

## Table of Contents

<u>Section</u>	<u>Description</u>	<u>Page</u>
	EXECUTIVE SUMMARY .....	i
I.	INTRODUCTION .....	1
II.	CHRONOLOGY OF PROJECT IMPACT WORK.....	3
III.	KEY ACTIVITY SUMMARIES .....	6
IV.	HAZARD ANALYSES.....	7
	A. Coastal Flooding.....	9
	B. Major Flooding .....	11
	C. Localized Flooding Due to Intense Storms .....	12
	D. Ice, Wind or Heavy Snowstorms.....	13
	E. Other Hazards .....	14
V.	RISK ASSESSMENT .....	16
	A. Hazard Type: Coastal Storm.....	16
	B. Hazard Type: River Flooding.....	16
	C. Hazard Type: Localized Flooding.....	16
	D. Hazard Type: Ice/Wind/Blizzard.....	16
VI.	MITIGATION STRATEGIES .....	17
	A. Coastal Storms .....	17
	B. Flooding of the Saco River.....	19
	C. Localized Flooding.....	19
	D. Ice/Wind/Blizzard.....	26
	E. Other Hazards .....	26
VII.	SHORT-TERM RISK REDUCTION STRATEGIES.....	27
VIII.	LONG-TERM RISK REDUCTION STRATEGIES.....	27
IX.	FISCAL IMPACT.....	28
X.	CLOSURE.....	31

<u>Figures</u>		<u>Follows Page</u>
1.	Category A, B, C Hazard Locations	14
1A.	Category A: Beach Area Map	14
2.	City Existing Land Use	15
3.	City Major Roadway Networks	15
4.	City Future Land Use	15
5.	Structural Projects to Increase Disaster Resistance	24

### Appendices

A	Hazard Assessment
B	Florida Power and Light Proposal for Training, Exercising, Updating, and Posting the Emergency Action Plan for the Skelton Dam, Saco River
C	Financial Report
D	Project Impact Partners List
E	Individual Project Summaries

**EXECUTIVE SUMMARY**  
**ALL HAZARD MITIGATION PLAN**  
**WITH**  
**SHORT AND LONG-TERM RISK REDUCTION STRATEGIES**

- The City of Saco became a participant in the FEMA Project Impact program in 1998 to increase disaster resistance in the community.
- The potential City disasters were categorized as follows:
  - Fire
  - Wind
  - Precipitation Events
  - Catastrophic



***Urban flooding prior to the Sawyer Brook project.***

- The most notable forms of disasters were identified as follows:
  - Coastal Events, specifically hurricanes
  - Major flooding of the Saco River
  - Localized flooding due to intense storms
  - Wind and ice damage to overhead utility systems
- Work groups were formed and established primary risks, prepared recommendations and presented them to the City Council. These recommendations were adopted by the Council.
- Inclusive in a risk reduction plan was a hazard analysis. Some types of hazards are as follows:
  - Floods, Blizzards, Earthquakes, Epidemics and Fires

- The FEMA definition of a hazard is based upon:
  - Potential Magnitude
  - Frequency of Occurrence
  - Severity Level
  
- For the City of Saco, the potential major hazards were identified as follows:
  - Coastal Flooding – particularly Camp Ellis
  - Major Flooding – 100-year flood limit associated with Saco River
  - Localized Flooding – particularly Bear Brook, Hill Street Watershed and Sawyer Brook
  - Ice, Wind or Heavy Snowstorms
  - Other Hazards
    - Urban Fires
    - Drought
    - Earthquake
    - Railroad Derailment or Accident
    - Civil, Social and Political Hazards
    - Epidemics
    - Hazardous Materials Incidents
  - For the major hazards, a detailed hazard analysis included the type, response agency, community affected, infrastructure, frequency and seasonal variations.
  - For each disaster, a risk assessment analysis was performed to assess the potential for each disaster. The most probable event would occur with heavy rains from a storm preceding a fall hurricane.
  - For each disaster, a mitigation strategy is determined. Highlights were as follows:
    - Coastal Storms
      - Prevent beach loss
      - Reduce risks to property
      - Dredge the Saco River and use the sand for beach nourishment
      - Manmade structure modifications
    - Flooding of the Saco River
      - Use of existing dams
      - Hydrologic mapping
      - Zoning
    - Localized Flooding
      - 50-year storm event for drainage designs
      - Prioritize projects for storm drain upgrades
      - Implement CSO Master Plan
      - Sawyer Brook – adopt Sawyer Brook plan
    - Ice/Wind/Blizzard
      - Remove potential problem tree limbs; review landscaping requirements

- Other Hazards
  - Mitigate by training specialized personnel in appropriate techniques
- Short-Term Risk Reduction Strategies:
  - Adopted CSO Master and Overflow Response Plans
  - Adopted 50-year storm event for drainage design
  - Developed a standard details and operations manual for stormwater management and design
  - Involved public and encourage participation
  - Adopted Sawyer Brook Study recommendations
  - Evaluated building codes
  - Participated and Support Saco Bay Beach Management plan
  - Assessed public shelters
  - Assessed landscaping requirements
- Long-Term Risk Reduction Strategies identified at the project inception:
  - Complete Sawyer Brook Trunk Drain project
  - Identify areas susceptible to beach erosion and prepare a mitigation plan for implementation
  - Abate combined sewer overflows
  - Initiate beach nourishment program
  - Acquire chronic flood-prone properties
  - Provide standby power for all emergency shelters



***Spring Street trunk drain piping***

- Fiscal Evaluation:

➤ Project Initiation	\$ 70,000
➤ Model Home, Sawyer Brook Improvements, Preparation of All Hazards Plan	\$ 500,000
➤ Anticipated Annual Administrative Costs	\$ 35,000
➤ Long-Term Capital Improvements	\$2,131,340

The costs are intended to be offset by reduced damage from future flooding and natural disasters. Since inception through this year, just under \$1.8 million in the long-term capital improvements have been implemented.

This annual update provides a summary of activities over the past year as well as an update of the City's plan for future work. To maintain the continuity of the Project Impact program, the City maintains, updates, and adds new partners. The Department of Public Works conducts frequent steering committee meetings with a goal of 12 times per year, conducts quarterly partnership meetings, and has hosted annual recognition dinners for the partners.

The City has benefited from 404 funds for structural improvements and continues to invest local dollars to complement and supplement the Project Impact goals. These include significant funds and appropriations for the long term CSO abatement plan. The progress on CSO abatement is reported in a separate annual report.

***Sewer diversion structure to permit Sawyer Brook Relief Drain Construction.***



The City has targeted new projects as well as several new initiatives. New projects are identified within the report.

New initiatives include:

- Preparation of an Asset Management Plan pursuant to GASB34 (Government Accounting Standard Bond).
- The update of the street and sidewalk infrastructure analysis to allow better coordination of public works budgets and priorities.
- Efforts to coordinate vital infrastructure links to areas west of the Maine Turnpike with the Turnpike widening.
- The City Public Works and Planning Departments' update of water quality standards to supplement the comprehensive plan update.
- A study of the water quality of Goosefare Brook is planned for the upcoming year.

John Gold of Saco has a library of photographs related to the program which can be viewed by interested parties. Contact should be made via Larry Nadeau, Department of Public Works, 300 Main Street, Saco, Maine 04072.

Continuous updates are maintained by the City of Saco on the website [www.sacodpwmaine.com](http://www.sacodpwmaine.com)



***Not every day went well, but the Sawyer Brook project was completed on time and on budget.***

**PROJECT IMPACT  
ALL HAZARDS MITIGATION PLAN  
SHORT AND LONG-TERM RISK REDUCTION STRATEGY**

**I. INTRODUCTION**

The City of Saco, Maine, became a participant in FEMA's Project Impact program to increase the disaster resistance of the community in 1998. This resulted after the City experienced historic storms in the preceding decade including Hurricane Bob, the October 1992 storm, and the 1996 historic rainfall event where nearly 19 inches of precipitation was recorded. These events increased the City's cognizance of the impact natural disasters can have on a community and made it a likely candidate for Project Impact.

In the fall of 1998, the Project Impact process commenced with a four-pronged approach of building partnerships, assessing the risks from natural hazards, prioritizing needs of the community to address hazards, and involving the community in this process. A FEMA-funded Project Impact was initiated and work groups were assembled to evaluate the role of local government, the current City infrastructure, the role of the retail/business community, the role of the construction/building trades, the role of community-based organizations, and the role of the public education system in this process.

