	FEMA-4108-DR-ME
March 12	2015	1,354,396.62	1,354,396.62	Severe Winter Storm/Flooding	FEMA-4208-DR-ME

Table 12 Breakdown of Cost to Communities for the Presidential Declarations.

Municipality	1198 January 1998	1468 December 2003	1815 January 2009	1891 April 2010	4108 March 2013	4208 March 2015
Baldwin	51,054	---	55,199	54,947	10,222	7,958
Bridgton	215,776	---	107,973	--	30,437	21,768
Brunswick	301,680	---	242,411	28,587	124,878	106,830
Cape Elizabeth	125,116	---	175,203	51,593	55,055	42,823
Casco	131,386	---	---	22,455	---	---
Chebeague Island	---	---	25,748	228,413	---	4,913
Cumberland	277,962	---	45,074	4,814	43,089	51,630
Falmouth	210,338	8,523	41,858	48,847	59,133	53,319
Freeport	213,453	---	121,856	8,237	---	41,181
Frye Island	---	---	---	--	---	---
Gorham	200,265	---	194,313	37,208	75,583	64,996
Gray	246,103	9,056	128,218	42,011	40,206	38,027
Harpswell	47,905	---	14,834	4,161	7,902	4,232
Harrison	149,697	---	---	--	---	---
Long Island	8,732	---	7,587	379,863	---	13,265
Naples	191,016	---	24,654	12,911	17,041	---
New Gloucester	262,309	---	127,316	--	38,458	37,116
North Yarmouth	55,664	---	54,817	--	14,977	10,778
Portland	859,489	---	1,174,088	2,109,056	417,153	309,445
Pownal	91,851	---	52,431	--	17,308	8,299
Raymond	153,949	---	33,853	--	10,887	12,989
Scarborough	107,024	---	426,908	67,067	85,373	69,578
Sebago	113,167	---	54,671	24,390	---	14,611
South Portland	322,433	16,495	261,563	29,167	188,128	109,024
Standish	248,458	---	126,357	57,201	41,544	29,307
Westbrook	252,604	---	189,947	32,411	69,933	58,282
Windham	438,534	---	205,577	14,094	69,281	56,106
Yarmouth	261,825	30,732	145,763	45,418	27,707	21,863
County	4,955	---	1,865	--	1,253	---
Bridgton Water District	2,676	10,919	---	--	---	---

Freeport Sewer District	1,739	---	---	--	---	---
Portland Water District	62,741	317,627	95,439	62,590	---	---
Brunswick/Topsham Water District	---	---	---	3,076	---	---
PNP's	165,373		131,930	11,681	---	166,056
Total	**5,775,274**	**396,919**	**4,272,667**	**3,391,202**	**1,458,800**	**1,354,397**
In 2015 Dollars	**8,397,780**	**511,286**	**4,720,373**	**3,686,083**	**1,484,224**	**1,354,397**

Probability

Based on its location in the Northeast and on the past 30 years of history, there is a high probability that Cumberland County will continue to experience winter snowstorms on a yearly basis, which will not likely produce significant damage. However, less frequently, the county will experience damaging snow and ice storms that rise to the level of disaster or emergency declaration, as evidenced by the chart above.

HAZARD – WILDFIRE

Wildfire is a natural phenomenon initially finding its origin in lightning; however, humans have become the greatest cause of fires in Maine. Wildland fires are those that burn vegetation such as grass, brush and timber. Wildland urban interface fires are created where homes meet highly volatile forest fuels. Both of these types of wild fire occur in Cumberland County.

Location and Extent:

Wildland fires can occur in any area of the County, but the most vulnerable areas are the smaller communities, especially those that have narrow roads inaccessible by today's fire equipment or lack of water supply. These fires typically extend to <100 acres.

Previous Occurrences:

The Maine Fire Service tracks all reported fire occurrences in the State on an annual basis. These are coded by cause: campfire, children, debris burning – which can include backyard burning as well as the agricultural practice of "burning over" blueberry fields, incendiary (includes arson), lightning, machinery (includes logging equipment, brush cutters as well as fires along power lines), miscellaneous, railroad and smoking. The chart below, provided by the Maine Fire Service, lists the wildland fires from 2010 through 2014 (the latest year analyzed as of the writing of this plan).

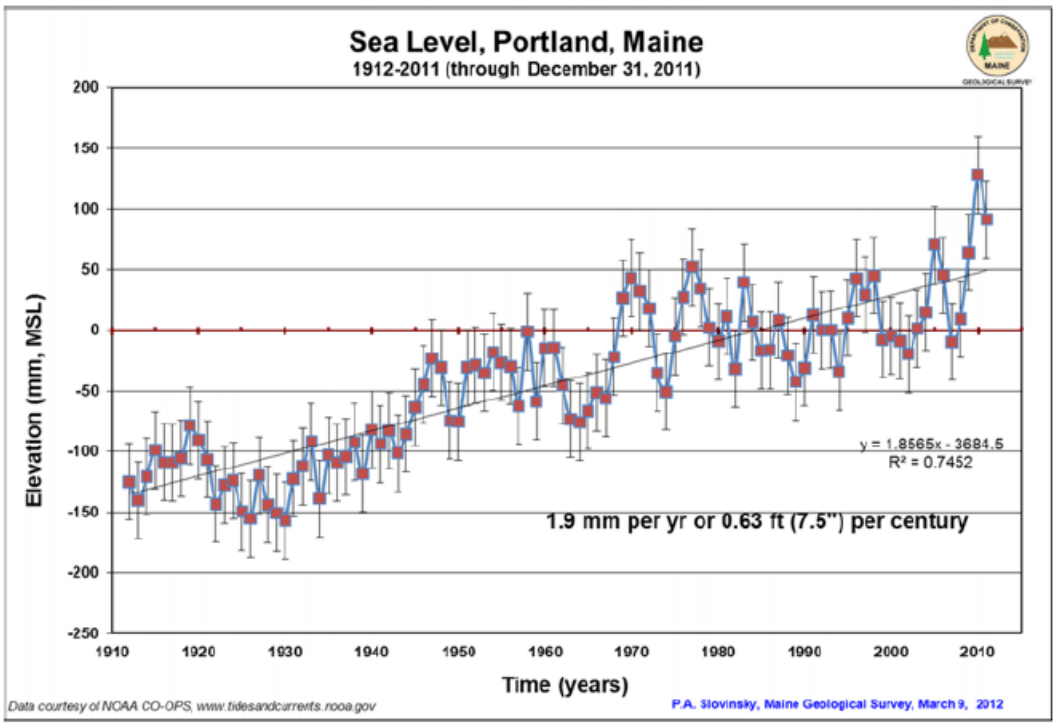
Fire County	CAUSE	# of Fires
CUMBERLAND	CAMPFIRE	7
CUMBERLAND	CHILDREN	9
CUMBERLAND	DEBRIS	18
CUMBERLAND	INCENDIARY	24
CUMBERLAND	MACHINE	21
CUMBERLAND	MISC	16
CUMBERLAND	RAILROAD	6
CUMBERLAND	SMOKING	11
	TOTALS	112
	Average YR	14

Forest fires remain one of the County's most significant hazards. Today, about 90% of all forest fires are caused by human activity while lightning causes about 10%. During dry periods, fire danger increases rapidly, especially in the spring and fall.

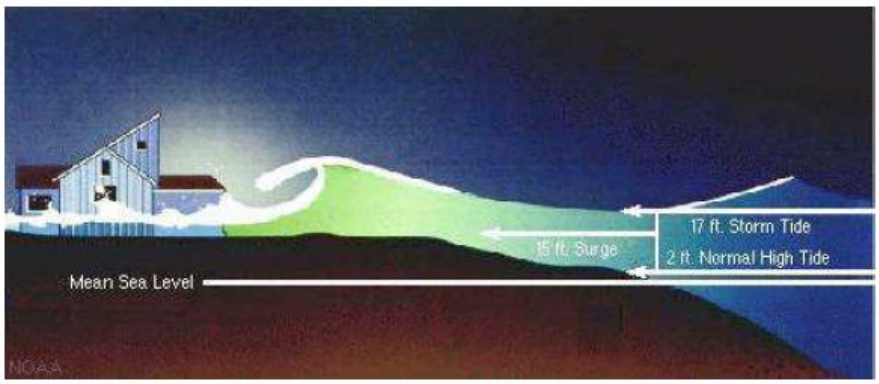
Impact:
Despite containing a high percentage of heavily forested areas, Cumberland County has not experienced major wildfire events in recent years, with the last widespread wildfire occurring in 1947. This wildfire event caused multiple deaths and resulted in the burning of over 200,000 acres throughout the state of Maine, with the greatest impacts being in York County and on Mount Desert Island. Since the 1947 fire, the County experienced a major wildfire on May 3, 1951 and in October of 1961. As well, it is typical for the county to experience several minor wildfires per year. These fires are typically relatively small and quickly contained (depending on fire apparatus accessibility).

Probability of Occurrence.
Based on the past thirty years of historical records of forest fires, the Maine Forest Service Forest Protection Division anticipates that on a state level there will be between 600 – 700 low acreage fires (a low acreage fire is less than 100-acres) from all causes each year. However, using the last three decades of fire records, the probability of a major wildfire (>1,000 acres, according to the Maine Forest Service) is once a decade.

Hazard: Coastal Erosion
This hazard, newly moved to the High Hazard category, is included because of increasing intensity of storms and greater effects of storm damage along the coasts of the 12 municipalities affected. Rising sea levels increase the effect of these storms. While the damages are currently localized and minimal, the trend is increasing, and communities are experiencing more damage or damage in areas not previously affected.



According to the Maine State Hazard Mitigation Plan – 2013 Update:
One of the consequences of sea level rise is the damage that can occur from storm surges. Storm surge is simply water that is pushed toward the shore by the force of the winds swirling around the storm as well as low barometric pressure. This advancing surge combines with the normal tides to create the storm tide. In addition, wind driven waves are superimposed on the storm tide. This rise in water level can cause severe flooding in coastal areas, particularly when the storm tide coincides with the normal high tides. The following illustration shows how storm surge can increase flooding risk.



No one knows for sure how high the sea will rise or how quickly it will occur, but the IPCC has prepared a range of scenarios based on a scientific analysis of a number of variables including glacial ice melt, thermal expansion of water due to global warming, slowing of the Gulf Stream (there has been a 25% reduction during the past decade), and the melting of ice caps in Greenland and Antarctica. Based on the IPCC's projections, the Maine Geological Survey (MGS) is using for its studies a conservative, mid-range estimate of two (2) additional feet of sea level rise by the year 2100.

Location:
The coastal communities of Scarborough, Cape Elizabeth, Portland, South Portland, Falmouth, Cumberland, Yarmouth, Freeport, Brunswick and Harpswell, and the island towns of Long Island and Chebeague Island are those affected.

Extent:
Low-lying areas such as marshes, roads that run parallel and close to the shore and homes build on bluffs of the geologic Presumpscot formation mud are most vulnerable. Island communities express most concern with their ferry terminals and the effects coastal erosion will have on these fixed structures. The extent of the erosion hazard under the various se-level rise scenarios has not been determined for individual roads and culverts. This would have to be calculated on a case-by-case basis.

Impact:
Damage to roads, erosion of protective barriers, and loss of property are among the largest impacts in Cumberland County to date. Other concerns, while outside the scope of this plan, include wetland migration and the effects of erosion on the natural habitat.

Probability:
According to the Maine State Hazard Mitigation Plan – 2013 Update, "…the gradual rise in the level of the sea is having a profound effect on the nature of coastal flooding. The sea has risen about 7.5 inches since

1900, and is conservatively projected by the Maine Geological Survey to rise by roughly two additional feet by 2100. Along the Maine Coast, if the 10-year and 100-year storm elevations are only one foot apart, a sea level rise of one (1) foot means that a storm that had a 1% chance of occurring in any one year (the 100-year storm) at the original elevation will have a 10% chance of occurring in any one year (the 10-year storm) at the new elevation. As a result, more homes, businesses, public infrastructure such as roads, and entire communities will be subject to more devastating coastal storms, as well as coastal erosion and landslides, on a more frequent basis. There is also concern in the scientific community that global warming may be increasing the intensity of coastal storms."

PRIORITIZATION OF HAZARDS

The preceding profiles describe the range of hazards for which Cumberland County is at risk. The history of hazard events in the County is the best indicator of future risks faced by the County. In order to prioritize future mitigation efforts, the range of hazard types was evaluated for frequency, impacts, and extent of affected population. The hazards were then ranked by order of priority, based on these criteria. Only the top five have been evaluated further. The prioritization matrix is shown below:

Table 13

Hazard Type	Frequency	Impact	% of County at risk	Total Score
High Priority				
Flooding	4	4	4	12
Severe Winter Storm	4	4	4	12
Severe Summer Storm	4	2	4	10
Wildfire	3	2	4	9
Coastal Erosion	4	2	2	8
Medium Priority				
Hurricane (included in summer storms	2	4	2	8
Low Priority				
Drought	1	2	4	7
Earthquake	1	2	4	7
Blight/infestation	1	2	3	6
Landslide	2	2	1	5
Avalanche	1	2	1	4
Ground subsidence	1	1	1	4

Frequency of events:

1- 10 years =4
Greater than 10 years =3
Greater than 50 years =2
Greater than 100 years =1

Impact:

Significant (multiple deaths, mass casualties, or millions of dollars in damages) =4
Major (injuries, or 100,000's of dollars in damages) =3
Moderate (injuries or 1,000's of dollars in damages) =2
Minimal (no injuries or 100's of dollars in damages) =1

% of County at risk:

All parts of county are vulnerable to hazard and might be impacted by an event	=4
All parts of county are vulnerable, but not all parts are likely to be impacted by an event	=3
Vulnerability and impacts are limited to certain regions of the county	=2
Vulnerability and impacts are localized	=1

This prioritization method remains valid for the 2017 Update. Coastal Erosion moved to High Priority in recognition of rising sea levels and community concerns.

ASSESSING VULNERABILITY: OVERVIEW

Requirement §201.6(c)(2)(ii):	The risk assessment shall include a description of the jurisdiction's vulnerability to the hazards described in paragraph (c)(2)(i) of this section. This description shall include an overall summary of each hazard and its impact on the community.

The hazard mitigation planning team identified critical facilities located within each municipality, using GIS data from the Maine Office of GIS, and Northeast States Emergency Consortium HAZUS documents. Critical facilities are defined by FEMA as "facilities that are critical to the health and welfare of the population and that are especially important following hazard events". Critical facilities include, but are not limited to, shelters, police and fires stations, and hospitals. The critical facilities identified in Cumberland County are: municipal offices, fire stations, police stations, water treatment facilities, wastewater treatment plants, libraries, schools, shelters, hospitals, airports, dams, rescue units, armories, roads, electric lines, and telephone lines.

As seen in the above table, the five highest priority hazards identified for Cumberland County are flooding, severe winter storms, severe summer storms, wildfires, and coastal erosion. The following describes the vulnerability of critical facilities to each of these hazards:

Flooding: The typical damage resulting from flooding in Cumberland County is structural damage to roads and utility infrastructure. There may be other types of critical facilities that are susceptible to damage from flooding, but insufficient data was available to determine these facilities. Mitigation measures in the future might include a more comprehensive field analysis of vulnerability. However, due to the varied topography within the county and the availability of higher elevation sites within all municipalities, nearly all critical facility structures are located outside of the flood zones, with the ~~possible~~ exception of roads, some wastewater treatment plants, and island ferry terminals.

Severe Winter Storms: Winter storms damage overhead utility lines, cause flooding (ice jams and spring melt off) and dump debris and large amounts of snow on the roads. The County is also susceptible to ice storms, which can affect the same infrastructure. The more widespread events, such as blizzards and ice storms will typically impact the county through severe damage to overhead electric and utility line infrastructure and blockage of roads by debris. When accompanied by flooding, the impacts will be as described above.

Severe Summer Storms: Localized events, such as microbursts or small tornados have the potential to cause significant damage to structures, should they happen to occur in direct proximity to a critical structure. The more widespread events, such as hurricanes and tornados will typically impact the County through severe damage to overhead electric and utility line infrastructure and blockage of roads by debris. When accompanied by flooding, the impacts will be as described above.

Wildfire: The combination of a high degree of development within the County, which is still primarily heavily forested, creates the potential for significant damage to critical facilities, homes and commercial

property in Cumberland County resulting from wildfires.

Coastal Erosion: Critical infrastructures such as roads running close to shorelines, wastewater treatment plants and ferry terminals are all subject to damage from coastal erosion caused by intense storms combined with rising sea levels.

ASSESSING VULNERABILITY: ADDRESSING REPETITIVE LOSS PROPERTIES

Requirement §201.6(c)(2)(ii):	The risk assessment must address National Flood Insurance Program (NFIP) insured structures that have been repetitively damaged by floods.

Repetitive Loss Properties. Based on January 2016 information from the NFIP State Coordinator for the Maine Floodplain Management Program, there were 13 repetitive loss properties located in Cumberland County. Due to privacy laws, the plan only identifies the Town and the number of repetitive losses suffered within each Town. The properties were all single or multi-family residential properties except two properties which were non-residential, commercial properties. The Towns and number of properties in each Town, which reported repetitive losses include the following:

Table 14

Municipality	Number of Properties	Property Type	Number of Claims
Cape Elizabeth	1	Residential	3
Casco	3	Residential	8
Falmouth	1	Residential	2
Gorham	1	Residential	2
Gray	1	Residential	3
Harrison	1	Residential	2
Scarborough	2	Residential	3
South Portland	1	Residential	5
Westbrook	1	Non-residential	3
Yarmouth	1	Non-residential	2

ASSESSING VULNERABILITY: IDENTIFYING STRUCTURES

Requirement §201.6(c)(2)(ii)(A):	The plan should describe vulnerability in terms of the types and numbers of existing and future buildings, infrastructure and critical facilities located in the hazard area.

The following table lists the type and numbers of critical facilities in each municipality in Cumberland County.

Table 15

Municipality	Municipal Office	Fire Station	Police Station	Water Treatment	WWTP – Major	WWTP – Minor	Schools	Shelters	Hospital/ Clinic	Airport/ Seaport	Dams	Rescue	Electrical Sub-Stations	Telecom Structures
Baldwin	1	3	0	0	0	0	2	1	0	0	1	0	0	0
Bridgton	1	4	1	1	0	1	3	1	1	1	5	1	0	2
Brunswick	1	2	1	1	1	4	8	5	2	2	1	2	0	5
Cape Elizabeth	1	2	1	0	0	1	5	2	0	1	0	1	0	2
Casco	1	2	0	0	0	0	2	2	0	0	0	2	0	2
Chebeague Isl.	1	1	0	0	0	0	1	1	0	0	0	1	0	0
Cumberland	1	2	1	0	0	0	5	1	0	0	1	3	0	1
Falmouth	1	4	1	0	1	1	5	3	0	1	1	2	0	4
Freeport	1	1	1	0	1	0	5	2	0	0	0	1	0	1
Frye Island	1	1	0	0	0	0	0	1	0	0	0	0	0	0
Gorham	1	3	1	0	0	2	5	0	0	1	0	2	1	10
Gray	1	3	0	0	0	0	3	2	0	0	1	1	0	4
Harpswell	1	3	0	0	0	1	2	2	0	1	0	3	0	1
Harrison	1	1	0	0	0	0	1	1	0	1	1	0	0	
Long Island	1	1	0	0	0	0	1	2	0	0	0	1	0	1
Naples	1	1	0	0	0	0	4	3	0	0	2	2	0	0
New Gloucester	1	1	0	0	0	0	3	1	0	1	4	1	0	1
North Yarmouth	1	1	0	1	0	0	1	1	0	1	0	1	0	2
Portland	1	8	6	1	1	5	34	5	3	1	0	3	0	1
Pownal	1	1	0	0	0	0	1	1	0	1	1	0	0	20
Raymond	1	3	0	0	0	0	3	1	0	0	1	3	0	1
Scarborough	1	6	1	1	1	1	8	1	0	0	0	2	0	1
Sebago	1	3	0	0	0	0	1	2	0	0	4	1	0	6
South Portland	1	6	1	0	1	9	13	7	0	0	0	2	0	0
Standish	1	3	0	0	1	0	4	2	0	0	1	2	0	8
Westbrook	1	2	1	0	1	0	9	2	1	1	3	2	0	2
Windham	1	4	1	0	3	0	4	4	1	1	1	2	0	2
Yarmouth	1	4	1	0	1	0	5	2	0	0	2	2	1	2
TOTAL	28	76	18	5	12	26	138	60	8	14	30	43	2	1
														80

Source: Cumberland County Emergency Management Agency

Vulnerability of existing buildings, infrastructure and critical facilities.

Flooding:

- Buildings. There are very few buildings in Cumberland County that are vulnerable to flood damages. Most of the developed areas in the County are located outside of designated floodplains and are thus not very vulnerable to flooding.

- Infrastructure. Roads and their associated storm drainage systems are the most vulnerable category of infrastructure. Much of the County is still rural in nature and is serviced by a network of rural roads that do not have proper storm drainage systems. These roads are very vulnerable to flooding caused by heavy downpours and/or the blockage of drainage systems by ice or debris.
- Critical facilities. Due to varied topography within the County and the availability of higher elevation sites within all municipalities, nearly all critical facilities are located outside of floodplains.

Severe Winter Storms:

- Buildings. All buildings in Cumberland County are vulnerable to winter storm damage. Damages can include burst water pipes during power outages, interior water damages due to ice dams forming on roofs and occasionally roof collapses due to heavy loads.
- Infrastructure. Roads and their associated storm drainage systems are the most vulnerable category of infrastructure. They can become temporarily blocked due to heavy snow falling over a short period of time or ice, which can build up on their surfaces. Water main breaks due to cold weather can also occur. Roads and their storm drainage systems can become blocked due to heavy snow, ice, and debris such as tree limbs.
- Critical facilities. All critical facilities in Cumberland County are vulnerable to winter storms in the same manner that individual buildings are vulnerable. However, some of the critical facilities throughout the County have back-up generator systems that allow heating systems to continue during a power outage.

Severe Summer Storms:

- Buildings. There are very few buildings in Cumberland County that are vulnerable to summer storms and associated flooding. With the exception of some areas in the outlying towns, most of the developed areas in the County are located outside of designated floodplains and are thus not very vulnerable to flooding.
- Infrastructure. Roads and their associated storm drainage systems are the most vulnerable category of infrastructure. They can become flooded over a short period of time during intense periods of rain. Roads and their storm drainage systems can become blocked due to debris such as tree limbs.
- Critical facilities. Due to varied topography within the County and the availability of higher elevation sites within all municipalities, nearly all critical facilities are located outside of floodplains.

Wildfires:

- Buildings. Almost all buildings within Cumberland County could be vulnerable to wildfire damages if not easily accessible by firefighting crews. Most of the rural areas are heavily forested and could be vulnerable to fire under certain conditions such as prolonged drought.
- Infrastructure. Roads and their associated storm drainage systems are the least vulnerable category of infrastructure. Although during wildfire events roads may become closed, it would be expected that once the fire is under control, the road could reopen without experiencing heavy damages.
- Critical facilities. All critical facilities in Cumberland County could be vulnerable to wildfires in the same manner that individual buildings could be vulnerable.

Coastal Erosion:

- Buildings: Those buildings which were built before zoning and shoreline ordinances were placed into effect may be vulnerable to damage to buildings or property.
- Infrastructure: Roads and low bridges are most at risk due to erosion and higher storm surges.
- Critical facilities: Those facilities built in low lying areas or into the water are most at risk.

Vulnerability of future buildings, infrastructure and critical facilities.

Flooding:

- Buildings. All of the municipalities in Cumberland County are in the flood insurance program, and all have municipal Shoreline zoning ordinances that generally prohibit the construction of residential, commercial and industrial structures in floodplains. Therefore, flooding of future buildings is not likely to be a serious issue.
- Infrastructure. Future roads and their associated storm drainage systems are the most vulnerable category of infrastructure. However, State and local road construction standards generally ensure that new roads are properly constructed with adequate drainage systems. Most roads (with the exception of some camp roads) in the public domain must be designed by a licensed professional engineer. Therefore, flooding of future roads is not likely a serious issue.
- Critical facilities. Conditions for future critical facilities would be the same as those described above for buildings.

Severe Winter Storms:

- Buildings. New buildings in Cumberland County are less vulnerable to winter storm damage. Damages can include burst water pipes during power outages, interior water damages due to ice dams forming on roofs and occasionally roof collapses due to heavy loads; however, with current building codes for new construction, water damage and failure from snow load should be limited.
- Infrastructure. Roads and their associated storm drainage systems will continue to be the most vulnerable category of infrastructure. They can become temporarily blocked due to heavy snow falling over a short period of time or ice that can build up on their surfaces. Water main breaks due to cold weather can also occur. Roads and their storm drainage systems can become blocked due to heavy snow, ice, and debris such as tree limbs.
- Critical facilities. Future critical facilities in Cumberland County are vulnerable to winter storms in the same manner that individual buildings are vulnerable. However, some of them will have back-up generator systems that allow heating systems to continue during a power outage.

Severe Summer Storms:

- Future buildings in Cumberland County will be vulnerable to summer storms and associated flooding in the same manner as existing buildings. With the exception of some areas in the outlying towns, most of the future development within the County will be located outside of designated floodplains and are thus not very vulnerable to flooding.
- Infrastructure. New roads and their associated storm drainage systems are the most vulnerable category of infrastructure. However, State and local road construction standards generally ensure that new roads are properly constructed with adequate drainage systems. Most roads (with the exception of some camp roads) in the public domain must be designed by a licensed professional engineer. Therefore, flooding of future roads is not likely a serious issue.
- Critical facilities. Future critical facilities in Cumberland County are vulnerable to summer storms in the same manner that individual buildings are vulnerable. However, some of them will have back-up generator systems which allow heating systems to continue during a power outage.

