

Municipality of Skagway

Multi-Hazard Mitigation Plan



Skagway, 2008

Prepared by:
The Municipality of Skagway
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Eileen Bechtol May 2008

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Acronyms

AAC	Alaska Administrative Code
AEIC	Alaska Earthquake Information Center
AEIS	Alaska Economic Information System
BFE	Base Flood Elevation (100 year flood)
BLM	Bureau of Land Management
CFR	Code of Federal Regulations
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
FEMA	Federal Emergency Management Agency
HMP	Hazard Mitigation Plan
HMPG	Hazard Mitigation Planning Grant
KLGO	Klondike Gold Rush National Park
MHMP	Multi-Hazard Mitigation Plan
MSL	Mean Sea Level
NFIP	National Flood Insurance Program
NPS	National Park Service
NOAA	National Oceanographic and Atmospheric Administration
NWS	National Weather Service
PDM	Pre Disaster Mitigation Grant
SCMP	Skagway Coastal Management Plan
UAF	University of Alaska, Fairbanks
USCOE	United States Army Corps of Engineers
USGS	U.S. Geological Survey
WCATWC	West Coast and Alaska Tsunami Warning Center

Planning Commission Resolution - Please add PC Resolution 09-04

Assembly Ordinance - To be added after Ordinance is Approved.

Final Approval Letter from FEMA - Will be added after final approval letter is received from FEMA.

Proposed by:	Administration
P&Z Review:	07/09/2009
First Reading:	12/03/2009
Second Reading:	12/17/2009
Vote: 5 Aye	0 Nay 1 Absent

MUNICIPALITY OF SKAGWAY, ALASKA

ORDINANCE NO. 09-24

AN ORDINANCE OF THE MUNICIPALITY OF SKAGWAY, ALASKA ADOPTING A MULTI-HAZARD MITIGATION PLAN (MHMP) FOR THE MUNICIPALITY OF SKAGWAY.

WHEREAS, the purpose of a Multi-Hazard Mitigation Plan (MHMP) is

1. Educate residents about the risk of natural hazards in their community and what mitigation actions or projects may be undertaken to reduce the risk to human life and property;
2. Make the community eligible to apply for Pre-Disaster Mitigation (PDM) Grant Program Funding and Hazard Mitigation Grant Program (HMGP) funding; and

WHEREAS, the PDM Grant Program is federally funded through the FEMA at 75% of the project and requires a 25% local (State) fund match; and

WHEREAS, the PDM Grant Program is annual and nationally competitive and is intended to reduce overall risks to the population and structures, while also reducing reliance on funding from actual disaster declarations; and

WHEREAS, A Hazard Mitigation Project grant is only available for communities that have a FEMA/State approved and community adopted Hazard Mitigation Plan; and

WHEREAS, 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; and

WHEREAS, The Hazard Mitigation Grant Program (HMGP) is available to communities after approval of a MHMP; and

WHEREAS, The projects are ranked using criteria designed to ensure that the most appropriate projects are selected for funding. Projects may be of any 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;
- Post-disaster code enforcement activities; and

WHEREAS, 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.

NOW THEREFORE BE IT ORDAINED AND ENACTED by the Municipality of Skagway, Alaska as follows:

Section 1. Classification. This is a non-code ordinance.

MUNICIPALITY OF SKAGWAY, ALASKA
ORDINANCE NO. 09-24
Page 2 of 2

Section 2. Purpose. To adopt a Multi-Hazard Mitigation Plan for the Municipality of Skagway.

Section 3. Organization. The Skagway Multi-Hazard Mitigation Plan is organized in 5 chapters:

Chapter 1. Outlines the process that was used to develop the plan; research, public involvement, implementation, monitoring, evaluating and update the plan, and continued public involvement.

Chapter 2. Provides a general overview of the community and outlines local, state and federal resources that may be used for mitigation planning and projects.

Chapter 3. Risk Assessment – General Overview. This chapter discusses in a general way what the federal requirements are for a risk assessment, identifies natural hazards profiled in the plan, provides maps, tables and figures of the community vulnerability to the natural hazard.

Chapter 4. Risk Assessment – Hazard Specific Sections. This chapter is broken into specific sections for each profiled natural hazard; hazard description, location, extent, probability, previous occurrences, impact, goals and potential projects.

Chapter 5. Mitigation Strategy. In order to apply for grants the community will need to do a benefit-cost analysis. A brief discussion, written by FEMA, is included in this chapter. A Benefit-Cost Listing Table is provided which lists potential projects and their respective benefits, costs and priority. A Mitigation Projects Table lists the same projects with potential funding sources, responsible agencies and timelines.

Section 4. Adoption. The Skagway Multi-Hazard Mitigation Plan dated November 9, 2009 is hereby adopted by reference.

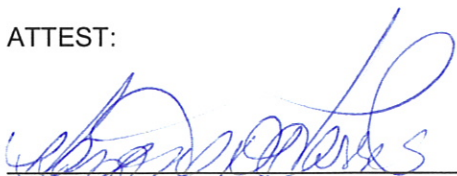
Section 5. Severability. If any provision of this ordinance or any application thereof to any person or circumstance is held invalid, the remainder of this ordinance and the application to other persons or circumstances shall not be affected thereby.

Section 6. Effective Date. This ordinance shall become effective immediately upon adoption.

PASSED AND APPROVED by a duly constituted quorum of the Borough Assembly of the Municipality of Skagway this 17th day of December, 2009.


Thomas D. Cochran, Mayor

ATTEST:


Marjorie D. Harris, Borough Clerk
(SEAL)



**PLANNING AND ZONING COMMISSION
RESOLUTION NO. 09-04**

A RESOLUTION OF THE PLANNING AND ZONING COMMISSION OF THE MUNICIPALITY OF SKAGWAY SUPPORTING THE PREAPPROVED DRAFT SKAGWAY MULTI-HAZARD MITIGATION PLAN

WHEREAS, the Municipality of Skagway 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 Public Safety Committee held a meeting on January 26, 2009 reviewing the Draft Skagway Multi-Hazard Mitigation Plan; and

WHEREAS, the Skagway Multi-Hazard Mitigation Plan has been sent to the Alaska Division of Homeland Security and Emergency Management and the Federal Emergency Management Agency and currently undergoing their review and preapproval; and

WHEREAS, the Planning & Zoning Commission held a public hearing on the Preapproved Draft Skagway Multi-Hazard Mitigation Plan on July 9, 2009; and

WHEREAS, No public comments were made pertaining to the Preapproved Draft Skagway Multi-Hazard Mitigation Plan adoption; and

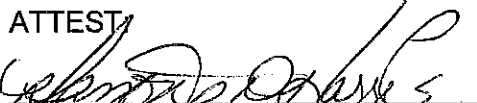
WHEREAS, the Skagway Multi Hazard Mitigation Plan will not be an enforcement policy; it will be used as a guide for disaster mitigation; and

NOW, THEREFORE, BE IT RESOLVED, that the Municipality of Skagway Assembly, hereby adopts the Municipality of Skagway Multi-Hazard Mitigation Plan as an official mitigation plan; and

BE IT FURTHER RESOLVED, that the Municipality of Skagway 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 review and approval.

PASSED AND APPROVED on the 9th day of July, 2009.

ATTEST


Marjorie D. Harris
Municipal Clerk


Robert Murphy
Chair

(SEAL)



Vote: 5 Aye 0 Nay 0 Absent 0 Vacant Seat

Skagway Multi-Hazard Mitigation Plan – Purpose and Organization

Purpose of a Multi-Hazard Mitigation Plan (MHMP)

1. Educate residents about the risk of natural hazards in their community and what mitigation actions or projects may be undertaken to reduce the risk to human life and property.
2. After a MHMP has been approved, the community may apply for the following types of grants.

Eligible Projects for PDM Funding

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

The program is annual and 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 **Project** grant is only available for communities that have a FEMA/State approved and community adopted Hazard Mitigation Plan.

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

The Hazard Mitigation Grant Program (HMGP) is available to communities after approval of a MHMP.

The projects are ranked using criteria 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.

Organization of the Skagway MHMP

Chapter 1. Outlines the process that was used to develop the plan; research, public involvement, implementation, monitoring, evaluating and update the plan, and continued public involvement.

Chapter 2. Provides a general overview of the community and outlines local, state and federal resources that may be used for mitigation planning and projects.

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This chapter is broken into specific sections for each profiled natural hazards; hazard description, location, extent, probability, previous occurrences, impact, goals and potential projects.

Chapter 5 – Mitigation Strategy

In order to apply for grants the community will need to do a benefit-cost analysis. A brief discussion, written by FEMA, is included in this chapter. A Benefit-Cost Listing Table is provided which lists potential projects and their respective benefits, costs and priority. A Mitigation Projects Table lists the same projects with potential funding sources, responsible agencies and timelines.

