Greater Ketchikan Area

Multi-Jurisdictional Hazard Mitigation Plan

Creek Street, Ketchikan, Alaska 2008

Prepared for the :

Ketchikan Gateway Borough, Alaska
City of Ketchikan, Alaska
City of Saxman, Alaska

By:

WHPacific

Bechtol Planning and Development

Acknowledgements

Greater Ketchikan Area Local Emergency Planning Committee
Ketchikan Borough
City of Ketchikan
City of Saxman
Ketchikan Fire Department
No. Tongass Fire Department
So. Tongass Fire Department
Alaska State Troopers
Ketchikan Indian Community
Division of Public Health
Ketchikan General Hospital
SEAPRO
Ketchikan Police Department

Ketchikan Gateway Borough
Ketchikan Gateway Borough Mayor
Dave Kiffer
Assembly
Jim Shoemaker
Janine Gibbons
Mike Salazar
Mike Painter
John Harrington
Glen Thompson
Todd Phillips

Borough Planning Commission
David Deal
William Rotecki
Richard Madden
Gregg Poppen
Mary Wanzer
Diane Naab

Borough Staff
Mark Jaqua
344 Front Street
Ketchikan, AK 99901
Phone: (907) 228-6625
Fax: (907) 247-6684
Email:
mjaqua@borough.ketchikan.ak.us
Web:
http://www.borough.ketchikan.ak.us

City of Ketchikan

Mayor, Bob Weinstein
Vice-Mayor, Marty West
Samuel Bergeron
Richard Coose
Charles Freeman
Jason Harris
KJ Harris
Lew Williams III

Ketchikan City Staff:
Karl Amylon, City Manager/KPU General Manager
334 Front Street
Ketchikan, AK 99901
Phone: (907) 228-5603
Fax: (907) 225-5075
karla@city.ketchikan.ak.us

Jim Hill, Fire Chief, KFD
319 Main Street
Ketchikan, AK 99901
(907) 225-5940 (O)
(907) 617-1291 (Cell)
Email: jimh@city.ketchikan.ak.us
City Website:
http://www.city.ketchikan.ak.us

City Council of Saxman
Dan Williams – Mayor
Richard Makua – Vice-Mayor
Joseph Williams
Tempa Major
Woodrow Watson
Gilbert Benge
Charles Denny

Staff
City Administrator Kelly Ludwig-Johnson
Route 2, Box 1 –Saxman
Ketchikan, AK 99901
Phone: (907) 225-4166
Fax: (907) 225-6450
E-Mail: Cityadmin@kpunet.net

Contractors
WHPacific
Suzanne Taylor, Project Manager
300 West 31st Avenue
Anchorage, Alaska 99503
Phone: (800) 478-4153 or (907) 339-6500
Email: staylor@whpacific.com

Bechtol Planning and Development
Eileen R. Bechtol, AICP
P.O. Box 3426
Homer, Alaska 99603
Phone: (907) 399-1624
Email: bechtol@pobox.xyz.net

Technical Assistance
Mark Roberts, Alaska State DHS&EM
Ervin Petty, Alaska State DHS&EM

Photography
Suzanne Taylor, Eileen Bechtol

The preparation of this plan was financed by funds from a grant from the Alaska State Division of Homeland Security and the Federal Emergency Management Agency.

Table of Contents

List of Maps

List of Tables

List of Figures

Acronyms

AAC Alaska Administrative Code

AEIC	Alaska Earthquake Information Center
AEIS	Alaska Economic Information System
BCA	Benefit- Cost Analysis
BCR	Benefit-Cost Review
BFE	Base Flood Elevation (100 year flood)
BIA	Bureau of Indian Affairs
BLM	Bureau of Land Management
CFR	Code of Federal Regulations
CMP	Coastal Management Plan
COK	City of Ketchikan
COS	City of Saxman
DCCED	(Alaska) Department of Commerce, Community and Economic Development
DCRA	(DCCED) Division of Community and Regional Affairs
DEC	(Alaska) Department of Environmental Conservation
DHS&EM	(Alaska) Division of Homeland Security and Emergency Management
DGGS	(Alaska) Division of Geological and Geophysical Surveys
DNR	(Alaska) Department of Natural Resource
DOT&PF	(Alaska) Department of Transportation & Public Facilities
EOC	Emergency Operations Center
EOP	Emergency Operations Plan
FDIC	Federal Deposit Insurance Corporation
FEMA	Federal Emergency Management Agency
FHLBB	Federal Home Loan Bank Board
FIRM	Flood Insurance Rate Maps
GKA	Greater Ketchikan Area
HMP	Hazard Mitigation Plan
HMPG	Hazard Mitigation Planning Grant
KGB	Ketchikan Gateway Borough
MHMP	Multi-Hazard Mitigation Plan
MSL	Mean Sea Level
NFIP	National Flood Insurance Program
NOAA	National Oceanographic and Atmospheric Administration
NWS	National Weather Service
PDM	Pre Disaster Mitigation (Grant Program)
UAF	University of Alaska, Fairbanks
USCOE	United States Army Corps of Engineers
USGS	U.S. Geological Survey
WCATWC	West Coast and Alaska Tsunami W

Resolution

Adoption of the Greater Ketchikan Area
Multi-Hazard Mitigation Plan

Whereas, the Greater Ketchikan Area includes the Ketchikan Gateway Borough, City of Ketchikan, and the City of Saxman; and,

Whereas, the Greater Ketchikan Area recognizes the threat that local natural hazards pose to people and property; and

Whereas, undertaking hazard mitigation projects before disasters occur will reduce the potential for harm to people and property and save taxpayer dollars; and

Whereas, an adopted Multi-Hazard Mitigation Plan is required as a condition of future grant funding for mitigation projects; and

Whereas, the Greater Ketchikan Area Multi-Hazard Mitigation Plan has been sent to the Alaska Division of Homeland Security and Emergency Management and the Federal Emergency Management Agency for their review and preapproval;

Now, therefore, be it resolved, that the Greater Ketchikan Area hereby adopts the Greater Ketchikan Area Multi-Hazard Mitigation Plan as an official plan; and

Be it further resolved, that the Greater Ketchikan Area will submit the adopted Multi-Hazard Mitigation Plan to the Alaska Division of Homeland Security and Emergency Management and the Federal Emergency Management Agency officials for final official approval.

_____ _____
Mayor, City of Ketchikan Date

_____
Mayor, Ketchikan Gateway Borough

_____
Mayor, City of Saxman

Chapter 1. GKA Planning Process and Methodology

Introduction

A Multi-Jurisdictional Multi-Hazard Mitigation Plan (MHMP) is a plan jointly prepared by more than one jurisdiction. This plan is called the Greater Ketchikan Area MHMP and includes the Ketchikan Gateway Borough, and within the Borough the communities of the City of Ketchikan and the City of Saxman.

The acronyms for the jurisdictions in the plan are as follows:

GKA = Greater Ketchikan Area – includes the Borough and the Cities
KGB = Ketchikan Gateway Borough (same boundaries as the GKA)
COK = City of Ketchikan
COS = City of Saxman

Hazard mitigation is any sustained action taken to reduce or eliminate the long-term risk to human life and property from hazards. Mitigation activities may be implemented prior to, during, or after an incident. However, it has been demonstrated that hazard mitigation is most effective when based on an inclusive, comprehensive, long-term plan that is developed before a disaster occurs. (FEMA 386-8)

Multi-Mitigation Plan regulations are found in the Code of Federal Regulations (CFR) at 44 CFR Part 201. This plan has been developed using the regulations to ensure compliance with federal criteria.

Federal regulations specify that local mitigation plans be designed to help jurisdictions identify specific actions to reduce loss of life and property from natural hazards. It is not intended to help jurisdictions establish procedure to respond to disasters or write an emergency operations plan. The goal of mitigation is to decrease the need for response as opposed to increasing response capability. (FEMA 386-8)

The benefits of choosing to prepare a multi-jurisdictional plan are that the process will:

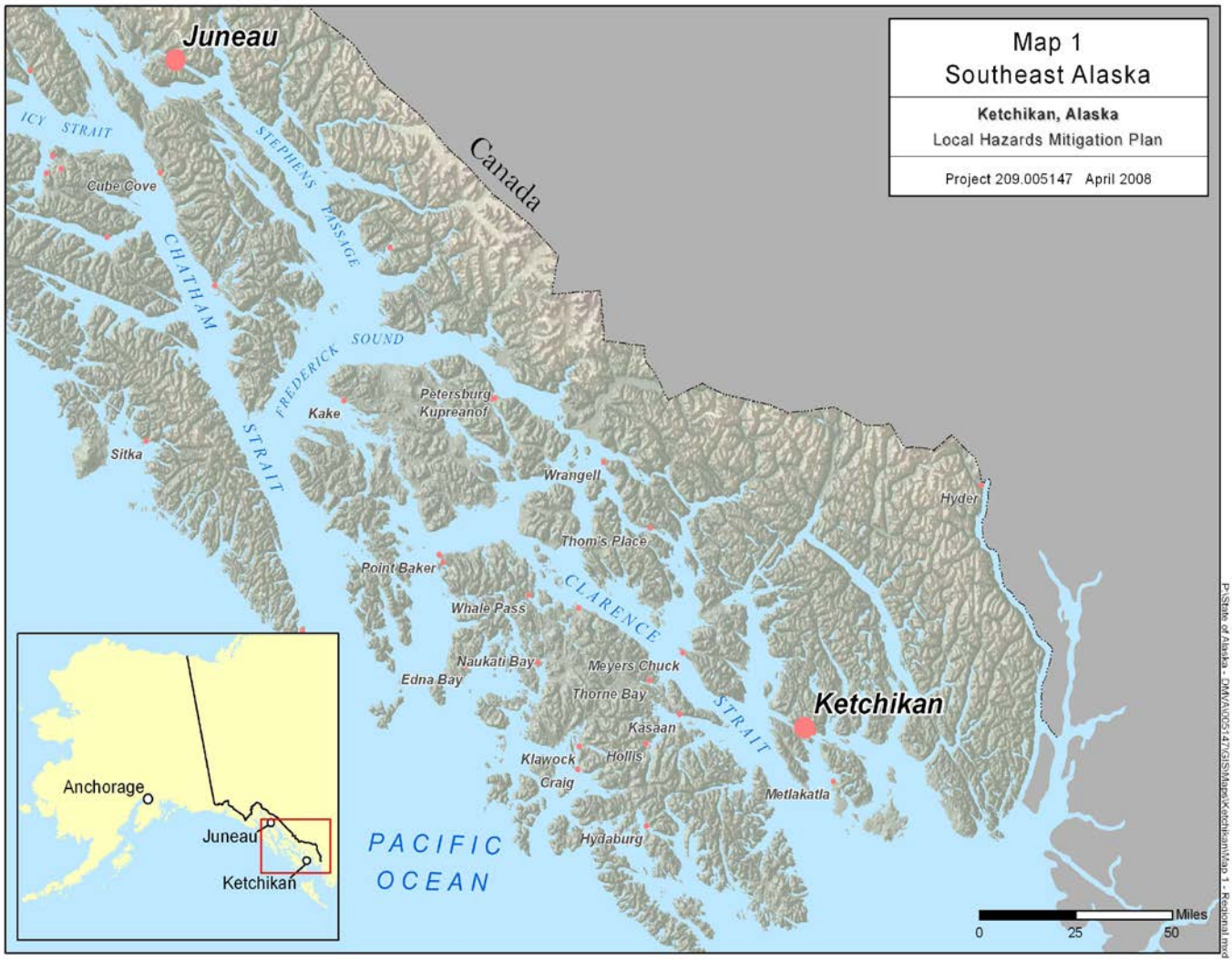
- Enable comprehensive approaches to mitigation of hazards that affect multiple jurisdictions:
- Allows economics of scale by:
  - Leveraging individual capabilities; and
  - Sharing costs and resources
- Avoid duplication of efforts; and
- Imposes an external discipline on the process.

The Ketchikan Gateway Borough is a 2nd Class Borough, incorporated in 1963. Within the Borough are two jurisdictions, Ketchikan and Saxman. The City of Ketchikan is a Home Rule City incorporated in 1900. The City of Saxman is a 2nd Class City incorporated in 1929.

The scope of this plan is natural hazards: ***flooding, earthquake, tsunami, and severe weather***. Some of the mitigation projects for the natural hazards would also mitigate impacts from other manmade hazards, such as technological and economic hazards.

The Greater Ketchikan Area (GKA) MHMP includes information to assist the borough and city governments and residents with planning to avoid potential future disaster losses. The plan provides risk assessment information on natural hazards that affect the GKA, descriptions of past disasters, and lists projects that may help the community prevent disaster losses. The plan was developed to help the communities regarding natural hazards that affect area.

Map 1. Greater Ketchikan Area



Organization of the GKA Multi-Hazard Mitigation Plan

The GKA MHMP is organized in parts. The first part of the plan includes items that are common to the entire Greater Ketchikan Area. The second part contains annexes for the incorporated cities within the GKA, which are Ketchikan and Saxman.

The annexes contain specific information on the incorporated cities including a description (history, economy, etc.) specific geographic hazards and risks, if any, and specific actions.

Project Staff and Plan Development

The Ketchikan Local Emergency Planning Committee (LEPC) was the lead public body in developing the GKA MHMP. Ketchikan Borough Planner Mark Jaqua, City of Ketchikan Fire Chief Jim Hill and City of Saxman Administrator Kelly Ludwig-Johnson were lead staff for the plan.

The Ketchikan Local Emergency Planning Committee reviewed drafts of the plan at public meetings.

WHPacific and Bechtol Planning & Development were hired by the state to write the plan with coordination and assistance from the GKA. Mark Roberts and Ervin Petty of the Division of Homeland Security & Emergency Management (DHS&EM) provided technical assistance and reviewed the drafts of this plan.

Plan Research

The plan was developed utilizing existing Ketchikan Gateway Borough and City plans and studies as well as outside information and research. The following list contains the most significant of the plans, studies and websites that were used in preparing this document.

1. *Alaska All-Hazard Risk Mitigation Plan*. Prepared by and for DHS&EM. October 2007.

2. *Disaster Cost Index*. Prepared by DHS&EM. October 2007

3. *Division of Community and Regional Affairs (DCRA) Community Information*: http://www.commerce.state.ak.us/dca/commdb/CF_BOCK.htm.

4. *Emergency Action Plan for the Ketchikan Lakes Hydroelectric Project, Ketchikan Lakes Dam*. Prepared by the Ketchikan Public Utilities. December 2004

5. *Emergency Operations Plan.* Greater Ketchikan Area. Prepared by and for the Greater Ketchikan Area. March 2007.

6. *Environmental Appendix, Ketchikan International Airport*. Prepared by USKH, Inc. for the State of Alaska DOT&PF. 2002.

7. *FEMA How to Guides:*
   - Getting Started: Building Support For Mitigation Planning (FEMA 386-1)
   - Local Multi-Hazard Mitigation Planning Guidance, July 1, 2008 (FEMA 386-87
   - Understanding Your Risks: Identifying Hazards And Estimating Losses (FEMA 386-2)
   - Developing The Mitigation Plan: Identifying Mitigation Actions And Implementing Strategies (FEMA 386-3)
   - Bringing the Plan to Life: Implementing the Hazard Mitigation Plan (FEMA 386-4)
   - Using Benefit-Cost Review in Mitigation Planning (FEMA 386-5)
   - Multi-Jurisdictional Mitigation Planning August 2008(FEMA 386-8)

8. *Ketchikan 2020 Draft Scoping Summary Report.* Prepared by HDR, Inc. for the Ketchikan Gateway Borough, 2000.

9. *Ketchikan 1996 Adopted Comprehensive Plan Issues & Strategies*. Prepared for and by the Ketchikan Gateway Borough, 1996.

10. *Ketchikan Coastal Management Plan Final Plan Update.* Prepared by LaRoche+Associates, for the Ketchikan Gateway Borough's Coastal Management District, 2007.

11. *Ketchikan City Website: http://www.city.ketchikan.ak.us*

12. *Ketchikan Gateway Borough Website*: http://www.borough.ketchikan.ak.us

13. *Tsunami Hazard Mapping of Alaska Coastal Communities*, Alaska GEO Survey News, Vol. 6, No. 2, Prepared by DGGS, June 2002.

14. *University of Alaska, Fairbanks, and Alaska Earthquake Information Center* website at: http://www.giseis.alaska.edu/Seis/

15. USGS Earthquake Probability Mapping: www//eqint.cr.usgs.gov

16. West Coast and Alaska Tsunami Warning Center, NOAA, http://wcatwc.arh.noaa.gov/

General Hazard Planning Web Sites

American Planning Association:	http://www.planning.org
Association of State Floodplain Managers:	http://www.floods.org
Developing the Implementation Strategy:	www.pro.gov.uk
Federal Emergency Management Agency:	http://www.fema.gov/fima/planning.shtm
Community Rating System:	http://www.fema.gov/nfip/crs.htm

Flood Mitigation Assistance Program:	http://www.fema.gov/fima/planfma.shtm
Hazard Mitigation Grant Program:	http://www.fema.gov/fima/hmgp
Individual Assistance Programs:	http://www.fema.gov/rrr/inassist.shtm
Interim Final Rule:	http://www.access.gpo.govl
National Flood Insurance Program:	http://www.fema.gov/nfip
Public Assistance Program:	http://www.fema.gov/rrr/pa

Public Involvement

During drafting of the plan, the Borough Planning Commission was briefed on the plan process at their regularly held meeting on May 13th, 2008. Another meeting was held at the Ketchikan Fire Hall which included representatives of the Ketchikan Gateway Borough, City of Ketchikan, City of Saxman, and the LEPC.

A copy of the draft Plan was available for public perusal during the drafting of the plan at the Ketchikan Gateway Borough Planning Department, City of Ketchikan, City of Saxman. The plan will be put online on the Borough website during the approval process.

The Ketchikan LEPC was the lead public body that reviewed drafts of the plan. The LEPC is made up of representatives from community organizations and public agencies as depicted on the figure at right.

Figure 1. LEPC Members

Ketchikan LEPC
City of Ketchikan
Ketchikan Gateway Borough
No. Tongass Fire Department
So. Tongass Fire Department
Alaska State Troopers
Ketchikan Indian Community
Division of Public Health
Ketchikan General Hospital
SEAPRO
City of Saxman
Ketchikan Police Department

The Appendix includes a community newsletter that was sent to governmental agencies, community members and businesses using usual public noticing procedures for the Borough and the Cities, including email and posting around the community.

The Appendix also includes a copy of a Power Point presentation that was given at a regularly noticed public meeting of the Borough Planning Commission.

All comments and revisions received by the LEPC, governmental staff, businesses, community members and other interested parties were incorporated into the plan.

Implementation

The Borough Assembly, Ketchikan City Council and Saxman City Council will be responsible for adopting the Greater Ketchikan Area MHMP and all future updates or changes. These governing bodies have the authority to promote sound public policy regarding hazards. The Borough Planning Commission performs planning functions for the Borough and the cities. The GKA MHMP will be assimilated into other Borough and

City plans and documents as they come up for review according to each plan's review schedule.

Table 1. Greater Ketchikan Area Plans

Document	Completed	Next Review
Ketchikan Gateway Borough Comprehensive Plan	1996	Updated Comp Plan To be completed in 2009
Ketchikan 2020 Scoping Summary Report	Draft	On-going
Ketchikan Gateway Borough Legislative Priorities	Annually	Annually
Greater Ketchikan Area Emergency Operations Plan	2007	As needed
Ketchikan Gateway Borough Transportation Plan	2008	Updated Comp Plan To be completed in 2009
Ketchikan Downtown Transportation Plan	2008	Updated Comp Plan To be completed in 2009
Ketchikan Gateway Borough Airport Terminal Master Plan	2002	As needed
Ketchikan Gateway Borough Coastal Management Plan	2007	2012
Gravina Island Plan	2005	Combined with Ketchikan 2020

Monitoring, Evaluating and Updating the Plan

Section §201.6(c)(4)(i) of the mitigation planning regulation requires that 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.

Monitoring the Plan

The Ketchikan Gateway Borough Manager, Ketchikan City Manager and Saxman City Manager or their designees are responsible for monitoring the plan. On an annual basis the Administrations will seek a report from the agencies and departments responsible for implementing the mitigation projects in Chapter 4 of the plan. The compiled report will be provided to the Borough and City Councils as information and noticed to the public. A report outlining all five years of the plan monitoring will be included in the plan update.

Evaluating the Plan

The Ketchikan Gateway Borough Manager, Ketchikan City Manager and Saxman City Manager or their designees will evaluate the plan during the five-year cycle of the plan.

On an annual basis, concurrent with the report above the evaluation should assess, among other things, whether:

- The goals and objectives address current and expected conditions.
- The nature, magnitude and/or types of risks have changed.
- The current resources are appropriate for implementing the mitigation projects in Chapter 4.
- There are implementation problems, such as technical, political, legal or coordination issues with other agencies.
- The outcomes have occurred as expected (a demonstration of progress).
- The agencies and other partners participated as originally proposed.

Updating the Plan

The mitigation planning regulations at §201.6(d)(3) direct the update of Mitigation Plans.

Plans must be updated and resubmitted to FEMA for approval every five years in order to continue eligibility for FEMA hazard mitigation assistance programs. Plan updates must demonstrate that progress has been made in the past five years to fulfill commitments outlined in the previously approved plan. This involves a comprehensive review and update of each section of the plan and a discussion of the results of evaluation and monitoring activities described above. Plan updates may validate the information in the previously approved plan or may involve a major plan rewrite. A plan update may not be an annex to this plan; it must stand on its own as a complete and current plan.

Figure 2 outlines a proposed schedule for the plan update to start the following tasks before the end of the five-year cycle as depicted on the figure below.

Figure 2. Mitigation Planning Cycle

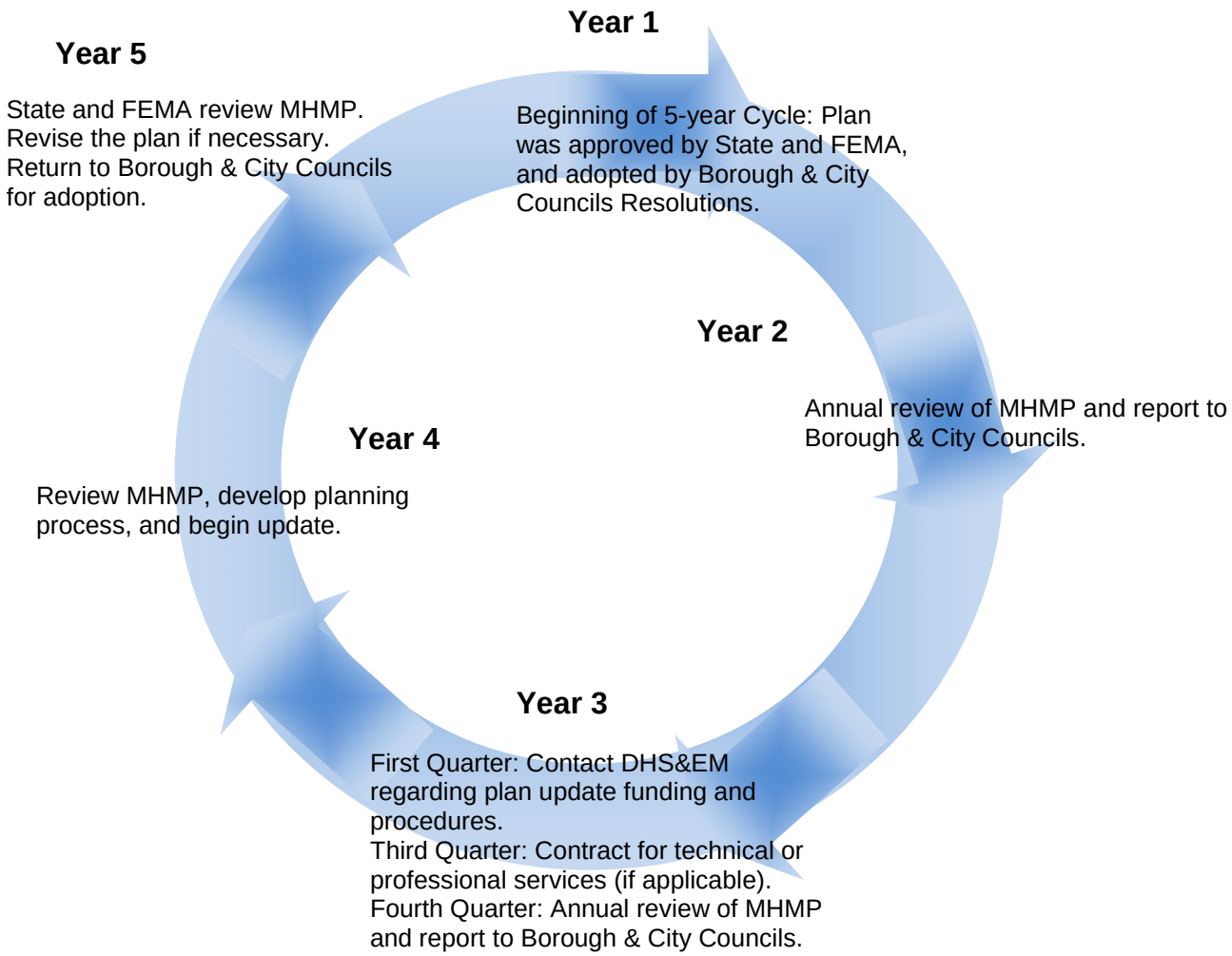


Table 2 lists the schedule for completion of these tasks, provided that funds are available to do so:

Table 2. Continued Plan Development

Hazard	Status	Hazard Identification Completion Date	Vulnerability Assessment Completion Date
Floods	Completed	2009	2009
Severe Weather	Completed	2009	2009
Earthquake	Completed	2009	2009
Tsunami	Completed	2009	2009
Snow Avalanche	Future Addition	2009	2014
Ground Failure	Future Addition	2009	2014
Economic	Future Addition	2014	2014
Technological	Future Addition	2014	2014
Public Health Crisis	Future Addition	2014	2014

Continued Public Involvement

The following methods will be used for continued public involvement.