Wildfires:

- Buildings. New buildings within Cumberland County will be vulnerable to wildfire damages in the same manner as existing buildings. With the exception of some areas in the metropolitan areas, most of the rural areas are heavily forested and thus are very vulnerable to fire.

- Infrastructure. New roads and their associated storm drainage systems are the least vulnerable category of infrastructure. Although during wildfire events roads may become closed, it would be
- expected that once the fire is under control, the road could reopen without experiencing heavy damages.
- Critical facilities. All future critical facilities in Cumberland County are vulnerable to wildfires in the same manner that individual buildings are vulnerable.

Coastal Erosion:

New buildings will be subject to shoreline zoning ordinances, which many communities are now strengthening. Old structures will be vulnerable to coastal erosion. The same holds true for infrastructure and critical facilities. Some critical facilities, by nature of their usage must remain in low-lying or vulnerable areas (wastewater treatment, etc.). This is a developing situation and will be addressed through engineering studies and policies put in place by each municipality.

ASSESSING VULNERABILITY: ESTIMATING POTENTIAL LOSSES

Overview:

This section of the Plan relies on historical damages as the basis for estimating future losses, subject to the following:

- Presidential Disaster Declarations have been used where possible, updated for inflation using the Consumer Price Index calculator from the U.S. Department of Labor, Bureau of Labor Statistics.
- Where statewide or county damages are used to determine damages for a specific jurisdiction, the damages are pro-rated using the 2010 Census.

Flooding. This plan uses worst-case, real-life damages to calculate potential flood losses, and assumes that historic patterns will hold for the future. The worst-case flood is the Patriot's Day Flood of 2007, which resulted in a Presidential Disaster Declaration of $7,145,955 in damages to Cumberland County alone. Using the Consumer Price Index, the damages in 2015 dollars would be $8,168,691.

In the same way, the winter storm of record is the 1998 Ice Storm with damages of $5,775,274, or $8,397,780 in 2015 dollars.

The per capita cost of $29.00 for the Patriot's Day Storm is calculated by taking the population of Cumberland County in 2010 (281,674) and dividing it into total 2007 flood damages in 2015 dollars ($8,168,691) . Similarly, the Ice Storm of 1998 cost $31.62 per capita. (population of Cumberland County 265,612; storm cost in 2015 dollars ($8,397,780) Census figures from U.S. Census Bureau.

The methodology for calculating potential losses in Cumberland County is to assume the greater of:

1) Actual damages updated using the Consumer Price Index, or
2) Flood losses based on $29.54 per capita . Each town's population is multiplied by $29.54 to get potential damages.

Potential losses were figured using the following:

Table 16

Consumer Price Index 1982-1984 = 100		
1947 = 22.3		
1980 = 82.4	**1992 = 140.3**	**2004 = 188.9**
1981 = 90.9	**1993 = 144.5**	**2005 = 195.3**
1982 = 96.5	**1994 = 148.2**	**2006 = 201.6**
1983 = 99.6	**1995 = 152.4**	**2007 = 207.3**
1984 = 103.9	**1996 = 156.9**	**2008 = 215.3**
1985 = 107.6	**1997 = 160.5**	**2009 = 214.5**
1986 = 109.6	**1998 = 163.0**	**2010 = 218.1**
1987 = 113.6	**1999 = 166.6**	**2011 = 224.9**
1988 = 118.3	**2000 = 172.2**	**2012 = 229.6**
1989 = 124.0	**2001 = 177.1**	**2013 = 232.9**
1990 = 130.7	**2002 = 179.9**	**2014 = 236.7**
1991 = 136.2	**2003 = 184.0**	**2015 = 237.0**

Table 17 **Cumberland County Population by municipality**

Town	2000	2010	Net Change	Growth Rate
Baldwin	1,290	1,525	235	18.22%
Bridgton	4,883	5,210	327	6.70%
Brunswick	21,172	20,278	(894)	-4.22%
Cape Elizabeth	9,068	9,015	(53)	-0.58%
Casco	3,469	3,742	273	7.87%
Chebeague Island	341	341	-	0.00%
Cumberland	7,159	7,211	52	0.72%
Falmouth	10,310	11,185	875	8.50%
Freeport	7,800	7,879	79	1.00%
Frye Island	-	5	5	
Gorham	14,141	16,381	2,240	15.84%
Gray	6,820	7,761	941	13.80%
Harpswell	5,239	4,740	(499)	-9.50%
Harrison	2,315	2,730	415	17.90%
Long Island	202	230	28	13.80%
Naples	3,274	3,872	598	18.30%
New Gloucester	4,803	5,542	739	15.38%
North Yarmouth	3,210	3,565	355	11.05%
Portland	64,249	66,194	1,945	3.02%
Pownal	1,491	1,474	(17)	-1.14%
Raymond	4,299	4,436	137	9.12%
Scarborough	16,970	18,919	1,949	11.48%
Sebago	1,433	1,719	286	19.95%

South Portland	23,324	25,002	1,678	7.19%
Standish	9,285	9,874	589	6.34%
Westbrook	16,142	17,494	1,352	8.38%
Windham	14,904	17,001	2,097	14.07%
Yarmouth	8,360	8,349	(11)	-0.13%
County	**265,953**	**281,674**	**15,721**	**5.91%**

Population figures from US Census Bureau

The maximum flood loss is the greater of 2015 loss or per capita loss.

Table 18 **Patriot's Day Storm**	**DR 1693** April 2007	**In 2015 Dollars**	**Potential Losses based on Per Capita $29.00**	**Maximum Potential Flood Loss in dollars**		**Great Ice Storm of '98**	**DR 1198 Jan. 1998**	**In 2015 Dollars**	**Potential Losses based on Per Capita $32**	**Maximum Potential Winter Storm Loss in dollars**
Baldwin	263,760	301,591	44,225	301,591		Baldwin	51,054	58,361	48,800	58,361
Bridgton	93,511	106,894	151,090	151,090		Bridgton	215,776	246,658	166,720	246,658
Brunswick	52,550	60,071	588,062	588,062		Brunswick	301,680	344,857	648,896	648,896
Cape Elizabeth	169,375	193,616	261,435	261,435		Cape Elizabeth	125,116	143,023	288,480	288,480
Casco	448,410	512,587	108,518	512,587		Casco	131,386	150,190	119,744	150,190
Chebeague Island	N/A	N/A	N/A	N/A		Chebeague Island	N/A	N/A	N/A	N/A
Cumberland	499,073	570,886	209,119	570,886		Cumberland	277,962	317,744	230,752	317,744
Falmouth	108,650	124,200	324,365	324,365		Falmouth	210,338	240,442	357,920	357,920
Freeport	120,986	138,302	228,491	228,491		Freeport	213,453	244,003	252,128	252,128
Frye Island	8,854	10,121	145	10,121		Frye Island	---	---	---	---
Gorham	82,366	94,154	475,049	475,049		Gorham	200,265	228,927	524,192	524,192
Gray	171,641	196206	225,069	225,069		Gray	246,103	281,325	248,352	281,352
Harpswell	48,931	55,934	137,460	137,460		Harpswell	47,905	54,761	151,680	151,680
Harrison	139,326	159,266	79,170	159,266		Harrison	149,697	171,122	87,360	171,122
Long Island	326,377	373,088	6,670	373,088		Long Island	8,732	9,982	736	9,982
Naples	252,876	289,068	112,288	289,068		Naples	191,016	218,354	123,904	218,354
New Gloucester	46,495	53,149	160,718	160,718		New Gloucester	262,309	299,851	177,344	299,851
North Yarmouth	18,164	20,764	103,385	103,385		North Yarmouth	55,664	63,631	114,080	114,080
Portland	2,327,749	2,660,899	1,919,626	2,660,899		Portland	859,489	982,500	2,118,208	2,118,208
Pownal	20,024	22,890	42,746	42,746		Pownal	91,851	104,997	47,168	104,997
Raymond	130,739	149,450	128,644	149,450		Raymond	153,949	175,982	141,952	175,982
Scarborough	557,178	636,922	548,651	636,922		Scarborough	107,024	122,341	605,408	605,408

Sebago	139,276	159,209	49,851	159,209		Sebago	113,167	129,364	55,008	129,364
South Portland	245,551	280,695	725,058	725,058		South Portland	322,433	368,580	800,064	800,064
Standish	51,453	58,817	286,346	286,346		Standish	248,458	284,018	315,968	315,968
Westbrook	98,500	112,597	507,326	507,326		Westbrook	252,604	288,757	559,808	559,808
Windham	149,401	170,783	493,029	493,029		Windham	438,534	501,297	544,032	544,032
Yarmouth	63,679	72,793	242,121	242,121		Yarmouth	261,825	299,298	267,168	299,298
County	9,295	10,625	--	--		County	4,955	5,664	--	--
Other	329,760	376,956	---	---		Other	232,529	265,809	---	---
Totals	**7,145,955**	**8,168,691**				**Total**	**5,775,274**	**8,397,780**		

2015 dollars figured from Bureau of Labor CPI calculator http://data.bls.gov/cgi-bin/cpicalc.pl

Summer Storms This plan uses worst-case, real-life damages to calculate potential summer storm damages, and assumes that in the future, historic pattern the historic pattern will repeat itself. Hurricane Edna (1954) was the most devastating summer storm to hit Maine, and impacted the State ten days after Hurricane Carol. (DR 24) It caused an estimated $25,000,000 in damages (from US Weather Bureau Office (https://noaahrd.wordpress.com/2014/09/10/60th-anniversary-of-**hurricane-edna**/). The Disaster

Declaration was for the entire state.

The damage in 2015 dollars would be approximately $220.2 million (multiply $25 million by 237– the CPI for 2015, and divide by 26.9 – the CPI for 1954). There has been substantial development, especially in the coastal areas since 1954. The low incidence of hurricanes in Maine keeps this within the category of summer storms; however, if hurricane probability were to increase, it would be included in future updates of the plan as a High Priority.

The methodology for calculating potential summer storm damages in Cumberland County is based on the damages that occurred in the State of Maine in 1954 with Hurricane Edna. The population of the State (from the 2010 census) is 1,328,361. Divide $220.2 million (the 1954 damages in 2015 dollars) by 1,328,361 to get a per capita cost of $166. Multiply each town's population by $166 to get potential summer storm damages.

Potential Summer Storm Damage in Cumberland County		
Baldwin	1,525	$253,150
Bridgton	5,210	$864,860
Brunswick	20,278	$3,36,6,148
Cape Elizabeth	9,015	$1,496,490
Casco	3,742	$621,172
Chebeague Island	341	$56,606
Cumberland	7,211	$1,197,026
Falmouth	11,185	$1,856,710
Freeport	7,879	$1,307,914
Frye Island	5	$830
Gorham	16,381	$2,719,246
Gray	7,761	$1,288,326
Harpswell	4,740	$786,840
Harrison	2,730	$453,180
Long island	230	$38,180
Naples	3,872	$642,752
New Gloucester	5,542	$919,972
North Yarmouth	3,565	$591,790
Portland	66,194	$10,988,204
Pownal	1,474	$244,684
Raymond	4,436	$736,376
Scarborough	18,919	$3,140,554
Sebago	1,719	$285,354
South Portland	25,002	$4,150,332
Standish	9,874	$1,639,084
Westbrook	17,494	$2,904,004
Windham	17,001	$2,822,166

Yarmouth	8,349	$1,385,934
TOTAL for County	**281,674**	**46,757,884**

Wildfires. This plan uses worst-case, real-life damages to calculate potential wildfire losses, and assumes that in the futures, the historic pattern will repeat itself.. The 1947 fire was the worst on record, although it was actually a series of wildfires that flared over Eastern and Southern Maine. The 1947 fire caused an estimated $30,000,000 (www.uninets.net/~dsrowley/Fires%20of%201947.pdf) in damages to Cumberland, Hancock, Oxford, and York Counties.

The damage in 2015 dollars would be about $318.8 million (multiply $30 million by 237– the CPI for 2015, and divide by 22.3 – the CPI for 1947). While there is significantly more development in each of these counties today than there was in 1947, fire-fighting capabilities have also increased so there may be no need to further increase the damage estimate. The probability that a wildfire such as the 1947 fire will hit Maine during the five-year period covered by this Plan is dependent upon such factors as rainfall, winds, and ignition sources, as well as fire apparatus accessibility.

The methodology for calculating potential wildfire losses in Cumberland County is based on the damages that occurred in the 1947 fire in Cumberland, Hancock, Oxford and York Counties. The population of these counties is 591,055; divide $318.8 million (the 1947 fire in 2015 dollars) by 591,055 to get a per capita cost of $540. Then multiply each town's population by $540 to get potential wildfire damages.

Potential Wildfire Damages in Cumberland County		
Municipality	**2010 Population**	**Potential Losses based on Per Capita $540.00**
Baldwin	1,525	$823,500
Bridgton	5,210	$2,813,400
Brunswick	20,278	$10,950,120
Cape Elizabeth	9,015	$4,868,100
Casco	3,742	$2,020,680
Chebeague Island	341	$184,140
Cumberland	7,211	$3,893,940
Falmouth	11,185	$6,039,900
Freeport	7,879	$4,254,660
Frye Island	5	$2,700
Gorham	16,381	$8,845,740
Gray	7,761	$4,190,940
Harpswell	4,740	$2,559,600
Harrison	2,730	$1,474,200
Long island	230	$124,200
Naples	3,872	2,090,880
New Gloucester	5,542	2,992,680
North Yarmouth	3,565	1,925,100
Portland	66,194	$35,744,760
Pownal	1,474	$795,960
Raymond	4,436	$2,395,440
Scarborough	18,919	$10,216,260
Sebago	1,719	$928,260
South Portland	25,002	$13,501,080
Standish	9,874	$5,331,960

Westbrook	17,494	$9,446,760
Windham	17,001	$9,180,540
Yarmouth	8,349	$4,508,460
County Total	**281,674**	**$152,103,960**

Coastal Erosion. Since this is a developing hazard with increasing sea levels and more intense storms, it is not yet possible to calculate the per capita estimate of damages (from coastal erosion) due to insufficient data and lack of reporting methodology by communities. In the next five years, CCEMA will work with local communities to document these damages separately from other storm damage.

ASSESSING VULNERABILITY: ANALYZING DEVELOPMENT TRENDS

Requirement §201.6(c)(2)(ii)(C):	The plan should describe vulnerability in terms of providing a general description of land uses and development trends within the community so that mitigation options can be considered in future land uses decisions.

Cumberland County is Maine's most populous County. Land use within the County ranges from densely populated urbanized areas to suburban residential areas to farm and forestland. The County contains Portland, which is Maine's most populous city. All of the communities in the County have enacted comprehensive plans, in compliance with Maine statute. All communities are participants in the NFIP program and all communities have floodplain ordinances to regulate development within flood zones. All but one community have enacted zoning and/or shoreline ordinances.

As can be seen by the population table above, overall population growth in the County between 2000 and 2010 was almost 6%. However, some communities experienced growth rates of up to 20% or during this period, while other communities experienced practically no growth at all. Several communities lost population including Brunswick and Harpswell, possibly as a result of the closure of Naval Air Station Brunswick. A clear trend in the county is that much of the residential growth is occurring in the suburban and rural communities.

As the population~~s~~ of the suburban towns grows, so too does the demand for land that encroaches on historically forested and riparian areas. New population growth in these areas may contribute to hazard affects particularly when buffers between human activities and wild lands are not protected. This has placed a burden on the suburban towns as they deal with urban interface fire issues and expansion of infrastructure into these more remote areas.

Mitigation options used for future land-use decisions are being incorporated into municipality development and community planning goals. Because of these options and ordinances, little development in hazard prone areas has taken place affecting the vulnerability of the jurisdictions. Regional cooperation is required in order to analyze land use practices, which may exacerbate hazards, and to implement strategies to deal with the changing demographics. At the community level, land use planning goals include ensuring the efficient allocation and management of resources and protection of the environment through compliance with federal, state and local laws and regulations.

MULTI-JURISDICTIONAL RISK ASSESSMENT

Requirement §201.6(c)(2)(iii):	For multi-jurisdictional plans, the risk assessment section must assess each jurisdiction's risks where they vary from the risks facing the entire planning area.

The following are hazards for which all areas of the County are subject to the same general risk:

- Severe winter storms
- Severe summer storms
- Riverine Flooding
- Wildfires (with some limited variance among the communities, particularly a lower degree of risk within the immediate Greater Portland area).

2017

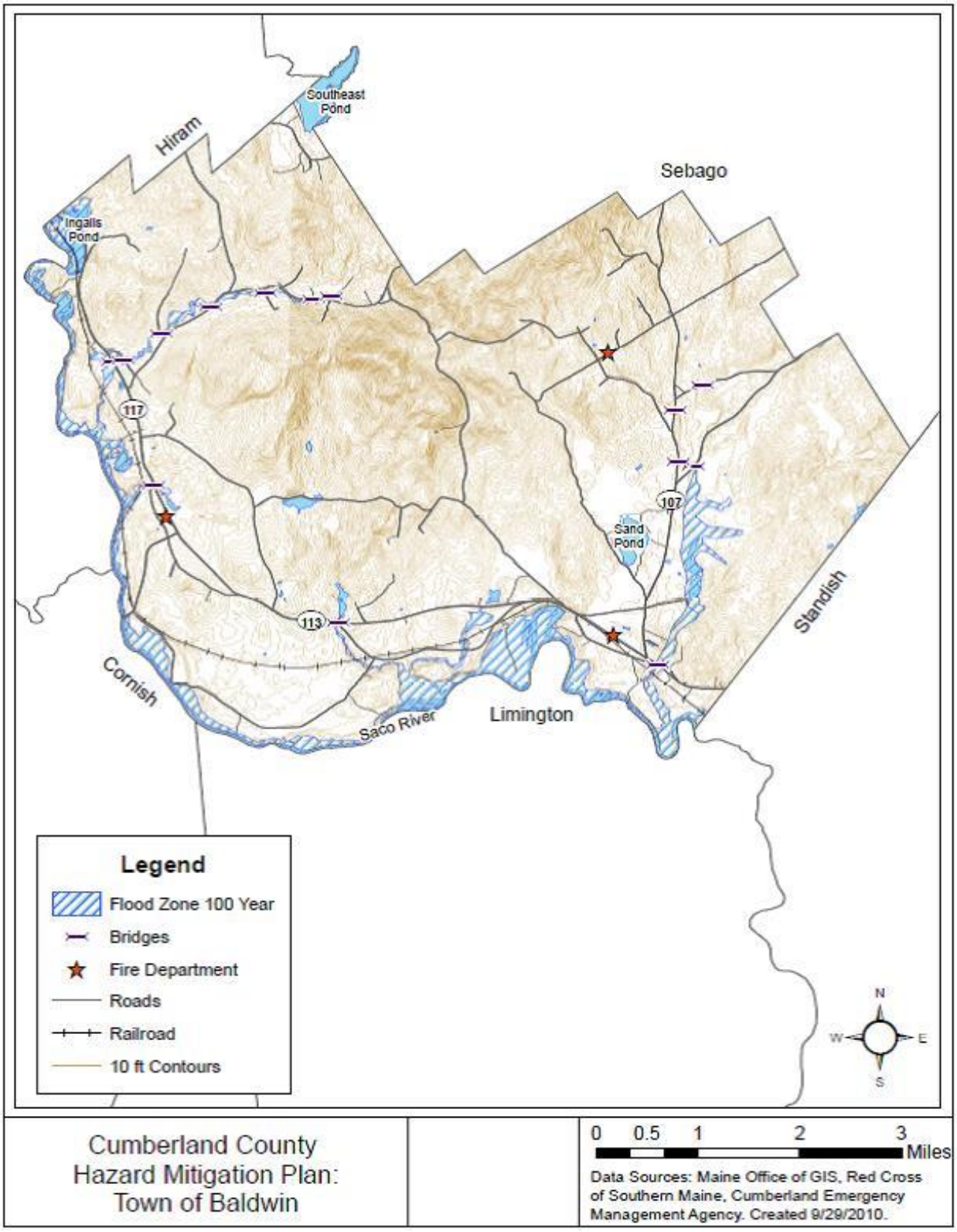
The following hazards primarily affect the coastal communities of Scarborough, Cape Elizabeth, South Portland, Portland, Falmouth, Cumberland, Yarmouth, Freeport, Brunswick, Long Island, Chebeague Island, and Harpswell:

- Coastal erosion

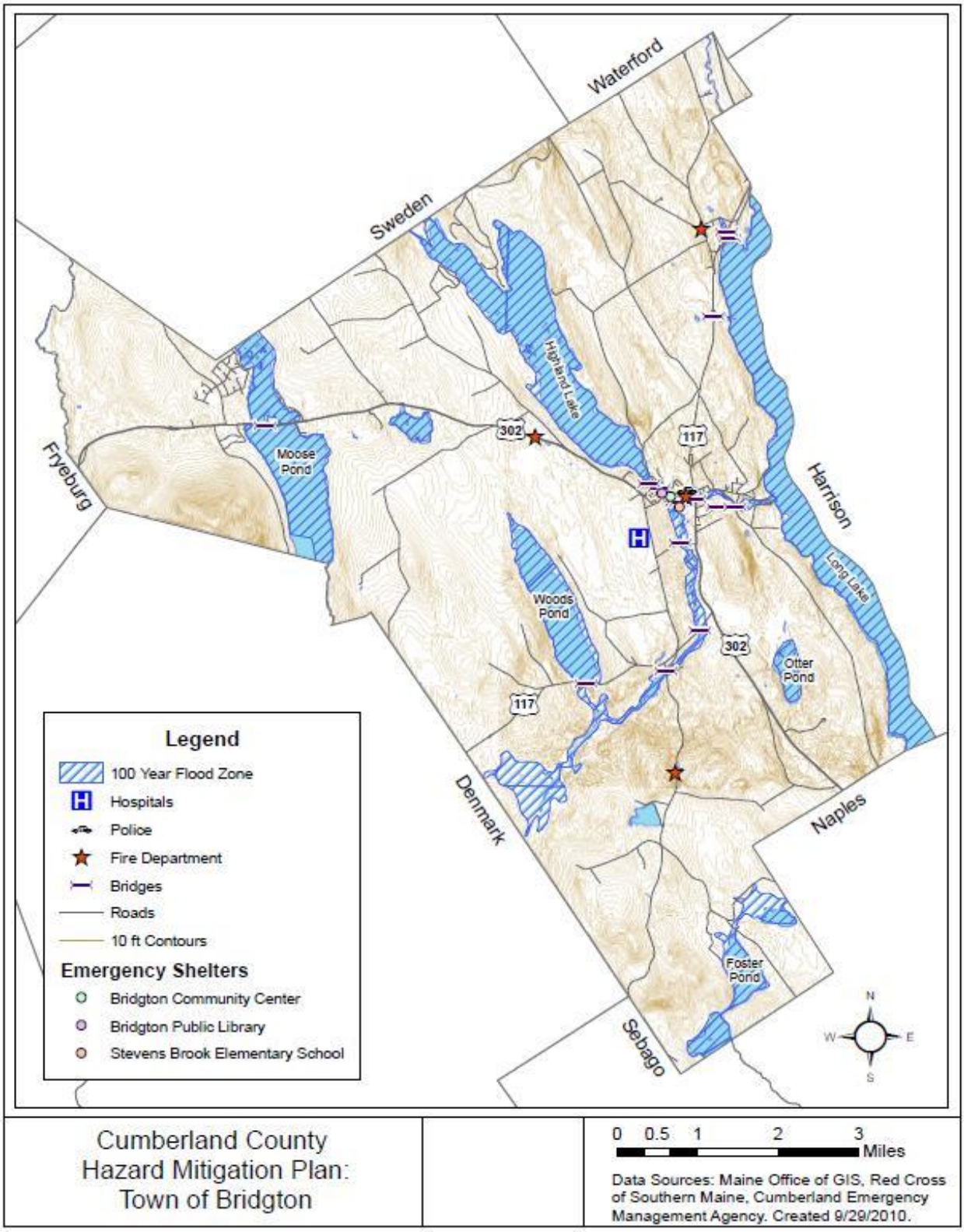
COUNTY BASE MAPS

Following are base maps of the 28 cities and towns in Cumberland County. Data was obtained from the Maine Office of GIS, Maine DEP, Maine Geological Survey, Maine Department of Transportation and the individual municipalities. Each figure shows the municipal boundary, topographic relief, floodplains, critical facilities and principal roads. The maps were created for the 2012 Plan and were reviewed for accuracy for the 2017 Plan.

