HAZARD MITIGATION PLAN

Knox County, Maine
2012 Update

Prepared by the

Knox County Hazard Mitigation Planning Team,
and
Knox County Emergency Management Agency

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SECTION 1 OVERVIEW

Purpose: The purpose of this plan update is to provide guidance for a hazard resistant Knox County that vigilantly assesses, plans for and mitigates any natural hazard.

Geography: The County has a total area of 1,142 square miles, of which, 366 square miles is land and 776 square miles (68%) is water. Thirteen of the County's municipalities, including five islands, are coastal communities with frontage on Penobscot Bay and the Atlantic Ocean. The mainland portion of the County includes 13 lakes and large ponds. Rolling hills and mountains rise in both coastal and inland communities to a maximum elevation of 1,385 feet.

Climate: Knox County's climate has an influence on the occurrence and severity of natural hazards. During the winters, temperatures range on average from 10 to 29°F. Ice, sleet, rain, snow, and heavy winds are common. The highest monthly precipitation is 5.37 inches in November. During the summers, temperatures are pleasant. The warmest month, July has an average daily maximum temperature of 76.2°F. However, storms are common and bring heavy winds and rain. The lowest monthly precipitation for the County is 2.91 inches on average in August.

Transportation: With the exception of school bus services and demand response services for special needs individuals, regularly scheduled, fixed-route municipal public transportation services are not provided within the County. Therefore, everyone is dependent on private vehicles and the road network. Additionally, island communities are served by state and private ferries and essential air services which can be severely impacted by extreme weather. US Route 1 is the principal arterial serving Knox County residents and businesses. It is an economic lifeline to the region. State Route 17 is a minor arterial, providing the main east-west inland access to the state capital Augusta. The other state routes are collector roads that link coastal, peninsular, and inland communities. The region has freight and seasonal tourist rail service only. Year-round passenger rail is not available.

Governance: Knox County has the following governmental units:

- **County -** One county government that includes the County Sheriff's Department and County Jail, County Administrative Office, County Treasurer's Office, Registrar of Deeds, Probate Judge, Assistant District Attorney, Regional Communications Center, Regional Airport and the Emergency Management Office.
- **City -** One city that is run by a city council/city manager form of government. The city council sets policy, adopts plans and ordinances, and approves annual budgets. The city office has regular hours, and provides a range of public services, like sewer, water, police, ambulance, fire protection, and public works. The city is responsible for tax collection, local road maintenance and snow removal, land use planning and permitting and code enforcement. Most city officials are paid employees.
- **Town -** Sixteen towns that are run by publically elected select boards, some with town administrators or managers. The town meeting form of government is used, in which registered voters adopt ordinances and plans, and approve budgets at yearly and special town meetings. Town offices are open to the public on a limited basis, and most town officials are volunteers. Towns provide limited services, and most depend upon the County or neighboring communities to assist with police and fire protection. The towns are responsible for tax collection, local road maintenance and snow removal, land use planning and permitting and code enforcement.
- **Plantation -** One plantation that is run by a Board of Assessors. Few services are provided locally, and the plantation depends upon the State and the County to assist with police protection and other essential services. Plantation office hours are irregular.

- **UT** (Unorganized Territory) - The State regulates land use development and permitting through the Land Use Regulation Commission (LURC), and tax collection. The County provides police protection and other essential services. The Unorganized Territory has no local government.

Employment: Most employment is located in the service center community of Rockland, followed by the specialized service center communities of Camden, Rockport, and Thomaston. Medical, social services and education professions have seen growth over the past decade, while many other sectors have stagnated or decreased. Hospitality occupations provide low wage employment in season. Traditional industries including construction, maritime activities, and related occupations remain important sectors, although they employ fewer people today than they once did.

Demographics:

County, State, Nation Profile				
Measure	**Knox County**		**Maine**	**USA**
	2010	**2000**	**2000**	**2000**
Population	39735	39,618	1,274,923	281,421,906
Total Housing Units	23744	21,612	651,901	115,904,641
Total Households	16945	16,608	518,200	105,480,101
Average Household Size	2.32	2.31	2.39	2.59
Median Household Income	$45291	$36,774	$37,240	$41,994
Persons below Poverty	4,325*	3,865	135,501	33,899,812
% of population under 5	4.8	5.3	5.5	6.8
% of population 18 and over	61.49	77.6	76.4	74.3
% of population 65 and over	19.1	17.2	14.4	12.4

Source: Census 2010

Notes: * Poverty figure is for 2008

Municipal Profile 2012			
Area	**Population**	**Total Housing Units**	**Occupied Year- Round Housing Units**
Appleton, Town of	1316	646	545
Camden, Town of	4850	3165	2382
Cushing, Town of	1534	926	642
Friendship, Town of	1152	896	508
Hope, Town of	1536	805	603
Isle au Haut, Town of	73	172	42
Matinicus Isle Plantation	74	147	41
North Haven, Town of	355	515	165
Owls Head, Town of	1580	1060	737
Rockland, City of	7297	3925	3423
Rockport, Town of	3330	1956	1422
St. George, Town of	2591	2107	1204
South Thomaston, Town of	1558	893	674
Thomaston, Town of	2781	1385	1219
Union, Town of	2259	1203	981
UT (Unorganized Territory)	7	68*	
Vinalhaven, Town of	1165	1295	545
Warren, Town of	4751	1760	1508
Washington, Town of	1527	797	614

Source: Census 2010

Note: *The housing units in the UT are seasonal, **not primary residences**.

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SECTION 2 PREREQUISITES

The Knox County ME Hazard Mitigation Plan update is for a multi-jurisdiction plan. See below.

2. Multi-Jurisdictional Plan Adoption	
Requirement §201.6(c)(5): For multi-jurisdictional plans, each jurisdiction requesting approval of the plan must document that it has been formally adopted.	
Elements	**A.** Does the new or updated plan indicate the specific jurisdictions represented in the plan?
	B. For each jurisdiction, has the local governing body adopted (the) new or updated plan?
	C. Is supporting documentation, such as a resolution, included for each participating jurisdiction?

The specific jurisdictions that participated in the review of and revisions to this plan update included all of the following communities:

- Appleton, Town of
- Camden, Town of
- Cushing, Town of
- Friendship, Town of
- Hope, Town of
- Isle au Haut, Town of
- Matinicus Isle Plantation
- North Haven, Town of
- Owls Head, Town of
- Rockland, City of
- Rockport, Town of
- St. George, Town of
- South Thomaston, Town of
- Thomaston, Town of
- Union, Town of
- UT (Unorganized Territory)
- Vinalhaven, Town of
- Warren, Town of
- Washington, Town of

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SECTION 3 PLANNING PROCESS

3. 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…Statewide plans will not be accepted as multi-jurisdictional plans.

This Knox County Hazard Mitigation Plan Update is a multi-jurisdictional plan that has been prepared by a Hazard Mitigation Planning Team hosted by the Knox County Emergency Management Agency with representatives from the state, county and municipal governments, private and volunteer sectors. The Planning Team also met or spoke with representatives of each of the municipalities to collect their comments and recommendations on the identification of hazards, assessment of vulnerabilities and risks, and the determination of mitigation goals and measures.

A. Documentation of local participation. Participation is documented by attendance lists of meetings, press releases, meeting notices, websites, and municipal survey responses in Appendix A and B. Each community's participation is summarized in the next table.

Summary of Local Participation				
Area	**Meeting Attendance**	**Telephone Conversations**	**Email Correspondence**	**Surveys and Mailings**
Appleton, Town of	x		x	x
Camden, Town of			x	x
Cushing, Town of	x		x	x
Friendship, Town of	x		x	x
Hope, Town of	x		x	x
Isle au Haut, Town of			x	x
Matinicus Isle Plantation		x	x	x
North Haven, Town of			x	x
Owls Head, Town of	x		x	x
Rockland, City of	x		x	x
Rockport, Town of	x		x	x
St. George, Town of	x		x	x
South Thomaston, Town of			x	x
Thomaston, Town of			x	x
Union, Town of	x		x	x
UT (Criehaven, Muscle Ridge Shoals)		x	x	x
Vinalhaven, Town of		x	x	x
Warren, Town of			x	x
Washington, Town of			x	x

B. Status of local participation.

Summary of Participating Municipalities		
Areas	**In 2005 Plan**	**In 2012 Plan**
Appleton, Town of	Yes	Yes
Camden, Town of	Yes	Yes
Cushing, Town of	Yes	Yes
Friendship, Town of	Yes	Yes
Hope, Town of	Yes	Yes
Isle au Haut, Town of	Yes	Yes
Matinicus Isle Plantation	Yes	Yes
North Haven, Town of	Yes	Yes
Owls Head, Town of	Yes	Yes
Rockland, City of	Yes	Yes
Rockport, Town of	Yes	Yes
St. George, Town of	Yes	Yes
South Thomaston, Town of	Yes	Yes
Thomaston, Town of	Yes	Yes
Union, Town of	Yes	Yes
UT (Criehaven & Muscle Ridge Shoals)	No	Yes
Vinalhaven, Town of	Yes	Yes
Warren, Town of	Yes	Yes
Washington, Town of	Yes	Yes

4. Documentation of the Planning Process

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.

A. Narrative description.

The planning process included a series of meetings for local officials and mailings to all municipalities in the county. The Hazard Mitigation Planning Team meetings are described in the paragraphs below and additional meeting information is in Appendix A**:**

June 30, 2009. The following is a summary of the start-up meeting that was held at Knox County EMA Office to develop the Knox County Hazard Mitigation Plan Update. Officials representing the municipalities attended the meeting.

Representatives from the Maine Emergency Management Agency (MEMA), and the Knox County Emergency Management Agency provided handouts. A question and answer session was held on basic plan requirements and how mitigation grant eligibility is tied to having FEMA-approved plans.

A representative from the Mid-Coast Regional Planning Commission, who was hired to assist in the drafting of the Plan Update asked attendees to review the current plan and consider revisions that they would like to see incorporated into the plan update. A municipal survey form will be distributed at the July meeting, which is part of the first step in obtaining required information for the risk assessment.

1. Municipal officials who attended the meeting agreed to form a Planning Team to continue the planning process.
2. The consensus of the group was to follow the overall format of the Knox County hazard mitigation plan.
3. It was agreed that the next meeting of the Planning Team would be held on July 21 at Knox County EMA Office.

July 21, 2009: Team members prioritized hazards (see Section 4: Risk Assessment). The arithmetic mean of the individual team member prioritizations will be calculated and presented to the team for their approval.

The team discussed whether to profile additional hazards and decided to include hurricanes within the severe storm category, given the infrequency of hurricanes in Knox County and the similar effects from hurricanes as from other severe storms.

The team reviewed the draft survey that will be sent to each municipality. The team agreed to provide any revisions to the public/emergency facilities map of their municipality. The team discussed revising General Goals, Objectives, and Actions and revising specific actions/projects (see Section 5: Mitigation Strategies) which included the most recent list and the projects from the earlier plan. It was agreed that each community should review these and determine a priority order, whether to add new projects and to document the progress of projects noted in the earlier plan.

August 18, 2009: The changes made to the plan update since the last team meeting were described. These changes include added housing data for the Knox County UT, wildfire timber harvesting data, historical data of hurricanes not affecting Knox County, the notation of State forecasted population projection declines for several communities, and that an evaluation of the plan should occur every three years

The team reviewed the averages of the Natural Ratings Hazards Sheet ratings/prioritization/ranking, which were calculated from team member responses. The team reviewed the Survey Results received to date, which will be placed in Appendix C. Team members were asked to review the Hazard Mitigation and to assess their current status of completion. Any revisions should be provided to the consultant by September 1.

The County GIS staff discussed mapping options and he requested that any corrections to the 2004 maps be provided to the County so that current maps can be made part of the plan update. In addition to mapping public facilities, the location of assisted living and other special needs medical and residential facilities will be shown. The use of Google maps will make this information accessible online and therefore more useful to the communities.

It was decided to submit the plan update to MEMA for preliminary review in September and to hold public meetings to describe the plan update and to solicit public opinion and suggestions in October. One meeting will be held in the morning, and one will be held in the evening, in order to attract as many people as possible. The meetings will be recorded for broadcast on cable access television. Rockland City Hall was suggested as the venue.

October 2009: Two public informational meetings were held at the Rockland City Hall on October 27, 2009. One meeting was held in morning, the other meeting in the evening. This was done to attract more attendees. Municipal officials and members of the public attended. After a presentation of the purpose and content of the plan update, the attendees asked

questions and made suggestions. The meetings were advertised in the local and regional media. See Appendix B for copies of the notices. The evening meeting was recorded and broadcast on the cable access television station.

June 2010: Plan was submitted to FEMA for conditional approval

March 2011: FEMA requested additional revisions to the plan

April 2011-2012: Re-revisions were made to the plan, to include adding the 2010 Census information and a complete re-evaluation of all town projects and their current status.

B. People who were involved in the planning process.

Staff level and consultant assistance: The EMA Director led the development of the plan at the staff level. The Director was assisted by consultant Mid-Coast Regional Planning Commission in the drafting of the plan update.

The **Hazard Mitigation Planning Team** consisted of representatives from state, county, and municipal governments, the regional council of governments, and several local officials. The Planning Team provided materials and information to the consultant, participated in drafting and reviewing the plan, arranged for public meetings, and provided overall coordination. The Hazard Mitigation Planning Team included:

Roger A. Moody, County Commissioner, Knox County
Ray O. Sisk, Knox County EMA Director
Donna Allen, Deputy Director for Admin, Knox County
Jeffrey Northgraves, Airport Manager, Knox County
EMA Director, Town of Appleton
Chris Farley, Fire Chief, Town of Camden
Arthur T. Kiskila, Fire Chief/EMA Director, Town of Cushing
Philip Bramhall, Fire Chief/EMA Director, Town of Friendship
Clarence Keller, Fire Chief, Town of Hope
Ellard Taylor, Fire Chief/EMA Director, Town of Isle Au Haut
Eva Murray, Citizen, Matinicus Isle Plantation
EMA Director, Town of North Haven
Frank Ross, III, Fire Chief, Town of Owls Head
Charles Jordan, Jr., Fire Chief/EMA Director, City of Rockland
Gregory Blackwell, Director of Public Works, City of Rockland
Craig Cooley, EMA Director, Town of Rockport
Timothy Polky, Fire Chief, Town of St. George
Becky Butler, EMA Director, Town of South Thomaston
Phillip Netzorg, EMA Director, Town of Thomaston
Barry W. Norris, Fire Chief, Town of Union
Marjorie Stratton, Town Manager, Town of Vinalhaven
George Field, EMA Director, Town of Warren
Grant Watmough, Town Manager, Town of Warren
Donald Grinnell, Selectman, Town of Washington
Tom Johnston, Fire Chief, Town of Washington
JoAnn E. Mooney, State Hazard Mitigation Officer, MEMA
Elizabeth Barton, Natural Hazards Planner, MEMA
Eric Galant, Executive Director, Mid-Coast Regional Planning Commission

Not every municipality in Knox County had a member on the Hazard Mitigation Planning Team. However, each municipality participated in one of several ways. Information for this plan was collected from data surveys that were sent out to each municipality. Most of the towns filled out the information, which consisted of Planning and Development Information, Critical Infrastructure Inventory, and a listing of reoccurring disaster damage areas. Those towns that did not send in their surveys were interviewed individually. Finally, every community participated in the Mitigation Project Selection Process by attending several public meetings held at the County EMA office after the Hazard Mitigation Planning Team completed their work. The following individuals represented their respective municipalities.

The Municipal Hazard Mitigation Planning Representatives consisted of the following:

See the previous section for the list of planning team members. See Appendix A for attendance lists of the Knox County Hazard Mitigation Planning Team meetings, public hearing sessions, and Knox County Local Emergency Planning Committee (LEPC) meetings

The following organizations and agencies participated in the development and review of the Knox County Hazard Mitigation Plan:

- Knox County Commissioners
- Knox County Emergency Management Agency
- Knox County Emergency Local Planning Committee (includes representation from the American Red Cross, Maine Department of Environmental Protection, U.S. Coast Guard, Penobscot Bay Medical Center, FMC Biopolymer Corporation, Dragon Products and Coastal Cement Corporation, Fisher Engineering, Lonza, Inc., Lyman Morse Boatbuilding Company, Maritime Energy, O'Hara Corporation, and Northeast Composites, Inc.)
- Knox County Regional Communication Center
- Mid-Coast Regional Planning Commission

C. How the public was given an opportunity to be heard.

The Planning Team used press releases, town mailing and the County EMA web site to provide public notice. Public notice was also given for all of the team meetings and public informational meetings, in which public comment was accepted, in the form of newspaper notices. Meeting notices, press releases, and websites links are included in Appendix.

D. Opportunities for additional comments.

Additional comments could be made to the County EMA in person, by phoning or writing by mail, email, and/or by completing the survey provided to the municipalities. Opportunities for neighboring jurisdictions, agencies, businesses, academia, nonprofits, and other interested parties to be involved in the planning process were given in the form of press releases, town mailings, the County EMA web site and newspaper notices used to meet the requirements of C, above.

E. Review and incorporation of existing plans and studies.

The Planning Team reviewed the 2005 County Plan, the latest version of the State Plan and other county and local plans and incorporated them as appropriate. The Risk Assessment portion of this plan provides a more detailed summary of plans, and other materials that were used to identify and document various hazards. This plan update may be incorporated into

other plans, municipal budgets, and EOPs once this plan update is approved by FEMA and adopted by the municipalities of Knox County.

F. How the planning team reviewed and analyzed each section of plan and whether each section was revised.

This Plan Updates were developed with input from:

- The 2005 County Hazard Mitigation Plan
- The 2007 State Hazard Mitigation Plan
- Disaster declarations since completion of the 2005 plan
- Information obtained from municipal comprehensive plans, municipal land use ordinances, and municipal capital investment/improvement plans completed since the 2005 plan
- The 2010 U.S. Census
- All towns regarding the 2012 status of their projects

All revised, updated, and new text, figures, and provisions not found in the 2005 plan are in color text in this Plan Update.

Knox County Hazard Mitigation Plan Sections

All sections:

For consistency within the required sections and for ease of review against the crosswalk, MEMA required all county plans to use the same format. As a result, the sections of this update were reformatted. All new text is shown in red font. Text from the 2005 plan is in black if the information is still relevant. For a description of the Hazard Mitigation Planning Team review of the draft sections, see meeting notes in 4.A. “Narrative Description”.

MEMA carefully reviewed all of the draft sections. To facilitate FEMA approval of the plan, MEMA provided suggested revisions in an outline format by email and explained those suggestions in phone conversations with the County EMA Director and the Mid-Coast Regional Planning Commission (MCRPC). MCRPC then incorporated those suggestions into revised drafts. MEMA reviewed subsequent versions of all of the draft sections and offered further suggested revisions, which were reviewed by the County EMA Director and MCRPC. MCRPC then incorporated those revisions into the draft sections. This process was repeated until MEMA determined that the draft sections were satisfactory for FEMA review.

Cover/Table of Contents: This section was revised for pagination.

1. Overview: This section was revised by MCRPC to include new information, including climate data and 2009 demographic estimates. This information was presented to the Hazard Mitigation Planning Team. The Team discussed this section and offered suggestions and corrections that were incorporated into a revised draft. The Team found the revised draft section acceptable.

2. Prerequisites: No substantive changes were made to this section.

3. Planning Process: This section was revised. New hazard mitigation planning team members, team meetings and public involvement opportunities was described. This section

was presented to the Hazard Mitigation Planning Team. The Team found this section acceptable.

4. Risk Assessment: This section was revised. New information, inventory data, and analysis were added, including the hazards profiled. Hazard types and incidents that have occurred since the 2005 County Plan were reviewed. The sources for this information are noted in this section. The Hazard Mitigation Planning Team ranked hazards based upon severity and likelihood, using the methodology of the 2005 County Plan. The hazards were profiled, adding data from the 2007 State Plan and from incidents that have occurred since the adoption of the 2005 County Plan. Demographics from 2009 were added to analyze development trends. This information was presented to the Hazard Mitigation Planning Team. The Team discussed this section and offered suggestions and corrections that were incorporated into a revised draft. The Team found the revised draft section acceptable.

5. Mitigation Strategies: This section was revised. New information, goals, activities, and municipal hazard mitigation projects were added based upon discussions with the Hazard Mitigation Planning Team and municipal officials who responded to the survey and to direct inquiries from the County EMA. Municipal officials reviewed, corrected and revised the projects for their own communities including project priorities, estimated costs, timeline for completion, responsible parties, and status. This information was presented to the Hazard Mitigation Planning Team. The Team discussed this section and offered suggestions and corrections that were incorporated into a revised draft. The Team found the revised draft section acceptable.

6. Plan Maintenance Process: This section was revised. Explanations of the planning process used were added. This information was presented to the Hazard Mitigation Planning Team. The Team discussed this section and offered suggestions and corrections that were incorporated into a revised draft. The Team found the revised draft section acceptable.

Appendix A: Meetings Attendance: This section was revised with the names of those who attended Hazard Mitigation Planning Team meetings, Public Sessions of the Plan, and Local Emergency Planning Committee meetings.

Appendix B: Notices and Websites: This section was revised with the letters, press releases and website information relating to this Plan Update.

Appendix C: Supplemental Data: This section is new and contains municipal survey responses.

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SECTION 4 RISK ASSESSMENT

5. Identifying Hazards
Requirement §201.6(c)(2)(i): (The risk assessment shall include a) description of the type…of all natural hazards that can affect the jurisdiction.

A. Description of natural hazards affecting the jurisdiction.

After reviewing the FEMA and State Plan list of all natural hazards, a summary table was prepared to use as an overview of all the hazards that could potentially affect Knox County. In conformance with the State of Maine Hazard Mitigation Plan, it was decided that because so many of the County's natural hazards tend to occur in seasonal groups, the summary table and hazard "titles" should be revised to reflect that.

Therefore, events such as thunderstorms, lightning, and tornados will all be found under "Severe Summer Storm Events" though it is possible for them to occur separately and at other times of year. Accordingly, blizzards, ice storms, nor'easters, and snowstorms are grouped under "Severe Winter Storm Events" even though nor'easters can occur in other seasons. In considering the effect of each hazard, it became apparent that the most common result was usually flooding. For that reason, "Dam Failure/Breach," though listed separately on the next table for identification purposes, will appear in the flood hazard sections throughout the rest of the plan.

Non-profiled hazards were eliminated from further consideration in the Plan, due to a lack of historical evidence, lack of overall countywide severity, or a low likelihood for the event to occur. There is no guarantee that non-profiled hazards could not occur and cause damage.

Knox County Natural Hazard ID – Summary of Hazards

Hazard Type	Sources of Information	Damage History	Location in Plan
Blight/Infestation	Departments of Agriculture and Forestry; department websites State Entomological Office historical records Input from residents County and State Hazard Mitigation Plans	Knox County has small-scale wood product related businesses. There are no historical records of major damage to these products that have caused serious economic conditions.	Not included
Dam Failure	MEMA, Dam Safety Program FEMA Disaster Reports Association of Dam Safety Officials Municipal EMA Directors County and State Hazard Mitigation Plans	In the event of High or Significant Hazard Dam failure, a "flash flood" would be the likely result.	Flooding

Hazard Type	Sources of Information	Damage History	Location in Plan
Drought	Department of Agriculture Historical Records Existing County and State Hazard Mitigation Plans	Severe, multi-year droughts occurred in Maine in the 1960's, 1980's and from 2000 to 2003. However, the effects of drought, such as wells running dry in some areas, have never been sufficient to create disaster conditions in Knox County, although they have increased the danger of wildfires.	Not included
Earthquake (5.0+ magnitude)	Maine Geological Survey Historical records Existing County and State Hazard Mitigation Plans	All of the earthquakes that occur in Maine are intra-plate earthquakes. Maine is far inland from the boundaries of the North American plate that extends from the Mid-Atlantic ridge on the east to the western boundary of the U.S. Maine is near the middle of the plate and is therefore not subject to the frequent, deep, and large earthquakes that are generated by the edges of the tectonic plates bumping into each other.	Not included
Landslide	State Planning Office, Flood Plain Management State Marine Geologist, ME Geological Survey FEMA Disaster Reports Municipal EMA Directors Newspaper articles Review of Historical Records County and State Hazard Mitigation Plans	Landslides although uncommon in Knox County, have occurred causing roadway and property damage. The most significant landslides occurred in Rockland.	Landslide
Erosion	State Planning Office, Flood Plain Management State Marine Geologist, ME Geological Survey FEMA Disaster Reports Municipal EMA Directors Newspaper articles Review of Historical Records County and State Hazard Mitigation Plans	Minor Erosion associated with Severe Summer Storms is noted in the Severe Summer Storm Events hazard profiled in this plan.	Summer Storms

Hazard Type	Sources of Information	Damage History	Location in Plan
Wildfire: • Wildfire/Urban Interface	Forestry, Fire Protection Division State Fire Marshall's Office Wildfire Loose: The Year Maine Burned Input from residents Committee and local knowledge Existing County and State Hazard Mitigation Plans	Much of Knox County has dense forestland cover. Wildfires have been numerous, though small, in the past.	Wildfire
Flooding (includes coastal, riverine, spring and stormwater run off, heavy rains)	MEMA records State Planning Office, Flood Plain Management FEMA Disaster Reports County EMA Director Municipal EMA Directors Newspaper articles Review of FEMA flood studies, FIRM maps Input from residents Emergency declarations Identification of repetitive losses SLOSH Maps Committee knowledge Existing County and State Hazard Mitigation Plans	Flooding is associated with the effects of, ice and snow build-up in the hills and rivers, spring runoff and storms including hurricanes. Several repetitive loss properties and roadways are located in the County. Several coastal communities experience coastal flooding during major storm events - winter and summer. The County contains one major river and many streams and lakes, and is located along the coast.	Flooding
Hurricanes	MEMA records FEMA Disaster Reports National Weather Service NOAA website Existing County and State Hazard Mitigation Plans	Direct hits from hurricanes in Knox County are few and so are considered in the Severe Summer Storm Events category. Hurricane Edna was the last major hurricane to hit Knox County in 1954.	Severe Summer Storm Events

Hazard Type	Sources of Information	Damage History	Location in Plan
Summer Storms • Lightning • Thunderstorms	National Weather Service NOAA website County EMA Director Municipal EMA Directors Committee and local knowledge Input from residents Existing County and State Hazard Mitigation Plans	Knox County is frequently hit with thunderstorms, heavy wind and rainstorms, hail and lighting, and rarely by hurricanes. Summer storms are often accompanied by high winds, road and culvert washouts.	Severe Summer Storm Events
Winter Storms: • Blizzard • Ice Storm • Nor'easters • Sleet Storm	MEMA records FEMA Disaster Reports National Weather Service NOAA website News paper articles County EMA Director Municipal EMA Directors Review of past disaster declarations Input from residents Risk assessments Review of library historical data Committee and local knowledge Records from 1998 ice storm County and State Hazard Mitigation Plans	Knox County is frequently hit by blizzards. The impacts of winter storms include erosion and wind damage, road and culvert washouts. The Knox County coastal communities are more often subject to ice/sleet storms.	Winter Storm Events
Other: Avalanche Subsidence Tsunami	FEMA hazards MEMA and FEMA reports County and State Hazard Mitigation Plans	There are no higher elevations in the County that hold large amounts of snow that would create avalanches. There have been no known cases of subsidence or Tsunami in Knox County.	Not included Not included Not included

Profiled Natural Hazard Ratings:

The Knox County Hazard Mitigation Planning Team identified and rated natural hazards. These hazards were identified through an extensive process that utilized input from members of the Hazard Mitigation Planning Team (comprised of representatives from state, county and municipal governments), public input, researching past disaster declarations in the County, a review of current maps, and a risk assessment completed by the Knox County Emergency Management Agency and the Hazard Mitigation Planning Team. The hazards, and their respective ratings, are shown in the following table.

Rating of Profiled Hazards by Hazard Mitigation Planning Team						
Category/Type of Hazard	**Potential Damages**	**Source**	**2005 Plan**		**2009 Plan Update**	
			Rating	**Priority**	**Rating**	**Priority**
Severe Summer Storm Events (Includes storms in the spring, coastal erosion/landslides associated with storms and Hurricanes)	Downed power lines, blocked roadways. Localized flooding and high wind damage to roads buildings, trees and utility lines. Localized flooding and high wind damage to roads buildings, trees and utility lines	NWS, FEMA, & History State Maine Coastal Program	3A	1	2.5A	1 (tied)
Severe Winter Storm Events	Downed power lines, blocked roadways, and heavy snow damage. Ice Storm 98 Localized flooding and high wind damage to roads buildings, trees and utility lines	NWS, FEMA, & History State	3A	1	2.5A	1 (tied)
Flooding	Damages to structures in flood zones, dams, bridges, culverts and roadways	FIRM	2B	2	2B	2
Wildfire	Timber lost, homes lost, businesses lost. October 1947 Fire	Maine Forest Service/ MEMA	2B	3	2B	3
Landslide	Damage to structures and roads	County EMA Records	1C	5	1.5C	4

Note: The Hazard Mitigation Team used the 5-year timeframe of the Plan as the basis for estimating the likelihood of various hazards (i.e., how likely is the hazard to occur within the next five years)

Key to Rating

Severity of hazard:

3	Severe:	Multiple deaths, mass casualties, or millions of dollars in damages
2.5	High:	Deaths or injuries; or $100,000s in damages
2	Moderate:	Single death or several injuries; or $10,000s in damages
1.5	Low:	Injuries; or $1,000s in damages
1	Slight:	No deaths, single injury; or $100s in damages

Likelihood of Hazard:

A.	Very Likely
B.	Possible
C.	Very unlikely

Key to Priority: 1. First Priority, 2. Second Priority, 3. Third Priority, 4. Fourth Priority

6. Profiling Hazards
Requirement §201.6(c)(2)(i): (The risk assessment shall include a) description of the …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.

Severe Summer Storm Events

Introduction.

Severe summer storm damages typically involve downed overhead utility lines, flooding from heavy rain, and debris in the roads (since flooding has been covered in the preceding section, it will not be reviewed in this section).