A copy of the MHMP will be put online at the borough website:
http://www.borough.ketchikan.ak.us/

Places where the hazard plan will be kept:

- Borough Planning Department
- Fire Departments
- Public Works Departments
- GKA Clerk's Offices
- Libraries
- City Halls

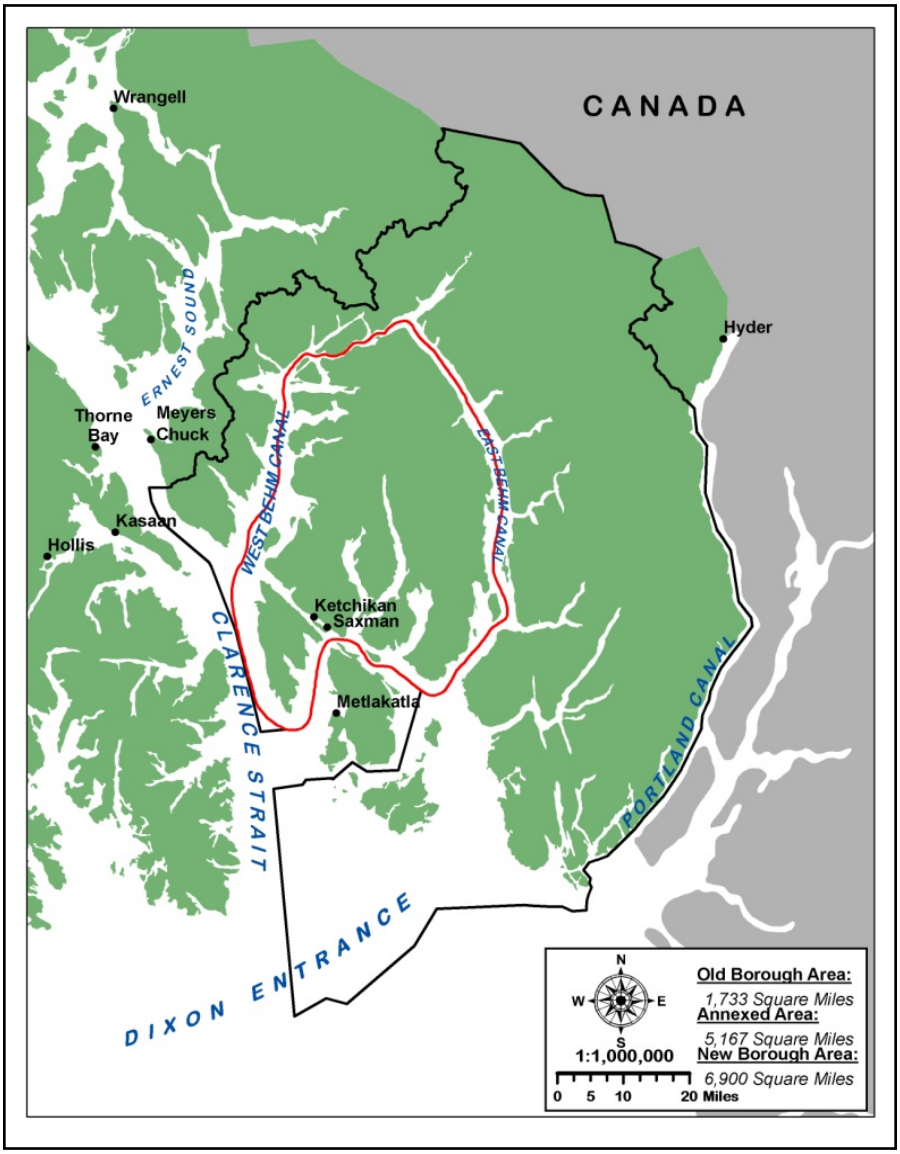
On an annual basis the LEPC will review the plan, which will be advertised to the public using the same method established under the public involvement section of this plan. The public will be involved in the process described in the above section on Monitoring, Evaluating and Updating the Plan.

Chapter 2. GKA Community Profile and Capability Assessment

GKA Community Profile

Location

Figure 3. Greater Ketchikan Area



The Greater Ketchikan Area, which includes the Borough, and within it, the cities, is located on the Southeast Panhandle near the State's southern border.

The Borough consists of Revillagigedo Island, Gravina and Pennock Islands, along with numerous smaller islands. Most of the Borough's land lies within the Tongass National Forest. It lies at approximately 55.333330° north latitude and -131.63330° west longitude. The borough encompasses 6,900 square miles of land and 520.8 square miles of water. The area is located in the Ketchikan Recording District.

Government

The Ketchikan Gateway Borough is the largest regional local Government entity in Southern Southeast Alaska. As a borough it is responsible for public school education, regional land-use planning and regulation, and property assessment and collection of taxes for both the borough Government and any cities within the Borough.

The Ketchikan Gateway Borough has also adopted areawide economic development powers and areawide Parks and Recreation powers. It operates the airport and bus

system for the community. It operates the community recreation Center and community aquatic facilities.

The Ketchikan Gateway Borough also provides services to some of its residents through service areas or exercise of powers in areas outside of cities. These services include library services, sanitary sewer permitting and septic pumping; sewer treatment in some locations; fire and emergency medical service in two service areas; road maintenance in three service areas; and public water service in one service area.

The Borough has been very active in recent years working on a long list of projects designed to meet the service needs of its residents. These include: remodeling of the junior high school; construction of a new elementary school; repairs to the aquatic facility; construction of a roadway serving the airport; construction of new water and sewer lines extending south of the city of Ketchikan; construction of a sludge treatment facility; upgrading and remodeling of the Ketchikan international Airport terminal; upgrading and remodeling of facilities at the Ward Cove industrial park to accommodate new tenants and new enterprises; construction of new restrooms at local sports fields; and assisting with the construction of a second ship lift at the Ketchikan shipyard. (KGB website at http://www.borough.ketchikan.ak.us)

Table 3. GKA Community Information

Community Information	**Contact Information**
Ketchikan Gateway Borough	Ketchikan Gateway Borough Mayor Dave Kiffer 344 Front Street Ketchikan, AK 99901 Phone: (907) 228-6625 Fax: (907) 247-6625 Email: boro_clerk@brorugh.ketchikan.ak.us Web: http://www.borough.ketchikan.ak.us
City of Ketchikan	City of Ketchikan Bob Weinstein, Mayor 334 Front Street Ketchikan, AK 99901 Phone: (907) 225-3111 Fax: (907) 225-5075 Email: mayor@city.ketchikan.ak.us Web: http://www.city.ketchikan.ak.us
City of Saxman	City of Saxman Dan Williams, Mayor Route 2, Box 1 –Saxman Ketchikan, AK 99901 Phone: (907) 225-4166 Fax: (907) 225-6450 E-Mail: Cityadmin@kpunet.net
Community Information	**Contact Information**
	Ketchikan Indian Corporation

Community Information	Contact Information
Ketchikan Village Council	Samuel Bergeron, President 2960 Tongass Avenue Ketchikan, AK 99901 Phone: (907) 225-5158 Fax: (907) 247-5158 Email: Media@kictribe.org Web: http://www.kictribe.org BIA-Recognized IRA Council
Saxman Village Council	Organized Village of Saxman (IRA) Joe Williams, President Route 2, Box 2-Saxman Ketchikan, AK 99901 **Phone:** 907-247-2502 | **Fax:** 907-247-2504 **Email:** saxmanira@kpunet.net BIA-Recognized IRA Council
Regional Native Corporation	Sealaska Corporation 1 Sealaska Plaza, Suite 400 Juneau, AK 99801 Phone: (907) 586-1512 Fax: (907) 586-2304 Web: http://www.sealaska.com
School District	Ketchikan Gateway Schools 333 Schoenbar Rd Ketchikan, AK 99901 Phone: (907) 225-2118 Fax: (907) 247-3820 Email: Boyler@kgbsd.org Web: http://www.kgbsd.org
Electric Utility	Ketchikan Public Utilities 2930 Tongass Avenue Ketchikan, AK 99901 Phone: (907) 228-5447

History

Tlingits from both the Tongass and Cape Fox clans have fished the Ketchikan Creek for centuries. The creek was traditionally known as “kitschk-hin,” meaning creek of the “thundering wings of an eagle.” In 1885, Mike Martin bought 160 acres of land from Chief Kyan. This land later became the Ketchikan Town site.

The first cannery was established the next year in 1886; by 1912, four additional canneries were opened. In 1892, a post office was established and the city was incorporated in 1900. During this time Ketchikan became a center in the gold and copper mining supply route. Ketchikan continued to boom due to the abundant natural resources.

Ketchikan Spruce Mills opened in 1903, processing lumber for boxes to pack the 1.5 million cases of salmon being produced by the seven canneries operating in Ketchikan. World War II spurred the need for spruce lumber; Ketchikan became a supply center for

area logging. A pulp mill was constructed at Ward Cove in 1954. The mill had a 50-year contract with the U.S. Forest Service; however, the contract was cancelled and the mill closed in March of 1997.

The largest collection of totem poles in the world is located in the Greater Ketchikan Area. Most of Ketchikan's Alaska Native residents are Tlingit.

Population

According to the 2000 U.S. Census, nearly 23 percent of Ketchikan's residents are Alaska Native. There are a total of 3,645 housing units in Ketchikan. 3,297 of these units are occupied, 65 are vacant due to seasonal use and 448 units are vacant year-round.

Economy

Ketchikan Gateway Borough's economy depends upon the area's natural resources. Tourism, fishing, fish processing and timber compose the base of the economy. A total 401 borough residents hold commercial fishing permits. Nearly 700,000 tourists visit the borough annually supplying a seasonal boost to the economy. The Borough sales tax is 2.5 percent. The borough's total potential work force is 10,567 residents. A total of 7,191 residents are employed and 2,795 adult residents are not in the labor force (not seeking work). The Borough has a unemployment rate of 7.6 percent. The per capita income is $23,994 and the median household income is $51,344. Approximately 6.5 percent of Borough residents live below the poverty line.

Transportation

A State-owned paved, lighted 7,500' long by 150' wide asphalt runway is located on Gravina Island, a 10-minute ferry ride. Regular jet services provide daily transportation in and out of Ketchikan. The Tongass Highway is approximately 30 miles long and crosses through the Borough. Ketchikan is a regional transportation hub. There are four float plane landing facilities, a deep draft dock, five small boat harbors, a dry dock and ship repair yard, boat launch and a State ferry terminal.

Climate

The Ketchikan Gateway Borough is located in a maritime climate zone. The Borough experiences warm winters, cool summers, and heavy precipitation. Average summer temperatures range from 46°F to 59°F; winter temperatures range from 29° to 48°F.

Vegetation and Soils

The Borough's temperate rain forests, alpine tundra, salt marshes, freshwater wetlands, rocky intertidal zones and water bodies are home to over 900 plant species. Tree species such as western hemlock-Ketchikan spruce, red cedar, Alaska or yellow cedar,

mountain hemlock, red alder, Sitka alder and lodgepole are common throughout the Borough. Cabbage, red elderberry, salal, devil's club, rustyleaf, menziesia, ferns, mosses, lichens and a variety of berries characterize the forest understory. Grasses and sedges are common along the coastline.

Wildlife

Terrestrial mammals such as Sitka black-tailed deer, black bear, wolf, mink, beaver, and river otters are common throughout the borough. Ketchikan Gateway Borough provides a variety of nesting and feeding habitats for the more than 300 bird species that visit the area and 160 species that nest in the region.

The fresh and marine waters support approximately 300 species of fish in about 65 families. All species of salmon along with steelhead trout, rainbow trout, cod, rockfish, sculpin, skate, sablefish, pacific herring, west behm herring, pacific halibut and many more a found throughout the Borough. Marine mammals are abundant in the coastal area sounding the Borough. Humpback whales, killer whales, and pacific white-sided dolphins are commonly observed. Dall porpoise, mink whale and harbor porpoise also travel through the area. Grey whales are sometimes observed near Vallenar Point and. Steller sea lions and harbor seals also migrate through the area. (*DCRA Community Information*: at http://www.commerce.state.ak.us/dca/commdb/CF_BOCK.htm.)

GKA Capability Assessment

Local Resources

The resources available in the GKA are summarized in Tables 4, 5 and 6.

The Ketchikan Gateway Borough is responsible for planning and zoning functions in the GKA.

Table 4. Regulatory Tools

Regulatory Tools (ordinances, codes, plans)	**KGB**	**COK**	**COS**
Building code	No	Yes	No
Zoning ordinance	Yes	No	Master Plan in Process
Subdivision ordinance or regulations	Yes	No	Master Plan in Process
Special purpose ordinances (floodplain management, stormwater management, hillside or steep slope ordinances, wildfire ordinances, hazard setback requirements)	Yes	No	No

Regulatory Tools (ordinances, codes, plans)	KGB	COK	COS
Growth management ordinances (also called “smart growth” or anti-sprawl programs)	No	No	No
Site plan review requirements	Yes	Yes	Yes
Comprehensive plan	Yes	No	Master Plan in Process
A capital improvements plan	Yes	Yes	Yes
An economic development plan	Yes	No	Master Plan in Process
An emergency response plan	Yes	Yes	Yes
A post-disaster recovery plan	No	No	No
Real estate disclosure requirements	No	No	No

Table 5. Administrative and Technical Capability

Staff/Personnel Resources	KGB	COK	COS
City Manager	Yes	Yes	Yes (Administrator)
Borough or City Clerk	Yes	Yes	Yes
Fire Chief	Yes	Yes	Yes
Planner	Yes	No	No
Public Works Director	Yes	Yes	Yes
Public Safety Director	No	Yes	No
Librarian	No	Yes	No
Volunteer Fire Department	Yes	Yes	Yes
Engineer(s) or professional(s) trained in construction practices related to buildings and/or infrastructure	No	Yes	No
Planners or Engineer(s) with an understanding of natural and/or human-caused hazards	Yes	Yes	No
Floodplain manager	Yes	No	No
Surveyors	No	No	No
Staff with education or expertise to assess the community’s vulnerability	Yes	Yes	No

Staff/Personnel Resources	KGB	COK	COS
to hazards			
Personnel skilled in GIS and/or HAZUS	Yes	No	No

Table 6. Fiscal Capability

Financial Resources	KGB	COK	COS
Community Development Block Grants (CDBG)	Yes	Yes	No
Capital improvements project funding	Yes	Yes	Yes
Authority to levy taxes for specific purposes	No	Yes	Yes
Fees for water and sewer	Yes	Yes	Yes
Impact fees for homebuyers or developers for new developments/homes	No	No	No
Incur debt through general obligation bonds	Yes	Yes	No
Incur debt through special tax and revenue bonds	Yes	Yes	No
Incur debt through private activity bonds	Yes	No	No
Withhold spending in hazard-prone areas	No	No	No

State Resources

- **Alaska DHS&EM** is responsible for coordinating all aspects of emergency management for the State of Alaska. Public education is one of its identified main categories for mitigation efforts. Improving hazard mitigation technical assistance for local governments is another high priority list item for the State of Alaska. Providing hazard mitigation training, current hazard information, and the facilitation of communication with other agencies would encourage local hazard mitigation efforts. DHS&EM provides resources for mitigation planning on their *Website* at http://www.ak-prepared.com.

- **DCCED DCRA** Provides training and technical assistance on all aspects of the National Flood Insurance Program and flood mitigation.

Other state resources include:

- **Division of Senior Services:** Provides special outreach services for seniors, including food, shelter and clothing.

- **Division of Insurance:** Provides assistance in obtaining copies of policies and provides information regarding filing claims.

- **Department of Military and Veterans Affairs:** Provides damage appraisals and settlements for VA-insured homes, and assists with filing of survivor benefits.

Federal Resources

The federal government requires local governments to have a hazard mitigation plan in place to be eligible for funding opportunities through FEMA such as the Pre-Disaster Mitigation Assistance Program and the Hazard Mitigation Grant Program. The Mitigation Technical Assistance Programs available to local governments are also a valuable resource. FEMA may also provide temporary housing assistance through rental assistance, mobile homes, furniture rental, mortgage assistance, and emergency home repairs. The Disaster Preparedness Improvement Grant also promotes educational opportunities with respect to hazard awareness and mitigation.

FEMA, through its Emergency Management Institute, offers training in many aspects of emergency management, including hazard mitigation. FEMA has also developed a large number of documents that address implementing hazard mitigation at the local level. Five key resource documents are available from FEMA Publication Warehouse (1-800-480-2520) and are briefly described below:

- **How-to Guides.** FEMA has developed a series of how-to guides to assist states, communities, and tribes in enhancing their hazard mitigation planning capabilities. The first four guides mirror the four major phases of hazard mitigation planning used in the development of the Multi-Hazard Mitigation Plan. The last five how-to guides address special topics that arise in hazard mitigation planning such as conducting cost-benefit analysis and preparing multi-jurisdictional plans. The use of worksheets, checklists, and tables make these guides a practical source of guidance to address all stages of the hazard mitigation planning process. They also include special tips on meeting Disaster Mitigation Act (DMA) 2000 requirements (http://www.fema.gov/fima/planhowto.shtm).

- **Post-Disaster Hazard Mitigation Planning Guidance for State and Local Governments.** FEMA DAP-12, September 1990. This handbook explains the basic concepts of hazard mitigation and shows state and local governments how they can develop and achieve mitigation goals within the context of FEMA's post-disaster hazard mitigation planning requirements. The handbook focuses on approaches to mitigation, with an emphasis on multi-objective planning.

- **Mitigation Resources for Success CD.** FEMA 372, September 2001. This CD contains a wealth of information about mitigation and is useful for state and local government planners and other stakeholders in the mitigation process. It provides mitigation case studies, success stories, information about Federal mitigation programs, suggestions for mitigation measures to homes and businesses, appropriate relevant mitigation publications, and contact information.

- **A Guide to Federal Aid in Disasters.** FEMA 262, April 1995. When disasters exceed the capabilities of state and local governments, the President's disaster assistance program (administered by FEMA) is the primary source of federal assistance. This handbook discusses the procedures and process for obtaining this assistance, and provides a brief overview of each program.

- **The Emergency Management Guide for Business and Industry.** FEMA 141, October 1993. This guide provides a systematic approach to emergency management planning, response, and recovery. It also details a planning process that businesses can follow to better prepare for a wide range of hazards and emergency events. This effort can enhance a business's ability to recover from financial losses, loss of market share, damages to equipment, and product or business interruptions. This guide could be of great assistance to businesses.

Other federal resources include:

- **Department of Agriculture.** Assistance provided includes: Emergency Conservation Program, Non-Insured Assistance, Emergency Watershed Protection, Rural Housing Service, Rural Utilities Service, and Rural Business and Cooperative Service.

- **Department of Energy, Office of Energy Efficiency and Renewable Energy, Weatherization Assistance Program.** This program minimizes the adverse effects of high energy costs on low-income, elderly, and handicapped citizens through client education activities and weatherization services such as an all-around safety check of major energy systems, including heating system modifications and insulation checks.

- **Department of Housing and Urban Development, Office of Homes and Communities, Section 108 Loan Guarantee Programs.** This program provides loan guarantees as security for federal loans for acquisition, rehabilitation, relocation, clearance, site preparation, special economic development activities, and construction of certain public facilities and housing.

- **Department of Housing and Urban Development, Community Development Block Grants.** Administered by Alaska Department of Commerce, Community and Economic Development (DCCED) DCRA. Provides grant assistance and technical assistance to aid communities in planning activities that address issues detrimental to the health and safety of local residents, such as housing rehabilitation, public services, community facilities, and infrastructure improvements that would primarily benefit low- and moderate-income persons.

- **Department of Labor, Employment and Training Administration, Disaster Unemployment Assistance.** Provides weekly unemployment subsistence grants for those who become unemployed because of a major disaster or emergency. Applicants must have exhausted all benefits for which they would normally be eligible.

- **Federal Financial Institutions.** Member banks of FDIC, FRS or FHLBB may be permitted to waive early withdrawal penalties for Certificates of Deposit and Individual Retirement Accounts.

- **Internal Revenue Service, Tax Relief.** Provides extensions to current year's tax return, allows deductions for disaster losses, and allows amendment of previous tax returns to reflect loss back to three years.

- **United States Small Business Administration.** May provide low-interest disaster loans to individuals and businesses that have suffered a loss due to a disaster. Requests for SBA loan assistance should be submitted to the Alaska Division of Homeland Security and Emergency Management.

Other resources: The following are *Website*s that provide focused access to valuable planning resources for communities interested in sustainable development activities.

- **Federal Emergency Management Agency,** http://www.fema.gov – includes links to information, resources, and grants that communities can use in planning and implementation of sustainable measures.

- **American Planning Association,** http://www.planning.org – a non-profit professional association that serves as a resource for planners, elected officials, and citizens concerned with planning and growth initiatives.

- **Institute for Business and Home Safety,** http://ibhs.org – an initiative of the insurance industry to reduce deaths, injuries, property damage, economic losses, and human suffering caused by natural disasters. Online resources provide information on natural hazards, community land use, and ways citizens can protect their property from damage.

Other Funding Sources and Resources

- **Real Estate Business.** State law for properties within flood plains requires real estate disclosure.

- **American Red Cross.** Provides for the critical needs of individuals such as food, clothing, shelter, and supplemental medical needs. Provides recovery needs such as furniture, home repair, home purchasing, essential tools, and some bill payment may be provided.

- **Crisis Counseling Program.** Provides grants to State and City mental health departments, which in turn provide training for screening, diagnosing and counseling techniques. Also provides funds for counseling, outreach, and consultation for those affected by disaster.

Chapter 3. GKA Risk Assessment

Section 1. Requirements

> Section 201.6(c)(2) of the mitigation planning regulation requires local jurisdictions to provide sufficient hazard and risk information from which to identify and prioritize appropriate mitigation actions to reduce losses from identified hazards. (FEMA 386-8)

The goal of mitigation is to reduce the future impacts of a hazard including loss of life, property damage, and disruption to local and regional economies, environmental damage and disruption, and the amount of public and private funds spent to assist with recovery.

Mitigation efforts begin with a comprehensive risk assessment. A risk assessment measures the potential loss from a disaster event caused by an existing hazard by evaluating the vulnerability of buildings, infrastructure, and people. It identifies the characteristics and potential consequences of hazards and their impact on community assets.

Federal Requirements for Risk Assessment

Federal regulations for hazard mitigation plans outlined in 44 CFR Section §201.6(c)(2) include a requirement for a risk assessment. This risk assessment requirement is intended to provide information that will help the community identify and prioritize mitigation activities that will prevent or reduce losses from the identified hazards. The federal criteria for risk assessments and information on how the GKA MHMP meets those criteria are outlined in Table 7.

Table 7. Risk Assessment - Federal Requirements

Section §201.6(c)(2) Requirement	**GKA Multi-Jurisdictional Hazard Mitigation Plan Where it is Addressed in Plan**
Identifying Hazards §201.6(c)(2)(i) The risk assessment *shall* include a description of the type . . . of all natural hazards that can affect the jurisdiction . . .	 Chapter 4, identifies flood, earthquake, tsunami, severe weather as natural hazards in GKA.