Chapter 1. Planning Process and Methodology

Introduction

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)

Mitigation Plan regulations are found in the Code of Federal Regulations 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)

On June 5, 2007, voters approved dissolution of the Municipality of Skagway and incorporation of the first first-class borough in the State of Alaska. The State of Alaska certified this election and the Municipality of Skagway Borough, called the Municipality of Skagway was incorporated on June 20, 2007.

This plan is a multi-hazard single jurisdiction plan. The Municipality limits did not change when Skagway became a borough.

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

The Municipality of Skagway Multi-Hazard Mitigation Plan (MHMP) includes information to assist the borough government and residents with planning to avoid potential future disaster losses. The plan provides information on natural hazards that affect Skagway, descriptions of past disasters, and lists projects that may help the community prevent disaster losses. The plan was developed to help the community of Skagway make decisions regarding natural hazards that affect the Municipality.

Plan Development

Location

The Municipality of Skagway is located at the northernmost end of Lynn Canal, at the head of Taiya Inlet. Skagway is considered the northernmost point in Southeast Alaska, 80 air miles northeast of Juneau and 110 road miles south of Whitehorse, Yukon Territory, Canada. It lies approximately 59.458330° North Latitude and 135.31890° West Longitude.



Skagway is located in the Skagway Recording District. The area encompasses 455 square miles of land and 11.9 square miles of water.

Project Staff

The Municipality of Skagway staff included Marj Harris, Municipality Clerk and Emily Rauscher. WHPacific and Bechtol Planning & Development were hired by the State to write the plan. The Planning Commission was the lead public body that reviewed the plan.

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 Skagway plans and studies as well as outside information and research. Outside sources are credited in parenthesis after their inclusion.

1. *State Hazard Mitigation Plan*. Prepared by and for DHS&EM. October 2007.
2. *Alaska DHS&EM Disaster Cost Index*. Prepared by and for DHS&EM. 2008.
3. *Coastal Management Plan, Revised*. Prepared by Sheinberg Associates for the Municipality of Skagway. 2007.
4. *Comprehensive Plan*. Prepared by and for Municipality of Skagway. 1999.

5. *Comprehensive Plan Update*. Prepared by Sheinberg Associates for Municipality of Skagway. 2009.
6. *Comprehensive Trails Plan*. Prepared by and for the Municipality of Skagway and National Park Service. 2003.
7. *Division of Community and Regional Affairs (DCRA) Community Information*: http://www.commerce.state.ak.us/dca/commdb/CF_BOCK.htm.
8. *FEMA How to Guides*:
 - Getting Started: Building Support For Mitigation Planning (FEMA 386-1)
 - Multi-Hazard Mitigation Planning Guidance, July 1, 2008 (FEMA 386-8)
 - 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)
9. Geological Society of London, Burlington House Piccadilly LONDON W1J 0BG
Tel: +44 (0)20 7434 9944 Fax: +44 (0)20 7439 8975 Email:
enquiries@geolsoc.org.uk Web site: www.geolsoc.org.uk
10. *Geophysical Survey, 2007* Prepared by a partnership between: the Municipality of Skagway, the Cold Regions Research Lab and the National Park Service, PowerPoint presentation to the Skagway Planning Commission, May 8, 2008 by Dave Schirokauer Natural Resources Manager Klondike Gold Rush NHP.
11. *Glacial Outburst Creates Flood on the Taiya River, Skagway, 2002*. Prepared by BLM, 2005 and 2007. PowerPoint presentation.
12. *Tsunami Hazard Mapping of Alaska Coastal Communities*, Alaska GEO Survey News, Vol. 6, No. 2, Prepared by DGGS, June 2002.
13. *University of Alaska, Fairbanks, and Alaska Earthquake Information Center (AEIC) website at*: <http://www.giseis.alaska.edu/Seis/>.
14. USGS Earthquake Probability Mapping: www/eqint.cr.usgs.gov.
15. 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/hmgrp
Individual Assistance Programs:	http://www.fema.gov/rrr/inassist.shtm
Interim Final Rule:	http://www.access.gpo.gov
National Flood Insurance Program:	http://www.fema.gov/nfip
Public Assistance Program:	http://www.fema.gov/rrr/pa

Public Involvement

A public meeting was held at the **May 8, 2008** Municipality Planning Commission meeting. The National Park Service provided information at this meeting regarding glacier outbursts which is included in the Chapter 4, Risk Assessment.

The Planning Commission reviewed the first draft of the plan at a meeting on **December 12, 2008** and authorized the plan's submittal for preapproval from the State and FEMA. Suggestions on drafting the plan were incorporated into the plan.

The Public Safety Committee reviewed the first draft and provided revisions of the plan at a meeting on **January 22, 2009**. Committee members present at the meeting were Mark Schaefer, Chairman of Committee, Mark Kirko, Fire Chief, Ray Leggett, Police Chief and Marj Harris, Borough Clerk. Project Manager Emily Rauscher and Eileen Bechtol (via teleconference) also attended the meeting. Comments and suggestions from this meeting were incorporated into the plan.

The Borough Planning Commission held another public meeting on the plan at their **July 9, 2009** regular meeting. No comments or suggested revisions were received at this meeting.

The Skagway Assembly will review and approve the plan after pre-approval by DHS&EM and FEMA.

A copy of the MHMP is available for public perusal at the Municipal Hall, Public Works Department, Municipal Library and online at the city website: <http://www.skagway.org>.

The Appendix includes a community newsletter that was sent to governmental agencies, community members and businesses using usual public noticing procedures for the Municipality. The newsletter and notices of all meetings regarding the SMHMP were distributed to the Planning Commission, Assembly, all other Skagway boards and commission, the Chamber of Commerce, area business and other governmental

agencies as per the Municipality customary noticing practices. The newsletter and public meeting notices were also posted around the community at several community businesses and other governmental agencies.

A copy of the Power Point presentation from the meeting is also included in the appendix of this plan.

All comments from interested parties during the public involvement period of this plan were incorporated.

Plan Implementation

The Skagway Planning Commission is the lead body for reviewing the plan and recommending approval to the Skagway Assembly. The Municipality of Skagway Assembly will be responsible for adopting the Skagway MHMP and all future updates. This governing body has the authority to promote sound public policy regarding hazards. The MHMP will be assimilated into other Skagway plans and documents as they come up for review according to each plan's review schedule.

Table 1. Skagway Plans

Document	Completed	Next Review
Skagway Comprehensive Plan	1999/Updated 2009	As needed
Skagway Legislative Priorities	FY 2010	Annually
Southeast Alaska Transportation Plan	2004	2012
Revised Skagway Coastal Management Plan	2007	2012
Skagway Comprehensive Trail Plan	2003	As needed

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 Municipality of Skagway Borough Manager or designee is responsible for monitoring the plan. On an annual basis, the Borough Manager will request 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 Planning

Commission and Assembly 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 Borough Manager or designee 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.

The schedule for the plan update is to start the following tasks before the end of the five-year cycle:

- 3 years: Contact DHS&EM regarding plan update funding and procedure.
- 2.5 years: Contract for technical or professional services (if applicable).
- 2 years: Review of mitigation plan, develop planning process and start the update.
- 6 months: State and FEMA review of plan. Update the plan if necessary.
- 3 months: Finish the public review and approval process.

The following table 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
Flood/Erosion	Completed	2009	2009
Earthquake	Completed	2009	2009
Tsunami	Completed	2009	2009
Severe Weather	Completed	2009	2009
Ground Failure	Future Addition	2013	To be scheduled
Snow Avalanche	Future Addition	2013	To be scheduled
Economic	Future Addition	2013	To be scheduled
Technological	Future Addition	2013	To be scheduled
Public Health Crisis	Future Addition	2013	To be scheduled

Continued Public Involvement

The following methods will be used for continued public involvement.

A copy of the MHMP will be put online at the municipality website:

<http://www.skagway.org>

Places where the hazard plan will be kept:

- Municipal Hall
- Planning Department
- Fire Department
- Public Works Department
- Clerk's Office
- Library

On an annual basis the Planning Commission will review the plan, which will be advertised to the public using the same method established under the public involvement section of this plan.