General Definition of Severe Summer Storm Events.

Severe summer storm events are violent weather phenomenon producing winds, heavy rains, lightning, and hail that can cause injuries, and destruction of property, crops, and livestock that usually occur between June and early October.

Types of Severe Summer Storm Events in Knox County.

There are several different types of potential severe storm events in Knox County

Summer Storms

- **Hurricane.** An intense tropical cyclone, formed in the atmosphere over warm ocean areas, in which wind speeds reach seventy-four miles per hour or more and blow in a large spiral around a relatively calm center called the “eye.”
- **Lightning.** An electrical discharge that results from the buildup of positive and negative charges within a thunderstorm. When the buildup becomes strong enough, lightning appears as a”bolt.” This flash of light usually occurs within the clouds or between the clouds and the ground. A bolt of lightning reaches a temperature approaching 50,000°F in a split second. The rapid heating and cooling causes thunder.
- **Thunderstorm.** A thunderstorm is formed from a combination of moisture, rapidly rising warm air, and a force capable of lifting air such as a warm or cold front, or a sea breeze. All thunderstorms have lightning and can occur singly, in clusters or in lines.
- **Tornado.** A violently rotating column of air extending downward from a thunderstorm to the ground. The distinctive slender, funnel shaped cloud, with wind velocities of up to 300 miles per hour at the central core, destroys everything along its narrow ground path.

A. Location of Severe Summer Storm Events.

Knox County is subject to severe summer storm events. The entire County is very susceptible to severe coastal summer storms, especially from the very high winds that are involved in such a storm. The entire County is vulnerable to one or more severe summer storms each year, usually in the form of thunderstorms. Within Knox County, severe summer storms have the most impact on shoreline areas along the coast, including harbor areas, and inland along lakeshores and watercourses like the Saint George River. Areas with steep slopes are also adversely affected by summer storms.

Erosion evidenced in Knox County has been the result of severe storms principally. The location of coastal erosion and landslides (though rare) is found in low-lying shoreline areas, where flooding can also often occur.

B. Extent (severity) of the Hazard.

In the summer, southwest to southerly winds may become quite prevalent across Knox County. Because of the frequent formation of sea breezes, southerly winds prevail along the Mid-Coast during the summer months. Severe summer storms bring high winds that 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 summer storms in Knox County is usually restricted to flooding caused by the copious amounts of moisture these storms can carry. Interestingly, the interaction of extra-tropical storms *and* hurricanes can produce events of a significant magnitude such as the floods of October 1996.

C. Previous Occurrences.

The following table contains a summary of severe summer storms that have occurred in Knox County. Note: Flooding during the spring is often a result of snowmelt, which may be from winter storms.

Historical Summary of Severe Summer Events in Knox County			
Year	**Incident Period**	**Financial Assistance for Knox County and Description/ FEMA Incident Type**	**Declaration**
1954	Sept 2 -15	NA / “Hurricane Edna”	None
1954	Aug 25 - Sept 1	NA / “Hurricane Carol”	None
1985	Sept 16 - Oct 2	NA / “Hurricane Gloria”	None
1991	Aug 16 - 20	NA / “Hurricane Bob”	None
1999	Sept 7 - 19	NA / “Hurricane Floyd”	None
2009	April	NA / Severe Storm	None
2009	June 18–July 8	$132,174* Severe Storms, Flooding, and Landslides	Presidential FEMA-1852-DR

Source: FEMA/MEMA **Notes**: *** These disasters are still open, and so these figures represent totals as of 10/19/09.** Of the hurricanes listed in this table, only Hurricane Edna hit Knox County directly. For the other hurricanes listed, heavy rain, winds and flooding occurred, but not at hurricane-strength levels.

D. Probability of Occurrence.
There are no probability studies available of summer storms. However, based on past experiences, the County can expect thunder and lightning every year.

It is expected that a severe summer storm will create damage in Knox County at least once every three years. Storm events are shown in the County Base Map section.

There have been no F2-5 tornados documented in Knox County since 1950. Historically, the probability of an F2-5 tornado is low and will not be considered further in the Plan.

Severe Winter Storm Events

Introduction.
Severe winter storm damages typically involve downed overhead utility lines, flooding from heavy rain, ice jams and melt off, and debris in the roads (since flooding has been covered in the preceding section, it will not be reviewed in this section).

General Definition of Severe Winter Storm Events.
Severe winter storm events are violent weather phenomenon producing winds, heavy snow, and sleet and ice that can cause injuries, and destruction of property, crops, and livestock. Low temperatures, strong winds, and often large quantities of ice and snow distinguish severe winter storms and weather conditions.

Types of Severe Winter Storm Events in Knox County.
There are several different types of potential severe storm events in Knox County.

- **Blizzard.** Sustained winds of 40 miles per hour (mph) or more or gusting up to at least 50 mph with heavy falling or blowing snow, persisting for one hour or more, temperatures of ten degrees Fahrenheit or colder and potentially life- threatening traveling conditions.
- **Ice Storms.** Rain which freezes upon impact. Ice coating at least one-fourth inch in thickness is heavy enough to damage trees, overhead wires, and similar objects and to produce widespread power outage.
- **Nor'easter.** Nor'easters are extra-tropical coastal storms that can produce tremendous amounts of precipitation and strong winds that can cause coastal flooding damage. When the precipitation is in the form of snow, sleet, or freezing rain, it can damage overhead utility lines and become a highway-driving hazard.
- **Sleet Storm.** Frozen rain drops (ice pellets) which bounce when hitting the ground or other objects. Does not stick to objects, but in accumulated depths of two inches or more, produces hazardous driving conditions.
- **Heavy Snow Storm.** A snowfall of fifteen inches or more within 12 to 24 hours, which disrupts or slows transportation systems and public safety departments' response capability.

A. Location of Severe Winter Storm Events.
The entire County is subject to major snowfall events; however, the northern, inland portion of the County typically will receive greater snowfall amounts, with especially impacted areas including windswept areas of higher elevations and areas with steep slopes. The entire

County can experience a major ice storm, as it did in January 1998, however, the shoreline of coastal communities on the mainland and on the islands, which contain the vast majority of the population, experience freezing rain, sleet, tide surges, flood damage, and ice storms more frequently. The entire County is very susceptible to "Nor'easter" winter storms.

B. Extent (severity) of the Hazard.
Severe winter storm types are described below.

Winter Storms
During the winter months, Knox County often has heavy snowfall, or snow combined with high winds, freezing rain or ice storms. Significant rainfall also often occurs during winter months. Nor'easters, the most severe form, can occur during the winter, spring, and fall. They rarely develop during the summer. Precipitation amounts can exceed several inches of water equivalent (20-30 inches of snow or more), while wind speeds can be equal to or greater than those for hurricanes that reach Knox County. Loss of electrical power and communication services can occur when utility lines yield under the weight of ice and snow. These conditions can impede the response time of ambulance, fire, police, and other emergency services, especially to remote or isolated residents.

Average seasonal snowfall amounts generally increase north and northwestward from the coastal region. Total seasonal snowfall ranges between 50 and 80 inches in the Coastal Division in which Knox County is located.

The snowfall season usually runs from November to April and sometimes into May. Occasionally an early season storm can bring snow in the first weeks of October even along the coast. January is usually the snowiest month and December usually the second snowiest month. The snowpack makes an important contribution to both surface and groundwater supplies, and years with a low snowpack can lead to water shortages by late summer. Melting of the snowpack in April and May is often gradual enough to prevent serious flooding, although there have been times when a quick melt has led to disastrous conditions.

C. Previous Occurrences.
Federally declared winter storm disaster events affecting Knox County since 1978 are shown in the next table. The worst storm in the past decade occurred in January 1998 and caused $305,292 in damage throughout the entire County. This storm, which nearly destroyed the electrical transmission system in the State of Maine, caused major damage to the forests, covered many roadways with debris and ice, and caused some limited building damages. However, most winter storms in the County are large snowstorms which over task the highway snow removal operations and cause localized power outages.

The next table is a summary of some of the most severe winter storms during the past 37 years.

Historical Summary of Severe Winter Events in Knox County			
Year	**Incident Period**	**Damages**	**Declaration**
1972	February 19	Snow	State Aid
1978	January 10	$12,541 Rain/Snow/Ice, Severe Storms, Flooding	Presidential -326-DR
1993	March 13-14	$14,857 Blizzards, Severe Winds and Snowfall, Coastal Storm	Presidential -3099-DR
1998	January 5-25	$305,292 Ice Storms "Great Ice Storm of '98"	Presidential FEMA-1198-DR
2005	February 10-11	$173,642 Snow	FEMA-3206-EM
2005	March 29-May 3	$429,928 Severe Storms, Flooding, Snow Melts, and Ice Jams	Presidential FEMA-1591-DR-ME
2008	December 11	NA Severe Winter Storm	FEMA-3298-EM
2008	December 11-29	$659,827* Severe Winter Storm and Flooding	Presidential FEMA-1815-DR

Source: FEMA/MEMA **Note: * These disasters are still open, and so these figures represent totals as of 10/19/09.**

Storm of Record: The "Great Ice Storm of '98."

The storm began January 5th and continued through January 25, 1998. During this time, residents in Knox County and statewide experienced effects from freezing rain, high winds, snow and ice. The combination of peak low-pressure areas, abundant moisture in the atmosphere, and cold temperatures near the ground caused significant rainfall and severe icing. Gusts were reported up to 50 miles per hour and brought much colder air and temperatures dropped to single digits. Wind chills were in the minus twenty to minus forty-degree range. The mixture of precipitation continued into the afternoon of January 25, with significant icing along the coast. Extending from western New York to Maine, below-freezing temperatures combined with record rainfall contributed to the formation of a blanket of solid ice. In some places, more than three inches of ice coated the rural and urban landscape.

On January 13, fifteen of Maine's sixteen counties were declared a federal disaster area, including Knox County, eligible for Infrastructure Support assistance. The Disaster Declaration was amended to cover Individual Assistance on January 15, and Aroostook, the final county, was added. Hazard Mitigation funds to reduce future disaster risks were made available on January 13.

At its peak, more than half of Maine's population was without power, caused by ice that coated lines and branches an inch-thick. Many state and secondary roads were closed because of downed trees on power lines. State, county, and municipal government offices were closed, and innumerable businesses were forced to close and remain closed because of blocked roadways and power outages. As a result, 130 emergency shelters were opened throughout the state. Heat, electricity, refrigeration, running water, and sanitary facilities were all

interrupted by the power outage. Maine Public Television and Radio remained unavailable to most viewers for more than a week. Other commercial radio and television stations in South-central Maine lost communication towers and or electrical power and were unable to broadcast. Even the Emergency Alert System failed.

D. Probability of Occurrence.

It is expected that a severe winter storm will create damage in Knox County at least once every three years. Prior Flood/Storm Damage areas are shown on the community-level base maps included in this plan update.

Neither the State of Maine, nor the National Weather Service, maintain data on snowfall and ice accumulation on a town-by-town basis. On average, the length of annual maximum snow cover is about 50 days along the coast.

Flooding

Introduction.
Flooding in Knox County takes place at many different intervals. Flooding results from spring thaw, severe storms and heavy rains.

General Definition of Flooding.
A temporary inundation of normally dry land as a result of: 1) the overflow of inland waters; and/or 2) the unusual and rapid accumulation or runoff of surface waters from any source. Note: the nature of Knox County's geology and hydrology is such that flooding is usually fast rising but of short duration.

Types of Flooding in Knox County.
There are several different types of potential flooding in Knox County:

- **Dam failure**: The sudden release of water resulting from structural collapse or improper operation of the impounding structure. Dam failure can cause rapid downstream flooding, loss of life, damage to property, and the forced evacuation of people.
- **Flash flood**: A flood event occurring with little or no warning where water levels rise rapidly due to heavy rains, ice-jam release, or rapid snow melt.
- **Ice jam**: An accumulation of floating ice fragments that blocks the normal flow of a river. During a thaw or rainstorm, the rapid increase in discharge from snowmelt and/or rainfall can rapidly lift and break up a thick ice cover and carry it downstream as an ice run. Ice runs can jam in river bends or against the sheet ice covering flatter reaches. The resulting ice jams can block flow so thoroughly that serious flooding may result within an hour of their formation. Failure of an ice jam suddenly releases water downstream. Damages from ice jam flooding usually exceed those of clear water flooding because of higher than predicted flood elevations, rapid increase in water levels upstream, and downstream, and physical damage caused by ice chunks. Moving ice masses can shear off trees and destroy buildings and bridges above the level of the floodwaters.
- **Lacustrine**: (Lake Flooding) occurs when the outlet for the lake cannot discharge the flood waters fast enough to maintain the normal pool elevation of the lake. During a base flood event, normal increases in water surface elevations on most lakes and ponds range from 1 to 5 feet. However, in Maine there are some examples where the base flood event will

reverse the flow of the outlet stream. In such instances, river and base flood elevations can rise more than 15 feet above normal pool. While this can impact individual sport camps built near the water's edge, there are no records of major damages so this type of flood will not be further addressed in the Plan.

- **Riverine/riparian**: Periodic overbank flow of rivers and streams, usually the result of spring run off, but can also be caused by major rain storms.
- **Urban**: Overflow of storm sewer systems, usually due to poor drainage, following heavy rain or rapid snow melt. The combined sanitary and storm water systems that some urban areas installed years ago cause flooding of sanitary sewerage when riparian floods occur. Runoff is increased due to a large amount of impervious surfaces such as roof tops, sidewalks and paved streets.
- **Beaver Dam Flooding**: Flooding resulting from back-up and overflow of water resulting from beaver dams.

A. Location of Flooding Hazard.

Knox County's susceptibility to flooding is further exacerbated by the wide-ranging weather variables. Due to seasonal (and regional) factors such as heavy rains, rapidly melting snow pack and/or ice jams, major flooding most frequently occurs between December and May. Based on MEMA data, the most flood prone months are April, January and March respectively. Floods can also be caused by severe storm events, including hurricanes, and may be further affected by rises in sea levels. Floods can saturate blueberry barrens, hay fields, and niche farm fields. Flood zones are mapped under the NFIP program. These maps are available at municipal offices. For more information, see Section 5 Mitigation Strategies, 15. Identification and Analysis of Mitigation Actions: National Flood Insurance Program NFIP Compliance.

There is one river located in Knox County. The St. George River flows through the towns of Appleton, Union, Warren, Thomaston, South Thomaston, Cushing and St. George. There are no dams on the St. George River. Flooding from the St. George River happens on occasion, but it is not severe. There are several dams located at the outlets of lakes and ponds that are very small and would not have a major flooding impact. However, on Megunticook Lake there are two dams, Megunticook East and Megunticook West, which the State has classified as High Hazard dams. If these dams were to fail, it would cause major flooding in downtown Camden. The Town of Camden has addressed this possibility by developing an Emergency Action Plan, which must be revised every two years, according to State law. Additionally, there is another High Hazard Dam in Camden, Seabright, which is regulated by FERC.

The most susceptible communities to coastal flooding are Camden, Cushing, Friendship, Isle Au Haut, North Haven, Owl's Head, Rockland, Rockport, St. George, South Thomaston, and Vinalhaven. There is a State of Maine ferry service at Rockland that services the islands of North Haven, Vinalhaven and Matinicus Island Plantation and this service could be impacted by coastal flooding.

The majority of the flood damage in the County is caused by winter runoff in the springtime, which undercuts or overtops local roads. When Maine has an above average snowfall for the winter and then warmer temperatures and rainfall suddenly arrive in the spring, the snow pack melts off more quickly than the watersheds can handle. This can cause local water bodies to overflow their boundaries and flood nearby road surfaces. Typically, the road damage is not major, although it can absorb the municipal road budget for an entire year and does happen in several towns every year. For recurring damages by community, see Appendix C: Supplemental Data.

B. Extent (nature) of the Hazard from Dam Failure.
Maine dams were constructed incrementally over a period of 300 years. Businesses harnessed the abundant fast flowing rivers and rocky rapids for the development of energy and transportation. Many are low head dams constructed using local materials of stone, timber and earth.

Dam failure is not a frequent occurrence, but it can and does occur. Accordingly, Maine law requires that dams classified as High or Significant Hazards must have current Emergency Action Plans (EAPS). By definition, if they failed, High Hazard dams could cause loss of life; Significant Hazard dams could cause significant property damage and Low Hazard dams would generally cause damage only to the owner's property. Usually, dams that produce electricity are regulated by the Federal Energy Regulatory Commission (FERC). The others are regulated by Maine Emergency Management Agency (MEMA).

In Knox County, there are three High Hazard dams, all upstream of the town of Camden. One of them (Seabright, MEMA ID 377) is regulated by FERC. Per their hazard classification, and EAPs, failure of these dams could cause loss of life in Camden, and seriously damage downstream buildings, businesses and the harbor.

Knox County has three Significant Hazard dams, as shown in the next table. Per their hazard classification, and EAPs, if these were to fail, the Lermond Pond Dam would damage the downstream roads in the eastern portion of Union and possibly two homes. Either Henderson Dam would damage the west end roads of Camden. The County also has 21 low hazard dams and 9 unranked or unclassified dams that are not included in the table.

Knox County High Hazard and Significant Hazard Dams					
MEMA ID	**Dam Name**	**Other Name**	**Dam Owner**	**Town**	**River / Water body**
High Hazard Dams					
81A	Megunticook East	Knox # 1	Camden, Town of	Camden	Megunticook
81B	Megunticook West	Knox #2	Camden, Town of	Camden	Megunticook
377	Seabright		Camden, Town of	Camden	Megunticook
Significant Hazard Dams					
85	Lermond Pond	East Union	Richard Morgan	Union	Mill Stream
864 A	Henderson #1		Henderson Lake Association	Camden	unknown
864 B	Henderson #2		Henderson Lake Association	Camden	unknown

Source: MEMA

C. Extent (nature) of Flood Hazard other than Dam Failure.
Severe flooding 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, and loss and interruption of business. Ironically, fire-fighting efforts can be compromised if fire fighters and equipment are responding to a flood emergency.

Generous precipitation (about 42 inches a year) contributes to the flood potential. Low pressure systems over the Eastern Seaboard and the tendency of some storms to follow one

another in rapid succession provide heavy, combined moisture. Water abundance is one of the County's most valuable natural resources and can be a hazard.

Previous Occurrences.
The next table contains a summary of floods that have occurred in Knox County.

Historical Summary of Flooding Events in Knox County			
Year	**Incident Period**	**Damages**	**Declaration**
1975	May 8	NA	SBA
1987	April 1	$13,062 Severe Storms, Flooding	Presidential FEMA-788-DR-ME
1992	March 27	$91,712 Flooding, Heavy Rain, Ice Jams	Presidential FEMA-940-DR-ME
1996	April 16-17	$434,989 Flooding and Mudslides	Presidential FEMA-1114-DR-ME (addendum to 1106)
2005	March 29-May 3	$429,928* Severe Storms, Flooding, Snow Melts, and Ice Jams	Presidential FEMA-1591-DR-ME
2007	March 16-18	$589,399* Flooding	Presidential FEMA-1691-DR-ME
2007	April 15-23	$375,046* Severe Storms and Inland and Coastal Flooding	Presidential FEMA-1693-DR-ME
2008	April 28-May 14	$361,835* Severe Storms and Flooding	Presidential FEMA-1755-DR
2009	December 11-29	$659,827* Severe Winter Storm and Flooding	Presidential FEMA-1815-DR
2009	June 18–July 8	$132,174* Severe Storms, Flooding, and Landslides	Presidential FEMA-1852-DR

Source: FEMA/MEMA **Note: * These disasters are still open, and so these figures represent FEMA totals as of 10/19/09.** Flooding during the spring is often a result of snowmelt, which may be from winter storms.

D. Probability of Occurrence.
Floods are described in local flood hazard 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 United States 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."

The Maine Geological Survey estimates that the ocean has risen about six (6) inches since 1900, and is currently rising at a rate of about 1/10th of an inch per year. The result has been

increased flooding, erosion of coastal bluffs and landslides. The consensus of the scientific community, reflected in the Fourth Assessment Report of the Intergovernmental Panel on Climate Change (IPCC) is that sea level will continue to rise at an accelerating rate through the year 2100. A storm that had a 1% chance of occurring in any one year (the 100-year storm) at the current sea level elevation has a more than 1% chance of occurring in any year at a higher sea level elevation. With sea level rise, more homes, businesses, public infrastructure such as roads, and entire communities will be subject to more devastating coastal floods on a more frequent basis.

Wildfire (also known as Wildland fires)

Introduction.
Much of the County is covered with forests. Wildfires have been numerous, though small, in the past and have the potential to damage or destroy structures, especially in the more rural sections of the County. Wildfires can negatively affect the forestry economy as well.

General Definition of Wildfire.
Wildfire**/** Wildland fires are defined as those fires that burn vegetative cover: grass, brush, timer, or slash (Clayton 1985). Though wildfire is a natural phenomenon and can be ignited by lightning, people have become the greatest cause of fires in the County. [See table below] Wildland urban interface fires are created where homes meet with highly volatile forest fuels.

Types of Wildfire in Knox County.
There are several different causes of wildfire events in Knox County. The Department of Conservation, Maine Forest Service Forest Protection Division tracks all reported fire occurrences in the state on an annual basis. These are coded by cause: campfire, children, and debris burning – which can include backyard burning as well as the agricultural practice of "burning over" blueberry fields, incendiary (includes arson) lightning, machinery, miscellaneous, railroad and smoking. The number of fires by cause by county is shown in the next table.

Number of Fires by Cause in Knox County 2002-2006

Camp	Child	Debris	Arson	Light.	Machin.	Misc	RR	Smoke	5 Yr Annual Average	5 Yr Total
7	11	40	3	0	6	6	6	7	17.2	86

Source: Maine Forest Service, 2007
Note: Fires burn an annual average of 12 to 13 acres in Knox County.

A. Location of Wildfire.
All parts of the County are subject to wildfire/wildland fires. However the northern portion of the county has the least accessibility to emergency services due to the lack of proper roads. The southern portion of the County has a larger number of homes and businesses within the Wildland-Urban Interface but better access to emergency services.

B. Extent (nature) of the Hazard.

In 2006, Knox County was estimated to have 173,100 acres of forestland, about 74% of the County land area (Maine Land Cover Dataset, 2006). The County's forestland base has remained essentially stable for the last several decades and is close to the estimated acreage of forestland present at the time of European settlement.

Well-distributed rainfall normally reduces forest fire risks, but seasonal variations, rapidly draining soils and unusually dry periods can induce major blazes. In addition, insect damage diseases, severe weather, and residential and commercial developments in wooded areas greatly increase the potential for catastrophic fires. Over time, a considerable fuel supply can accumulate from the ignitable slash of some timber harvesting operations and/or from dead trees left standing on the forest floor after insect infestations. According to the Maine Department of Labor, there were six work locations in forestry and logging in Knox County in 2008, with 18 employees.

Several demographic factors make Knox County's rural areas less resistant to the threat of wildfires. The in-migration of persons over age 65 and the outmigration of young people (up to age 25) from rural areas often leave an older, more vulnerable population, that usually depend on just volunteer fire departments. As in all of Maine, Knox County's housing stock is aging: old farm homes and wood frame buildings remain in remote forested areas.

C. Previous Occurrences.

Knox County has had 251 minor wildland forest fires from 1995 to 2006. In the past five years, there have been on average more than 17 wildfires annually in Knox County, which burn about 12 to 13 acres per year. The Maine Forest Service does not have records of a major forest fire (covering 500 or more acres) having occurred in Knox County between 1934 and 2007

D. Probability of Occurrence.

Knox County is subject to minor wildland fire events. About 74% of the County is forestland and the accessibility by vehicle to many areas is limited.

It is expected that a wildland fire event could cause notable destruction in Knox County at least once every decade. Wildfire danger areas are shown on the County Base Maps included in this section.

Landslide

Introduction

Landslides are uncommon in Knox County, although one occurred in Rockland and one occurred in Thomaston. Unstable coastal bluffs in excess of 20 feet in height will likely be subject to landslides on a more frequent basis as a result of severe storms, flooding and sea level rise.

General Definition of Landslide

The rapid movement of earth materials down-slope under the force of gravity.

Types of Landslides in Knox County

The only recorded type of landslide in Knox County was in a coastal zone, due principally to wave action. No landslides have been recorded inland on hillsides, mountains or other steep areas.

A. Location of Landslide

A landslide took place in Rockland along a portion of Waldo Ave that abuts Rockland Harbor. A landslide took place in Thomaston along a portion of rail line that abuts the riverbank of the St. George River.

B. Extent (nature) of the Hazard.
Coastal landslides are triggered by chronic bluff erosion in areas with mud banks that exceed 20 feet in height. In contrast to the erosion that occurs on the face of a bluff less than 20 feet in height, a coastal landslide is the result of the internal instability of sediment bluffs and their potential to rapidly move large amount of land down-slope under the influence of gravity. In general, landslide-prone bluffs have the following characteristics:

- A high, steep face;
- Clay sediment;
- Erosion near the high-tide line; and
- A high ground water table.

A Landslide hazard map is included in this plan and shows areas where a landslide potential exists.

C. Previous Occurrences.
A landslide occurred in Rockland in the spring of 1996. That landslide sent two homes and 300 feet of bluff into the harbor. The clay that made up the bluff sheared into blocks, losing its strength as it collapsed. The cost of mitigation was $848,000. A landslide occurred in Thomaston in the winter of 2010 along a portion of rail line that abuts a riverbank. The landslide/washout was about 45 feet wide by the tracks and up to 150 feet wide by riverfront. That landslide resulted in the temporary closure of a state owned rail line that supports local industry dependent on freight rail and seasonal passenger tourist service. The cost to repair the damage has not been determined as of the date of this plan.

D. Probability of Occurrence.
No probability studies have been done, and predictive models do not exist. However, Maine Geological Survey is developing landslide maps along the Maine coast. As these maps are completed, they are presented to the towns for future planning purposes.

7. 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.

A. Vulnerability of Knox County to each hazard:

Severe Summer Storm Events. The entire County is vulnerable to thunderstorms, microbursts, and high winds.

Severe Winter Storm Events. The entire County is vulnerable to severe winter storms, including ice storms. As noted earlier in this Assessment, Knox County has been included in a number of Presidential Disaster Declarations for winter storms.

Flooding. With the exception of a few downtown portions of Camden and Rockland, most of the developed areas in Knox County are located outside of designated flood plains, and are thus not very vulnerable to riverine flooding. On the other hand, a large portion of the county

is very rural in nature, and is served 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 system by ice or debris, even though these roads may not be in an identified flood plain.

Wildfires. Most of Knox County is forested, about 74%, and likely to experience small wildfire/wildland fire events.

Landsides. Those limited areas with unstable coastal bluffs in excess of 20 feet in height may become vulnerable to landslides on a more frequent basis because of severe rain storm events, flooding, and sea level rise.

B. Impacts of each hazard on Knox County Maine:

Severe Summer Storm Events. The damages from summer storms typically involve the washout of roads, downed utility lines and debris clearance. If severe enough, this could result in the loss of income to businesses and individuals due to business closures.

Severe Winter Storm Events. The damage impacts of severe winter storms include road closures (and the subsequent inability of emergency vehicles to provide help), the loss of power for extended periods of time, high costs to local governments for snow removal efforts. If severe and prolonged enough, it could result in loss of income to businesses and individuals due to business closures. Roof collapses, both residential and commercial, are rare but they can occur when snow loads become extreme.

Flooding. The typical damages resulting from flooding in Knox County include damage to roads and their respective drainage systems. Historically, flood damages have included partial or complete road washouts, as well as severe erosion of roadside ditches, resulting in damages to town and personal vehicles. In some cases, entire communities have been partly or completely isolated because the only road serving the town has been become impassable.

Wildfire. The impacts of wildfires include the destruction of woodland forest stands of trees and other vegetation, which when located on steep slopes and/or near watercourses can increase erosion and pollution to water bodies. Loss of income from wood products destroyed and non-commercial properties enrolled in the state tree growth program for private property owners can occur from wildfires. Although uncommon in Knox County, structures in the urban interface including residences can be damaged or destroyed from wildfires. Temporary road closures may be warranted when wildfires are close to roadways or cross over roadways.

Landslide. The impacts of landslides include the damage or destruction of structures located in landslide prone areas, the potential for injury and loss of life, as well as damage to public infrastructure including roadways and utility lines.

8. Assessing Vulnerability: Addressing Repetitive Loss Properties
Requirement §201.6(c)(2)(ii): (The risk assessment) must also address National Flood Insurance Program (NFIP) insured structures that have been repetitively damaged (by) floods.

Repetitive loss properties. There are only two repetitive loss properties in Knox County; both are single-family dwellings in Owls Head. In accordance with the Federal Privacy Act, the Maine State Planning Office will not disclose the addresses, owner names or claim information of these repetitive loss properties.

9. 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 identified hazard area...

A. Vulnerability of existing buildings, infrastructure, and critical facilities

Severe Summer Storm Events:

- **Buildings.** All buildings in Knox County are vulnerable to summer storms. Damages can include debris like tree limbs; and from high winds, interior water damages due to wind- driven heavy rain.
- **Infrastructure.** Roads and their associated storm drainage systems are the most vulnerable category of infrastructure. They can become temporarily blocked due to heavy rain and debris over a short period. There are approximately 48 roads/road segments in Knox County vulnerable to flooding.
- **Critical facilities**. All critical facilities in Knox County are vulnerable to summer storms in the same manner that individual buildings are vulnerable. However, some of the critical facilities throughout the County have back-up generator systems, which allow building systems to continue operating during a power outage. The municipal base maps that are included in this Plan update identify the location of critical facilities. The purpose of these maps is to identify those facilities that overlap with coastal flood surge zone hazard areas in order to determine what assets are potentially impacted.