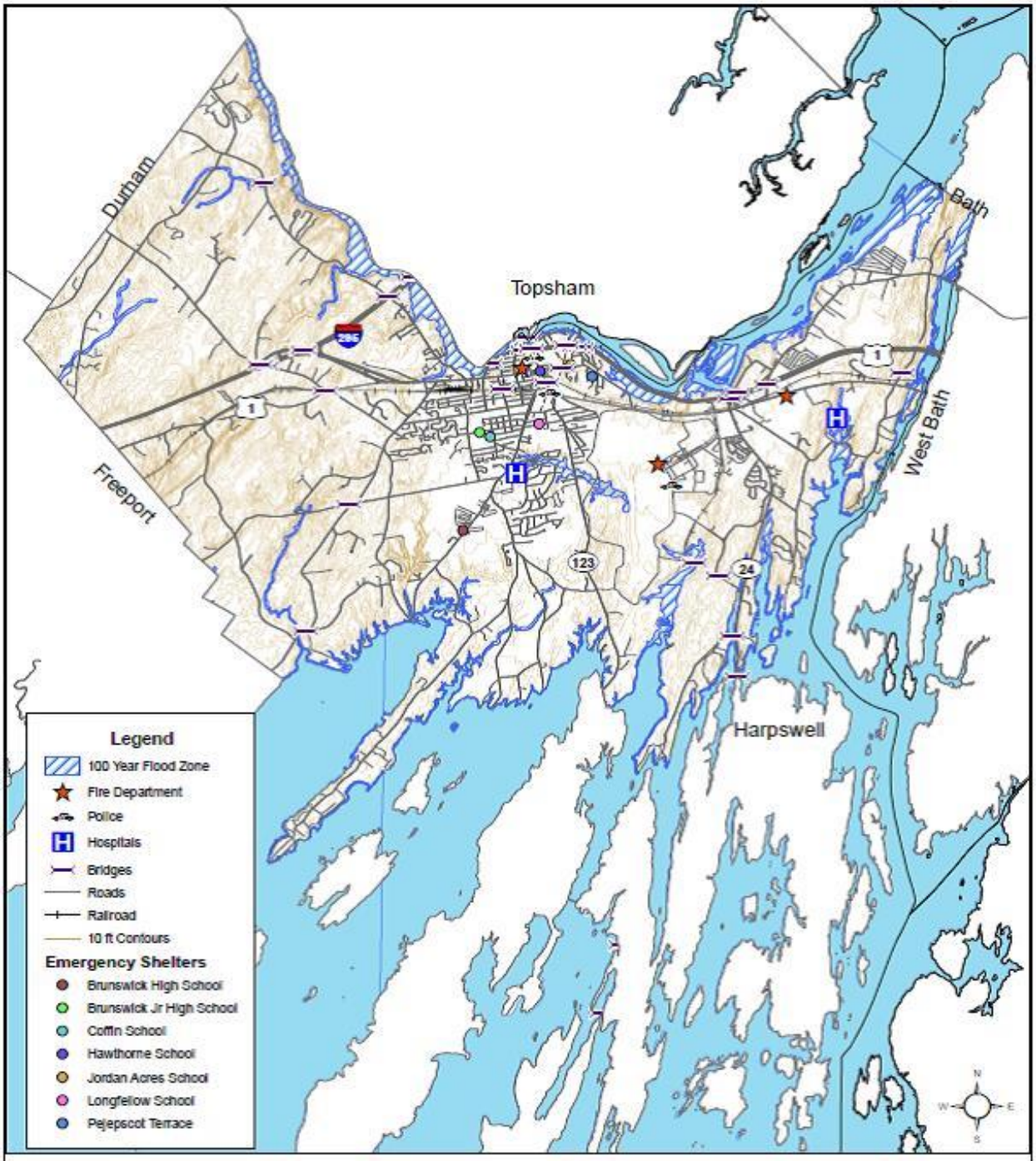
The primary flood analysis data used was the FEMA FIRM flood zone areas. The Army Corps of Engineers SLOSH data for Cumberland County was obtained and examined for storm surge inundation areas. These areas appeared to follow roughly with the FEMA FIRM data. LIDAR mapping has been done on many areas of the county, but the analysis is still in process.



Cumberland County Hazard Mitigation Plan: Town of Baldwin



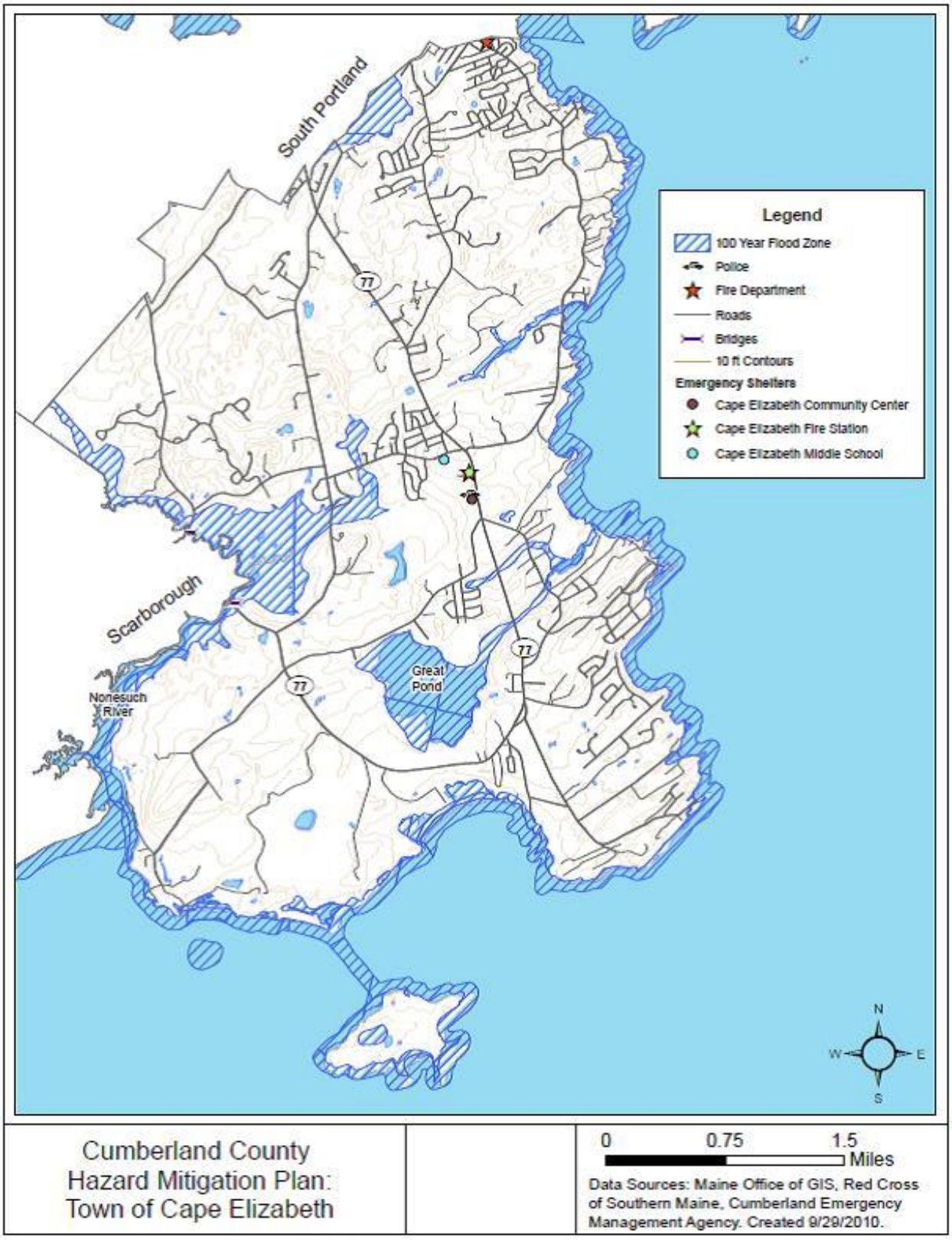
Cumberland County Hazard Mitigation Plan: Town of Bridgton



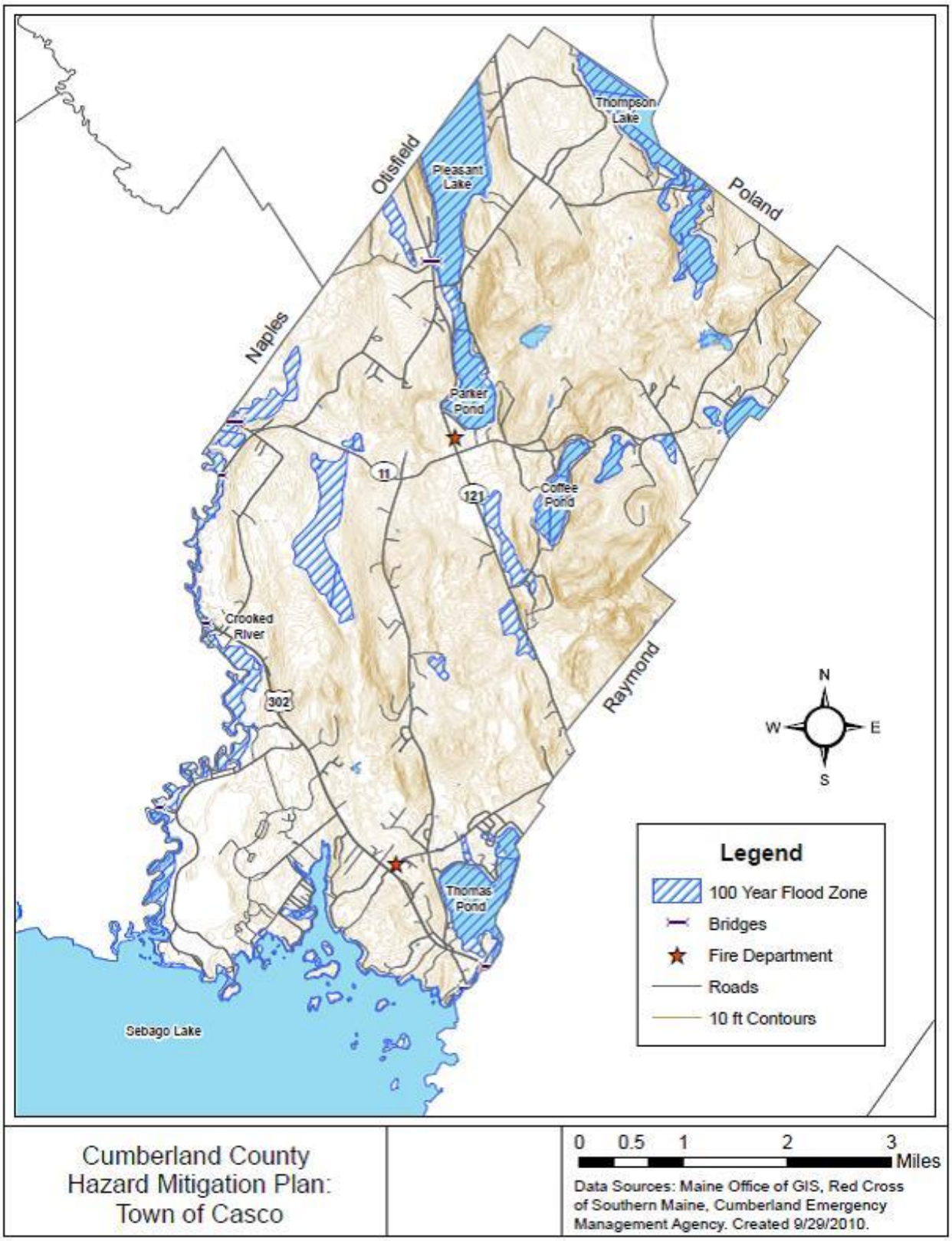
Cumberland County
Hazard Mitigation Plan:
Town of Brunswick

0 0.5 1 2 3 Miles

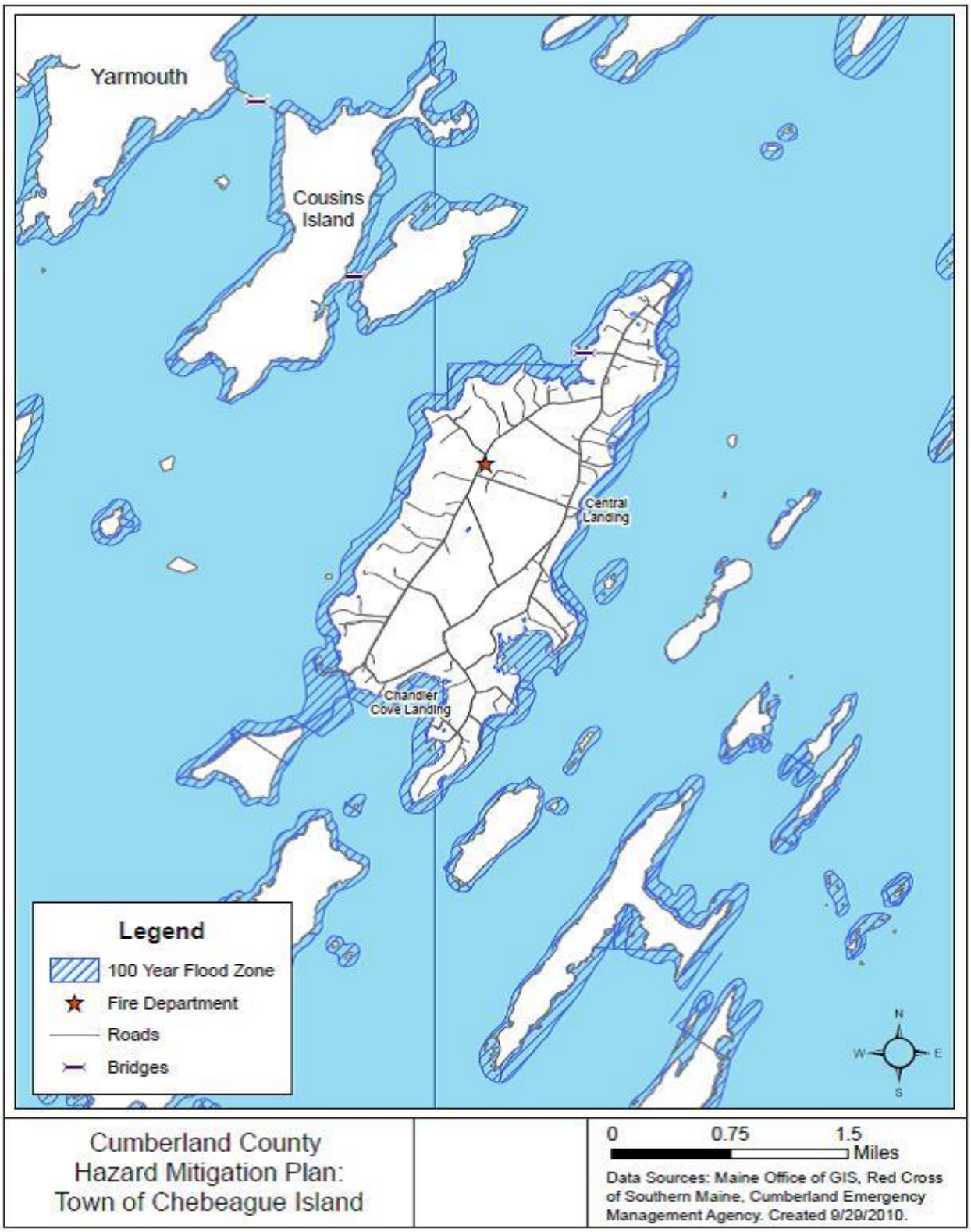
Data Source: Maine Office of GIS, Red Cross of Southern Maine, Cumberland Emergency Management Agency. Created 9/29/2010.

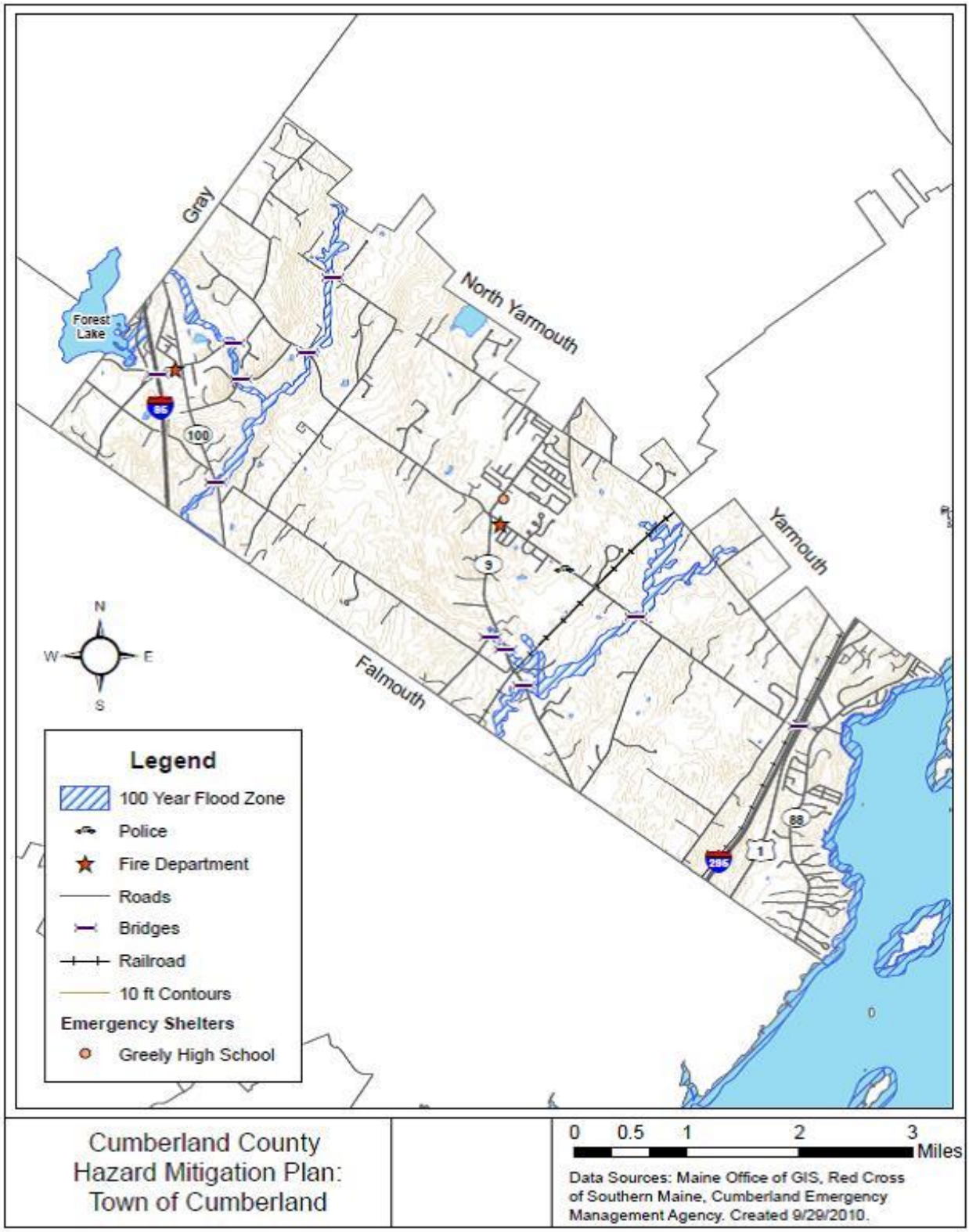


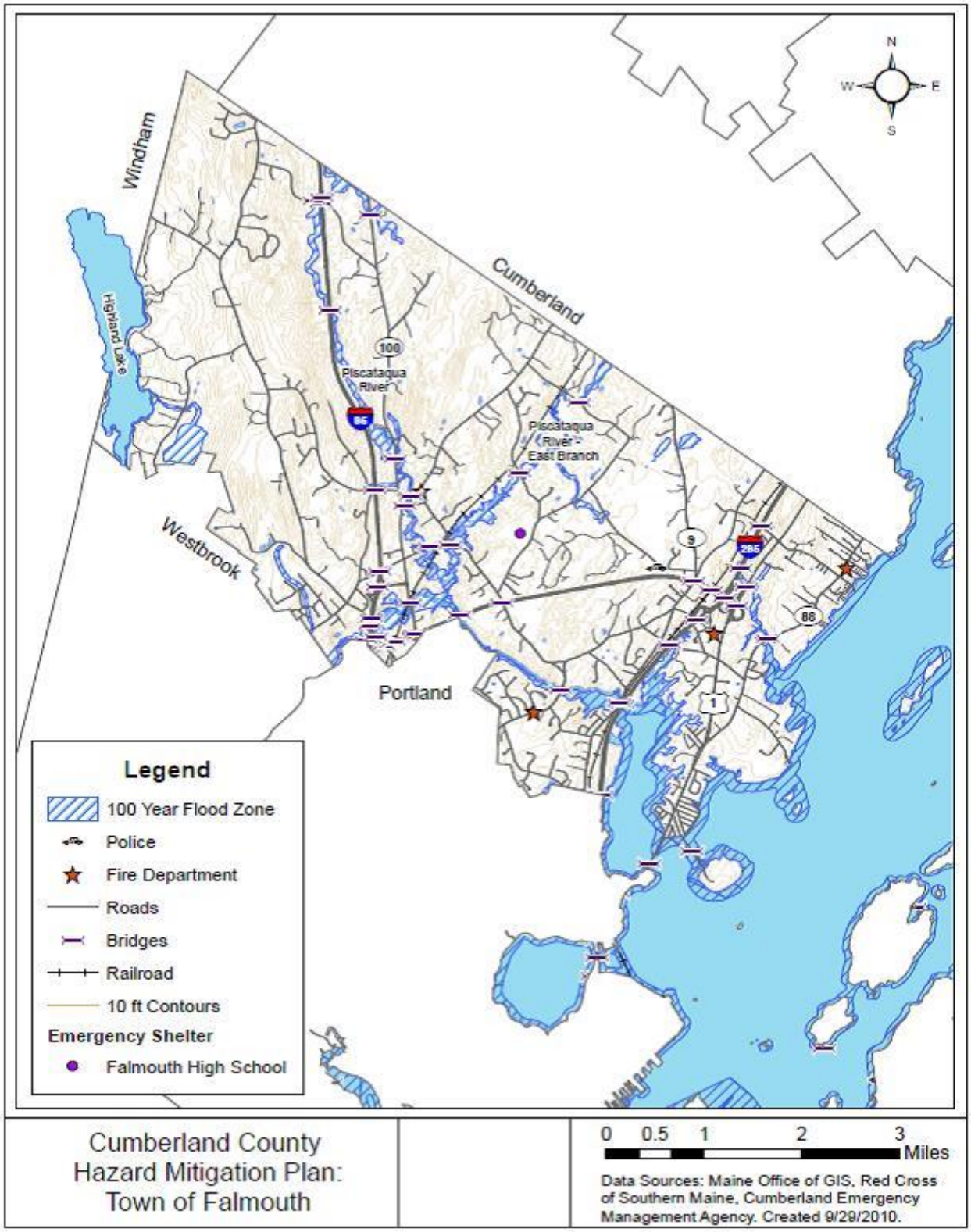
Cumberland County Hazard Mitigation Plan: Town of Cape Elizabeth