Chapter 2: Skagway Community Profile and Capability Assessment

Community Overview

Current Population:	854 (2006 DCCED Certified Population)
Pronunciation:	SKAG-way
Incorporation Type:	1 st Class Borough
Borough:	Municipality of Skagway
Census Area:	Skagway
Square Land Miles:	455 square land miles
Federal, non-NPS:	472,780 acres (85.3%)
Federal-NPS:	1,679 acres (0.3%)
State-General:	67,998 acres (12.3%)
Mental Health Trust:	1,486 acres (0.3%)
Municipality of Skagway:	8,429 acres (1.5%)
Private:	1,645 acres (0.3%)



Government

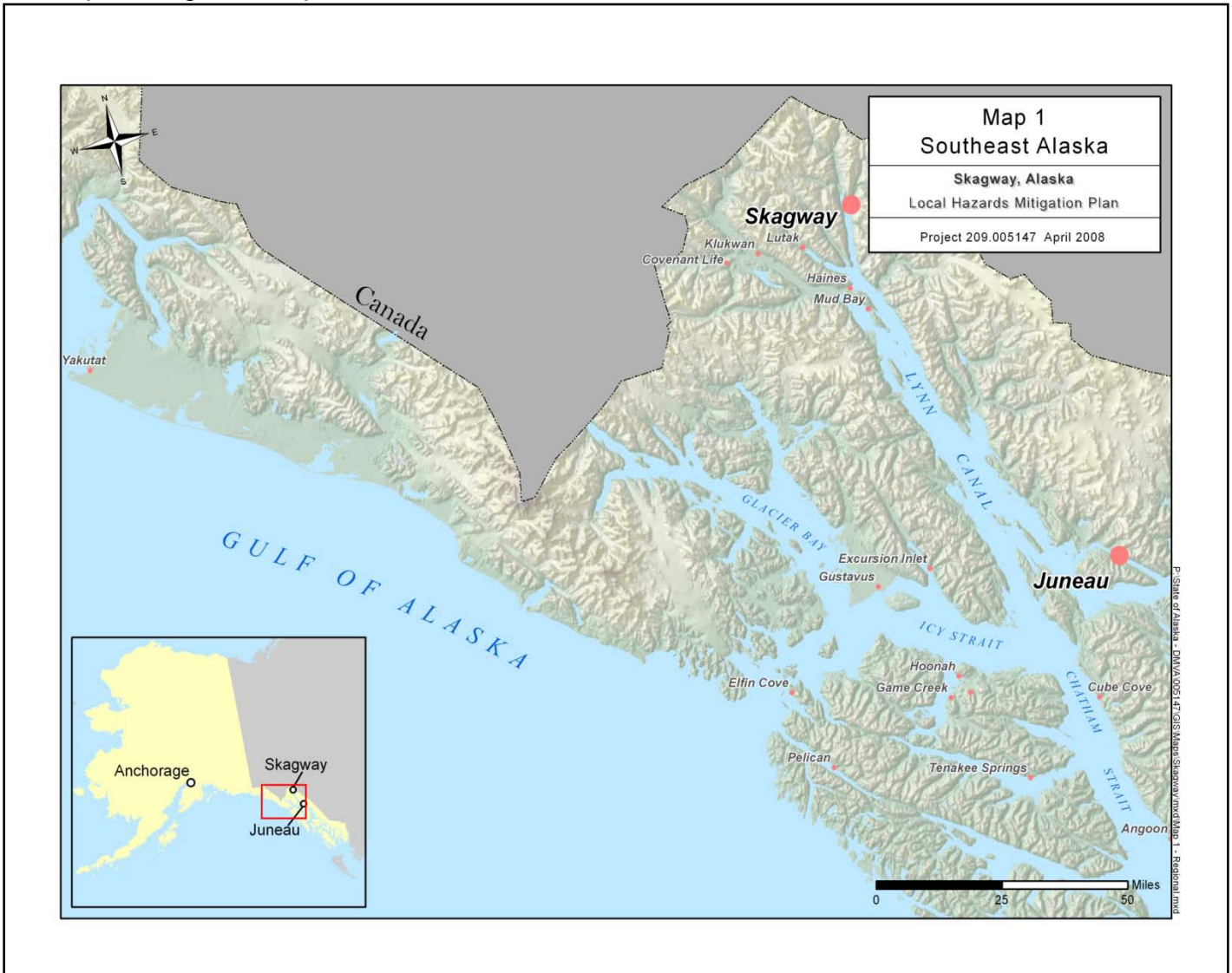
Skagway, Alaska was incorporated on June 28, 1900, as the first first-class city in the Territory of Alaska. During the early 1900s Skagway was known as the "Gateway to the Klondike." On June 5, 2007, voters approved dissolution of the City of Skagway and incorporation of the first first-class borough in the State of Alaska. The State of Alaska certified this election and the Municipality of Skagway Borough was incorporated on June 20, 2007.

The mayor is serving a 3-year term during the transition from the city to borough status. Once the initial term has expired the borough regulations will take effect. The mayor serves as the presiding officer at meetings, is not a voting member, but may vote in the case of a tie. The mayor has veto powers. The Assembly is elected at large and each of the 6 members serves a 3-year term. There are no term limits.



Skagway Welcome Sign, 2008

Map 1. Regional Map



The following table provides local and regional contact information for Skagway.

Table 3. Community Information

Community Information	Contact Information and Type
<p>Municipality of Skagway</p>	<p>P.O. Box 415 Skagway, AK 99840 Phone: (907) 983-2297 Fax: (907) 983-2151 E-Mail: m.harris@skagway.org Web: http://www.skagway.org</p>

Community Information	Contact Information and Type
Village Council: (BIA-Recognized IRA Council/ Also a Public Law 93-638 tribal gov't contractor)	Skaqua Traditional Council (Not ANCSA) P.O. Box 1157 Skagway, AK 99840 Phone: (907) 983-4068 Fax: (907) 983-3068 E-Mail: amathews@skagwaytraditional.org Web: http://www.skagwaytraditional.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
Regional Non-Profit:	Skagway Development Corporation P.O. Box 1236 Skagway, AK 99840 Phone: (907) 983-3414 Fax: (907) 983-3414 E-Mail: skagdev@aptalaksa.net Web: http://www.skagwaydevelopment.org
Census Area	Skagway
Regional Development	Skagway Development Corporation P.O. Box 1236 Skagway, AK 99840 Phone: (907) 983-3414 Fax: (907) 983-3414 E-Mail: skagdev@aptalaksa.net Web: http://www.skagwaydevelopment.org

Source: DCCED website information, April 2008

History

The Municipality of Skagway lies within the traditional boundaries of the Lkhoot (Chilkoot) band of Tlingits. The area traditionally was not occupied year round. Fish camps and hunting cabins were occupied from spring to fall, while traditional foods, medicines and supplies were gathered. Skagway was also home to a vital trade route that extended from the interior to the southern tip of California. Tlingit tribes had developed a complex economy.

One of the first non-native residents was Captain William "Billy" Moore who settled the City in 1887. Moore is credited with reconnoitering the White Pass route through the Skagway River Valley. Gold was first discovered on Bonanza Creek of the Klondike River in 1896. The resulting Gold Rush lasted from 1896 to 1899. During the Gold Rush Skagway's population exploded, once estimated to have reached 10,000. The White Pass and Yukon Route railroad was built during the Gold Rush. The city was incorporated on June 28, 1900. At the end of the Gold Rush Skagway experienced a

drastic population decline; by 1910 only 872 residents remained. During World War II, the city became an important center in Alaska's defense system. A fuel pipeline was constructed paralleling the railroad from Skagway to Whitehorse, YT. In 2008, the Municipality of Skagway was incorporated as a first Class Borough.

Culture

Skagway has historical Tlingit influences. Downtown buildings have been restored to reflect the history of the gold rush through the Chilkoot Pass. Currently Skagway is transitioning from city to borough status.

Population

The population of Skagway consists primarily of Caucasians. Approximately 5 percent of the population is Alaska Native or part Native. During the 2000 U.S. Census, total-housing units numbered 502, and vacant housing units numbered 101. Vacant units due to seasonal use totaled 47.

Economy

The nearly 1 million annual cruise ship visitors drive Skagway economy. Skagway is a port of call for cruise ships, state ferries and a transfer site for rail and interior bus tours. Shipping of lead/zinc ore, fuel and freight out of the Port, and via the Klondike Highway to and from Canada also provides some jobs. Four residents hold commercial fishing permits. Skagway has a median household income of \$49,375, a per capita of \$27,700. Only 3.7 percent of residents live below the poverty line. The potential work force is 705 people of which 478 residents are employed. 149 adult residents are not in the labor force (not seeking work). Skagway has an unemployment rate of 14 percent.

Facilities

Water is pumped from four wells, stored and piped to 82 percent of Skagway's residents. Piped sewage receives primary treatment before being released into the ocean. The influx of summer tourists nearly doubles the demand on the public water and wastewater system. Those residents not connected to public service utilize individual wells and septic systems. Only ten percents of residents depend on surface water sources and outhouses for water and wastewater needs. Refuse is disposed of in a City-operated incinerator, baler and ash fill facility. The community participates in recycling and annual hazardous waste disposal events. Electricity is generated by a hydroelectric and diesel facility operated by Alaska Power and Telephone Company.

Transportation

The Klondike Highway and Alaska Highway connect Skagway to Canada, south to the lower 48 or north to Interior Alaska. A State-owned 3,550-foot-long by 75-foot-wide paved runway provides air service to and from Skagway. A seaplane base and boat harbor provides base for air taxis, cruise ships and small boats. Two privately owned deep draft docks are loading and storage areas for freight barges.