Severe Winter Storm Events:

- **Buildings.** All buildings in Knox County are vulnerable to winter storms. Damages can include burst water pipes during power outages due to subfreezing weather and a lack of heat and/or pumps, which require electricity to function, interior water damages due to ice dams forming on roofs, and occasionally, roof collapses due to heavy snow loads.
- **Infrastructure.** Roads and their associated storm drainage systems are the most vulnerable category of infrastructure. There are approximately 48 roads/road segments in Knox County vulnerable to flooding. They can become temporarily blocked due to heavy snow, ice, and debris falling over a short period of time, or ice that can build on their surfaces. Water main breaks due to cold weather can also occur.
- **Critical facilities**. All critical facilities in Knox 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, which allow heating systems to continue operating during a power outage. The municipal base maps that are included in this Plan update identify the location of critical facilities. The purpose of these maps is to identify those facilities that overlap with coastal flood surge zone hazard areas in order to determine what assets are potentially impacted.

Flooding:

- **Buildings.** Very few buildings in Knox County are vulnerable to flood damages. There are only two properties identified in Knox County due to repetitive loss; both are single-family dwellings in Owls Head. With the exception of downtown portions of Camden and Rockland, most of the developed areas in Knox 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. There are approximately 48 roads/road segments in Knox County vulnerable to flooding. Much of the county is very rural in nature, and is served 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 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 floodplains. Possible exceptions include some wastewater treatment plants, due to the need to locate these facilities at lower elevations. The municipal base maps that are included in this Plan update identify the location of critical facilities. The purpose of these maps is to identify those facilities that overlap with coastal flood surge zone hazard areas in order to determine what assets are potentially impacted.

Wildfire:

- **Buildings.** Buildings in the wildland urban interface within Knox County are vulnerable to wildfires. Damages can include fire damage and destruction.
- **Infrastructure.** Roads are vulnerable to temporary closure when wildfires are nearby or cross roadways.
- **Critical facilities**. Very few critical facilities in Knox County are identified as vulnerable to wildfires in the same manner that individual residential buildings may be vulnerable. The municipal base maps that are included in this Plan update identify the location of critical facilities. The purpose of these maps is to identify those facilities that overlap with forested areas in order to determine what assets are potentially impacted.

Landslide:

- **Buildings.** Buildings in the landslide prone areas, as defined previously in this section and as mapped, within Knox County are vulnerable to landslides. Damages can include structure damage and destruction.
- **Infrastructure.** Roads are vulnerable to temporary closure when landslides are nearby or cross roadways. Landslides have affected three road segments with temporary closures. If the landslide includes the roadway itself, the closures may be longer term as reconstruction and realignment efforts are undertaken.
- **Critical facilities**. No critical facilities in Knox County are identified as vulnerable to landslides in the same manner that individual residential buildings may be vulnerable. The municipal base maps that are included in this Plan update identify the location of critical facilities. The purpose of these maps is to identify those facilities that overlap with landslide prone areas in order to determine what assets are potentially impacted.

B. Vulnerability of future buildings, infrastructure, and critical facilities

Severe Summer Storm Events:

- **Buildings.** New buildings in Knox County will be less vulnerable to severe summer storms because they are built to meet modern code requirements. State-mandated shoreland zoning ordinance regulations for areas within 250 feet of the shoreline of the coast, lakes and ponds, and within 75 feet of streams, limit the location of new buildings in areas prone to coastal erosion and storm surges that often result from Severe Summer Storm Events. Damages may include roof damage from falling trees and debris. There will be less Interior water damage due to wind-driven heavy rains

because the roofs of newer buildings generally are properly designed and roofing materials are more resistant to water infiltration.

- **Infrastructure.** Roads will continue to be the most vulnerable category of infrastructure. New roads can be blocked on a temporary basis due to heavy rainfall, and debris such as tree limbs accumulating on the road surface during a storm event.
- **Critical facilities**. Future critical facilities in Knox County will be vulnerable to summer storms in the same manner that individual buildings will be vulnerable. However, some of them will have back-up generator systems which will allow building systems to continue operating during a power outage. The municipal base maps that are included in this Plan update identify the location of critical facilities. The purpose of these maps is to identify those facilities that overlap with coastal flood surge zone hazard areas in order to determine what assets are potentially impacted.

Severe Winter Storm Events:

- **Buildings.** New buildings in Knox County will be less vulnerable to severe winter storms because they are built to meet modern code requirements. There will be less Interior water damage due to ice dams forming on roofs because the roofs of newer buildings generally are properly vented, which allows the roofs to remain cold. Roof collapses due to heavy snow loads will be very rare because newer roofs are designed to withstand heavy snow loads. State-mandated shoreland zoning ordinance regulations for areas within 250 feet of the shoreline of the coast, lakes and ponds, and within 75 feet of streams, limiting the location of new buildings in areas prone to coastal erosion and storm surges that often result from Severe Winter Storm Events. Damages may include burst water pipes in winter, but many newer buildings will be better insulated than older ones, thus being better able to retain heat during longer periods of time when there is a power outage.
- **Infrastructure.** Roads will continue to be the most vulnerable category of infrastructure. New roads can be blocked on a temporary basis due to heavy snowfall, ice building up on the road surface, and debris such as tree limbs accumulating on the road surface during a storm event.
- **Critical facilities**. Future critical facilities in Knox County will be vulnerable to winter storms in the same manner that individual buildings will be vulnerable. However, some of them will have back-up generator systems which will allow building systems including heating systems to continue operating during a power outage. The municipal base maps that are included in this Plan update identify the location of critical facilities. The purpose of these maps is to identify those facilities that overlap with coastal flood surge zone hazard areas in order to determine what assets are potentially impacted.

Flooding:

- **Buildings.** Virtually of the municipalities in Knox County are in the flood insurance program, and all have municipal shoreland zoning ordinances that prohibit the construction of residential, commercial and industrial structures in floodplains.
- **Infrastructure.** State and local road construction standards generally ensure that new roads are properly constructed with adequate storm drainage systems. Road construction exceeding $100,000 must be designed by a registered professional engineer. Therefore, roadway flooding should not be as likely or as serious for new roads as it is for old roads in Knox County.
- **Critical facilities**. Because of the requirements of the Flood Insurance Program, as well as state-mandated shoreland zoning and a greater awareness of flooding in all communities, future critical facilities will continue to be located outside floodplain

areas. The exception may be wastewater treatment plants, due to the need to locate these facilities at lower elevations. The municipal base maps that are included in this Plan update identify the location of critical facilities. The purpose of these maps is to identify those facilities that overlap with coastal flood surge zone hazard areas in order to determine what assets are potentially impacted.

Wildfire:

- **Buildings.** New buildings in Knox County within the Wildland urban interface within will be vulnerable to wildfires, as will those constructed at higher elevations on windswept ridgelines. Damages may include scorched exterior walls, roofs or complete destruction.
- **Infrastructure.** Roads will not likely be a vulnerable category of infrastructure. New roads can be blocked on a temporary basis due to wildfires, debris such as burned tree limbs accumulating on the road surface during a wildfire event.
- **Critical facilities**. Only those future critical facilities in Knox County that are located with the Wildland urban interface will be vulnerable to wildfires in the same manner that individual buildings will be vulnerable. However, clearing around such facilities will be maintained to reduce the probability of such events. The municipal base maps that are included in this Plan update identify the location of critical facilities. The purpose of these maps is to identify those facilities that overlap with forested areas in order to determine what assets are potentially impacted.

Landslide:

- **Buildings.** New buildings in Knox County will be less vulnerable to landslides, due to the mapping and regulation of such areas through State-mandated shoreland zoning ordinance regulations for areas within 250 feet of the shoreline of the coast, lakes and ponds, and within 75 feet of streams, restricting the location of new buildings in areas prone to landslides.
- **Infrastructure.** Roads near landslide prone areas will continue to be the most vulnerable category of infrastructure. New roads can be blocked on a temporary basis due to landslide activity, and debris such as mud accumulating on the road surface during such an event. State law restricts the construction of new roads in landslide prone areas.
- **Critical facilities**. Future critical facilities in Knox County will not be located in landslide prone areas and will thus not be vulnerable to landslides. The municipal base maps that are included in this Plan update identify the location of critical facilities.

10. Assessing Vulnerability: Estimating Potential Losses
Requirement §201.6(c)(2)(ii)(B): (The plan should describe vulnerability in terms of an) estimate of the potential dollar losses to vulnerable structures identified in paragraph (c)(2)(ii)(A) of this section and a description of the methodology used to prepare the estimate…

Severe Summer Storm Events.

Hurricane damages are included in the Severe Summer Storm Events category considered in this Plan, and not as a separate category due to low occurrence of hurricanes in Knox County, as noted in the rankings portion of this Plan. Worst-case, real-life damages were used to calculate potential damages from hurricanes. The most recent, devastating hurricane to hit Knox County was probably Edna in September 1954.

Edna produced $7,000,000 in damages to a coastal swath of Maine including Knox County. The hurricane resulted in eight deaths in Maine and power outages. The damage in 2009 dollars would be about $55,480,000. However, this figure should be increased to $77,078,000 to account for the substantial amount of primary and second homes and commercial development in coastal counties since 1954. Knox County comprises 6.6% of the population of the affected area. Prorating the damage based on population, Knox County could have $5,110,722 in damages from a similar hurricane event. The following Hurricanes also caused damage in Maine: Carol 1954, Gloria 1985, Bob 1991, and Floyd 1999, but these hurricanes did not cause recorded damage in Knox County.

The probability that a Category 1 or higher hurricane will strike Maine during the five-year period covered by this Plan update is low. For coastal communities, there will be wind and flooding damages to structures, flooding damages to roads, and downed power lines. For inland communities, damages will be limited to flooding (see the flood damage estimates, above).

When coastal erosion or landslides occur, it is often the result of a Severe Storm Event. Landslides are also profiled separately in this plan. The worst-case, real-life damages of coastal erosion in Knox County were used to calculate potential damages from such erosion. See the Landslides heading on the next page for a cost estimate.

Severe Winter Strom Events.
Worst-case, real-life damages were used to calculate potential winter storm damages. It was assumed that historic patterns would hold for the future. The ice storm of 1998, which resulted in a Presidential Disaster Declaration of $47,748,466, was the worst such storm to affect Knox County. The Ice Storm of 1998 resulted in a total of $48,000,000+ in damages to the State. The Disaster Declaration did not cover damages to power lines and private structures. Using the Consumer Price Index, the $47.7 million in the disaster declaration damages in 2009 dollars would be $63,980,000. Knox County comprises 3.1% of the population of the 16-county area. Prorating the damage based on population, Knox County could have $1,983,380 in damages from a similar winter storm event.

Flooding.
Worst-case, real-life damages were used to calculate potential flooding damages, and it was assumed that historic patterns will hold for the future. For Knox County, the worst recorded flooding was the April Fool's Day flood of 1987, which resulted in a Presidential Disaster Declaration of $100,000,000 in damages to 14 counties.

Using the Consumer Price Index, the damages in 2009 dollars would be $192,250,000. Knox County comprises 3.4% of the population of the 14-county area. Prorating the damage based on population, Knox County could have $6,536,500 in damages from a similar flooding event.

Wildfire.
Based upon the 1947 Fire adjusted for the Knox County portion of the population, and in 2009 dollars, the estimate of the worst-case costs of wildfire damages for Knox County would be $20,360,000. Given the lack of a major wildfire (defined as 500 acres or larger) in Knox County over the past eight decades and the relatively low-density development in areas prone to wildfires, the real-life worst-case costs of wildfire damages for Knox County over the next five years would probably be lower. Based upon the median housing price for Knox County ($186,000 in 2008), a worst-case cost might be closer to $4,000,000, which would be the equivalent of the total destruction of 16 detached housing units and the attendant public infrastructure including utilities and road reconstruction.

Landslide.
The worst-case, real-life damages of a landslide in Knox County were used to calculate potential damages from such erosion. The worst event occurred in Rockland in the spring of 1996. That landslide sent two homes and 300 feet of bluff into the ocean. The clay that made up the bluff sheared into blocks, losing its strength as it collapsed. The damage costs were $848,000. That cost in 2009 dollars would be $1,180,390.

11. 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 use descriptions.

Land use within Knox County ranges from densely populated urban areas, like downtown Rockland and downtown Camden, to suburban residential areas, to rural areas with farms, and forestland. The largest community in the County is Rockland with a 2009 population of 7,419. Eight of the municipalities in the County have enacted comprehensive plans that are consistent with Maine law. Seventeen communities are participants in the National Flood Insurance Program. Eighteen communities have shoreland zoning ordinances, and 11 have enacted town-wide zoning ordinances in addition to shoreland zoning.

Between 1990 and 2009, the County's population grew from 36,310 to 40,805 for a gain of 4,495 people, or 12.4%. However, some communities experienced growth rates several times that rate, while others experienced very little growth or none at all. A clear trend in the County is that nearly all of the residential growth is occurring in the suburban and rural communities, while a population decline was seen in the City of Rockland, Matinicus and Friendship. Declines in these three coastal communities is attributed to the loss of local employment opportunities, which forces some to move to larger labor markets outside Knox County, and/or to move to non-coastal areas where housing costs are typically more affordable. The table below documents the rate of growth for all municipalities in Knox County.

Population Growth 1990 – 2010					
Area	**2010**	**2000**	**1990**	**Net Change 1990 - 2009**	**% Change 1990 - 2009**
Appleton, Town of	1,425	1,271	1,069	356	33.3%
Camden, Town of	5,225	5,254	5,060	165	3.3%
Cushing, Town of	1,399	1,322	988	411	41.6%
Friendship, Town of	1,010	1,204	1,099	-89	-8.1%
Hope, Town of	1,403	1,310	1,017	386	38.0%
Isle au Haut, Town of	87	79	46	41	89.1%
Matinicus Isle Plantation	45	51	67	-22	-32.8%
North Haven, Town of	403	381	332	71	21.4%
Owls Head, Town of	1,737	1,601	1,574	163	10.4%
Rockland, City of	7,419	7,609	7,972	-553	-6.9%
Rockport, Town of	3,525	3,209	2,854	671	23.5%
St. George, Town of	2,680	2,580	2,261	419	18.5%
South Thomaston, Town of	1,434	1,416	1,227	207	16.9%
Thomaston, Town of	3,882	3,748	3,306	576	17.4%
Union, Town of	2,253	2,209	1,989	264	13.3%
UT (Unorganized Territories)	0	0	0	0	0
Vinalhaven, Town of	1,303	1,235	1,072	231	21.5%
Warren, Town of	4,126	3,794	3,192	934	29.3%
Washington, Town of	1,449	1,345	1,185	264	22.3%
Knox County	40,805	39,618	36,310	4,495	12.4%

Source: U.S. Census, Claritas, Inc. 2009

Based on population projections prepared by the Maine State Planning Office for organized municipalities and plantations, Knox County is expected to grow modestly over the next 5 to 10 years, as summarized in the table below. Most of the County's future growth is expected to occur in smaller rural and suburban communities.

Projected Population					
Area	**2020**	**2015**	**2010**	**Net Change 2010 - 2020**	**% Change 2010 - 2020**
Appleton, Town of	1,534	1,468	1,401	133	9.5%
Camden, Town of	5,564	5,507	5,431	133	2.4%
Cushing, Town of	1,164	1,214	1,255	-91	-7.3%
Friendship, Town of	1,201	1,208	1,209	-8	-0.7%
Hope, Town of	1,908	1,750	1,595	313	19.6%
Isle au Haut, Town of	69	72	75	-6	-8.0%
Matinicus Isle Plantation	42	44	47	-5	-10.6%
North Haven, Town of	411	405	397	14	3.5%
Owls Head, Town of	1,765	1,729	1,688	77	4.6%
Rockland, City of	7,770	7,762	7,722	48	0.6%
Rockport, Town of	4,322	4,035	3,752	570	15.2%
St. George, Town of	3,081	2,959	2,833	248	8.8%
South Thomaston, Town of	1,782	1,689	1,595	187	11.7%
Thomaston, Town of	5,097	4,755	4,417	680	15.4%
Union, Town of	2,791	2,643	2,495	296	11.9%
UT (Unorganized Territories)	1	1	1	0	0.0%
Vinalhaven, Town of	1,602	1,508	1,414	188	13.3%
Warren, Town of	3,794	3,813	3,816	-22	-0.6%
Washington, Town of	1,680	1,595	1,510	170	11.3%
Knox County	45,576	44,158	42,653	2,923	6.9%

Source: Maine State Planning Office. Notes: The State does not explain the predicted decline in population for several communities. Based upon recent growth in the year-round population in Warren, it is anticipated that Warren's 2020 population will be larger than the State estimates, and above the 2009 figure from Claritas.

Housing growth has occurred at a faster rate than the growth in population. This is due to the construction of vacation/second homes that are used seasonally, whose residents are not included in the year round population figures. As well, a notable decrease in average household size has occurred over the past twenty years. This decrease is due to the in-migration of retiree-aged households, empty nesters, families headed by single parents, and reduced birth rates, among other causes. By far Rockport has seen the largest increase in its housing stock, followed by Warren and St. George.

Housing Unit Growth 1990 – 2009					
Area	**2010**	**2000**	**1990**	**Net Change 1990 - 2009**	**Growth Rate 1990 - 2009**
Appleton, Town of	644	547	450	194	43.1%
Camden, Town of	2,979	2,883	2,654	325	12.2%
Cushing, Town of	877	778	602	275	45.7%
Friendship, Town of	865	849	818	47	5.7%
Hope, Town of	777	687	542	235	43.4%
Isle au Haut, Town of	195	164	136	59	43.4%
Matinicus Isle Plantation	138	135	101	37	36.6%
North Haven, Town of	560	488	441	119	27.0%
Owls Head, Town of	1,137	992	909	228	25.1%
Rockland, City of	3,786	3,752	3,719	67	1.8%
Rockport, Town of	1,931	1,677	1,409	522	37.0%
St. George, Town of	1,957	1,777	1,567	390	24.9%
South Thomaston, Town of	849	804	697	152	21.8%
Thomaston, Town of	1,631	1,535	1,212	419	34.6%
Union, Town of	1,119	1,052	878	241	27.4%
UT (Unorganized Territories)	68	67	52	16	30.8%
Vinalhaven, Town of	1,383	1,228	1,038	345	33.2%
Warren, Town of	1,718	1,534	1,277	441	34.5%
Washington, Town of	788	694	532	256	48.1%
Knox County	23,271	21,612	19,009	4,262	22.4%

Source: U.S. Census, Claritas, Inc. 2009, Maine Land Use Regulation Commission

Natural disasters including storms and flooding can temporarily close businesses, which results in a loss of income and economic activity. Most major employers and employment opportunities are located in the service centers of Rockland, Camden, Rockport, and Thomaston, and are generally on or near US Route 1. Following is a list of all the employment sectors in Knox County as recorded at the end of 2008.

Knox County Employment Sectors

Sector	Establishments	Employees
Retail Trade	262	2,741
Health Care and Social Assistance	146	2,710
Accommodation and Food Services	163	1,645
Education Services	47	1,557
Manufacturing	92	1,532
Construction	224	1,235
Public Administration	57	1,176
Other Services (except Public Admin.)	164	599
Admin., Support, Waste Mgmt, Remediation	88	575
Professional, Scientific & Technical Svc	154	500
Information	45	461
Finance and Insurance	53	453
Transportation and Warehousing	74	418
Wholesale Trade	87	389
Arts, Entertainment, and Recreation	62	359
Agriculture, Forestry, Fishing & Hunting	111	353
Real Estate and Rental and Leasing	63	186
Utilities	12	130

Source: Maine Department of Labor

12. Multi-Jurisdictional Risk Assessment

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

As previously stated, the following are hazards for which all areas of the County are subject to the same general risk:

- Flooding
- Severe summer storm events
- Severe winter and storm events
- Wildfires in urban interface areas (Although most areas are at risk from wildfires, it is the less densely developed areas of the smaller communities that face forest acreage losses. This is due to the lack of adequate roads for providing emergency services. In addition, the resources of municipal fire departments for fighting wildfires are extremely limited, due to the small population base and the fact that most firefighters are volunteers.)

Coastal flooding affects limited portions of the coastal communities of Camden, Cushing, Friendship, Isle Au Haut, North Haven, Owls Head, Rockland, Rockport, St. George, South Thomaston, and Vinalhaven. The State of Maine Ferry Terminal at Rockland that serves the islands of North Haven, Vinalhaven and Matinicus Isle Plantation could be impacted by coastal flooding, as could the island ferry facilities.

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BASE MAP

LEGEND

- State road
- Township road
- Water body
- Municipal boundary

WALDO COUNTY

LINCOLN COUNTY

HANCOCK COUNTY

Washington

Appleton

Hope

Camden

Union

Rockport

Warren

Rockland

Thomaston

Owls Head

South Thomaston

Cushing

Friendship

Saint George River

Saint George

North Haven

Vinalhaven

Isle Au Haut

Muscle Ridge Shoals

Atlantic Ocean

Matinicus Isle Plt

Criehaven Twp

KNOX COUNTY

N

W E

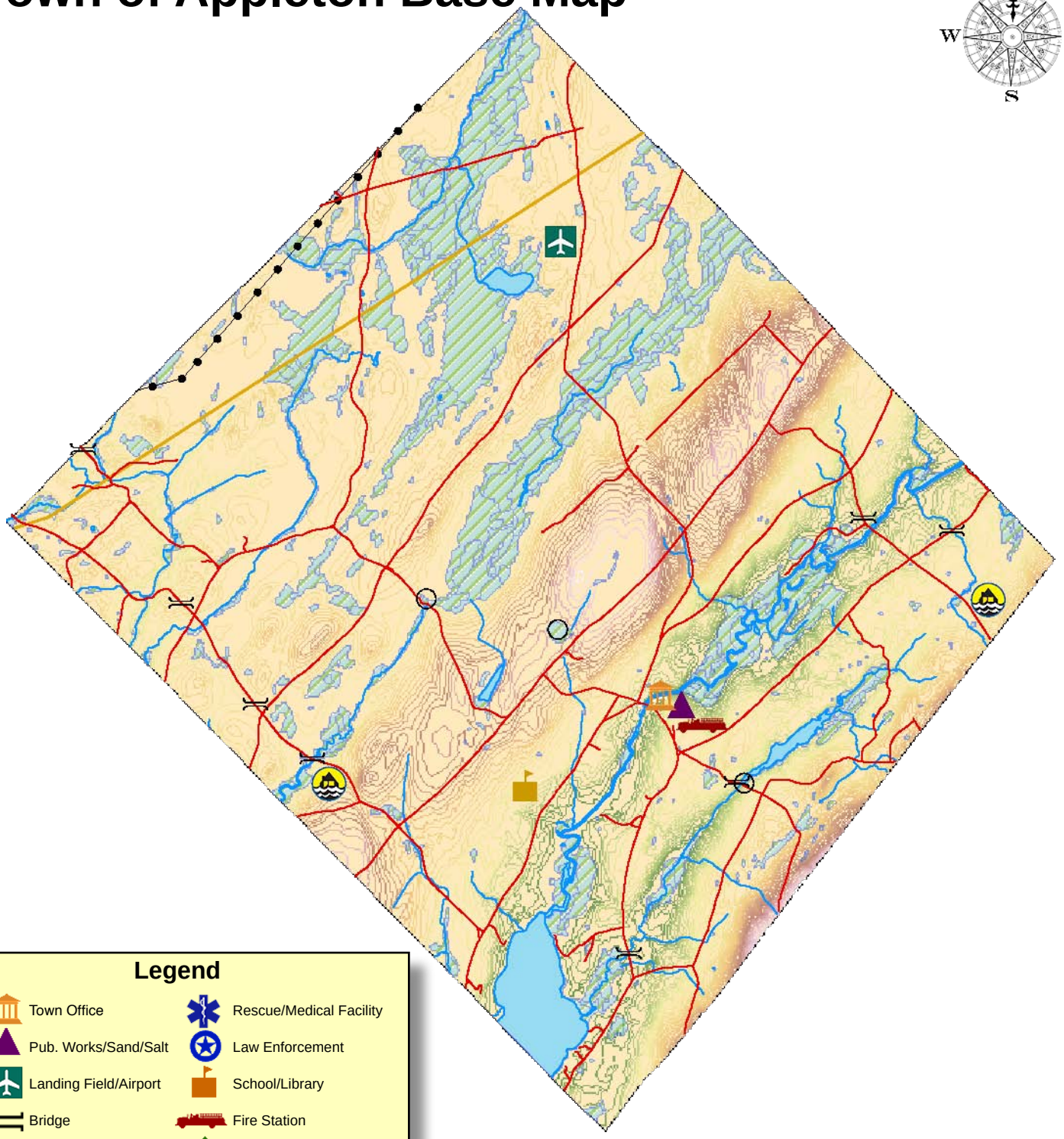
S

0 1.25 2.5 5 Miles

Map prepared by Eastern Maine Development Corporation
Sources: MEDOT and MEGIS
Map created: October, 2009

MID-COAST REGIONAL PLANNING COMMISSION
166 SOUTH MAIN STREET, SUITE 201
ROCKLAND, ME 04841
(207) 594-2299 ~ WWW.MIDCOASTPLANNING.ORG

Town of Appleton Base Map



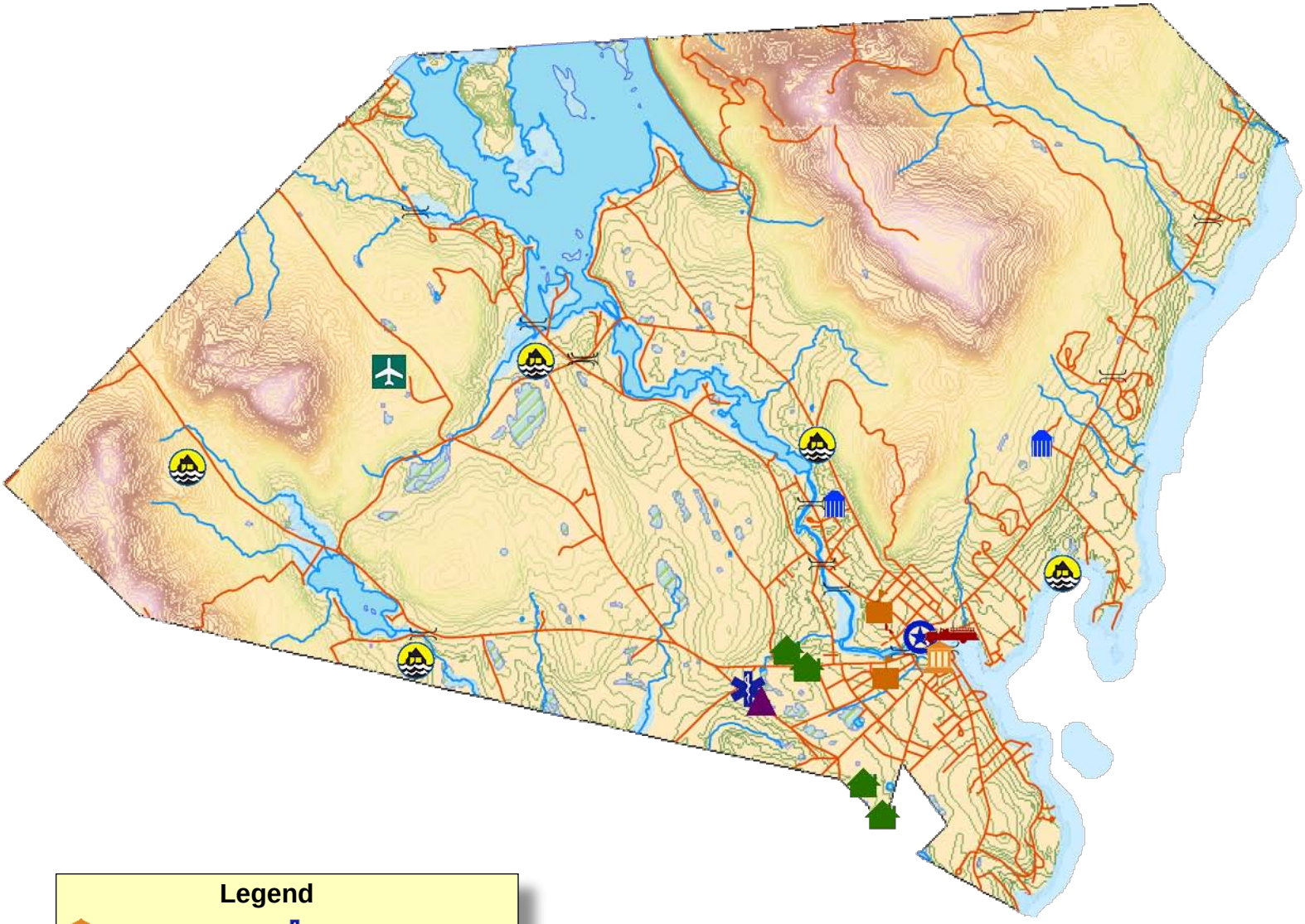
Legend

- Town Office
- Pub. Works/Sand/Salt
- Landing Field/Airport
- Bridge
- Dam
- Road
- Electric Line
- Gas Line
- Water Tower/Treatment
- Rescue/Medical Facility
- Law Enforcement
- School/Library
- Fire Station
- Residential Care Facility
- Prior Flood/Storm Damage
- Stream
- Lake
- Wetland

EMERGENCY MANAGEMENT AGENCY
KNOX COUNTY, MAINE

Hazard Mitigation Plan: 2010
Knox County EMA Director: Ray Sisk
Map Source: Dale Rowley, Masato Fueki
Map by Tay Vaughan, Timestream, Inc.
Data Source: Maine Office of GIS