Section §201.6(c)(2) Requirement	GKA Multi-Jurisdictional Hazard Mitigation Plan Where it is Addressed in Plan
Profiling Hazards §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.	Chapter 4, Risk Assessment, includes hazard-specific sections in the GKA. The MHMP profiles the natural hazards that may affect the area. The Plan includes **location, extent, probability, and impact** for each natural hazard identified. The MHMP also provides hazard specific information on **previous occurrences** of hazards events.
Assessing Vulnerability: Overview §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.	Chapter 3, Assessing Vulnerabilities contains overall summaries of each hazard and the impacts on the community are contained in each hazard specific section in Chapter 4.
Assessing Vulnerability: Addressing Repetitive Loss Properties §201.6(c)(2)(ii) The risk assessment in all plans approved after October 1, 2008 must also address National Flood Insurance Program (NFIP) insured structures that have been repetitively damaged floods.	There are no repetitively damaged structures in the GKA. Chapter 4, Section 1, requirement in more detail.
Assessing Vulnerability: Identifying Structures §201.6(c)(2)(ii)(A) The plan *should* describe vulnerability in terms of the types and number of existing and future buildings, infrastructure, and critical facilities located in the identified hazard areas.	Chapter Three, Section 3, identifies structures located in the hazard areas.
Assessing Vulnerability: Estimating Potential Losses §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.	Chapter 3, Section 3, estimates potential dollar lasses to critical facilities.

Vulnerability Assessment Methodology

The goal of mitigation is to reduce the future impacts of a hazard including loss of life, property damage, and disruption to local and regional economies, environmental damage and disruption, and the amount of public and private funds spent to assist with recovery.

Mitigation efforts begin with a comprehensive risk assessment. A risk assessment measures the potential loss from a disaster event caused by an existing hazard by evaluating the vulnerability of people, buildings, and infrastructure. It identifies the characteristics and potential consequences of hazards and their impact on community assets.

A risk assessment typically consists of three components; hazards identification, vulnerability assessment and risk analysis.

1. ***Hazards Identification*** - The first step in conducting a risk assessment is to identify, profile hazards, and their possible effects on the jurisdiction. This information can be found in Chapter 3: Hazards.

2. ***Vulnerability Assessment*** – Step two is to identify the jurisdiction's vulnerability; the people, infrastructure and property that are likely to be affected. It includes everyone who enters the jurisdiction including employees, commuters, shoppers, tourists, and others.

Populations with special needs such as children, the elderly, and the disabled should be considered; as should facilities such as the hospital, health clinic, senior housing and schools because of their additional vulnerability to hazards.

Inventorying the jurisdiction's assets to determine the number of buildings, their value, and population in hazard areas can also help determine vulnerability. A jurisdiction with many high-value buildings in a high-hazard zone will be extremely vulnerable to financial devastation brought on by a disaster event.

Identifying hazard prone critical facilities is vital because they are necessary during response and recovery phases.

Critical facilities include:

- Essential facilities, which are necessary for the health and welfare of an area and are essential during response to a disaster, including hospitals, fire stations, police stations, and other emergency facilities;

- Transportation systems such as highways, airways and waterways;

- Utilities, water treatment plants, communications systems, power facilities;

- High potential loss facilities such as bulk fuel storage facilities; and
- Hazardous materials sites.
- Other items to identify critical facilities include economic elements, areas that require special considerations, historic, cultural and natural resource areas and other jurisdiction-determined important facilities.

3. ***Risk Analysis*** – The third step is to calculate the potential losses to determine which hazard will have the greatest impact on the jurisdiction. Hazards should be considered in terms of their frequency of occurrence and potential impact on the jurisdiction. For instance, a possible hazard may pose a devastating impact on a community but have an extremely low likelihood of occurrence. Such a hazard must take lower priority than a hazard with only moderate impact but a very high likelihood of occurrence.

For example, there might be several schools exposed to one hazard but one school may be exposed to four different hazards. A multi-hazard approach will identify such high-risk areas and indicate where mitigation efforts should be concentrated.

The purpose of a vulnerability assessment is to identify the assets of a community that are susceptible to damage should a hazard incident occur.

Facilities are designated in the plan as critical if they are: (1) vulnerable due to the type of occupant (children, disabled or elderly for example); (2) critical to the community's ability to function (roads, power generation facilities, water treatment facilities, etc.); (3) have a historic value to the community (museum, cemetery); or (4) critical to the community in the event of a hazard occurring (emergency shelter, etc.).

This hazard plan includes an inventory of critical facilities from the records and land use map.

The description of each of the identified hazards includes a narrative and in some cases a map of the following information:

- The **location** or geographical area(s) of the hazard in the community.

- The **extent** (i.e. magnitude or severity) of potential hazard events, based on the criteria listed in Table 8,

Table 8 was used to rank the extent of each hazard. Sources of information to determine the extent include the *State of Alaska All-Hazard Mitigation Plan*, historical or previous occurrences and other outside sources.

Table 8. Extent of Hazard Ranking

Magnitude/Severity	Criteria to Determine Extent
Catastrophic	Multiple deaths Complete shutdown of facilities for 30 or more days More than 50% of property severely damaged
Critical	Injuries and/or illnesses result in permanent disability Complete shutdown of critical facilities for at least 2 weeks More than 25% 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% 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 more Less than 10% of property is severely damaged

- The **impact** of each hazard to the community.

- The **probability** of the likelihood that the hazard event would occur in an area.

Table 9, taken from the *State of Alaska All-Hazard Mitigation Plan* categorizes the probability of a hazard occurring. Sources of information to determine the probability for each specific hazard include the *State Hazard Mitigation Plan*, historical or previous occurrences and information from the location of the hazard.

Table 9. Probability Criteria Table

Probability	Criteria Used to Determine Probability
Low	Hazard is present with a low probability of occurrence within the next ten years. Event has up to 1 in 10 year's chance of occurring.
Moderate	Hazard is present with a moderate probability of occurrence within the next three years. Event has up to 1 in 3 year's chance of occurring.
High	Hazard is present with a high probability of occurrence within the calendar year. Event has up to 1 in 1 year chance of occurring.

- **Previous occurrences** of hazard events.

The previous occurrences of natural events are described for identified natural hazards. The information was obtained from the *State of Alaska All-Hazard Plan*, *State Disaster Cost Index*, City records, other state and federal agency reports, newspaper articles, web searches.

Section 2. Identifying Hazards

This section identifies and describes the hazards likely to affect the GKA. The following sources were used to identify the hazards present in community: the *Alaska State Hazard Mitigation Plan, 2007*, Borough and Cities' ordinances and reports, *GKA Emergency Operations Plan*, 2007, and previous occurrences of events.

Matrices - Alaska State Hazard Mitigation Plan, 2007

Tables 10 and 11 were developed by the State of Alaska and are from the *Alaska State Hazard Mitigation Plan, 2007*.

Table 10. Hazard and Vulnerability Matrix

Greater Ketchikan Area					
Flood	**Wildland Fire**	**Earthquake**	**Volcano**	**Snow Avalanche**	**Tsunami & Seiche**
Y	Y-L	Y	U	Y-L	Y-M
Severe Weather	**Ground Failure**	**Erosion**			
Y	Y	N			

Y = Hazard is present in jurisdiction but probability unknown

Y – L = Hazard is present with a low probability of occurrence within the next ten years. Event has up to 1 in 10 year's chance of occurring.

Y – M = Hazard is present with a moderate probability of occurrence with the next three years. Event has up to 1 in 3 year's chance of occurring.

Y – H = Hazard is present with a high probability of occurrence within the calendar year. Event has up to 1 in 1 year chance of occurring.

N = Hazard is not present

U = Unknown if the hazard occurs in the jurisdiction

Source: Alaska State Hazard Mitigation Plan, 2007

Table 11. Previous Occurrence of Hazards 1978 to Present

Greater Ketchikan Area					
Flood	**Wildland Fire**	**Earthquake**	**Volcano**	**Avalanche**	**Tsunami & Seiche**
0	0	0	0	0	0
Severe Weather	**Ground Failure**	**Erosion**			
0	0	0			

Source: Alaska State Hazard Mitigation Plan, 2007

Identification of Natural Hazards Profiled in GKA MHMP

Based on consultation with the GKA, Tables 10 and 11 from the *Alaska State Hazard Mitigation Plan, 2007*, GKA plans and reports, interviews and newspaper articles, GKA identified the following hazards to be profiled in this plan. The GKA may consider profiling snow avalanche and ground failure in future additions.

Table 12. Hazards Identification and Decision to Profile

Hazard	Yes/No	Decision to Profile Hazard
Flood	Yes	Participates in NFIP, has had limited damage in the past.
Wildland Fire	No	The soil conditions and heavy rainfall combine to make wildland fire hazard unlikely.
Earthquake	Yes	GKA is located near the Queen Charlotte – Fairweather System
Volcano	No	The Alaska Volcano Observatory identifies the closest active volcano to GKA at being over 400 miles away.
Snow Avalanche	No	Not a risk in the GKA populated areas, may be appropriate for a future addition.
Tsunami	Yes	Designated as a moderate hazard in *State of Alaska Hazard Mitigation Plan, 2007*.
Severe Weather	Yes	Heavy rainfall and high winds combine to produce a high risk.

Hazard	Yes/No	Decision to Profile Hazard
Ground Failure	No	Not a risk in the GKA populated areas, may be appropriate in a future addition.
Erosion	No	The State DHS&EM does not list erosion as a hazard.

The following table identifies where the natural hazards are located by jurisdiction.

Table 13. Hazard Identification by Jurisdiction

Natural Hazards Profiles	KGB	COK	COS
Flood	√	√	No
Earthquake	√	√	√
Tsunami	√	√	√
Severe Weather	√	√	√

Key
√ = Affects the jurisdiction

Please see Chapter 4, Section 5, Hazards not Profiled in GKA for more information on the hazards not profiled in the plan.

Section 3. Assessing Vulnerability

Overall Summary of Vulnerability to Each Hazard

Table 14 includes an overall summary description of the GKA vulnerability to each hazard.

Definitions for the designations are:

NA= Not applicable; not a hazard to the community,

L= Low risk; little damage potential, minor damage to less than 5% of the jurisdiction,

M= Medium risk; moderate damage potential, causing partial damage to 5-10% of the jurisdiction, infrequent occurrence, and

H= High risk; significant risk/major damage potential, destructive damage to more than 10% of the jurisdiction.

Table 14. Overall Summary of Vulnerability by Jurisdiction

Natural Hazards Identified	GKA	COK	COS
Flood	L	L	N/A
Earthquake	M	M	M
Tsunami	M	M	M
Severe Weather	M	M	M

Maps and Tables Depicting Facilities in Hazard Zones

The following maps and tables describe vulnerability in terms of the types and numbers of existing critical infrastructure and buildings located in the identified hazard areas.

The vulnerability overview section is a summary of GKA's vulnerability to the above-identified hazards. The summary includes, by type of hazard, the types of structures, infrastructures and critical facilities affected by the hazards.

The following maps and tables illustrate critical facilities and their vulnerability to natural hazards in GKA.

1. Map 2. Critical Infrastructure - Ketchikan

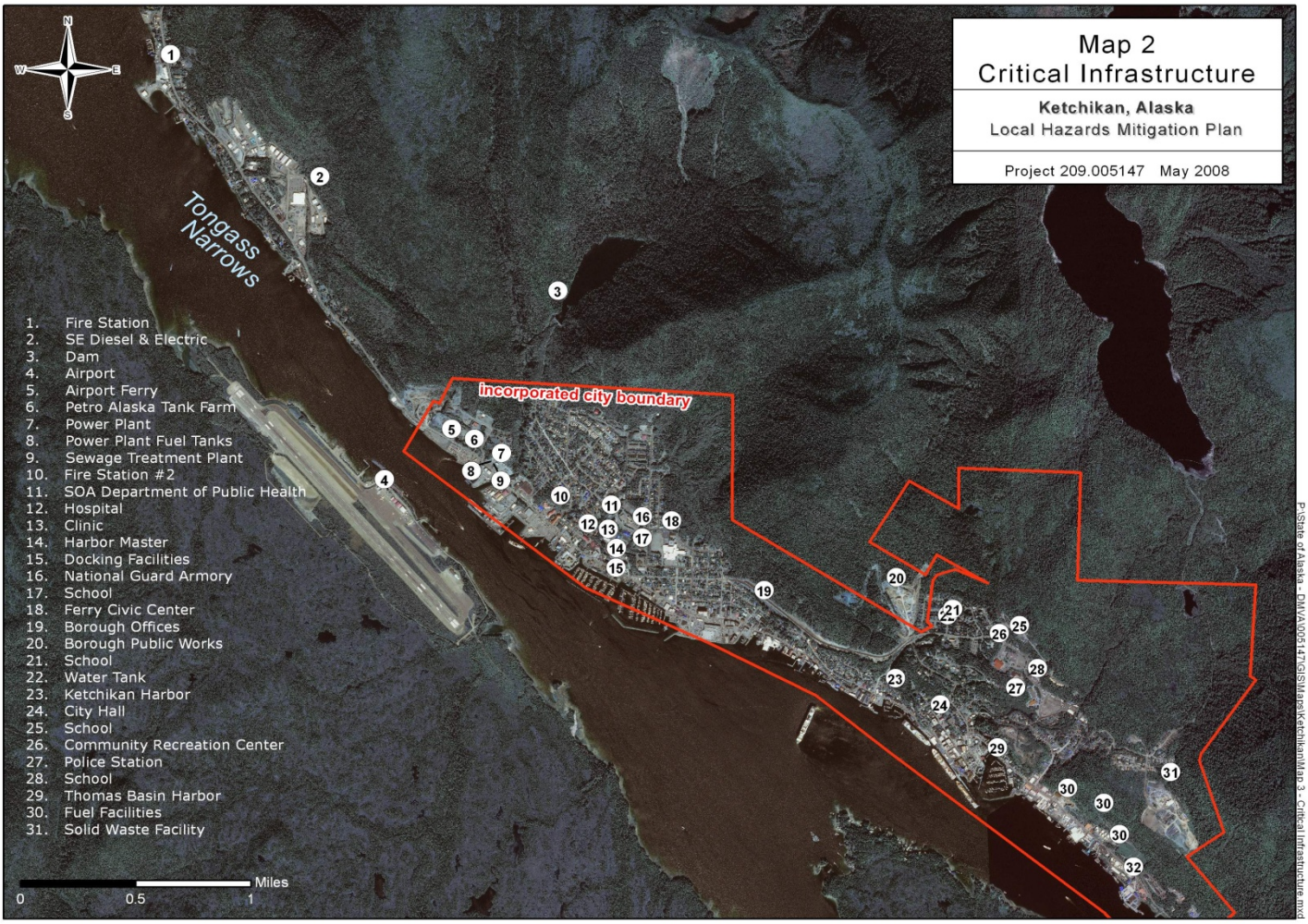
2. Map 3. Critical Infrastructure - Saxman

3. Map 4. Regional Infrastructure

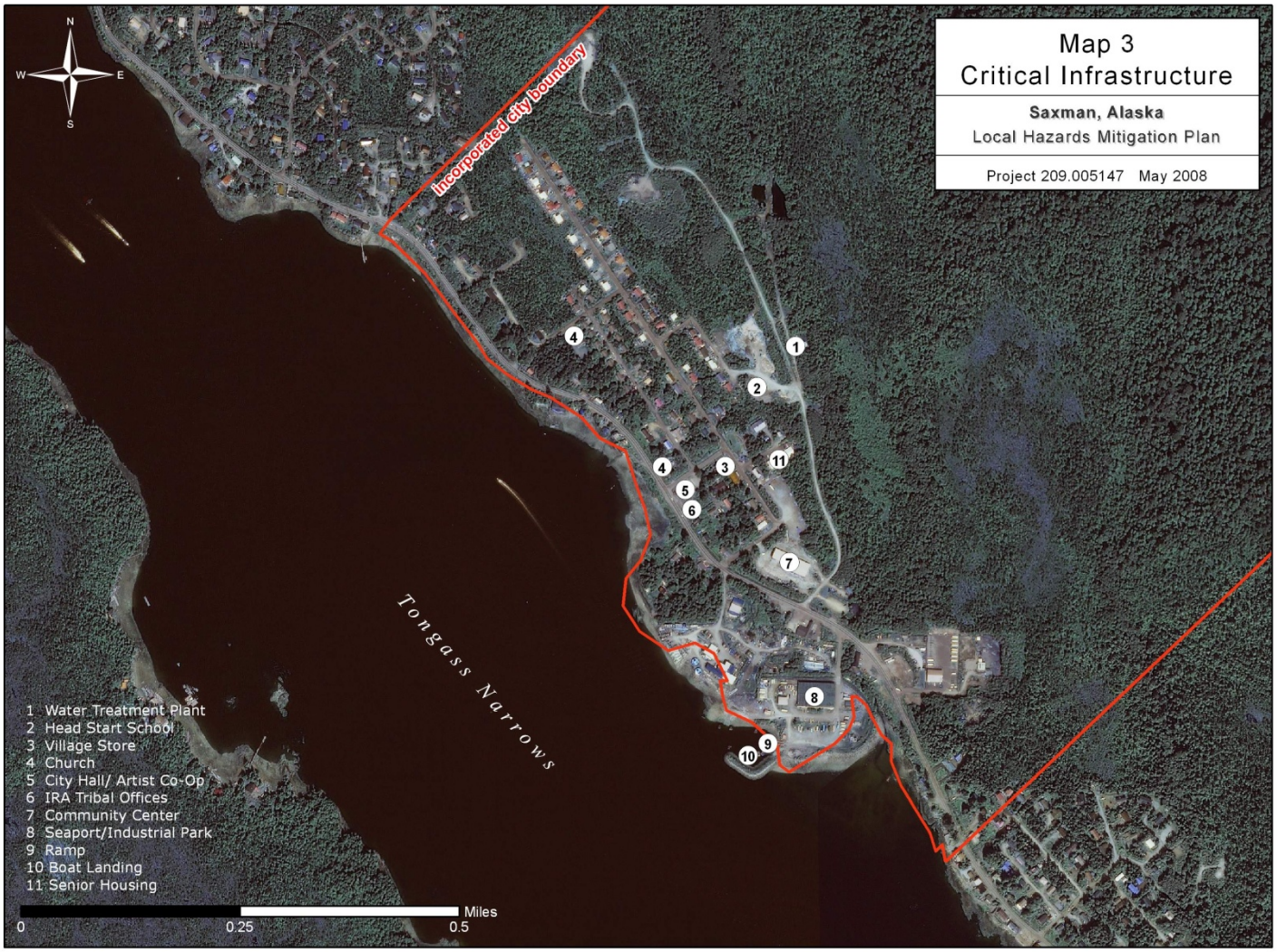
3. Table 15. Hazard Assets Matrix

4. Table 16. Potential Dollar Losses of Municipal Structures

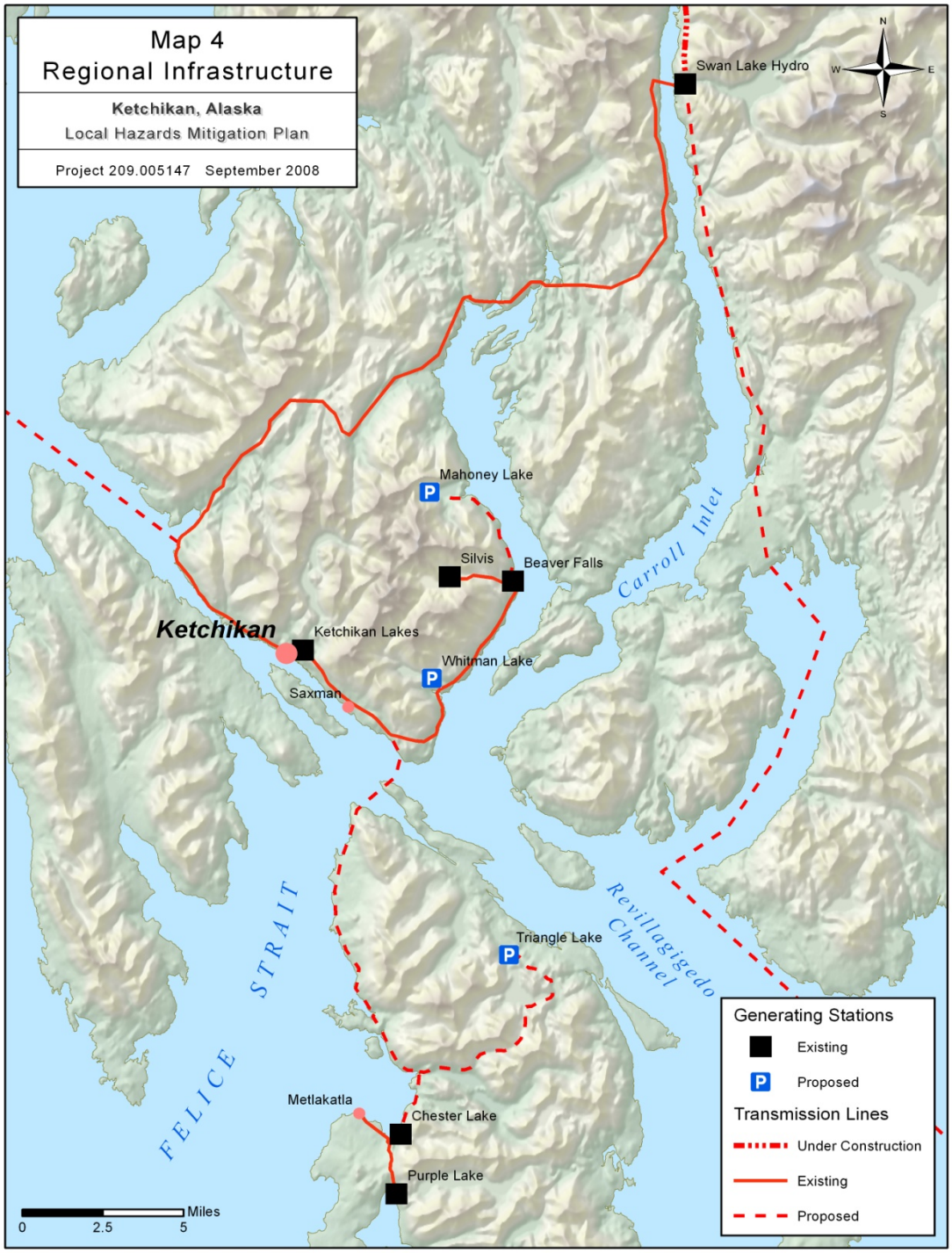
Map 2. Critical Infrastructure - Ketchikan



Map 3. Critical Infrastructure - Saxman



Map 4. Regional Infrastructure



Hazard Asset Matrix

The following numbered facilities, businesses and infrastructure are shown on Map 2, Critical Infrastructure – Ketchikan, and Map 3 – Critical Infrastructure – Saxman, and their vulnerability to identified natural hazards and whether, based on its location, each asset has a low, moderate or high vulnerability to specific natural hazards.

Table 15. Hazard Asset Matrix

Infrastructure/Structures	Location	Flood*	Equake**	Weather**	Tsunami***
Map 4. Regional Infrastructure					
Generating Stations	GKA COK COS	L	M	M	
Transmission Lines	GKA COK COS	L	M	M	
Map 2. GKA & City of Ketchikan Critical Infrastructure					
1. Fire Station	GKA		M	M	
2. SE Diesel & Electric	GKA		M	M	
3. Dam	GKA		M	M	
4. Airport	GKA		M	M	
5. Airport Ferry	GKA COK	L	M	M	
6. Petro Alaska Tank Farm	GKA COK	L	M	M	
7. Power Plant	GKA COK	L	M	M	
8. Power Plant Fuel Tanks	GKA COK	L	M	M	
9. Sewage Treatment Plant	GKA COK	L	M	M	
10. Fire Station #2	GKA COK		M	M	
11. Depart. Of Public Health	GKA COK		M	M	
12. Hospital	GKA COK		M	M	

Not Mapped

Infrastructure/Structures	Location	Flood*	Equake**	Weather**	Tsunami***
13. Clinic	GKA COK		M	M	
14. Harbor Master	GKA COK		M	M	
15. Docking Facilities	GKA COK		M	M	
16. National Guard Armory	GKA COK		M	M	
17. School	GKA COK		M	M	
18. Ferry Civic Center	GKA COK		M	M	
19. Borough Offices	GKA COK		M	M	
20. Borough Public Works	GKA COK		M	M	
21. School	GKA COK		M	M	
22. Water Tank	GKA COK	L	M	M	
23. Ketchikan Harbor	GKA COK	L	M	M	
24. City Hall	GKA COK		M	M	
25. School	GKA COK		M	M	
26. Community Recreation Center	GKA COK		M	M	
27. Police Station	GKA COK		M	M	
28. School	GKA COK		M	M	
29. Thomas Basin Harbor	GKA COK		M	M	
30. Fuel Facilities	GKA COK		M	M	
31. Solid Waste Facility	GKA COK		M	M	

Not Mapped

Infrastructure/Structures	Location	Flood*	Equake**	Weather**	Tsunami***
32. U.S. Coast Guard Facilities	GKA COK		M	M	
Map 3. GKA & COS Critical Infrastructure					
1. Water Treatment Plant	GKA COS		M	M	
2. Head Start School	GKA COS		M	M	
3. Village Store	GKA COS		M	M	
4. Church	GKA COS		M	M	
5. City Hall/Artist Co-Op	GKA COS		M	M	Not Mapped
6. IRA Tribal Offices	GKA COS		M	M	
7. Community Center	GKA COS		M	M	
8. Seaport/Industrial Park	GKA COS		M	M	
9. Ramp	GKA COS		M	M	
10. Boat Landing	GKA COS		M	M	
11. Senior Housing	GKA COS		M	M	

* FIRMs are only available within the City of Ketchikan

** Earthquake and Severe weather are area wide hazards

*** The current tsunami map is very outdated (1983) and based only on elevations and distance from shoreline so was not used.