Climate

As a consequence of Skagway's location deep within the coastal mountain range, the area is influenced both by the rainforest climate of Southeast Alaska and the continental climate typical of interior Alaska and Canada. As a result, Skagway is much drier than the rest of Southeast Alaska with an average of 29 inches of precipitation.

The average winter lows are between 18 to 37 degrees Fahrenheit (°F); the average high temperature during the summer is 45°F to 67°F. Snowfall averages 39 inches, with total precipitation of 29 inches per year. Two-thirds of Skagway's precipitation falls from September through January. Persistent surface winds are also common.

Vegetation and Soils

Skagway is located within the coastal spruce and hemlock forest. Cottonwood trees grow along the river floodplains. Spruce and hemlock forests cover Skagway's slopes from sea level to the timberline; near the timberline, at 2,000 to 3,000 feet in elevation, stunted mountain hemlock and firs are scattered about. Alpine tundra encompasses the area above the timberline. The forest's understory is characterized by a variety of shrubs including willow, red alder, devil's club, skunk cabbage and a variety of berries. Near the coast, in tideflats and wetlands, grasses, sedges and rushes are prevalent.

Skagway has a variety of soil types; ranging from fine silt and organic material to boulders. A sand and gravel alluvial deposit underlies the town. The bedrock consists of igneous, intrusive rock, and some metamorphic rock. The two primary rock types, igneous and intrusive, are characterized by low permeability resulting in rapid rises in stream and river water levels during the spring melt.

Skagway Capability Assessment

Local Resources

Skagway has a number of planning and land management tools that will allow it to implement hazard mitigation activities. The resources available in these areas have been assessed by the Borough, and are summarized in the following tables.

Table 4. Regulatory Tools

Regulatory Tools (ordinances, codes, plans)	Local Authority (Yes/No)	Year of Most Recent Update
Building code	Yes	
Zoning ordinance	Yes	
Subdivision ordinance or regulations	Yes	
Special purpose ordinances (floodplain management, stormwater management, hillside or steep slope ordinances, wildfire ordinances, hazard setback requirements)	Flood Plain Regulations 1977	Need new FIRMs
Growth management ordinances (also called “smart growth” or anti-sprawl programs)	Yes	
Site plan review requirements	Yes	
Comprehensive plan	Yes	Ongoing Update – 2009
A capital improvements plan	Yes	Annually
An economic development plan	Yes	Part of Comp Plan
An emergency response plan	Yes	2003
A post-disaster recovery plan	No	
Real estate disclosure requirements	No	

Table 5. Staff/Personnel Resources

Staff/Personnel Resources	Yes/No	Department/Agency and Position
Engineer(s) or professional(s) trained in construction practices related to buildings and/or infrastructure	Yes	
Planners or Engineer(s) with an understanding of natural and/or human-caused hazards	Yes	Municipal engineer
Floodplain manager	Yes	Building official
Surveyors	No	
Staff with education or expertise to assess the community's vulnerability to hazards	No	None
Personnel skilled in GIS and/or HAZUS	Yes	
Scientists familiar with the hazards of the community	No	None
Emergency manager	No	
Grant writers	No	None

Table 6. Fiscal Capabilities

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

- **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 Skagway 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 step-by-step 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 Skagway 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 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 Web sites 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 Borough 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.



Municipality of Skagway, 2008

Chapter 3: Risk Assessment, General Overview

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.

Section 1. 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 Skagway MHMP meets those criteria are outlined below:

Table 7. Risk Assessments - Federal Requirements

Section §201.6(c)(2) Requirement	Skagway Multi-Hazard Mitigation Plan Where it is Addressed in Plan
<p>Identifying Hazards §201.6(c)(2)(i)</p> <p>The risk assessment <i>shall</i> include a description of the type . . . of all natural hazards that can affect the jurisdiction . . .</p>	<p>Chapter 3, Section 3 identifies flood/erosion, earthquake, snow avalanche, tsunami and severe weather as the top five natural hazards in Skagway.</p>
<p>Profiling Hazards §201.6(c)(2)(i)</p> <p>The risk assessment <i>shall</i> 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.</p>	<p>Chapter 4, Sections 1-5 includes hazard-specific sections of the natural hazards that may affect the Municipality. The MHMP includes location, extent and probability for each natural hazard identified. The MHMP also provides hazard specific information on past occurrences of hazards events.</p>

Section §201.6(c)(2) Requirement	Skagway Multi-Hazard Mitigation Plan Where it is Addressed in Plan
<p>Assessing Vulnerability: Overview §201.6(c)(2)(i)</p> <p>The risk assessment <i>shall</i> 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.</p>	<p>Chapter 4, Sections 1-5 contain overall summaries of each hazard. The impacts on the community are contained in each hazard specific section in the chapter.</p>
<p>Assessing Vulnerability: Addressing Repetitive Loss Properties §201.6(c)(2)(ii)</p> <p>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.</p>	<p>There are no repetitively damaged structures in the Municipality of Skagway. Chapter 4, Section 1, Flood/Erosion explains this requirement in more detail.</p>
<p>Assessing Vulnerability: Identifying Structures §201.6(c)(2)(ii)(A)</p> <p>The plan <i>should</i> describe vulnerability in terms of the types and number of existing and future buildings, infrastructure, and critical facilities located in the identified hazard areas.</p>	<p>Chapter 3, Section 1, Table 13 lists structures; infrastructure and critical facilities located in the identified hazard areas.</p>
<p>Assessing Vulnerability: Estimating Potential Losses §201.6(c)(2)(ii)(B)</p> <p>The plan <i>should</i> 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.</p>	<p>Chapter 3, Section 2, Table 14 estimates potential dollar losses to municipal owned facilities. The methodology used to obtain the losses is above the table.</p>

Section 2. 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 and profile hazards, and their possible effects on the jurisdiction. This information can be found in Chapter 3: Hazards.
2. **Vulnerability Assessment** – Step 2 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.

Inventorizing 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 next 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.).

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 Hazard Mitigation Plan*, historical or past 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.
- **Previous occurrences** 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 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 past occurrences and information from interviews with residents or other stakeholders.

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 years 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 years 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.

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

Section 3. Identifying Hazards, Overview

This section identifies and describes the hazards likely to affect the Municipality of Skagway. The following tables are reproduced directly from the *State Hazard Mitigation Plan*.

State Hazard Mitigation Plan – 2007 Matrices

Table 10. State Hazard Mitigation Plan Hazard Vulnerability Matrix

Municipality of Skagway					
Flood/ Erosion	Wildland Fire	Earthquake	Volcano	Snow Avalanche	Tsunami & Seiche
Y-M	Y-M	Y-H	Y-L	Y-H	Y-L
Severe Weather	Ground Failure				
Y-H	Y				

Source: *State Hazard Mitigation Plan*

- 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 with 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

Table 11. Previous Occurrence of Hazards 1978 to Present

Municipality of Skagway					
Flood/Erosion	Wildland Fire	Earthquake	Volcano	Avalanche	Tsunami & Seiche
6-L	Z	Z	Z	Z	Z
Severe Weather	Ground Failure				
1-L	Z				

Source: *State Hazard Mitigation Plan*

- Extent:
 Z = Zero
 L = Limited
 T = Total
Number: Occurrences

Section 4. Identification of Natural Hazards Profiled in Plan

Based on consultation with the Alaska DHS&EM, the above tables from the *State Mitigation Hazard Plan*, Skagway plans and reports, interviews and newspaper articles, Skagway identified the following **highest risk hazards** to be profiled.

Table 12. Hazards Identification and Decision to Profile

Hazard	Yes/No	Decision to Profile Hazard
Flood/Erosion	Yes	Designated as a high hazard in the <i>State Hazard Mitigation Plan</i> . Participates in NFIP, has had limited damage in the past.
Wildland Fire	No	Future Addition. The soil conditions and abundant rainfall combine to make wildland fire hazard unlikely
Earthquake	Yes	Designed in state plan as high risk. Located near the Queen Charlotte – Fairweather fault System
Volcano	No	The Alaska Volcano Observatory identifies the closest active volcano to Skagway at being over 300 miles away.
Snow Avalanche	Yes	Designated as a high hazard in <i>State Hazard Mitigation Plan</i> .
Tsunami	Yes	Designated as a low hazard in <i>State Hazard Mitigation Plan</i> .
Severe Weather	Yes	Designated as a high hazard in the <i>State Hazard Mitigation Plan</i>
Ground Failure	No	Future addition, designated as a hazard in the state plan but with an unknown probability.

Please see Chapter 4, Section 6, Hazards not Present in Skagway, for more information on the hazards not present in the community.

Section 5. Assessing Vulnerability

Overview

The vulnerability overview section is a summary of Skagway’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.