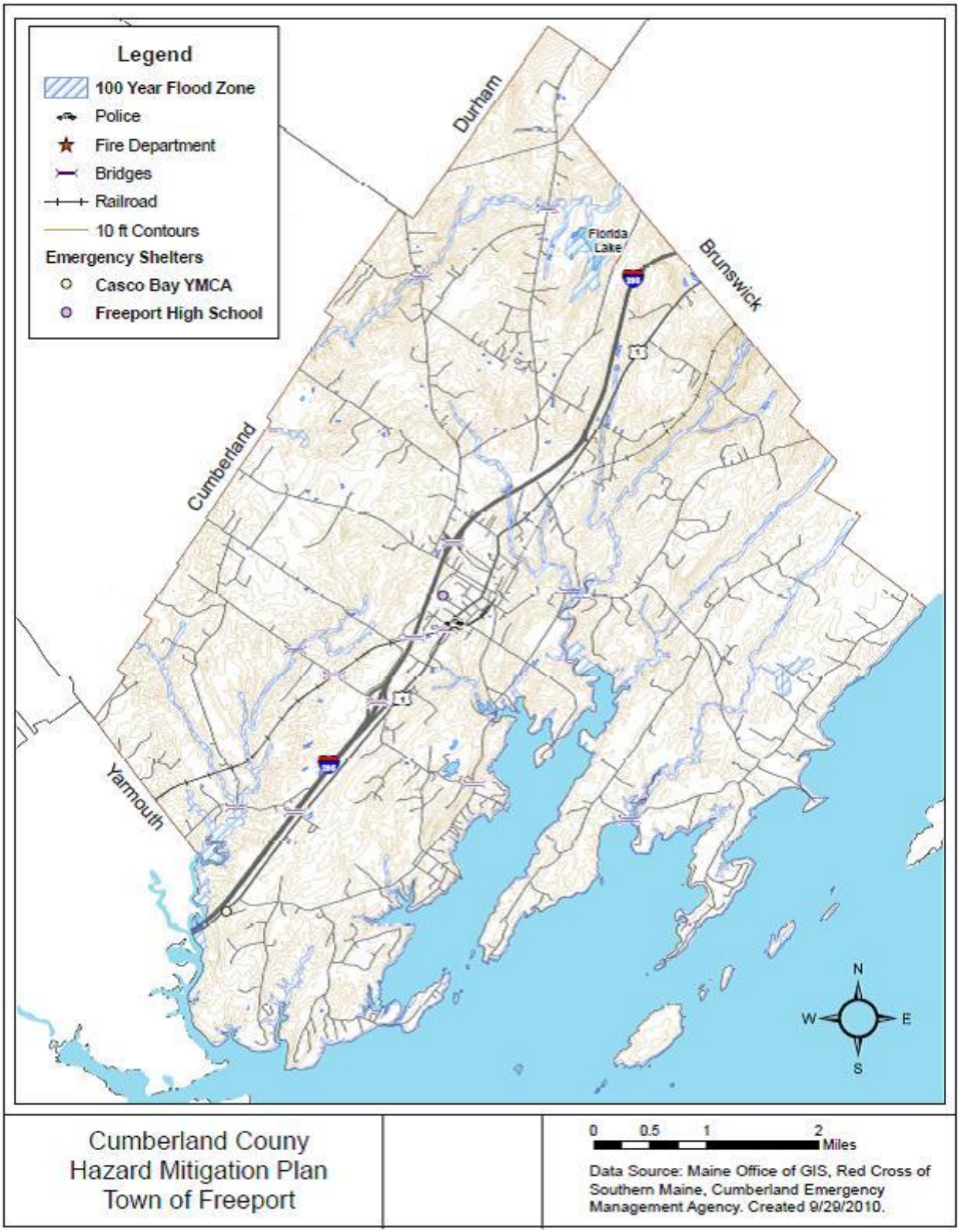


Cumberland County Hazard Mitigation Plan: Town of Casco

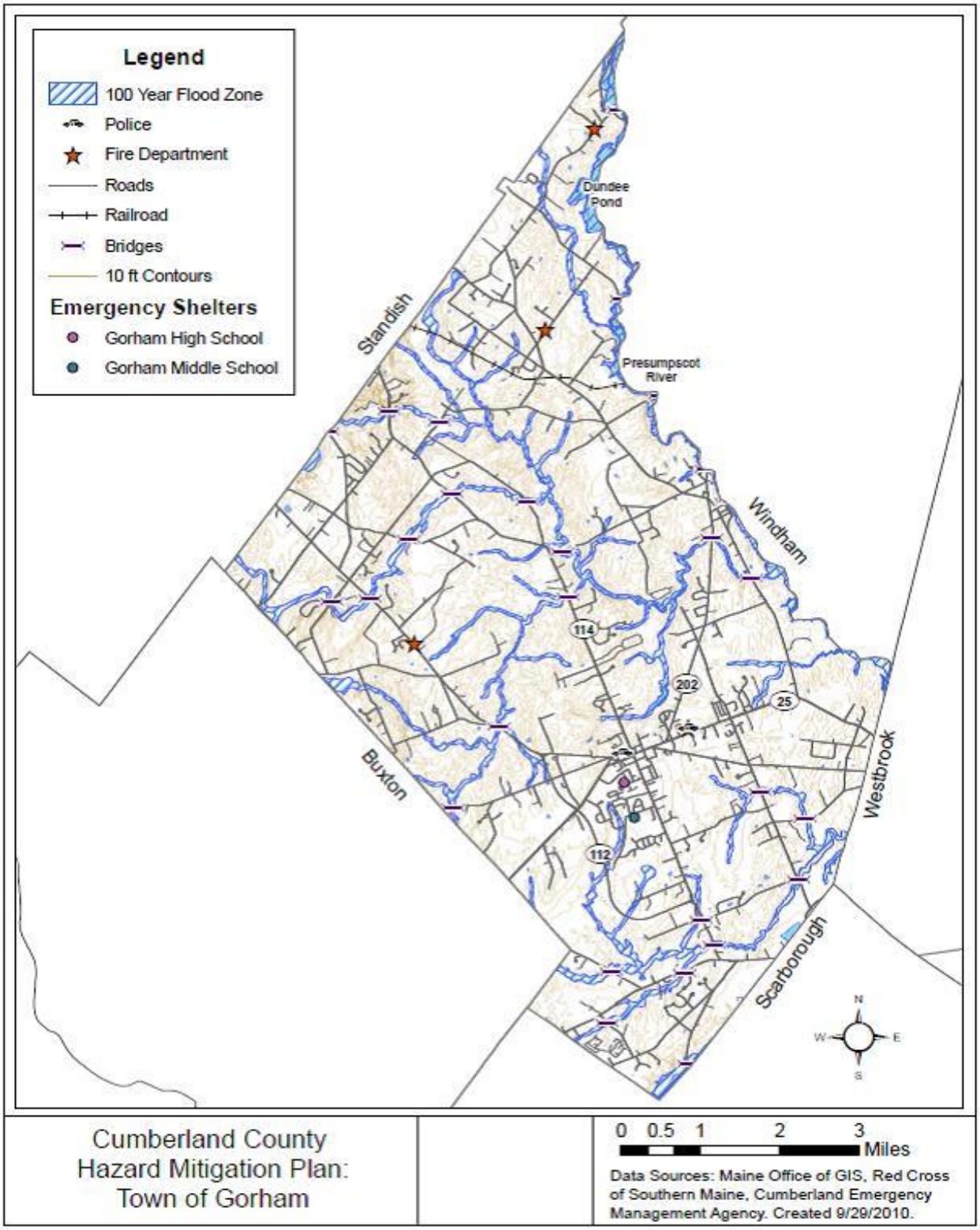

Yarmouth
Cousins Island
Central Landing
Chandler Cove Landing
Legend
100 Year Flood Zone
Fire Department
Roads
Bridges
N
W
E
S
Cumberland County Hazard Mitigation Plan: Town of Chebeague Island
0
0.75
1.5
Miles
Data Sources: Maine Office of GIS, Red Cross of Southern Maine, Cumberland Emergency Management Agency. Created 9/29/2010.


Gray
North Yarmouth
Yarmouth
Falmouth
Forest Lake
95
100
9
88
1
295
N
W
E
S
Legend
100 Year Flood Zone
Police
Fire Department
Roads
Bridges
Railroad
10 ft Contours
Emergency Shelters
Greely High School
Cumberland County
Hazard Mitigation Plan:
Town of Cumberland
0 0.5 1 2 3
Miles
Data Sources: Maine Office of GIS, Red Cross of Southern Maine, Cumberland Emergency Management Agency. Created 9/29/2010.

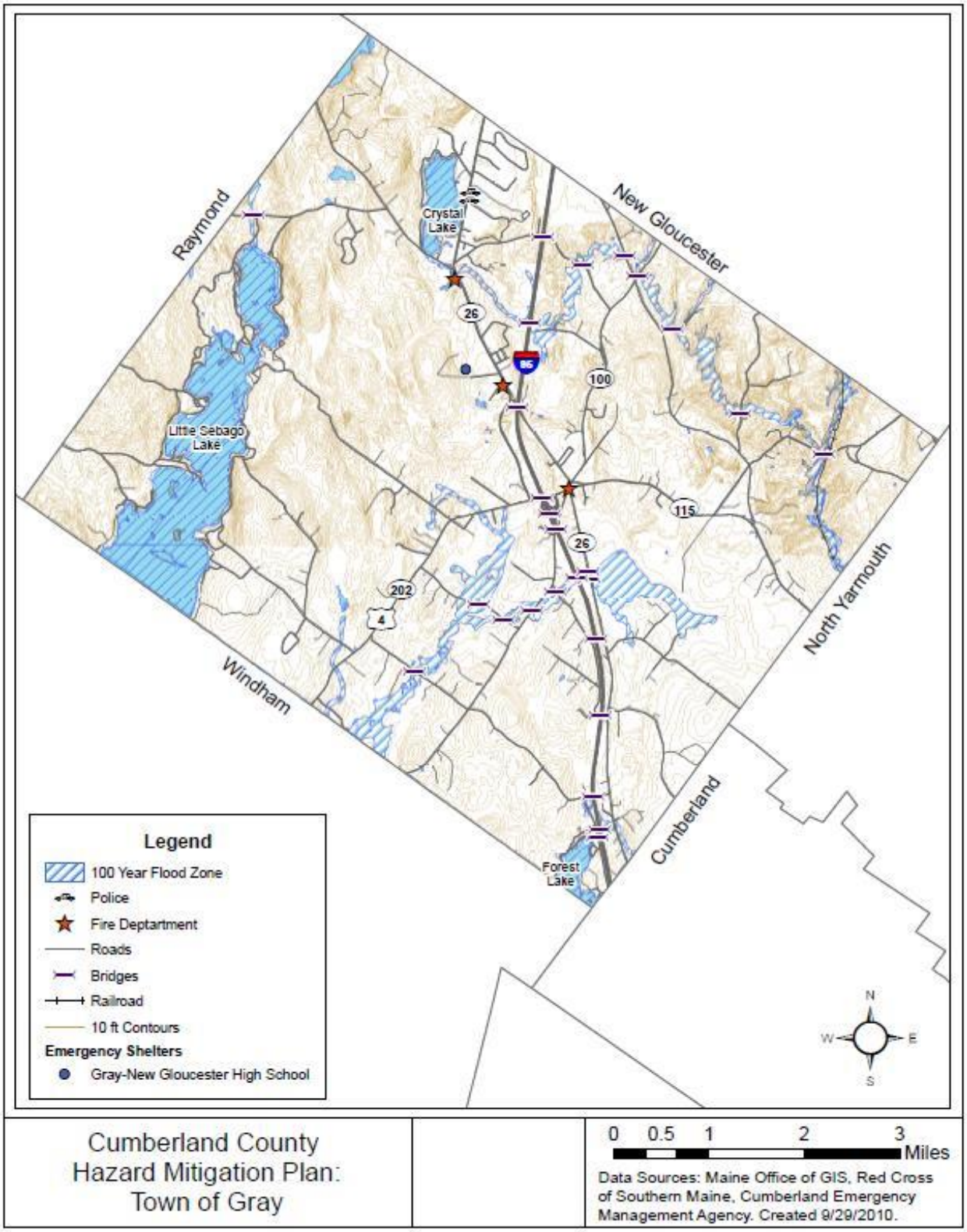

N
W
E
S
Windham
Cumberland
Highland Lake
100
Piscataqua River
95
Piscataqua River - East Branch
Westbrook
9
295
88
Portland
1
Legend
100 Year Flood Zone
Police
Fire Department
Roads
Bridges
Railroad
10 ft Contours
Emergency Shelter
Falmouth High School
Cumberland County Hazard Mitigation Plan: Town of Falmouth
0 0.5 1 2 3 Miles
Data Sources: Maine Office of GIS, Red Cross of Southern Maine, Cumberland Emergency Management Agency. Created 9/29/2010.


Legend
100 Year Flood Zone
Police
Fire Department
Bridges
Railroad
10 ft Contours
Emergency Shelters
Casco Bay YMCA
Freeport High School
Durham
Brunswick
Cumberland
Yarmouth
Florida Lake
N
W
E
S
Cumberland County
Hazard Mitigation Plan
Town of Freeport
0 0.5 1 2 Miles
Data Source: Maine Office of GIS, Red Cross of Southern Maine, Cumberland Emergency Management Agency. Created 9/29/2010.

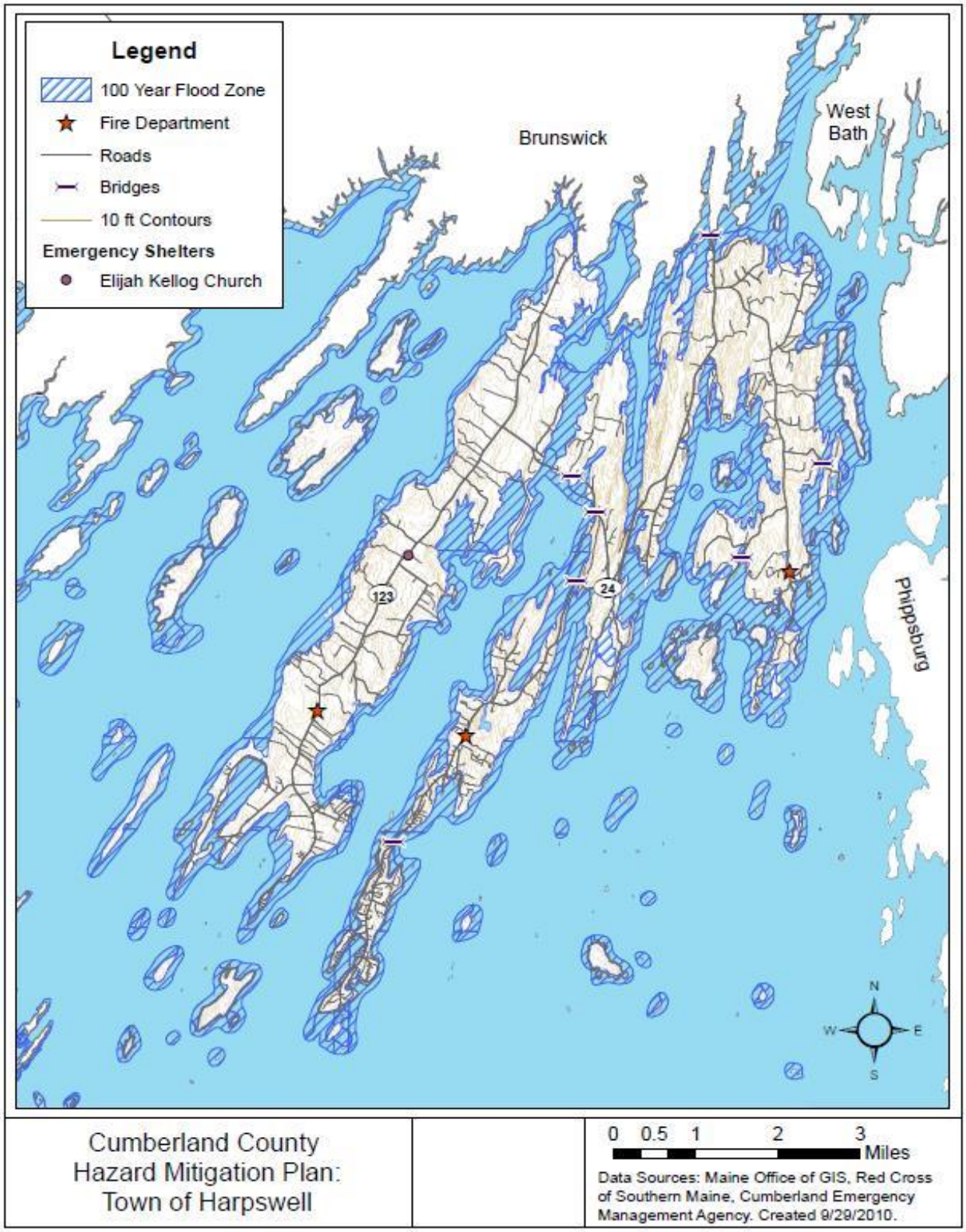
Raymond
Legend
100 Year Flood Zone
Fire Department
Roads
10 ft Contours
N
W
E
S
Cumberland County
Hazard Mitigation Plan:
Town of Frye Island
0 0.125 0.25 0.5
Miles
Data Sources: Maine Office of GIS, Red Cross of Southern Maine, Cumberland Emergency Management Agency. Created 9/29/2010.

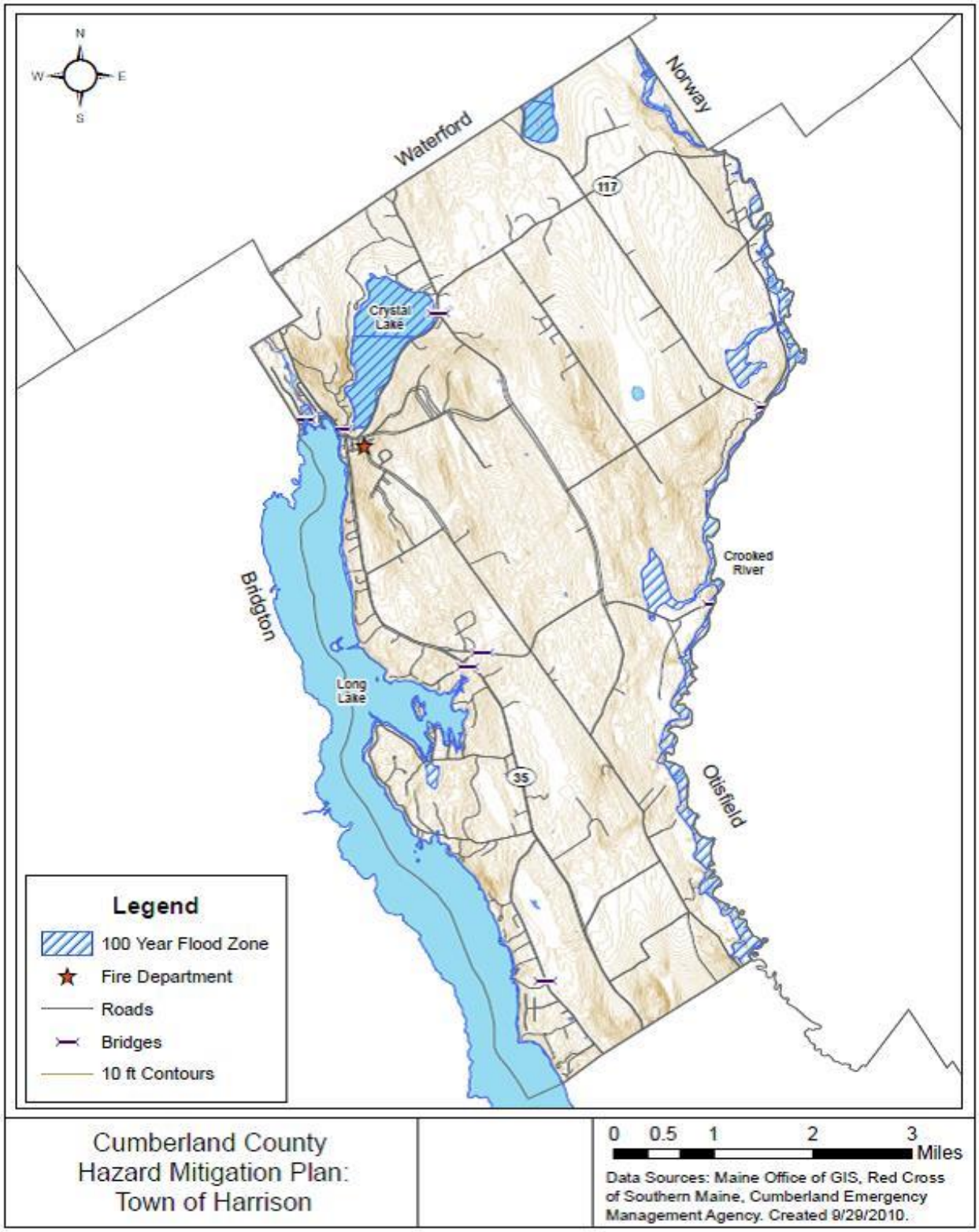


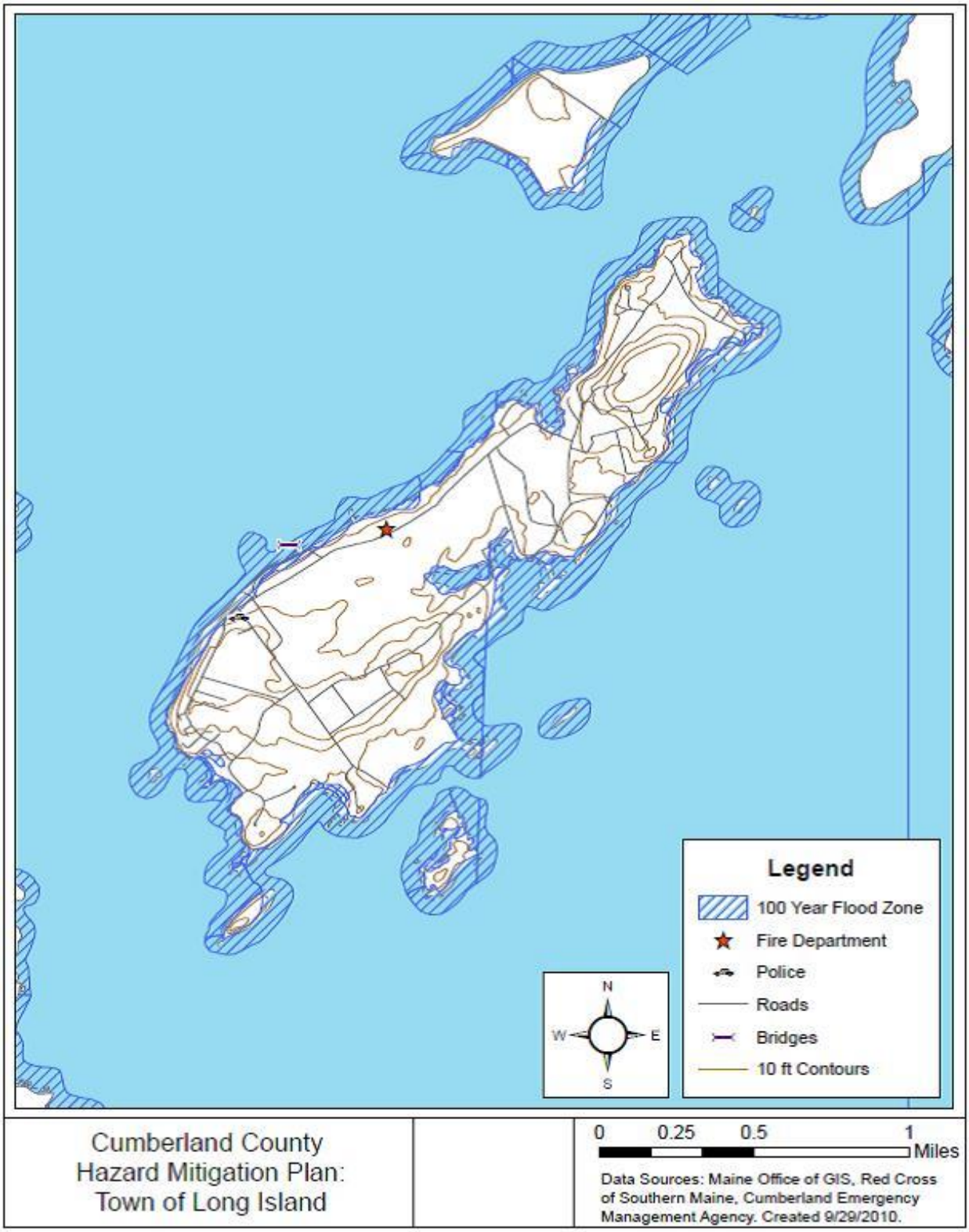
Cumberland County
Hazard Mitigation Plan:
Town of Gorham

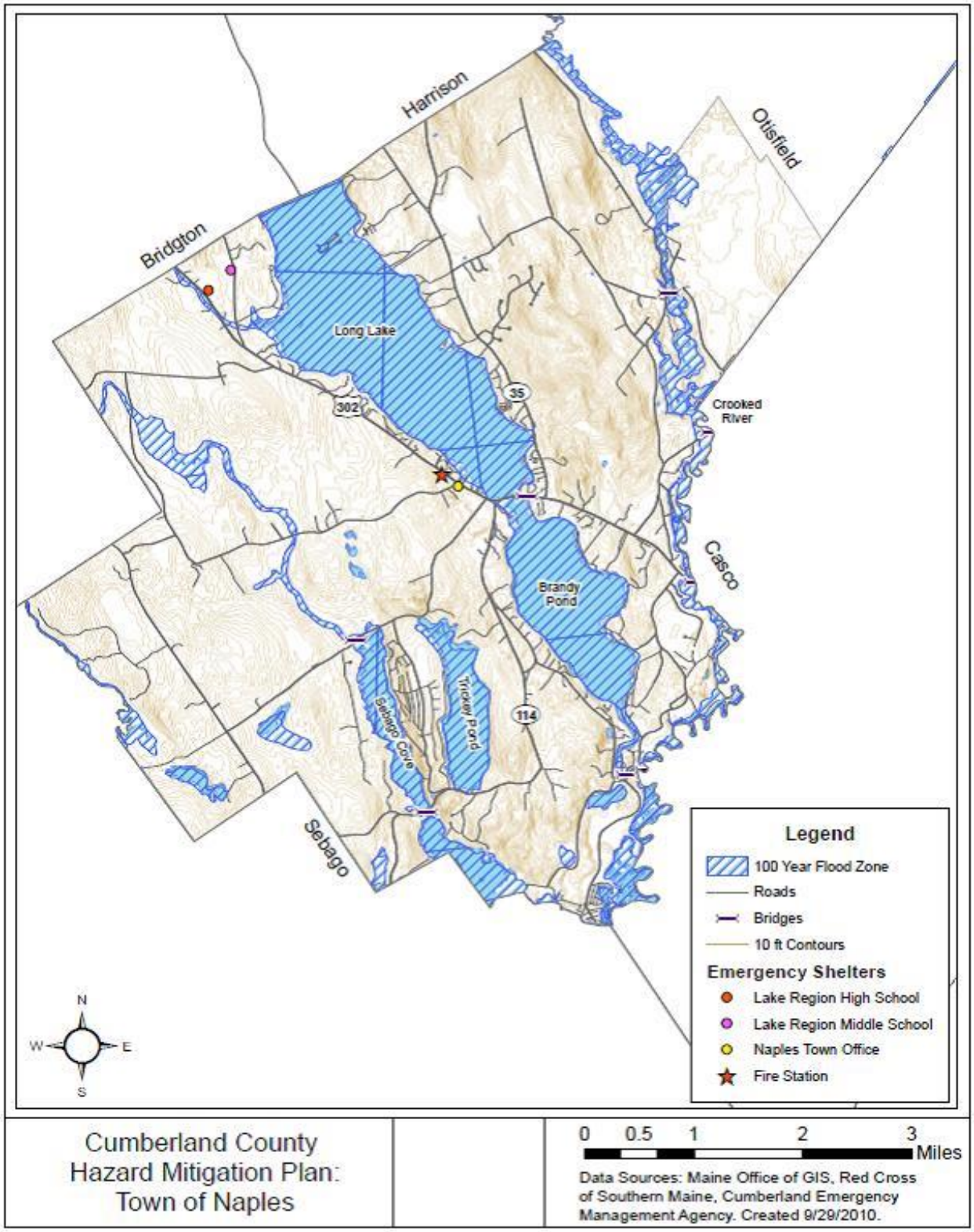


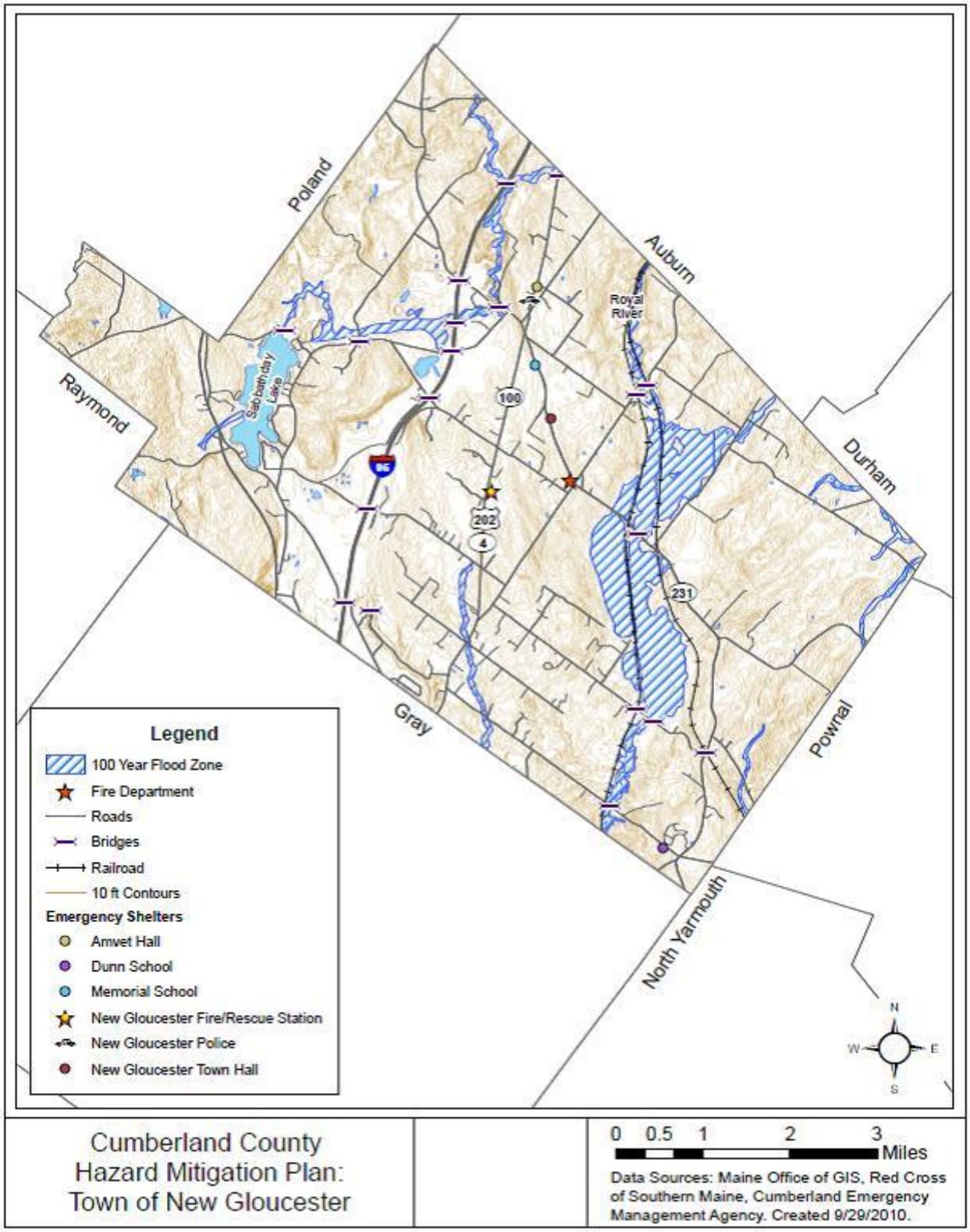
Cumberland County Hazard Mitigation Plan: Town of Gray