Estimating Potential Dollar Loss

Table 16. Estimating Potential Dollar Loss of Critical Facilities

Source and Methodology: FEMA contracted URS Corporation to conduct the Alaska Critical Facilities Inventory of the Greater Ketchikan Area critical facilities. URS Corporation contacted Ketchikan Fire Chief Jim Hill who provided the information from the Finance Department records, using replacement values from the City's insurer Alaska Municipal League.

Critical Facility	Y/N	Type of Structure	Description	Value
Airports	Y	7,500 ft long by 150 ft wide asphalt runway, lighted, paved	Ketchikan Intl Airport on Gravina Island (10 min ferry ride) 4 float plane facilities (Tongass Narrows, Peninsula Point, Ketchikan Harbor, and Murphy)	2003 Airport Wastewater Plant - $50,000 2006 Runway Rehab $83,251; 3,769,482; 21,660,637; 2006 emergency generators $273,232 2005 Runway rehab $147,474 2007 Airport Docks and Ferry Facility Upgrades - $25, 843 2002 Taxiway Construction $10,257,935; Runway safety area construction $160,000; Navadis $21,333; Seaplane base Rehab $160,000; 2000 Rehab Taxiway lighting $1,228,790 and $690,000; Ceiling and Lighting $31,146 1996 Seaplane float rehab $3,840,000 1995 Seaplane Float Improvements $3,900,000; Terminal Renovations $34,179; Curtain Wall replacement $144,557
Bridge	Y	Herring Cove – Steel Structure	Herring Cove Bridge Ketchikan Creek Bridge	1997 painting Herring Cove bridge, and restore, lighting, repainting etc Ketchikan Creek Bridge - $664,000 1995 Herring Bay Bridge $77,000
Cemetery				

Critical Facility	Y/N	Type of Structure	Description	Value
Church				
Civic Center	Y		Ted Ferry Civic Center	
Community Freezers				
Community Hall	Y		American Legion Hall Boys and Girls Club' Johnson Youth Center	2007 Johnson Youth Center hot water heater $3,565
Community Storage Shed				
Emergency Operations Centers	Y		Public Safety Building	2004 – new building $1,225,000
Emergency Shelters				
Fire Stations	Y		Ketchikan Fire Dept; South Tongass Fire EMS; Pond Reef Volunteer Fire Dept	2008 Fire station replacement preliminary - $100,000 2007 – N Tongass Volunteer Fire Dept Training Room - $78,000

Critical Facility	Y/N	Type of Structure	Description	Value
Fuel Storage Tanks (greater than 500 gallons)	Y	60,000-gal Island Fuels Inc/Petro Alaska 150,000-gal Boyer Alaska Barge lines 230,000-gal Ketchikan Utilities 9,100-gal EC Phillips and Son 920,000-gal Andrews Oil 6,902,100-gal White Pass Alaska 7,000-gal Ward Cove Packing No amount – Salmon Falls Marine		
Generators	Y		Diesel back up generators for Ketchikan Utilities	
Harbor/Dock/Port	Y		Breakwater, deep draft dock, five small boat harbors, dry dock and ship repair yard, boat launch, State ferry terminal, Thomas Basin Grid	2008 Ferry Terminal Overhaul - $13,444,500 2000 – Floating Dock Upgrade $6,973 1999 Ferry Transfer Facility Construction $5,972,781 1997 – relocate ferry terminal $2,695,925

Critical Facility	Y/N	Type of Structure	Description	Value
Hospitals and Emergency Rooms	Y		Ketchikan General Hospital; Ketchikan Indian Community Tribal Health Clinic; U.S. Coast Guard Ketchikan Dispensary; Long term care available at Ketchikan Pioneer's Home and Island View Manor; Specialized care at Gateway Center for Human Services	2005 Health Center Duct Cleaning - $76,077 2003 – Pioneer Home Renovation $101,512 2006 General Hosp Outpatient Clinic Renovation $955,700 2005 Pioneer Home Wanderguard Replacement $85,046 and Bathing Room Conversion $106,512 1995 Pioneer Home upgrade $300,000 1995 Ketchikan Health Center Expansion $105,392
Landfill/Incinerator	Y		Deer Mountain landfill with incinerator, recycling, and household haz waste collection (ADEC permitted facility)	
Library	Y		11 State; City Public, Schools, University	
Museum	Y		Totem Heritage Center Museum Centennial Museum Tongass Historical Museum	
National Guard				
Offices				
Oil and Natural Gas Transmission Pipelines				
Park	Y		Totem Bight State Historical Park; Saxman Totem Park and Carving Center Misty Fiords National Monument and Wilderness	1999 Totem Bight Park Parking and Scenic Wayside $650,000
Police Stations	Y		City Police Dept and State Troopers Post	
Post Office				

Critical Facility	Y/N	Type of Structure	Description	Value
Potable Water Production and Treatment Facilities	Y		Water is chlorinated, stored, and piped to homes within City boundaries. Borough operates water treatment facility at Mountain Point, south of Ketchikan. Few homes use rain catchment systems (ADEC permit no. 120232)	2007 Water and Sewer Improvements - $750,000 1995 Mountain Point Water and Sewer Construction $2,920,000 1993 Mt. Point Water and Sewer Construction $1,800,000 1990 Mt Point Water and Sewer Construction $370,000, $150,000, and $600,000 (new water treatment plant)
Power Generation Facilities	Y	64,050 kw capacity	Ketchikan Public Utilities purchases power from state-owned Swan Lake Hydro Facility, and owns three hydroelectric plants (Ketchikan, Beaver Falls, and Silvis) and 2 diesel fueled plants	$2.5 million has been provided to design and construct a 57-mile power transmission intertie between Swan Lake and Tyee Lake hydroelectric projects. 2003 – Tyee Swan Intertie $16,443,587 2002 – Tyee Swan Intertie - $5,000,000 2006 – Gravina Electric Line - $200,000 2004 – Swan Lake Lake Tyee Intertie - $61,450,858 1994 – Swan Lake Tyee Lake Intertie $64,600,000
Radio Transmitter				
Reservoir/Supply /Dam (water)			Dam on Ketchikan Lake	

Critical Facility	Y/N	Type of Structure	Description	Value
Roads (State Owned)	Y		South Tongass Hwy Ward Lake Road Metlakatla to Walden Point Road Airport Access Road Tongass/3rd Ave Extension Tongass Ave Stedman Street to Woodland Ave	1996 Ward Lake Road Relocation $6,000,000 1996 Metlakatla to Walden Point Rd $500,000 1999 Improvements to Airport Access Road $2,159,443 1998 Tongass/3rd Ave Ext – Construct 1.1 miles of new road connect 3rd with Schoenbar Rd $11,165,000 and 1996 reconstruction $2,736,000 1996 – Tongass Ave Lane improvements $1,972,100 1996 3rd Ave Extension - $28,388,217 and ROW acquisition $4,020,412 1995 Widening N Tongass Hwy/Ward Cove to Whipple Creek $9,220,000 1993 Stedman St to Woodland Ave widening $4,241,099
Roads (State Maintained)				North Tongass Hwy MP 15 to Settlers Cove Paving $258,711
Roads (Community Owned)	Y			
Roads (Community Maintained)				
Satellite				

Critical Facility	Y/N	Type of Structure	Description	Value
School	Y		Fawn Mountain Elementary School P-6 Houghtaling Elementary School P-6 Ketchikan Charter School K-6 Ketchikan Correspondence K-12 Ketchikan High School 9-12 Ketchikan Regional Youth Facility 5-12 Point Higgins School P-6 Revilla Jr/Sr High School 7-12 Schoenbar Middle School 7-8 Southeast Island Correspondence K-12 Tongass School of Arts and Sciences K-6 University of Alaska Southeast: Ketchikan Campus	2007 – Fawn Mountain School Track and Field improvements $322,456 2004 – Schoenbar Middle School Renovation $12,857,143 2004 Regional Youth Facility Restrooms $27,552 1999 Revilla HS roof - $113,801
Senior Center	Y		Rendezvous Senior Day Services inc	2007- Ceiling Replacement $38,657 2007 – Fire alarm upgrades $39,600 2002 – Structural Maintenance $27,099 1999 construction $270,641 2003 Facility Modifications $29,556 1998 – Elevator installation $223,385
Service/Maintenance			Maintenance Facility	2001 $154,961
Sewage Lagoon				

Critical Facility	Y/N	Type of Structure	Description	Value
Store	Y		Multiple includes: grocery, pharmacy, building supplies, gas, convenient, sporting goods, automotive, jewelry, and other general retail etc Safeway, Walmart,	
Tannery				
Teachers Quarters				
Telephone	Y		In State – Ketchikan Public utilities Long Distance – GCI, ACS	
Washeteria				
Waste Water Treatment Facilities			City runs a central sewage collection system with primary treatment . New borough sewage treatment plan located at Mountain Point; few homes use outhouses or septic tanks	

Source: URS Corporation

Vulnerability – Future Structures in Hazard Zones

New public structures in GKA are built to withstand the identified hazards of earthquake and severe weather.

Development permits for all new building construction, or substantial improvements, are required by the Borough in all A, AO, AH, A-numbered Zones. Flood insurance purchase may be required in flood zones A, AO, AH, A-numbered zones as a condition of loan or grant assistance. An Elevation Certificate is required as part of the development permit. The Elevation Certificate is a form published by the Federal Emergency Management Agency required to be maintained by communities participating in the NFIP. According to the NFIP, local governments maintain records of elevations for all new construction, or substantial improvements, in floodplains and must keep the certificates on file.

Chapter 4. Risk Assessment - Hazard Specific Section

Section 1. Floods

Hazard Description

Flood hazards in the GKA include voluminous, cumulative rainfall and coastal storms.

Floods occur in rivers as a result of a large input of water to the drainage basin in the form of rainfall, snowmelt, glacier melt, or a combination of these inputs. In the Ketchikan area, as well as most coastal areas of Southcentral and Southeast Alaska, the floods due to snowmelt are typically lower in magnitude than those due to rainstorms in late summer or fall.

Deposition is the accumulation of soil, silt, and other particles on a river bottom or delta. Deposition leads to the destruction of fish habitat and presents a challenge for navigational purposes. Deposition also reduces channel capacity, resulting in increased flooding or bank erosion.

Location

The Federal Emergency Management Agency (FEMA) has mapped the expected 100-year floodplain for only the City of Ketchikan. The KGB administers the NFIP for the GKA.

The limits of the FEMA study extend from one-half mile north of Carlanna Creek to the Coast Guard Station within the City of Ketchikan. Much of the City of Ketchikan, including the Schoenbar, Hoadley, Whipple and Carlanna Creek areas lie within the floodplain of a 100-year flood (FEMA 1990).

GKA Shoreline

The following maps have the FIRM “A” zones overlaid on the land use map. The “A” zones are defined as areas of 100-year flood zones.

Properties unaffected directly, will suffer due to road closures, impacts to public safety (access and response capabilities), limited availability of perishable commodities, and isolation.

Map 5. Flood Insurance Map - Downtown

Map 6. Flood Insurance Rate Map - South

Extent

The extent (i.e. magnitude or severity) of the flood hazard is measured in this plan by using statistics from the National Flood Insurance Program, historical past events and the *State of Alaska Hazard Mitigation Plan, 2007*. Based on these factors and using the criteria established in Table 8. Extent of Hazard Ranking, page 25, the GKA has a **limited** extent of flooding not due to tsunami, which is covered in Chapter 3, Section 3.

The Greater Ketchikan Area participates in the NFIP, which is administrated by the Ketchikan Gateway Borough. Although FEMA has not determined floodplains for areas outside the City of Ketchikan, the Borough has adopted Flood Damage Prevention Standards that establish a minimum building pad elevation of 22 feet above sea level. However, because of the steep mountain slopes and the small size of the watersheds, flooding is not expected to be significant.

The function of the National Flood Insurance Program (NFIP) is to provide flood insurance to homes and businesses located in floodplains at a reasonable cost. In trade, the GKA agrees to regulate new development and substantial improvement to existing structures in the floodplain, or to build safely above flood heights to reduce future damage to new construction. The program is based upon mapping areas of flood risk, and requiring local implementation to reduce flood damage primarily through requiring the elevation of structures above the base (100-year) flood elevations.

The table below describes the FIRM zones.

Table 17. FIRM Zones

Firm Zone	***Explanation***
A	Areas of 100-year flood; base flood elevations and flood hazard not determined.
AO	Areas of 100-year shallow flooding where depths are between one (1) and three (3) feet, average depths of inundation are shown but no flood hazard factors are determined.
AH	Areas of 100-year shallow flooding where depths are between one (1) and three (3) feet; base flood elevations are shown but no flood hazard factors are determined.
A1-A30	Areas of 100-year flood; base flood elevations and flood hazard factors determined.
B	Areas between limits of the 100-year flood and 500-year flood; or certain areas subject to 100-year flooding with average depths less than one (1) foot or where the contributing drainage area is less than one square mile; or areas protected by levees from the base flood.
C	Areas of minimal flooding.
D	Areas of undetermined, but possible, flood hazards.

Elevation Certificates are used to:

1. Record the elevation of the lowest floor of all newly constructed buildings, or substantial improvement, located in the floodplain.
2. Determine the proper flood insurance rate for floodplain structures
3. Local governments must insure that elevation certificates are filled out correctly for structures built in floodplains. Certificates must include:
   - The location of the structure (tax parcel number, legal description and latitude and longitude) and use of the building.
   - The Flood Insurance Rate Map panel number and date, community name and source of base flood elevation date.
   - Information on the building's elevation.
   - Signature of a licensed surveyor or engineer.

The NFIP provides nearly **$531 million** in flood insurance coverage in Alaska to individuals, businesses, and renters.
The average annual policy costs **$674**.
Average flood insurance coverage is **$199,519**.
As a rule, the lower structures are built, compared to the 100-year flood elevation the higher the flood insurance premium.
The average paid loss $14,949.

Table 18. NFIP Statistics

Emergency Program Date Identified	**Regular Program Entry Date**	**Map Revision Date**	**NFIP Community Number**	**CRS Rating Number**	**Total # of Current Policies (10/13/09)**
08/04/1975	04/16/1990		020003B	9	44
Total Premiums	**Total Loss Dollars Paid Since 1978**	**Average Value of Loss Since 1978**	**AK State # of Current Policies (10/13/09)**	**AK State Total Premiums (10/13/09)**	**AK Total Loss Dollars Paid Since 1978**
$58,900	0	0	2,818	$2.2 million	$4.7 million
GKA Average Premium (10/13/09)	**AK State Average Premium (10/13/09)**	**Repetitive Loss Claims**	**Dates of Rep. Losses**	**Total Rep. Loss**	**Average Rep. Loss**
$1,339	$796	0	N/A	0	0

Table 19. State and Local Floodplain Coordinators

GKA Floodplain Coordinator	Richard Harney, Floodplain Coordinator Ketchikan Gateway Borough
State of AK Floodplain Coordinator	Floodplain Management Programs Coordinator Division of Community and Regional Affairs Department of Commerce, Community & Economic Development Taunnie Boothby, State Floodplain Coordinator 550 W. 7th Avenue, Suite 1640 Anchorage, AK 99501 (907) 269-4567 (907) 269-4563 (fax) Email: taunnie_boothby@commerce.state.ak.us Website: http://www.commerce.state.ak.us/dca/nfip/nfip.htm

Probability

Based on the *State of Alaska Hazard Mitigation Plan, 2007*, NFIP, and GKA records and past historical events the GKA has a **low** probability of flooding. A criterion used in the profiling methodology section of this plan defines low probability, as the hazard is present with a low probability of occurrence within the next ten years. Event has up to 1 in 10 year's chance of occurring.

The *State of Alaska Hazard Mitigation Plan, 2007* lists the GKA as having flood hazard present but with an unknown probability. The NFIP statistics for are described above and the previous occurrences are listed below.

Previous Occurrences

The *DHS&EM Disaster Cost Index* establishes a summary of State funds expended on disaster relief since the creation by the Alaska Legislature of the Division of Emergency Services (DES). There are no recorded instances of flooding that entailed state or federal funds the GKA.

Repetitive Loss Properties

The risk assessment in all plans approved after October 1, 2008 must also address National Flood Insurance Program (NFIP) insured structures that have been repetitively damaged floods.

Under NFIP guidelines, repetitive loss structures include any currently insured building with two or more flood losses (occurring more than ten days apart) greater than $1,000 in any 10-year period since 1978.

States should provide communities with information on historic floods throughout the state so communities will know what type of damage has occurred (even if it didn't occur within that particular community).

States should ensure that lists of repetitive loss properties are kept up to date and that communities have the most current list. States should contact their FEMA Regional Office for this information.

FEMA also maintains a national list of properties that comprise the "Repetitive Loss Target Group". These are repetitive loss properties that have either experienced four or more losses with the characteristics above, or have had losses that cumulatively exceed the property value of the building.

Repetitive loss properties are those with at least two losses in a rolling ten-year period and two losses that are at least ten days apart. Specific property information is confidential, but the State DCRA Floodplain Coordinator related that in the GKA there have been ***zero*** properties that meet the FEMA definition of repetitive loss.

Impact

A flooding event in Ketchikan could damage the structures and infrastructure that are located along the shoreline in the community, and within the flood zones described above. A flooding event in Ketchikan could isolate the community from other areas of the state and cause wide spread damage.

Flood Mitigation Goals and Projects

Goals

Goal 1. Reduce and prevent flood damage.

Support elevation, flood proofing, buyout or relocation of structures that are in danger of flooding or are located on eroding banks.

Goal 2. Increase public awareness

Increase public knowledgeable about mitigation opportunities, floodplain functions, emergency service procedures, and potential hazards.

Projects

Please add specific projects to this list, if any are in planning stages.

FLD-1. Identify Drainage Patterns and Develop a Comprehensive Drainage System (Goal 1)

FLD-2. Structure Elevation and/or Relocation (Goal 1)

FLD-3. Updated FIRM Ketchikan Maps (Goal 1)

FLD-4. Public Education (Goal 2)

FLD-5. Continue yearly process with FEMA for the CRS rating to lower flood insurance rates. (Goal 1)

FLD-6. Continue to obtain flood insurance for all Borough structures, and continue compliance with NFIP. (Goal 1)

FLD-7. Require that all new public structures be constructed according to NFIP requirements and set back from the shoreline to lessen future erosion concerns and costs. (Goal 1)

Section 2. Earthquake Hazard

Hazard Description

Approximately 11% of the world's earthquakes occur in Alaska, making it one of the most seismically active regions in the world. Three of the ten largest quakes in the world since 1900 have occurred here. Earthquakes of magnitude 7 or greater occur in Alaska on average of about once a year; magnitude 8 earthquakes average about 14 years between events.

Most large earthquakes are caused by a sudden release of accumulated stresses between crustal plates that move against each other on the earth's surface. Some earthquakes occur along faults that lie within these plates. The dangers associated with earthquakes include ground shaking; surface faulting, ground failures, snow avalanches, seiches and tsunamis. The extent of damage is dependent on the magnitude of the quake, the geology of the area, distance from the epicenter and structure design and construction. A main goal of an earthquake hazard reduction program is to preserve lives through economical rehabilitation of existing structures and constructing safe new structures.

Ground shaking is due to the three main classes of seismic waves generated by an earthquake. Primary waves are the first ones felt, often as a sharp jolt. Shear or secondary waves are slower and usually have a side-to-side movement. They can be very damaging because structures are more vulnerable to horizontal than vertical motion.

Surface waves are the slowest, although they can carry the bulk of the energy in a large earthquake. The damage to buildings depends on how the specific characteristics of each incoming wave interact with the buildings' height, shape, and construction materials.

Earthquakes are usually measured in terms of their magnitude and intensity. Magnitude is related to the amount of energy released during an event while intensity refers to the effects on people and structures at a particular place. Earthquake magnitude is usually reported according to the standard Richter scale for small to moderate earthquakes.

Strike-slip faults are where each side of the fault moves horizontally. Normal faults have one side dropping down relative to the other side. Thrust (reverse) faults have one side moving up and over the fault relative to the other side.

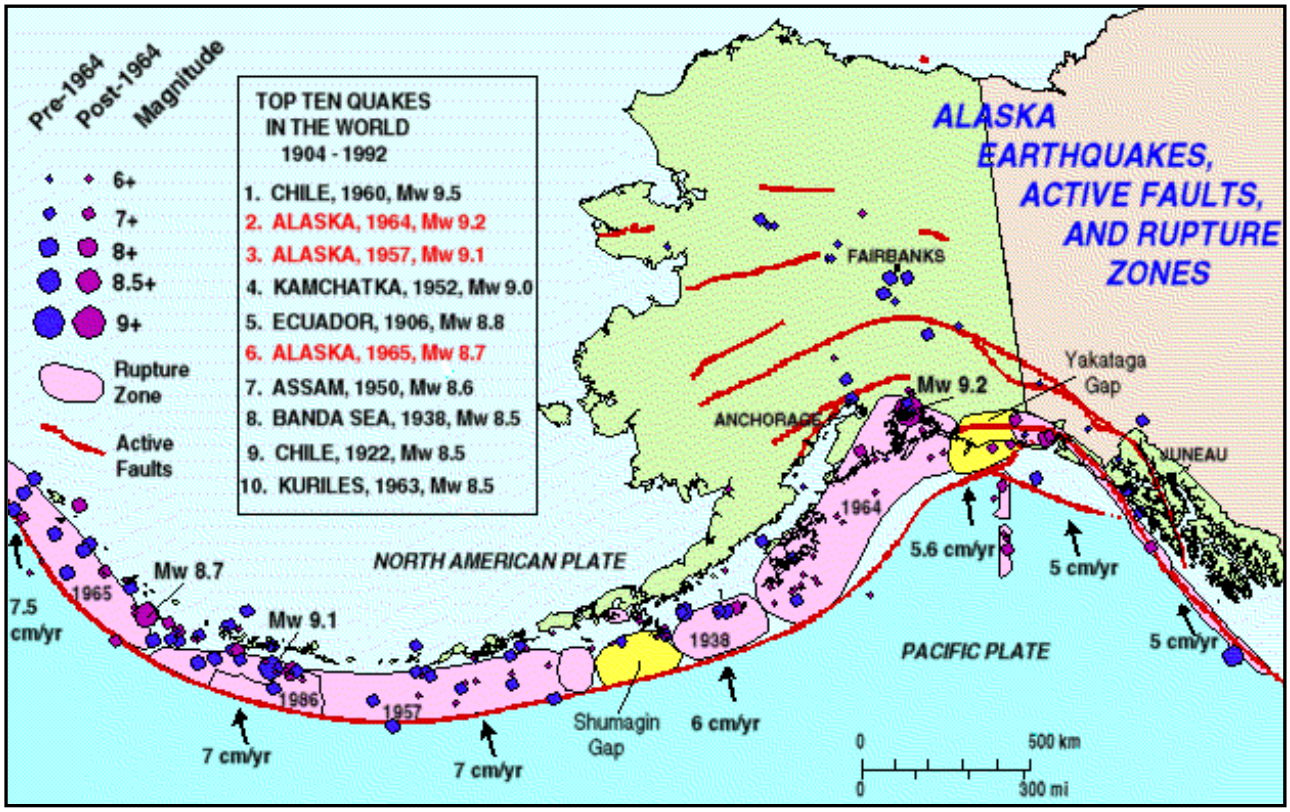
Earthquake-induced ground failure is often the result of liquefaction, which occurs when soil (usually sand and course silt with high water content) loses strength as a result of the shaking and acts like a viscous fluid.