The groups agreed that Saco's disaster potential would be categorized into four areas:

- Fire
- Wind
- Precipitation events
- Catastrophic

The City also identified the potential for other disaster types including earthquakes, civil disobedience, hazardous materials incidents and others.

Most notable risks of natural hazards in the City of Saco were determined to be attendant with four events:

- Coastal events, specifically hurricanes
- Major flooding of the Saco River
- Localized flooding due to intense storms
- Wind and ice damage to overhead utility systems

Each work group established primary risks and prepared recommendations. The groups reconvened and established overall priorities which were presented the City Council.

The Council adopted recommendations and applied to FEMA for grants to implement the Project Impact priorities of the City.

A strategy to enhance disaster awareness, enhance disaster preparedness, reduce disaster hazard, improve response, assess risks, and implement the program was prepared during this process and has been ongoing since the program was adopted.

This narrative summarizes the City's hazards, the mitigation plans, and short and long-term risk reduction strategies. This is the City's annual report update for 2001.

This annual update provides a summary of activities over the past year as well as an update of the City's plan for future work. To maintain the continuity of the Project Impact program, the City maintains, updates, and adds new partners. The Department of Public Works conducts frequent partner committee meetings with a goal of 12 times per year (quarterly, with monthly steering committee meetings), conducts quarterly partnership meetings, and has hosted annual recognition dinners for the partners.

The City has benefited from 404 funds for structural improvements and continues to invest local dollars to complement and supplement the Project Impact goals. These include significant funds and



***Urban flooding prior to the Sawyer Brook project.***

appropriations for the long term CSO abatement plan. The progress on CSO abatement is reported in a separate annual report prepared by the City of Saco's Superintendent of Wastewater Treatment Facility, Department of Public Works.

The City has targeted new projects as well as several new initiatives. New projects are identified within the report.

New initiatives include:

- Preparation of an Asset Management Plan pursuant to GASB34 (Government Accounting Standard Bond).
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## **II. CHRONOLOGY OF PROJECT IMPACT WORK**

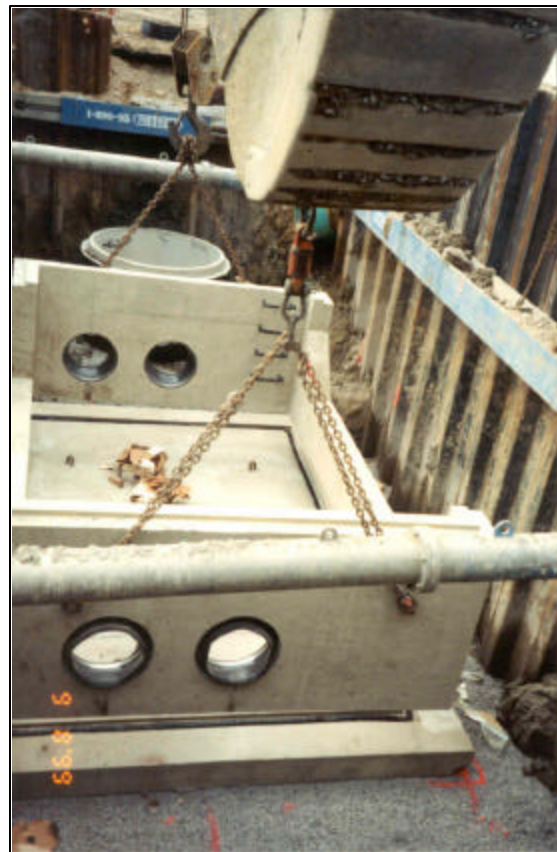
The City's Project Impact activities are summarized by the following chronology of major events:

### **2001**

- APWA web based presentations by Larry Nadeau and Lisa Parker
- Public Works Director Leads Water Quality Issues Discussion At National Meeting of AWPA
- Project Impact Partners Recognition Dinner
- Saco Students Tour Hurricane Hunters, Portsmouth, N. H.
- DPW Employees Receive Generalized Safety Training From Shaw Brothers
- Saco Public Works Director Assists FEMA with Disaster Mitigation Policy
- Successful completion of participation in American Red Cross's Masters of Disaster Program.
- Director of Public Works participates in FEMA/NOAA sponsored hurricane preparedness training at National Hurricane Center in Miami, February.
- SMRPC in partnership with Saco receives bids for CTP floodplain aerial photography.

### **2000**

- City receives the 2000 "Star Community Award" from FEMA Region 1



***Sewer diversion structure to permit Sawyer Brook Relief Drain Construction.***

- City is recognized nationally at the 2000 Washington DC Project Impact Summit as a "Star Community", 1 of 10 communities;
- City receives the 2000 "Mentoring Community Award" from FEMA Region 1;
- City wins a Federal/Private grant award valued at \$30,000 in 2000 to do a record assessment program funded by EverGreen Data Continuity, Inc.;
- City receives a \$30,000 grant from FEMA to kick-off the multi-year Coordinating Technical Partnership (CTP) program;
- City receives EPA nomination as CSO Community of the Year 2000 Award;
- City partners launch a partnership drive at the Annual Firemen's Convention being hosted by Saco;
- City approves in December the Camp Ellis implementation team to start the dialogue addressing the erosion problem at Camp Ellis with assistance from Congressman Tom Allen's office.
- City receives a \$975,000 grant from FEMA in 2000 to finish the Sawyer Brook storm drainage improvements;
- Thornton Academy accepts the scholarship effort and commits to work with city on program framework;
- City receives a grant from FEMA for Park Street at North Street drainage improvements in 2000 for \$98,000;
- City receives a grant from FEMA for Therrien Avenue drainage improvements in 2000 in the amount of \$35,000;
- City takes measures to become a 7 in the CRS program, first in State;
- 74 Businesses and 27 Individual Partnerships, in place and growing;

## **1999**

- City is awarded the 1999 Region 1 Project Impact Community of the year;
- City completed a \$527,000 drainage improvement in Boothby Park, a low-income area in North Saco, with funds received from the Federal Disaster Initiative through State's CDBG oversight in 1999-2000;
- City receives a grant from FEMA for Park Street at Central Street drainage improvements in 1999 in the amount of \$45,000;
- City has the Project Impact message on television Channel 30 and working with Channel 13 on a Project Impact series;
- City permits personnel to undertake emergency training at various locations to include EMI;

- City officials continue to be asked to speak at various functions on behalf of sharing emergency preparedness and the Project Impact progress;
- City DPW continues to expand its Mutual Aid Plan started in 1997 with surrounding Communities and New Hampshire UNH;
- Tri-Community Public Works effort to purchase specialized equipment, recent purchase is a utility inspection system;
- Planning Board approves the proposal to increase storm design level from 25 to 50 year design;
- City's National Flood Insurance Program accomplishes a better CRS rating, from a 9 to 8 reducing rates by 5 per cent;
- Thornton Academy Students in 1999 prepare brochure introducing Project Impact for a citywide mailing;
- DPW sends crews for Hazmat Operations Training to assist Fire Dept. with heavy equipment needs during disasters;
- Building Inspector undertakes the building of a disaster resistant model home using special tie down and construction methods;
- City and several partners undertake special work programs together;
- Police Department looking to take Project Impact into schools;
- Police & Fire Departments training in schools;
- City of Portland invites City of Saco and vice versa to join each other's Project Impact;
- Cities of Saco and Portland jointly participate in a Portland Home Show event sharing Project Impact's value;
- City adopts a new "All Hazard Mitigation Plan" with an effort to undertake at least two projects per year;
- In 1999 County EMA and City leaders with business leaders and partners successfully petition County Technical College to carry an Emergency Management Curriculum;
- Mayor Johnson commits to working with Thornton Academy (City's High School) to develop a scholarship program for students wishing to pursue York County Technical College Curriculum in Emergency and Safety Management field;
- City adopts SSO (Sanitary Sewer Overflow) Response Plan in 1999 to mitigate health issues during dry weather sewer overflow events (before EPA implement requirements);
- City adopts Storm & Water Quality Management Plan in 1999;
- City adopts its Comprehensive Plan in 1999 with a focus to prepare and mitigate against disasters;
- City finishes a Saco Bay Regional Beach Management Plan (two years in the making) with a commitment to undertake final mitigative measures for beach erosion;

- City Administration informs Departments to seek grants with a commitment to fund;
- City hosts a recognition dinner in 1999 for all its partners;

### **1998**

- June 1998 City of Saco is nominated as Project Impact Community for Maine, first community;
- City receives a grant from NESEC for dune restoration project in 1998 in the amount of \$5,000;
- City undertakes a FEMA \$100,000 Flood Mitigation Assistance Program in 1998 for local residents to undertake flood proofing measures with great results;
- Local banks sponsor low interest loans to assist in Flood Mitigation Loan Program to residents;
- DPW develops a Time Delineating Schedule (TDS) for storm emergencies in 1998;
- City undertakes Sawyer Brook Drainage Improvement Project of \$2.6 million and completes Phase I totaling \$1.7 million of which \$1.4 million are federal funds, awarded in 1998-99.