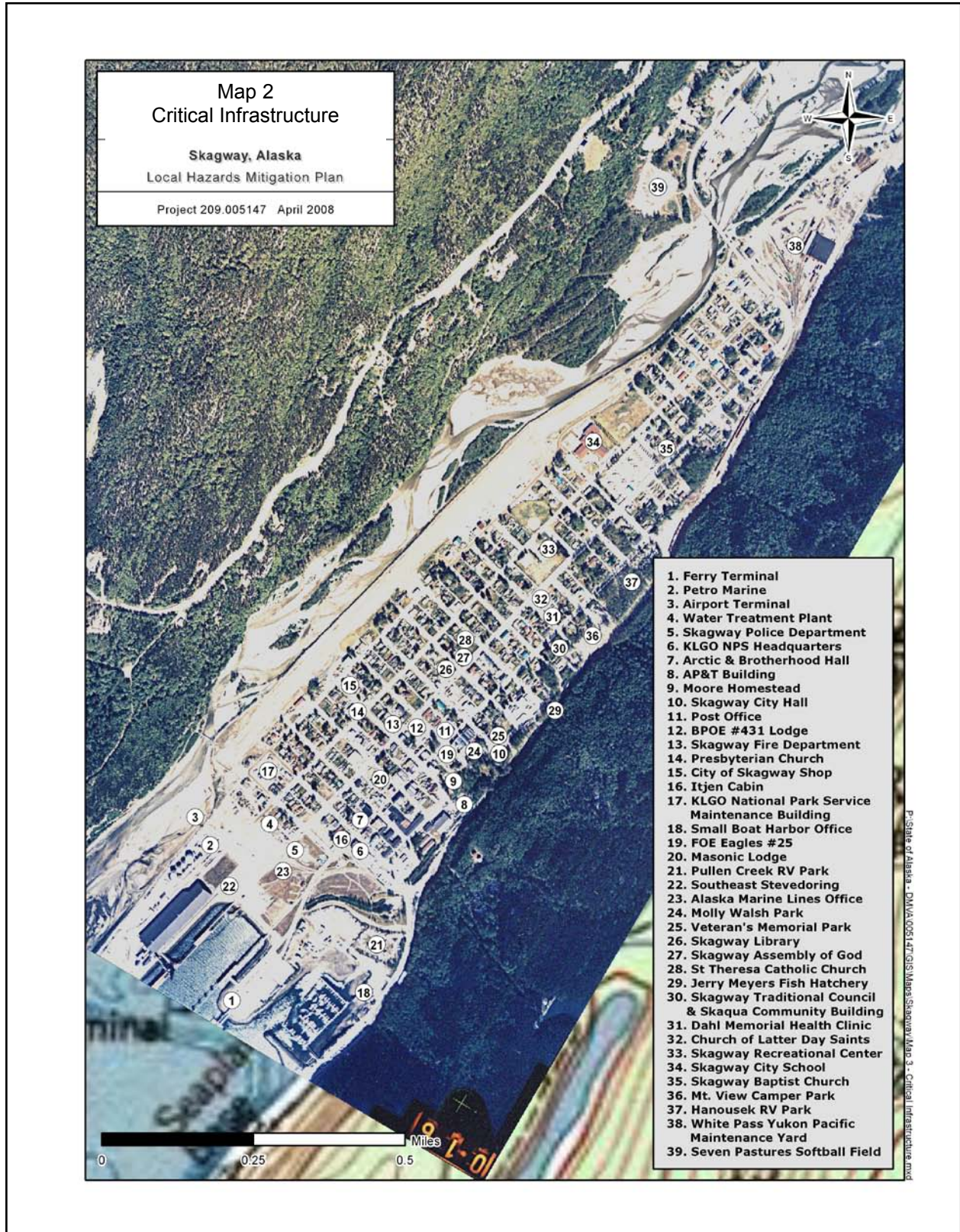
Maps and Figures Depicting Natural Hazards

The following maps and figures illustrate the natural hazards located in Skagway.

1. Map 2. Critical Infrastructure

2. Map 3. Regional Infrastructure
3. Figure 1. SCMP Designated Natural Hazards
4. Figure 2. Skagway Flood Rate Insurance Map - 01
5. Figure 3. Flood Rate Insurance Map - 02
6. Figure 4. National Park Service (NPS) Satellite Image of the Municipality of Skagway and the KLG (Klondike Gold Rush National Park) Park Boundaries