Town of Camden Base Map



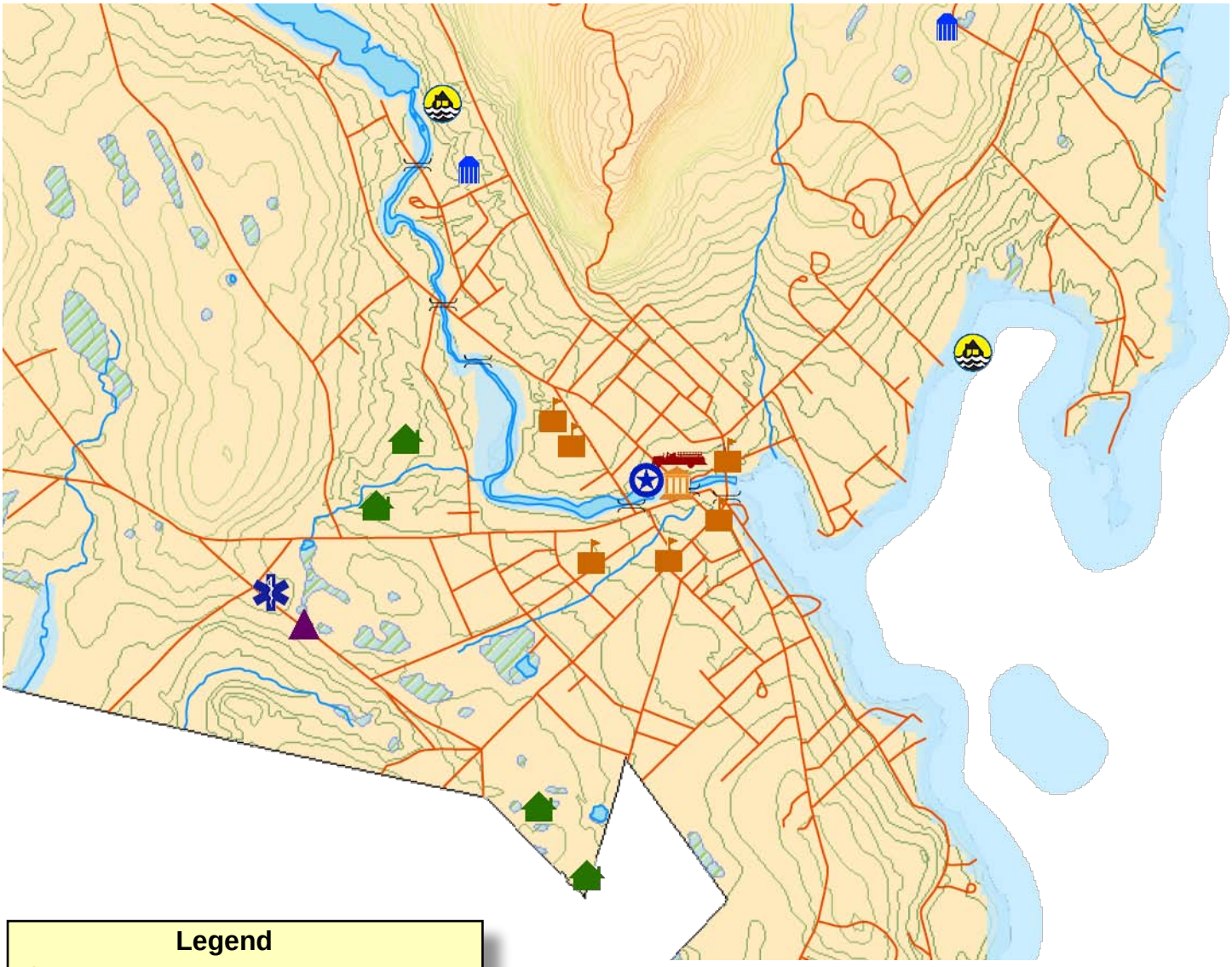
Legend

- Town Office
- Pub. Works/Sand/Salt
- Landing Field/Airport
- Bridge
- Dam
- Road
- Electric Line
- Gas Line
- Water Tower/Treatment
- Rescue/Medical Facility
- Law Enforcement
- School/Library
- Fire Station
- Residential Care Facility
- Prior Flood/Storm Damage
- Stream
- Lake
- Wetland

EMERGENCY MANAGEMENT AGENCY
KNOX COUNTY, MAINE

Hazard Mitigation Plan: 2010
Knox County EMA Director: Ray Sisk
Map Source: Dale Rowley, Masato Fueki
Map by Tay Vaughan, Timestream, Inc.
Data Source: Maine Office of GIS

Town of Camden Detail Map



Legend

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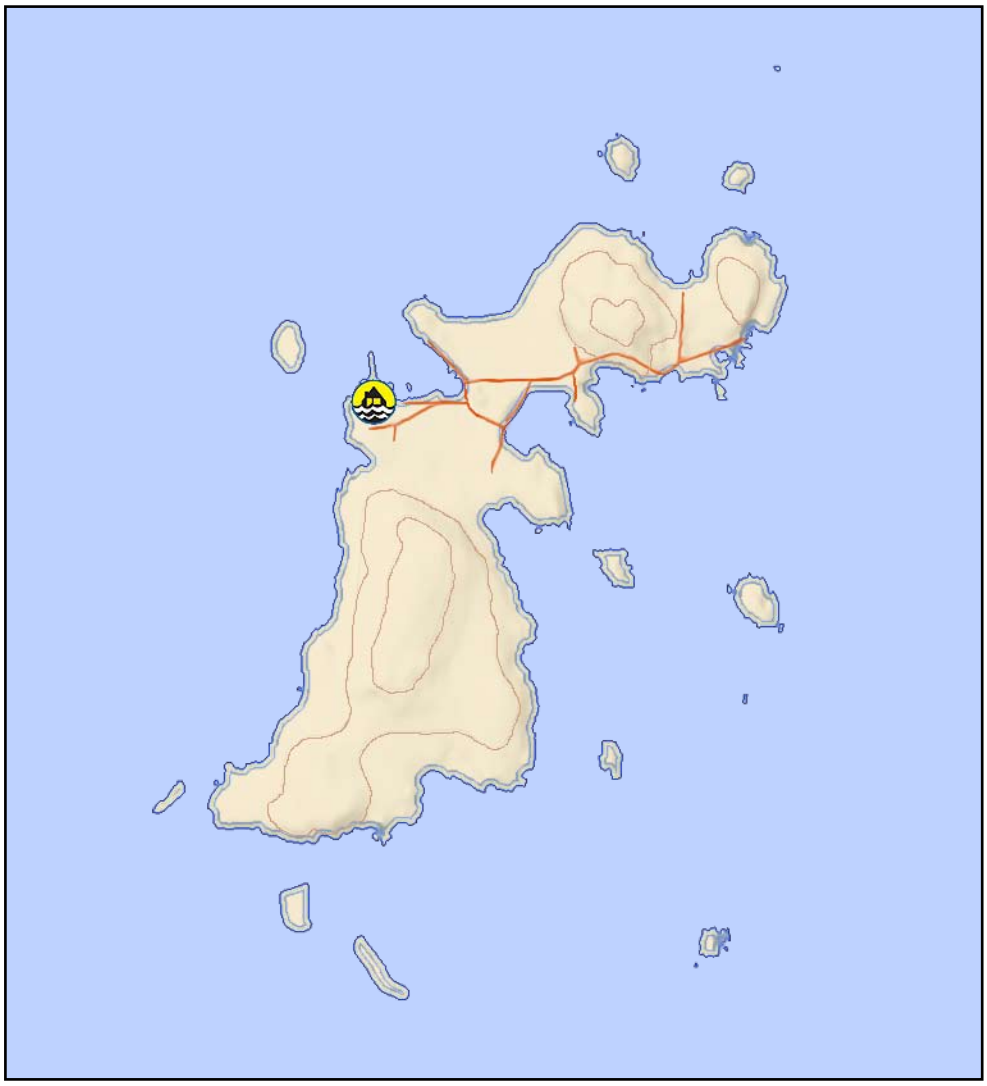
EMERGENCY MANAGEMENT AGENCY
KNOX COUNTY, MAINE

Hazard Mitigation Plan: 2010
Knox County EMA Director: Ray Sisk
Map Source: Dale Rowley, Masato Fueki
Map by Tay Vaughan, Timestream, Inc.
Data Source: Maine Office of GIS

Criehaven Township Base Map



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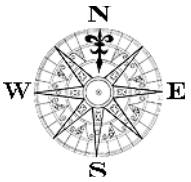
EMERGENCY MANAGEMENT AGENCY
KNOX COUNTY, MAINE

Town of Cushing Base Map



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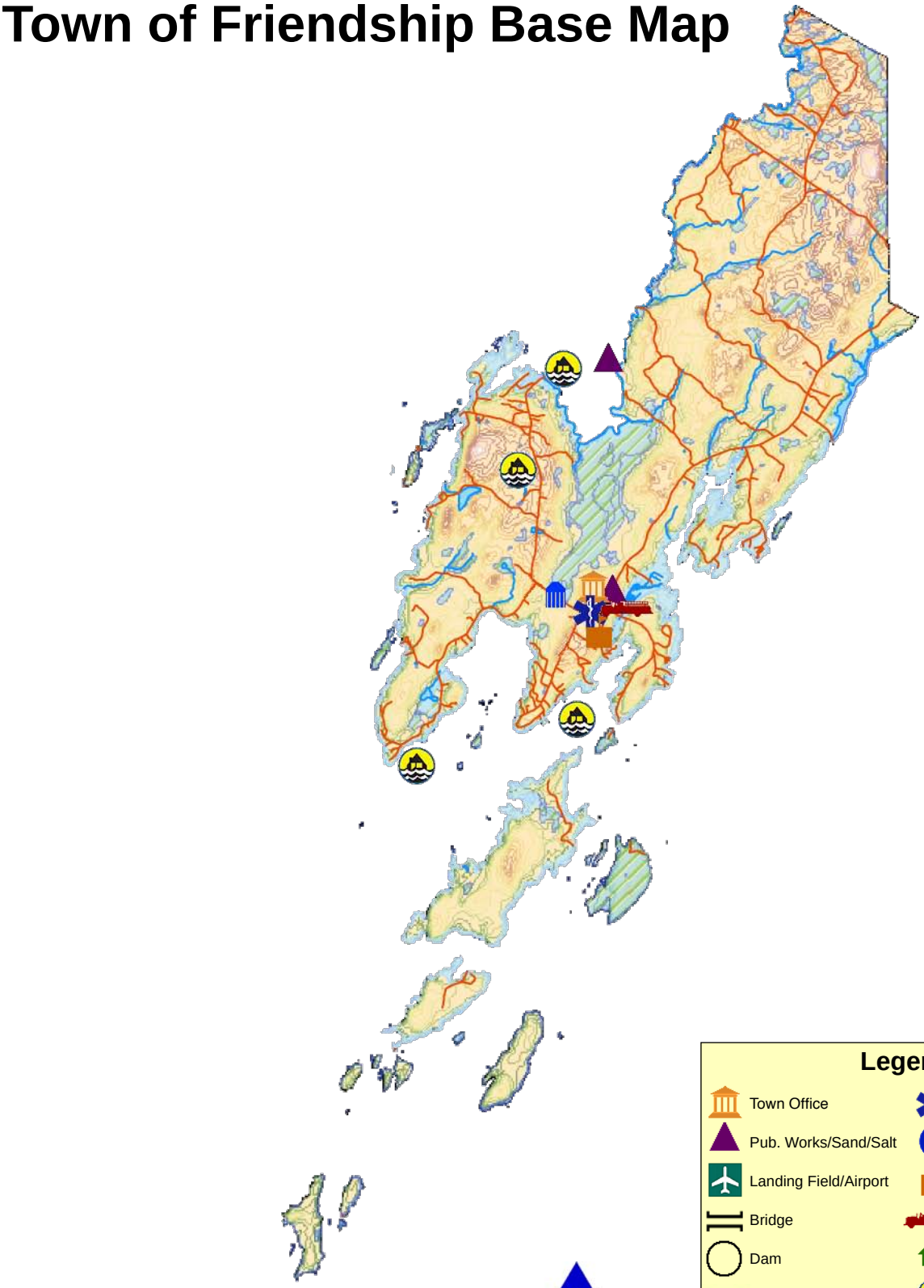
EMERGENCY MANAGEMENT AGENCY
KNOX COUNTY, MAINE

Town of Friendship Base Map



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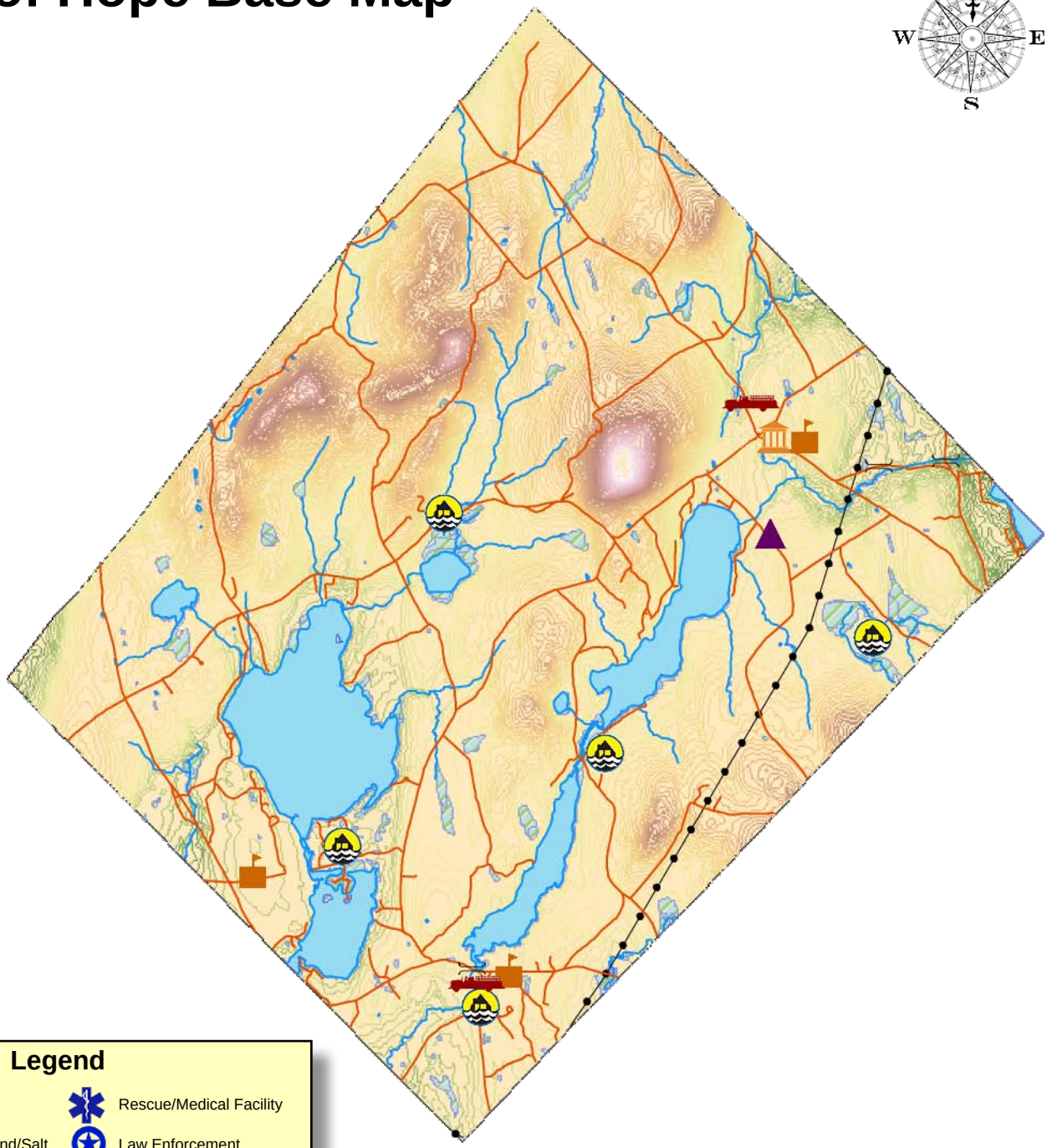
EMERGENCY MANAGEMENT AGENCY
KNOX COUNTY, MAINE

Town of Hope Base Map



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EMERGENCY MANAGEMENT AGENCY
KNOX COUNTY, MAINE

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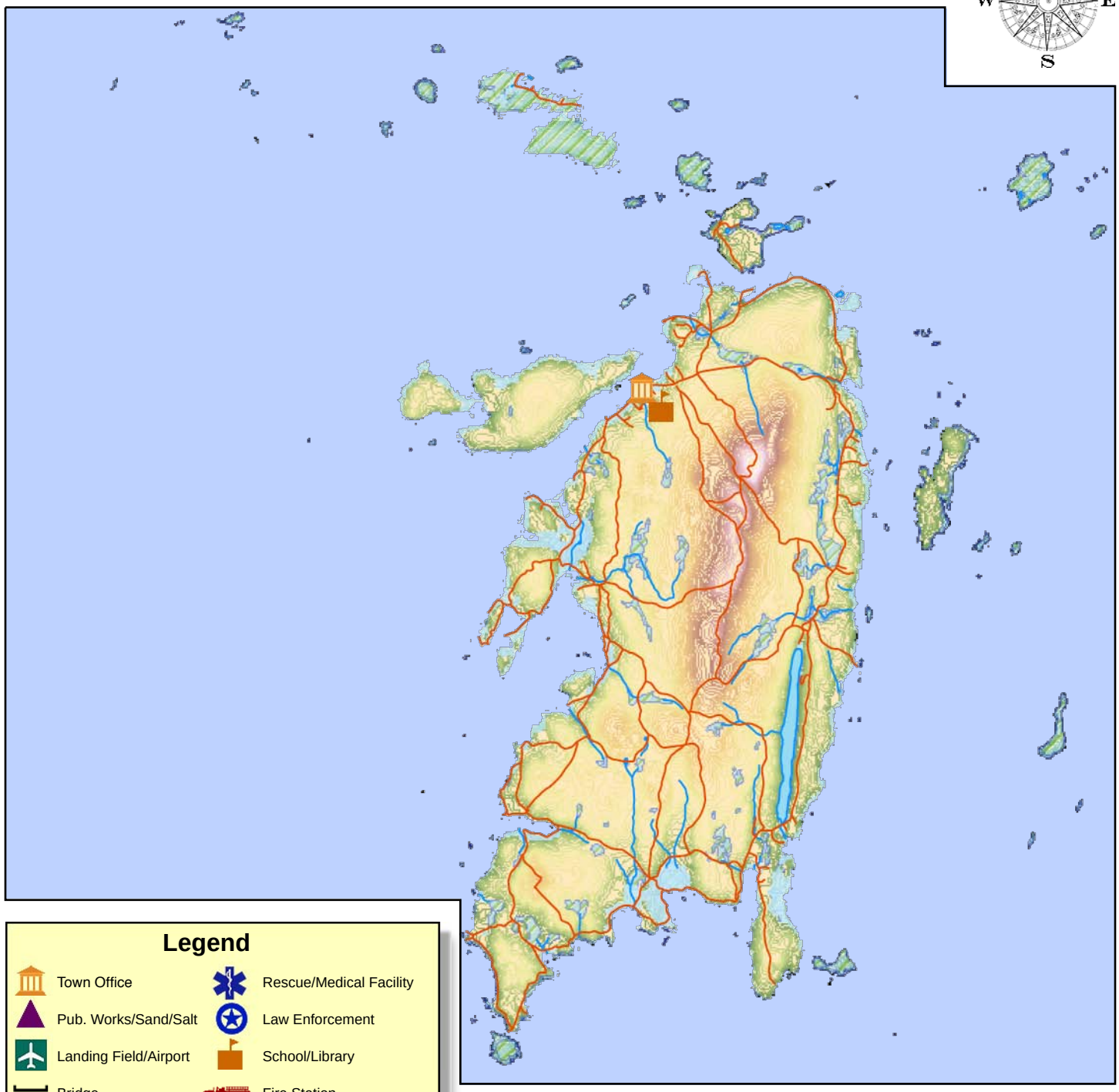
Town of Isle Au Haut Base Map



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EMERGENCY MANAGEMENT AGENCY
KNOX COUNTY, MAINE

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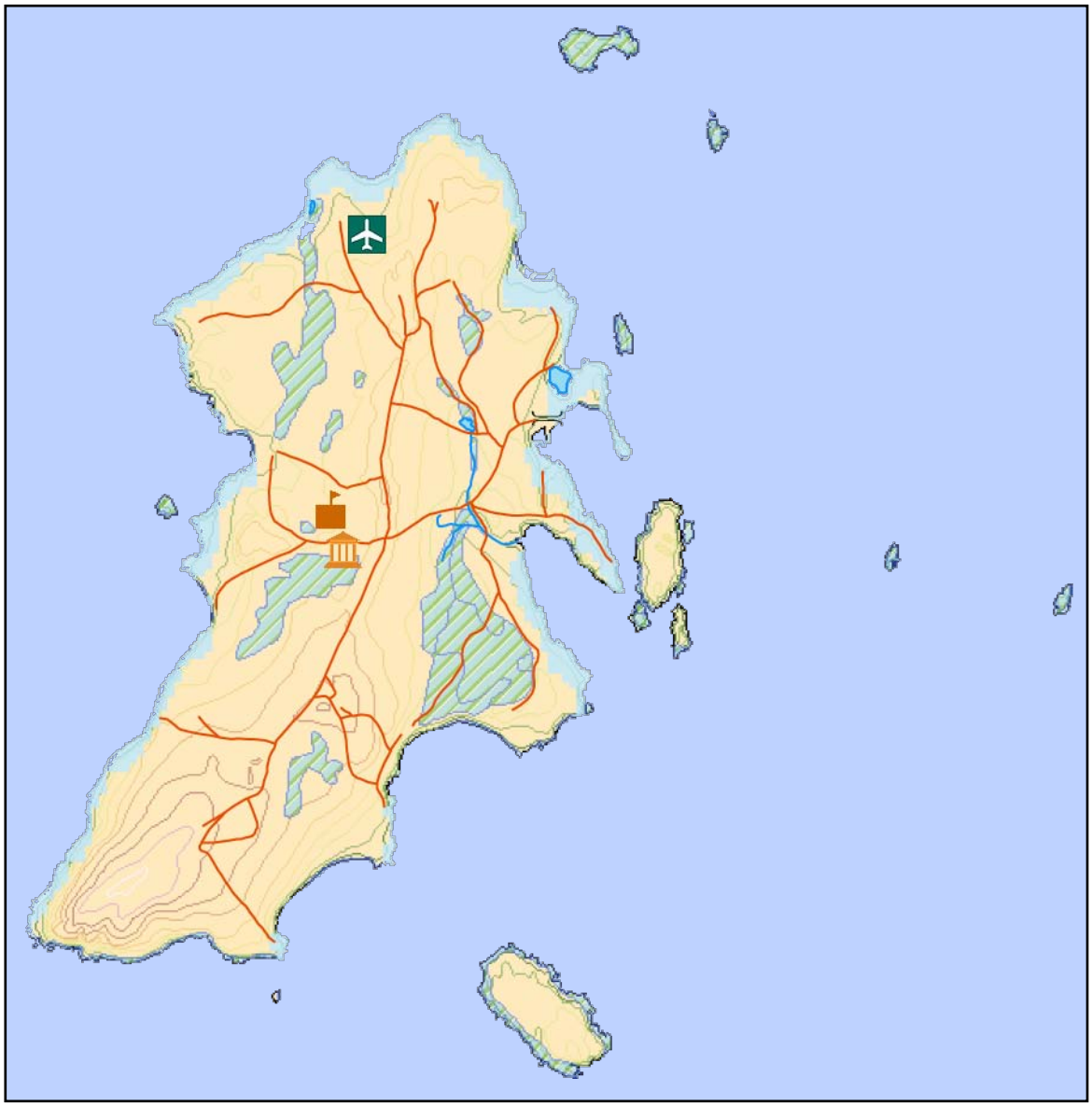
Matinicus Isle Plantation Base Map



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EMERGENCY MANAGEMENT AGENCY
KNOX COUNTY, MAINE

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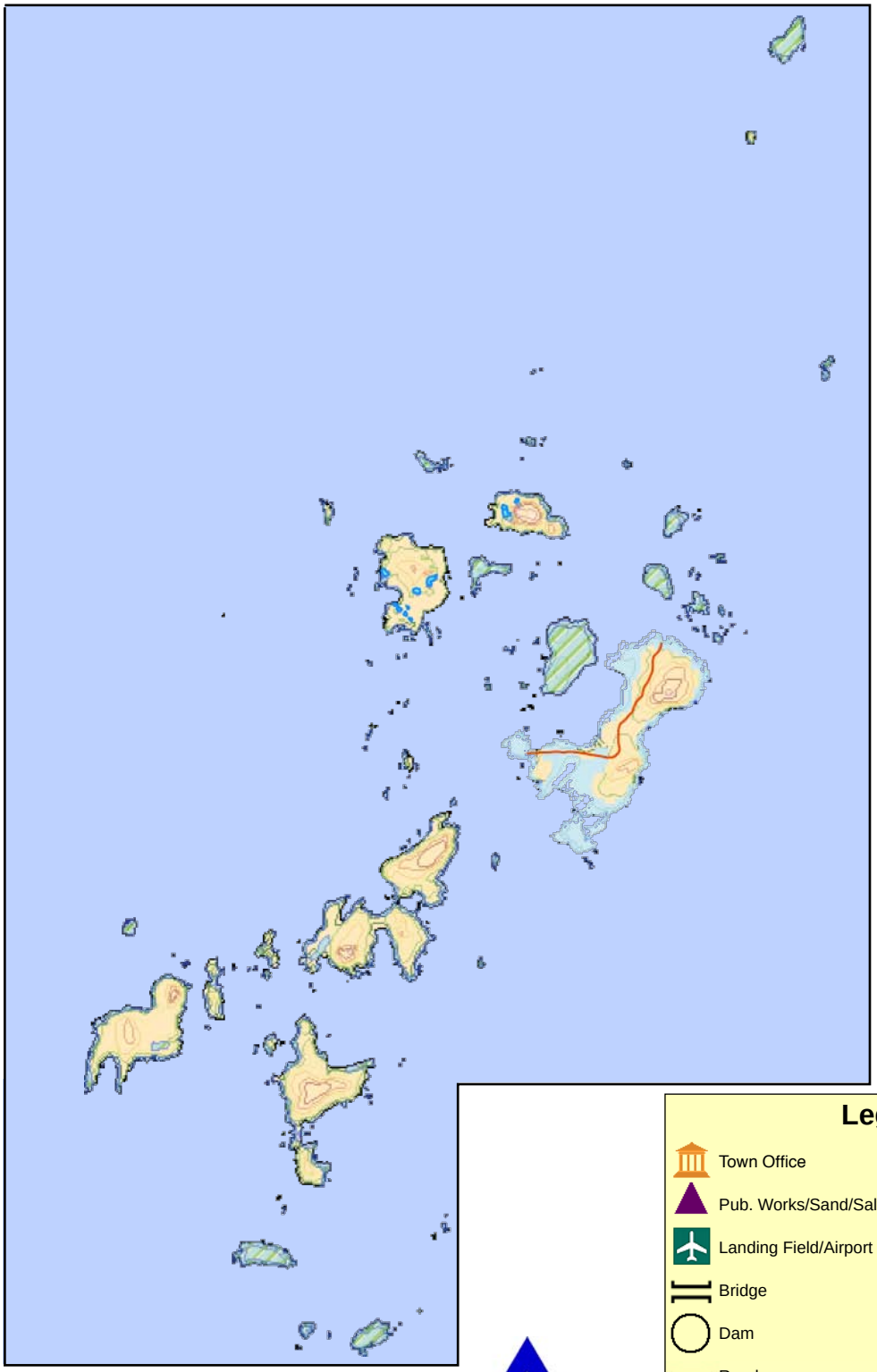
Muscle Ridge Shoals Township Base Map



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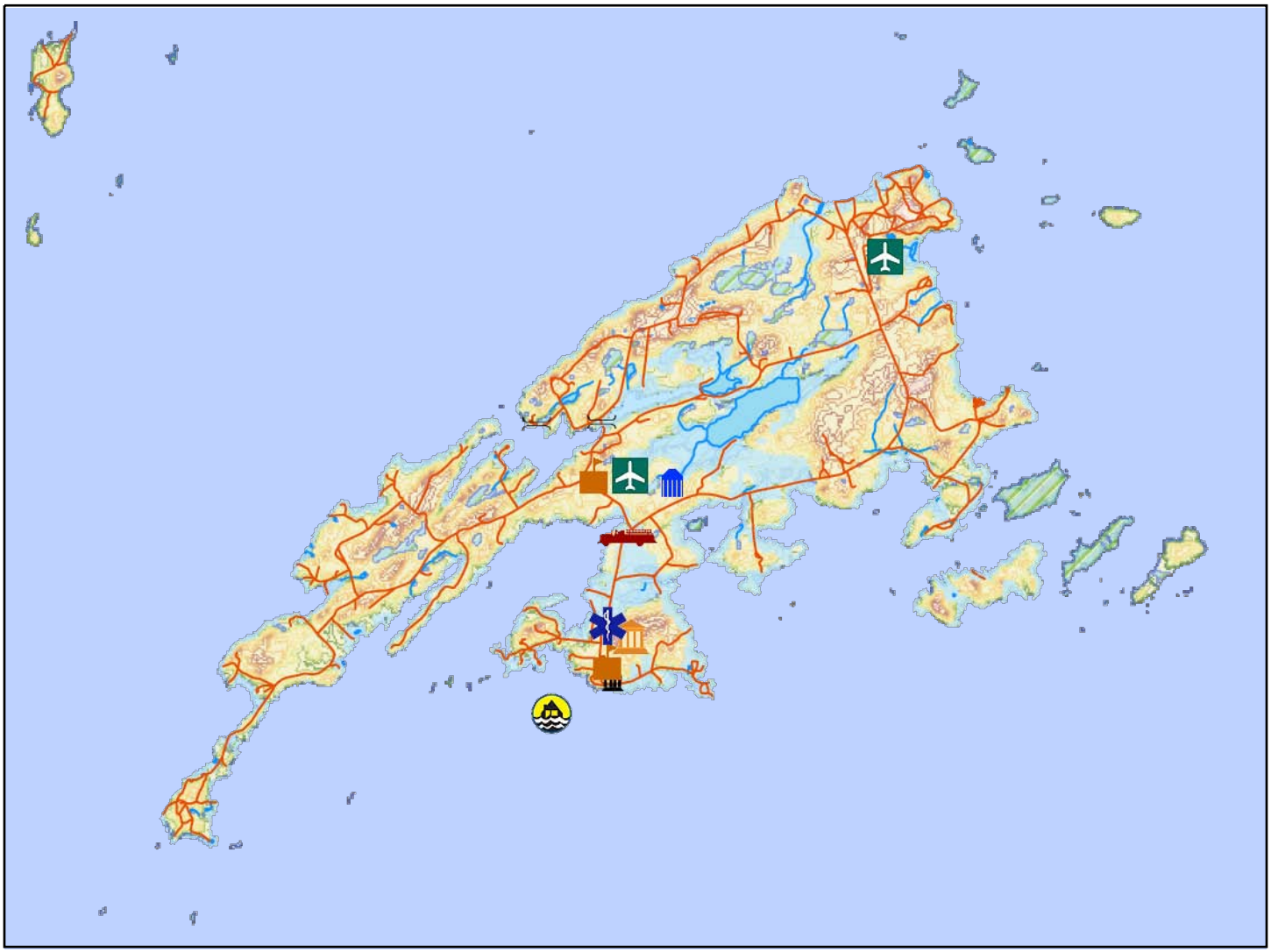
EMERGENCY MANAGEMENT AGENCY
KNOX COUNTY, MAINE