### **All Years**

York County and Red Cross training programs underway.

Periodic updates are provided on the website at [www.sacodpwmaine.com](http://www.sacodpwmaine.com).

## **III. KEY ACTIVITY SUMMARIES**

The City of Saco has prepared a chronology of the major milestones for Project Impact as follows:

- Sawyer Brook Storm Drain and Urban Flood Mitigation Project, Ribbon Cutting Ceremony – June 8, 2001
- Saco Students Visit Hurricane Hunters – May 2001
- Partnership in Emergency Management – April 2001
- Project to Build a Disaster-Resistant Community – April 26, 2001
- Dedication Ceremony Celebrates Completion of Sawyer Brook Project – April 24, 2001
- Masters of Disaster – April 23, 2001
- Project Impact Partners Recognition Dinner – April 10, 2001
- Saco Awarded Coleman Generator for Project Impact Work – April 5, 2001
- Saco Public Works Director to Assist FEMA with Disaster Mitigation Policy – March 21, 2001
- Project Impact Partners to be Recognized at Dinner – February 20, 2001
- Masters of Disaster: Bringing Safety to the Schools – February 15, 2001

- Saco, Maine Named Project Impact Star Community, *Star Communities Exemplify the Spirit of Disaster Prevention* – November 17, 2000
- Saco to Test Disaster Skills – September 26, 2000
- Local, County, State and Federal Official and Representatives Visit Sawyer Brook Project

Individual descriptions of this activity is provided in Attachment C. Periodic updates are provided on the website at [www.sacodpwmaine.com](http://www.sacodpwmaine.com).

#### IV. **HAZARD ANALYSES**

Inclusive in the development of a risk reduction plan was a hazard analysis. The hazards in the City of Saco were identified using the Maine Emergency Management Agency (MEMA) workbook, which is included as Appendix A.

The hazard types identified using the MEMA workbook were categorized for Saco's Hazard Analysis as follows:

<b>Hazard Type</b>	
<b>As Identified by MEMA</b>	<b>Category for Hazard Assessment</b>
Drought	E
Earthquake	F
Erosion/Coastal Erosion	A
Riverine Flooding	B
Flash Flooding	C
Urban Flooding	C
Hurricane	A/B/C
Blizzard	D
Civil/Political Disorder	G
Economic Emergency	G
Hostage Incident	G
Riot	G
Strike/Lockout	G
Sabotage	G
Armed Conflict	G
Weapons Conflict	G
Dam Failure	B
Human Epidemic	H
Animal Epidemic	H
Hazardous Materials Incident	I
Radiological Incidents	I
Transportation Incidents Including Railroad Derailment	I
Urban Fire	D

Natural Hazard Incidents categories are as follows:

- A Coastal Hazards
- B Saco River Flooding
- C Localized Flooding
- D Blizzard/Ice Storms/Urban Fires

- E Drought
- F Earthquake

Other Hazards were classified as:

- G Civil, Social and Political Hazards
- H Epidemics
- I Hazardous Materials Incidents
- J Transport Disaster

It is noted that the MEMA workbook classifies any hazard which has any potential of loss of property or life as “significant” and requires inclusion as a hazard in the Emergency Plan even though many are very remote possibilities. The Federal Emergency Management Agency has definitions based on the magnitude, frequency, and severity levels which are defined as follows:

**POTENTIAL MAGNITUDE** (Percentage of the jurisdiction that can be affected):

- Catastrophic: More than 50%
- Critical: 25 to 50%
- Limited: 10 to 25%
- Negligible: Less than 10%

**FREQUENCY OF OCCURRENCE:**

- Highly Likely: Near 100% probability in next year.
- Likely: Between 10 and 100% probability in next year, or at least one chance in 10 years.
- Possible: Between 1 and 10% probability in next year, or at least one chance in next 100 years.
- Unlikely: Less than 1% probability in next 100 years.

Severity Level	Characteristics
Catastrophic	Multiple deaths. Complete shutdown of facilities for 30 days or more. More than 50 percent of property is severely damaged.
Critical	Injuries and/or illnesses result in permanent disability. Complete shutdown of critical facilities for at least two weeks. More than 25 percent of property is severely damaged.
Limited	Injuries and/or illnesses do not result in permanent disability. Complete shutdown of critical facilities for more than one week. More than 10 percent of property is severely damaged.
Negligible	Injuries and/or illnesses are treatable with first aid. Minor quality of life lost. Shutdown of critical facilities and services for 24 hours or less. Less than 10 percent of property is severely damaged.

The City of Saco has numerous unlikely, negligible significant hazards. However, the potential is not zero and they have been identified in this manual. Further, DeLuca-Hoffman Associates, Inc. elected to use the term “very limited” instead of FEMA’s term “negligible” in the hazard assessment evaluation (Appendix A).

For the hazards, five steps were taken and are summarized in this section:

1. Hazard identification
2. Profile of the hazard
3. Community profile
4. Prioritization
5. Analysis of scenarios

This section includes the hazard identification and profiles. Figure 1 identifies key hazard areas in the City. Subsequent sections consider various scenarios and assign community priorities.

#### **A. Coastal Flooding**

This hazard is caused by elevated surf and the accompanying wind and rain typical of hurricanes or coastal storms. Saco's coastal areas, particularly Camp Ellis, are most vulnerable.

Although the hazard occurs during a natural event, there are concerns that the frequency and severity of coastal erosion and impacts is increasing and heightened by the following:

- The effect of manmade structures which interfere with natural beach processes.
- The apparent increase in sea level and possible increase in storm intensity.



***A 10-foot by 16-foot precast concrete structure was installed for the Sawyer Brook project to accommodate the trunk line transition from a box culvert to twin circular storm drain lines.***



This hazard is one wherein opinions are strong and divided concerning these two items.

The severity of the impact of a coastal storm is valuable dependent upon:

- Moon phase at time of storm (since moon cycle affects tidal range);
- Wind direction; and
- Tidal stage.

In the event of a coastal storm of this nature, it is likely to be most severe during the two-hour period closest to a high tide. On occasion, alerts would continue through three tide cycles.

Moon phase and tide cycles are well known and predictable. However, rapid changes can occur in wind direction and the exact intensity of a storm where predictability is less accurate or precise. Most major storms are predicted over a day in advance, but the difficulty is predicting the potential significance to a particular location.

Coastal flooding is limited to the specific areas of Saco which front the beaches. Continued damages from the coastal storms in these areas is likely to continue. The sector affected by coastal homes is limited in geographic area, being focused on Camp Ellis. Approximately 35 homes, a restaurant, small businesses and the public pier are susceptible to damage. The homes most susceptible to damage are on the immediate shoreline, constructed of conventional foundations on the last frontal dune. Loss of this frontal dune would make homes very vulnerable to much more substantial damage. Revetments and shore protection measures are limited by current state regulations. The area is accessible from the City via an arterial, Ferry Road, with secondary access via Bayview Road. Utility systems can be isolated and shut down during emergency conditions and a safe evacuation route is in place.

## **B. Major Flooding**

The City of Saco's southern boundary is the Saco River. The Saco River originates at the outlet of Saco Lake in the White Mountains near Crawford Notch and drains an area of approximately 1,623 square miles. The river has approximately six sites with one or more dams along the river, including Hiram Dam (42 miles upstream of Saco), Bonny Eagle (22 miles upstream of Saco), West Buxton (19 miles upstream of Saco), Skelton Dam (12 miles upstream of Saco), and four dams in the Cataract area of Saco.