Map 2. Critical Infrastructure



Map 3. Regional Infrastructure

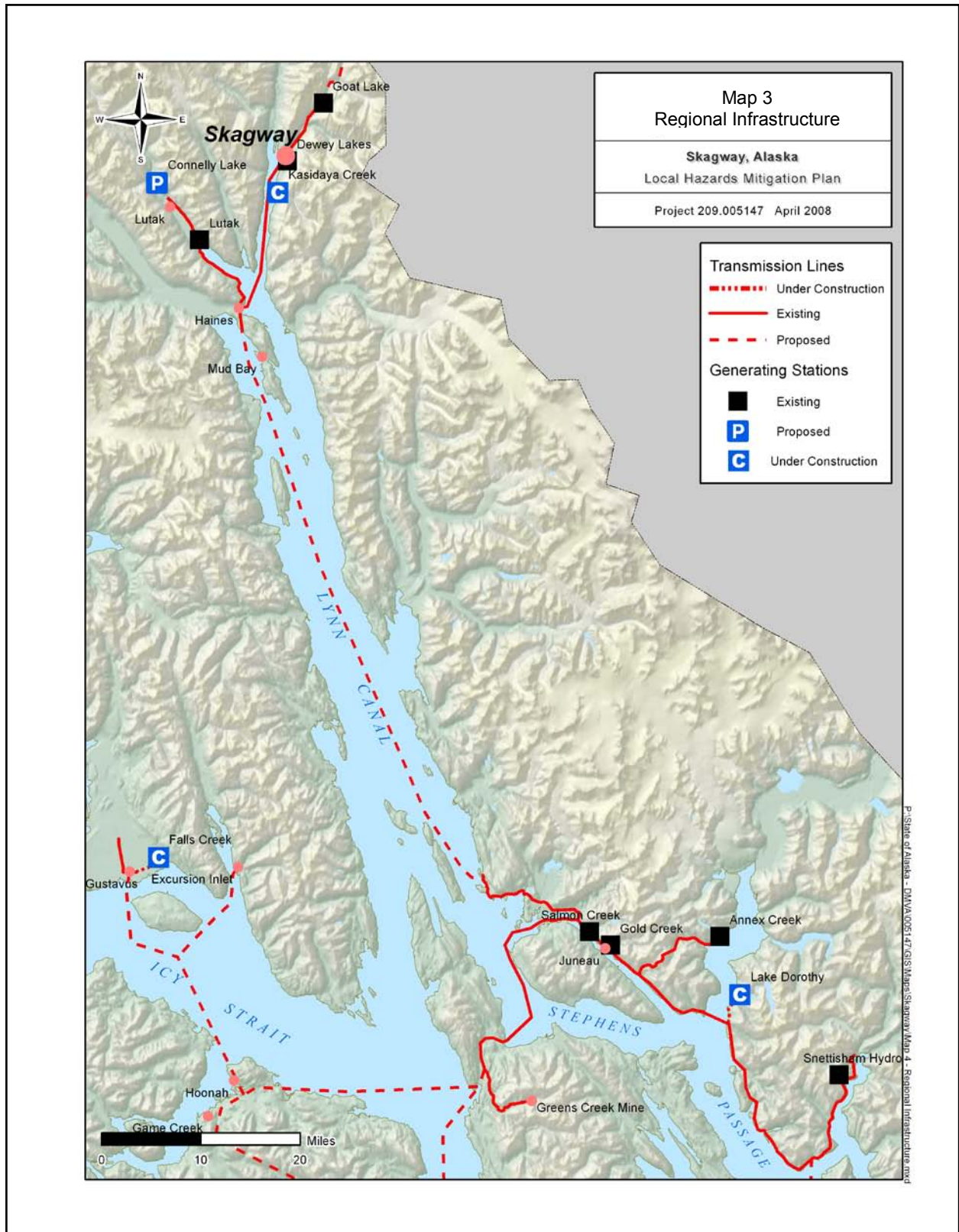


Figure 1. Skagway CMP Designated Natural Hazards

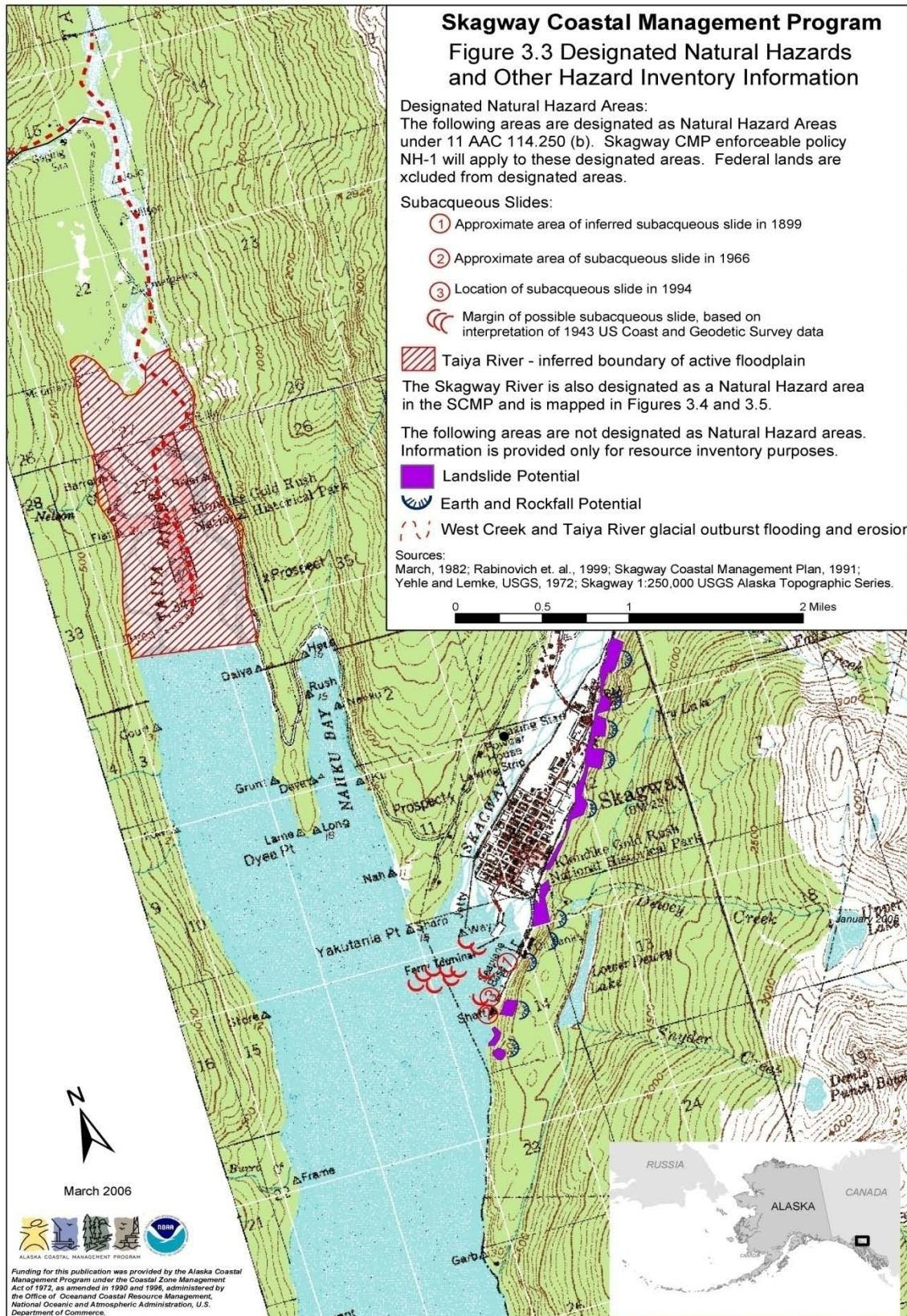


Figure 2. Skagway Flood Insurance Rate Map - 01

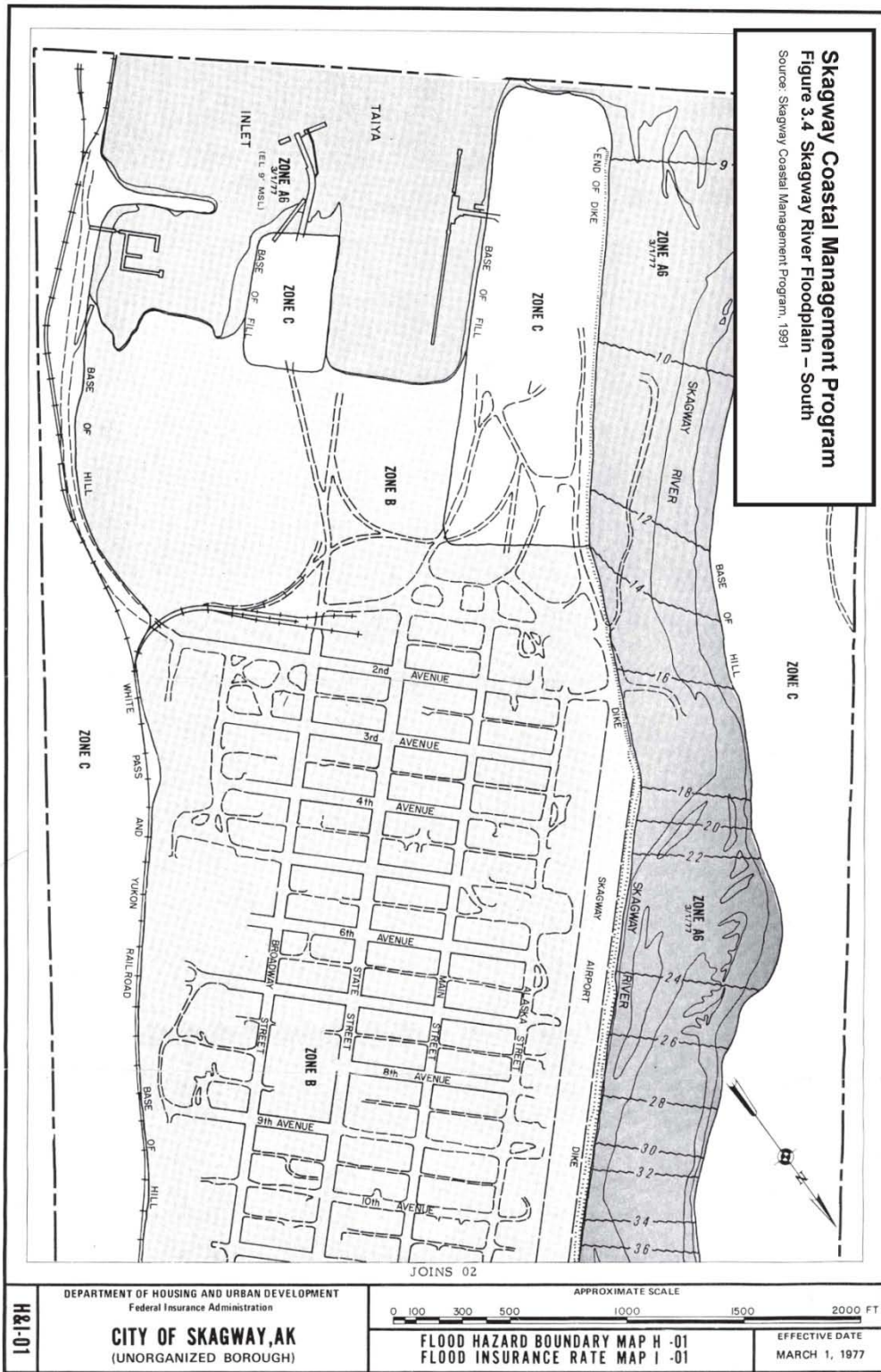


Figure 3. Skagway Flood Insurance Rate Map - 02

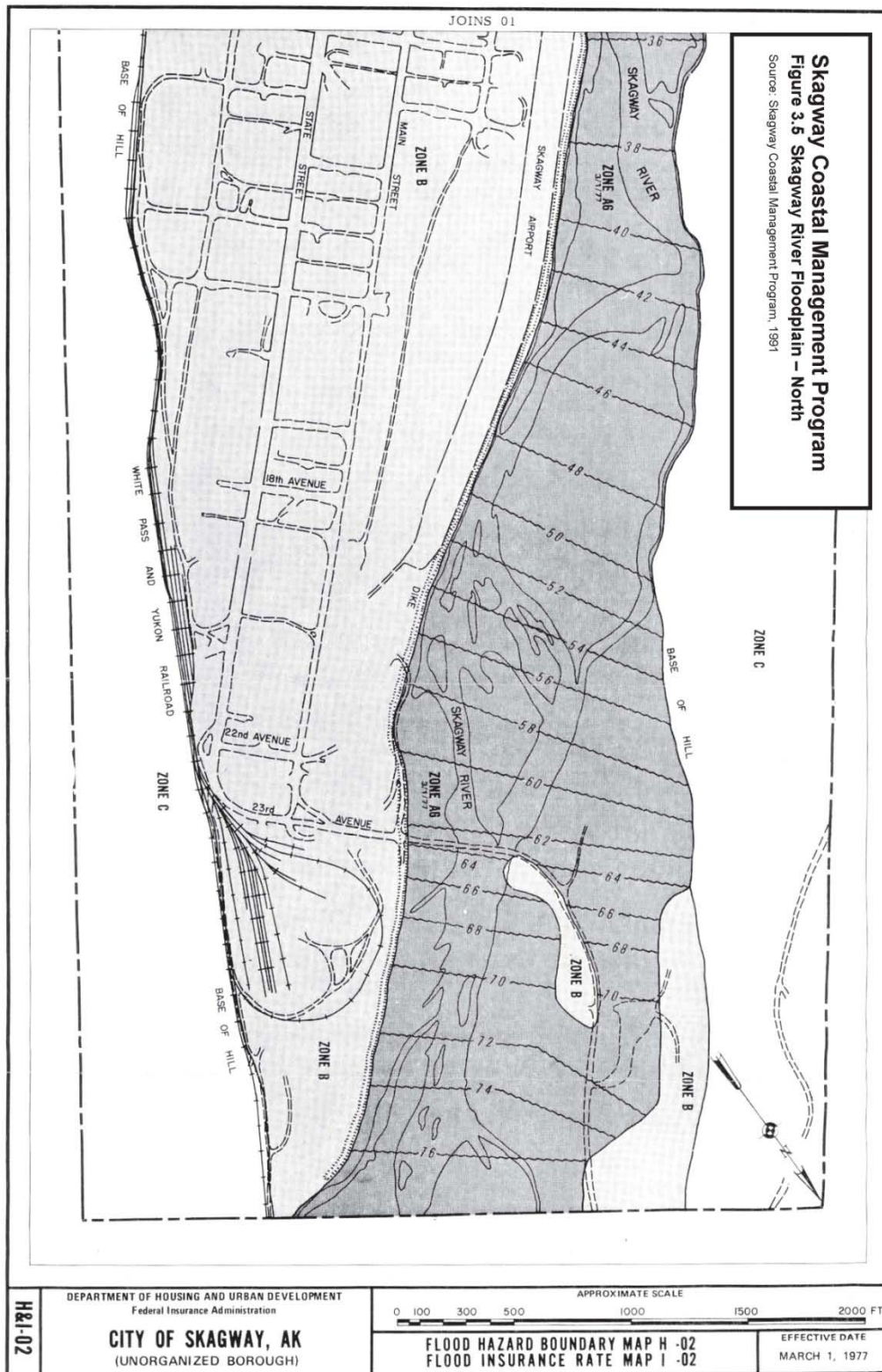
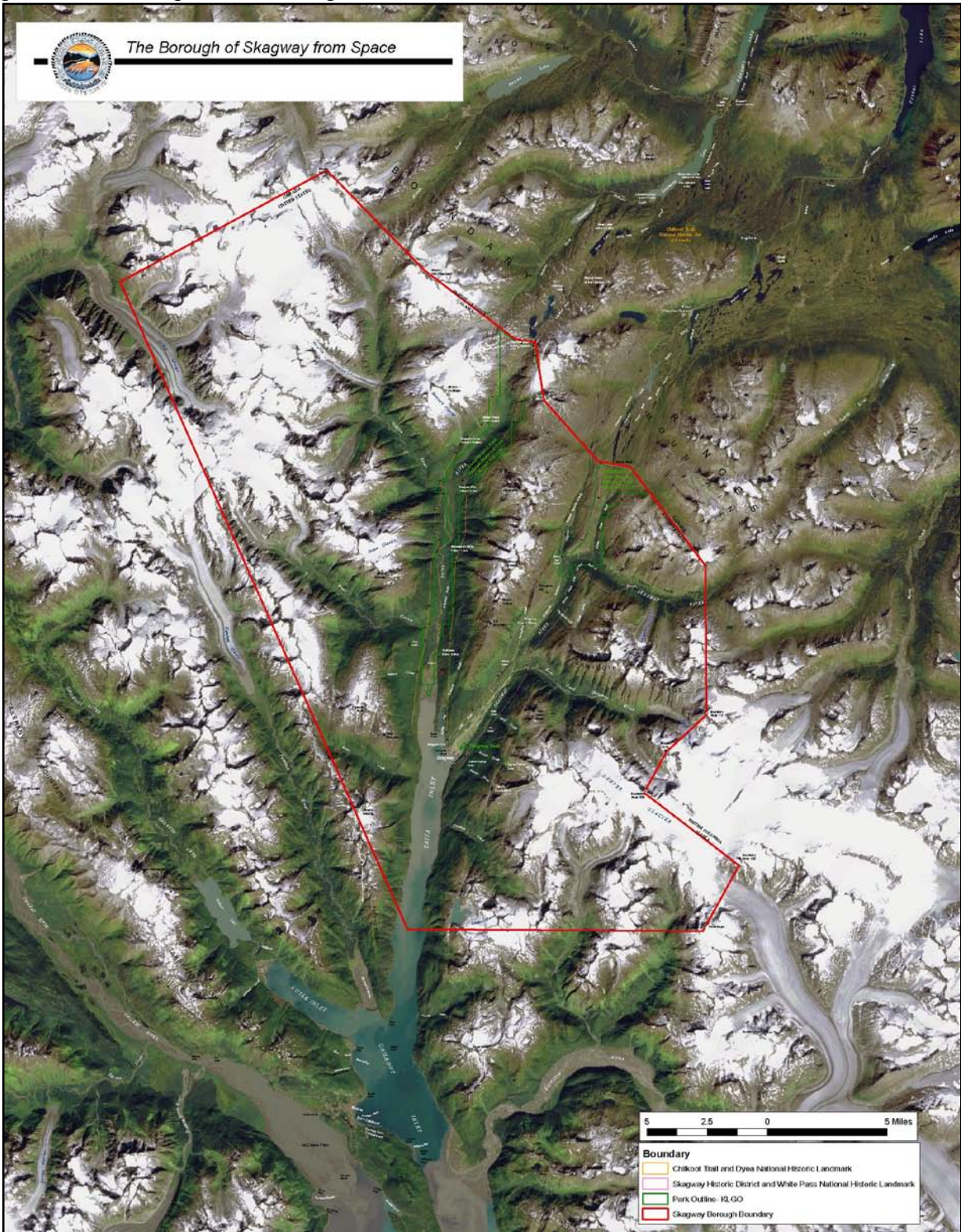


Figure 4. NPS Figure of Borough and KLGO



Hazard Asset Matrix

The Hazard Asset Matrix below contains the critical infrastructure their vulnerability to identified natural hazards.

Table 13. Hazard Asset Matrix

Structure/Facility	Flood/ Erosion	Earthquake	Snow Avalanche	Tsunami	Severe Weather		
1. Ferry Terminal	M	H			H		
2. Petro Marine	M	H			H		
3. Airport Terminal	M	H			H		
4. Water Treatment Plant	M	H	N o t M a p p e d	N o t M a p p e d	H		
5. Skagway Police Department		H					H
6. KLG0 NPS Headquarters		H					H
7. Artic & Brotherhood Hall		H					H
8. AP&T Building		H					H
9. Moore Homestead		H					H
10. Skagway Municipal Hall		H					H
11. Post Office		H					H
12. BPOE #431 Lodge		H					H
13. Skagway Fire Department		H					H
14. Presbyterian Church		H			H		
15. Municipality of Skagway Shop		H			H		
16. Itjen Cabin		H			H		
17. KLG0 NPS Maintenance Shop		H			H		