Town of North Haven Base Map



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EMERGENCY MANAGEMENT AGENCY
KNOX COUNTY, MAINE

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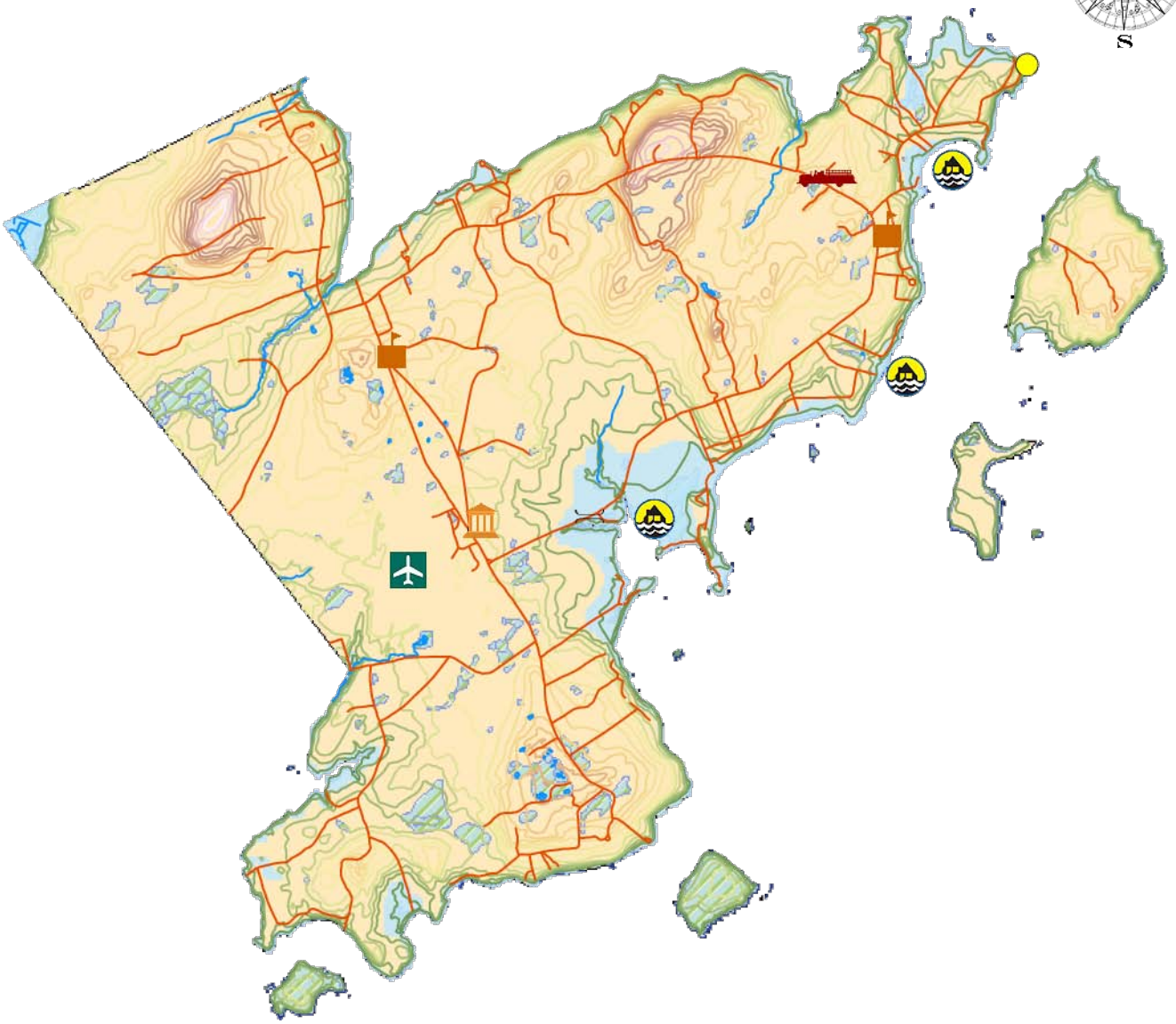
Town of Owls Head Base Map



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EMERGENCY MANAGEMENT AGENCY
KNOX COUNTY, MAINE

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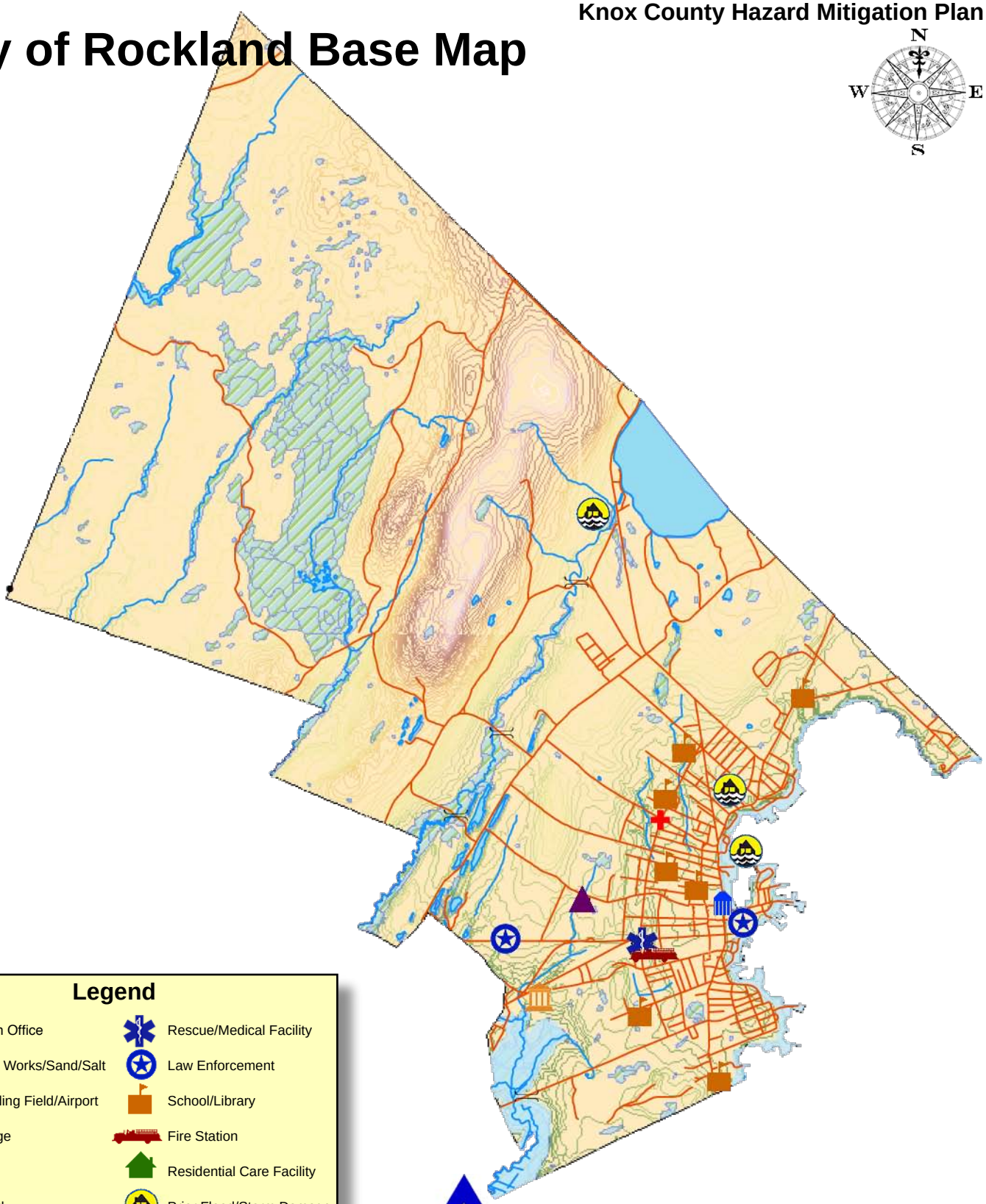
Knox County Hazard Mitigation Plan

City of Rockland Base Map



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EMERGENCY MANAGEMENT AGENCY
KNOX COUNTY, MAINE

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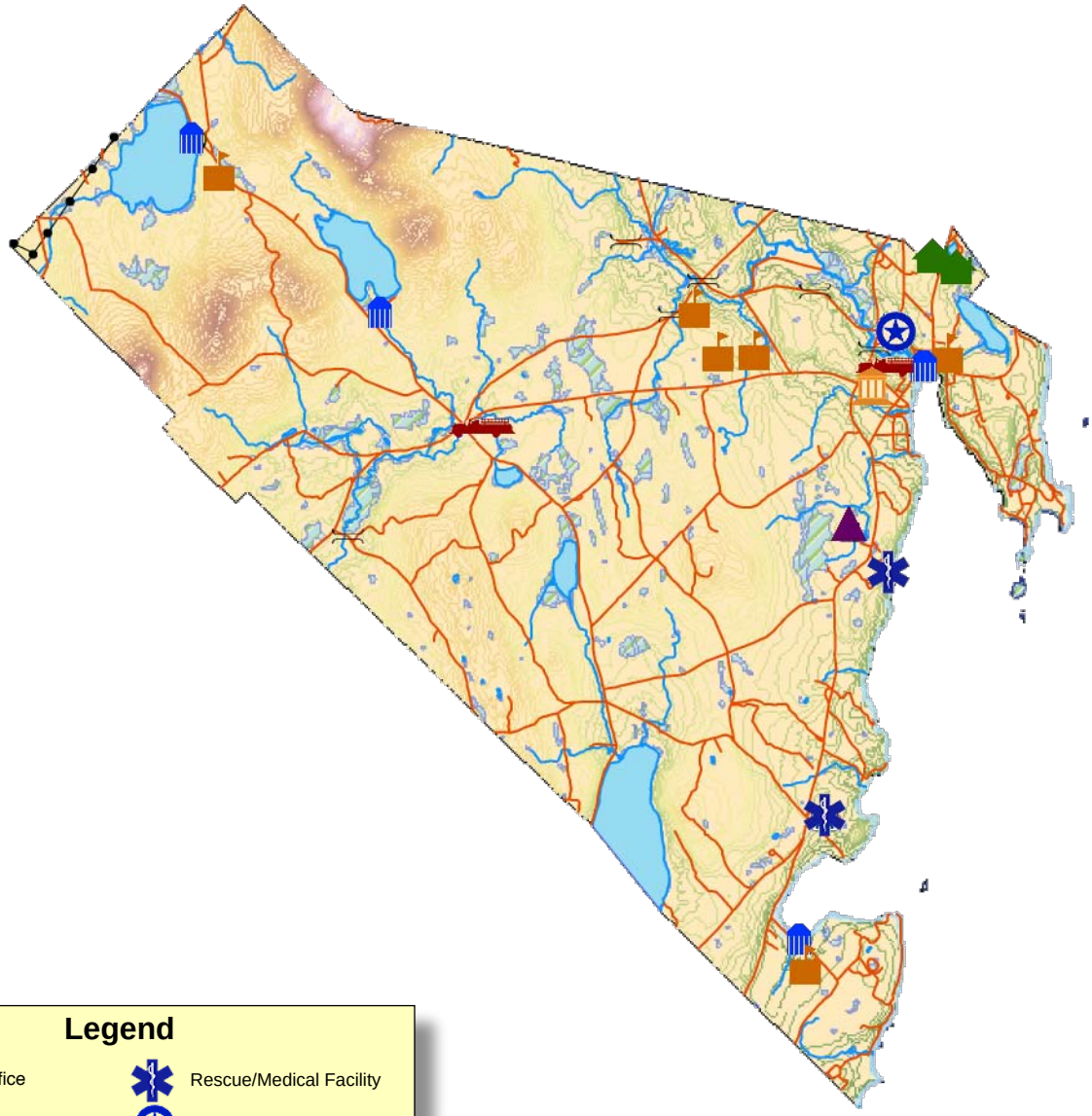
Town of Rockport Base Map



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EMERGENCY MANAGEMENT AGENCY
KNOX COUNTY, MAINE

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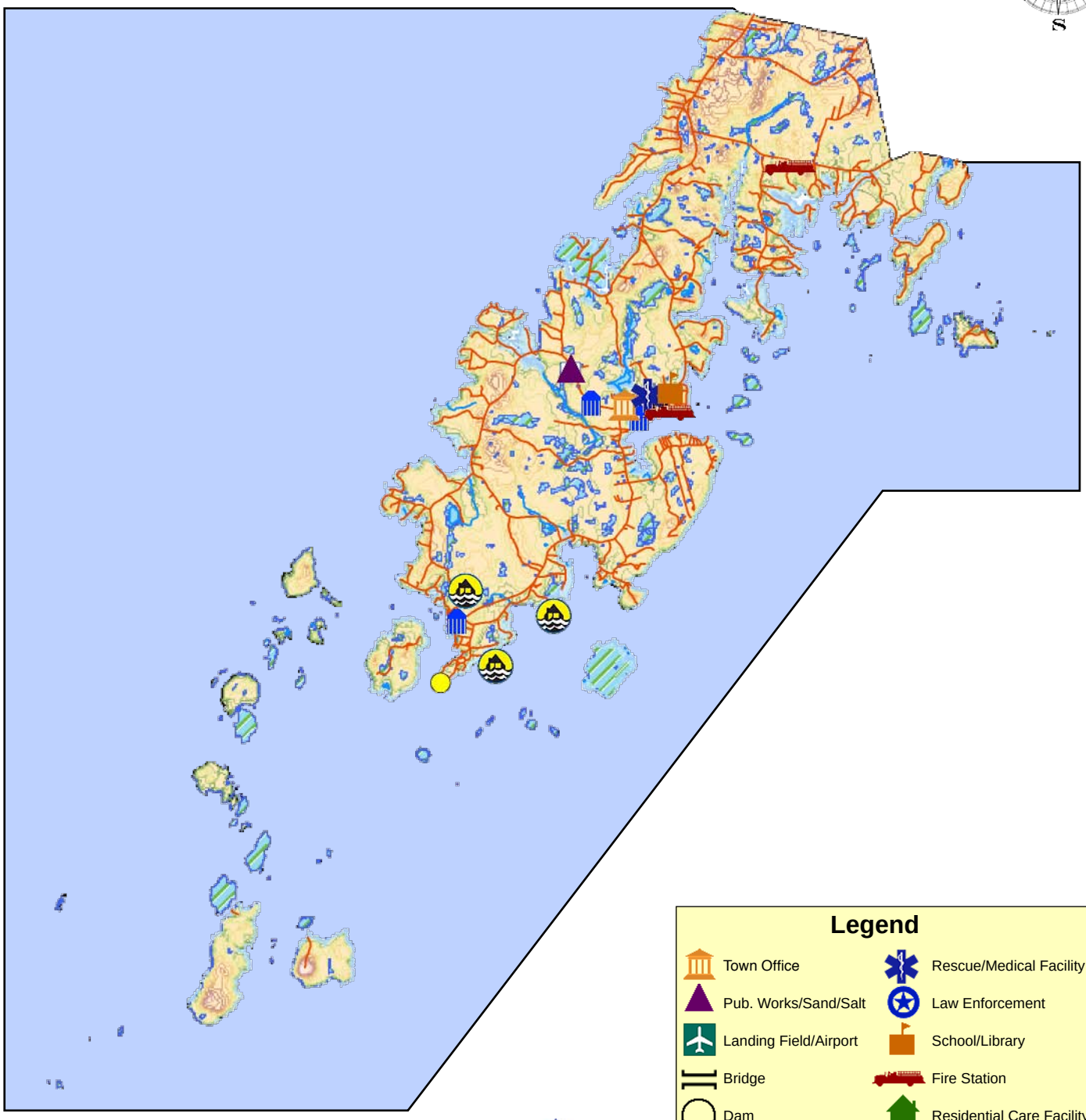
Town of Saint George Base Map



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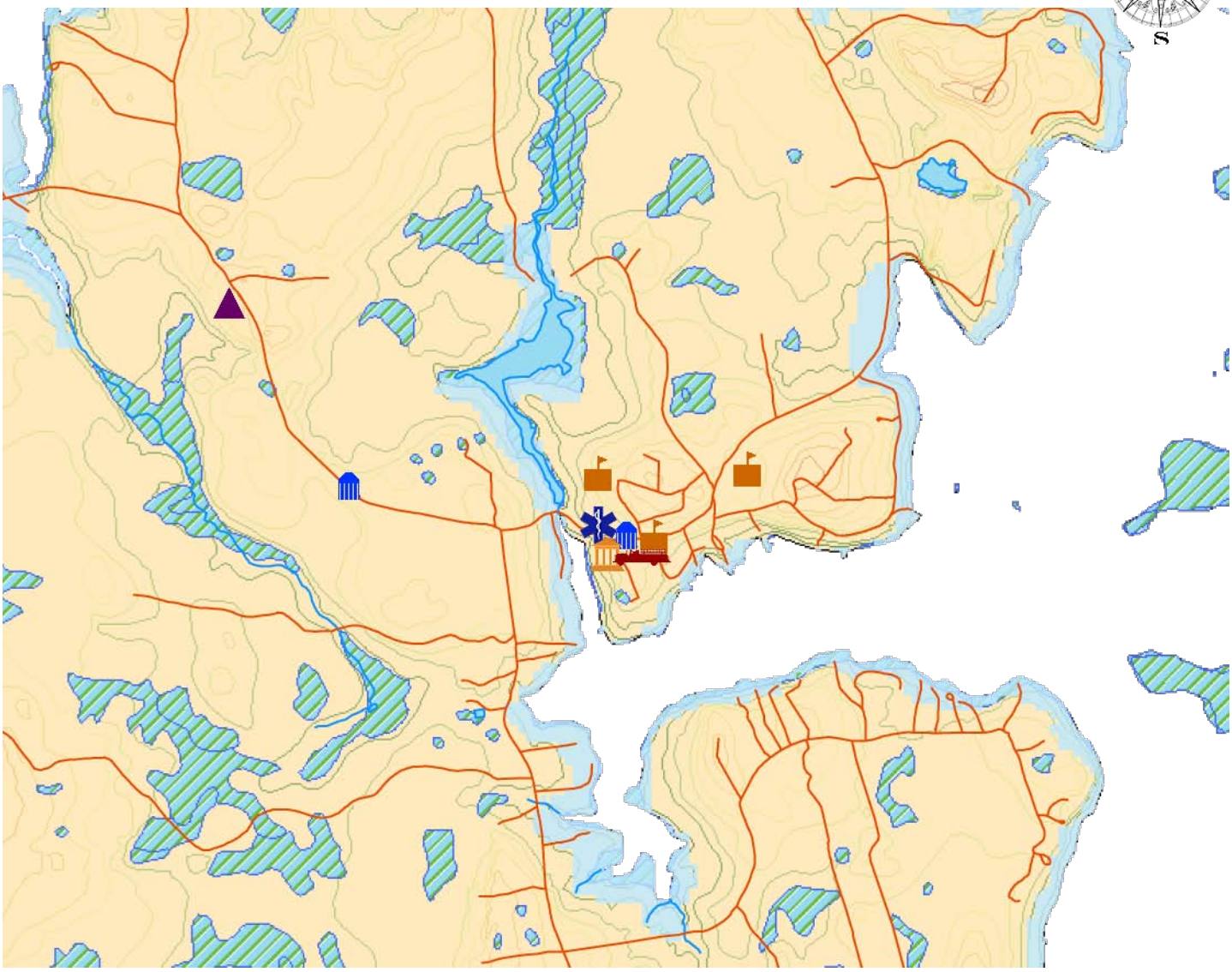
EMERGENCY MANAGEMENT AGENCY
KNOX COUNTY, MAINE

Town of Saint George Detail Map



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EMERGENCY MANAGEMENT AGENCY
KNOX COUNTY, MAINE

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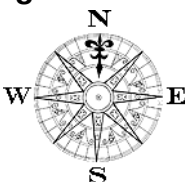
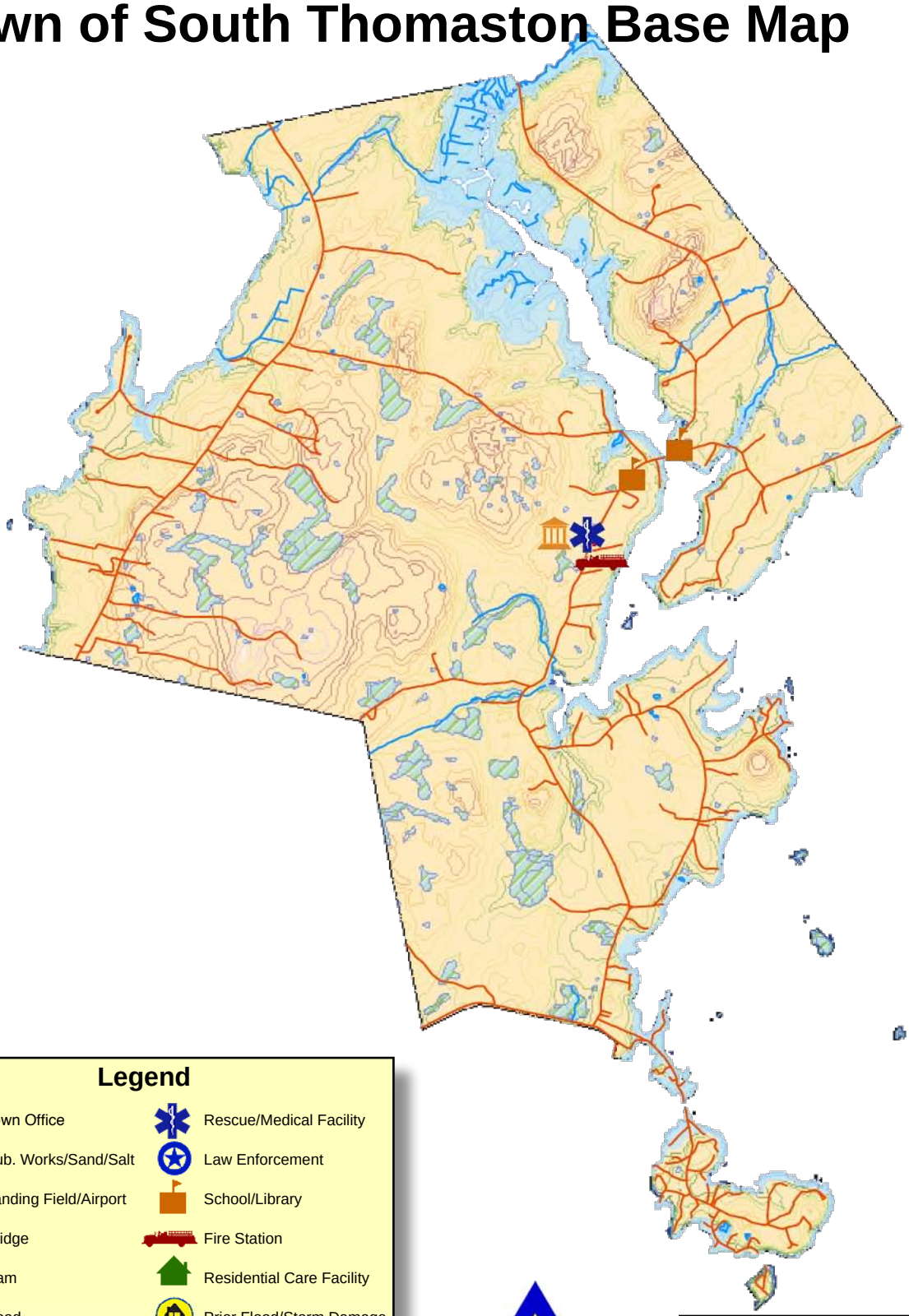
Town of South Thomaston Base Map





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EMERGENCY MANAGEMENT AGENCY
KNOX COUNTY, MAINE

Hazard Mitigation Plan: 2010
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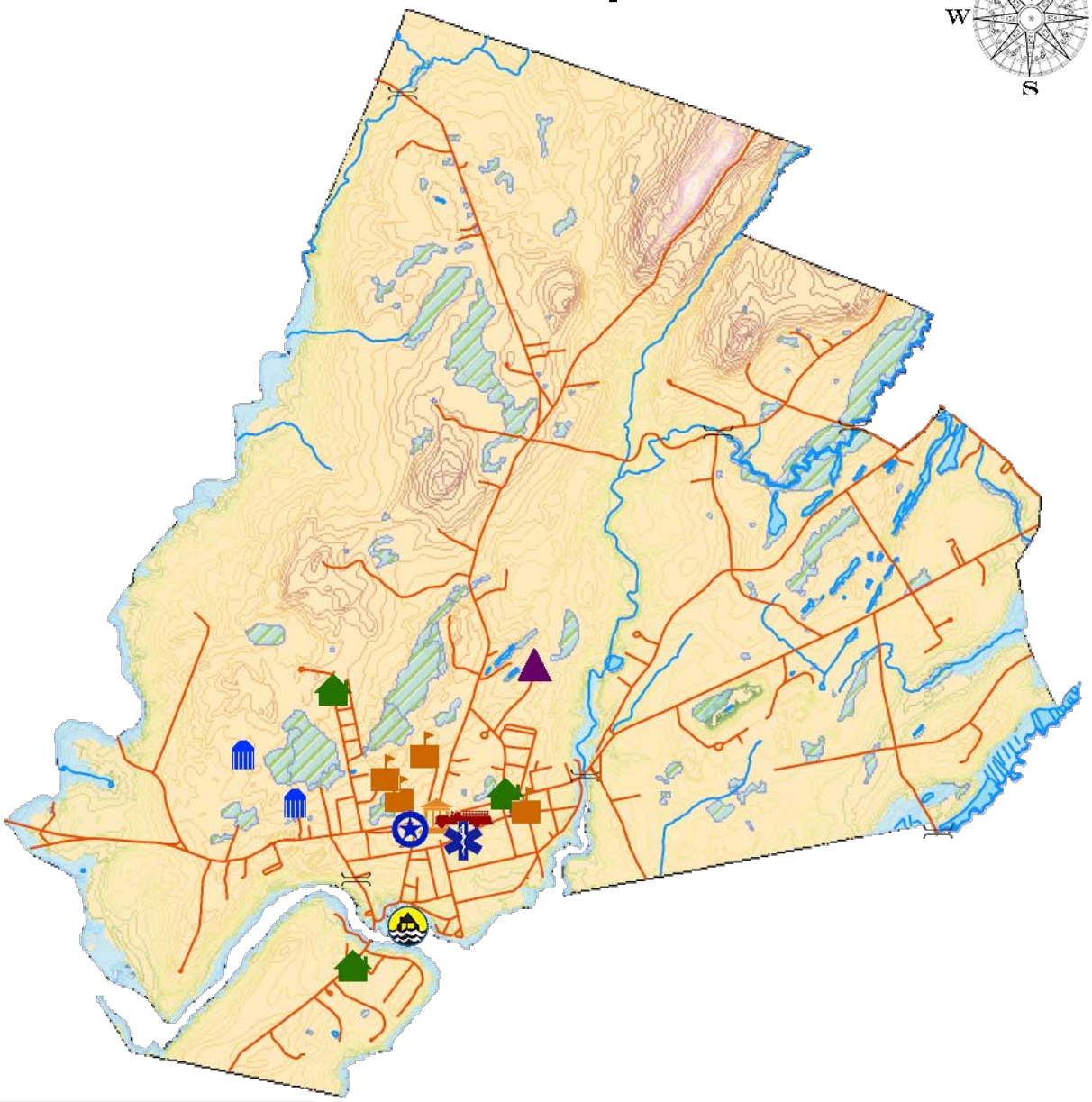
Town of Thomaston Base Map