Liquefaction causes three types of ground failures: lateral spreads, flow failures, and loss of bearing strength. In the 1964 earthquake, over 200 bridges were destroyed or damaged due to lateral spreads. Flow failures damaged the port facilities in Seward, Valdez and Whittier.

Similar ground failures can result from loss of strength in saturated clay soils, as occurred in several major landslides that were responsible for most of the earthquake damage in Anchorage in 1964. Other types of earthquake-induced ground failures include slumps and debris slides on steep slopes.

The following figure was obtained from the University of Alaska, Fairbanks (UAF), and Alaska Earthquake Information Center (AEIC) website at:
http://www.giseis.alaska.edu/Seis/

Figure 4. AEIS Earthquake Active Faults



Southeastern Alaska

Southeastern Alaska, also known as "the panhandle", includes the area of the state from Prince Wales Island to Icy Bay. In 1904, the state's first seismic monitoring station was installed in southeastern Alaska at the Astronomical Observatory in Sitka. It was the only seismic station monitoring earthquakes in Alaska until 1935 when a second station was installed at College near Fairbanks. The Sitka station continues to operate today as part of a statewide network of seismograph stations. (AEIC)

Major faults in the area include the Queen Charlotte fault, the Fairweather fault, and the Chatham Strait fault, described in further detail below. Minor faults in the area include the Clarence Strait fault and the Peril Strait fault. The eastern end of the Denali and Transition faults (main discussions in Interior and Southcentral seismicity sections) are also found in southeastern Alaska. (AEIC)

The strongest shaking will occur in musket, man-made fills, modern alluvial and delta deposits, and volcanic ash deposits. The saturated muskeg and reworked volcanic ash would be subject to possible liquefaction during severe earthquake-caused ground shaking, and are thus unreliable as stable foundation materials.

An earthquake would also cause other disastrous events to potentially occur at the same time, including tsunamis, fires, release of hazardous materials, and energy shortages.

Queen Charlotte - Fairweather fault system

The Queen Charlotte and Fairweather faults are part of a long fault system that marks the eastern boundary of the Pacific plate and the western boundary of the North American plate. The Pacific plate moves in a northwestward direction relative to the North American plate, creating a transform boundary, the name given to the interface between two plates moving horizontally in opposite directions. The fault associated with a transform boundary is a strike-slip fault. The Queen Charlotte and Fairweather faults are very similar to some of the most well known strike-slip faults in the world; the faults associated with California's San Andreas Fault system.

At the northern end of the Queen Charlotte-Fairweather fault system is the Fairweather fault, a strike-slip fault with right lateral movement. The Fairweather fault is visible on land for about 280 kilometers from Cross Sound northwestward to its junction with the St. Elias fault in the vicinity of Yakutat Bay. Seismic exploration methods have projected the Fairweather fault just offshore of the Alexander Archipelago from Cross Sound to the mouth of Chatham Strait. At this point, the fault is believed to connect with the Queen Charlotte fault. The Queen Charlotte fault, which extends southeastward from Chatham Strait past the Queen Charlotte Islands, is also a strike-slip fault with right lateral movement. (AEIC)

Chatham Strait fault

The Chatham Strait fault is the second largest right lateral strike-slip fault in southeastern Alaska. Starting near Haines, the fault follows Lynn Canal south into Chatham strait and is thought to be truncated by the Fairweather-Queen Charlotte fault system west of Iphigenia Bay. (AEIC)

Location

The hazard of earthquake could potentially impact any part of the Greater Ketchikan Area.

Earthquake damage would be area-wide with potential damage to critical infrastructure up to and including the complete abandonment of key facilities. Limited building damage assessors are available in the GKA to determine structures integrity following earthquake damage. Priority would have to be given critical infrastructure to include: public safety facilities, health care facilities, shelters and potential shelters, and finally public utilities.

Extent

The extent of an earthquake in the GKA could be ***critical***. Table 12 uses the following criteria to determine the extent of possible damage: Injuries and/or illnesses result in permanent disability, complete shutdown of critical facilities for at least two weeks, more than 25% of property is severely damaged.
Intensity is a subjective measure of the strength of the shaking experienced in an earthquake. Intensity is based on the observed effects of ground shaking on people, buildings, and natural features. It varies from place to place within the disturbed region depending on the location of the observer with respect to the earthquake epicenter.

The "intensity" reported at different points generally decreases away from the earthquake epicenter. Local geologic conditions strongly influence the intensity of an earthquake; commonly, sites on soft ground or alluvium have intensities 2 to 3 units higher than sites on bedrock.

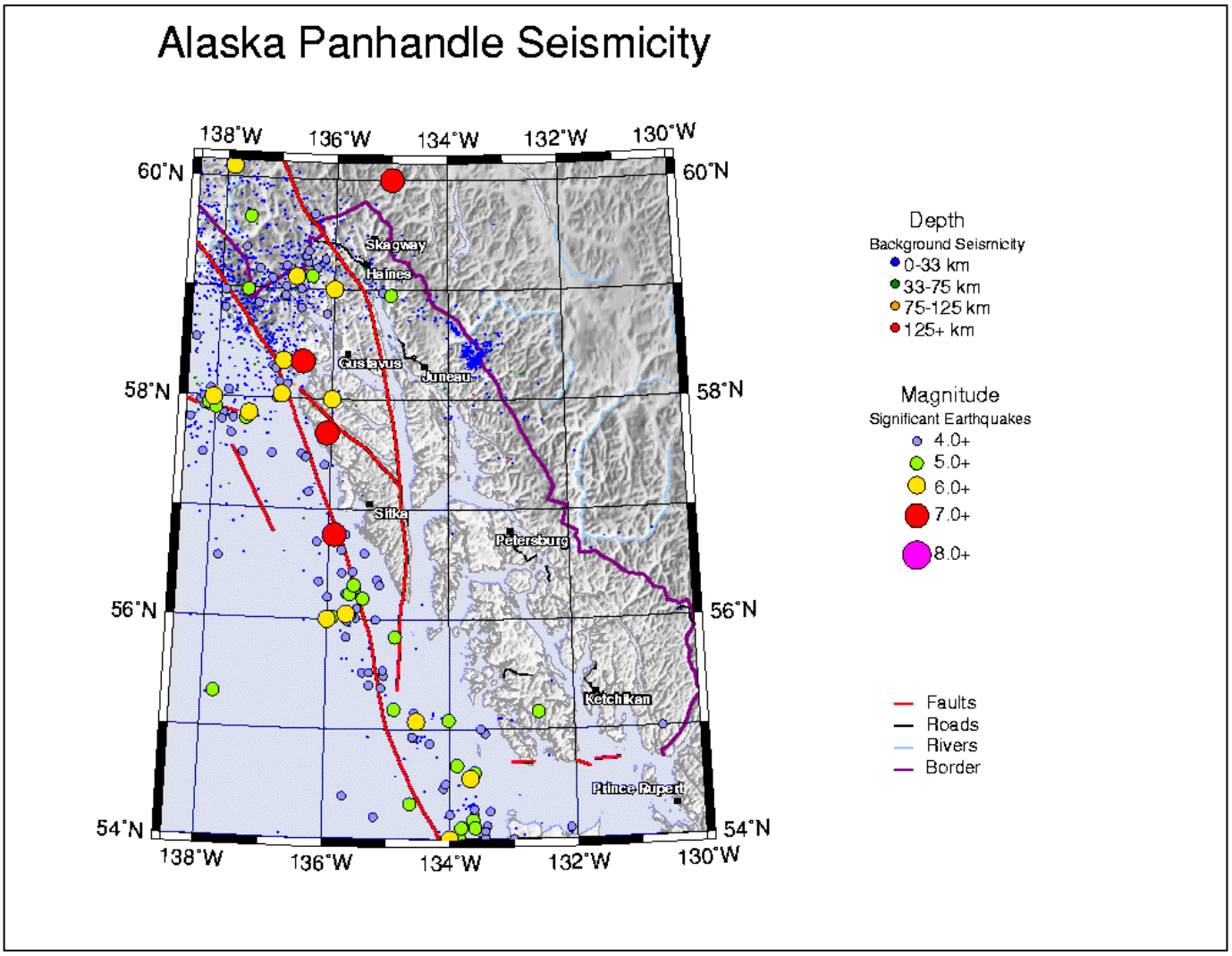
The Richter scale expresses, magnitude as a decimal number. A 5.0 earthquake is a moderate event, 6.0 characterize a strong event, 7.0 is a major earthquake and a great earthquake exceeds 8.0. The scale is logarithmic and open-ended. (*State of Alaska Hazard Mitigation Plan, 2007*)

A magnitude of 2 or less is called a microearthquake, they cannot even be felt by people and are recorded only on local seismographs. Events with magnitudes of about 4.5 or greater are strong enough to be recorded by seismographs all over the world. But the magnitude would have to be higher than 5 to be considered a moderate earthquake, and a large earthquake might be rated as magnitude 6 and major as 7. Great earthquakes (which occur once a year on average) have magnitudes of 8.0 or higher (British Columbia 1700, Chile 1960, Alaska 1964). The Richter Scale has no upper limit, but for the study of massive earthquakes the moment magnitude scale is used. The modified Mercalli Intensity Scale is used to describe earthquake effects on structures.

The extent of a major earthquake in GKA could be critical. The Ketchikan area is located near the Fairweather fault, which extends from south of Queen Charlotte Islands to Yakutat. The fault moves right-laterally approximately 2.25 inches per year. A study by the U.S. Geological Survey predicts a magnitude 8 or greater earthquake will occur near Ketchikan in the future. This could be especially devastating because ground shaking can cause liquefaction of Ketchikan’s thixotropic soils.

Figure 5 from the UAF AEIC illustrates that a major earthquake has occurred near Ketchikan in the past and show that a fault is located near the Greater Ketchikan area.

Figure 5. AEIC Alaska Panhandle Seismicity



Source: http://www.aeic.alaska.edu/html_docs/information_releases.html

Probability

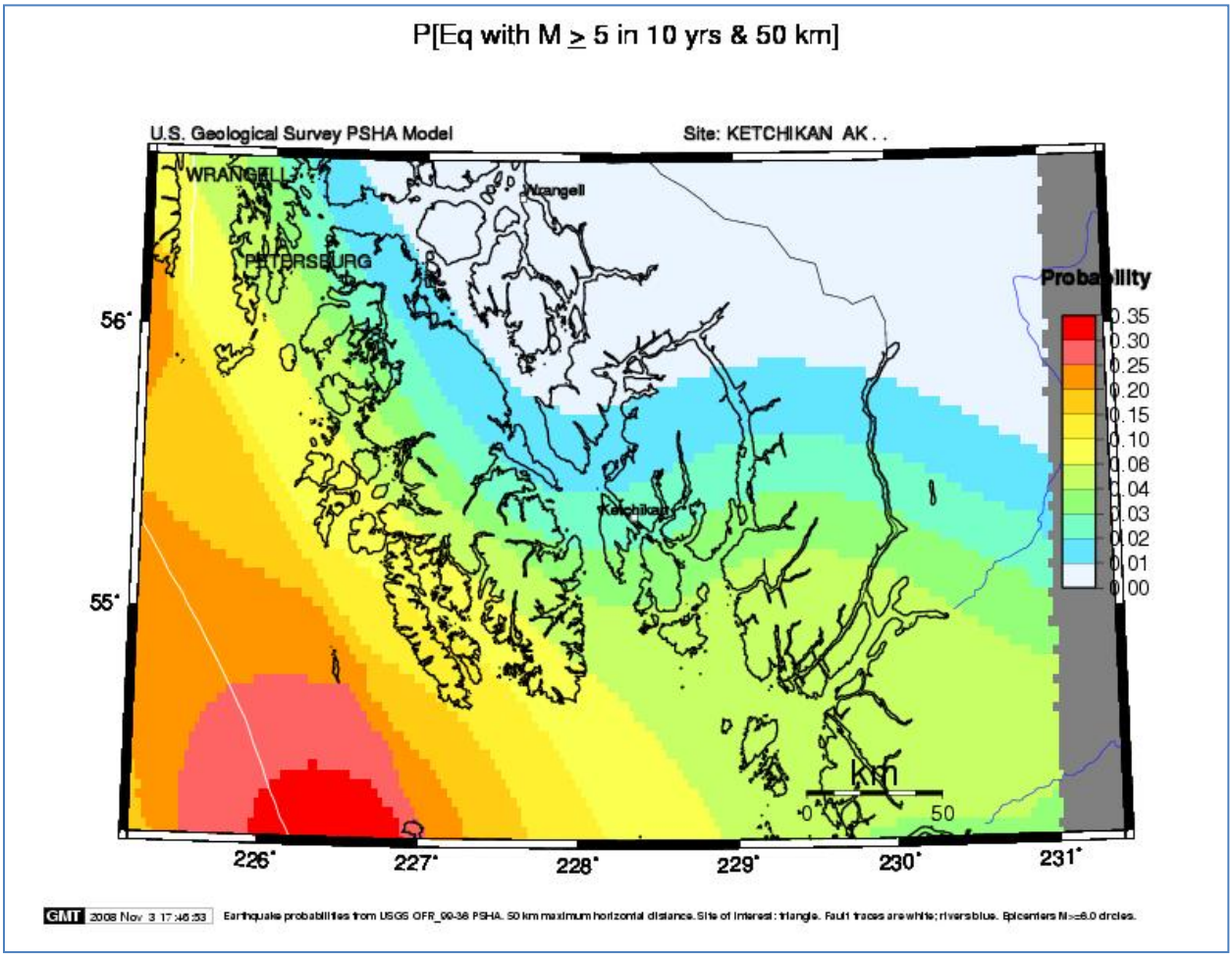
The GKA has a ***low*** probability of earthquake hazard. Table 9. Probability Criteria Table, page 25 defines the criteria for a high probability as that the hazard is present with a low probability of occurrence within the next ten years. Event has up to 1 in 10 year chance of occurring.

As stated above Ketchikan is located near the Fairweather fault, which extends from south of Queen Charlotte Islands to Yakutat. The fault moves right-laterally approximately 2.25 inches per year. A study by the U.S. Geological Survey (USGS) predicts a magnitude 8 or greater earthquake will occur in Southeast Alaska in the future. This could be especially devastating because ground shaking can cause liquefaction of Ketchikan's thixotropic soils. (AEIC)

While it is not possible to predict an earthquake, the USGS has developed Earthquake Probability Maps that use the most recent earthquake rate and probability models. These models are derived from earthquake rate, location and magnitude data from the USGS National Seismic Hazard Mapping Project.

Figure 6 was developed by using the USGS website (see source for web address). The figure predicts that the probability of an earthquake with an intensity of 5.0 or greater will occur within the next ten years within 50 kilometers (31 miles) of Ketchikan is 2 percent.

Figure 6. USGS Probability Map



Source: USGS Earthquake Probability Mapping; http://eqint.cr.usgs.gov/eqprob/2002/index.php

Previous Occurrences

Four major earthquakes have been linked to the Queen Charlotte-Fairweather fault system in the last century. In 1927 a magnitude 7.1 (Ms - surface wave magnitude) earthquake occurred in the northern part of Chichagof Island, in 1949 a magnitude 8.1 (Mw - moment magnitude) earthquake occurred along the Queen Charlotte fault near the Queen Charlotte Islands, in 1958 movement along the Fairweather fault near Lituya

Bay created a magnitude 7.9 (Ms) earthquake, and in 1972 a magnitude 7.4 (Ms) earthquake occurred near Ketchikan. The 1958 Lituya Bay earthquake, which was felt as far away as Seattle, Washington, caused a large rockslide, which deposited the contents of an entire mountainside into the bay. The gigantic wave that resulted from this rockslide scoured the shores of the bay down to bedrock and uprooted trees as high as 540 meters above sea level. Fishing boats were carried on the wave at a reported height of at least 30 meters over the spit at the entrance to the bay and tossed into the open ocean.
Geologic evidence shows that the Chatham Strait fault was active as recently as the mid-Tertiary period and had total right lateral displacement up to 150 km.

Although a 1987 magnitude 5.3 (mb - body wave magnitude) earthquake was located near the Chatham Strait fault, very few earthquakes in the area appear to have been directly related to the fault. (AEIC)

The *Greater Ketchikan Area Emergency Operations Plan* (GKA EOP) states that a severe earthquake struck the GKA in the 1960's. Damage resulting from the earthquake was minimal.

Impact

The *GKA EOP* states that since the last event, building codes have been adopted by the City of Ketchikan. Building technology has improved to make structures built since the 1960 event more resistant to damage.

While structures within the district are typically built on bedrock and tend to be short in order to withstand high winds, the possibility exists that large earthquakes could cause dam failures, and bridge and roadway collapse.

Property damage expected to be moderate. Damage to the environment is expected to be moderate as a result of hazardous material releases.

Infrastructure damage could be extensive due to catastrophic failure of hydroelectric dams and roadway damage. (GKA EOP)

Earthquake Mitigation Goal and Projects

Goal — Obtain funding to protect existing critical infrastructure from earthquake damage.

Projects

Please add specific projects to this list, if any are in planning stages.

E-1. Identify buildings and facilities that must be able to remain operable during and following an earthquake event.

E-2. Contract a structural engineering firm to assess the identified buildings and facilities to determine their structural integrity and strategy to improve their earthquake resistance.

E-3. Assess facilities and improve earthquake preparedness through such measures as installing bookshelf tie-downs, improving computer servers' resistance to earthquakes, moving heavy objects to lower shelves, etc.

E-4. Conduct mock emergency exercises to identify response vulnerabilities.

Section 3. Tsunami Hazard

Hazard Description

A tsunami is a series of long waves generated in the ocean by a sudden displacement of a large volume of water. Underwater earthquakes, landslides, volcanic eruptions, meteor impacts, or onshore slope failures can cause this displacement. Most tsunamis originate in the Pacific "Ring of Fire," the area of the Pacific bounded by the eastern coasts of Asia and Australia and the western coasts of North America and South America that is the most active seismic feature on earth.

Tsunami waves can travel at speeds averaging 450 to 600 miles per hour. As a tsunami nears the coastline, its speed diminishes, its wavelength decreases, and its height increases greatly. Unusual heights have been known to be over 100 feet high. However, waves that are 10 to 20 feet high can be very destructive and cause many deaths and injuries.

After a major earthquake or other tsunami-inducing activity occurs, a tsunami could reach the shore within a few minutes. From the source of the tsunami-generating event, waves travel outward in all directions in ripples. As these waves approach coastal areas, the time between successive wave crests varies from 5 to 90 minutes. The first wave is usually not the largest in the series of waves, nor is it the most significant. One coastal community may experience no damaging waves while another may experience destructive deadly waves. Some low-lying areas could experience severe inland inundation of water and deposition of debris of more than 1000 feet inland.

The Alaska and Aleutian Seismic Zone that threatens Alaska has a predicted occurrence (84 percent probability between 1988 to 2008) of an earthquake with

magnitude greater than 7.4 in Alaska. If an earthquake of this magnitude occurs, Alaska's coastlines can be expected to flood within 15 minutes. (WCATWC)

Types of Tsunami

Tele-Tsunami

Tele-tsunami is the term for a tsunami observed at places 1,0000 kilometers from their source. In many cases, tele-tsunamis can allow for sufficient warning time and evacuation.

No part of Alaska is expected to have significant damage due to a tele-tsunami. Only one tele-tsunami has caused damage in Alaska; the 1960 Chilean tsunami. Damage occurred to pilings at MacLeod Harbor, Montague Island on Cape Pole, Kosciusko Island where a log boom broke free.

Seismically generated local tsunami

Most seismically generated local tsunamis have occurred along the Aleutian Arc. Other locations include the back arc area in the Bering Sea and the eastern boundary of the Aleutian Arc plate. They generally reach land 20 to 45 minutes after starting.

Landslide-generated tsunami

Submarine and subaerial landslides can generate large tsunami. Subaerial landslides have more kinetic energy associated with them so they trigger large tsunamis. An earthquake usually, but not always, triggers this type of landslide and they are usually confined to the bay or lake of origin. One earthquake can trigger multiple landslides and landslide generated tsunamis. Low tide is a factor for submarine landslides because low tide leaves part of the water-saturated sediments exposed without the support of the water.

Landslide generated tsunamis are responsible for most of the tsunamis deaths in Alaska because they allow virtually no warning time.

Seiches

A seiche is a wave that oscillates in partially or totally enclosed bodies of water. They can last from a few minutes to a few hours because of an earthquake, underwater landslide, atmospheric disturbance or avalanche. The resulting effect is similar to bathtub water sloshing repeatedly from side to side. The reverberating water continually causes damage until the activity subsides. The factors for effective warning are similar to a local tsunami. The onset of the first wave can occur in a few minutes, giving virtually no time for warning.

Characteristics of Tsunamis

Debris: As the tsunami wave comes ashore, it brings with it debris from the ocean, including man-made debris like boats, and as it strikes the shore, creates more on-shore debris. Debris can damage or destroy structures on land.

Distance from shore: Tsunamis can be both local and distant. Local tsunamis give residents only a few minutes to seek safety and cause more devastation. Distant tsunamis originating in places like Chile, Japan, Russia, or Alaska can also cause damage.

High tide: If a tsunami occurs during high tide, the water height will be greater and cause greater inland inundation, especially along flood control and other channels

Outflow: Outflow following inundation creates strong currents, which rip at structures and pound them with debris, and erode beaches and coastal structures.

Water displacement: When a large mass of earth on the ocean bottom impulsively sinks or uplifts, the column of water directly above it is displaced, forming the tsunami wave. The rate of displacement, motion of the ocean floor at the earthquake epicenter, the amount of displacement of the rupture zone, and the depth of water above the rupture zone all contribute to the intensity of the tsunami.

Wave runup: Runup is the height that the wave extends up to on steep shorelines, measured above a reference level (the normal height of the sea, corrected to the state of the tide at the time of wave arrival).

Wave strength: Even small wave heights can cause strong, deadly surges. Waist-high surges can cause strong currents that float cars, small structures, and other debris.

Location

Tsunami Inundation Mapping for Alaska Communities:

To help mitigate the risk these earthquakes and tsunamis pose to Alaskan coastal communities, the Geophysical Institute of the University of Alaska Fairbanks and the Alaska Division of Geological and Geophysical Surveys participate in the National Tsunami Hazard Mitigation Program by evaluating and mapping potential inundation of selected parts of Alaska coastlines using numerical modeling of tsunami wave dynamics. The communities for inundation modeling are selected in coordination with the Alaska Division of Homeland Security and Emergency Management with consideration to location, infrastructure, availability of bathymetric and topographic data, and willingness for a community to incorporate the results in a comprehensive mitigation plan. (Alaska Earthquake Information Center, AEIC)

Table 20. AEIC Tsunami Communities below lists Ketchikan as Number 16 on the list to receive inundation mapping. Until the maps are finished it is not possible to determine the possible locations of runup from a future tsunami.

Table 20. AEIC Tsunami Communities

Community	Tsunami Ready Community	State's Priority (Yes / No)	Distant Tsunami Potential	Local Tsunami / Seiche Potential	Large Scale USGS Base Maps	Infrastructure	Tourism	Cruise Ships (Tour Bus/Ship)	Special Seasonal Events	Fishing / Commercial / Timber
1. Kodiak City/Map Combined with	✓	Done	H	Y	✓	✓	✓	☐	✓	✓
2. Woman's Bay		Done	H	Y	✓	☐	☐	☐	☐	☐
3. US Coast Guard Station		Done	H	Y	✓	☐	☐	☐	☐	☐
4. Homer/Map Combined with	✓	Done	H	Y	✓	✓	✓	✓	✓	✓
5. Seldovia		Done	H	Y	☐	☐	☐	☐	☐	☐
6. Seward	✓	Y	H	Y	✓	✓	✓	✓	✓	✓
7. Sitka	✓	Y	H	Y	✓	✓	✓	✓	✓	✓
8. Valdez		Y	L	Y	✓	✓	✓	✓	✓	✓
9. Sand Point		Y	H	Y		✓	✓	☐	✓	✓
10. Unalaska		Y	H	Y		✓	✓	✓	✓	✓
11. Juneau/Douglas		Y	L	Y	✓	✓	✓	✓	✓	✓
12. Whittier		Y	L	Y	✓	✓	✓	✓	✓	✓
13. Cordova		Y	M	Y	✓	✓	✓	✓	✓	✓
14. Akutan		Y	M	Y		☐	☐	☐	✓	✓
15. Yakutat		Y	H	Y	✓	✓	✓	☐	✓	✓
16. Ketchikan		Y	L	Y	✓	✓	✓	✓	✓	✓

DISTANT SOURCE TSUNAMI HAZARD means the tsunami is generated so far away that the earthquake was not felt at all or only slightly. An estimate can be made of potential danger. Maximum runup heights would only be reached at the shoreline and the maximum distance inland only reached where the coast is low, flat, and unobstructed. ***"High"*** means possible runup to 50 foot elevation and reaching up to 1 mile inland. ***"Moderate"*** means possible runup to 35 foot elevation and inland up to 3/4 mile. ***"Low"*** means possible runup to 20 foot elevation and reaching up to 1/2 mile inland. ***NIL*** means neglible indication of a tsunami occurring.