Major flooding could occur with a hydrologic event within the basin or with progressive or immediate dam failure.

Major flooding due to hydrologic events may be aggravated by:

- Earlier precipitation
- Snow melt
- Ice blockage

The FEMA flood maps for the City depict the 100-year flood limit of the river. Within the 100-year flood limit are the following:

- Irving Street, Water Street, Lincoln Street and a portion of Market Street.
- A portion of the Wastewater Treatment Plant

However, snow melt or ice blockage can aggravate the effects of a given hydrologic event. In general, the 100-year flood limit affects approximately 1,200 acres of property within the City of Saco.

Irving Street is located adjacent to the Saco River with eight multi-family dwellings located within the 100-year flood plain. Many of these buildings are prone to complete basement and first-floor flooding.

Market Street is intersected by Irving Street and approximately three residences are subjected to flooding.

Lincoln Street parallels the Saco River along the upstream area of Spring's Dam. Two businesses and a single-family dwelling are located within the 100-year flood plain.

Water Street parallels the Saco River between Spring's Dam and Cataract Dam, with portions of the roadway embankment defining the riverbank. An office complex, apartment building, and retirement community building are located within the flood-prone areas of Water Street.

Three dwellings along the southerly side of Storer Street are within the flood hazard zone. Much of this region is susceptible to yard and basement flooding.

Floods typically could be more likely to occur in the fall or spring. Wherein Saco is at the base of the river, flooding would tend to occur progressively along the river with a couple of days' notice to most residents. Structures within the basin could be immediately inundated by 2 feet.

Warnings through the National Weather Service and more recently an emergency action plan for the failure of one of the Bonny Eagle dams approximately 22 miles up river of Saco. (Failure of

the Bonny Eagle Dam would represent a significant hazard 7 miles downstream to the Bar Mills area of Buxton.) Florida Power and Light (FPL) has established a classification for various events which result in failure:

- Category A: Catastrophic Dam Failure
- Category B: Progressive Dam Failure has Commenced
- Category C: Non-Failure Emergency Condition

FPL coordinates flows at the Bonny Eagle Station with weather data from the National Weather Service to optimize flows and stages to reduce downstream flooding conditions. In the event of a major storm, Florida Power and Light is implementing controls to reduce the potential for a breach of the dam.

The large watershed area and the ability of Florida Power and Light to monitor and reduce downstream flooding conditions reduce the amount of Saco affected by an event and reduce the frequency of occurrence to a low possibility only.

Florida Power and Light has conducted a similar study for failure of the Skelton Dam, which is 17 miles upstream of the mouth of the Saco River. Florida Power and Light's Emergency Action Plan (EAP) for this structure is much more significant to Saco, since there are no dams between those at the Cataract Dam and this structure. The downstream communities potentially affected by a dam failure or flooding as a result of large operational releases include populated areas of Saco (and Biddeford). Because of the potential of downstream flooding, a siren has been installed at Spring Island Dam in Biddeford to provide as much notification as possible.

The inundation map for this EAP was not available at the time this report was prepared. (It should be added to the manual as soon as possible.)

Attachment B of this study is the draft EAP proposal for training, exercising, updating and posting the EAP.

Extension of Florida Power and Light Emergency Action Plan to include the City of Saco Public Works and Fire Department is recommended, who will notify neighboring communities. In the event of a flood, access to the flood-prone areas could occur from the south by Biddeford and from the north by Saco (although major north-south arterials could be affected).

### **C. Localized Flooding Due to Intense Storms**

The City of Saco is a community with an original urban core sited on the Saco River with peripheral forests and farmlands, and a large wetland bog (the Saco Heath). Over time, localized watercourses were culverted, flood storage areas filled, and flows increased due to urbanization. Recurrence of localized flooding in these areas has the potential to increase unless mitigation strategies with support by the community are fully implemented.

The City had a prior 25-year design standard for stormwater analysis of localized areas. However, at times analysis done for design purposes may have been inconclusive since it did not consider full impacts within the watershed. Further, restrictions, regulations and enforcement of ordinances to protect the floodways of the local streams may have been limited.

Localized flooding is a frequent event. It tends to be limited in magnitude and impact but addressing the impacts can require substantial fiscal resources of the City and private owners. Locations of localized flooding are more prevalent on the lower reaches of localized streams where past urbanization has resulted in inadequate capacity for conveyance systems and greater

loss of flood storage. Combined sewer overflows result from intense stormwater flows in approximately 123 acres of the City. Major watercourses subject to localized flooding include Bear Brook, the Hill Street watershed, Sawyer Brook, and others. Flooding from localized events generally has a duration of several hours. The spring when snow melt occurs and fall coastal storms are the more likely conditions for flooding in the larger inter-city waterways, but unexpected heavy thunderstorms can cause very localized flooding events in smaller watersheds.



***A temporary sedimentation basin, silt fence and hay bales were utilized at the area of the trunk outfall to protect the Saco River from suspended solids and erosion (Spring Street Trunk Storm Drain Project).***

The larger watersheds are more likely to have precipitation events predicted by the National Weather Service, whereas extremely localized events are not well known. However, because the smaller watersheds are subject to localized intensities, the predictability is reduced.

As the City grows, the hazard has a real potential of increasing substantially.

One advantage is that the same areas subject to effects of the hazards are closest to emergency services and a gridded street system where rescue from more points of access is possible. A detailed study of the Sawyer Brook watershed typifies the hazard for this type of event. Key findings include:

- The culverted portion of the lower reach of Sawyer Brook is inadequate to convey stormwater flows;
- The stormwater flows result in combined sewer overflows which impair water quality;
- Future development should address impacts throughout the watershed;
- Operation and maintenance guidelines should be instituted;
- Easements should be acquired to protect the flooding of the brook;
- Existing structures subject to limited inundation should be flood proofed.

These findings are applicable to many other localized flooding areas within the City.

#### **D. Ice, Wind or Heavy Snowstorms**

The combination of ice and wind or heavy snowstorms represents the potential for a broader based hazard affecting a wider area of Saco. The highest hazard occurs in the winter due to

climatic conditions (favorable for ice formation) and the broader based impact of loss of power and heat. Prediction generally is about 48 hours in advance.

#### **E. Other Hazards**

Other hazards include:

1. Urban Fires: Urban fires are a possibility in any urbanized area. However, the City's urbanized area is a gridded street system, the City has a formal Fire Department, and public water with fire protection capability serves these areas with active mutual aids from adjacent communities. Therefore, while the possibility exists, the severity would be very limited in geographic area and the magnitude and frequency unlikely.
2. Drought: The City's rural areas are subject to drought and subsequent impacts. Severity and magnitude would likely be very limited.
3. Earthquake: The Maine Geologic Service rates Maine to have the potential of significant earthquake. The location of fault lines, specific hazards in the Saco area, and detailed hazard assessment is beyond the scope of this initial plan.
4. Civil, Social and Political Hazards: The City of Saco has these hazards merely through its population. The risk is low since there are no particular highly controversial facilities in the area. Further, Saco has fully trained public safety staff including police, public works and fire departments and a strong local government with high leadership skills. The City also has a mass gathering ordinance which allows staff to prepare for large gatherings in advance.

The workforce is diverse with no single industry solely affecting the vibrant economic base of the City.

5. Epidemics: The City of Saco is as vulnerable to epidemics as other communities.
6. Hazardous Materials Incident: The City is bisected by the Maine Turnpike where most goods pass via interstate trucking. This probably heightens the risk of hazard. The City has two entrances to the Turnpike and the I195 spur permits multi-point access to most arterials for emergency service in the event of a hazardous materials incident.

The City is also served by rail and natural gas lines with their attendant risks.

Category A, B, and C hazard locations are depicted on Figure 1 which follows this page.

A summary table of the hazard analysis is provided in the following table.