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KNOX COUNTY, MAINE

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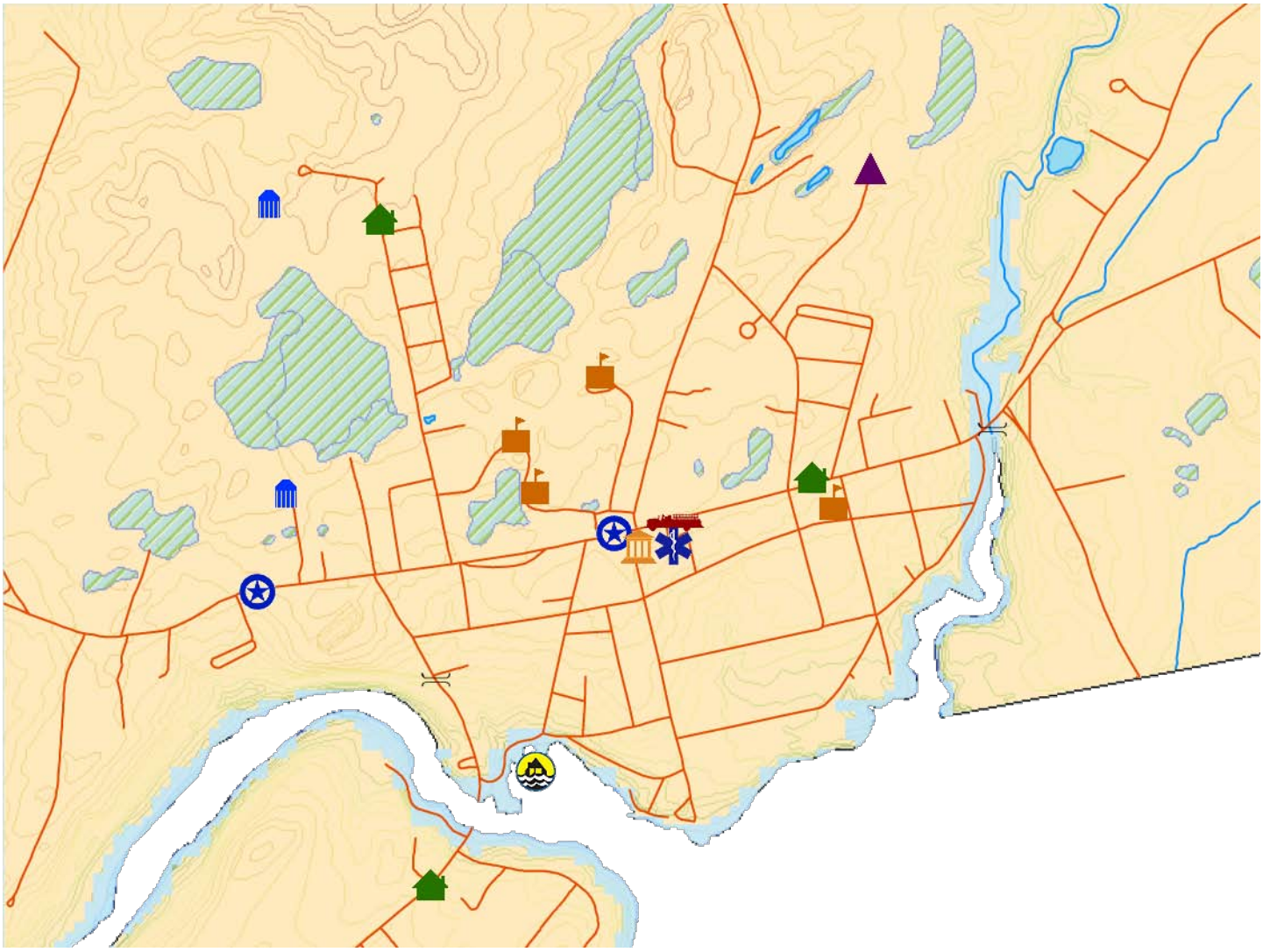
Town of Thomaston Detail Map



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EMERGENCY MANAGEMENT AGENCY
KNOX COUNTY, MAINE

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Town of Union Base Map

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EMERGENCY MANAGEMENT AGENCY
KNOX COUNTY, MAINE

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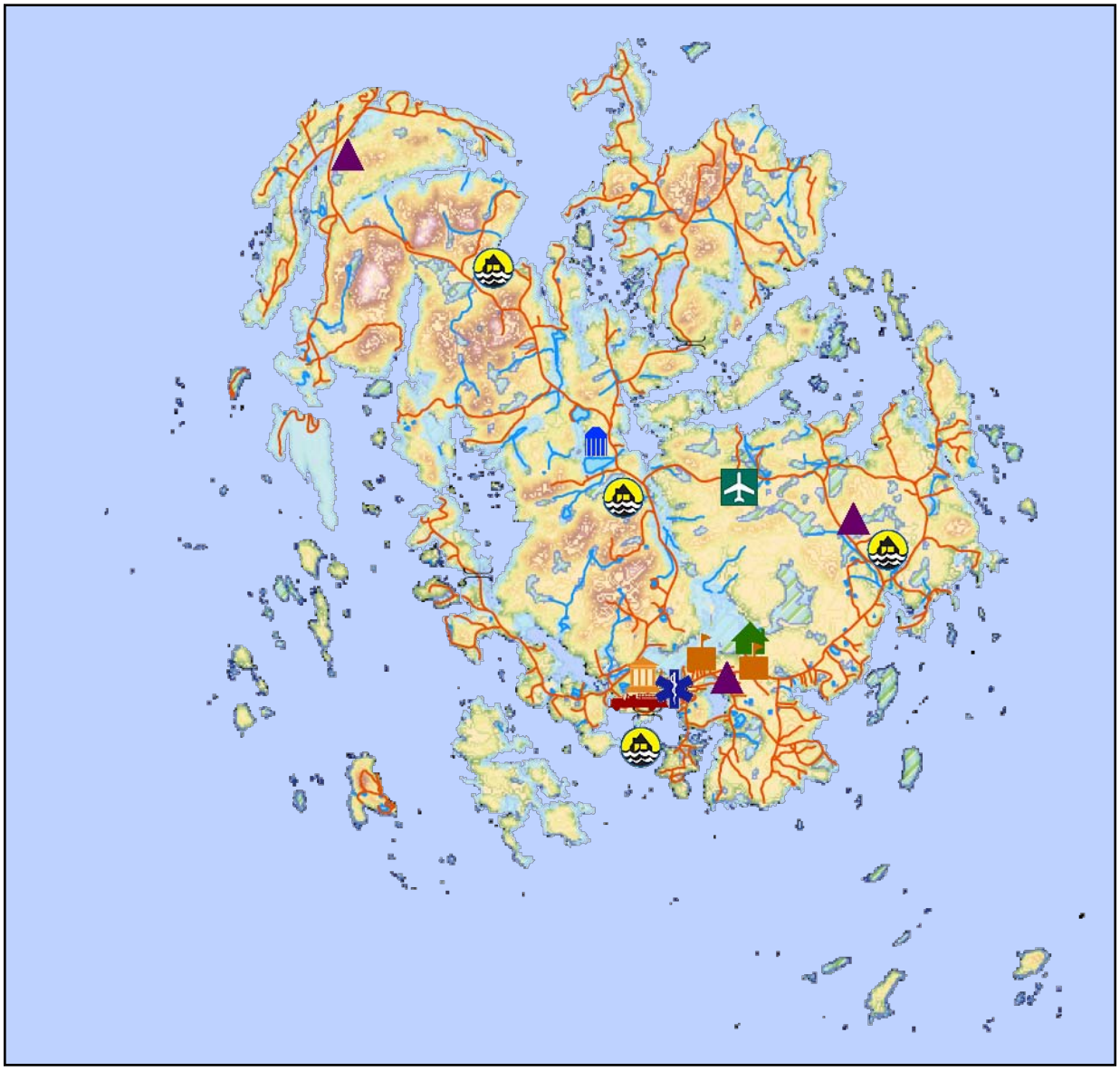

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KNOX COUNTY, MAINE

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Town of Warren Base Map

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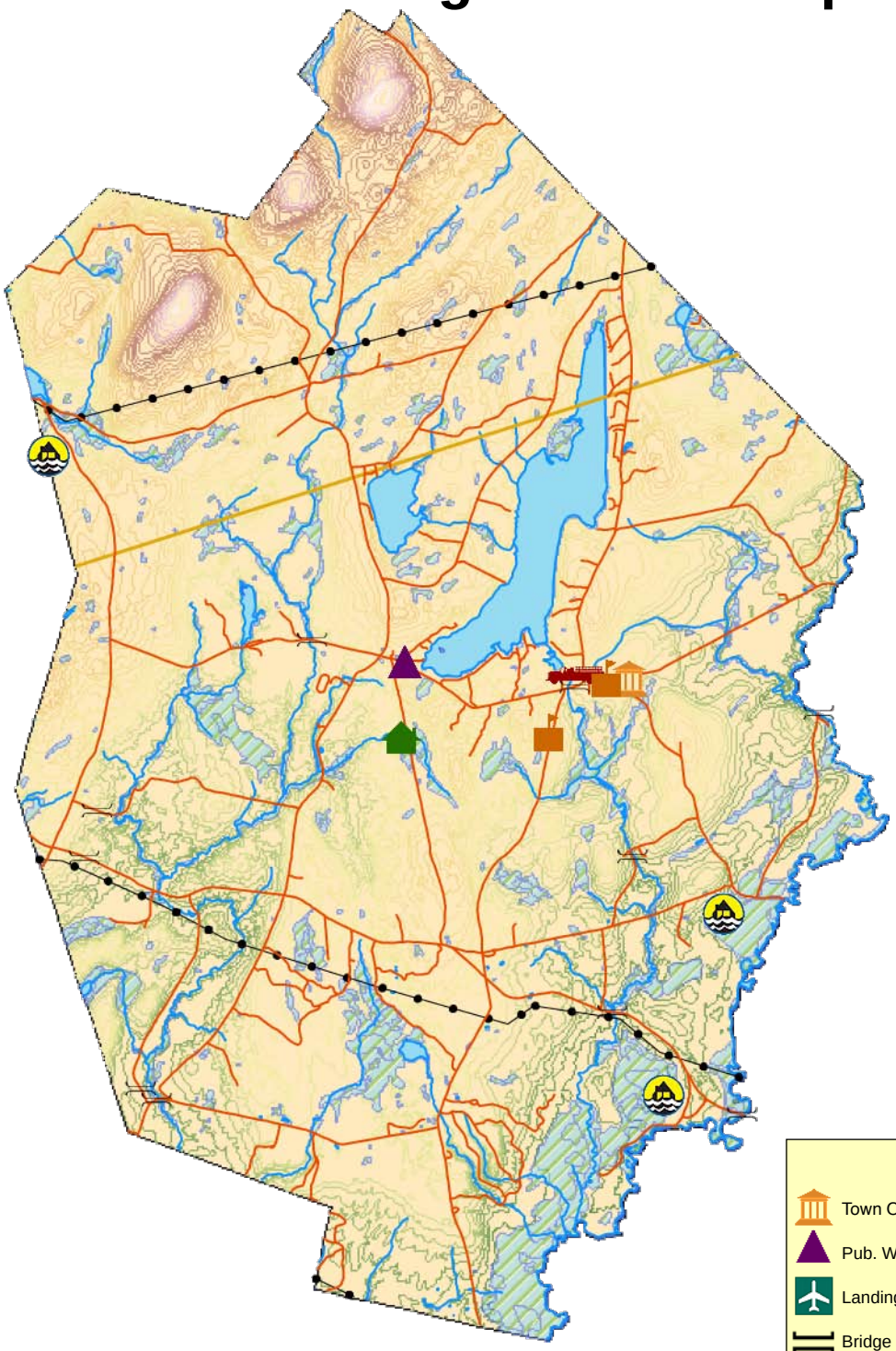
EMERGENCY MANAGEMENT AGENCY
KNOX COUNTY, MAINE

Town of Washington Base Map



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EMERGENCY MANAGEMENT AGENCY
KNOX COUNTY, MAINE

SECTION 5 MITIGATION STRATEGIES

Mitigation Strategy
Requirement §201.6(c)(3): The plan shall include a mitigation strategy that provides the jurisdiction's blueprint for reducing the potential losses identified in the risk assessment, based on existing authorities, policies, programs and resources, and its ability to expand on and improve these existing tools.

13. 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.	
Element	**A.** Does the new or updated plan include a description of mitigation goals to reduce or avoid long-term vulnerabilities to the identified hazards?

See updated Goals/objective/action tables starting on page 5-2 for county-wide activities for each of the previously profiled hazards.

14. 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.	
Elements	**A.** Does the new or updated plan identify and analyze a comprehensive range of specific mitigation actions and projects for each hazard?
	B. Do the identified actions and projects address reducing the effects of hazards on **new** buildings and infrastructure?
	C. Do the identified actions and projects address reducing the effects of hazards on **existing** buildings and infrastructure?

A. Comprehensive Range of Mitigation Actions and Projects

The following pages contain goals, objectives, and strategic actions for each of the hazards identified earlier in this report, followed by a summary of prioritized projects by municipality. The goals, objectives, and strategic actions were developed by the Hazard Mitigation Team at several hazard mitigation meetings, which were held from 2009 – 2012 at the Knox County EMA offices.

B. Actions and Projects that Reduce Hazards on New Buildings and Structures from 2009 – 2012

Summer Storms:	2B, 3C
Winter Storms	3C
Flooding	2A, 2B, 2C, 2D
Wildfire	1D, 2A, 2B, 2D, 2E, 3B
Landslide	2A, 1B, 2B

C. Actions and Projects that Reduce Hazards on Existing Buildings and Structures

Summer Storms:	2B, 3C
Winter Storms	2B, 2D
Flooding	2A, 2B, 2C, 2D
Wildfire	1D, 2A, 2B, 2D, 2E, 3B
Landslide	1B, 2B

SEVERE SUMMER STORM EVENTS

The most likely damages caused by a severe summer storm event are the loss of electrical power from downed power transmission lines, the blockage of roads from tree debris, wash-outs caused by water runoff that overwhelms local drainage systems, and erosion resulting from wave action or river flow. There could be injuries or loss of life caused by delayed responses from emergency services, debris falling on an individual, or from storm-related vehicle accidents resulting from downed tree limbs, and road washouts, or erosion. Other types of general damage to personal and real property may be caused by high winds, like those from a hurricane. If power is lost for extended periods of time, severe storm events can shut down businesses, resulting in major losses of income to local businesses and individuals. In fact, the very presence of a coastal storm will shut commerce down, resulting in major losses of income for local businesses.

Goal: Reduce loss of life, injury, and property damage in Knox County caused by severe summer storm events (including hurricanes and coastal erosion resulting from severe storm events).

Objectives	Activities	Responsibility	Status/Rationale if no Action
1. Lessen loss of life and injuries resulting from severe summer storm events and hurricanes, and the resulting water runoff or erosion, including coastal erosion.	A. Educate the public on the dangers of severe summer storms and about the importance of being self-supporting for up to 72 hours following a storm by having necessary emergency supplies on hand, and where emergency shelters can be found.	Broadcast media, County EMA Director Municipal officials	Watches, warnings and advisories posted to County website in the "weather" section; updated as needed.
	B. Continue to warn the public about pending summer storms and hurricanes. Encourage residents without utilities to report to emergency shelters.	Local EMA Directors Municipal governments	Watches, warnings and advisories posted to County website in the "weather" section; updated as needed.
	C. Develop procedures and provide training to locate and identify special health need populations. Maintain a list of special needs people who would be vulnerable during a power outage.	Municipal fire departments, Social service agencies Local EMA directors	Done at town level; updated as needed.
	D. Encourage the public to check on the safety of elderly or infirm neighbors and relatives who may be adversely affected by power outages.		Watches, warnings and advisories posted to County website in the "weather" section; updated as needed.
	E. Encourage homeowners to keep primary and secondary egress routes cleared.		Watches, warnings and advisories posted to County website in the "weather" section; updated as needed.

Objectives	Activities	Responsibility	Status/Rationale if no Action
2. Lessen property damages caused by severe summer storm events and the resulting water runoff or erosion, including coastal erosion	A. Encourage municipalities to maintain road damage repair records, seek guidance on hydrology and roadway design, which may include Stormwater Analysis and Management Plans.	Municipal officials County	County has provided copies of the "Road Tracker" to each community; has regular meetings with the Public Works and Road Commissioners Working Group.
	B. Enforce ordinances	Municipal officials	Continue to enforce; update ordinances as necessary.
	C. Apply for grants to upgrade roads, culverts, ditches, and drainage systems in accordance with plans for making roads safe from summer storms and water runoff.	Municipal officials County	Lack of records has made this difficult in meeting BCA; use of the Road Tracker should help in building better databases.
	D. Educate homeowners about summer storm preparations.	Municipal officials County	Advisories and preparedness information posted to County website in the "weather" section; updated as needed.
	E. Encourage homeowners to purchase insurance for severe storm damages.	Municipal officials County	Continue as needed.
	F. Develop plans to handle surges in boat mooring requirements.	Municipal officials County	Continue as needed.
3. Assure all emergency facilities have temporary backup power capabilities.	A. Encourage acquisition of generators at all critical facilities and utilities such as Fire/Police Stations, EMS garages, public works fuelling points, Water and Sewer treatment plants, schools, and shelters.	Municipal officials County	5 generators purchased to date; deferred until further funding becomes available.
	B. Encourage homeowners to have generators, non-electrical heating, or alternate energy sources, such as solar, wind or hydropower.	Municipal officials County	Continue as needed.
	C. Develop/update policies to require new or existing critical public facilities to have a generator.	Municipal officials	Some towns have embraced this idea; others will consider pending funding availability.
4. Assure prompt restoration of critical transportation links.	A. Train and equip a quick-response Road Debris Clearance Team from public works, fire department, and/or volunteers.	Municipal officials	Continue via the Public Works and Road Commissioners Working Group.
	B. Update or develop the resources section in the municipal Emergency Operations Plan with heavy equipment that could be used for debris removal.	Municipal officials Partners	County/private/public partnership developed in 2010-2011; MOU's signed; training as needed.

	C. Develop alternate-transportation means for emergency responders.	Municipal officials Transportation Providers	MOU signed with local transportation providers; could transport approximately 3,500

SEVERE WINTER STORM EVENTS

The most likely damages caused by a severe winter storm event are the loss of electrical power from downed power transmission lines, the blockage of roads from tree debris, wash-outs caused by ice jams and water runoff that overwhelms local drainage systems, and erosion resulting from wave action or river flow. There could be injuries or loss of life caused by delayed responses from emergency services, the improper use of back-up heat sources, freezing conditions, debris falling on an individual, or from storm-related vehicle accidents resulting from downed tree limbs, road washouts, erosion, or icy conditions. Other types of general damage to personal and real property may be caused by high winds, like those from a blizzard. If power is lost for extended periods of time, severe storm events can shut down businesses, resulting in major losses of income to local businesses and individuals. In fact, the very presence of a blizzard or winter coastal storm will shut commerce down, resulting in major losses of income for local businesses.

Goal: Reduce loss of life, injury, and property damage in Knox County caused by severe winter storm events.

Objectives	Activities	Responsibility	Status/Rationale if no Action
1. Lessen loss of life and injuries resulting from severe winter storm events.	A. Educate the public on the dangers of severe winter storms and about the importance of being self-supporting for up to 72 hours following a storm by having necessary emergency supplies on hand, and where emergency shelters can be found.	Broadcast media, County EMA Director Municipal officials	Watches, warnings and advisories posted to County website in the "weather" section; updated as needed.
	B. Continue to warn the public about pending winter storms. Encourage residents without utilities to report to emergency shelters.	Local EMA Directors Municipal governments	Watches, warnings and advisories posted to County website in the "weather" section; updated as needed.
	C. Develop procedures and provide training to locate and identify special health need populations. Maintain a list of special needs people who would be vulnerable during a power outage.	Municipal fire departments, Social service agencies Local EMA directors	Done at town level; updated as needed.
	D. Encourage the public to check on the safety of elderly or infirm neighbors and relatives who may be adversely affected by power outages.	Municipal fire departments, Social service agencies Local EMA directors	Done at town level; updated as needed.
	E. Encourage homeowners to keep primary and secondary egress routes cleared.	Municipal fire departments, Social service agencies Local EMA directors	Done on an as needed basis.

Objectives	Activities	Responsibility	Status/Rationale if no Action
2. Lessen property damages caused by severe winter storm events.	A. Educate the public on the dangers of severe winter storms and about the importance of being self-supporting for up to 72 hours following a storm by having necessary emergency supplies on hand, and where emergency shelters can be found.	Municipal officials County	Watches, warnings and advisories posted to County website in the "weather" section; updated as needed.
	B. Apply for grants to upgrade roads, culverts, ditches, and drainage systems in accordance with plans for making roads safe from summer storms and water runoff.	Municipal officials County	Lack of records has made this difficult in meeting BCA; use of the Road Tracker should help in building better databases. PDM not funded FY13
	C. Educate homeowners about winter storm preparations.	Municipal officials County	Advisories and preparedness information posted to County website in the "weather" section; updated as needed.
	D. Encourage homeowners to purchase insurance for severe storm damages.	Municipal officials County	Continue as needed.
	E. Develop plans to handle surges in boat mooring requirements.	Municipal officials County	Continue as needed.
3. Assure all emergency facilities have temporary backup power capabilities.	A. Encourage acquisition of generators at all critical facilities and utilities such as Fire/Police Stations, EMS garages, public works fuelling points, Water and Sewer treatment plants, schools, and shelters.	Municipal officials County	5 generators purchased to date; deferred until further funding becomes available.
	B. Encourage homeowners to have generators, non-electrical heating, or alternate energy sources, such as solar, wind or hydropower.	Municipal officials County	Continue as needed.
	C. Develop/update policy to require new or existing critical public facilities to have a generator.	Municipal officials	Some towns have embraced this idea; others will consider pending funding availability.
4. Assure prompt restoration of critical transportation links.	A. Develop a written municipal road snow and ice removal operations plan that includes a prioritization of roads to be cleared.	Municipal officials	Continue via the Public Works and Road Commissioners Working Group.
	B. Train and equip a quick-response Road Debris Clearance Team from public works, fire department, and/or volunteers.	Municipal officials	Continue via the Public Works and Road Commissioners Working Group.
	C. Develop mutual aid agreements with local ATV and Snowmobile organizations.	Municipal officials	MOUs signed with four of six clubs.
	D. Update or develop the resources section in the municipal Emergency Operations Plan with heavy equipment that could be used for snow removal.	Municipal officials	Continue via the Public Works and Road Commissioners Working Group.

	E. Develop alternate-transportation means for emergency responders.	Municipal officials	MOU signed with local transportation providers; could transport approximately 3,500

GENERAL GOALS, OBJECTIVES AND MITIGATION ACTIONS

FLOODING. In Knox County, flooding is most often associated with the effects of severe summer storms, ice and snow build-up, and spring run-off. The most likely damages resulting from flooding are the destruction of roads caused by washouts and undercutting. Most communities that have flooding issues have joined the National Flood Insurance Program and are controlling future development through the enforcement of local flood hazard ordinances.

Goal: Reduce loss of life, injury, and property damage in Knox County caused by flooding.

Objectives	Activities	Responsibility	Status/Rationale if no Action
1. Lessen loss of life and injuries resulting from flooding.	A. Monitor the preparation of Emergency Action Plans (EAPs) for High Hazard dams, and review the results of dam inspections by the Federal Energy Regulatory Commission (FERC).	County EMA Director Dam owners Local EMA directors	All EAPs current as of April 2012
	B. Encourage FEMA to update flood boundary maps and flood insurance rate maps.	County EMA Director, Municipalities	Part of community input during 2012 Risk Map meetings; continue as needed.
	C. Educate drivers on risks of crossing flooded roadways.	County EMA Director, Municipalities	Hand out materials provided during events of opportunity.
	D. Develop a "Barricade Plan" to block flooded roads in order to prevent crossing by vehicle operators. Acquire necessary barricade equipment and supplies.	County EMA Director, Municipalities	County purchased and equipped rapid deployment traffic control trailer including barricades and signage specific to road closures, detours and sheltering. Resource available for statewide deployment.
	E. Educate the public on staying away from flooded riverbanks.	County EMA Director, Municipalities	Hand out materials provided during events of opportunity.
2. Lessen property damages caused by flooding.	A. Encourage participation in the flood insurance program, as well as actions needed to ensure continued municipal compliance with NFIP program.	County EMA Director, State Officials, MEMA,	Continue as needed.
	B. Implement and enforce local floodplain management ordinances to minimize future flood losses caused by new construction.	Code Enforcement Officers Planning Boards	Continue as needed.
	C. Encourage homeowners in flood zones to mitigate their properties.	Municipalities Local EMA directors	Used FEMA/NFIP handout materials at meetings and exercises.
	D. Encourage municipalities to work with Floodplain Management at ME Dept. of Conservation to continue compliance with the NFIP requirements.	County EMA Director, Municipalities	New

3. Reduce road flooding hazard.	A. Encourage municipalities to maintain road damage repair records, seek guidance on hydrology and roadway design, which may include Stormwater Analysis and Management Plans.	Municipalities	Some planning done; no money for most projects – State and municipalities facing severe budget shortfalls.

WILDFIRE. All parts of Knox County are subject to wildfires/wildland fires in the urban interface, however the northern portion of the county has the least accessibility to the productive forestland due to the lack of roads and development, and the coastal portion of the County has a larger number of homes and businesses within urban interface. The impacts of wildfires include the destruction of woodland forest stands of trees and other vegetation, which when located on steep slopes and/or near watercourses can increase erosion and pollution to water bodies. Loss of income from timber harvesting can occur from wildfires. Although uncommon in Knox County, structures including residences can be damaged or destroyed from wildfires. Temporary road closures may occur when wildfires are close to roadways or cross over roadways.

Goal: Reduce damage, injury, and loss of life in Knox County caused by wildfires.

Objectives	Activities	Responsibility	Status/Rationale if no Action
1. Lessen the future loss of life and personal injuries resulting from wildfires.	A. Develop warning and evacuation plans and systems for fast moving forest fires.	County EMA Director Local EMA directors	County purchased "City Watch ENS" system for alerts and warnings. Available to towns to use as needed.
	B. Train all firefighters in Wildland Fire Fighting Safety.	County EMA Director, Local EMA directors	Continue as needed
	C. Equip all fire departments with sufficient wildfire personal protection equipment.	Local EMA directors	Funding is major issue; will continue as funding becomes available.
	D. Educate the public of dangers of forest fires.	Broadcast media, County EMA Director Municipal officials	Supported and promoted Maine Forest Service (MFS) "Defensible Space and Fuel Reduction Program" (see Appendix D)
2. Reduce real and personal property destruction from wildfires.	A. Introduce building codes requiring fire-retardant roofing and siding materials.	Municipal officials	Continue as needed
	B. Educate homeowners on tactics to protect their homes from wildfires.	Code Enforcement Officers Municipal officials	Supported and promoted Maine Forest Service (MFS) "Defensible Space and Fuel Reduction Program" (see Appendix D)
	C. Provide more authority and better training to the municipal Fire Wardens.	Municipal officials Local EMA directors	Continue as needed
	D. Encourage the construction of Fire Ponds by private landowners.	Municipal officials	Continue as needed
	E. Encourage private landowners to cut back tree growth along access drives.	Municipal officials	Supported and promoted Maine Forest Service (MFS) "Defensible Space and Fuel Reduction Program" (see Appendix D)

3. Reduce the loss of timber resources caused by forest fires.	A. Encourage bulk slash reduction through good Forestry Best Management Practices (BMPs).	Municipal officials	Continue as needed
	B. Maintain woods and logging roads for firefighting access.	Forestry Operators Property owners	Continue as needed

LANDSLIDE. Landslides are uncommon in Knox County, although one occurred in Rockland. Unstable coastal bluffs in excess of 20 feet in height will likely be subject to landslides on a more frequent basis as a result of severe storms, flooding and sea level rise. Coastal bluff stability maps are included in this plan and show areas where a landslide potential exists. The impacts of landslides include the damage or destruction of structures located in landslide prone areas, the potential for injury and loss of life, as well as damage to public infrastructure including roadways and utility lines. Roads are vulnerable to temporary closure when landslides are nearby or cross roadways. If the landslide includes the roadway itself, the closures may be longer term as reconstruction and realignment efforts are undertaken.

Goal: Reduce damage, injury, and loss of life in Knox County caused by landslides.

Objectives	**Activities**	**Responsibility**	**Status/Rationale if no Action**
1. Lessen the future loss of life and personal injuries resulting from landslides.	A. Develop warning and evacuation plans and systems for landslide prone areas.	County EMA Director Local EMA directors	Part of all hazards watches, warnings and advisories.
	B. Educate the public of the dangers of landslides.	Broadcast media, County EMA Director Municipal officials	Part of all hazards watches, warnings and advisories.
2. Reduce real and personal property destruction from landslides.	A. Encourage enforcement of State-mandated shoreland zoning provisions that restrict future development in landslide prone areas.	Municipal officials Code Enforcement Officers	Continue as needed.
	B. Educate homeowners on tactics to protect their homes or development sites from landslides, including the use of shoreland stabilization, riprap, and re-grading where state law allows such mitigation.	Code Enforcement Officers Municipal officials	Continue as needed.

Prioritized Mitigation Projects in Knox County

Note: The projects included in the Hazard Mitigation Projects by Municipality tables were largely developed with MEMA staff working directly with specific municipalities in this county.

Mitigation Projects listed in priority order. Knox County's Hazard Mitigation Plan encompasses 1 city, 16 towns, 1 plantation, and its portion of the Unorganized Territory. Most municipalities in the County identified one or more mitigation projects consistent with the countywide goals, objectives and activities, to mitigate hazards at the local level. The jurisdictions, as well as the specific mitigation projects they will pursue, are listed in priority order in the following table. The timeframes shown are based upon acceptance of the project by FEMA and / or the availability of materials and funding. The major change in this part of the update is that the old projects, which were very generic, have been replaced with specific, measureable projects.

Criteria for prioritization – **Towns**: The list of local mitigation projects was developed separately by each municipality. Local officials did not use formal, written criteria for the identification of local projects. Local mitigation officials relied on common sense, 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 the 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.

Criteria for prioritization – **County-wide**: The list of county-wide mitigation actions was developed by the Planning Team after the Risks were prioritized in Section 4. To order the objectives, the Planning Team decided the following:

- Life/safety was the first priority – for all five profiled hazards
- Property protection was the second priority - for all five profiled hazards
- Public facilities were the third priority – for summer and winter storm risk
- Road protection was the third priority – for flooding risks
- Timber protection was the third priority – for wildfire risk

The actions to achieve the objectives were then ordered in an A, B, C format, "A" being the top priority. Since educating and warning citizens is closest to life/safety, those types of activities usually are the top actions, followed by the more time consuming and/or expensive actions such as "acquiring barricade equipment". (See 1D in the Flooding Risk activities.)

How the actions will be implemented. The Hazard Mitigation Projects by Municipality tables identify a timeframe for each project, and identifies one or more parties who will be responsible for implementation.

Use of a cost-benefit analysis. Many of the jurisdictions included in this Plan are small towns run by part time staff and / or volunteers. They do not have staff, resources or funding to prepare cost-benefit analyses for the projects included in this Plan. 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 carefully scrutinized rather than simply being plugged into a formula. Furthermore, MEMA and the County EMA have made it clear to local officials that a formal cost benefit analysis will have to be prepared in the event they apply for mitigation funding.