Legend
100 Year Flood Zone
Fire Department
Roads
Bridges
10 ft Contours
Emergency Shelters
Elijah Kellog Church
Brunswick
West Bath
Phippsburg
123
24
N
W
E
S
Cumberland County Hazard Mitigation Plan: Town of Harpswell
0 0.5 1 2 3 Miles
Data Sources: Maine Office of GIS, Red Cross of Southern Maine, Cumberland Emergency Management Agency. Created 9/29/2010.

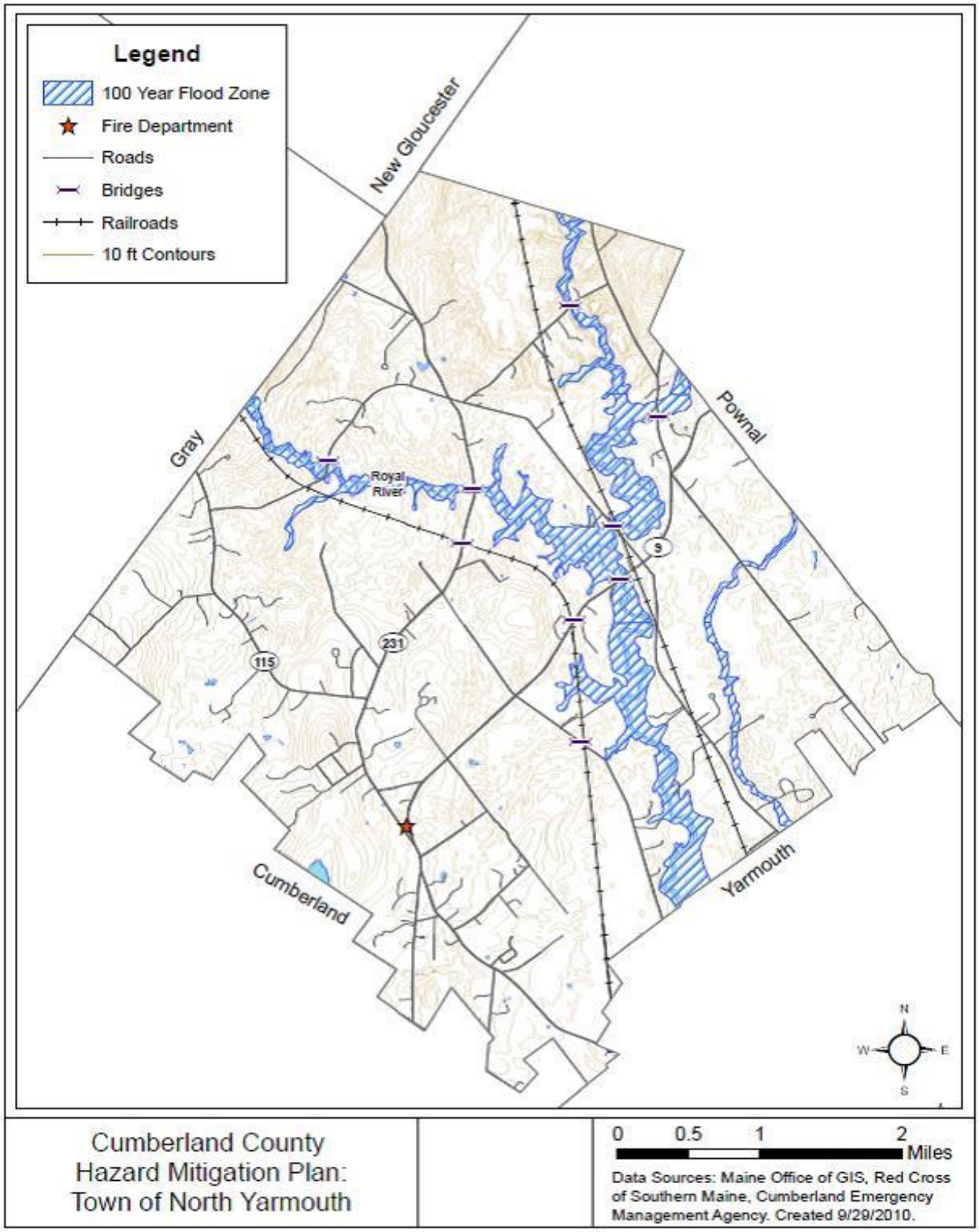

N
W
E
S
Waterford
Norway
117
Crystal Lake
Bridgton
Long Lake
Crooked River
35
Otisfield
Legend
100 Year Flood Zone
Fire Department
Roads
Bridges
10 ft Contours
Cumberland County Hazard Mitigation Plan: Town of Harrison
0 0.5 1 2 3 Miles
Data Sources: Maine Office of GIS, Red Cross of Southern Maine, Cumberland Emergency Management Agency. Created 9/29/2010.


Legend
100 Year Flood Zone
Fire Department
Police
Roads
Bridges
10 ft Contours
N
W
E
S
Cumberland County
Hazard Mitigation Plan:
Town of Long Island
0
0.25
0.5
1
Miles
Data Sources: Maine Office of GIS, Red Cross of Southern Maine, Cumberland Emergency Management Agency. Created 9/29/2010.

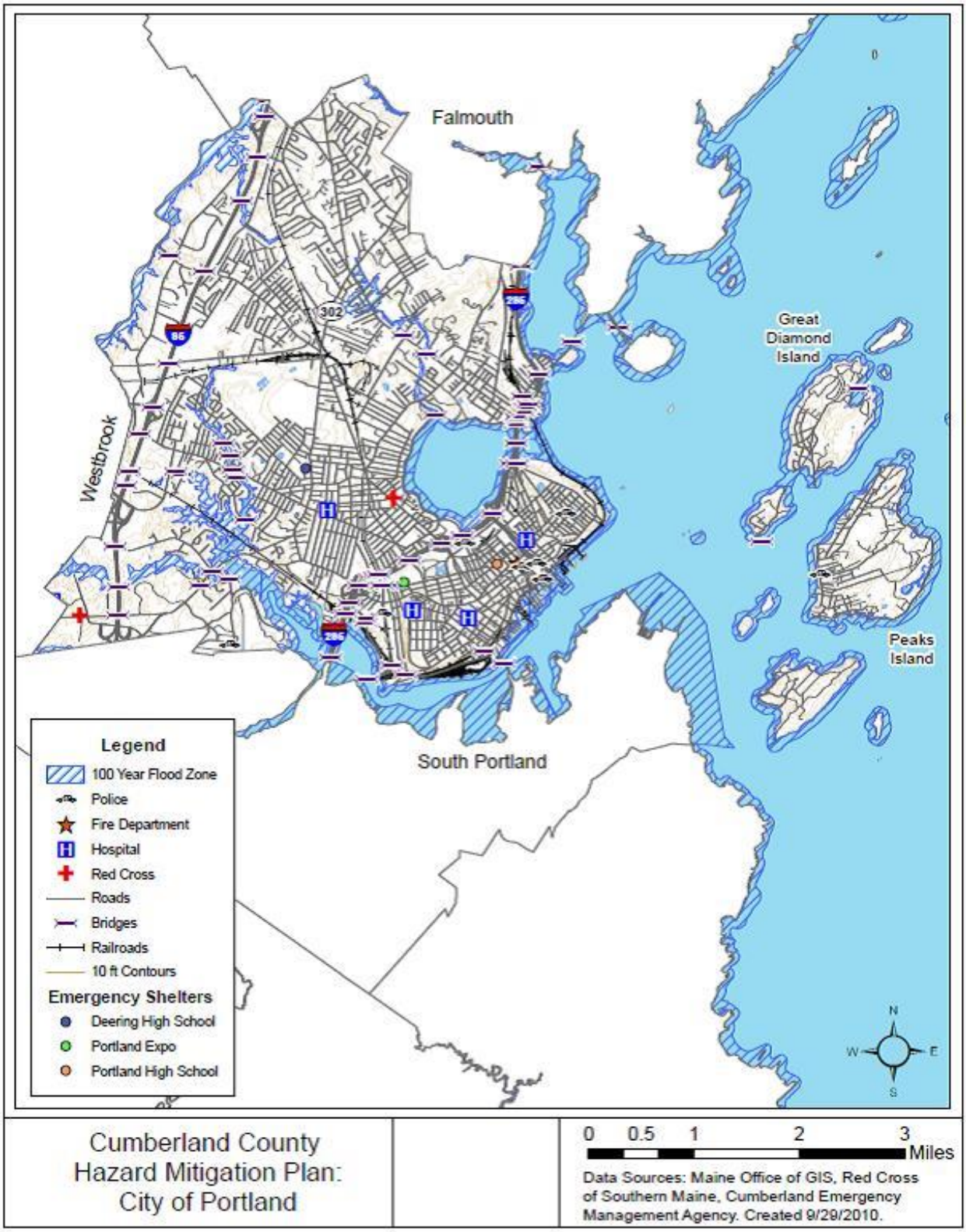

Harrison
Otisfield
Bridgton
Long Lake
302
35
Crooked River
Casco
Brandy Pond
Trickey Pond
Sebago Cove
114
Sebago
Legend
100 Year Flood Zone
Roads
Bridges
10 ft Contours
Emergency Shelters
Lake Region High School
Lake Region Middle School
Naples Town Office
Fire Station
N
W
E
S
Cumberland County Hazard Mitigation Plan: Town of Naples
0 0.5 1 2 3 Miles
Data Sources: Maine Office of GIS, Red Cross of Southern Maine, Cumberland Emergency Management Agency. Created 9/29/2010.



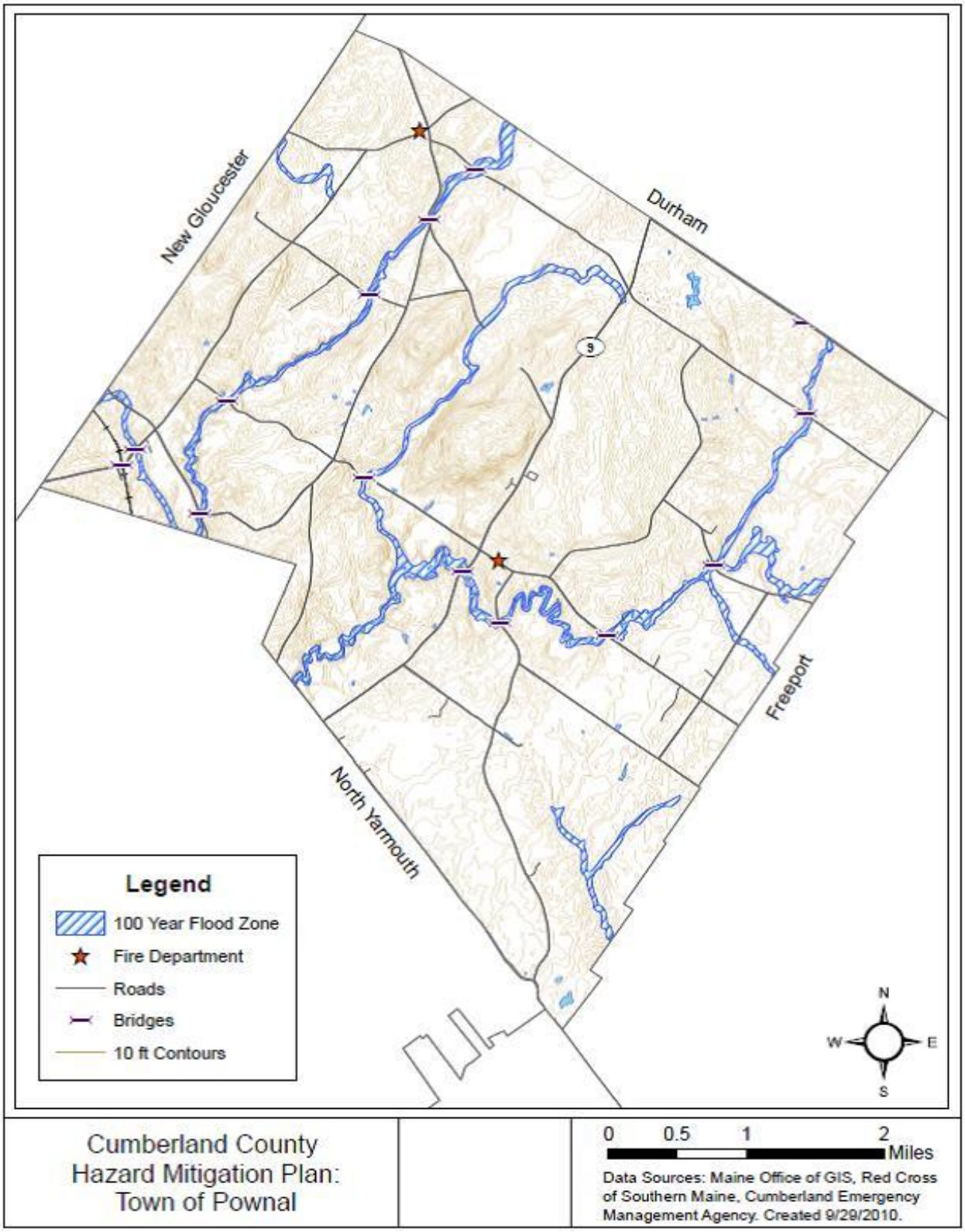
Cumberland County
Hazard Mitigation Plan:
Town of New Gloucester



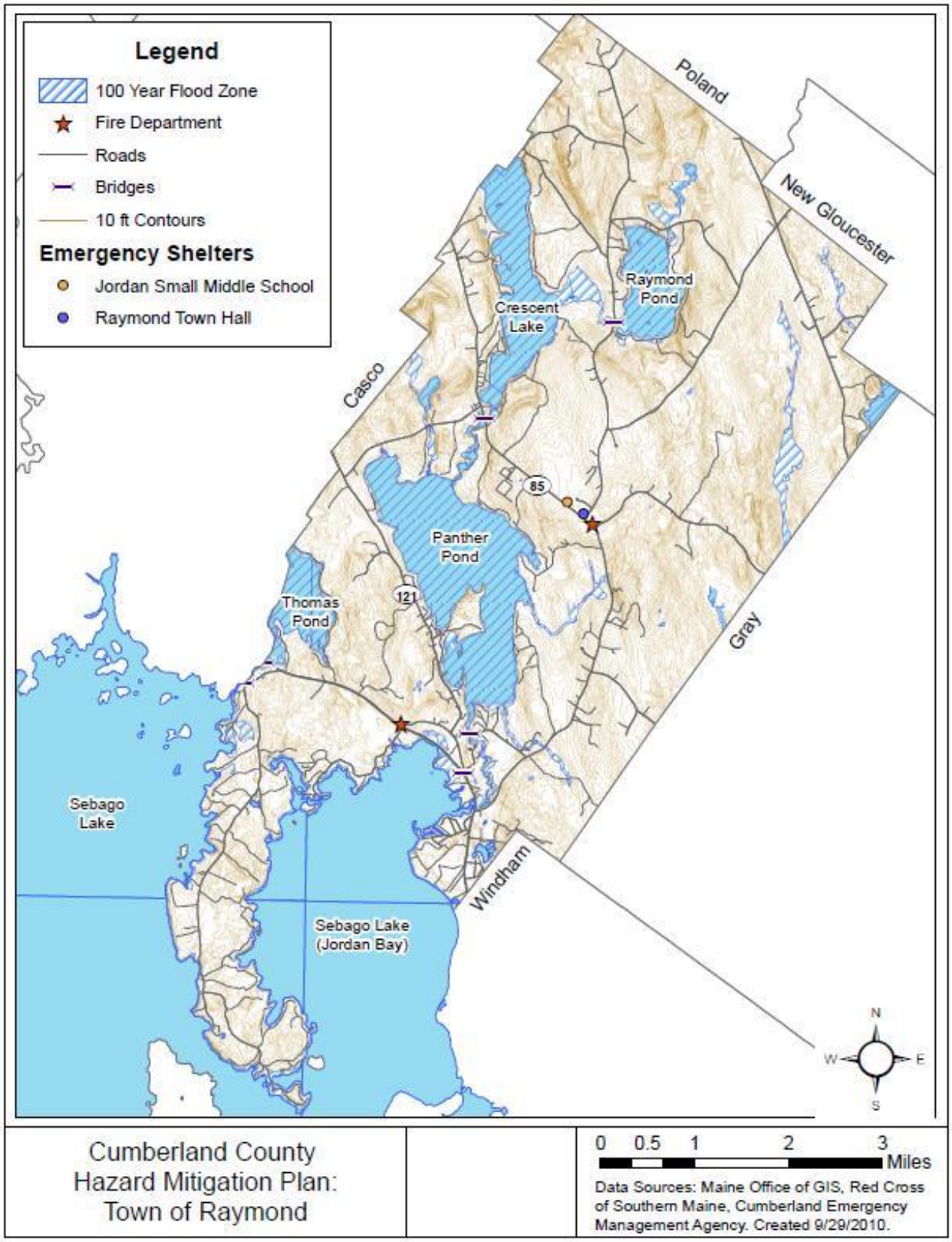
Cumberland County
Hazard Mitigation Plan:
Town of North Yarmouth



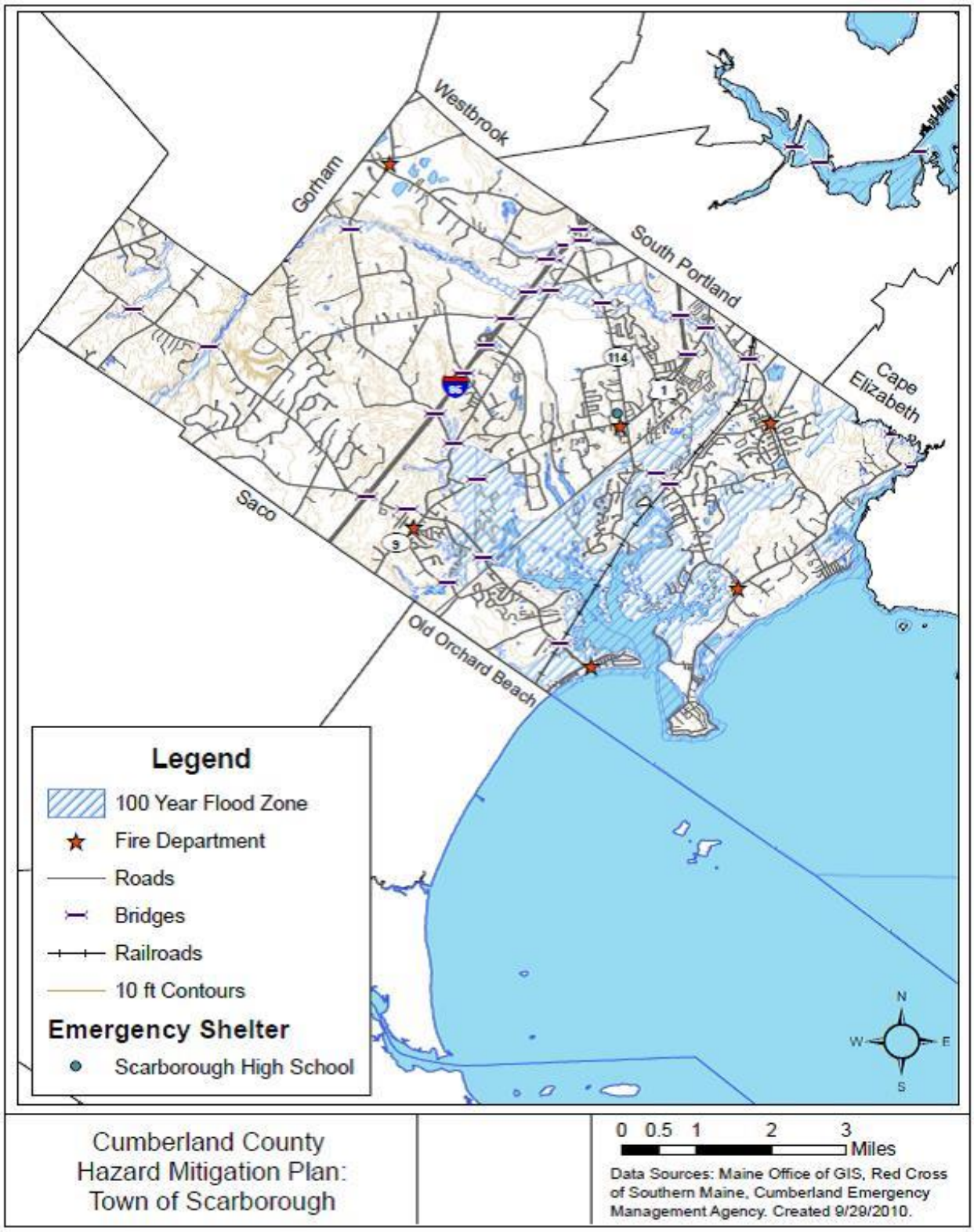
Cumberland County Hazard Mitigation Plan: City of Portland