18. Small Boat Harbor	M	H			H		
19. FOE Eagles #25		H			H		
20. Masonic Lodge		H			H		
21. Pullen Creek RV Park		H			H		
22. Southeast Stevedoring		H			H		
23. Alaska Marine Lines Office	M	H			H		
24. Molly Walsh Park		H			H		
25. Veterans Memorial Park		H			H		
26. Skagway Library		H			H		
27. Skagway Assembly of God		H			H		
28. St. Theresa Catholic Church		H			H		
29. Jerry Meyers Fish Hatchery		H			H		

Structure/Facility	Flood/ Erosion	Earthquake	Snow Avalanche	Tsunami	Severe Weather
30. Skagway Traditional Council & Skaqua Community Building		H	Not	Not	H
31. Dahl Memorial Health Clinic		H	M	M	H
32. Church of Later Day Saints		H	Not	Not	H
33. Skagway Recreation Center		H	Not	Not	H
34. Skagway Municipal School		H	Not	Not	H
35. Skagway Baptist Church		H			H
36. Mt. View Camper Park		H			H
37. Hanousek RV Park		H			H
38. White Pass Yukon Pacific Maintenance Yard		H			H
39. Seven Pastures Softball Field		H			H
40. Major Transportation Routes	M	H			H
Transmission Lines - (From Map 3)	M	H			H

Estimating Potential Dollar Losses

The following table lists the replacement values, plus content values of municipal owned buildings. The Skagway Finance Department provided the information for this table, using potential dollar loss figures from the municipal insurance provider.