<b>Detailed Hazard Analysis – Major Natural Disasters</b>				
<b>Hazard Type</b>	<b>Coastal Storm</b>	<b>Saco River Flooding</b>	<b>Localized Flooding</b>	<b>Wind/Ice Blizzard</b>
<b>Profile of Hazard</b>	Limited to immediate coastal area	Limited to Saco River Floodplain	Along major tributaries/localized areas/more acute near urban center	Widespread
<b>Geography</b>	Coastal beach area and a very small portion of the City	Riverfront area of City subject to inundation is small	Mild topography; likely closes some streets	Minor rolling hills, some relatively flat areas
<b>Infrastructure</b>	At terminus of most infrastructure systems	City Wastewater Treatment Plant is on the riverfront; water system uses river as source	Combined sewers in urban area activated frequently during this type of event	Most infrastructure is in the street. Overhead systems (particularly power) most susceptible to outage
<b>Response Agencies</b>	City has fire substation in this area	No known major response agencies are located in floodplain	Response agencies tend to be sited in protected areas	City is accessible from Turnpike, Route 1, Route 112; some links in service from the west; ocean is eastern boundary
<b>Community Profile/Property</b>	35± homes, restaurant, fire station, fish pier		Interurban shopping area, homes/businesses	Potential widespread impact. More acute with distance from urban core.
<b>Human Population (Demographics)</b>				
<b>Animals</b>				
<b>Frequency</b>	1 year	25 years	2 years	Varies – major events 25 years
<b>Seasonal Variations</b>	Highest in spring/fall	Highest in spring/fall	Highest in spring/fall but can occur throughout the year	Winter months

The other potential hazards are generally more widespread throughout the City, with concentration near arterials and population densities. Figures 2, 3 and 4 following this page show existing land uses, transportation facilities, and anticipated future land use features within the City.

## V. **RISK ASSESSMENT**

The risk assessment reveals that most of the discrete risks affect very limited areas of Saco. The potential of overlapping hazards (those which occur concurrently) is somewhat limited due to the variation in the specific hydrologic events which need to occur. These were considered as follows:

### A. **Hazard Type: Coastal Storm**

Potential of Overlapping Hazard: Concurrent coastal storm with river flooding would require a broad coastal front with significant inland penetration or the concurrent occurrence of a coastal storm and a storm with heavy rainfall occurring from the west. This is an unlikely event.

A coastal storm with localized inland flooding is more likely to occur, principally because the current frequency for localized hazard events is lower than other hazards in the City.

A coastal storm with wind damages is also somewhat more likely since the coastal storms which have high damages often are accompanied by heavy rains.

### B. **Hazard Type: River Flooding**

Potential of Overlapping Hazard:

- Coastal: See item A, above.
- Localized flooding: Since river flooding affects the area, localized flooding, especially as a result of backwater at the base of the tributaries occurring concurrently is high.
- Wind/Ice/Blizzard: Unlikely to occur concurrently.

### C. **Hazard Type: Localized Flooding**

Potential of Overlapping Hazard: High for all types except ice and blizzard, which are negligible.

### D. **Hazard Type: Ice/Wind/Blizzard**

Ice storms are unlikely to coincide with other storm events. Wind is associated with coastal hurricanes and is highly likely.

A blizzard with other hazards is rare.

In summary, the most probable event would likely occur with heavy rains from a separate storm preceding a fall hurricane with the two events coinciding at peak intensity. This is an unlikely event, but would have impacts to limited segments of the population.

Within the City, the higher risks of natural hazard occur as follows:

Coastal: The risk to the City of Saco's Camp Ellis area is high. Essential facilities, the small population, and infrastructure serving the area are at risk. Because the area can be evacuated, the risk to the immediate area is critical.

Localized Flooding: With the continued development of the City, the limited risk areas of the City could expand.

On a city-wide basis, the combined hazard rating is very limited, but possible with reasonable warning times in place. Impacts occur in specific segments of the City making the severity very limited.

Hazard ratings for categories D through I are widespread throughout the City, but focused on arterials, population centers, and transportation routes.

## **VI. MITIGATION STRATEGIES**

The various hazards have been reviewed to determine appropriate mitigation measures and strategies:

### **A. Coastal Storms**

Continued coastal storms could result in the ultimate loss of most of the Camp Ellis community. The potential for loss increases due to several factors including the loss of beach nourishment and replenishment. Full loss of the Camp Ellis area would result in millions of dollars in direct property losses as well as secondary economic loss to the area.

The forces attendant with coastal storms and waves are not easily mitigated. The Saco Bay Regional Beach Management Plan is in progress and looks at several factors:

Prevention/Reduction in Acceleration of Beach Loss: A center focus of the Saco Bay Regional Beach Management Plan is the question of the impact of manmade activities on the beach area.

- Development Control
- Simplifying and Improving Regulatory Provisions which Protect Natural Resources

Viewpoints are divided with:

- Concern that development on the dunes deters natural beach replenishment.
- Concern that the jetty at the mouth of the Saco River does not permit natural processes to occur and replenish the beach.

The Saco Bay Regional Beach Management Plan is a broad study which includes consideration of:

- Prevention;
- Property Protection;
- Natural Resource Impacts;
- Structural Projects; and
- Public Information.

Specific planning strategies are:

- Restoring or maintaining existing beaches
- Reducing risks to property
- Protecting wildlife habitat
- Enhancing the economic value of beaches
- Refining beach regulations
- Regional coordination

Related activities include goals to educate the public, dredging and harbor maintenance and non-point water quality controls.

The City of Saco has emergency measures in place to perform the following:

- Short-term and immediate response to place sand barriers along the shoreline when coastal storms are predicted.
- Provide for emergency assistance and relief.
- Continually reinforce the temporary measures during a storm.

Short-term measures of the Saco Bay Regional Beach Management Plan include the potential regional purchase of a dredge to replenish the beaches and remove unwanted sand from navigable areas.

The Saco Bay Regional Beach Management Plan informs the public of the issues, suggests a partnership between federal, state, and local officials, provides historical backup, and generally follows mitigation strategies favored by Project Impact. Further, the plan is generally in conformance with FEMA's STAPLE criteria (STAPLE is an acronym for Social, Technical, Administrative, Political, Legal and Economic/Environmental criteria used in making planning decisions).



***Spring Street trunk drain piping.***

A long-term risk reduction strategy is anticipated from the Saco Bay Regional Beach Management Plan.

Significant action on this item remains a future priority for Saco.

## **B. Flooding of the Saco River**

Flooding along the Saco River can occur with a major hydrologic event or the catastrophic loss of a dam on the river. The series of dams along the river permit the energy of the river to be used, but also provide the ability for man to manage and reduce the impact of major hydrologic events or flooding.

Key prevention measures in place include:

- The regulatory, zoning, and oversight of the Saco River Corridor Commission, MeDEP, and communities along the River;
- The detailed hydrologic mapping of FEMA to identify the flood hazard areas;
- State and federal regulations which address natural resource protection;
- The availability of emergency service providers to access the River
- The structural protection afforded by dams along the River.

However, public information and intergovernmental/private response services can be enhanced.

Florida Power and Light: Emergency Action Plan initiates a plan for the Bonny Eagle and Skelton Dams which fully quantifies risk and establishes an emergency action plan. This is a separate document entitled "Emergency Action Plan in the Event of Dam Failure for Bonny Eagle Project – FERC No. 2529-ME and No. 2527-ME". This plan and EAP should be commended by the City and network Saco into the EAP programs.

Over the longer term, the City of Saco should consider restrictions and zoning regulations for any flood-prone areas along the river including the Irving Street area; conduct a study to determine the impact the maximum predicted storm (MPN) hydrologic event on the wastewater treatment plant, and continue efforts to mitigate the impact of combined sewer overflows on water quality. Further and continued public information training is also recommended and is supported by the Florida Power and Light EAPs.

Significant action on this item remains a future priority for Saco.

## **C. Localized Flooding**

The City of Saco has set a priority in the prevention of localized flooding through the following:

- Conducting hydrologic studies to ascertain flood-prone areas.
- Increasing conveyance capacity.
- Adopting regulations to require downstream areas to be protected from localized flooding by requiring the impacts of urbanization to be mitigated.

The Sawyer Brook watershed is the most chronic problem in the City and well known since it impacts the Saco Valley Shopping Center.

To mitigate the impact of development and prevent future increases in the hazard risk, the City has adopted the 50-year storm event for major drainage designs and is implementing a manual on stormwater system operation and maintenance. The City has also mapped its drainage infrastructure in the urban area to allow analysis of the infrastructure.