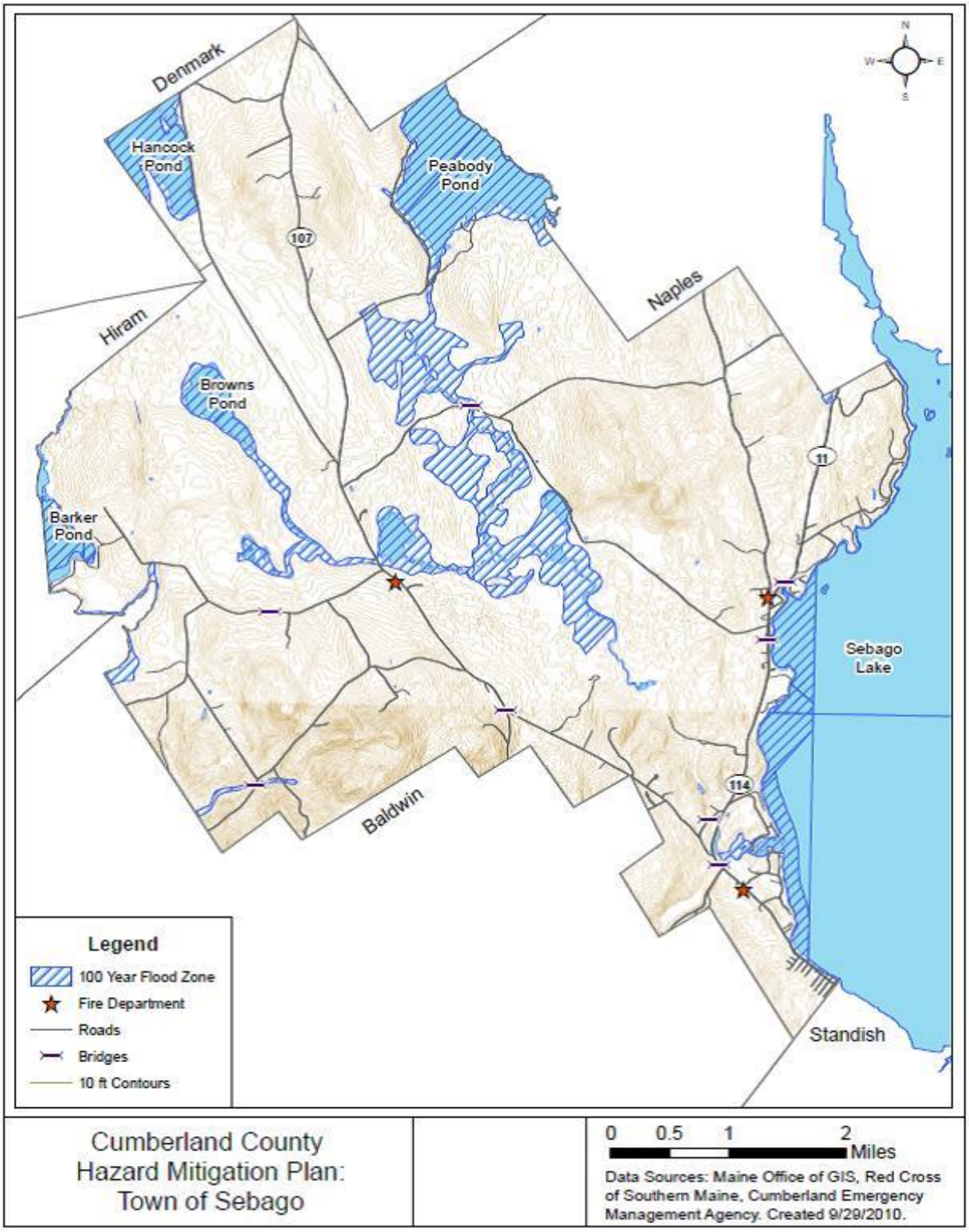


Cumberland County Hazard Mitigation Plan: Town of Pownal

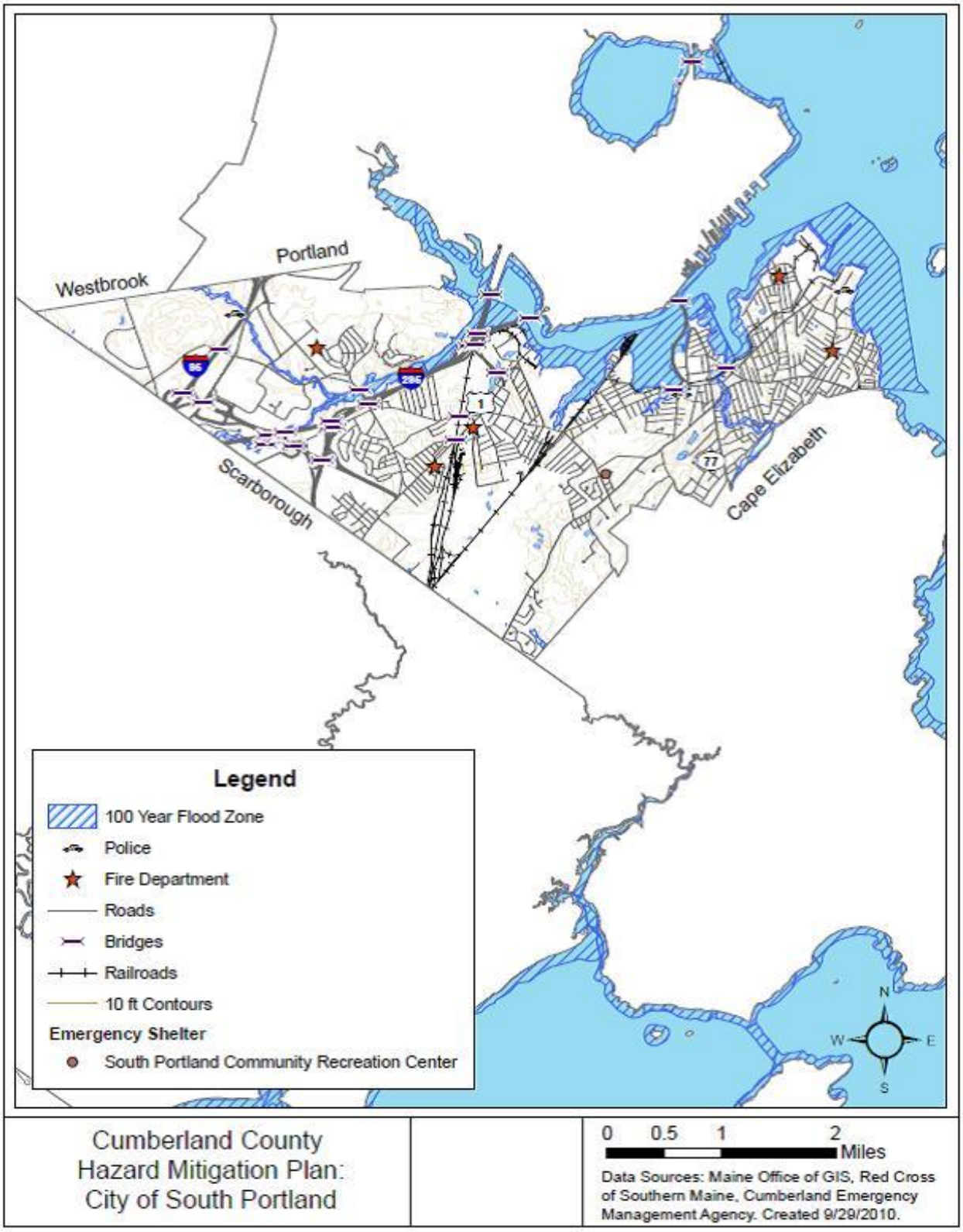


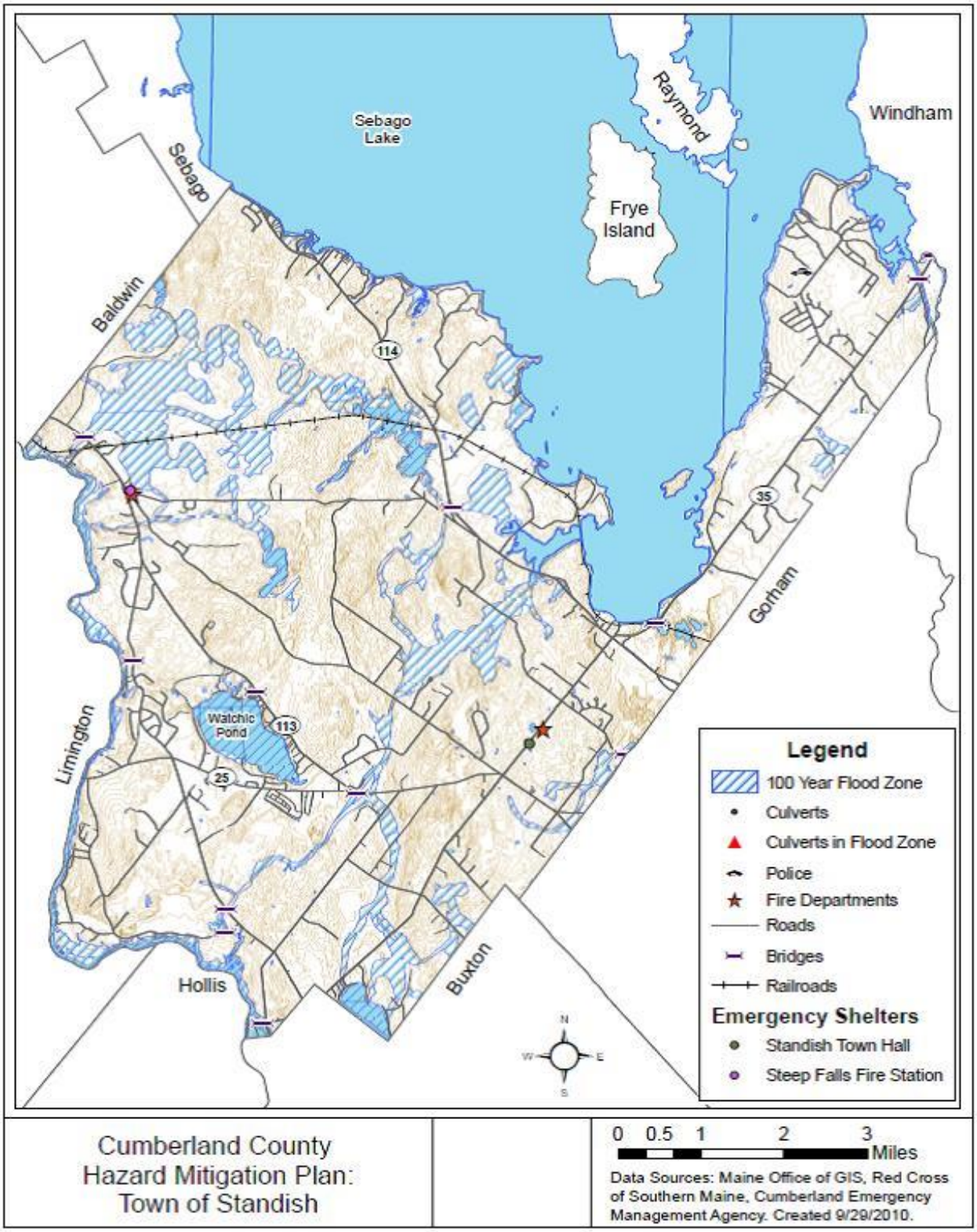
Cumberland County Hazard Mitigation Plan: Town of Raymond

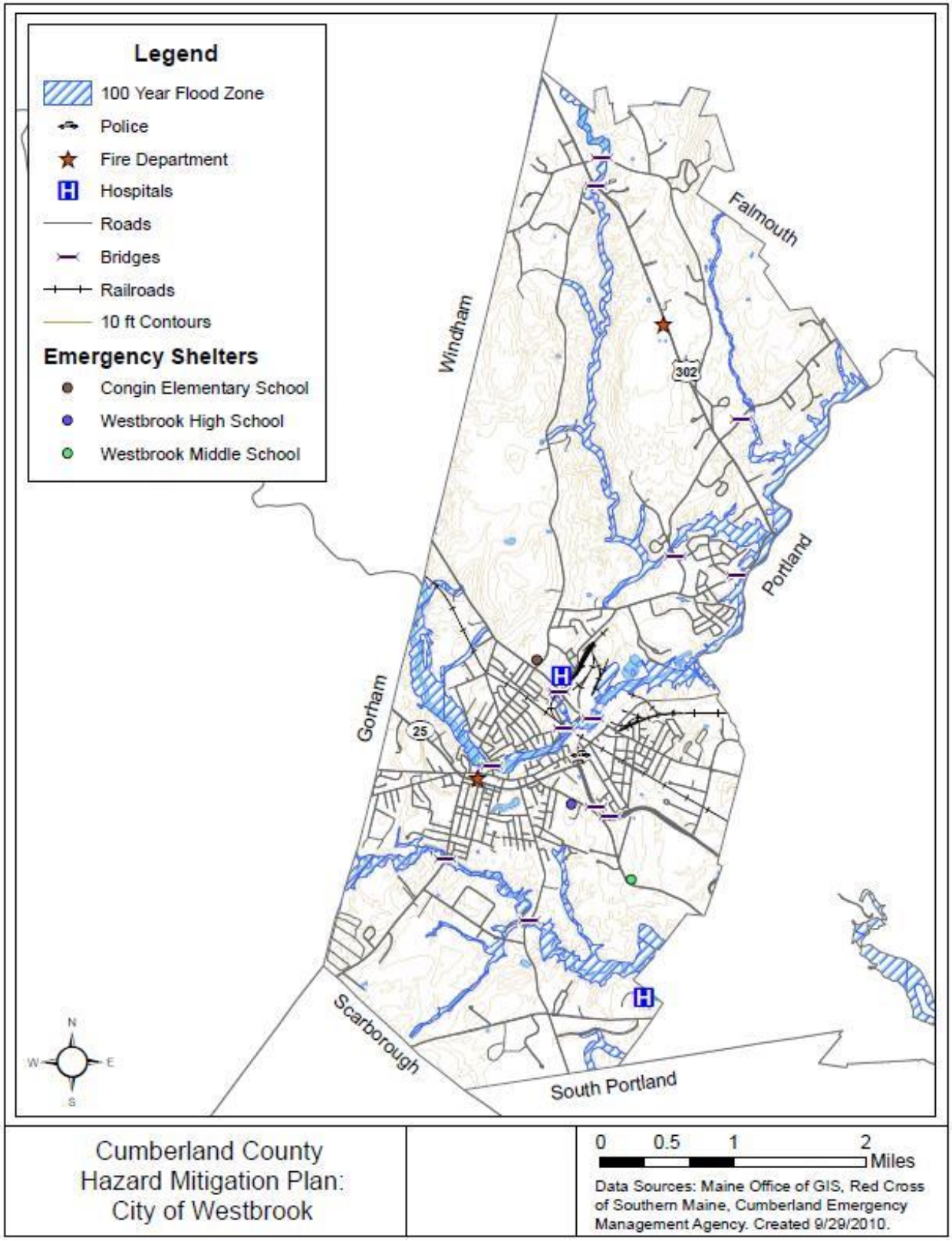

Westbrook
Gorham
South Portland
Cape Elizabeth
Saco
Old Orchard Beach
114
1
9
Legend
100 Year Flood Zone
Fire Department
Roads
Bridges
Railroads
10 ft Contours
Emergency Shelter
Scarborough High School
N
W
E
S
Cumberland County
Hazard Mitigation Plan:
Town of Scarborough
0 0.5 1 2 3
Miles
Data Sources: Maine Office of GIS, Red Cross of Southern Maine, Cumberland Emergency Management Agency. Created 9/29/2010.



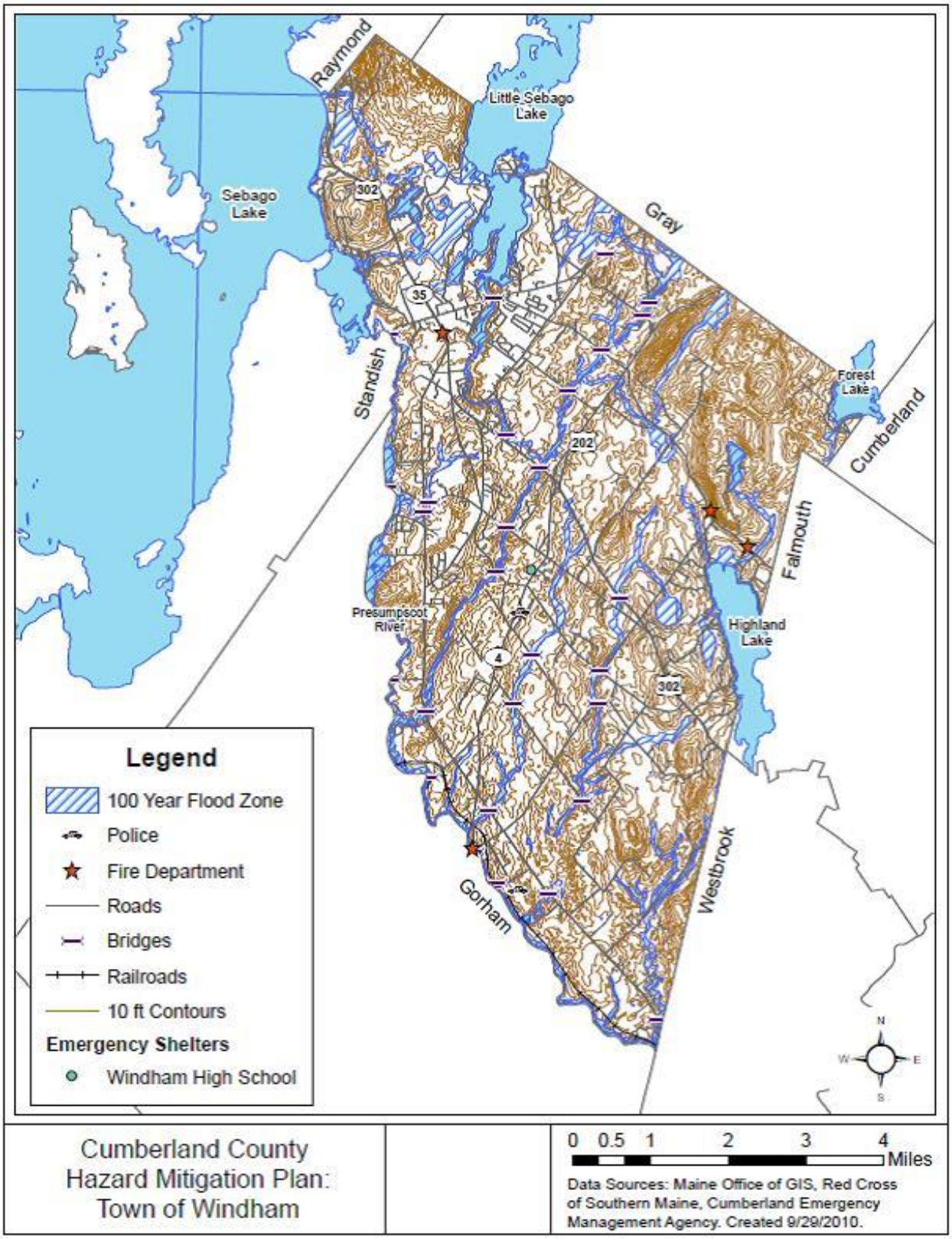
Cumberland County Hazard Mitigation Plan: Town of Sebago


Westbrook
Portland
Scarborough
Cape Elizabeth
95
295
1
77
Legend
100 Year Flood Zone
Police
Fire Department
Roads
Bridges
Railroads
10 ft Contours
Emergency Shelter
South Portland Community Recreation Center
N
W
E
S
Cumberland County
Hazard Mitigation Plan:
City of South Portland
0 0.5 1 2
Miles
Data Sources: Maine Office of GIS, Red Cross of Southern Maine, Cumberland Emergency Management Agency. Created 9/29/2010.

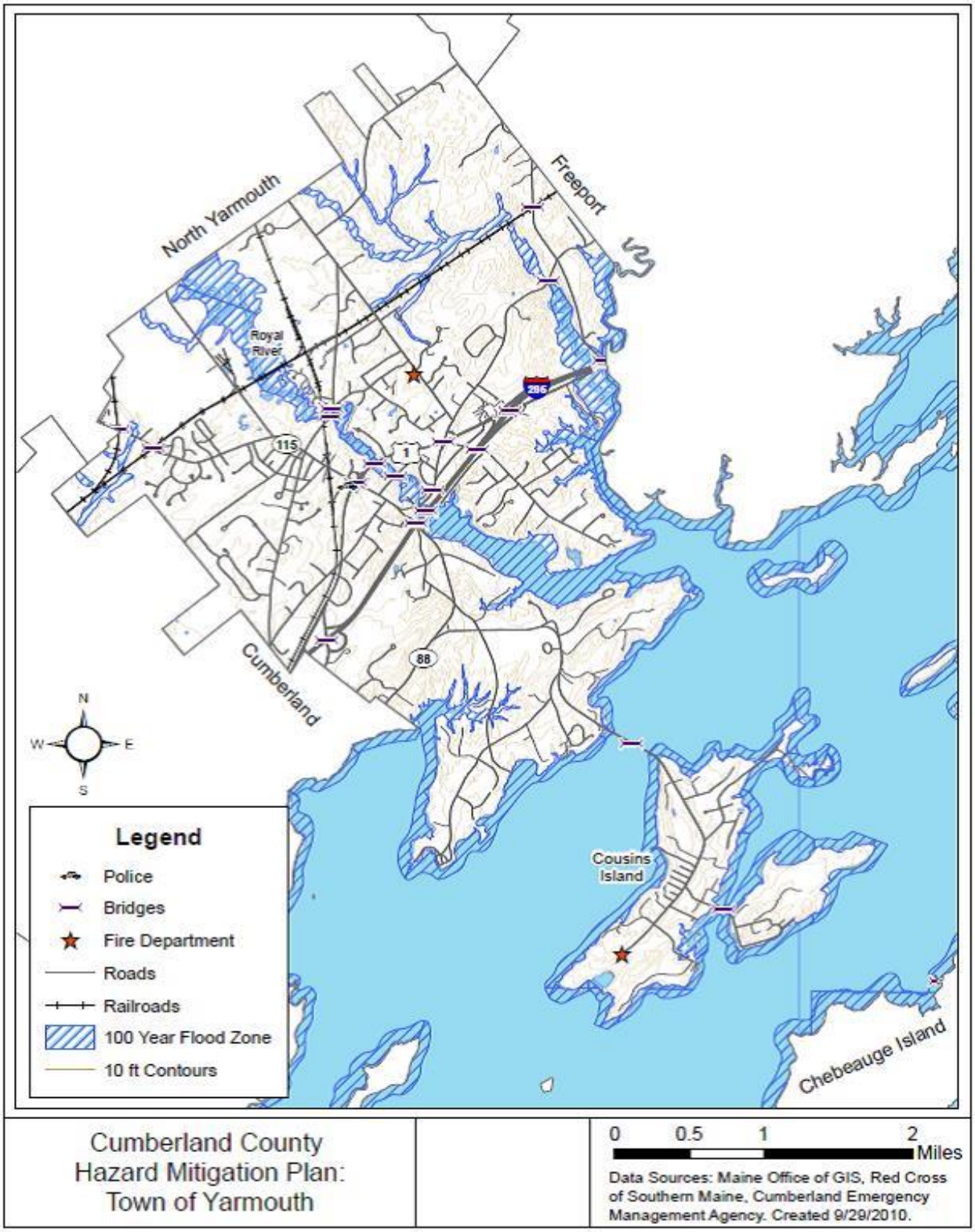

Sebago Lake
Raymond
Windham
Sebago
Frye Island
Baldwin
114
35
Gorham
Limington
Walchic Pond
113
25
Hollis
Buxton
Legend
100 Year Flood Zone
Culverts
Culverts in Flood Zone
Police
Fire Departments
Roads
Bridges
Railroads
Emergency Shelters
Standish Town Hall
Steep Falls Fire Station
N
W
E
S
Cumberland County
Hazard Mitigation Plan:
Town of Standish
0 0.5 1 2 3
Miles
Data Sources: Maine Office of GIS, Red Cross of Southern Maine, Cumberland Emergency Management Agency. Created 9/29/2010.



Cumberland County Hazard Mitigation Plan: City of Westbrook



Cumberland County Hazard Mitigation Plan: Town of Windham


North Yarmouth
Freeport
Royal River
295
115
1
88
Cumberland
Cousins Island
Chebeauge Island
N
W
E
S
Legend
Police
Bridges
Fire Department
Roads
Railroads
100 Year Flood Zone
10 ft Contours
Cumberland County Hazard Mitigation Plan: Town of Yarmouth
0 0.5 1 2 Miles
Data Sources: Maine Office of GIS, Red Cross of Southern Maine, Cumberland Emergency Management Agency. Created 9/29/2010.

SECTION V – MITIGATION STRATEGY

LOCAL HAZARD MITIGATION GOALS

Requirement §201.6(c)(3)(i):	The hazard mitigation strategy shall include a] description of mitigation goals to reduce or avoid long-term vulnerabilities to the identified hazards.

The following pages contain goals and strategic mitigation actions for each of the hazards identified earlier in this plan, followed by a town-by-town summary of prioritized projects. Within the municipalities, their priorities are based on local knowledge of their risks/vulnerabilities and available budget and potential funding to address them. If a town wishes to apply for grant funding, officials understand that they will need to use FEMA's Benefit/Cost Analysis (BCA) process and the County will support their efforts by providing information and/or guidance.

The goals for the 2017 Plan remain the same. Because Maine is a home rule State and counties can only promote and educate to specific activities, some objectives have been deleted.

The following presents a list of the mitigation goals and actions planned to reduce or avoid long-term vulnerability in the County thereby reducing the impact of natural disasters on people, property, ~~a~~ infrastructure, and the environment.

Goal #1: Reduce damage, injury and loss of life resulting from flooding in Cumberland County.