Status of completed, deleted or deferred projects. The Hazard Mitigation Projects by Municipality tables contain a status column that identifies the completed, deleted or deferred mitigation projects. For deferred projects, the "status" column lists the reason or reasons that no changes occurred.

Hazard Mitigation Projects by Municipality

Goal: **Benefit cost analysis.**
Prior to grant application development, projects will have their cost effectiveness determined by use of the FEMA BCA module. MEMA will provide technical assistance as part of this process. Strategies for hazard mitigation within the County were identified to reduce overall damage in the County, including damage to new and existing buildings and new and existing infrastructure. Although these strategies are aimed at reducing overall damage in the County, each jurisdiction will be responsible for pursuing the actions that are relevant to that jurisdiction. The jurisdictions, along with the specific actions they will pursue, are listed as follows:

Community	Project (in Order of Priority)	Cost estimate in 2012 dollars	Timeline	Responsible Agency	Status of Plan resubmitted 2012
Appleton, Town of	(1) Jones Hill Rd: Ditch and seed 4,000' add (1) 30" x 40' hdpe and (2) 15" x 40' hdpe culvert.	$15,000	3 weeks	Road commissioner	Completed
	(2) Appleton Ridge Rd; Ditch 1,500' and blast as needed.	$10,000	3 weeks	Road commissioner	Completed
	(3) Peabody Rd: Ditch 1,000' and add (1) 18" x 40' hdpe culvert.	$4,500	3 weeks	Road commissioner	In planning phase
	(4) Provide generator at EOC/Fire Station	$2,400	4 weeks	AOEM	Completed
	(5) Equip FD with wildfire protective equipment	$850	4 weeks	AFD	Completed
	(6) Improve drainage, upsize culvert projects as needed	$3,000-10,000	1-3 Weeks	Road Commissioner	New – deferred pending funding
Camden, Town of	(1) Molyneaux Road Bridges: Replace two bridges near the Megunticook East and West Dams	$400,000 to $500,000	6 weeks	Public Works	In planning phase (scheduled 2010)
	(2) Steamboat Road/Landing: Replace storm drain	$60,000	2 weeks	Public Works	In planning phase (scheduled 2011)
	(3) Rollins Road: Ditching, box culvert installation	$40,000	3 weeks	Public Works	In planning phase (scheduled 2012)
	(4) Spruce Avenue: replace storm drain and rebuild road	$124,000	4 weeks	Public Works	New – pending funding
	(5) Curtis Avenue; replace rotted and heaved storm drain and extend	$125,000	4 weeks	Public Works	New – pending funding
	(6) Melvin Heights: replace large rotted cross culvert	$50,000	4 weeks	Public Works	New – pending funding

Community	Project (in Order of Priority)	Cost estimate in 2012 dollars	Timeline	Responsible Agency	Status of Plan resubmitted 2012
Camden, cont'd	(7) Park Street; replace existing storm drain	$125,000	4 weeks	Public Works	New – pending funding
	(8) Jacobs Ave: Upsize, lengthen and realign existing twin 24'' x 40' with 2' x 4' 50' box culvert or according to H&H study and repave, stabilize stream bank 100' x 3' x 2'.	$35,000	4 weeks	Public Works	Deferred – pending funding
	(9) Improve drainage and upsize culvert as needed	$3,000 - 10,000	1-3 weeks	Public Works	New – pending funding
Cushing, Town of	(1) Salt Pond Road: Elevate 180' x 21' x 3' on average, upsize 18'' x 40' cmp with 24'' x 50' hdpe and repave.	$28,000	3 weeks	Road commissioner	In planning phase
	(2) Improve drainage and upsize culvert projects as necessary	$3,000 - 10,000	1-3 weeks	Road Commissioner	New – deferred pending funding
Friendship, Town of	(1) Martins Point Rd: Install riprap 100' x 8' x3' and extend protection onto stone shoreline.	$6,000	3 weeks	Road commissioner	In planning phase
	(2) Town Wharf: Replace piles and re-deck 60' x 16'.	$20,000	4 weeks	Road commissioner	In planning phase
	(3) Martins Point Town Landing: Extend cement boat ramp an additional 60 ' and add geo-textile honeycomb chambers, backfill with crushed stone and/or concrete.	$50,000	3 weeks	Road commissioner	In planning phase
	(4) Friendship Long Island Town Road; selective wildland timber fuel reduction/fire break. Road drainage improvements	$50,000	4 weeks	Road Commissioner	Deferred; pending funding
	(5) Ditching and Erosion Control for Harbor Rd and Timber Rd	$7,000	4 weeks	Road commissioner	Deferred; pending funding

Community	Project (in Order of Priority)	Cost estimate in 2012 dollars	Timeline	Responsible Agency	Status of Plan resubmitted 2012
Friendship, cont'd	(6) Delano Rd repair	$21,000	6 weeks	Road commissioner	Completed
	(7) Martins Point Rd repair	$8,500	6 weeks	Road commissioner	Completed
	(8) Improve drainage and upsize culverts as necessary	$3,000 - 10,000	1-3 weeks	Road Commissioner	New – pending funding
Hope, Town of	(1) Gillette Rd/ Crabtree Rd: Upsize and lengthen (8) 15" x 40' cmps to 18" x 45' and (6) 24" x 40' cmps to 24" x 50' HDPEs, riprap intake and outlets.	$40,000	2 weeks	Road commissioner	In planning phase
	(2) Improve drainage and upsize culverts as necessary	$3,000 - 10,000	1-3 weeks	Road Commissioner	New – pending funding
Isle Au Haut, Town of	(1) Loop Road at Pats Brook: Add (3) 18" x 40' HDPE culverts and elevate 200' x 20' x 2' on average.	$27,000	3 weeks	Road commissioner	In planning phase
	(2) Loop Road at Town Brook Add 4' x 30' squash culvert.	$6,000	2 weeks	Road commissioner	In planning phase
	(3) Riches Cove Brook: Upsize to 4' x 40' squash culvert and riprap intake and outlet.	$7,000	2 weeks	Road commissioner	In planning phase
	(4) Pond Lookout Road: Install 4' x 5' x 30' bottomless box culvert and riprap intake and outlet.	$40,000	3 weeks	Road commissioner	In planning phase
	(5) Loop Road at Duck Harbor Cross Rd: Add 24" x 30' relief culvert.	$2,500	2 weeks	Road commissioner	In planning phase
	(6) Eastern Head Road: Add 30" x 20' culvert.	$2,500	2 weeks	Road commissioner	In planning phase
	(7) Loop Road: at Poor Cybles Install Driveway culvert 48" x 40' squash culvert.	$6,000	2 weeks	Road commissioner	In planning phase
	(8) Dewitt Drainage in Village: stormwater drainage system improvement/upgrade	$125,000	4 weeks	Road commissioner	In planning phase

Community	Project (in Order of Priority)	Cost estimate in 2012 dollars	Timeline	Responsible Agency	Status of Plan resubmitted 2012
Matinicus Isle Plantation (Note: No municipal roads)	(1) Forestry: Selective cutting to reduce fire hazard	$25,000 - 100,000	2-6 weeks	Assessors / State Partnership	Deferred; pending funding
	2. Selective upgrades / replacement of plantation-owned electrical supply system (limited segments)	$5,000 - 25,000	1-4 weeks	Assessors	NEW
	3. Improve drainage; install / upsize culverts on plantation-owned ways – projects as needed	$2,500 - $10,000	1-4 weeks	Assessors	NEW
North Haven, Town of (Note: Town has no current mitigation projects per Town Manager.)	(1) Upgrade drainage and culverts of flood prone roads.	$5,000 - $35,000	1-6 weeks	Assessors	Deferred: pending funding
Owls Head, Town of	(1) Obtain a generator for the Town Municipal Building (an implementation item in the school and airport emergency plans, as septic systems depends on pump)	$18,000	2 weeks	Select Board	In planning phase
	(2) Re-engineer and construct a new Boat Ramp at the end of Main St (to reduce washouts associated with severe storms and the current poor ramp design)	$25,000	8 weeks	Select Board	In planning phase
	(3) Town wharf: replace existing tidal guides Piles and connections to float to wharf with stronger units.	$10,000	2 weeks	Harbor Master	In planning phase
	(4) Cottage Ave: Land erosion threatened sewer lines.	NA	8 weeks	Select Board	Completed with PA

Community	Project (in Order of Priority)	Cost estimate in 2012 dollars	Timeline	Responsible Agency	Status of Plan resubmitted 2012
Rockland, City of	(1) Lindsey Brook: Upgrade interceptor line by placing 1,000' x 36" underground drainage and adding 5 manholes and repave.	$541,000	6 weeks	Public Works	Completed
	(2) Tolman Rd: Ditch 2,500' stone line and add check dams.	$19,000	2 weeks	Public Works	Deferred: pending funding
	(3) West Meadow Rd: Ditch 7,500 blast where needed, add (6) 24" x 40' hdpe culverts.	$35,000	4 weeks	Public Works	Deferred: pending funding
	(4) Mountain Rd: Ditch 2,500' and add (2) 24" x 40' hdpe culverts.	$12,500	2 weeks	Public Works	Deferred: pending funding
	(5) Bog Rd: Ditch 5,000 and add (4) 24" x 40' hdpe culverts.	$24,000	2 weeks	Public Works	Deferred: pending funding
	(6) Thompson Road Bridge: Upgrade bridge	$60,000	6 weeks	Public Works	Deferred: pending funding
	(7) Rockland Harbor Park: to prevent further damage to seawall, remove current asphalt cover, excavate , add bigger fill and more riprap, and recover with asphalt	$300,000	4 weeks	Harbor & Waterfront	Deferred: pending funding
	(8) Municipal Fish Pier: to prevent further damage to seawall, remove current asphalt cover, excavate, add bigger fill and more riprap, and recover with asphalt	$250,000	4 weeks	Harbor & Waterfront	Deferred: pending funding
	(9) Snow Marine: more riprap to prevent further erosion	$50,000	2 weeks	Harbor & Waterfront	Deferred: pending funding
	(10) Sandy Beach Park: more riprap to prevent further erosion	$50,000	2 weeks	Harbor & Waterfront	Deferred: pending funding
	(11) Improve drainage; upsize culverts as needed	$3,000 – 10,000	1-3 weeks	Public Works	NEW
Rockport, Town of	(1) Grub out and stone line spillway Tolmans Pond and install 24" x 40' overflow culvert and repave.	$15,000	3 weeks	Public Works	Deferred: pending funding
	(2) Old Rockland Road: upsize existing cmp's with 4' x 5' x 30' bottomless box culvert, raise road 2' x 200' x 21' on average and repave.	$60,000	4 weeks	Public Works	In current budgeting process

	(3) Upgrade ditches, culverts & drainage including but not limited to School St (800 feet with 6 catch basins).	$8,000	4 weeks	Public Works	Deferred: pending funding
Rockport cont'd	(4) Improve ditching, upsizing culverts as needed in the Warrenton Street area	$7,000 – 14,000	2-4 weeks	Public Works	2012 - In progress
	(5) Improve drainage and upsizing culvert projects as needed	$3,000 – 10,000	1-3 weeks	Public Works	NEW
Saint George, Town of	(1) Turkey Cove at Glenmere Rd: Upsize existing 2'x3'x40' stone box culvert w/ 4'x5'x40' bottomless box culvert, riprap intake & outlet repave.	$55,000	3 weeks	Road commissioner	Completed
	(2) Equip FD with sufficient wildfire PPE	$5,000	1 week	Fire Department	Completed
	(3) Improve ditching and upsize culverts as needed	$3,000 – 10,000	1-3 weeks	Road Commissioner	NEW
South Thomaston, Town of	(1) Update Snow Removal resources in EOP	$0	3 weeks	EMA	Completed
	(2) Improve drainage and upsize culverts as necessary	$3,000 – 10,000	1-3 weeks	Road commissioner	NEW
Thomaston, Town of	(1) West Meadow Rd: Up size existing 8' x 45' arch culvert with 7' x 10' x 45' bottomless box culvert. Add headwalls and riprap intake and outlet.	$133,000	4 weeks	Public Works	Completed
	(2) Equip all firefighters with wildfire PPE	$6,000	1 week	Fire Department	Completed
	(3) Gilchrist Street drainage project	$5,500	5-6 weeks	Public Works	Completed
	(4) High Street-Marsh Road drainage project	$11,200	5-6 weeks	Public Works	Completed
	(5) Main Street to School Street; drainage project (crosses Rt. 1 and mall area) proposed new 42" storm drain culvert and catch basins; related to MDOT #017890	$220,000 (from 2009 est.)	6 weeks	Public Works/ICW MDOT	Deferred; pending funding
	(6) Improve drainage; culvert upsize projects as needed	$3,000 – 10,000	1-3 weeks	Public Works	NEW

Community	Project (in Order of Priority)	Cost estimate in 2012 dollars	Timeline	Responsible Agency	Status of Plan resubmitted 2012
Union, Town of	(1) Clary Hill Rd: Elevate 300' x 21' x 18" on average using gabion baskets repave road for use as low water crossing.	$22,000	4 weeks	Public Works	Deferred pending funding
	(2) Equip FD with sufficient wildfire PPE	$4,000	1 week	Fire Department	Completed
	(3) Improve drainage and upsize culverts projects as needed	$3,000 – 10,000	1-3 weeks	Public Works	NEW
UT (Criehaven and Muscle Ridge Shoals) (Note: No municipal roads)	(1) Forestry: Selective cutting to reduce fire hazard	$5,000	2 weeks	State Forest Service	In 2012 planning phase
Vinalhaven, Town of	(1) Poor Farm Rd: Remove ledge and improve ditch line 500' upsize (1) 15" x 40' culvert and (1) 24" X 40' culvert, remove soil over wet spot 200' x21' 2' and install geo-textile pillow and replace gravel.	$20,000	3 weeks	Road commissioner	Deferred pending funding
	(2) Pequot Rd: Upsize culverts and improve ditch line, install paved low water crossing	$12,000	3 weeks	Road commissioner	Completed
	(3) Calder woods Neck Rd: Improve ditch line at privilege hill upsize existing culvert.	$21,000	3 weeks	Road commissioner	Deferred pending funding
	(4) Young Rd: Ditch 10,000' and remove ledge as needed.	$35,000	3 weeks	Road commissioner	Completed
	(5) Round The Island Rd at Deadmans corner: Upsize existing 15" x 40' culvert to 30" x 40' culvert and riprap intake and outlet.	$4,000	2 weeks	Road commissioner	Deferred pending funding
	(6) Zekes Rd: Elevate and shape road 6" x 16' x 5,000' and improve ditch line 5,000'	$67,000	4 weeks	Road commissioner	Deferred pending funding
	(7) School Street: Elevate 200' x20' x 1' and repave.	$6,000	2 weeks	Road commissioner	Deferred pending funding
	(8) Improve drainage and culvert upsizing as needed	$3,000 – 10,000	1-3 weeks	Road Commissioner	NEW

Community	Project (in Order of Priority)	Cost estimate in 2012 dollars	Timeline	Responsible Agency	Status of Plan resubmitted 2012
Warren, Town of	(1). Sandy Shores Road Site 1: Replace 7-foot culvert with aluminum box culvert 13 ft. span by 8-foot rise approx. 31 feet long. (Work would need to be done mid-summer when water is lowest. This road is the only access to at least 36 homes and 75 campsites).	$60,000	3 weeks	Road Commissioner	Deferred pending funding
	(2). Improve ditching and upsize culverts as needed	$3,000 – 10,000	1-3 weeks	Road Commissioner	NEW
Washington, Town of	(1) Vanner Road; replace 48” steel culvert with 48” fiberglass culvert; build headwalls to eliminate erosion	$25,000	3 weeks	Public Works and Selectmen	NEW; construction planned for 2013
	(2) Youngs Hill Road; replace (2) 60” steel culverts with (2) 60” fiberglass culverts; build headwalls to eliminate erosion	$25,000	3 weeks	Public Works and Selectmen	NEW; construction planned for 2013
	(3) Old County Rd. Site 1: Up size existing 5 culverts of various sizes with one 4' x8' x 40' bottomless box culvert, elevate 2' x 21' x 200' and add precast head walls.	$65,000	4 weeks	Public Works and Selectmen	Deferred pending funding
	(4) Old County Rd. Site 2 @ Davis Stream: Up size existing 5 culverts of various sizes with one 4' x8' x 40’ bottomless box culvert and add head walls.	$65,000	3 weeks	Public Works and Selectmen	Deferred pending funding
	(5) Skidmore Rd: Upsize existing twin culverts with 4'x 5' x 40' bottomless box culvert and add precast headwalls.	$45,000	4 weeks	Public Works and Selectmen	Deferred pending funding
	(6) Improve drainage; culvert upsize projects as needed	$3,000 – 10,000	1-3 weeks	Public Works and Selectmen	NEW

15. Identification and Analysis of Mitigation Actions: National Flood Insurance Program (NFIP Compliance	
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.	
Elements	**A.** Does the new or updated plan describe the jurisdiction's participation in the NFIP?
	B. Does the mitigation strategy identify, analyze and prioritize actions related to continued compliance with the NFIP?

A. Participation in the National Flood Insurance Program (NFIP)

The following table summarizes the extent of municipal participation in the National Flood Insurance Program in Knox County. At this writing, Cushing is in the process of re-entering the NFIP program. The town has adopted an ordinance and a Community Assistance Visit (CAV) was conducted by the (former) State Planning Office. Paperwork is now being finalized.

Summary of Local Participation in the National Flood Insurance Program

Jurisdiction	Participation in NFIP	Comments
Appleton, Town of	Yes	
Camden, Town of	Yes	
Cushing, Town of	No	See comment above
Friendship, Town of	Yes	
Hope, Town of	Yes	
Isle au Haut, Town of	No	Refrained: No FIRM Pending new FIRMs
Matinicus Isle Plantation	Yes	
North Haven, Town of	Yes	
Owls Head, Town of	Yes	
Rockland, City of	Yes	
Rockport, Town of	Yes	
St. George, Town of	Yes	
South Thomaston, Town of	Yes	
Thomaston, Town of	Yes	
Union, Town of	Yes	
UT (Unorganized)	Yes	NSFHA
Vinalhaven, Town of	Yes	
Warren, Town of	Yes	
Washington, Town of	Yes	

Source: Maine State Planning Office (April 2012)

B. Actions related to continued compliance with the NFIP.

Actions related to continued compliance with the NFIP are included in the Goals, Objectives, and Mitigation Actions. See flooding, Mitigation Actions 2 A and B. Joining the NFIP (2A) is obviously the first step toward conscious management of floodplains. Once in the program, the enforcement (2B) of town-established ordinances will protect the floodplain.

16. Implementation of Mitigation Actions	
Requirement §201.6(c)(3)(iii): (The mitigation strategy section shall include) an action plan describing how the actions identified in section (c)(3)(ii) will be prioritized, implemented and administered at the local jurisdiction. 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.	
Elements	**A.** Does the new or updated mitigation strategy include (a discussion abut) how the actions are prioritized? (For example, is there a discussion of the process and the criteria used?)
	B. Does the new or updated mitigation strategy address how the actions will be implemented and administered, including the responsible department, existing and potential resources and the timeframe to complete each action?
	C. Does the new or updated prioritization process include an emphasis on the use of a cost-benefit review to maximize benefits?
	D. Does the updated plan identify the completed, deleted or deferred mitigations as a benchmark for progress, and if actions are unchanged (i.e., deferred) does the updated plan describe why no changes occurred?

A. How the actions are prioritized.
See introductory statements and page 5-10 for a discussion about how these county-wide actions and town-by-town projects were prioritized.

B. How the actions will be implemented and administered.

See Prioritized Mitigation Projects beginning on page 5 - 12 for a project-by-project summary of costs, timeframe, and responsible party.

C. Use of a cost-benefit analysis.

See the Goal statement at the beginning of the Prioritized Mitigation Projects table beginning on page 5 - 10. MEMA will utilize the cost benefit analyses prepared by applicants when they apply for mitigation funding.

The state does not accept non-cost beneficial applications for projects. If a project is not cost beneficial it will not be accepted in application form. All projects listed have been reviewed with this in mind.

Many of the jurisdictions included in this Plan are small towns run by volunteers. They do not have staff, resources or funding to prepare cost-benefit analyses for the projects included in this Plan. 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. This review is at least equal to a formal benefit-cost calculation because each expenditure item will be carefully scrutinized rather than simply being plugged into a formula. Nevertheless, MEMA and the County EMA have made it clear to local officials that a cost benefit analysis will have to be prepared in the event they apply for mitigation funding.

D. Benchmarks for progress.

See explanation of the “Status/Rationale if no Action” column in tables of General Goals, Objectives and Mitigation Actions on pages 5 - 2 to 5 - 8 of this Plan. See the “Status as of Plan Submittal January 2010” column in table of Hazard Mitigation Projects by Municipality beginning on page 5-12 of this Plan.

17. Multi-Jurisdictional Mitigation Actions	
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.*	
Elements	**A.** Does the new or updated plan include identifiable action items for each jurisdiction requesting FEMA approval of the plan?
	B. Does the updated plan identify the completed, deleted or deferred mitigation actions as a benchmark for progress, and if activities are unchanged (*i.e.*, deferred), does the updated plan describe why no changes occurred?

Action items for each jurisdiction began on page 5-12 and include a status column that indicates whether the project is new, completed, deleted or deferred. Unless specified otherwise, most "deferred" projects are those pending needed funds.

SECTION 6 PLAN MAINTENANCE PROCESS

18. Monitoring, Evaluating and Updating the Plan
Requirement §201.6(c)(4)(i): (The plan maintenance process shall include a) section describing the method and schedule of monitoring, evaluating and updating the mitigation plan within a five-year cycle.

A. Monitoring the Plan.

Knox County has developed a method to ensure that regular review and update of the Hazard Mitigation Plan occurs. The Knox County Emergency Management Agency has formed a Hazard Mitigation Plan Evaluation Team that consists of members from the County EMA office, the County Commissioners, Selectmen and EMA directors from member towns and the Local Emergency Planning Committee.

Every three years following the completion of this Plan update, the Knox County EMA will distribute a survey form to each of the local EMA directors in the county. This form will ask each director to comment on how his or her community has or has not addressed the Plan's objectives during the past three years. The County EMA will take the individual municipal results and compile a progress report that will be distributed to local officials. The County EMA also intends to work with MEMA officials and the Mid-Coast Regional Planning Commission in periods following disasters to better leverage mitigation opportunities for roads, critical facilities, residential structures, and businesses.

B. Evaluating the Plan. Provide a brief description of how the Plan will be evaluated.

During the fourth year of the five-year planning cycle, the Knox County EMA will convene a meeting of the Hazard Mitigation Planning Team to review the risk assessment portion of the Plan to determine if this information should be updated or modified, and if additional hazards should be profiled. The Planning Team will also review the County EMA's status report on implementation, as well as each mitigation action to determine its continued relevance to changing situations and land developments in the County, as well as changes in Federal or State policy, and to ensure that each action is addressing current and expected conditions.

C. Updating the Plan. Provide a brief description of how the Plan will be updated.

At the beginning of the fourth year of implementation of this Plan, the County EMA will convene a meeting of the local EMA Directors, who will serve as liaisons to other municipal staff and officials. Based on the evaluation of the Plan, proposed changes will be prepared for the following five-year period. The County EMA and the County Hazard Mitigation Planning Team will rely on local EMA Directors and public input obtained through public workshops, mailings, and phone-in meetings. Proposed changes to the Plan will be submitted to MEMA and FEMA for review.

19. Incorporation into Existing Planning Mechanisms
Requirement §201.6(c)(4)(ii): (The plan shall include a) process by which local governments incorporate the requirements of the mitigation plan into other planning mechanisms such as comprehensive or capital improvement plans, where appropriate.

A. Identification of local planning mechanisms.

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

There is a total of 1 city, 16 towns, 1 plantation, and a portion of the Unorganized Territory consisting of 2 unorganized townships in the County. The UT is under the jurisdiction of the Maine Land Use Regulation Commission (LURC) and is thus controlled and governed by the State of Maine.

Available planning mechanisms at the municipal level include:

- Local comprehensive plans
- Capital improvement plans (only the larger municipalities have capital improvement plans; most of the smaller ones do not);
- Road maintenance planning efforts;
- Emergency management and mitigation planning;
- Fire prevention planning; and
- Training for NFIP ordinances

The majority of the mitigation measures that were identified, and all of the actions selected by individual communities are either structural, public educational, or emergency planning measures.

B. 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 and does provide information to local units of government, as well as technical assistance.

Following approval of the Plan by FEMA, the County EMA will send a copy to all municipalities in the County with a recommendation that local comprehensive planning efforts, municipal road maintenance planning efforts, emergency management programs and local fire prevention programs will be utilized to their greatest extent to complete the community's mitigation measures.

The County EMA Office will assist the municipal officers in implementing their selected mitigation projects. The County EMA Office will also continue to assist municipalities with the completion of FEMA Mitigation Grant packages.

C. Explanation of how local governments incorporated strategies and other information.

The County EMA and all municipal EMAs have continued to warn and advise their respective jurisdictions on pending hazard events, such as winter storms and severe rain/wind events, as well as posted public service announcements in public locations such as municipal offices.

Municipalities have incorporated strategies and other information from the hazard mitigation plan into their respective municipal capital investment/improvement plans for budgeting purposes, and into their respective emergency operating plans (EOPs) which are reviewed by the County annually.

The County has continuously notified local officials of hazard mitigation workshops such as those related to the Pre-Disaster and Hazard Mitigation Grant programs, and workshops with hazard mitigation content such as those sponsored by Maine Department of Transportation's Local Roads Center that promotes the use of geo-textiles and "Best Practices."

See Section 5 Mitigation Strategies: Hazard Mitigation Projects by Municipality, which shows completed projects implemented during the past five years, in addition to proposed projects.

20. Continued Public Involvement
Requirement §201.6(c)(4)(iii): (The plan maintenance process shall include a) discussion on how the community will continue public participation in the plan maintenance process.

A. Public participation.

Knox County is committed to involving the public directly in the continued reshaping and updating of the Hazard Mitigation Plan. The Hazard Planning Team is responsible for reviewing and updating the Plan. Members of the Planning Team will continue to represent the public through their municipal affiliations. All meetings will continue to be open to the public in order to gain meaningful input to the Plan.

Copies of the approved Plan will be issued to each municipality and therefore available to the general public through the municipal offices in the County. Additionally, the County will post the Plan on its web site, assuring not just county, but statewide access and beyond. The Plan will include the address and phone number of the Knox County EMA Office that is responsible for keeping track of public comments on the Plan.

The Knox County EMA Office will also provide a public comment period at each meeting of the Hazard Mitigation Team to assure a public forum for input. The County EMA Office will be responsible for providing public notice for each meeting of the Hazard Planning Team, for hosting the meeting, for providing information about the public comment period and for managing the data that is gathered from it.

21. Plan Review	
Requirement §201.6(d)(3): (A local jurisdiction must review and revise its plan to reflect changes in development, progress in local mitigation efforts, and changes in priorities, and resubmit it for approval within 5 years in order to continue to be eligible for mitigation project grant funding).	
Elements	**A.** Has the updated plan been reviewed and revised to reflect changes in development?
	B. Has the updated plan been reviewed and revised to reflect progress in local

	mitigation efforts?
	C. Has the updated plan been reviewed and revised to reflect changes in priorities?

A. Changes in Development

Mitigation strategies/actions to address vulnerability to hazards. This plan contains a number of Mitigation Actions that specifically address the vulnerability of future development to the hazards identified in this Plan. These strategies, which were previously enumerated in the Strategy section include:
Severe Summer Storms: See 2B, 3C
Severe Winter Storms: See 3C
Flooding: See 2A, 2B, 2C, 2D
Wildfire: See 1D, 2A, 2B, 2D, 2E, 3B
Landslide: See 2A, 1B, 2B

B. Progress in Local Mitigation Efforts

Reduction in Vulnerability. As noted in Section 5, hazard mitigation projects listed on pages 5-12 through 5-20, demonstrate that some local projects were completed, thus reducing vulnerability.

Repetitive loss properties. There are only two repetitive loss properties in Knox County; both are single-family dwellings in Owls Head. In accordance with the Federal Privacy Act, names, addresses or specific claim information is not disclosed.

Comprehensive Plan Updates. A number of comprehensive plans have been updated, but as far as is known, none have been updated to reflect mitigation issues and priorities.

C. Revisions in Priorities

This plan has been revised to reflect changes in local priorities as reflected in Section 5, Hazard Mitigation Projects, on pages 5-12 through 5-20. In addition, the General Goals, Objectives and Mitigation Actions at the county level, on pages 5-3 through 5-9 were reviewed and re-prioritized based on planning team reviews and discussions.