After Hurricane Bob and subsequent studies, the City assessed the damages which occurred and initiated implementation measures to prevent the recurrence of the hazard. Projects completed (keyed to the numbers used on Figure 5 following page 24) include:

1. **Grant Road at Boynton Brook:** This project included culvert outlet stabilization as well as road shoulder repair to reduce erosion.
2. **Cumberland Avenue at Bear Brook:** Extension of culvert and channel improvements. This project will result in a stabilized embankment adjacent to Cumberland Avenue and protect the roadway from erosion damage during significant rain events.
3. **Sheppard and Locke at Bear Brook:** This project involved stabilization of the twin 48” culvert outlets and stream channel to reduce erosion.
4. **Maple Street Drainage Upgrades:** Placement of 36” lines to intercept open channel flows, convey under Maple Street to open channel and channel stabilization to reduce erosion of downstream channels.
6. **Roebuck Avenue Project:** Placement of twin 36” lines to provide adequate conveyance capacity for flows from open channels under Roebuck/North Street. This project significantly decreased flooding of a major arterial roadway and maintains continued access for emergency vehicles during disaster events.
10. **Hobson Lane:** Construction of riprap channel improvements to intercept runoff and convey flow from the James Street area to the Saco River Estuary and protect the erosion and washout of Hobson Lane.
12. **Wharf Street Outfall:** Replace undersized drainage system and rehabilitate existing granite box outfall in conjunction with other sewer separation improvement work within the area.
13. **Jenkins Road at Goosefare Brook:** Replacement of undersized culvert crossing and stabilization of storm channel and roadway embankments.
14. **Portland Road (US Route 1) at Cascade Brook:** Stabilization of culvert outlet apron and riprap armor lining of storm channel and embankments to reduce erosion of downstream property.
15. **Portland Road (US Route 1) at Mill Brook:** Installation of riprap and paved sluiceways to convey surface water from roadway surface, across to the existing drainage course. This project will protect the roadway embankment from erosion during significant rainfall events.
16. **Storer/Water Street:** Separation of stormwater from the combined sewer and construction of a new outfall to the Saco River. The project eliminates continual ponding in a low-lying area beyond the limits of the roadway drainage network.
17. **Sawyer Brook Phase I to IV:** Construction of the Trunk Storm Drain Outfall and redirection of the lower reaches of the Sawyer Brook system from the urban core.
18. **Ross Road at Goosefare Brook:** Replacement of undersized culvert crossing and stabilization of stream channel and roadway embankments.

19. **Moody Street:** Replacement of undersized culvert crossing and installation of granite and riprap slope protection to convey runoff through a confined residential area.
20. **Wastewater Treatment Plant:** Replacement of secondary clarifier tank to replace existing tankage that was damaged by hydrostatic uplift associated with extreme flooding. The new replacement tank was constructed with structural connections securing the new tank to the underlying bedrock.
21. **Tappan Valley:** This project included stabilization of the storm channel and culvert crossings along Tappan Valley which experience significant channel erosion during significant flow events. Structural linings of the channel were employed to protect the existing stream banks which are highly erodible soils.
23. **Park Street Culvert Crossing Project:** Replacement of undersized culvert on Sawyer Brook. This project would install a new culvert at the Sawyer Brook crossing to maintain adequate conveyance within the drainage system.
25. **Therien Avenue Relief Storm Drain Project:** Construction of a drain line to relieve neighborhood drainage problems. The project will provide adequate drainage to relieve flooding which results from the inundation of an adjacent wetland.
26. **Boothby Park Improvements:** Construction of a closed conduit drainage system and outfall to relieve poor neighborhood drainage as a result of the high groundwater table.
27. **Riverside Avenue Improvements:** Construction of a relief storm drain to assist in reducing floodwaters which occur as a result of coastal storm events.
28. **Water Street to Main Street:** Construction of a new 36" outfall to serve the Main Street drainage area. The project allows for the connection of future collector drains and eventual discharge to the Saco River.
29. **Park Street:** Completion of the storm drain inlet and extension to the Central Nye Street storm drain system. This project intercepted a tributary of Sawyer Brook from the back yards of an urban neighborhood and redirected to the Sawyer Brook Trunk Storm Drain.
30. **Central/Nye Streets:** Separation and construction of feeder lines for eventual interception by the new Sawyer Brook trunk line. The project provided immediate relief of flooding within the roadway as well as low-lying yard areas.
34. **Ferry Lane Drainage Improvement Project:** Replace undersized culverts for drainage relief. This project will replace an existing deficient culvert with a new 36" culvert to eliminate flooding adjacent to Ferry Road.
35. **Irving Street Collection System Flood Proofing:** Elevate and flood proof pump station to avoid chronic flooding. The project would allow for continued operation of an integral part of the sewer system. When this pump station is flooded, several residences must be evacuated due to bacterial and fecal contamination. (The Superintendent of Wastewater Treatment Facility has recently released this work for construction bids.)

**Projects pending implementation include:**

5. **Foley Street and Goodale Avenue Storm Drain:** Construction of a storm drain to intercept natural drainage and convey it through the residential area of Foley and Goodale Avenue.
7. **Ocean Park Road:** Replace undersized drainage system to intercept and convey flow entering north of Ocean Park Road to a discharge point east of Norman Street. This project will utilize a combination of structural as well as natural channel drainage features to increase conveyance of this drainage system.
8. **Simpson Road at Stackpole Creek:** This project will involve stabilization of the channel and diversion of flow to reduce erosion and sedimentation at the culvert crossing which continually reduces conveyance capacity of the structure. Supplemental improvements to the culvert include rehabilitation of the granite masonry and inspection of the superstructure.
9. **Route 1 Channel Stabilization Project Near Mobil Mart:** Rip rap channel improvements opposite Mobil station. This project will formalize the channel geometry and stabilize the channel to convey discharge from Route 1.
11. **North Street Sanitary Sewer Relocation:** This project will relocate an existing interceptor from alongside the Sawyer Brook Channel to the public right of way. Relocation of the interceptor sewer will eliminate bacterial contamination which occurs when the sewer system is damaged due to erosion and discharges to the Brook.
22. **Sawyer Brook at Nye Street Culvert Crossing Project:** Replacement of undersized culvert on Sawyer Brook. This project would install a new culvert at the Sawyer Brook crossing to maintain adequate conveyance within the drainage system.
24. **B&M Box Culvert Crossing Replacement:** This project would install a new culvert at the Sawyer Brook crossing to maintain adequate conveyance within the drainage system.
31. **Cleveland Street and Summer Street:** Culvert enlargements and channel improvements. This project will mitigate surficial flooding by formalizing portions of the channel and increasing culvert sizes to correspond with desired channel conveyance capacity.
32. **Water Street Floodway Improvements:** Bank stabilization and protection from scour. This project will utilize an integrated system of sheet piles and cribworks to stabilize and contain floodwaters along Water Street.

***Silt fence and hay bales were utilized at the area of the trunk outfall to protect the Saco River from suspended solids and erosion. (Spring St. Trunk Storm Drain Project.)***



- 33. Ferry Road Storm Drain Outfall Project:** This project is intended to intercept overland flow along Ferry Road and provide a stable outlet to eliminate continued erosion of the roadway due to scour.
- 36. Union Street Relief Storm Drain:** This project is intended to alleviate neighborhood flooding and repetitive sinkhole repairs by installing a new storm drain conduit and filling the existing granite box to prevent further deterioration and damages.

Projects the City plans to implement over a longer term include significant work to abate combined sewer overflows. The City's adopted CSO master plan identifies and prioritizes 45 separate projects for implementation over 20 years. The City has a 20-year plan for mitigation. The detailed list of projects is identified in Chapter VIII of the CSO Master Plan.

**New projects the City of Saco proposes to implement include:**

- 37. Upgrade of Stockman Avenue Drainage System:** This project would alleviate localized flooding in residential areas caused by an inadequate conveyance system.
- 38. Bradley Street:** This cross-country project would improve channel conveyance capacity.
- 39. Completion of Sawyer Brook Trunk Drain:** The final phase of this project will complete the relocation of the lower reaches of Sawyer Brook from the urban core and reduce downstream flooding which has historically translated into upstream flooding due to lack of downstream conveyance capacity.
- 40. Wildwood Drive West Drainage Basin Cleanup:** This drainage basin cleanup project will clean up an existing drainage channel and reduce existing erosion problems.
- 41. Bayview Terrace at Oceanview Circle:** Storm drainage improvements to alleviate flooding of homes at the end of Oceanview Circle. Project borders the Rachel Carson Preserve.