Hazard: Flooding			
Actions	**Time Frame**	**Status**	**Responsible Party**
1.1 Provide information to the public concerning the dangers of flooding through brochures (such as those from the National Weather Service) posted on the county website and social media, (measured through "hits" and "engagements" on these sites) and distributed at public events (See Appendix for samples of brochures)	Annually and As Needed	New	CCEMA
1.2 Review Emergency Action Plans for High and Significant Hazard dams on an annual basis and update contact information	Annually	Completed As Planned and Ongoing	CCEMA/LEMD
1.3 Provide Flood insurance Program updates to local EMA directors and town officials through local director meetings and monthly newsletter	An needed	New	CCEMA
1.4 Promote community participation in NFIP's Community Rating System through local director meetings monthly newsletter and community outreach	Annually	Completed As Planned and Ongoing	CCEMA
1.5 Provide information to local directors and town officials about green infrastructure solutions to urban runoff/flooding through local director meetings and monthly newsletter	Annually	New	CCEMA
1.6 Promote river/stream corridor and wetland protection through education of local EMA directors and municipal officials, and monthly newsletter.	Annually	Completed As Planned and Ongoing	CCEMA

Goal #2: Reduce damage, injury and loss of life resulting from severe summer and winter storms in Cumberland County.

Hazard: Severe Summer and Winter Storms			
Action	**Timeframe**	**Status**	**Responsible Party**
2.1 Provide information to the public concerning the dangers of severe summer and winter storms through hazard-specific brochures (such as those from the National Weather Service)posted on the county website and social media, (measured through "hits" and "engagements" on these sites) and distributed at public events (See Appendix)	Annually and As Needed	New	CCEMA
2.2 Support towns and eligible non-profits in applying for generator grants to protect their critical functions	Annually	New	CCEMA/LEMD
2.3 Use social media and Vulnerable Population Communication Network to inform public of impending storms/hazardous conditions (See Appendix)	As needed	New	CCEMA
2.4 Track mitigation projects through surveys with local EMA directors/Public Works directors	Annually	New	CCEMA/LEMD
2.5 Support municipalities in development/maintenance of warming/cooling center plans	Annually	New	CCEMA

Goal #3: Reduce damage, injury and loss of life resulting from wildfires in Cumberland County

Hazard: Wildfires			
Action	**Timeframe**	**Status**	**Responsible Party**
3.1 Promote participation in wildfire prevention programs such as FireWise through local director meetings, monthly newsletter and community outreach	Annually	New	CCEMA/LEMD/TO
3.2 Promote participation in Maine Forest Service workshops and consultations through education of local directors and municipal officials through local director meetings and monthly newsletter.	Annually and As Needed	New	CCEMA/LEMD
3.3 Provide information to the public concerning the dangers of wildfires through brochures (such as those from the National Weather Service and the Maine Forest Service) posted on the county website and social media, (measured through "hits" and "engagements" on these sites) and distributed at public events	Annually and As Needed	New	CCEMA

Goal #4 Reduce damage, injury and loss of life resulting from coastal erosion in Cumberland County.

Hazard: Coastal Erosion			
Action	**Timeframe**	**Status**	**Responsible Party**
4.1 Update local emergency managers concerning storm surge mapping and relevant evacuation zones	Annually and As Needed	New	CCEMA
4.2 Inform local emergency management directors of grant availability for mitigation of vulnerable infrastructure	When Available	New	CCEMA

4.3Work with local emergency managers and town officials to develop a tracking methodology for coastal erosion separately from other storm damages	Annually and As Needed	New	CCEMA/LEMD/TO

IDENTIFICATION AND ANALYSIS OF MITIGATION ACTIONS

Requirement §201.6(c)(3)(ii):	The mitigation strategy shall include a] section that identifies and analyzes a comprehensive range of specific mitigation actions and projects being considered to reduce the effects of each hazard, with particular emphasis on new and existing buildings and infrastructure.

Requirement §201.6(c)(3)(ii):	[The mitigation strategy] must also address the jurisdiction's participation in the National Flood Insurance Program (NFIP), and continued compliance with NFIP requirements, as appropriate.

Requirement §201.6(c)(3)(iii):	[The mitigation strategy shall include] an action plan describing how the actions identified in section (c)(3)(ii) will be prioritized, implemented, and administered by the local jurisdictions. Prioritization shall include a special emphasis on the extent to which benefits are maximized according to a cost benefit review of the proposed projects and their associated costs.

Requirement §201.6(c)(3)(iv):	For multi-jurisdictional plans, there must be identifiable action items specific to the jurisdiction requesting FEMA approval or credit of the plan.

Currently, all 28 communities within Cumberland County participate in the National Flood Insurance Program (NFIP). Their continued compliance with the program is encouraged at all levels of the County's mitigation strategy. Two communities participate in the Community Rating System at Level Eight (Portland and Cape Elizabeth. Each community will continue to enforce its existing floodplain ordinance

The list of local projects contained in the following table was developed and prioritized separately by each municipality. Projects were chosen based on local knowledge of the frequency and extent of local damages, local knowledge of which projects were of the highest priority (based on frequency and severity of damages), local knowledge of weather, the geography and topography of the community, and the technical and financial abilities of their respective communities to address hazards and mitigate the impacts of hazards. Municipal capabilities could expand if other funding were to become available.

Many of the municipalities in Cumberland County are small towns that do not have the resources, staff or funding to prepare cost benefit analyses for their proposed projects. However, in virtually all cases involving expenditure of local funds for implementation, there will be a very rigorous, line-by-line analysis of cost effectiveness during the budget review process and subsequent public discussion through regular and special meetings. This review is at least equal to a formal benefit-cost calculation because each expenditure item will be scrutinized rather than simply plugged into a formula. Furthermore, MEMA and CCEMA have made it clear to local officials that a formal cost-benefit analysis must be prepared when they apply for mitigation funding.

The list of projects contained in the table below is largely the result of Cumberland County EMA's collaboration with town officials, local EMA, and Public Works officials to first review and update their hazard mitigation project lists, and secondly, to continue their ongoing efforts to map specific locations that require mitigation. The table includes project data relevant to its identification/location, its prioritization, its cost, the timeframe estimated to complete, and the responsible agency. The timeframe includes the estimated completion period that starts when

funding is available and permitting has been obtained. Short term is 1 year, midterm is 2-3 years, and long term is 4-5 years before completion.

All municipalities understand that placing projects in the plan is no guarantee of their eligibility for grants or of federal funding.

In addition to stating whether the project is new, completed, deleted, or revised, the status column also identifies when FEMA funds were used for the project.

It should be noted that many urgently needed projects are not included here as they are on State roads and the towns do not have authority to do needed upgrades. In some instances, lengthy permitting processes are holding up needed work.

It should also be noted that in many instances, capabilities could expand if additional funding were to become available.

In the following projects list, completed projects move to the bottom of the list and newer projects are re-prioritized.

Municipality	Project	Est. Cost	Timeframe	Responsible Official	Status
Baldwin	1) Wentworth Rd: paving, culverts, ditching, shoulder work, reclaim, rip-rap, cut trees	$175,000	Long Term	Road Commissioner	New Project
	2) Senator Black Rd: culverts, ditching, shoulder work, reclaim, rip-rap, cut trees	$600,000	Long term	Road Commissioner	New Project
	3) Saddleback West Rd.; Remove trees from ditch line 3,500' add ditch 650' add 24" x 40' N-12 cross culvert.	$9,000	Long term	Road Commissioner	Deferred – Lack of Funding
	4) Anderson Rd; Add (2) 18" x 40' N-12 culverts and riprap inlet and outlet.	$6,000	Mid tern	Road Commissioner	Completed 2014 with Town funds
	5) Brown Rd; Elevate road 925' x 21' x 3' add 24" x 40' N-12 culvert and stabilize shoulders. H&H study, engineering design, upgrade to 24" HDPE culvert, upgrade two 24" culverts to 57"x38" squash pipe	$56,000 $96,348.94	6 months	Road Commissioner &engineering firm	HMGP project Completed Oct 2012
	6) Senator Black Rd; Ditch 150' and upsize existing culverts.	n/a	2 weeks	Road Commissioner	Completed with Town funds per 2012 plan
Bridgton	1) Post Office Square (Main St-Depot St.); Upsize existing 48" x 50' culvert with 4' x 10' x 50' bottomless box culvert to match culvert under US 302. Revised: needs study and permitting from DEP, EPA, NFIP and USACE	TBD	Long term	Road Commissioner Engineering Firm	Revised from 2012 Plan
	2) Mountain Rd; Upsize existing triple culverts with 4' x 10' x 40' bottomless box culvert and riprap inlet and outlet. Replaced existing culverts	$45,000	2 weeks	Road Commissioner	Completed with Town Funds

Brunswick	1) Bull Rock Rd; Ditch and armor 400' add (2) 15" x 40' N-12 driveway culverts & an 18" x 40' N-12 cross culvert riprap inlet and outlet.	$12,000	Long term	Director of Public Works	Deferred – Lack of Funding
	2) Pleasant Hill Rd; Upsize twin 5' x 66' culverts w/ 12' x 6' x 70' bottomless box culvert w/ integrated headwalls.	$175,000-$200,000	Long term	Director of Public Works	Deferred – Lack of Funding
	3) Highland Rd. Upsize existing 24" x 40' culvert with 36" x40' N-12 culvert and riprap inlet and outlet.	$25,000	Long term	Director of Public Works	Deferred – Lack of Funding
	4) Collins Brook Rd; Upsize existing 6' x 40' culvert with 8' x 5' x40' bottomless box culvert and riprap inlet and outlet.	$33,868.80	3 weeks	Director of Public Works	Completed August 2014 town funds
Cape Elizabeth	1) Kettle Cove Rd. @ Crescent Beach; Rebuild road substructure/retaining wall that abuts Crescent Beach	$500,000	Long term	Director of Public Works	Revised from 2012 Plan and still deferred: lack of municipal funds
	2) Garden Circle. Improve gravity storm drain outfall and/or install stormwater pump station	$125,000-$1,100,000	Mid term	Director of Public Works	New Project
	3) Oakhurst Rd & Hemlock Hill Rd.; Upsize 200' underground drainage. Add downstream stormwater catch basins on adjacent public way (Hemlock Hill Rd.) and replace current outfall	$125,000	Long term	Director of Public Works	Revised from 2012 plan
	4) Sawyer St..; Elevate 600' x 22' x 18" add (3) 18" x 40' N-12 cross culverts, stabilize shoulders and repave.	$200,000	4 weeks Long term	Director of PW; Joint Project Scarborough	Deferred – Lack of Funding

	5) Garden Circle; Install pump system with vault and backup generator to remove ponding. Portland Water District installed grinder sanitary pump station, replaced existing catch basin with 4' diameter pipe. Outflow pipe being replaced with project #2	$250,000	3 weeks	Director of Public Works	completed 2014 with PWD funds
	6) Spurwink Ave @ Spurwink River; Extend arch culvert.	unknown	unknown	Director of Public Works	Completed with Town funds per 2012 Plan
	7) Sawyer St. @ Trout Brook; upsize existing culvert with metal arch.	$175,000	3 weeks	Director of Public Works	Completed with Town funds per 2012 Plan
	8) Scott Dyer Rd./ Elizabeth Park: Enlarge stormwater discharge outfall pipe.	unknown	unknown	Director of Public Works	Completed with Town funds per 2012 Plan
	~~9~~) Running Tide Rd; Sewer Rehabilitation project.	unknown	unknown	Director of Public Works	Completed with Town funds per 2012 Plan
	10) Old Ocean House Rd. @ Alewife Brook: Culvert Upgrade.	unknown	unknown	Director of Public Works	Completed with Town funds per 2012 Plan
	11) Spurwink Ave @ Trout Brook; Upsize existing culvert with metal arch culvert.	$85,000	3 weeks	Director of Public Works	Completed with Town funds per 2012 Plan
Casco	1) Point Sebago Rd. Site #1; Add 24" x 40' N-12 cross culvert, ditch and line 200' and repave	$4,000	Mid term	Road Commissioner	Deferred – Lack of Funding

	2) Johnson Hill Rd; Ditch and line 2,000', install check dams and upsize (4) 15" x 24' culverts w/ (4) 18" x 32' N-12 culverts. Road reconstruction scheduled	$23,000	Short term	Road Commissioner	Deferred – Lack of Funding
	3) Leach Rd; Upsize existing cross culvert with 6'x 4' x 40' box culvert.	$35,000	Long term	Road Commissioner	Deferred – Lack of Funding
	4) Edwards Rd Site #1; Elevate Road 300' x 2' x 21' upsize 36" x 40' corrugated metal pipe with 4' x 10' x 40' bottomless box culvert, repave and stabilize shoulders.	$165,000	3 weeks	Road Commissioner	Completed 2013 with Town funds
	5) Edwards Rd Site #2; Upsize existing 24" x 40' corrugated metal pipe with 36" x 40' N-12 culvert riprap outlet.	$5,000	2 weeks	Road Commissioner	Completed 2012 with Town Funds
	6) Edwards Rd Site #3; Riprap existing culvert.	$1,000	1 day	Road Commissioner	Completed 2012 with Town Funds
	7) Point Sebago Rd. Site #2; Riprap inlet and outlet of existing culvert.	$1,000	1 day	Road Commissioner	Completed 2014 with Town Funds
	8) Libby Rd; Elevate 200' x 21' x 2' stabilize shoulder and repave. Road reconstructed	$18,000	3 weeks	Road Commissioner	Completed 2015 with Town funds
	9) Crooked River Corridor; Acquire and/or elevate 12 houses.	$1,200,000-3,500,000	6 months	Town Manager	Deferred - owners unwilling to sell at this time
Chebeague Island	1) Stone Wharf. Replace or relocate Chebeague island Ferry landing. Vulnerability Study complete; Engineering Study ongoing	$300,000-$1,000,000	Unknown Long term	Town Manager Road Commissioner	New Project

	2) Bennett Cove. Engineering Study for improvements to stone block commercial boat ramp	unknown	Long term	Town Manager Road Commissioner	New Project
	3) Indian Point Rd; Install sheet pile 500' x 10'.	$14,000	Mid term	Road Commissioner	Deferred – Lack of Funding
	4) Ongoing public education of homeowners about protection from wildfires.	$500	2016-2021	Fire Department & Island Institute Fellow.	Completed as planned; continuing
Cumberland	1) Tuttle Rd Site 2; Elevate 200' x 21' x 3' stabilize shoulders and repave. Engineering Study completed	$18,000	Long term	Director of Public Works	Deferred – Lack of Funding
	2) Middle Rd @ Hazeltines; Upsize existing 36" x 50' lined culvert with 42" x 50' N-12 culvert and riprap inlet and outlet.	$17,000	Long term	Director of Public Works	Deferred – Lack of Funding
	3) Tuttle Rd Site 1; Upsize existing 36" x 40' culvert with 48" x 40' N-12 culvert and riprap inlet and outlet.	$14,000	2 weeks	Director of Public Works	Completed with Town funds
	4) Harris Rd; Upsize existing culvert with box and elevate road.	$294,216.94	unknown	Director of Public Works	Completed with FEMA PA/ Town funds per 2012 Plan
	5) Range Rd. (5) sites Upsize culverts and improve inlet and outlets.	$50,000	1 year	Director of Public Works	Completed with Town funds per 2012 Plan

Falmouth	1) Northbrook Drive; Upsize existing 48" culvert with 8' x 4' x 80' bottomless box culvert and riprap inlet and outlet.	$200,000	Long term	Director of Public Works	Deferred – Lack of Funding
	2) Middle Rd. @ Scittery Gussett Brook; Upsize triple 15" culverts with bottomless box culvert or as required by H&H study and riprap inlet and outlet.	$100,000	Long term	Director of Public Works	Revised from 2012 Plan - held up for Army Corp of Engineering permit
	3) Shoreline Drive Coastal Erosion; Stabilize bank 100' x 50' x 3' with large fractured stone Engineering study complete	$75,000	Long term	Director of Public Works	Study -Town funds Deferred – Lack of Funding
	4) Woodville Road Piscataqua River Crossing; upsize double culvert with bridge or box culvert	$500,000	Unknown	Director of Public Works	Completed with Town funds per 2012 Plan
	5) Woodville Rd @ High School; upsize existing culverts	$50,000	1 week	Director of Public Works	Completed with Town funds per 2012 Plan
Freeport	1) Hunter Road. Upsize existing culvert with 24" culvert	$125,000	Mid term	Director of Public Works	New Project
	2) Percy Street. Upsize existing culvert with 24" culvert	Unknown	Mid term	Director of Public Works	New project
	3) Richards Lane; Elevate 150' x 1' x 22' stabilize shoulders upsize twin 15" x 40' culverts with 6' x 3' x 40' bottomless box and riprap inlet and outlet.	Unknown	Long term	Director of Public Works	Deferred – Lack of Funding
	4) Grant Rd; Upsize existing culvert with 24" x 40' N-12 culvert.	$4,000	3 days	Director of Public Works	Completed with Town funds
	5) Webster/Old County Rd; Install 36" x 50' N-12 culvert and riprap inlet and outlet.	$5,000	1 week	Director of Public Works	Completed with Town funds

	6) Flying Point Rd; Enlarge existing corrugated metal pipe. Add additional culvert and elevate road and repave.	$200,000-500,000	1 week	Director of Public Works	Completed with Town funds per 2012 Plan
	7) Cheehawk Rd; Added additional 18" x 40' N-12 culvert.	$2,500	3 days	Director of Public Works	Completed with Town funds per 2012 Plan
Freeport Sewer District	1) move dry pit pump above ground and raise structure at least three feet.	$300,000	Long Term	Board of Directors	New Project
Frye Island	1) Monitor/mitigate hillside erosion in Recreation Area trail between Beach 10 and Long Beach. Site monitoring will continue in order to collect more information and determine the best approach to mitigating the hazard.	Unknown	Long term	Director of Public Works	New Project
	2) Erosion at beach #6; Installed retention pond and added (2) culverts to divert flow from beach.	$10,000	2 weeks	Town Manager	Completed with Town funds per 2012 Plan
Gorham	1) Mitchell Hill Rd; Elevate road 300' x 3' x 22' stabilize shoulders and upsize existing culvert with bridge approx. 100' x 22' with wing walls.	$600,000	Long Term	Director of Public Works; Joint project with Scarborough	Deferred – Lack of municipal funds
	2) Dingley Springs Rd.; Upsize existing multiple culverts with 12' x 6 x 40' bottomless box culvert and riprap inlet and outlets.	$80,000	Long Term	Director of Public Works	Deferred – Lack of Funding
	3) Wood Rd; Upsize existing multiple culverts with 12' x 6 x 40' bottomless box culvert and riprap inlet and outlets.	$80,000	Long Term	Director of Public Works	Deferred – Lack of Funding
	4) Wilson Rd: Upsize existing culvert with 10' x 5 x 40' bottomless box culvert and riprap inlet and outlets.	$60,000	Long term	Director of Public Works	Deferred – Lack of Funding

	5) Buck St; Upsize existing multiple culverts with 20'x 8' x 40' bottomless box culvert and riprap inlet and outlets. Elevate road 200' x 21' x 3' and repave.	$130,000	Long Term	Director of Public Works	Deferred – Lack of Funding
	6) New Portland Rd; Upsize existing multiple culverts with 10' x 5' x 40' bottomless box culvert and riprap inlet and outlets.	$60,000	Long Term	Director of Public Works	Deferred – Lack of Funding
	7) Spiller Rd; Upsize existing multiple culverts with 20'x 8' x 40' bottomless box culvert and riprap inlet and outlets. Elevate road 200' x 21' x 3' and repave. Twin plastic culvert installed by PW	$30,000	3 weeks	Director of Public Works	Completed in 2014 with Town Funds
	8) Huston Rd; Upsize existing multiple culverts with 20'x 8' x 40' bottomless box culvert and riprap inlet and outlets.	$75,000	2 weeks	Director of Public Works	Completed with Town funds per 2012 Plan
	9) Tow Path Rd; Slope protection, upsize culvert.	$20,000	2 weeks	Director of Public Works	Completed with Town funds per 2012 Plan
	10) North Gorham Rd; Slope protection, upsize culvert.	$20,000	2 weeks	Director of Public Works	Completed with Town funds per 2012 Plan
	11) Hodgdon Rd @ South Branch Brook; Install metal arch pipe.	$200,000	1 month	Director of Public Works	Completed with FEMA funds per 2012 Plan
	12) Washburn Rd; Slope protection, upsize culvert.	$20,000	2 weeks	Director of Public Works	Completed with FEMA funds per 2012 Plan
Gorham, cont.	13) Longfellow Rd @ Indian Camp Brook; Slope protection, upsize culvert.	$20,000	2 weeks	Director of Public Works	Completed with Town funds per 2012 Plan

	14) Day Rd @ Indian Camp Brook; Slope protection, upsize culvert.	$20,000	2 weeks	Director of Public Works	Completed with Town funds per 2012 Plan
	15) Weeks Rd @ Gully Brook; Slope protection, upsize culvert.	$20,000	2 weeks	Director of Public Works	Completed with Town funds per 2012 Plan
	16) Plummer Rd @ Westcott Brook; Slope protection, upsize culvert.	$20,000	2 weeks	Director of Public Works	Completed with Town funds per 2012 Plan
	17) New Portland Rd. @ East Branch of Indian Brook; Slope protection, upsize culvert.	$20,000	2 weeks	Director of Public Works	Completed with Town funds per 2012 Plan
	18) Flaggy Meadow Rd. @ Little River; Slope protection, upsize culvert.	$20,000	2 weeks	Director of Public Works	Completed with Town funds per 2012 Plan
	19) Brackett Rd.; Slope protection, upsize culvert.	$20,000	2 weeks	Director of Public Works	Completed with Town funds per 2012 Plan
	20) Files Road @ Files Brook; Scour protection.	$20,000	2 weeks	Director of Public Works	Completed with Town funds per 2012 Plan
	21) Brackett Rd @ Indian Brook; Additional scour protection and redesign bridge.	$200,000	unknown	Director of Public Works	Completed with Town funds per 2012 Plan
	22) Fort Hill Rd@ Tannery Brook; Additional scour protection and redesign bridge.	$200,000	unknown	Director of Public Works	Completed with Town funds per 2012 Plan

	23) Deering Rd @ Stroutwater River; Slope protection, upsize culvert.	$20,000	2 weeks	Director of Public Works	Completed with Town funds per 2012 Plan
	24) Hurricane Rd; Slope protection and upsize culvert.	$20,000	Unknown	Director of Public Works	Completed with FEMA funds per 2012 Plan
Gray	1) Campbell Shores Rd Site #1; Upsize triple 24" x 40' culvert with 4' x 8' x 40' bottomless box culvert raise road 21' x 3' x 500' and repave	$60,000	Long term	Director of public Works	Deferred – Lack of Funding
	2) Campbell Shores Rd Site #2; ;Upsize triple 24" x 40' culvert with 4' x 8' x 40' bottomless box culvert raise road 21' x 3' x 500' and repave.	$60,000	Long term	Director of Public Works	Deferred – Lack of Funding
	3) Long Hill Rd.; Upsize 60" x 40' culvert with 5' x 8' x 40' bottomless box culvert, raise road 21' x 6' x 500' stabilize shoulders and repave.	$70,000	Long term	Director of Public Works	Deferred – Lack of Funding - Engineering study – Town funds Possible DEP grant
	4) Westwood Rd at Sucker Brook; H&H, engineering design Upsize existing 36" x 40' culvert with 6' x 8' x 40' bottomless box culvert with integrated wing walls.	$110,165.64	4 weeks	Director of Public Works & engineering firm	HMPG project completed Oct 2012
	5) Lawrence Rd; Elevate road 22' x 700' x 4' on average, raise bridge deck, stabilize shoulders and repave.	$202,122.00	2 months	Director of Public Works / Town Engineer	Completed with town Funds August 2015

Harpswell	1) Long Point Rd. Shore up embankment; engineering study done 2013	$75,000	Mid term	Road Commissioner	New project
	2) Bethel Point Rd.; Replace existing 8' x 40' culvert with same sized culvert.	$149,000	2 months	Director of Public Works	Completed with Town Funds
Harrison	1) Buck Rd; Remove ledge in ditch line 300', continue berm along road and upsize existing twin culverts with 36" x 40' N-12 culvert.	$9,000	Mid term	Road Commissioner	Deferred – Lack of Funding
	2) Fog Rd.; Upsize existing twin 36" x 40' cross culvert with 8' x 4' x 40' box culvert riprap inlet and outlet	$9,000	Long term	Road Commissioner	Deferred – Lack of Funding
Long Island	1) 765 Island Ave; Engineering Study and upgrade culvert and stabilize outlet with riprap.	$100,000	Long term	Road Commissioner	Revised from 2012 Plan
	2) Island Ave. & Garfield St; Install catch basin, add 18" x 40' N-12 culvert and upsize 15" x 40' culvert with 18" x 40' N-12 culvert. Ditch and armor 700' and shim 800' of road. Rebuild drainage grate	$12,000	Long term	Road Commissioner	Revised from 2012 plan
	3)Beach Ave. Remove ledge 50' x 6' x 2' Ditch and line 200' add 12" x 30'N-12 driveway culvert	$8,000	2 weeks	Road Commissioner	Completed with Town Funds
	4) Harbor De Grace St; Upsize 12" x 80' culvert with 15" x 80' N-12 culvert, remove ledge 30' x 6' x 2' and ditch 50'.	$8,500	3 weeks	Road Commissioner	Completed with Town Funds