All listed communities have a **LOCAL TSUNAMI HAZARD** which means a tsunami could be generated in nearby waters and reach your community before a formal warning could be transmitted. These waves may arrive in less than one hour and have historically been the highest, up to 100 foot or more. The estimated possible height in each community is difficult to determine. Coastal residents who feel a very strong earthquake (lasting over 30 seconds or if you have difficulty standing) should move to higher ground immediately. Source; http://www.aeic.alaska.edu/tsunami/intro.html

Extent

A tsunami in the GKA could be of a ***critical*** extent. A critical event is defined in Table 9. Probability Criteria Table, page 25 as an event that causes injuries and/or illnesses, complete shutdown of critical facilities for at least two weeks and with more than 25% of property severely damaged.

The intensity or extent of a tsunami is impacted by the following factors:

Coastline configuration: Tsunamis impact long, low-lying stretches of linear coastlines, usually extending inland for relatively short distances. Concave shorelines, bays, sounds, inlets, rivers, streams, offshore canyons, and flood control channels may create effects that result in greater damage. Offshore canyons can focus tsunami wave energy, and islands can filter the energy. The orientation of the coastline determines whether the waves strike head-on or are refracted from other parts of the coastline. Tsunami waves entering flood control channels could reach a mile or more inland, especially if it enters at high tide.

Coral reefs: Reefs surrounding islands in the western North Pacific and the South Pacific generally cause waves to break, providing some protection to the islands.

Earthquake characteristics: Several characteristics of the earthquake that generates the tsunami contribute to the intensity of the tsunami, including the area and shape of the rupture zone, and:

Fault movement: Strike-slip movements that occur under the ocean create little or no tsunami hazard. However, vertical movements along a fault on the seafloor displace water and create a tsunami hazard.

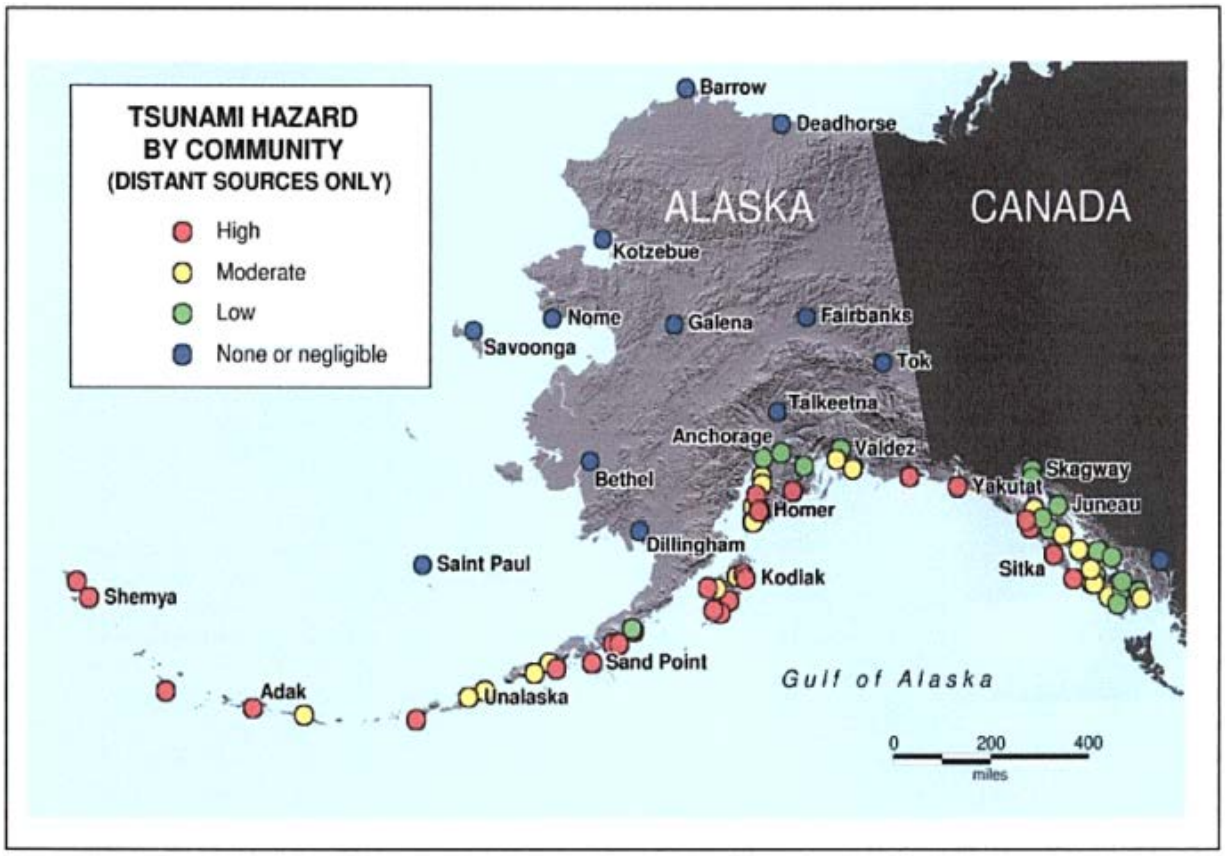
Magnitude and depth: Earthquakes with greater magnitude cause more intense tsunamis. Shallow-focus earthquakes also have greater capacity to cause tsunamis.

Human activity: With increased development, property damage increases, multiplying the amount of debris available to damage or destroy other structures. *(State of Alaska All-Hazards Mitigation Plan, 2007)*

Probability

The GKA has a ***low*** probability of a tsunami event. The hazard is present with a low probability of occurrence with the calendar year. Event has up to 1 in 10 year chance of occurring.

Figure 7. Tsunami Hazard by Community



The figure above from the *Alaska All-Hazards Risk Mitigation Plan, 2007*, and the *GKA EOP, 2007*, depicts the probability of a tsunami in Ketchikan as low.

Alaska has the greatest earthquake and tsunami potential in the entire United States. It is a very seismically active region where the Pacific plate is subducting under the North American plate. This subduction zone, the Alaska-Aleutian megathrust zone, creates high tsunami hazards for the adjacent coastal areas. The coseismic crustal movements that characterize this area have a high potential for producing vertical sea floor displacements, which are highly tsunamigenic. (AEIC)

The Alaska and Aleutian Seismic Zone that threatens Alaska has a predicted occurrence (84 percent probability between 1988 to 2008) of an earthquake with magnitude greater than 7.4 in Alaska. If an earthquake of this magnitude occurs, Alaska's coastlines can be expected to flood within 15 minutes. (WCATWC)

Since science cannot predict when earthquakes will occur, they cannot determine exactly when a tsunami will be generated. But, with the aid of historical records of tsunamis and numerical models, science can get an idea as to where they are most likely to be generated. Past tsunami height measurements and computer modeling help to forecast future tsunami impact and flooding limits at specific coastal areas. There is an average of two destructive tsunamis per year in the Pacific basin. Pacific wide tsunamis are a rare phenomenon, occurring every 10 - 12 years on the average. (WCATWC)

Previous occurrences

There is no record of a tsunami resulting in damage to Revilla or Gravina Islands for the 200 years that records have been kept. Topographically, the GKA is sheltered from distantly generated tsunamis by other islands. Local seismic activity has not resulted in any locally generated tsunamis. (*GKA EOP*)

Earthquakes have generated local subaerial and subaqueous landslides, which have the potential to trigger local tsunamis.

Historic tsunamis that were generated by earthquakes in the Alaska-Aleutian subduction zone have resulted in widespread damage and loss of life along the Alaskan Pacific coast and other exposed locations around the Pacific Ocean. Seismic water waves originating in Alaska can travel across the Pacific and destroy coastal towns hours after they are generated. However, they are considered to be a near-field hazard for Alaska, and can reach Alaskan coastal communities within minutes after an earthquake. Therefore, saving lives and property depends on how well a community is prepared, which makes it essential to model the potential flooding area in a case of a local or distant tsunami. (AEIC)

There has been at least one confirmed volcanically triggered tsunamis in Alaska. In 1883, debris from the Saint Augustine volcano triggered tsunamis that inundated Port Graham with waves 30 feet high.

Submarine and subaerial landslides can generate large tsunamis. Subaerial landslides have more kinetic energy associated with them so they trigger larger tsunamis. An earthquake usually, but not always, triggers this type of landslide and they are usually confined to the bay or lake of origin. One earthquake can trigger multiple landslides and landslide-generated tsunamis. Low tide is a factor for submarine landslides because low tide leaves part of the water-saturated sediments exposed without the support of the water. Loading on the delta from added weight such as trains or a warehouse or added fill can add to an area's instability.

These events usually occur in the heavily glaciated areas of Prince William Sound and the part of Southeast Alaska. (AEIC)

Impact

A large tsunami would be expected to create major property damage. The GKA contains many harbor facilities and on-shore structures that would be damaged or destroyed by a large tsunami. It is assumed that a tsunami would damage or destroy most of the electrical power and telephone communications infrastructure throughout the area. Water and sewer systems in the cities of Ketchikan and Saxman and many service areas would be damaged or destroyed. Transportation infrastructure would suffer from road damage, damage to the airport, and damage to marine docking facilities. (GKA EOP)

Tsunami Mitigation Goals and Projects

Goals

Goal 1. Increased Public Education about Tsunamis and Seiches.

Goal 2. Tsunami Ready Community Designation Program.

Goal 3. Develop accurate inundation maps for the Ketchikan coastline.

Goal 4. Update Ketchikan Emergency Operations Plan, as needed.

Projects

Please add specific projects to this list, if any are in planning stages.

T-1. Siren and lights at both ends of town for Tsunami and other hazardous warnings. (Goal 1)

T-2: Continued Participation in Tsunami Awareness Programs, consider obtaining TsunamiReady Designation. (Goal 2)

T-3. Update Greater Ketchikan Area Emergency Operations Plan, as needed, Conduct Emergency Operation Plan Exercises. (Goal 4)

T-4. Inundation Mapping. (Goal 3)

Section 4. Severe Weather Hazard

Hazard Description

Weather is the result of four main features: the sun, the planet's atmosphere, moisture, and the structure of the planet. Certain combinations can result in severe weather events that have the potential to become a disaster.

In Alaska, there is great potential for weather disasters. High winds can combine with loose snow to produce a blinding blizzard and wind chill temperatures to 75°F below zero. Extreme cold (-40°F to -60°F) and ice fog may last for weeks at a time. Heavy snow can impact the interior and is common along the southern coast. A quick thaw means certain flooding.

The GKA is at greatest risk of damage from heavy rainfall and hurricane force winds.

GKA Rainfall Gauge

Heavy, wet snow, generally more than 12 inches of accumulation in less than 24 hours, can immobilize a community by bringing transportation to a halt. Until the snow can be removed, airports and major roadways are impacted, even closed completely, stopping the flow of supplies and disrupting emergency and medical services. Accumulations of snow can cause roofs to collapse and knock down trees and power lines. Heavy wet snow can also damage light aircraft and sink small boats. A quick thaw after a heavy snow can cause substantial flooding. The cost of snow removal, repairing damages, and the loss of business can have severe economic impacts on cities and towns. Injuries and deaths related to heavy snow usually occur as a result of vehicle accidents.

Casualties also occur due to overexertion while shoveling snow and hypothermia caused by overexposure to the cold weather.

Location

The hazards of severe weather impact Ketchikan on an area wide basis.

A severe weather event would create an area wide impact and could damage structures and potentially isolate the GKA from the rest of the state.

Extent

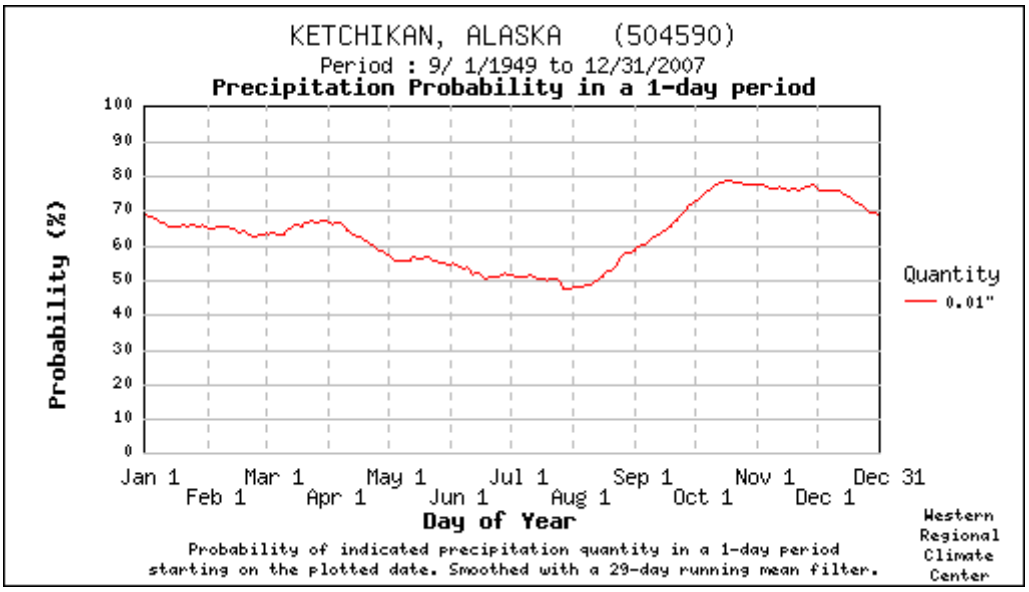
Severe weather could result in a ***limited*** extent event in the GKA. Table 8, page 25, defined limited as an event that would cause injuries and/or illnesses, that do not result in permanent disability; complete shutdown of critical facilities for more than one week and more than 10% of property severely damaged.

Probability

Heavy rainfall and hurricane force winds are common the GKA which means that the probability of an Severe weather event is ***high***. A high probability is defined in Table 9, page 25, as an event that is present with a high probability of occurrence within the calendar year. Event has up to 1 in 1 year chance of occurring.

The following figure from the Western Regional Climate Center shows that Ketchikan has a 50% to 80% probability of at least a half-inch of rainfall most days.

Figure 8. Precipitation Probability in a 1-day period



Previous occurrences

Heavy rainfall and hurricane force winds are common within the area. There have been two reported events of severe weather that caused property damage. High winds knocked down radio transmission towers in the 1980's and in 1999 heavy snows mixed with rain caused the collapse of several buildings in the southeaster portion of the GKA. (*GKA EOP*)

Average annual precipitation is 162 inches a year. An analysis of wind climatologic in Tongass Narrows, based on 25 years of hourly data from the Ketchikan Airport, indicates that the 100-year return wind is 85 miles per hour and the 100-year return gust is 130 miles per hour. The excess soil moisture causes tree roots to develop in the surface layers, leaving the mature trees highly susceptible to being blown down. (Ketchikan International Airport, Environmental Appendix, 2002)

Impact

Property damage to infrastructure, telephone lines and broken water and sewer could be expected during an severe weather event. Structures built over the last twenty years within the area are generally built to sustain high winds and heavy precipitation.

Severe Weather Mitigation Goals and Projects

Goals

Goal 1. Mitigate the effects of extreme weather by instituting programs that provide early warning and preparation.

Goal 2. Educate people about the dangers of extreme weather and how to prepare.

Goal 3. Develop practical measures to warn in the event of a severe weather event.

Projects

Please add specific projects to this list, if any are in planning stages.

SW-1. Research and consider instituting the National Weather Service program of *"Storm Ready"*. (Goal 2)

SW-2. Conduct special awareness activities, such as Winter Weather Awareness Week, Flood Awareness Week, etc. (Goal 2)

SW-3. Expand public awareness about NOAA Weather Radio for continuous weather broadcasts and warning tone alert capability. (Goal 1, 3)

SW-4. Encourage weather resistant building construction materials and practices. (Goal 1)

Background Information

Storm Ready

Research and consider instituting the National Weather Service program of *"Storm Ready"*.

Storm Ready is a nationwide community preparedness program that uses a grassroots approach to help communities develop plans to handle all types of severe weather—from tornadoes to tsunamis. The program encourages communities to take a new, proactive approach to improving local hazardous weather operations by providing emergency managers with clear-cut guidelines on how to improve their hazardous weather operations.

To be officially Storm Ready, a community must:

1. Establish a 24-hour warning point and emergency operations center.
2. Have more than one way to receive severe weather forecasts and warnings and to alert the public.
3. Create a system that monitors local weather conditions.
4. Promote the importance of public readiness through community seminars.
5. Develop a formal hazardous weather plan, which includes training severe weather spotters and holding emergency exercises.
6. Demonstrate a capability to disseminate warnings.

Specific Storm Ready guidelines, examples, and applications also may be found on the Internet at: www.nws.noaa.gov/stormready

Section 5. Hazards not Profiled in the GKA

Volcanoes

The responsibility for hazard identification and assessment for the active volcanic Centers of Alaska falls to the Alaska Volcano Observatory and its constituent organizations (USGS, DGGS, and UAF).

The Alaska Volcano Observatory (AVO), which is a cooperative program of the U.S. Geological Survey (USGS), Alaska Division of Geological & Geophysical Surveys (DGGS), and the University of Alaska Fairbanks Geophysical Institute (UAF/GI), monitor the seismic activity at 23 of Alaska's 41 active volcanoes in real time. In addition, satellite images of all Alaskan and Russian volcanoes are analyzed daily for evidence of ash plumes and elevated surface temperatures. Russian volcanoes are also a concern

to Alaska as prevailing winds could carry large ash plumes from Kamchatka into Alaskan air space. AVO also researches the individual history of Alaska's active volcanoes and produces hazard assessment maps for each center.

The AVO identifies the closest active volcano to the GKA at being over 400 miles away. http://www.avo.alaska.edu/

Wildland Fire

The soil conditions and abundant rainfall combine to make wildland fire hazard unlikely.

Snow Avalanche and Ground Failure

Not a risk in the GKA populated areas, but with additional roads more areas will become available to develop. It may be appropriate for a future addition.

Chapter 5. GKA Mitigation Strategy

Benefit - Cost Review

This chapter of the plan outlines the GKA's overall strategy to reduce its vulnerability to the effects of the hazards studied. Currently the planning effort is limited to the hazards determined to be of the most concern; *flooding, tsunami, severe weather and earthquake*; however the mitigation strategy will be updated as additional hazard information is added and new information becomes available.

The projects listed on the following Benefit and Costs Listing Table, were prioritized using a listing of benefits and costs review method as described in the FEMA *How-To-Guide Benefit-Cost Review in Mitigation Planning* (FEMA 386-5).

Due to monetary as well as other limitations, it is often impossible to implement all mitigation actions. Therefore, the most cost-effective projects for implementation will be pursued for funding first, not only to use resources efficiently, but also to make a realistic start toward mitigating risks.

Due to the dollar value associated with both life-safety and critical facilities, the prioritization strategy represents a special emphasis on benefit-cost review because the factors of life-safety and critical facilities steered the prioritization towards projects with likely good benefit-cost ratios. The GKA considered the following factors in prioritizing the mitigation projects.

Prioritization Strategy

1. Extent to which benefits are maximized when compared to the costs of the projects, the Benefit Cost Ratio must be 1.0 or greater.

2. Extent the project reduces risk to life-safety.

3. Project protects critical facilities or critical Municipality functionality.

4. Hazard probability.

5. Hazard severity.

Other criteria that were used to developing the benefits – costs listing:

- Vulnerability before and after Mitigation

  Number of people affected by the hazard, areawide, or specific properties
  Areas affected (acreage) by the hazard
  Number of properties affected by the hazard
  Loss of use

Loss of life (number of people)
Injury (number of people)

- List of Benefits

  Risk reduction (immediate or medium time frame)
  Other community goals or objectives achieved
  Easy to implement
  Funding available
  Politically or socially acceptable

- Costs

  Construction cost
  Programming cost
  Long time frame to implement
  Public or political opposition
  Adverse environmental effects

This method supports the principle of benefit-cost review by using a process that demonstrates a special emphasis on maximization of benefits over costs. Projects that demonstrate benefits over costs and that can start immediately were given the highest priority. Projects that the costs somewhat exceed immediate benefit and that can start within five years (or before the next update) were given a description of medium priority, with a timeframe of one to five years. Projects that are very costly without known benefits, probably cannot be pursued during this plan cycle, but are important to keep as an action, were given the lowest priority and designated as long term.

The plan is subject to final Assembly approval after pre-approval is obtained by DHS&EM.

After the MHMP Update has been approved, the projects must be evaluated using a Benefit-Cost Analysis (BCA) during the funding cycle for disaster mitigation funds from DHS&EM and FEMA.

A description of the BCA process follows. Briefly, BCA is the method by which the future benefits of a mitigation project are determined and compared to its cost. The result is a Benefit-Cost Ratio, which is derived from a project's total net benefits divided by its total cost. The BCR is a numerical expression of the cost-effectiveness of a project. Composite BCRs of 1.0 or greater have more benefits than costs, and are therefore cost-effective.

Benefit-Cost Review vs. Benefit-Cost Analysis (FEMA 386-5) states in part:
Benefit-Cost Review for mitigation planning differs from the benefit cost analysis (BCA) used for specific projects. BCA is a method for determining the potential positive effects of a mitigation action and comparing them to the cost of the action. To assess and demonstrate the cost-effectiveness of mitigation actions, FEMA has developed a suite of BCA software, including hazard-specific modules. The analysis determines whether a mitigation project is technically cost-effective. The principle behind the BCA is that the benefit of an action is a reduction in future damages.

DMA 2000 does not require hazard mitigation plans to include BCA's for specific projects, but does require that a BCR be conducted in prioritizing projects.

Benefit-Cost Analysis

The following section is reproduced from a document prepared by FEMA, which explains how to perform a Benefit –Cost Analysis. The complete guidelines document, a benefit-cost analysis document and benefit-cost analysis technical assistance are available online http://www.fema.gov/government/grant/bca.

Facilitating BCA

Although the preparation of a BCA is a technical process, FEMA has developed software, written materials, and training that simplify the process of preparing BCAs. FEMA has a suite of BCA software for a range of major natural hazards: earthquake, fire (wildland/urban interface fires), flood (riverine, coastal A-Zone, coastal V-Zone), hurricane wind (and typhoon), and tornado.

Sometimes there is not enough technical data available to use the BCA software mentioned above. When this happens, or for other common, smaller-scale hazards or more localized hazards, BCAs can be done with the Frequency Damage Method (i.e., the Riverine Limited Data module), which is applicable to any natural hazard as long as a relationship can be established between how often natural hazard events occur and how much damage and losses occur as a result of the event. This approach can be used for coastal storms, windstorms, freezing, mud/landslides, severe ice storms, snow, tsunami, and volcano hazards.

Applicants and sub-applicants must use FEMA-approved methodologies and software to demonstrate the cost-effectiveness of their projects. This will ensure that the calculations and methods are standardized, facilitating the evaluation process. Alternative BCA software may also be used, but only if the FEMA Regional Office and FEMA Headquarters approve the software.

To assist applicants and sub-applicants, FEMA has prepared the *FEMA Mitigation BCA Toolkit* CD. This CD includes all of the FEMA BCA software, technical manuals, BC training courses, Data-Documentation Templates, and other supporting documentation and guidance.

The *Mitigation BCA Toolkit* CD is available free from FEMA Regional Offices or via the BC Helpline, at bchelpline@dhs.gov or toll free number at (866) 222-3580.

The BC Helpline is also available to provide BCA software, technical manuals, and other BCA reference materials as well as to provide technical support for BCA.

For further technical assistance, applicants or sub-applicants may contact their State Mitigation Office, the FEMA Regional Office, or the BC Helpline. FEMA and the BC Helpline provide technical assistance regarding the preparation of a BCA.

Eligible Projects for PDM Funding

The PDM (Grant Program) is federally funded through FEMA at 75% of the plan or project and requires a 25% local fund match.

The program is annual, nationally competitive and is intended to reduce overall risks to the population and structures, while also reducing reliance on funding from actual disaster declarations.

A Hazard Mitigation ***Planning*** grant is only available for communities that do not have a FEMA/State approved and community adopted All-Hazard Mitigation Plan.

A Hazard Mitigation ***Project*** grant is only available for communities that do have a FEMA/State approved and community adopted Hazard Mitigation Plan. Approval of this plan will meet this requirement.