Figure 5 following this page shows the geographic locations of these projects with a priority for future projects. Section VII provides cost estimates for the pending projects.

The detailed study of the Sawyer Brook watershed set forth a basic mitigation strategy which is generally applicable to areas of localized flooding.

Basic steps include:

- Conduct a detailed analysis of the area to identify problems indicating public contact and interviews
- Quantify the problem
- Evaluate alternatives
- Adopt a strategy or plan for corrective measures

Management options to reduce urbanized flooding were outlined in the Sawyer Brook plan as follows:

***“City codes and ordinances to help minimize loss of life and property damage from future floods, prevent degradation of the watershed’s environmental resources, and ensure orderly community growth in areas suitable for development. The City should use the data and recommendations in this report to reduce nuisance flooding problems; as a guide for implementing a flood plain management program for the watershed and the remainder of the City; and to complement the ongoing combined sewer overflow (CSO) abatement effort.***

***The City should review building permits for all proposed construction to ensure the building will be reasonably free from flooding and groundwater problems and does not encroach into the natural flood plain. It also should require that structures in flood-prone areas use construction materials and methods that will minimize flood damage.***

***Future development within the watershed should be carefully planned and controlled. Before considering any future site development activities, City planners, regulatory, and permitting officials; developers; and other interested individuals should evaluate available soil resource information by visiting the local SWCD office in Sanford.***

***The data generated by this study should be made available to local, state, and Federal agencies, planning groups, engineers, consultants, and others involved in community planning and the design of hydraulic structures, conduits, channels, roads, bridges, culverts, and other community facilities.***

***The City should consider amending its flood plain base maps to reflect the findings of this study. To inform the public of the extent of the existing flood hazard, the City should consider erecting flood warning signs or markers in flood-prone areas or to prominently post previous or predicted flood levels. The City should ensure that residents in flood-prone areas are aware that Federally subsidized flood insurance under the NFIP is available from most insurance agents.***

***The City should acquire and enforce conservation, scenic, or flood control restrictions or easements for floodway or flood hazard areas where little or no development is desirable. It should consider the use of land use restrictions or the purchase of future land rights to prevent development that is incompatible with public objectives, while allowing continued private ownership of the land. Permitted uses could be for wildlife habitat, low intensity recreation, and***

**woodland. Land use restrictions also should result in a lowering of the landowner's tax assessment.**

**The City could enhance the natural and recreational values of Sawyer Brook by adopting new, and enforcing existing, measures that would regulate development within the 100-year flood plain, and in other areas with known stormwater management and ground water problems. This could be done in conjunction with the preparation of an overall use plan that would set integrated objectives for such items as public access, historic sites, recreational areas, and the preservation of remaining undeveloped wetlands and other suitable wildlife habitat areas.**

**Considering the suitability of soils for potential uses, the undeveloped areas of the watershed are best suited for idle land, woodland, wetland plants, shallow water areas, wildlife, and non-intensive recreation. NRCS recommends that the City consider modification of its land use plan and zoning ordinances to allow for preservation of these areas and the watershed's small NWI wetlands while the opportunity to do so still exists. There do not appear to be opportunities for restoration of the natural values already lost in developed areas.**

**The City should consider acquisition of easements and enactment of ordinances to protect the natural remnants of Sawyer Brook. The brook is currently adequate for flow conveyance but is being used for deposition of brush, yard clippings, leaves, and other debris which could result in loss of capacity if it continues in the future. This debris also increases the opportunity for blockage of culvert inlets."**

Information and Education aspects of the plan were as follows:

**"Every property owner that reported water damage from hurricane 'Bob', lives near Sawyer Brook or the Saco River, lives where water tables are high, or lives where stormwater management measures are inadequate should be advised of the availability of publications that deal with flood areas, floodproofing, basement protection techniques, and cleanup after flooding. Single copies are free of charge.**

**Several structures in the Sawyer Brook watershed could derive benefit from floodproofing. Property owners should consult a qualified professional with floodproofing experience to help with selection of the most appropriate measure or combination of measures.**

**The City should consider sponsoring and participating in workshops and training on flood plain management topics, the NFIP, and floodproofing measures. Many activities are provided free of charge to local governments by the U.S. Army Corps of Engineers and the State Floodplain Management Coordinator's office."**

The city of Saco has used Project Impact to help initiate these management goals as follows:

- **Revising the Design Standard:** The City revised the design standard from the 25-year to the 50-year storm event. This will theoretically reduce hazard incidents by 50%.
- **Flood Management Program:** The City completed the preparation of a Stormwater Management Operation and Maintenance manual to guide all future development and to assign responsibilities for operation and maintenance.
- **City Building Codes/Methods:** The City has constructed a model home unit to demonstrate building practices which render a facility more disaster resistant.

- **Flooding Management:** The City adopted the flood plain mapping of the Sawyer Brook Study and is evaluating land use controls near key waterways. The updated comprehensive plan inventories natural resources and sets guidance for the City to protect the resources.
- **Floodproofing:** The City has implemented a program for flood mitigation grants to floodproof homes.

With respect to information and education, Project Impact has followed guidelines of the Sawyer Brook Study.

At this point, the mitigation measures are in place for adoption and the City has either completed or intends to complete studies which identify structural measures to reduce this hazard. The most significant structural measure has been the recently completed Sawyer Brook Drainage Study.

**D. Ice/Wind/Blizzard**

The impacts of ice and wind, as well as potential impact to property damage during blizzards, are affected by the loss of overhead power service and blocking of roadways by fallen trees.

The City of Saco and utility providers are working jointly to reduce the hazard by:

- Selection of tree types for landscaping which are less susceptible to blowdown and breakage during storm events. (Adopted; now in City Specifications.)
- Increased removal of limbs which can impact service lines.
- Considering the upgrade of regulations to increase the areas where underground utility services are required. (Pending.)

Property protection will be better afforded by the measures outlined above.

Public information has been disseminated through Project Impact. The public interest was heightened with the short time since the 1998 ice storm where over one-half million customers in the state lost power.

**E. Other Hazards**

The other hazards are a potential in the City. Mitigation measures involve the training of specialized personnel and an adequate public safety response team. The City of Saco works with these hazards. The City may want to selectively screen the EOP documents for inclusion as attachments to this report and include these in future updates.



***Not every day went well, but the Sawyer Brook project was completed on time and on budget.***

## **VII. SHORT-TERM RISK REDUCTION STRATEGIES**

The following summarizes the short-term risk reduction strategies for the City of Saco.

- Adoption of CSO Master Plan Study to abate CSO activity. (Completed.)
- Reducing the disaster potential by adopting a higher design standard (50-year versus 25-year storm). (Completed.)
- Implementing an operation/maintenance manual for stormwater management systems. (Completed.)
- Developing standard details and specifications for the installation of stormwater systems within the City of Saco. (Completed.)
- Public involvement/partnerships through Project Impact. (Remains active.)
- Initiation of the lower reach of the Sawyer Brook trunk drain. (Completed.)
- Adoption of recommendations of the Sawyer Brook study. (Completed.)
- Identification of other flood-prone areas and applying for state/federal assistance for hazard mitigation. (Ongoing.)
- Affording flood proof aid to increase disaster resistance.
- Increasing routine O&M of stormwater systems. (Ongoing.)
- Increasing the preparation of community shelters. (Ongoing.)
- Construction of a public display home to demonstrate better construction techniques.
- Evaluation of building codes for disaster resistance. (Ongoing.)
- Adopting a sewer overflow response plan. (Completed.)
- Participation and support for the Saco Bay Beach Management Plan. (Ongoing.)
- Florida Power and Light's preparation of emergency action plans for the Saco River. (Completed.)
- Assessment of public shelters for condition and needs to enhance disaster resistance. (Ongoing.)
- Revision to ordinances affecting plantings and trees near the overhead power sources. (Completed.)

## **VIII. LONG-TERM RISK REDUCTION STRATEGIES**

The following are included in the City of Saco's long-term risk reduction strategy:

- Completion of Sawyer Brook trunk drain and other structural projects to reduce localized flooding. (Ongoing.)