	5) Island Ave; Stabilize bank with riprap and native plantings 400' x 60' x 2'.	10,000	3 weeks	Road Commissioner	Completed with Town Funds
	6) Levitt Street/ Public Works Yard; Excavate wet spot in road install 12' x 30' filter fabric and crushed stone pillow.	$8,000	3 weeks	Road Commissioner	Completed with Town funds per 2012 Plan
	~~1)~~ 7) Island Ave @ Stepping Stone Ln.; Install 12" x 40 N-12 culvert and re-establish ditch line.	$9,000	2 weeks	Road Commissioner	Completed with Town funds per 2012 Plan
	8) Apple Tree Ln.; Upsize existing cross culvert add (2) driveway culverts and (1) catch basin clean ditches and add check dams.	$5,000	3 weeks	Road Commissioner	Completed with Town and PA funds per 2012 Plan
Naples	1) Lakehouse Road near Muddy River ditching	$3,500	Mid term	Road Commissioner	New Project
	2) Lamb's Mill Road from Rt 302 to hilltop ditching	$3,000	Mid term	Road Commissioner	New Project
	3) Edes Falls Road and River Road junction 30"culvert upgrade and ditching	$6,500	Mid term	Road Commissioner	New Project
	4) Wiley Rd @ Sam's Bluff; Upsize existing 30" x 40' corrugated metal pipe with 36" x 40' N-12 culvert and riprap inlet and outlet.	$8,000	Long term	Town Manager	Deferred - Lack of funding
	6) Songo Rd; Ditch 2,500' and add 30" x 40' N-12 culvert.	$11,000	2 weeks	Town Manager	Completed with Town Funds
	7) Lambs Mill Rd; Remove road bed 200' x 21' x 12" install french drain and geotextile fabric and repave.	$10,000	1 week	Town Manager	Completed 2012 with Town funds
	8) Horace Files Rd. @ Pikes Hill; Ditch 200' and build detention pond 10'x 10' x 6'.	$2,000	1 week	Town Manager	Completed 2012 with

					Town funds
	9) Sand Rd; Upsize existing culvert with 24" x 40' N-12 culvert, remove catch basin and replace with stone lined plunge pool. New catch basin installed	$5,000	1 week	Town Manager	Completed 2012 with Town funds
New Gloucester	1) Ayers Rd; Upsize multiple culverts with (1) 3' x 8' x 40' bottomless box culvert and (1) 3' x 10' x 40' bottomless box culvert, elevate road 300' x 21' x 2' and stabilize shoulders riprap and repave	$116,000	Long term	Director of Public Works	Deferred - Lack of funding
	2) Durham Rd; Upsize multiple culverts with 3' x 8' x 40' bottomless box culvert, elevate road 600' x 21' x 2' and stabilize shoulders riprap and repave	$73,000	Long term	Director of Public Works	Deferred - Lack of funding
	3) Woodman Rd; Upsize multiple culverts with 3' x 8' x 40' bottomless box culvert, elevate road 600' x 21' x 2' and stabilize shoulders riprap and repave.	$60,000	1 month	Director of Public Works	Completed with Town funds
North Yarmouth	1) West Pownal Rd; Continue to monitor erosion at site (elevation of road would cost $2 million). Site monitoring will continue in order to collect more information and determine the best approach to mitigating the hazard.		Long Term	Road Commissioner	Revised from 2012 Plan
Portland	1) Johanson and Front St; Park Side Condos acquisition and demolition of six unit condo complex.	1,000,000-2,000,000	Long term	City Council	Deferred - Lack of funding
	2) Washington Ave. @ Leister Dr; Upsize, realign and lower outlet 36" x 150' corrugated metal pipe with 48" x 150' N-12 culvert and install plunge pool.	$50,000	Long term	Director of Public Works	Deferred - Lack of funding

	3) Gertrude St. Install backflow prevention.	$500,000	Long term	Director of Public Works	Deferred - Lack of funding
	4) Capisic St.; Install backflow prevention.	$500,000	Long term	Director of Public Works	Deferred - Lack of funding
	6) Back Cove @ Tukeys Bridge; Stabilize bank along back cove 100' x 90' x 3' using one ton fractured stone and flat revetments in the water up to 5' above mean high tide.	$180,000	2 months	Director of Public Works	Completed City funds
	7) Back Cove @ Dartmouth St; Stabilize bank erosion along walking trail 6'x 150' x 2' using 500 lb. fracture stone riprap.	$14,256	1 week	Director of Public Works	Completed City funds
	8) West end Commercial St; Upgrade drainage.	$500,000	Unknown	Director of Public Works	Completed with City funds per 2012 Plan
	9) Alden and Violette St; Upsize culverts, build detention pond upstream and install backflow valves.	$1,000,000	Unknown	Director of Public Works	Completed with City funds per 2012 Plan
	10) Alden @ Violette Circle; Upsize Lucas St culvert, build detention ponds upstream and install backflow preventers.	$1,000,000	Unknown	Director of Public Works	Completed with City funds per 2012 Plan
	11) Mona/Bernard/Washington/Maine Ave. @ Falls Brook; Easement acquisition, culvert upgrades and stream channel work.	$8,000,000	Unknown	Director of Public Works	Completed with City funds per 2012 Plan
	12) West end of Commercial St; Upgrade storm water system.	$1,000,000	Unknown	Director of Public Works	Completed with City funds per 2012 Plan

	13) 60 kW Generator for Munjoy Fire Station to power 100% of building Also protects sprinkler system for Portland observatory which is wired into Fire Station	$93,655	24 weeks	City of Portland	HMPG Grant funding Completed 2015
Pownal	1) Chadsey Rd Site #1 Upstream; Upsize triple N-12 culverts with 12' x 4' x 40' bottomless box culvert and riprap inlet and outlets.	$45,000	Long term	Road Commissioner	Deferred - Lack of funding
	2) Chadsey Rd Site #2; Upsize triple N-12 culverts with 12' x 4' x 40' bottomless box culvert and riprap inlet and outlets.	$45,000	Long term	Road Commissioner	Deferred - Lack of funding
	3) Brown Rd; Upsize twin 48" x 40' culverts with 12' x 4' x 40' bottomless box culvert, riprap inlet and outlets and repave.	$48,000	Long term	Road Commissioner	Deferred - Lack of funding
Raymond	1) Monitor/mitigate as needed ditch erosion at Raymond Hill Rd and Webbs Mill Rd Site monitoring will continue in order to collect more information and determine the best approach to mitigating the hazard.	Unknown	Long term	Road Commissioner	New Project
	2) Plains Road at Route 85 & Crescent Beach; Install closed drain and catch basin	$50,000 - $200,000	3 weeks	Director of Public Works	Completed with Town Funds
	3) Mountain Rd from Spiller Hill to McDermott Drive; Upsize culvert and armor ditch.	$20,000 - $50,000	2 Weeks	Director of Public Works	Completed with Town funds per 2012 Plan
	4) Elizabeth Ave. from Route 302 to Pine Road	Unknown	Unknown	MDOT	Completed with State funds per 2012 Plan

Scarborough	1) Gorham Rd at Nonesuch River. Engineering study and replacement of existing 5' culvert	$200,000 - $300,000	Long term	Director of Public Works	New Project
	2) Payne Road at Cabela's Boulevard. Engineering study and upsizing of drainage culverts	$75,000 - $175,000	Long term	Director of Public Works	New Project
	3) Pleasant Hill Upgrade storm drain system.	$600,000	Long term	Director of Public Works	Revised from 2012 Plan
	4) Broadturn Rd & Martin Ave; Upsize existing twin 36" x 40' corrugated metal pipes with 10' x 4' x 40' bottomless box culvert and add 36" x 40' N-12 culvert on Martin Ave.	$65,000	Long term	Director of Public Works	Deferred - Lack of funding
	5) Mitchell Hill Rd; Elevate road 300' x 3' x 22' stabilize shoulders and upsize existing culvert with bridge approx.. 100' x 22' with wing walls.	$600,000	Long term	Director of Public Works; Joint project with Gorham	Deferred - Lack of funding
	6) Sawyer St.; Elevate 600' x 22' x 18" add (3) 18" x 40' N-12 cross culverts, stabilize shoulders and repave.	$95,000	Long term	Director of Public Works; Joint project with Cape Elizabeth	Deferred - Lack of funding
	7) Higgins Beach along Bay View Dr; shoreline erosion. Install plantings/storm breaks.	$75,000	3 weeks	Director of Public Works	Completed with FEMA/ Town funds. Still Issues. per 2012 Plan
	8) Higgins beach between Cliff and Shell St; Upgrade storm drain system.	$100,000	Unknown	Director of Public Works	Completed with Town funds per 2012 Plan
	9) Clay Pitts Rd; Armor river banks with riprap	$7,500	3 weeks	Director of Public Works	Completed with FEMA/ Town funds per 2012 Plan

Sebago	1 Shore Road: 600' surface improvements, add gravel cross culverts	$100,000	Short Term	Road Commissioner	New Project
	2. Anderson Road: ditch, cross culverts and repave	$90,000	Long Term	Road Commissioner	New Project
	3. Robinson Hill Rd.: rebuild cross culverts under drains (spring), ditch both sides of road, repave	$225,000	Short Term	Road Commissioner	New Project Completed with Town Funds
	4 Swamp Road: ditch both sides of road, cross culverts and repave	$165,000	Short Term	Road Commissioner	New Project completed with Town Funds
	5) Peabody Pond Rd. Ditch and line 1,800' add (2) driveway culverts 15" X 30' and (~~1~~2) cross culvert 15" x 40' remove ledge from ditch line. Second cross culvert 4' x 45"	$75,000	2 weeks	Road Commissioner	Revised from 2102 Plan In progress
	6) River Rd; Elevate and reconstruct road replace 18" x 40' culverts with 24" x 40' N-12 culverts.	$120,000	3 weeks	Road Commissioner	Completed with Town Funds
	7) Hancock Pond Rd; Upsize culvert and elevate road and add ditches. Ditched on both sides and repaved 3.6 miles	140,000	3 weeks	Road Commissioner	Completed with Town Funds
	8) Winn Mountain Rd; Ditch 500'. Ledge blasting to improve drainage	$5,000	1 week	Road Commissioner	Completed with Town Funds
	9) Dyke Mountain Rd; Ditch and pave road.	$67,000	1 week	Road Commissioner	Completed with Town funds per 2012 Plan
	10) Orchard Rd; Ditching and install 140' of culverts.	$8,000	1 week	Road Commissioner	Completed with Town funds per 2012 Plan

South Portland	1) Fessenden St @ Trout Brook; Upsize existing twin 36" x 50' culvert with 3' x 8' x 50' bottomless box culvert and riprap inlet and outlet.	$65,000	Long term	Director of Public Works	Deferred - Lack of funding
South Portland Cont.	2) Alfred St; Upsize existing twin 24" x 40' culvert with 3' x 6' x 50' bottomless box culvert and riprap inlet and outlet.	$55,000	Long term	Director of Public Works	Deferred - Lack of funding
	3) Boothby St @ Trout Brook; Upsize existing culvert with 3' x 6' x 50' bottomless box culvert and riprap inlet and outlet.	$55,000	Long term	Director of Public Works	Deferred - Lack of funding
	4) Running Hill Rd; Install catch basin.	$25,000	Mid term	Director of Public Works	Deferred - Lack of funding
	5) Broadway @ Daytona; Relocate Basin	$50,000	unknown	Director of Public Works	Completed with City funds per 2012 Plan
	6) Highland Av @ High school; Upgrade storm drain system.	$130,000	unknown	Director of Public Works	Completed with City funds per 2012 Plan
	7) Main St @ Massachusetts and Main @ Wallace Ave.; Road rehabilitation	Unknown	unknown	Director of Public Works	Completed with City funds per 2012 Plan
	8) Preble @ Alder and Day St; Add curb inlet.	$10,000	unknown	Director of Public Works	Completed with City funds per 2012 Plan
	9) Broadway @ Boys Club; New sidewalks and upgrade systems.	$50,000	unknown	Director of Public Works	Completed with City funds per 2012 Plan

10) Highland Ave @ Whispering Pines; Upgrade storm drain system.	$100,000	unknown	Director of Public Works	Completed with City funds per 2012 Plan
11) Broadway @ underpass; Upgrade Storm drain system.	$100,000	unknown	Director of Public Works	Completed with City funds per 2012 Plan
12) Dike Farm Rd @ Meadow Way; Upgrade storm drain system.	$50,000	unknown	Director of Public Works	Completed with City funds per 2012 Plan
13) Nutter Rd; Upsize existing culvert.	$10,000	unknown	Director of Public Works	Completed with City funds per 2012 Plan
14) Highland Ave @ Gamblers Brook; Upsize existing culvert.	$10,000	unknown	Director of Public Works	Completed with City funds per 2012 Plan
15) Angell Ave. @ Preble St; Install curb inlets.	$50,000	unknown	Director of Public Works	Completed with City funds per 2012 Plan
16) Cummings Rd @ Westbrook Line; Upgrade culverts.	N/A	unknown	Director of Public Works	Completed with City funds per 2012 Plan
17) Broadway @ Scarborough Line; Upgrade Ditches.	N/A	unknown	Director of Public Works	Completed with City funds per 2012 Plan
18) Willow St @ Sand pebbles condo's; Tidal effect	N/A	unknown	Director of Public Works	Completed with City funds per 2012 Plan

Standish	1) Blake Rd; Upsize existing twin culverts 36" x 40' culverts with 8' x 4' x 40' bottomless box and riprap inlet and outlet	$70,000	Long term	Director of Public Works	Deferred - Lack of funding
Standish cont.	2) Middle Jam Rd; Install precast head wall with wing walls on inlet and outlet of 40" culvert.	$15,000	Mid term	Director of Public Works	Deferred - Lack of funding
	3) Northeast Rd @ Rt. 35; Ditch and armor 300' add 30" x 30' N-12 driveway culvert.	$7,000	Mid term	Director of Public Works	Deferred - Lack of funding
	4) Route 35A – Cape Road; upsize culvert, create spillway, armor downstream side of road bed.			Director of Public Works	Deferred - Lack of funding
	5) Cape Rd; Upsize existing 30" x 40' corrugated metal pipe with 36" x 40' N-12 culvert and riprap inlet and outlet.	$5,000	2 week	Director of Public Works	Completed with town funds
	6) White Bridge Rd; Upsize existing culvert and create spillway and armor downstream side of road.	$ 50,000-200,000	3 weeks	Director of Public Works	Completed with Town funds per 2012 Plan
Westbrook	1) Brook Street. Replace bridge over Minnow Brook with new culvert to meet crossing standards	Unknown	Long term	Director of Public Works	New Project
	2) Cottage Place. Culvert upgrade to meet crossing standards.	Unknown	Long term	Director of Public Works	New Project

	3) Purchase and demolish building at 40 Lincoln St.	$250,000	Long term	Director of Public Works	New Project
	4) Cumberland St; Upsize existing twin culverts.	Unknown	Unknown	Director of Public Works	Completed with City funds per 2012 Plan
	5) River Walk @ Ash St; Stabilize bank with 12" riprap.	$5,000	3 Days	Director of Public Works	Completed with City funds per 2012 Plan
Windham	1) Highland Cliff Rd @ Annie Leighton Brook. Add second culvert	$45,000	Long term	Director of Public Works	Revised from 2012 Plan
	2) Nash Rd; Elevate road 1,200' x 21' x 2' stabilize shoulders add 24" x 40' N-12 cross culvert and repave.	$74,000	Mid term	Director of Public Works	Deferred - Lack of funding – now in capital budget
Yarmouth	1) Ledge Rd; Install headwall and wing walls on inlet side of Pratt's Brook.	$10,000	Mid term	Director of Public Works	Deferred - Lack of funding
	2) North Rd; Add 42" x 80' N-12 overflow culvert at Pratt's Brook.	$15,000	2 weeks	Director of Public Works	Completed with Town Funds

3) Pratt's Brook @ Northwood Rd; Problem should be solved by adding overflow culvert @ North Rd.	N/A	N/A	Director of Public Works	Resolved by North Rd culvert
4) Pratt's Brook @ East Elm St; Problem should be solved by adding overflow culvert @ North Rd.	N/A	N/A	Director of Public Works	Resolved by North Rd culvert

SECTION VI – PLAN MAINTENANCE PROCESS

MONITORING, EVALUATING AND UPDATING THE PLAN

Requirement §201.6(c)(4)(i):	(The plan shall include a plan maintenance process that includes) a section describing the method and schedule of monitoring, evaluating, and updating the mitigation plan within a five year cycle

§201.6(c)(4)(i) requires a formal plan maintenance process to take place to ensure that the Mitigation Plan remains an active and pertinent document. The plan maintenance process includes a schedule for monitoring and evaluating the plan at least every five years, and continued public participation throughout the plan maintenance process. This section also includes an explanation of how the county and municipal governments intend to incorporate their mitigation strategies into any existing planning mechanisms they have.

Monitoring the Plan. Monitoring of the Plan continues to be conducted by the Cumberland County Emergency Management Agency (CCEMA) and the local Emergency Management Agency Directors CCEMA collects information (via email and phone conversations) on an annual basis from the local EMA Directors to assess progress on the mitigation goals and objectives. CCEMA also hosts monthly meetings of the County EMA Directors at which issues relating to the implementation of the plan are addressed. This process has worked well for Cumberland County and will continue in the next five years. The mitigation plan and project application process will also be addressed at each federal disaster declaration kickoff meeting and will be reinforced via email announcements for workshops and grant application deadlines

Evaluating the Plan
The plan is constantly being evaluated through various measures at county and local levels. Annually and after each disaster declaration, Cumberland County EMA reviews the hazards in the risk assessment section of this plan. In addition, Cumberland County EMA contacts towns in regards to Form 7 briefings and submittals, workshops on project applications, and for the status on existing projects and the addition of new projects. This process has worked well for Cumberland County and will continue in the next five years.

Updating the Plan. The Plan will be updated every five years. The method for determining what changes might be necessary will be to review and assess information gathered from disaster declarations, unusual weather events and/or significant changes in science or legislation. As previously described, part of that schedule will be reviews on a monthly basis and after disasters, but in the fourth year of the plan, a more in depth review will take place, and the plan will be updated accordingly. At the beginning of the fourth year, CCEMA will again initiate a process to assess the implementation of the plan including a re-evaluation of the hazard analysis and the mitigation measures. This process will involve the local EMA Directors, who serve~~d~~ as liaisons to other municipal staff and officials. Based on the information collected and an analysis of that information, proposed changes to the plan will be made for the five year period and submitted to the Maine Emergency Management Agency and Federal Emergency Management Agency. This process will be repeated during the fourth year of implementation for each updated version of the Plan.

INCORPORATION INTO EXISTING PLANNING MECHANISMS

Requirement §201.6(c)(4)(ii): (The plan shall include a plan maintenance process that includes) a process by which local governments incorporate the requirements of the mitigation plan into other planning mechanisms such as comprehensive or capital improvement plans, when appropriate.	
Element	C6. Does the plan describe a process by which local governments will integrate the requirements of the mitigation plan into other planning mechanisms, such as comprehensive or capital improvement plans, when appropriate?

County government is very limited in scope and authority in the State of Maine and does not have the staff, authority, or fiscal capabilities to control planning or development within municipalities. In Maine, most government authority is derived from State statues and rules and with the municipal "home rule" ordinances.

It must be recognized that there is a variety of governance structures within Cumberland County. Some municipalities can adopt ordinances and other regulatory mechanisms by council or select board vote, while other municipalities must put such proposals to a town meeting vote. The citizens in attendance at these meetings have a vested interest in the town and how and what is funded annually. Through the municipal budget process and long-term planning based on the identified mitigation actions, towns will be better able to allocate funding for these projects to safeguard their communities. In all cases, the need to educate the public as well as elected officials is paramount

The Cumberland County Emergency Management Agency (CCEMA) will provide guidance to the local EMA Directors who will play the lead role in incorporating measures in the hazard mitigation plan into other planning mechanisms. (See Appendix for letter regarding SLOSH modeling)

The municipalities used the following planning mechanisms to incorporate the mitigation strategy and other information contained in the 2011 HMP, where appropriate. Planning mechanisms at the municipal level include:

- All municipalities have Comprehensive Plans. Comprehensive plans are policy documents that address a wide range of issues affecting the future of the community, and those relating to public safety and environmental protection would be consistent with the strategies contained in this plan. In general, local comprehensive plans do not include recommendations on specific projects, although they may contain recommendations that roads and their associated infrastructure be upgraded as funds become available.
- Participation in the National Flood Insurance Program. In addition, two communities have attained Level Eight in the Community Rating System.
- Capital improvement plans (most of the larger municipalities have capital improvement plans; some of the smaller ones do not, but they do have local budgeting processes which are used to examine potential expenditures in detail and establish overall spending priorities).
- Road maintenance planning efforts: These may include priorities for local improvements, but not necessarily engineering studies or cost benefit analyses.
- Emergency management and mitigation planning.
- Fire prevention planning and coordination, including participation in mutual aid agreements and multi-town wildfire training exercises, and:
- Grant writing (many of the County's municipalities have been active in applying for grants to address municipal priorities).

It must be noted that all of the mitigation measures identified by the local EMA directors for the 2017 revision of the Plan were structural and not ordinance related.

Process for Incorporating Mitigation Strategies and Related Information into Local Planning Mechanisms.

County government does not have the authority to control local planning mechanisms. However, the County EMA Director can provide information to local units of government, as well as technical assistance. After adoption of the Mitigation Plan, the Cumberland County EMA Office offers assistance to municipal officers in implementing their selected mitigation measures. The County EMA Office conducts annual reviews with local EMA directors to determine the status of their measures. The County EMA office assists the municipalities with the completion of FEMA PreDisaster Mitigation and Hazard Mitigation Grant packages.

Explanation of How Local Governments Incorporated Strategies and other Information.

In addition to the planning mechanisms discussed above, there has been progress in some additional areas, but no known actions in other areas:

- Comprehensive plans – no State money for new plans or updates
- Road maintenance planning efforts – many towns in Cumberland County are now using MEMA's Road Tracker to document repair costs
- Emergency management and mitigation planning – limited because of part time EMA directors and little or no budgets
- Ordinances –no State money for new plans or updates
- Grant applications – a few of the County's municipalities have been active in applying for grants to address mitigation issues

The County EMA notifies municipal EMA's and local officials of hazard mitigation workshops such as those related to the Pre-Disaster and Hazard mitigation Grant programs, workshops with hazard mitigation context such as those sponsored by Maine's Local Roads Center that deal with the use of geotextiles, and workshops dealing with various sea level rise scenarios and how they may affect specific municipalities.

The responsible agency within each municipality that is responsible for the implementation and completion of each mitigation measure will notify the County EMA Office whenever assistance is needed or whenever a measure is completed. Existing programs such as the municipal road maintenance plan, emergency management program and local fire prevention programs will be utilized to their greatest extent to complete the community's mitigation measures.

Continued Public Participation

Requirement §201.6(c)(4)(iii): (The plan shall include a plan maintenance process that includes) a discussion on how the community will continue public participation in the plan maintenance process	
Element	A5. Is there discussion on how the community(ies) will continue public participation in the plan maintenance process?
	A6. Is there a description of the method and schedule for keeping the plan current (monitoring, evaluating and updating the mitigation plan within a 5year cycle)?

Cumberland County is committed to involving the public directly in the continued reshaping and updating of the Hazard Mitigation Plan. The CCEMA Planning Team is responsible for reviewing and updating the plan. The opportunity for the public to comment on the HMP has been available, and will continue to be available, on the Cumberland County website, and is linked to our Facebook and Twitter sites. Contained in the plan is the address and phone number of the Cumberland County EMA Office, which is responsible for keeping track of public comments on the plan.

Each municipality will receive a copy of the completed plan to keep on file at the municipal office. A notice will be posted at each municipal office advising the public of the availability of the plan for review. Municipalities with websites may choose to post the plan on the website. The original and draft updates have been posted on the CCEMA website during the updating process in order to encourage public comment on the plan during the draft stage. The website is as follows: http://www.cumberlandcounty.org/223/Emergency-Management-Agency.

Members of the public have been welcome to submit comments, suggestions, or feedback on the plan to CCEMA via our website (See Appendix for Feedback form). Each comment from the public are reviewed for possible inclusion in the final plan. CCEMA will continue its efforts to coordinate with volunteer community groups.

At the time of the initial five-year review and update of the plan, and at subsequent updates, CCEMA will notify the public of the plan review and updating process and will invite public comment and participation in the process. To a large degree, this will be done through the use of the monthly regional meetings CCEMA holds with the local emergency management directors. Included as an agenda item will be the request for updates on the HMP from the meeting participants. This will serve to reinforcement the importance of the plan and encourage local directors to provide to their constituents information on the plan and the update process.

In Cumberland County, hazard mitigation is far more than a written plan. It is an important part of the overall mission of the Cumberland County Emergency Management Agency (EMA), and is fully integrated into the comprehensive nature of the EMA's emergency management responsibilities. Most of the EMA's activities and communications emphasize the importance of planning, preparation, mitigation, training, and emergency response. A partial list of EMA's public outreach efforts includes:

- Maintaining and updating the EMA's website;
- Including on the website and social media public information materials such as the Winter Awareness brochure;
- Including on the website and social media notice of training opportunities for local public safety personnel;
- Communicating with the public on an ongoing basis through the website and social media
- Supporting emergency communications systems such as PageGate (the messaging server used in Cumberland County)
- Holding meetings and training sessions with local EMA officials;
- Maintaining the Vulnerable Population Communication Network and ensuring the agencies on the list are contacted during storms and other emergencies
- Participating in public outreach efforts such as the annual Maine Preparedness Conference
- Participating in events with County Special Teams such as
    - Southern Maine COAD booths at Scarborough Summerfest and the Portland Sea Dogs events night
    - Medical Reserve Corps participation in flu clinics
    - Animal response team participation in Portland Home Show

County EMA will also continue to provide advisories on its website and social media when public safety may be impacted by hazards such as flooding or severe winter storms.

The address and phone number of the Cumberland County EMA office is:

Cumberland County Emergency Management Agency
22 High Street – Unit 1
Windham, ME 04062
207-892-6785
207-892-8617 (fax)

http://www.cumberlandcounty.org/223/Emergency-Management-Agency