Hazard Mitigation Projects are intended to reduce risk to life and property and examples include:

Elevation of flood prone structures
Structural and non-structural seismic retrofits of public facilities
Voluntary acquisition or relocation of structures out of the floodplain
Natural hazard protective measures for utilities, water and sanitary sewer systems
Localized storm water management and flood control projects

Eligible Projects for HMGP Funding

To be eligible for funding under the HMGP, proposed measures must meet the minimum project criteria under 44 CFR 206.434(b).

These criteria are designed to ensure that the most appropriate projects are selected for funding. Projects may be of any nature that will result in protection of public or private property from natural hazards. Some types of projects that **may be eligible** include:

- Acquisition of hazard prone property and conversion to open space;
- Retrofitting existing buildings and facilities;
- Elevation of flood prone structures;
- Vegetative management/soil stabilization;
- Infrastructure protection measures;
- Stormwater management;
- Minor structural flood control projects; and
- Post-disaster code enforcement activities.

The following types of projects **are not** eligible under the HMGP:

- Retrofitting places of worship (or other projects that solely benefit religious organizations); and
- Projects in progress.

There are five minimum criteria that all projects must meet in order to be considered for funding:

- Conforms with the *State Hazard Mitigation Plan*;
- Provides beneficial impact upon the designated disaster area;
- Conforms with environmental laws and regulations;
- Solves a problem independently or constitutes a functional portion of a solution; and,
- Is cost-effective.

To be eligible for funding under the HMGP, proposed measures must meet the minimum project criteria under 44 CFR 206.434(b).

These criteria are designed to ensure that the most appropriate projects are selected for funding. Projects may be of any nature that will result in protection of public or private property from natural hazards. Some types of projects that **may be eligible** include:

- Acquisition of hazard prone property and conversion to open space;
- Retrofitting existing buildings and facilities;
- Elevation of flood prone structures;
- Vegetative management/soil stabilization;
- Infrastructure protection measures;
- Stormwater management;
- Minor structural flood control projects; and
- Post-disaster code enforcement activities.

The following types of projects **are not** eligible under the HMGP:

- Retrofitting places of worship (or other projects that solely benefit religious organizations); and

- Projects in progress.

There are five minimum criteria that all projects must meet in order to be considered for funding:

- Conforms with the *State Hazard Mitigation Plan*;
- Provides beneficial impact upon the designated disaster area;
- Conforms with environmental laws and regulations;
- Solves a problem independently or constitutes a functional portion of a solution; and,
- Is cost-effective.

Benefit – Costs Review Listing Table

The projects listed on Table 21, list the benefits or pros of a potential project and the costs or cons of a potential project. The review method is further described in the FEMA *How-To-Guide Benefit-Cost Review in Mitigation Planning* (FEMA 386-5).

Priority Definitions in Table 21:

High = Clearly a life/safety project, or benefits clearly exceed the cost or can be implemented 0 – 1 year.
Medium = More study required to designate as a life/safety project, or benefits may exceed the cost, or can be implemented in 1 – 5 years.
Low = More study required to designate as a life/safety project, or not known if benefits exceed the costs, or long-term project, implementation will not occur for over 5 years.

Table 21. GKA Benefit Cost Review Listing

Mitigation Projects	Benefits (pros)	Costs (cons)	Priority*
Note: Please identify any specifics projects to add to this list.			
Flood/Erosion (FLD)			
FLD-1. Identify Drainage Patterns and Develop a Comprehensive Drainage System	Benefit to entire community Property damage reduction	Engineering study needed >$50,000 1 – 5 years	Medium
FLD-2. Structure Elevation and/or Relocation	Life/Safety project Benefit to government facilities and private properties.	Dollar cost unknown, >$50,000 1 – 5 year implementation	Medium
FLD-3. Updated FIRM Ketchikan Maps	USCOE facilitated project. Can be started immediately.	Expensive, at least $100,000	High
FLD-4. Public Education	DCRA funding may be available. Could be done yearly. Inexpensive <$1,000	Not clear if there would be community interest or participation.	Medium
FLD-5. Continue yearly process with FEMA for the CRS rating to lower flood insurance rates.	High capability by borough to do on an annual basis Will keep reducing NFIP insurance for entire community. <$1,000/year	Staff time.	High

Mitigation Projects	Benefits (pros)	Costs (cons)	Priority*
FLD-6. Continue to obtain flood insurance for all structures within the flood zone and continue compliance with NFIP.	High capability by Borough to do on an annual basis. Public benefit to have public buildings insured through NFIP. Inexpensive, approx. $3,000/year.	Staff time	High
FLD-7. Require that all new structures be constructed according to NFIP requirements and set back from the river shoreline to lessen future erosion concerns and costs.	High capability by Borough to do on an annual basis. Public benefit to have public buildings insured through NFIP. Inexpensive, approx. $3,000/year.	Staff time	High
Earthquake (E)			
E-1. Identify buildings and facilities that must be able to remain operable during and following an earthquake event.	Life/Safety issue/Risk reduction Benefit to entire community Inexpensive State assistance available	Staff time	High
E-2. Contract a structural engineering firm to assess the identified bldgs and facilities.	Benefit to entire community Risk reduction	Feasibility and need analysis needed. 1 – 5 years	Medium
E-3. Nonstructural mitigation projects (i.e. assessing whether heavy objects are tied down)	Reduce property damage and reduces risk of injury from falling objects	Staff or Volunteer time	Medium
E-4. Conduct mock emergency exercises to identify response vulnerabilities.	Life/Safety issue/Risk reduction Benefit to entire community Inexpensive State assistance available Could be an annual event	Staff or Volunteer time	Medium

Mitigation Projects	Benefits (pros)	Costs (cons)	Priority*
Tsunami (T)			
T-1. Participation Tsunami Ready Community Designation	Life/Safety issue/Risk reduction Benefit to entire community Inexpensive State assistance available Could be an annual event	Staff time	High
T-2. Inundation Mapping	FEMA, PDM, HMGP and State DCRA funding available. USCOE facilitated project. 1 – 5 year project.	Expensive, at least $100,000	Medium
T-3. Update GKA Emergency Operations Plan, as needed	Life/Safety issue/Risk reduction Benefit to entire community Inexpensive State assistance available 1 – 5 years, or as needed.	Staff time	Medium
Severe Weather (S/W)			
S/W-1. Research and consider instituting the National Weather Service program of *"Storm Ready"*.	Life/Safety issue Risk reduction Benefit to entire community Inexpensive State assistance available	Staff time	High
S/W-2. Conduct special awareness activities, such as Winter Weather Awareness Week, Flood Awareness Week, etc.	Life/Safety issue Risk reduction Benefit to entire community Inexpensive State assistance available	Staff time	High
S/W-3. Expand public awareness about NOAA Weather Radio for continuous weather broadcasts and warning tone alert capability	Life/Safety issue Risk reduction Benefit to entire community Inexpensive State assistance available	Staff time	High

Mitigation Projects	Benefits (pros)	Costs (cons)	Priority*
S/W-4. Encourage weather resistant building construction materials and practices.	Risk and damage reduction. Benefit to entire community.	May require ordinance change. Potential for increased staff time. Research into feasibility necessary. Political and public support not determined. 1 – 5 year implementation	Medium

Mitigation Projects Table

Table 22 presents Greater Ketchikan Area's strategy for mitigation of the natural hazards faced by the community and includes a brief description of the projects, lead agencies, costs, potential funding sources and an estimated timeframe for each project. The final column allows the community to make note of specific progress on projects during the 5-year life of the plan.

Table 22. GKA Mitigation Projects

Mitigation Projects	Responsible Agency	Cost	Funding Sources	Estimated Timeframe	Project Status (during annual review)
Note: Please identify any specifics projects to add to this list.					
Flood/Erosion (FLD)					
FLD-1. Identify Drainage Patterns and Develop a Comprehensive Drainage System	FEMA	N/A	PDM FMA	>1 year	
FLD-2. Structure Elevation and/or Relocation	FEMA DHS&EM	N/A	PDM FMA	>1 year	
FLD-3. Updated FIRM GKA Maps	FEMA	>$100,000	FMA PDM	<1 year	
FLD-4. Public Education	Borough DHS&EM	Staff Time	Borough	Ongoing	
FLD-5. Pursue obtaining a lower CRS rating to lower flood insurance rates.	Borough DCRA	<$1,500	Borough	<1 year	
FLD-6. Continue to obtain flood insurance for all Borough structures, and continue compliance with NFIP.	Borough	<$1,500	Borough	Ongoing	

Mitigation Projects	Responsible Agency	Cost	Funding Sources	Estimated Timeframe	Project Status (during annual review)
FLD-7. Require that all new structures be constructed according to NFIP requirements and set back from the shoreline to lessen future erosion concerns and costs.	Borough	Staff Time	Borough Budget	Ongoing	
Earthquake (E)					
E-1. Identify buildings and facilities that must be able to remain operable during and following an earthquake event.	Cities & Borough DHS&EM DCRA	Staff Time	State Grants	>1 year	
E-2. Contract a structural engineering firm to assess the identified bldgs and facilities.	Cities & Borough DHS&EM	>$10,000	PDM	>5 years	
E-3. Nonstructural mitigation projects (i.e. assessing whether heavy objects are tied down)	Cities & Borough	Staff time	Borough	<1 year	
E-4. Conduct mock emergency exercises to identify response vulnerabilities.	Cities & Borough DHS&EM	Staff/Volunteer time	Borough DHS&EM	>1 year	
Tsunami (T)					
T-1. Siren and lights at both ends of town for Tsunami and other hazardous warnings	Borough DHS&EM	Not determined	PDM HMGP DHS&EM/ NOAA NTHMP	>1 year	
T-2: Continued Participation in the Tsunami Awareness Programs.	Borough DHS&EM	Staff Time	Borough DHS&EM	Ongoing	

Mitigation Projects	Responsible Agency	Cost	Funding Sources	Estimated Timeframe	Project Status (during annual review)
T-3. Update GKA Emergency Operations Plan, as needed, Conduct Emergency Operation Plan Exercises	Borough DHS&EM	>$20,000	PDM	Ongoing	
T-4. Inundation Mapping	NOAA/ NTHMP DHS&EM	>$150,000	NOAA - NTHMP	>5 years	
Severe Weather (SW)					
SW-1. Research and consider instituting the National Weather Service program of *"Storm Ready"*.	Borough	Staff Time	Borough DHS&EM	<1 year	
SW-2. Conduct special awareness activities, such as Winter Weather Awareness Week, Flood Awareness Week, etc.	Borough DCRA DHS&EM	Staff Time	Borough DCRA DHS&EM	<1 year	
SW-3. Expand public awareness about NOAA Weather Radio for continuous weather broadcasts and warning tone alert capability	Borough	Staff Time	Borough NOAA	Ongoing	
SW-4. Encourage weather resistant building construction materials and practices.	Borough	Staff Time	Borough	<1 year	

Acronyms used on this table:

HMGP	Hazard Mitigation Grant Program
NTHMP	National Tsunami Hazard Mitigation Program
NOAA	National Oceanographic and Atmospheric Administration
NWS	National Weather Service
PDM	Pre-Disaster Mitigation (Grant)

Chapter 6. City of Ketchikan Annex

Section 1. Community Overview

Note: Section 1 was reproduced directly from the DCRA website found at *Division of Community and Regional Affairs (DCRA) Community Information*: http://www.commerce.state.ak.us/dca/commdb/CF_BOCK.htm. Please update if outdated or incorrect.

Table 23. COK Community Information

Community Information	Contact Information
City of Ketchikan	City of Ketchikan Bob Weinstein, Mayor 334 Front Street Ketchikan, AK 99901 Phone: (907) 225-3111 Fax: (907) 225-5075 Email: mayor@city,ketchikan.ak.us Web: http://www.city.ketchikan.ak.us
Borough Located In:	Ketchikan Gateway Borough Dave Kiffer, Mayor 344 Front Street Ketchikan, AK 99901 Phone: (907) 228-6625 Fax: (907) 247-6625 Email: boro_clerk@brorugh.ketchikan.ak.us Web: http://www.borough.ketchikan.ak.us
Village Council	Ketchikan Indian Corporation Samuel Bergeron, President 2960 Tongass Avenue Ketchikan, AK 99901 Phone: (907) 225-5158 Fax: (907) 247-5158 Email: Media@kictribe.org Web: http://www.kictribe.org
Regional Native Corporation	Sealaska Corporation 1 Sealaska Plaza, Suite 400 Juneau, AK 99801 Phone: (907) 586-1512 Fax: (907) 586-2304 Web: http://www.sealaska.com
Electric Utility	Ketchikan Public Utilities 2930 Tongass Avenue Ketchikan, AK 99901 Phone: (907)228-5447
School District	Ketchikan Gateway Schools 333 Schoenbar Rd Ketchikan, AK 99901 Phone: (907) 225-2118

Community Information	Contact Information
	Fax: (907) 247-3820 Email: Boyler@kgbsd.org Web : http://www.kgbsd.org

Current Population: 7,622 (2006 DCCED Certified Population)

Pronunciation: KETCH-ih-kan

Incorporation Type: Home Rule City

Borough: Ketchikan Gateway Borough

Census Area: Ketchikan Gateway

Government

The City of Ketchikan is organized under a home rule charter. It was first adopted in October of 1960 and has been amended eight times since that date, most recently in 2002. Any amendments to the Charter must be approved by a vote of the public. The Ketchikan Charter may be viewed on the City website.

The City Council consists of one mayor and seven council members, elected by the citizens of the City of Ketchikan. The vice mayor is selected to serve a one-year term from among the council members shortly after the elections. Municipal elections are held the first Tuesday of each October and each council member elected serves a three-year term. The Council meets for regularly scheduled meetings every first and third Thursday of each month.

Population

According to the 2000 U.S. Census, nearly 23 percent of Ketchikan's residents are Alaska Native. There are a total of 3,645 housing units in Ketchikan. 3,297 of these units are occupied, 65 are vacant due to seasonal use and 448 units are vacant year-round.

Economy

Ketchikan has a diverse economy as an industrial center and a major port of entry in Southeast Alaska. Commercial fishing, fish processing, tourism and timber industries offer seasonal employment. A total of 401 residents hold commercial fishing permits. Cruise ships bring over 650,000 visitors to Ketchikan each summer; an additional 50,000 independent travelers also visit the area.

Ketchikan's potential work force totals 6,092. A total of 3,974 residents are employed. 1,772 adult residents are not in the labor force (not seeking work). Ketchikan has an unemployment rate of 8.2 percent. The per capita income is $22,484. The median

household income is $45,802. Approximately 7.6 percent of residents live below the poverty line.

Facilities

Downtown Ketchikan

Water is drawn from a dam on Ketchikan Lake. The water is treated, stored and piped to 99.5 percent of Ketchikan's households. The households not connected to city water utilize rain catchment systems. The city operates a central sewage collection system that services 98 percent of households. The sewage receives primary treatment before being discharged. Ketchikan Public Utilities purchases power from the state-owned Swan Lake Hydro Facility, and owns three hydroelectric plants. Refuse is hauled to the Deer Mountain landfill which has an incinerator, balefill system, recycling and resource re-use, and household hazardous waste collection services.

Ketchikan has a general hospital, an Indian community tribal health clinic and, for emergency support only, U.S. Coast Guard Dispensary. The hospital is a qualified Acute Care facility with Medevac service. Long term care is available at the Pioneers' Home and Island View Manor. Ketchikan is in EMS Region 3A in the Southeast region. Emergency services have limited highway, marine, airport, floatplane and helicopter access.

Ketchikan Gateway Borough School District has 10 schools, 156 teachers and 2,321 students. The University of Alaska Southeast also has a campus in Ketchikan.

Transportation

A State-owned, paved, lighted 7,500-foot-long by 150-foot-wide asphalt runway is located on Gravina Island, a 10-minute ferry ride. Regular jet service provides transportation in and out of Ketchikan daily. Ketchikan is a regional transportation hub. There are four float plane landing facilities, a deep-draft dock, five small boat harbors, a

dry dock, ship repair yard, boat launch and a State ferry terminal. (DCRA **http://www.commerce.state.ak.us/dca/commdb/CF_BOCK.htm)**

Section 2. Risk Assessment

Identified Hazards

The City of Ketchikan has the same identified hazards of floods, earthquake, tsunami and severe weather as described in Chapter 4.

> ***Federal 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.*

Location

The location for Earthquake, Tsunami and Severe Weather natural hazards are the same as outlined in Chapter 4.

The Federal Emergency Management Agency (FEMA) has mapped the expected 100-year floodplain for only the City of Ketchikan.

The limits of the FEMA study extend from one-half mile north of Carlanna Creek to the Coast Guard Station within the City of Ketchikan. Much of the City of Ketchikan, including the Schoenbar, Hoadley, Whipple and Carlanna Creek areas lie within the floodplain of a 100-year flood (FEMA 1990).

Chapter 4, Maps 5 and 6 depict the FIRM "A" zones overlaid on the land use map. The "A" zones are defined as areas of 100-year flood zones.

Properties unaffected directly, will suffer due to road closures, impacts to public safety (access and response capabilities), limited availability of perishable commodities, and isolation.

Extent

The extent of floods, earthquake, tsunami and severe weather hazards are the same as outlined in Chapter 4.

Probability

The extent of floods, earthquake, tsunami and severe weather hazards are the same as outlined in Chapter 4.

Previous Occurrences

Previous occurrences of floods, earthquake, tsunami and severe weather hazards are the same as outlined in Chapter 4.

Impact

The impact of floods, earthquake, tsunami and severe weather hazards are the same as outlined in Chapter 4.

Section 3. City of Ketchikan Mitigation Projects

> ***Federal 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.*

Table 24. City of Ketchikan Projects

Mitigation Projects	Responsible Agency	Cost	Funding Sources	Estimated Timeframe	Annual Review
Note: Please identify any specifics projects to add to this list.					
Structure Elevation and/or Relocation	FEMA DHS&EM	N/A	PDM FMA	>1 year	
Identify buildings and facilities that must be able to remain operable during and following an earthquake event.	Cities & Borough DHS&EM DCRA	Staff Time	State Grants	>1 year	
Consider Participation in the Tsunami Awareness Programs for the residents of the City of Ketchikan	COK DHS&EM	N/A	DHS&EM	Ongoing	
Conduct special awareness activities, such as Winter Weather Awareness Week, Flood Awareness Week, etc in COK	COK	N/A	City Budget	Ongoing	

Chapter 7. City of Saxman - Annex

Note: Section 1 was reproduced directly from the DCRA website found at *Division of Community and Regional Affairs (DCRA) Community Information*: http://www.commerce.state.ak.us/dca/commdb/CF_BOCK.htm. Please update if outdated or incorrect.

Section 1. Community Overview

Current Population:	422 (2006 DCCED Certified Population)
Incorporation Type:	2nd Class City
Borough:	Ketchikan Gateway Borough
Census Area:	Ketchikan Gateway

History

Saxman was named after Samuel Saxman, a Presbyterian teacher who was lost at sea while helping local Tlingits find a new village site. In 1886 Tlingits from old Tongass and Cape Fox villages wanted a new village site to construct a central BIA school and Presbyterian Church. In 1894, the new village site was chosen and construction of the school and houses began immediately. By 1900, 142 people lived in Saxman surviving on Saxman's natural resources. The city was incorporated in 1929. Totem poles and various other artifacts were retrieved from abandoned village sites. The totem poles were restored and relocated to Saxman. A rail-barge terminal was completed in 1967; it serves as Ketchikan's major cargo container terminal.

Saxman City Hall, 2008

Culture

Saxman residents are predominately Tlingit and engage in a subsistence lifestyle.

Population

Approximately 70% of Saxman residents are Alaska Native. According to the 2000 U.S. Census, Saxman has total of 146 housing units and 127 occupied housing units. 19 housing units are vacant and 1 is vacant due to seasonal use.

Economy

Most Saxman residents work in the nearby city of Ketchikan. The City and Saxman Seaport provide limited employment opportunities. The Cape Fox Corporation offers employment in the tourism and timber sectors. One resident holds a commercial fishing permit. Saxman's total potential work force is 349; 182 residents are employed and 115 adult residents are not in the labor force (not seeking work). The City's unemployment rate is 26.6%. The per capita income is $15,642 and the median household income is $44,375. Approximately 12% of Saxman residents live below the poverty line.

Facilities

Water is derived from a dammed reservoir. Water is treated, stored and piped to 98% of Saxman residents. Wastewater is piped from 92% of Saxman's housing units to a new treatment plant. Residents, not connected to public water and wastewater, derive water from surface sources and typically have an individual septic system. Refuse is collected by a private company and disposed of in the Ketchikan landfill. The electric utility is Ketchikan Public Utilities; who purchases some power from the state-owned Swan Lake Hydro Facility, and owns three hydroelectric plants.

The Ketchikan General Hospital also services Saxman residents. Saxman is classified as a highway village, it is found in EMS Region 3A in the Southeast Region. Emergency services have limited highway, coastal, and helicopter access, and are within 30 minutes of a higher-level satellite health care facility.

Transportation

The South Tongass Highway connects Saxman to Ketchikan. Daily passenger jet service, boat moorage and State ferry services is available out of Ketchikan. Saxman Seaport is equipped with a dock and commercial barge facilities.

Climate

Saxman lies in a maritime climate zone characterized by warm winters, cool summers, and heavy precipitation. Summer temperatures range from 46°F to 59°F; winter temperatures range from 29°F to 48°F. The record high temperature is 97°F; the record low is -4°F. An average of 163 inches of precipitation annually, including 69 inches of snow.

Section 2. Risk Assessment

Identified Hazards

The City of Saxman has the same identified hazards of floods, earthquake, tsunami and severe weather as described in Chapter 4.

Location

The location of floods, earthquake, tsunami and severe weather are the same as outlined in Chapter 4.

Extent

The extent of floods, earthquake, tsunami and severe weather hazards are the same as outlined in Chapter 4.

Probability

The extent of floods, earthquake, tsunami and severe weather hazards are the same as outlined in Chapter 4.

Previous Occurrences

Previous occurrences of floods, earthquake, tsunami and severe weather hazards are the same as outlined in Chapter 4.

Impact

The impact of floods, earthquake, tsunami and severe weather hazards are the same as outlined in Chapter 4.

Section 3. City of Saxman Mitigation Projects

Federal 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.*

Table 25. Saxman Mitigation Project Plan

Mitigation Projects	Responsible Agency	Cost	Funding Sources	Estimated Timeframe	Annual Review
Note: Please identify any specifics projects to add to this list.					
Structure Elevation and/or Relocation	FEMA DHS&EM	N/A	PDM FMA	>1 year	
Identify buildings and facilities that must be able to remain operable during and following an earthquake event.	Cities & Borough DHS&EM DCRA	Staff Time	State Grants	>1 year	
Consider Participation in the Tsunami Awareness Programs for the residents of the City of Saxman	COS DHS&EM	N/A	DHS&EM	Ongoing	
Conduct special awareness activities, such as Winter Weather Awareness Week, Flood Awareness Week, etc in COK	COS	N/A	City Budget	Ongoing	

Glossary of Terms

A-Zones

Type of zone found on all Flood Hazard Boundary Maps (FHBMs), Flood Insurance Rate Maps (FIRMs), and Flood Boundary and Floodway Maps (FBFMs).

Acquisition

Local governments can acquire lands in high hazard areas through conservation easements, purchase of development rights, or outright purchase of property.

Asset

Any manmade or natural feature that has value, including, but not limited to people; buildings; infrastructure like bridges, roads, and sewer and water systems; lifelines like electricity and communication resources; or environmental, cultural, or recreational features like parks, dunes, wetlands, or landmarks.

Base Flood

A term used in the National Flood Insurance Program to indicate the minimum size of a flood. This information is used by a community as a basis for its floodplain management regulations. It is the level of a flood, which has a one-percent chance of occurring in any given year. Also known as a 100-year flood elevation or one-percent chance flood.

Base Flood Elevation (BFE)

The elevation for which there is a one-percent chance in any given year that flood water levels will equal or exceed it. The BFE is determined by statistical analysis for each local area and designated on the Flood Insurance Rate Maps. It is also known as 100-year flood elevation.

Base Floodplain

The area that has a one percent chance of flooding (being inundated by flood waters) in any given year.

Building

A structure that is walled and roofed, principally above ground and permanently affixed to a site. The term includes a manufactured home on a permanent foundation on which the wheels and axles carry no weight.

Building Code

The regulations adopted by a local governing body setting forth standards for the construction, addition, modification, and repair of buildings and other structures for the purpose of protecting the health, safety, and general welfare of the public.

Community

Any state, area or political subdivision thereof, or any Indian tribe or tribal entity that has the authority to adopt and enforce statutes for areas within its jurisdiction.