The address and phone number of the Knox County EMA Office is:

62 Union Street
Rockland, ME 04841
TEL: 207-594-5155

APPENDIX A: MEETING ATTENDANCE

December 16, 2008: *2004 Plan Review - starting the revision process/ Review of Municipal Hazard ID and Risk Analysis job Aids/EMD's*
Location: Knox County EMA Rockland, ME
Start: 1800 End: 2010 TT: 2.1 MH: 22.1

Meeting Attendees	Function	Representing
Arthur Grierson	EMD	Town of South Thomaston
Arthur Kiskila	Fire Chief/EMD	Town of Cushing
Ray Sisk	EMA Dir	County of Knox
Susan Kiskila	Resident	Town of Cushing
Barry Norris	Fire Chief/EMD/CEO	Town of Union
George Field	EMD	Town of Warren
Tom Johnston	Fire Chief/EMD	Town of Washington
Chris Farley	Fire Chief/ EMD	Town of Camden
Marc Candage	Fire Chief/EMD	Town of Vinalhaven
Donna Allen	DDA EMA	County of Knox

January 6, 2009: *Plan Revision timeline and revision process meeting - discussed 2004 plan mitigation & goals/Public Safety, Industry Partners*
Location: Knox County EMA Rockland, ME
Start: 1000 End: 1135 TT: 1.6 MH: 17.6

Meeting Attendees	Function	Representing
Dennis Healy	Environmental Officer	FMC Biopolymer
Ray Sisk	Selectman	Town of Hope
Wally Tower	Dep Police Chief	City of Rockland
Robert Williams	Response Branch	Maine DEP
Adam Miceli	Dep Fire Chief/EMS	City of Rockland
Charles Jordan	Fire Chief/EMD	City of Rockland
Linwood Lothrop	Communications Director	County of Knox
Laurie Beckwith	Quality, Risk & Safety	Penobscot Bay Medical Center
Ron Defoe	Environmental Health & Safety	Lyman Morse Corp
Andrew L. Hart	Administrator	County of Knox
Donna Allen	DDA EMA	County of Knox

January 20, 2009: *Plan Revision timeline and revision process PS Input/Public Safety*
Location: Knox County EMA Rockland, ME
Start: 1600 End: 1715 TT: 1.25 MH: 16.25

Meeting Attendees	Function	Representing
Barry Norris	Fire Chief/EMD/CEO	Town of Union
Tom Johnston	Fire Chief/EMD	Town of Washington
Burke Lynch	EMS Director	Town of Vinalhaven
Scot Sabins	EMS Director	Town of Union
Kevin Soule	DEMD	Town of Union
Arthur Kiskila	Fire Chief/EMD	Town of Cushing
Bryan Calderwood	Fire Chief	Town of South Thomaston
Chris Knight	EMS Director/CFAA	Town of Camden
Adam Miceli	Dep Fire Chief/EMS	City of Rockland
Kevin Haj	Police Chief	Town of Thomaston
Ray Sisk	EMA Dir	County of Knox
Carrie Adams	EMT-P	City of Rockland
Linwood Lothrop	Communications Director	County of Knox

January 22, 2009: *Plan Revision Meeting-validate Municipal HIRA's/EMA Directors*
Location: Knox County EMA Rockland, ME
Start: 1900 End: 2130 TT: 2.5 MH: 27.5

Meeting Attendees	Function	Representing
Ray Sisk	Selectman	Town of Hope
Arthur Kiskila	Fire Chief/EMD	Town of Cushing
Phil Netzorg	EMD	Town of Thomaston
Waino Kangas	DEMD	Town of St. George
Tim Polky	Fire Chief/EMD	Town of St. George
Tom Johnston	Fire Chief/EMD	Town of Washington
Arthur Grierson	EMD	Town of South Thomaston
Clarence Keller	Fire Chief/EMD	Town of Hope
Kevin Soule	DEMD	Town of Union
Charles Jordan	Fire Chief/EMD	City of Rockland
Chris Farley	Fire Chief/EMD	Town of Camden

February 3, 2009: *Plan Revision Outreach Strategy Planning Meeting*.
Location: Knox County EMA Rockland, ME
Start: 1030 End: 1115 TT: .75 MH: 4.5

Meeting Attendees	Function	Representing
Linwood Lothrop	Communications Director	County of Knox
Wallace Tower	Deputy Police Chief	City of Rockland
Barb Sylvester	Deputy Treasurer	County of Knox
Laurie Beckwith	Quality Risk & Safety Mgr	Pen Bay Medical Center
Susan Simmons	Training and Education	American Red Cross
Ray Sisk	EMA Dir	County of Knox
Charles Jordan	Fire Chief/EMA Dir	City of Rockland

February 9, 2009: *Public Information Meeting*. *Review of 2004 Plan*
Location: Knox County EMA Rockland, ME
Start: 1700 End: 1830 TT: 1.5 MH: 18

Meeting Attendees	Function	Representing
Arthur Emmanuelson	Resident	Town of Waldoboro
Martha Hooper	Resident	Town of Union
Clark Hoooper	Resident	Town of Union
Eric Schweikhardt	Resident	Town of St. George
Shannon Nachajko	Resident	Town of Warren
Elizabeth May	Resident	Town of St. George
Monroe B. Hall III	Resident	Town of St. George
Caron Leichtman	Resident	Town of Rockport
Laurie Arguin	Resident	Town of Warren
Susan Smith-Riedel	Resident	Town of St. George
Donna Allen	DDA EMA	County of Knox
Ray Sisk	EMA Dir	County of Knox

June 30, 2009: *Hazard Mitigation Planning Team Meeting*. *Review of Municipal Surveys and project list*.
Location: Knox County EMA Rockland, ME
Start: 1400 End: 1510 TT: 1.2 MH: 18

Meeting Attendees	Function	Representing
Eric Galant	Executive Director	Mid-Coast RPC
JoAnn Money	State Mitigation Officer	State of Maine
Ray Sisk	EMA Dir	County of Knox
Barry Norris	Fire Chief/EMA Dir/CEO	Town of Union
Roger Moody	Commissioner	County of Knox
Philip Bramhall	Fire Chief/EMA Dir	Town of Friendship
Charles Jordan	Fire Chief/EMA Dir	City of Rockland
Steve Beverege	Public Works Director	Town of Rockport
Greg Blackwell	Public Works Supervisor	City of Rockland
James Connon	Public Works	City of Rockland
Ann Matlack	AA to City Manager	City of Rockland
Nancy Colson	Selectman	Town of Owls Head
Donna Allen	DDA EMA	County of Knox
Robert Peabody	Town Manager	Town of Rockport
Chris Farley	Fire Chief/EMA Dir	Town of Camden

July 21, 2009: *Hazard Mitigation Planning Team Meeting*. *Review of Municipal Surveys and project list*.
Location: Knox County EMA Rockland, ME
Start: 1400 End: 1515 TT: 1.25 MH: 17.5

Meeting Attendees	Function	Representing
Arthur Kiskila	Fire Chief/EMA Dir	Town of Cushing
Tim Polky	Fire Chief/EMA Dir/CEO/LPI	Town of St. George
Barry Norris	Fire Chief/EMA Dir/CEO	Town of Union
Philip Bramhall	Fire Chief/EMA Dir	Town of Friendship
Eric Galant	Executive Director	Mid-Coast RPC
Robert Peabody	Town Manager	Town of Rockport
Andrew Hart	Administrator	County of Knox
Ann Matlack	AA to City Manager	City of Rockland
Charles Jordan	Fire Chief/EMA Dir	City of Rockland
Jeff Benner	Public Works Director	City of Rockland
Ray Sisk	EMA Dir	County of Knox
Marjorie Stratton	Town Manager	Town of Vinalhaven
Marc Candage	Fire Chief/EMA Dir	Town of Vinalhaven
Donna Allen	DDA EMA	County of Knox

August 18, 2009: *Hazard Mitigation Planning Team Meeting. Review of Municipal Surveys and project list*.
Location: Knox County EMA Rockland, ME
Start: 1400 End: 1530 TT: 1.5 MH: 16.5

Meeting Attendees	Function	Representing
Eric Galant	Executive Director	Mid-Coast RPC
Barry Norris	Fire Chief/EMA Dir	Town of Union
Charles Jordan	Fire Chief/EMA Dir	City of Rockland
Tim Polky	Fire Chief/EMA Dir /CEO/LPI	Town of St. George
Alex Ludwig	Road Commissioner	Town of Hope
Chris Farley	Fire Chief/EMA Dir	Town of Camden
Donna Allen	DDA EMA	County of Knox
Philip Bramhall	Fire Chief EMA Dir	Town of Friendship
Ann Matlack	AA to City Manager	City of Rockland
Tay Vaughan	GIS Planner	Town of Appleton
Ray Sisk	Selectman	Town of Hope

October 27, 2009: *Public Review and Comment AM Session.*
Location: Rockland City Hall
Start: 0900 End: 0930 TT: .5 MH: 3

Meeting Attendees	Function	Representing
Roesmary Kulow	City Manager	City of Rockland
Charles Jordan	Fire Chief/EMA Dir	City of Rockland
Ann Matlack	AA to City Manager	City of Rockland
Ray Sisk	Selectman	Town of Hope
Donna Allen	DDA EMA	County of Knox
Eric Galant	Executive Director	Mid-Coast RPC

October 27, 2009: *Public Review and Comment PM Session.*
Location: Rockland City Hall (Hearing broadcast on local access TV Station for 30 days)
Start: 1900 End: 1945 TT: .75 MH: 7.5

Meeting Attendees	Function	Representing
Ray Sisk	Selectman	Town of Hope
Grant Watmough	Town Manager	Town of Warren
Donna Allen	DDA EMA	County of Knox
Ann Matlack	Budget Committee	County of Knox
Nancy Colson	Selectman	Town of Owls Head
Brian Harden	City Councilor	City of Rockland
Charles Jordan	Fire Chief/EMA Dir	City of Rockland
Don Grinnell	Selectman	Town of Washington
Wesley Daniel	Selectman	Town of Washington
Eric Galant	Executive Director	Mid-Coast RPC

November 3, 2009: *Local Emergency Planning Committee (LEPC) Meeting*. Review MM Hazards.
Location: Knox County EMA Rockland, ME
Start: 1030 End: 1210 TT: 1.6 MH: 17.6

Meeting Attendees	Function	Representing
Linwood Lothrop	Communication Director	County of Knox
Ron Defoe	Production Supervisor	Lyman Morse, Inc
Joe Weston	Engineer	O'Hara Corp
Paul McFarland	Production Supervisor	O'Hara Corp
Dennis Healy	Environmental Officer	FMC Biopolymer
Jim Duncan	Safety Engineer	Fisher Engineering
Ray Sisk	EMA Director	County of Knox
Laurie Beckwith	Quality, Risk and Safety Mgr	Pen Bay Medical Center
Andrew Hart	Administrator	County of Knox
Donna Allen	DDA EMA	County of Knox
Charles Jordan	Fire Chief/EMA Dir	City of Rockland

December 1, 2009: *Review updated sections with LEPC Planning Committee*.
Location: Knox County EMA Rockland, ME
Start: 1030 End: 1111 TT: 1.2 MH: 13.2

Meeting Attendees	Function	Representing
Jean Robinson	Compliance	Maritime Energy
Foner Curtis	Environmental Safety	Lonza, Inc
Susan Simmons	Training and Education	American Red Cross
Robert Williams	Response Branch	Maine DEP
Ron Defoe	Production Supervisor	Lyman Morse, Inc
Wally Tower	Dep Police Chief	City of Rockland
Charles Jordan	Fire Chief /EMD	City of Rockland
Laurie Beckwith	Quality, Risk & Safety Manager	Pen Bay Medical Center
Andrew L. Hart	Administrator	County of Knox
Ray Sisk	EMA Dir	County of Knox
Donna Allen	DDA EMA	County of Knox

December 17, 2009: *Planning Update and Public Comments*.
Location: Hope Fire Station Hope, ME
Start: 1800 End: 2000 TT: 2.0 MH: 38

Meeting Attendees	Function	Representing
Peggy Ludwig	Citizen	Town of Hope
Nancy Keller	Resident	Town of Hope
Brandon Bodman	Resident	Town of Cushing
Lela Claflin-Sisk	Resident	Town of Hope
Sue Kiskila	Resident	Town of Cushing
Edward Grinnell	Fire Chief/EMA Dir	Town of Warren
Polly Wood	EMS Dir	Town of Warren
Shirley Kangas	Resident	Town of St. George
Todd Butler	Resident	Town of South Thomaston
Becky Butler	EMA Dir	Town of South Thomaston
Kevin Soule	Dep Fire Chief	Town of Union
Chris Farley	Fire Chief/EMA Dir	Town of Camden
Clarence Keller	Fire Chief/EMA Dir	Town of Hope
Waino Kangas	Firefighter	Town of St. George
Tim Polky	Fire Chief/EMA DIR/CEO/LPI	Town of St. George
Robert Coombs	EMA Dir	Town of Thomaston
Donna Allen	DDA EMA	County of Knox
Ray Sisk	Selectman	Town of Hope
Arthur Kiskila	Fire Chief/EMA Dir	Town of Cushing

January 5, 2010: *Discussed general plan and status with LEPC Planning Committee Meeting*.
Location: Knox County EMA Rockland, ME
Start: 1030 End: 1130 TT 1.5 MH: 16.5

Meeting Attendees	Function	Representing
Laurie Beckwith	Quality, Risk & Safety Manager	Pen Bay Medical Center
Ray Sisk	Selectman	Town of Hope
Mark Curtis	HR & Safety Manager	Dragon Products
Foner Curtis	Environmental Safety	Lonza Corporation
Robert Williams	Response Branch	Maine DEP
Stephen Badger	Safety Coordinator	Fisher Engineering
Curtis Barthel	Commanding Officer	USCG Station Rockland
Andrew L. Hart	Administrator	County of Knox
Susan Simmons	Training and Education	American Red Cross
Donald L. Grinnell	Selectman	Town of Washington
Eileen Wilkinson	ESF#6 Planner	Knox County EMA

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APPENDIX B: NOTICES AND WEBSITES

Example of Letter to Knox County Municipalities

Knox County
Emergency Management
Agency

Ray O. Sisk
Director
rsisk@knoxcountymaine.gov

Arthur Kiskila
Deputy Director

Donna Allen
Deputy Director for Admin
dallen@knoxcountymaine.gov

62 Union Street
Rockland, Maine 04841
(207)594-5155
fax (207)594-0450

www.knoxcounty.midcoast.com

July 23, 2009

Roger Moody
251 Washington Street
Camden, Maine 04843

Commissioner Moody,

The Knox County Hazard Mitigation Planning Team is working to revise the 2004 Hazard Mitigation Plan for Knox County and we need input from your town.

Enclosed, please find the *Municipal Survey* the planning team is using to gather information for the revision. Also is a GIS base map(s) where you can mark up infrastructure changes for your town. A *Natural Hazards Rating* worksheet rounds out this package. We ask municipal officers to review and update this information and return to the County EMA by August 14th.

The next meeting of the planning team is scheduled for **Tuesday, August 18th at 2:00pm** in the County EMA office. You are encouraged to send a representative to help develop this important plan.

Background. Each municipality must have a plan endorsed by FEMA which addresses mitigation strategies for hazards and risks which can impact the jurisdiction. In Maine, county-wide plans are created which represent all municipalities. Your town participated in the 2004 Knox County plan.

Adoption of the plan, along with participation in the National Flood Insurance Program (NFIP), qualifies towns to seek federal funding for projects designed to prevent or reduce the impact from natural and man made disasters under a variety of programs.

Mr. Eric Galant of the Midcoast Regional Planning Commission is facilitating the planning effort. Please feel free to contact either him or myself with any questions you may have. To see work in progress on this revision, visit the *Resources and Downloads* section of the MRPC website at www.midcoastplanning.org. The approved 2004 plan can be accessed from the EMA department pages at the county website.

Sincerely,

Ray O. Sisk

Press Release Provided to Local, County and State-wide Media

Knox County Emergency Management Agency
62 Union Street
Rockland, Maine 04841

For more information contact:
Ray Sisk (207)594-5155
e-mail: rsisk@knoxcountymaine.gov

For Immediate Release October 15, 2009

KNOX COUNTY CONTINUES HAZARD MITIGATION PLAN REVISION

(Rockland, Maine) -- The Knox County Emergency Management Agency (EMA) was approved for a Comprehensive Hazard Mitigation Planning grant. Along with the Mid-Coast Regional Planning Commission, municipal and private sector partners, the agency began the revision cycle in December of 2008. The planning committee is on track to submit the revision for preliminary review by the Federal Emergency Management Agency early. The plan revision effort, required every five years, follows guidelines set by FEMA.

The purpose of a Hazard Mitigation Plan is to assess the County's risk to likely disasters, inventory special need populations and critical infrastructure, and to develop strategies and goals to lessen the impacts of a potential disaster. Examples of several mitigation strategies outlined in a plan include floodplain management, whereby new construction in floodplains is limited and, projects to replace undersized or poorly placed roadway culverts to prevent repetitive storm damages to public ways.

"A vital element of the Hazard Mitigation Planning process is the public's involvement in validation of risks and strategies included in the County Plan", stressed Eric Galant, Executive Director of the MCRPC. "Input from municipalities and interested citizens is vital to make the plan work successfully for us."

The planning committee will host two public meetings to discuss the plan. Both will be held on Tuesday, Oct 27 at Rockland City Hall located on Pleasant Street. There will be a morning information session starting at 9:00am and an evening presentation at 7:00pm. Interested members of the public are encouraged to attend.

To view work in progress on the plan, visit the resources and downloads page of the Midcoast Regional Planning Commission website at www.midcoastplanning.org. For more information, contact the Knox County EMA office at 594-5155.

###

Meeting Notice for Public Hearing Sessions

One of Maine's Finest Coastal Cities Established in 1854

WELCOME TO THE CITY OF ROCKLAND

General Events Calendar - Date Detailed

27

Tuesday Oct 27, 2009

Knox County Hazard Mitigation Plan Presentation **9 AM and 7 PM**
Posted By Ann Matlack
Location: City Hall Council Chambers

The Knox County Hazard Mitigation Team will hold public meetings on Tuesday, October 27, at 9 AM and 7 PM in the Rockland City Hall Council Chambers to present the draft revision of the Knox County Hazard Mitigation Plan.
The draft plan may be reviewed at the Midcoast Regional Planning Commission website.

270 Pleasant Street Rockland, ME 04841 **Phone:** (207) 594-0300 **Email:** info@ci.rockland.me.us

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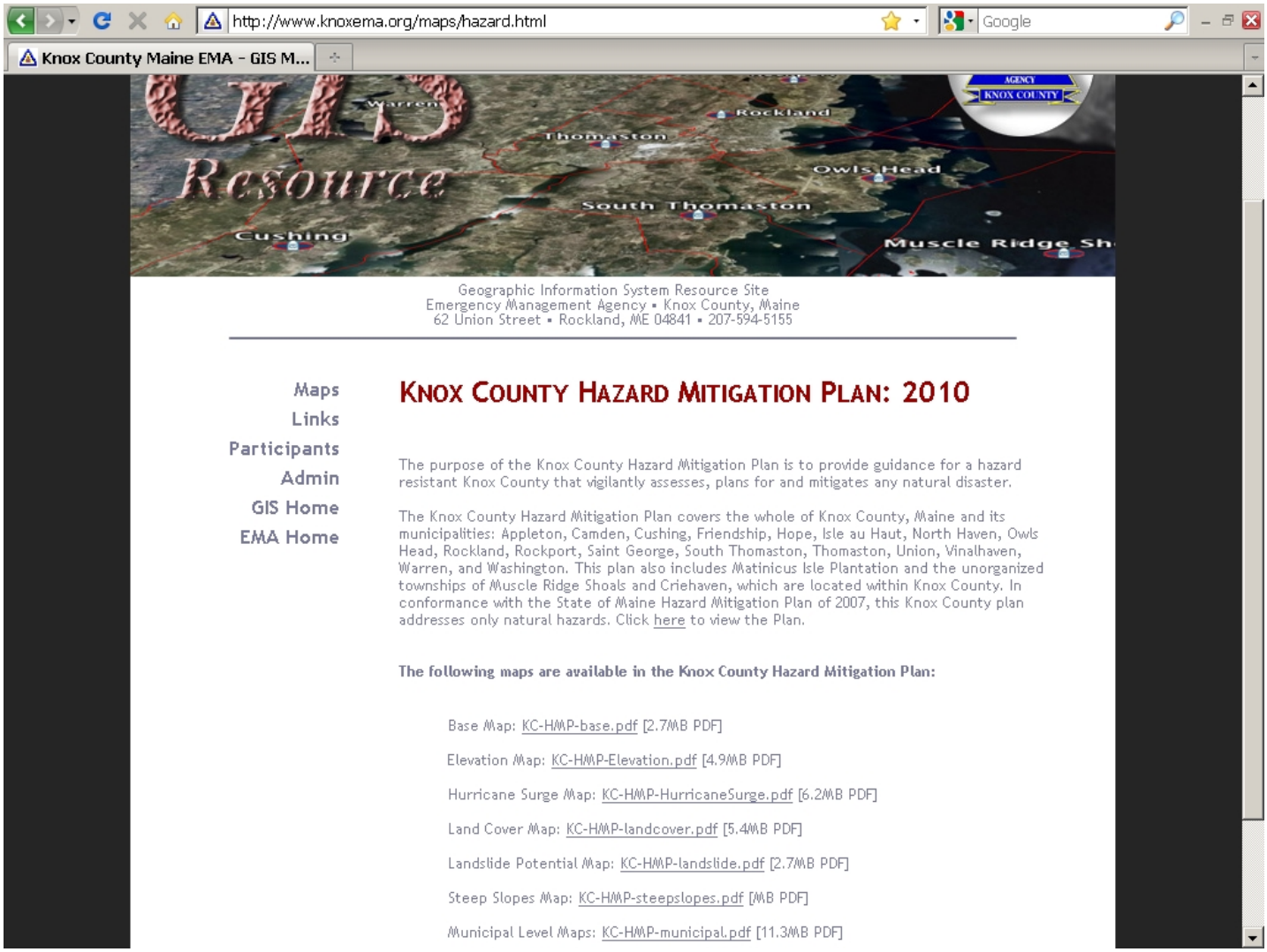
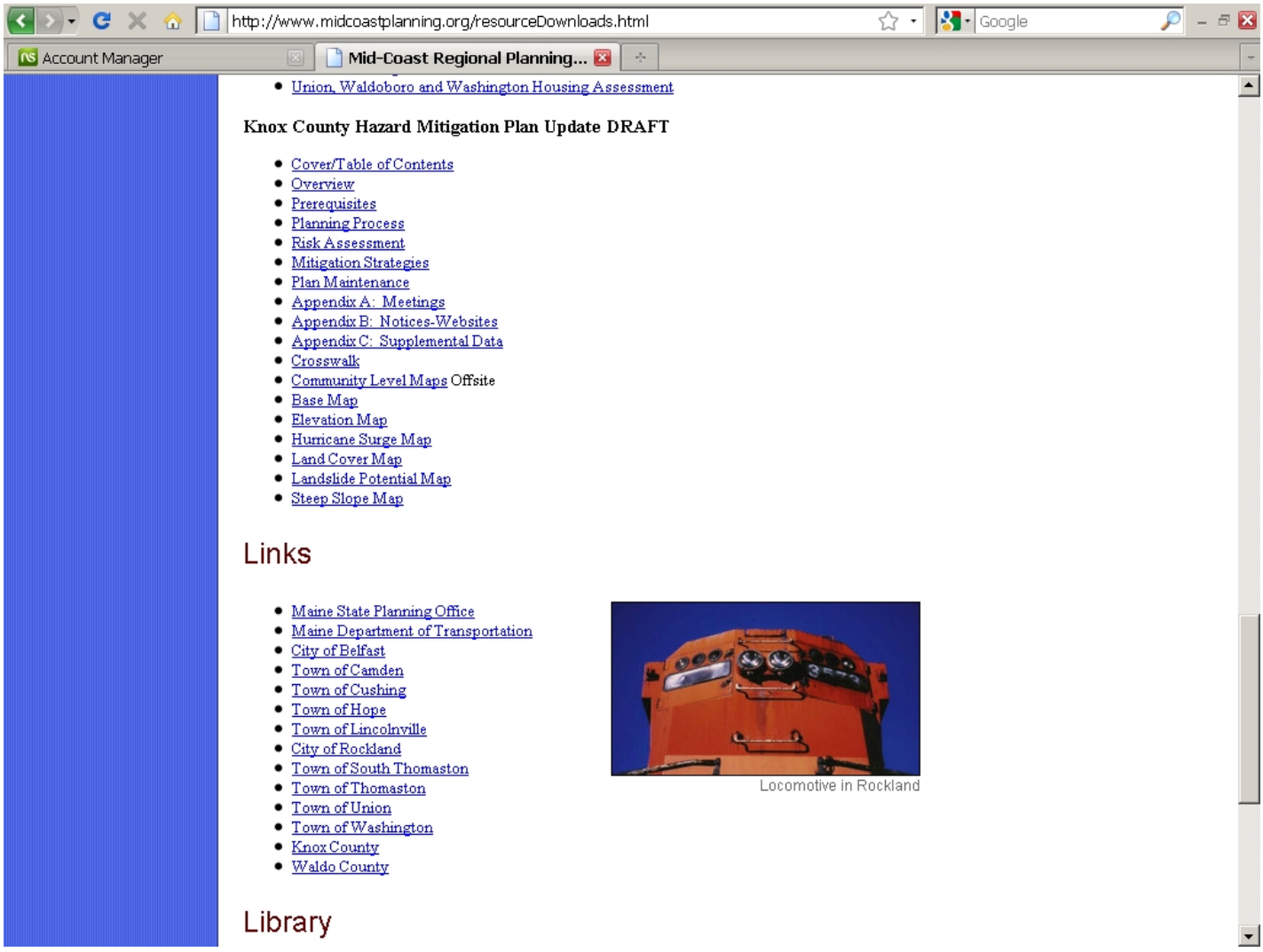
Knox County EMA Website Hazard Plan Info

Knox County EMA Website Hazard Plan Maps



Mid-Coast Regional Planning Commission Website – Plan Links



APPENDIX C: SUPPLEMENTAL DATA

Municipal Survey Result Summary Table

Community	Reoccurring damages, such as flooded roadways (road length, cost of repairs)
Appleton, Town of	Pettengill Stream near Route 105 (Burkettvile Rd), Saint George tributary stream near Route 105 (Camden Road)
Camden, Town of	Routes 52 and 105, Hosmer Pond Rd, Barnestown Rd, Howe Hill Rd, Molyneaux Rd (flooding and storm water runoff)
Cushing, Town of	Salt Pond Rd ($1,000)
Friendship, Town of	Martin Point Rd (2/10th of a mile $8,500 completed), state roads, Delano Cove Rd ($21,000) , Route 220, Route 97
Hope, Town of	Gillette Rd, Howe Hill Rd, High St. Route 235 near Mansfield Pond and west of Notch Rd, Route 105 at Camden town line
Isle au Haut, Town of	[TBD]
Matinicus Isle, Plantation of	None
North Haven, Town of	None
Owls Head, Town of	Shoreline from Rockland city line to South Thomaston town line, Spaulding Island, inland bay side west, Lucia Beach Rd, Ginn Point Rd
Rockland, City of	Thompson Rd Bridge ($4,000), Sherer Ln ($2,500), Mountain Rd ($ 8,000), Benner Rd ($2,500), Bog Rd ($11,000), West Meadow Rd ($7,000), Tolman Rd ($6,000), Pen Bay Acres subdivision ($1,000) (All figures from the St. Patrick's Day Storm, 2007)
Rockport, Town of	Mt. Pleasant Rd., South Hope Rd., and Mill St. have had major wash outs to total 3,000 ft. for all ($67,000+ over the last 5 years)
St. George, Town of	Kinney Woods Rd at Jones Brook, Otis Cove Rd, Turkey Cove Rd Bridge
South Thomaston, Town of	No
Thomaston, Town of	[NA]
Union, Town of	Clarry Hill Rd (210 feet $50,000+), Route 131/Appleton Rd
UT (Unorganized Territories)	No roadways, only footpaths and ATV trails
Vinalhaven, Town of	1. Poor Farm Rd (500 feet washes out due to undersized culverts, ledge within ditch line, 200 feet impassable due to softening of the road during the spring and heavy rain) 2. Pooles Hill Rd before State Beach Rd intersection (Culvert and shoulder washout due to undersize culvert and heavy runoff from Lindsey Pond during heavy rain or storms) 3. Calderwood Neck Rd (Approx. 500 feet before Young Rd intersection washout due to inadequate ditches, ledge within existing ditch line) 4. Young Rd (Approx. 10,000 feet washout in spots due to inadequate ditches and ledge in existing ditch line) 5. Island Rd at Deadman's Corner (frequently floods out during heavy

Community	Reoccurring damages, such as flooded roadways (road length, cost of repairs)
	rains and spring run-off due to undersized culvert). 6. Zekes Point Rd (5,000 feet washouts and damages due to inadequate ditching and run-off from roadway) 7. School St (Approx. 200 feet flooded on astronomical high tides and/or storm surge)
Warren, Town of	Rabbit Farm Rd culverts (replace with larger culvert), Packard Mill Rd at culvert (replaced with larger culvert), Beechwood St (erosion at roadside, ditching done)
Washington, Town of	Skidmore Rd-Old Union Rd end ($25,000), Old County Rd West ($70,000), Leigher Rd ($25,000), Sprague Rd ($20,000)

Source: Municipal Surveys- Various return dates

Maine Department of Conservation
Maine Forest Service
Forest Protection Division

Free Defensible Space Fuel Reduction Program Available to Communities

The Maine Forest Service, is offering a **FREE** "***Fuel Reduction Chipping Program***" to communities who have initiated a community wildfire risk assessment with the Maine Forest Service. Communities wishing to take advantage of this service should contact their local Forest Ranger or by calling 287-4990.

Communities should:

- ✓ ***Request the use of the chipper and coordinate well in advance with their local Forest Ranger.***
- ✓ ***Publicize the event in community newspapers, in newsletters, on bulletin boards, etc.***
- ✓ ***Distribute the "Will Your Home Survive" firewise brochure to homeowners.***
- ✓ ***Distribute and collect applications from homeowners.***
- ✓ ***Provide a crew of at least four to assist in hauling and feeding brush into the chipper. Training and personal protective equipment will be provided .***

Homeowners should

- ✓ ***Create defensible space within 30 feet of their home free from excess flammable vegetation.***
- ✓ ***Trim "ladder fuels" (branches) at least ten feet (or no more than 1/3 the tree height) above the ground.***
- ✓ ***Haul material to be chipped to within 5 feet of road on up-hill side; cut ends facing the same direction (towards road); piles should be no more than 4' high x 20' long; branches can be no more than 12" in diameter. Old dead wood dulls blades and should be disposed of by other means if possible.***

Ensure piles to be chipped are:

- ✓ ***free of all roots, stumps, rocks and mud.***
- ✓ ***free of any metal.***
- ✓ ***Do not contain leaves, pine needles or lawn clippings. We cannot chip these.***

Communities benefit by: Reducing the risk of wildfire, keeping branches, brush and other debris out of expensive landfills, and using the by-product (chips) as mulch, for landscaping material, for trails or as bio-fuel.

The Maine Forest Service will:

- ✓ ***Transport the chipper and collection vehicle to your community at no cost.***
- ✓ ***Provide personnel to operate the chipper.***
- ✓ ***Transport chips to a central location in the community unless desired by the homeowner.***