- Abatement of combined sewer overflows. (Ongoing.)
- Identification and mitigation of beach erosion sources. (Pending.)
- Beach nourishment. (Pending.)
- Increased flood proofing of homes and businesses along flood hazard sources. (Program in place.)
- Potential acquisition of chronic flood-prone property. (Pending.)
- Installation of flood hazard warning gauges at the Cataract Dam. (Pending.)
- Improving the structural disaster resistance and providing standby power for all emergency shelters. (Partially complete.)
- Adopting growth management strategies for trees near overhead utility services. (Ongoing.)

**IX. FISCAL IMPACT**

The fiscal impact of the City of Saco’s all hazard mitigation plan is estimated as follows:

**A. Initial Project Costs:**

Over the past 1½ years of Project Impact the City incurred costs in implementation and administering the program.

These costs were as follows:

Administration Funds – FEMA	\$50,000
Municipal Department of Public Works Other (Computer Maintenance – Staff – Supplies)	\$20,000

The City also retained DeLuca-Hoffman Associates, Inc. to prepare the all hazard mitigation plan, prepare the stormwater O & M plan, prepare standard details for stormwater and erosion control details, prepare standard stormwater specifications and participate in the Project Impact administration.

The City reviewed grants for portions of the initial project costs and following capital improvement/demonstration projects:

<b>Project</b>	<b>Grant Amount</b>	<b>City Share</b>
Model Home Construction and Education	\$25,000.00	\$8,625.00
Short and Long Term Risk Reduction Activities	\$45,000.00	\$14,985.00
Sawyer Brook Improvements	\$415,000	\$138,395.00
Camp Ellis at Riverside Ave. Drainage Improvements	\$15,000.00	\$4,995.00
<b>Total</b>	<b>\$500,000.00</b>	<b>\$167,000.00</b>

The above City costs are “one time” costs attendant with the implementation of the program and total \$667,000.00.

**B. On-Going Operation and Administrative Costs**

The City anticipates annual costs for managing the initiatives as follows:

Administration	\$22,500
Inter-Agency Coordination	\$ 2,500
Personnel Training	\$ 5,000

State/Federal Grant Applications	\$ 3,500
Annual Update of All Hazards Plan	\$ 1,500
<b>Total</b>	<b>\$35,000</b>

This cost does not include O & M of Stormwater Systems not currently maintained by the City.

**C. Capital Improvements**

Since inception through early 2001, the City of Saco has completed the following capital improvement projects:

	<b>P. I. Budget</b>
1. Grant Road at Boynton Brook	\$ 11,000
2. Cumberland Avenue at Bear Brook	\$ 12,000
3. Sheppard and Locke at Bear Brook	\$ 8,000
4. Maple Street	\$ 250,000
6. Roebuck Avenue/North Street at Sawyer Brook	\$ 101,152
10. Hobson Lane	\$ 15,000
12. Wharf Street Outfall	\$ 50,000
13. Jenkins Road at Goosefare Brook	\$ 25,000
14. Portland Road (US Route 1) at Cascade Brook	\$ 12,000
15. Portland Road (US Route 1) at Mill Brook	\$ 8,000
16. Storer/Water Street	\$ 23,550
17. Spring Street Trunk Storm Drain	\$2,700,000
18. Ross Road at Goosefare Brook	\$ 145,000
19. Moody Street	\$ 20,000
20. Wastewater Treatment Plant	\$1,146,000
21. Tappan Valley	\$ 45,000
23. Sawyer Brook at Park Street	\$ 93,750
25. Therrien Avenue Drainage System	\$ 66,000
26. Boothby Park Improvements	\$ 530,000
27. Riverside Avenue Improvements	\$ 20,000
28. Water Street to Main Street	\$ 196,121
29. Park Street	\$ 44,800
30. Central/Nye Streets	\$ 350,000
34. Ferry Lane Drainage Improvement Project	\$ 31,615
35. Irving Street Collection System Flood Proofing	\$ 27,000
<b>Total</b>	<b>\$5,930,988</b>

The Spring Street Trunk Drain was identified as a major requirement for CSO abatement. CSO abatement projects provide flood relief and water quality enhancement. The 1.6 million dollar James Street separation/infrastructure project eliminated all overflows from the Hobson Lane overflow. Further information on CSO abatement activity is described in the City's national-award-winning CSO Abatement Plan.

The following long-term mitigation measures remain a part of the community's capital improvement projects for flood mitigation as follows:

1. Drainage:

5. Foley Street and Goodale Avenue Storm Drain	\$ 82,320
7. Ocean Park Road	\$ 150,000

8. Simpson Road at Stackpole Creek	\$ 80,000
9. Route 1 Near Mobil Mart	\$ 12,210
11. North to Spring Cross Country Sewer	\$ 300,700
22. Sawyer Brook at Nye Street	\$ 111,675
24. Sawyer Brook at Railroad	\$ 263,000
31. Cleveland Street and Hill Street	\$ 80,000
32. Water Street Floodway Improvements	\$ 238,850
33. Ferry Road Storm Drain Outfall Project	\$ 32,775
36. Union Street Relief Storm Drain	\$ 34,810
37. Upgrade of Stockman Avenue Drainage System	\$ 300,000
38. Bradley/Lincoln	\$ 175,000
39. Completion of Sawyer Brook Trunk Drain	\$ 60,000
40. Wildwood Drive West Drainage Basin Cleanup	\$ 10,000
41. Bayview Terrace at Oceanview Circle	\$ 200,000
<b>Total</b>	<b>\$2,131,340</b>

These costs exclude other City initiatives such as the implementation of the CSO abatement plan.

2. Camp Ellis:

The potential capital expressed at Camp Ellis cannot be quantified at this time. Forty thousand dollars has been appropriated for Saco's participation in the Saco Bay Management Program. This program will require considerable planning prior to implementation.

Non-Federal Sponsorship is the most significant outstanding issue. While both the State of Maine and City of Saco have expressed a strong interest in implementing a solution to the problem at Camp Ellis, neither has agreed to act as the cost-sharing partner for the Feasibility Phase. Approval to proceed with the feasibility study depends on timely approval and execution of the Feasibility Cost-Sharing Agreement with a Sponsor and timely completion and approval of the Project Management Plan – Feasibility Phase.

The cost of the feasibility phase of the Camp Ellis project is currently estimated at \$600,000. The total project cost is estimated at \$3,500,000.

3. Disaster Resistance/Standby Power and Structural Improvements at Emergency Shelters

In the City's continued effort to become a more disaster-resistant community, structural improvements are in progress and have been completed at local schools, especially ones that have structural deficiencies and serve as emergency shelters.

Saco Middle School Emergency Generator (In Progress)	\$180,000
6 K Burns School Emergency Generator	\$230,000
Improve Structural Capacity of Roof of Saco Middle School/Emergency Shelter (Work Done)	\$195,000

These costs are based upon the Oak Point Associates report on file at the Public Works Department. The structural improvements at the school have been completed.

4. Tree Trimming to Protect Utility Lines \$ 42,000

**D. Summary**

New initiatives brought forth through Project Impact were projected to have the following costs:

Project Initiative (One time cost)	\$ 70,000
Sawyer Brook Improvements, Model Home, and Preparation of All Hazards Plan	\$ 500,000
Annual Administrative Costs	\$ 35,000
Long-Term Capital Improvements	\$2,131,340

The City of Saco has been actively implementing the goals of Project Impact as demonstrated above.

These costs exclude any attempts to quantify the potential hazard mitigation cost for Camp Ellis and projects included in the City's adopted CSO Master Plan, or cost for the City if added O & M of stormwater system is born by the City. The costs are intended to be offset by reduced damages from future flooding and natural disasters.

A financial report is to be provided by the City and will be incorporated in this report as Appendix C.

**X. CLOSURE**

This report is the 2001 update and will be available to stakeholders in Project Impact. The report will be updated on a frequent basis to continue to make the City more disaster resistant. The City is proposing a community impact mitigation team of key Project Impact partners be retained for this update. The all hazards mitigation plan is consistent with the City Comprehensive Plan (Section 17-10, subparagraph 25).

## **Appendix A**

### **Hazard Assessment**

## **Appendix B**

### **Florida Power and Light Proposal for Training, Exercising, Updating, and Posting the Emergency Action Plan for the Skelton Dam, Saco River**

**Appendix C**

**Financial Report**

**Appendix D**

**Project Impact Partners List**

## **Appendix E**

### **Individual Project Summaries**