Community Rating System (CRS)

The Community Rating System is a voluntary program that each municipality or county government can choose to participate in. The activities that are undertaken through CRS are awarded points. A community's points can earn people in their community a discount on their flood insurance premiums.

Critical Facility

Facilities that are critical to the health and welfare of the population and that are especially important during and after a hazard event. Critical facilities include, but are not limited to, shelters, hospitals, and fire stations.

Designated Floodway

The channel of a stream and that portion of the adjoining floodplain designated by a regulatory agency to be kept free of further development to provide for unobstructed passage of flood flows.

Development

Any man-made change to improved or unimproved real estate, including but not limited to buildings or other structures, mining, dredging, filling, grading, paving, excavation or drilling operations or of equipment or materials.

Digitize

To convert electronically points, lines, and area boundaries shown on maps into x, y coordinates (e.g., latitude and longitude, universal transverse mercator (UTM), or table coordinates) for use in computer

Disaster Mitigation Act (DMA)

DMA 2000 (public Law 106-390) is the latest legislation of 2000 (DMA 2000) to improve the planning process. It was signed into law on October 10, 2000. This new legislation reinforces the importance of mitigation planning and emphasizes planning for disasters before they occur.

Earthquake

A sudden motion or trembling that is caused by a release of strain accumulated within or along the edge of the earth's tectonic plates.

Elevation

The raising of a structure to place it above flood waters on an extended support structure.

Emergency Operations Plan

A document that: describes how people and property will be protected in disaster and disaster threat situations; details who is responsible for carrying out specific actions; identifies the personnel, equipment, facilities, supplies, and other resources available for use in the disaster; and outlines how all actions will be coordinated.

Erosion

The wearing away of the land surface by running water, wind, ice, or other geological agents.

Federal Disaster Declaration

The formal action by the President to make a State eligible for major disaster or emergency assistance under the Robert T. Stafford Relief and Emergency Assistance Act, Public Law 93-288, as amended. Same meaning as a Presidential Disaster Declaration

Federal Emergency Management Agency (FEMA)

A federal agency created in 1979 to provide a single point of accountability for all federal activities related to hazard mitigation, preparedness, response, and recovery.

Flood

A general and temporary condition of partial or complete inundation of water over normally dry land areas from (1) the overflow of inland or tidal waters, (2) the unusual and rapid accumulation or runoff of surface waters from any source, or (3) mudflows or the sudden collapse of shoreline land.

Flood Disaster Assistance

Flood disaster assistance includes development of comprehensive preparedness and recovery plans, program capabilities, and organization of Federal agencies and of State and local governments to mitigate the adverse effects of disastrous floods. It may include maximum hazard reduction, avoidance, and mitigation measures, as well policies, procedures, and eligibility criteria for Federal grant or loan assistance to State and local governments, private organizations, or individuals as the result of the major disaster.

Flood Elevation

Elevation of the water surface above an establish datum (reference mark), e.g. National Geodetic Vertical Datum of 1929, North American Datum of 1988, or Mean Sea Level.

Flood Hazard

Flood Hazard is the potential for inundation and involves the risk of life, health, property, and natural value. Two reference base are commonly used: (1) For most situations, the Base Flood is that flood which has a one-percent chance of being exceeded in any given year (also known as the 100-year flood); (2) for critical actions, an activity for which a one-percent chance of flooding would be too great, at a minimum the base flood is that flood which has a 0.2 percent chance of being exceeded in any given year (also known as the 500-year flood).

Flood Insurance Rate Map

Flood Insurance Rate Map (FIRM) means an official map of a community, on which the Administrator has delineated both the special hazard areas and the risk premium zones applicable to the community.

Flood Insurance Study

Flood Insurance Study or Flood Elevation Study means an examination, evaluation and determination of flood hazards and, if appropriate, corresponding water surface elevations, or an examination, evaluations and determination of mudslide (i.e., mudflow) and/or flood-related' erosion hazards.

Floodplain

A "floodplain" is the lowland adjacent to a river, lake, or ocean. Floodplains are designated by the frequency of the flood that is large enough to cover them. For example, the 10-year floodplain will be covered by the 10-year flood. The 100-year floodplain by the 100-year flood.

Floodplain Management

The operation of an overall program of corrective and preventive measures for reducing flood damage, including but not limited to emergency preparedness plans, flood control works and floodplain management regulations.

Floodplain Management Regulations

Floodplain Management Regulations means zoning ordinances, subdivision regulations, building codes, health regulations, special purpose ordinances (such as floodplain ordinance, grading ordinance and erosion control ordinance) and other applications of police power. The term describes such state or local regulations, in any combination thereof, which provide standards for the purpose of flood damage prevention and reduction.

Flood Zones

Zones on the Flood Insurance Rate Map (FIRM) in which a Flood Insurance Study has established the risk premium insurance rates.

Flood Zone Symbols

A - Area of special flood hazard without water surface elevations determined.
A1-30 - AE Area of special flood hazard with water surface elevations determined.
AO - Area of special flood hazard having shallow water depths and/or unpredictable flow paths between one and three feet.
A-99 - Area of special flood hazard where enough progress has been made on a protective system, such as dikes, dams, and levees, to consider it complete for insurance rating purposes.
AH - Area of special flood hazard having shallow water depths and/or unpredictable flow paths between one and three feet and with water surface elevations determined.
B - X Area of moderate flood hazard.
C - X Area of minimal hazard.
D - Area of undetermined but possible flood hazard.

Geographic Information System

A computer software application that relates physical features of the earth to a database that can be used for mapping and analysis.

Governing Body

The legislative body of a municipality that is the assembly of a borough or the council of a city.

Hazard

A source of potential danger or adverse condition. Hazards in the context of this plan will include naturally occurring events such as floods, earthquakes, tsunami, coastal storms, landslides, and wildfires that strike populated areas. A natural event is a hazard when it has the potential to harm people or property.

Hazard Event

A specific occurrence of a particular type of hazard.

Hazard Identification

The process of identifying hazards that threaten an area.

Hazard Mitigation

Any action taken to reduce or eliminate the long-term risk to human life and property from natural hazards. (44 CFR Subpart M 206.401)

Hazard Mitigation Grant Program

The program authorized under section 404 of the Stafford Act, which may provide funding for mitigation measures identified through the evaluation of natural hazards conducted under §322 of the Disaster Mitigation Act 2000.

Hazard Profile

A description of the physical characteristics of hazards and a determination of various descriptors including magnitude, duration, frequency, probability, and extent. In most cases, a community can most easily use these descriptors when they are recorded and displayed as maps.

Hazard and Vulnerability Analysis

The identification and evaluation of all the hazards that potentially threaten a jurisdiction and analyzing them in the context of the jurisdiction to determine the degree of threat that is posed by each.

Mitigate

To cause something to become less harsh or hostile, to make less severe or painful.

Mitigation Plan

A systematic evaluation of the nature and extent of vulnerability to the effects of natural hazards typically present in the State and includes a description of actions to minimize future vulnerability to hazards.

National Flood Insurance

The Federal program, created by an act of Congress in Program (NFIP) 1968 that makes flood insurance available in communities that enact satisfactory floodplain management regulations.

One Hundred (100)-Year

The flood elevation that has a one-percent chance of occurring in any given year. It is also known as the Base Flood.

Planning

The act or process of making or carrying out plans; the establishment of goals, policies, and procedures for a social or economic unit.

Repetitive Loss Property

A property that is currently insured for which two or more National Flood Insurance Program losses (occurring more than ten days apart) of at least $1000 each have been paid within any 10-year period since 1978.

Risk

The estimated impact that a hazard would have on people, services, facilities, and structures in a community; the likelihood of a hazard event resulting in an adverse condition that causes injury or damage. Risk is often expressed in relative terms such as a high, moderate, or low likelihood of sustaining damage above a particular threshold due to a specific type of hazard event. It can also be expressed in terms of potential monetary losses associated with the intensity of the hazard.

Riverine

Relating to, formed by, or resembling rivers (including tributaries), streams, creeks, brooks, etc.

Riverine Flooding

Flooding related to or caused by a river, stream, or tributary overflowing its banks due to excessive rainfall, snowmelt or ice.

Runoff

That portion of precipitation that is not intercepted by vegetation, absorbed by land surface, or evaporated, and thus flows overland into a depression, stream, lake, or ocean (runoff, called immediate subsurface runoff, also takes place in the upper layers of soil).

Seiche

An oscillating wave (also referred to as a seismic sea wave) in a partially or fully enclosed body of water. May be initiated by landslides, undersea landslides, long period seismic waves, wind and water waves, or a tsunami.

Seismicity

Describes the likelihood of an area being subject to earthquakes.

State Disaster Declaration

A disaster emergency shall be declared by executive order or proclamation of the Governor upon finding that a disaster has occurred or that the occurrence or the threat of a disaster is imminent. The state of disaster emergency shall continue until the governor finds that the threat or danger has passed or that the disaster has been dealt with to the extent that emergency conditions no longer exist and terminates the state of disaster emergency by executive order or proclamation.

Along with other provisions, this declaration allows the governor to utilize all available resources of the State as reasonably necessary, direct and compel the evacuation of all or part of the population from any stricken or threatened area if necessary, prescribe routes, modes of transportation and destinations in connection with evacuation and control ingress and egress to and from disaster areas. It is required before a Presidential Disaster Declaration can be requested.

Topography

The contour of the land surface. The technique of graphically representing the exact physical features of a place or region on a map.

Tribal Government

A Federally recognized governing body of an Indian or Alaska native Tribe, band, nation, pueblo, village or community that the Secretary of the Interior acknowledges to exist as an Indian tribe under the Federally Recognized Tribe List Act of 1994, 25 U.S.C. 479a. This does not include Alaska Native corporations, the ownership of which is vested in private individuals.

Tsunami

A sea wave produced by submarine earth movement or volcanic eruption with a sudden rise or fall of a section of the earth's crust under or near the ocean. A seismic disturbance or landslide can displace the water column, creating a rise or fall in the level of the ocean above. This rise or fall in sea level is the initial formation of a tsunami wave.

Vulnerability

Describes how exposed or susceptible to damage an asset it. Vulnerability depends on an asset’s construction, contents, and the economic value of its functions. The vulnerability of one element of the community is often related to the vulnerability of another. For example, many businesses depend on uninterrupted electrical power – if an electrical substation is flooded, it will affect not only the substation itself, but a number of businesses as well. Other, indirect effects can be much more widespread and damaging than direct ones.

Vulnerability Assessment

The extent of injury and damage that may result from hazard event of a given intensity in a given area. The vulnerability assessment should address impacts of hazard events on the existing and future built environment.

Watercourse

A natural or artificial channel in which a flow of water occurs either continually or intermittently.

Watershed

An area that drains to a single point. In a natural basin, this is the area contributing flow to a given place or stream.

Appendix
Community Newsletter

Figure 9. GKA Newsletter

Ketchikan Multi-Jurisdictional
Local Hazard Mitigation Plan

May 13, 2008

The Planning Process

The Disaster Mitigation Act of 2000 requires the plan to follow and record the following elements:

1. Planning process
2. Hazard Identification
3. Risk Assessment
4. Mitigation Strategy with Goals, Objectives and Actions
5. Plan Maintenance
6. Adoption by local government
7. Approval from FEMA, and the State Department of Home land Security and Emergency Manage ment

For more information on mitigation planning you can visit FEMA's website at http://www.fema.gov/plan/mitplanning/index.shtm

Local Hazards Mitigation Planning

Disasters, such as avalanches, coastal erosion, earthquakes, floods, high winds, landslides, tsunamis, wildfires, and severe weather, are events beyond human control. However, reducing the risks and damage from these events through mitigation efforts is possible.

The Federal Emergency Management Agency (FEMA) wants to ensure that each community's critical facilities and services will continue to function after a natural disaster. FEMA has funds available for projects that help to do this.

Preparing a Local Hazards Mitigation Plan (LHMP) is the first step in this process. Through the planning process risks from each type of hazard are assessed, critical facilities are identified within the community and their vulnerability to hazard is determined, potential losses are estimated, and community land use is considered.

With this information, a mitigation strategy will be developed, including mitigation goals, objectives and actions to reduce or avoid long-term risk or damage from disaster events. Projects will be identified, evaluated and prioritized, and an implementation strategy developed.

The plan must be approved by the local government, FEMA, and the state Department of Homeland Security and Emergency Management (DHS&EM) before it is official.

Once the plan is finalized, the community is eligible to apply to FEMA and DHS&EM for funds for the community's identified mitigation projects.

State DHS&EM sponsors planning effort in Ketchikan

The Alaska Division of Homeland Security and Emergency Services has funded a local hazards mitigation plan for Ketchikan. WHPacific, Inc. and Bechtol Planning and Development (BP&D) have been hired to help the community to prepare the plan.

The LHMP will include information specific to the **Ketchikan Borough, City of Ketchikan and City of Saxman**, including critical facilities, potential threats from natural hazards, and strategies to minimize the risk to people and property.

Strategies may be for immediate implementation or long term activities, and can range from educating residents about what to do in the event of a natural disaster to relocating structures away from high-risk areas.

To Get Involved

The most practical plans are ones that have local public input. Your ideas are valuable to the planning team and to the usefulness of the plan. The planning team will introduce the project at the Ketchikan Borough Planning Commission Meeting on May 13, 2008 at 6:00 p.m. in the City Council Chambers. At this meeting team members will share information about the plan and its value to the community.

Your comments are welcome!

The planning team hopes that you will take an active role in the Ketchikan LHMP development. If you would like more information or have questions or comments, you can reach the planning team by phone or email:

Contacts

Jonathon Lappin, AICP, Ketchikan Boro
907.228.6625
Jim Hill, City of Ketchikan
907.225.3111
Kelly Ludwig-Johnson, City of Saxman
907.225.4166
Ervin Petty, DHS&EM Mitigation Section
800.478.2337 ervin.petty@alaska.gov

Nicole McCullough or Suzanne Taylor
WHPacific, Inc.
300 W 31st, Anchorage, AK 99503
1.800.427.4153, 907.339.6570
staylor@whpacific.com
Eileen Bechtol, AICP
Bechtol Planning & Development
907.235.4246
bechtol@pobox.xyz.net

Further information may also be found on the DHS&EM website at:

http://www.ak-prepared.com/plans/mitigation/mitplanresourcesa.htm

Public Meeting

Date/Time: May 13, 2008, 6:00 p.m.

Where: City Council Chambers

Why: Solicit Input in the Hazard Plan.

Please Join Us!

Mitigation is any sustained action taken to reduce or eliminate long-term risk to life and property from a hazard event.

WHPacific

Community Presentation

Figure 10. Community Presentation

Ketchikan Gateway Borough
City of Ketchikan
City of Saxman
Multi-Jurisdictional
Local Hazards Mitigation Plan

Presentation to Ketchikan Borough Planning -Zoning Commission

May 13, 2008

Eileen R. Bechtol, BP&D,
Suzanne Taylor WHPacific Inc.

Which of These Hazards are Present in Ketchikan?

- Severe Weather
- Wildfire
- Avalanches/Landslides
- Earthquake
- Tsunami
- Flooding/Erosion

What is a Local Hazards Mitigation Plan?

A plan adopted by the local governing body, which identifies hazards, risks, and vulnerabilities and includes prioritized mitigation projects.

Mitigation

Any activities which actually eliminate or reduce damages incurred from a disaster.

Why do Local Communities Need One?

- DMA 2000 requires local governments, as a condition of receiving federal disaster mitigation funds, to have a mitigation plan.
- Disaster Mitigation Act of 2000 (DMA 2000) section 322 (a-d) plan requirements.

After Plan is Completed?

- Ketchikan will be eligible to apply for mitigation project funds from DHS&EM and FEMA.

Ketch
Na
Haz

Volcano	Snow Avalanche	Tsunami & Seiche	Ground Failure
U	Y	Y	Y

Key:

Y: Hazard is present in jurisdiction but probability unknown

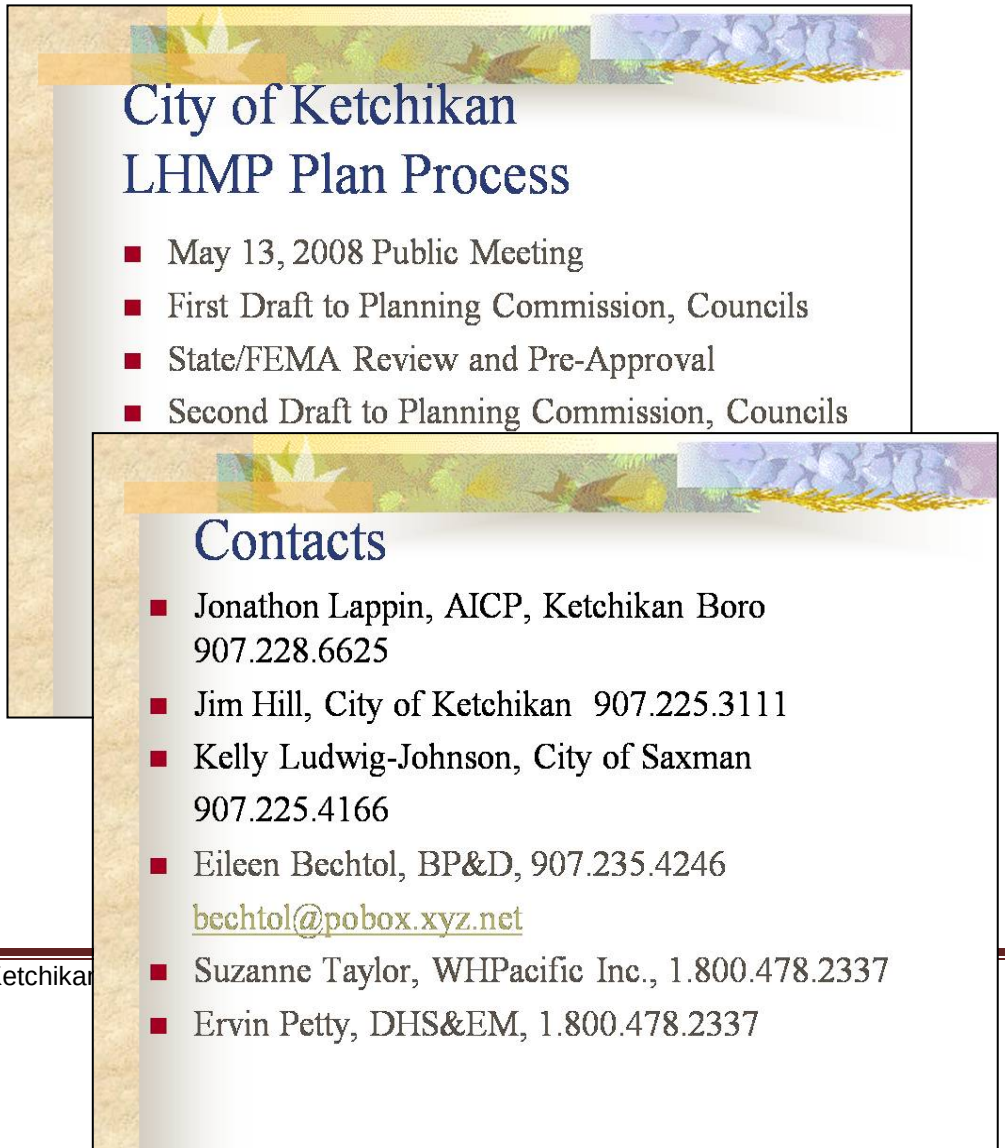
Y – L: Hazard is present with a **low** probability of occurrence within the next ten years. Event has up to 1 in 10 years chance of occurring.

Y – M: Hazard is present with a **moderate** probability of occurrence within the next three years. Event has up to 1 in 3 years chance of occurring.

Y – H: Hazard is present with a **high** probability of occurrence within the calendar year. Event has up to 1 in 1 year chance of occurring.

N: Hazard is not present

U: Unknown if the hazard occurs in the jurisdiction


City of Ketchikan
LHMP Plan Process
May 13, 2008 Public Meeting
First Draft to Planning Commission, Councils
State/FEMA Review and Pre-Approval
Second Draft to Planning Commission, Councils
Contacts
Jonathon Lappin, AICP, Ketchikan Boro
907.228.6625
Jim Hill, City of Ketchikan 907.225.3111
Kelly Ludwig-Johnson, City of Saxman
907.225.4166
Eileen Bechtol, BP&D, 907.235.4246
bechtol@pobox.xyz.net
Suzanne Taylor, WHPacific Inc., 1.800.478.2337
Ervin Petty, DHS&EM, 1.800.478.2337

Ketchikan 2020 – Future Land Use and Development Trends

The following document is from the draft Ketchikan 2020 Comprehensive Plan, written for the Ketchikan Gateway Borough by HDR, Inc.

The excerpt copied below describes future land use development trends for the Greater Ketchikan Area.

3.1 Land and Water Use
Goal 1. Ensure the efficient use of land resources in the Borough.

Goal 2. Maintain a flexible land use planning process directed toward enhancing future economic growth, opening new lands for development, maintaining the diversity of lifestyles available to the people of Ketchikan, and balancing resource development needs with natural resource protection.
A. Provide for a land use pattern that balances resource development needs with resource protection needs.
B. To select and develop public lands and to guide development of private lands in a manner that adequately meets present and future needs.[moved to land management section].
C. Allow tideland development, leasing, and use in an efficient and orderly manner.
D. To minimize losses of property and life by recognizing the threat imposed by geophysical hazards and planning accordingly. [Moved to geophysical hazards]

Goal 3. Recognize that the planning process is ongoing and existing approved plans must be implemented to maintain flexibility and effectiveness.
A. Maintain the currency and applicability of the Coastal Management Plan.
B. Implement the Coastal Management Plan.

Goal 4. Guide the use of land in a manner that provides for the orderly and efficient growth of the community and enhances the quality of life for present and future generations
A. Provide adequate land for commercial, industrial, and residential growth in a manner that promotes the efficient use, value, and enjoyment of the environment.
B. Promote the quality, livability, and long term stability of development in the community.
C. Maintain, to the extent feasible, viewsheds important to resident's quality of life and the economy.
D. Discourage strip mall development, especially outside of town
E. Support the mix of water front uses.
F. Encourage the provision of local services downtown.
G. Use zoning and other regulatory tools to minimize the impacts of adjacent noncompatible land uses such as industrial and residential development.
H. Adopt Development Standards.
I. Promote housing choice, quality, and availability in the community.

General land shortage Issues
· There is a shortage of relatively level and accessible land on Revilla.

· Remaining vacant land on Revilla may not be developable.
· Shortage of industrial waterfront.
· Marine operations constrained by lack of waterfront.
· Scarcity of developable land for commercial and industrial purposes often results in conflicting and incompatible residential and industrial/commercial land uses.
· Supply of land not sufficient for effective market competition.
· Need to open up land for residential, industrial, and commercial development.
· Need to create more land for residential development; land is too expensive.
· Need to open up Borough land on Pennock Island.

Gravina Island Development
A. Identify ownership of lands on Gravina Island for transportation needs.
1. Transportation corridors north and south of the airport.
2. Build Roads.
B. Work with all landowners on Gravina.
1. Mental Health Trust.
2. Borough.
3. Forest Service.
4. University Land Trust.

Goal 2. Provide areas on Gravina Island for the following uses.
A. Water-related uses on the waterfront.
B. Airport-related industrial uses.
C. Recreation and subsistence uses particularly in Bostwick Inlet.
D. Lewis Reef Development.
E. Land for airport expansion
F. Seafood industry facilities.
G. Residential development
H. Large residential lots
I. Common waterfronts
J. Moorage for small boats
K. Moorage for small planes
L. Rural residential and cottage industry on North Gravina.
M. Regional landfill facility.
N. Consider moving industrial back from the coast rather than along coast of Gravina. Establish common access via landing ramp and roads.
O. Buffers between industrial uses and residential uses.

Goal 3. Diversify recreational opportunities on Gravina.
A. Green Belts
B. Public beaches
C. Golf course.
D. Public access to the Gravina shoreline for recreation.

Goal 4. Implement the Plan, i.e. develop needed infrastructure (power, roads, sewer, water), to support industry (commercial and industrial).

Goal 5. Provide fixed ("hardlink") access to Gravina and secondary supporting infrastructure i.e.; a road system.

Gravina Island Development Issues

· Maintain rural residential and cottage industry character of North Gravina.
· Buffer industrial uses from residential on Gravina. It gets crowded on the Revilla Side.
· Consider moving industrial back from the coast rather than along coast of Gravina. Establish common access via landing ramp and roads.
· Explore possibility of regional landfill facility on Gravina.
· Concern for loss of habitat on Gravina, esp. the shoreline.
· Public access to the Gravina shoreline for recreation.
· Concern about pollution in Tongass Narrows from existing Revilla development and future Gravina Island development.