Table 14. Potential Dollar Losses of Municipal Structures

Municipal Owned Structures	Year Built/ Size	Replacement Value	Content Value (%)	Total
McCabe Building (Borough Offices and Trail of 98 Municipal Museum)	1899, Major renovation in 2000	3,664,000	37%	5,037,838
Incinerator	1998	1,500,000	50%	2,250,000
Public Works Shop	WW II	1,406,000	21.5%	1,706,000
Wastewater Treatment Plant		1,250,000	26%	1,570,000
Police Station	1998	477,500	115%	1,025,248
Library	1979 2,116 s.f.	1,166,500	31%	1,529,182
Fire Hall	1970 5,600 s.f.	1,665,000	21%	2,018,057
Artic Brotherhood (AB Hall) Skagway CVB	1898	515,625	25%	540,475
Small Boat Harbor	16 acres	2,000,000	0	2,000,000
Skagway Medical Clinic		750,000	34%	1,001,502
Future Home of Medical Clinic	14,531 s.f.	6,500,000	150	7,500,000
Mollie Walsh Park Restrooms	400 s.f.	100,711	0	100,711
Pullen Creek Shoreline Restrooms	400 s.f.	100,711	0	100,711
Skagway Family Fitness & Recreation Center	120,000 s.f.	2,200,000	9%	2,400,000
Lookout Platform area	2008	132,000	0	132,000
7 th Pastures Ballfields	1998	125,000	0	125,000
Small Boat Harbor office & Restrooms	1,000 s.f.	250,000	39%	347,653
Teen Center (23 rd & main)	1380 s.f.	345,000	0	345,000
2 Redwood water Tanks	150,000 gal	746,666	0	746,666
Sea Walk Restrooms	2006/2007	600,000	125%	700,000
Booster Station	2008	600,000	108%	650,000
Total Potential Dollar Losses		26,094,713		31,826,043

Chapter 4: Risk Assessment, Hazard Specific Sections

Section 1. Flood/Erosion Hazard

The following flood/erosion hazard profile includes a description of the hazard, the location, extent and probability of the hazard and past occurrences of flooding/erosion in Skagway.

The *State Hazard Mitigation Plan* states that Skagway is one of the most flood-prone cities in the State because of its location on a river delta. A dike along the Skagway River partially protects the municipality. However, the municipality has experienced ten flood disasters in the 1900s alone.

Hazard Description

Flood hazards in Skagway include voluminous rainfall, snow, glacier melt and release of glacier-dammed lakes, and coastal storms.

Rainfall/Snowmelt/Glacler Melt Flooding

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 Skagway 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. Glacier melt is typically largest in late summer; increasing the potential magnitude of late summer rainfall floods in glacial streams.

Erosion

Erosion is a process that involves the wearing away, transportation, and movement of land. Erosion rates can vary significantly and erosion can occur quite quickly as the result of a flash flood, coastal storm or other event. It can also occur slowly as the result of long-term environmental changes. Erosion is a natural process but its effects can be exacerbated by human activity.

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.

Stream bank erosion involves the removal of material from the stream bank. When bank erosion is excessive, it becomes a concern because it results in loss of streamside vegetation, loss of fish habitat, and loss of land and property.

Coastal erosion: Coastal erosion is the wearing away of coastal land. It is commonly used to describe the horizontal retreat of the shoreline along the ocean, or the vertical

down cutting along the shores of the Great Lakes. Erosion is considered a function of larger processes of shoreline change, which includes erosion and accretion. Erosion results when more sediment is lost along a particular shoreline than is redeposited by the water body. Accretion results when more sediment is deposited along a particular shoreline than is lost. When these two processes are balanced, the shoreline is said to be stable. In assessing the erosion hazard in a community or state, it is important to realize that there is a temporal, or time aspect associated with the average rate at which a shoreline is either eroding or accreting. Over a long-term period (years), a shoreline is considered either eroding, accreting or stable. When evaluating coastal erosion in a community or state, the focus should be on the long-term erosion situation. However, in the short-term, it is important to understand that storms can erode a shoreline that is, over the long-term, classified as accreting, and vice versa.

Erosion is measured as a rate, with respect to either a linear retreat (i.e., feet of shoreline recession per year) or volumetric loss (i.e., cubic yards of eroded sediment per linear foot of shoreline frontage per year). Erosion rates are not uniform, and vary over time at any single location. Annual variations are the result of seasonal changes in wave action and water levels.

Erosion is caused by coastal storms and flood events; changes in the geometry of tidal inlets, river outlets, and bay entrances; man-made structures and human activities such as shore protection structures and dredging; long-term erosion; and local scour around buildings and other structures. Further information on coastal erosion can be found in FEMA-55, Coastal Construction Manual, FEMA's Multihazard Identification and Risk Assessment, Evaluation of Erosion Hazards published by The Heinz Center, and Coastal Erosion Mapping and Management, a special edition of the Journal of Coastal Research. (FEMA, 386-2)

Location

There are two major river systems, within the Municipality of Skagway, the Taiya and Skagway; these valleys provide a short route to glacier free mountain passes, which link the coast to the interior. The *State Hazard Mitigation Plan* states that Skagway is one of the most flood-prone cities in the State because of its location on the river deltas.



Skagway River Dike, May 2008

National Flood Insurance Rate Maps

Figures 2 and 3, Section 2, show areas of the community, that are located within the National Flood Insurance Rate Map (FIRM) “A” zone. The “A” zones are defined as areas of 100-year flood zones.

The FIRMs for Skagway are from mapping that was completed in 1977. Since that time, areas have been filled to above the Base Flood Evaluation in some cases. Until the FIRM has an official revision or a Letter of Map Revision is approved by FEMA, the designations stand but may not be accurate and do not necessarily reflect the current situation in the field.

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

Skagway Coastal Management Plan, 2007

The *Skagway Coastal Management Plan (SCMP) 2007* (Sheinberg Associates) designated the following as natural hazard areas, under ACMP regulation 11 AAC (Alaska Administrative Code) 114.250(b). These areas are illustrated above on Figures 1, 2 and 3.

- Skagway River, 100-year floodplain
- Taiya River, 100-year floodplain
- Areas in Taiya Inlet subject to underwater landslides and locally generated tsunamis

With the designation of these areas in the SCMP, the following ACMP (Alaska Coastal Management Program) statewide regulation will apply to future development in these areas:

11 AAC 112.210(c): Development in a natural hazard area may not be found consistent [with the SCMP] unless the applicant has taken appropriate measures in the siting, design, construction, and operation of the proposed activity to protect public safety, services, and the environment from potential damage caused by known natural hazards.

The following resource analyses on the Skagway River and Taiya River Floodplains are from the approved *Skagway Coastal Management Plan (SCMP) 2007* (Sheinberg Associates).

Skagway River Floodplain

The City (Municipality) of Skagway has long recognized that development in the Skagway River floodplain must be done in a manner that does not exacerbate potential flooding and erosion, and also protects coastal development, life and property from the flood and erosion hazard. The original Skagway townsite (including commercial and residential areas), airport and school are immediately adjacent to the riverbanks. There is demand for continued development and use of land in and adjacent to the floodplain. Through its coastal management program, implementation of other municipal ordinances, and intent to construct additional flood control structures, the Municipality is working to effectively manage the flood hazard.

Development of the city townsite has required the river to be channelized to prevent the river from channel shifting, eroding property and flooding the Skagway community. Beginning in the 1940s, flood control dikes have been built on both sides of the Skagway River, through the townsite and to about 1.5 miles upstream, by the US Army, the Army Corps of Engineers, private landowners and the Alaska Department of Transportation and Public Facilities (DOT&PF, 1999). Repairs to the dikes were made in 1945, 1951 and 1967. Dikes have since been constructed upstream of the townsite by various entities, including private landowners, the Corps of Engineers, and DOT&PF.

Taiya River Floodplain

The Taiya River watershed is approximately 180 square miles and is located west of Skagway. The river enters the Taiya Inlet at the historic townsite of Dyea. Major tributaries to the river include West Creek and the Nourse River, which are both subject to flooding. U.S. Geological Survey (USGS) gauging data for the Taiya River from 1969 to 1977 show an average discharge of 1,130 cfs, with a maximum discharge of 11,500 cubic square feet (cfs) on September 27, 1976, for the gauging period. USGS data notes that a flood of September 1967 was estimated to reach a peak of over 25,000 cfs. The USGS reactivated the Taiya River gauge in October 2003.



Extent

Taiya River, 2008

The extent (i.e. magnitude or severity) of the flood/erosion hazard is measured in this plan by using statistics from the National Flood Insurance Program, historical past

events and the State Mitigation Hazard Plan. Based on these factors and using the criteria established in Table 8 the Municipality of Skagway has a **critical** extent of flooding not due to tsunami, which is covered in Section 6.

Skagway Participation in the NFIP

The Municipality of Skagway participates in the NFIP. Table 13 lists critical facilities located in the located in the “A” flood zone, which is described below

The function of the National Flood Insurance Program (NFIP) is to provide flood insurance at a reasonable cost to homes and businesses located in floodplains. In trade, the Municipality of Skagway regulates new development and substantial improvement to existing structures in the floodplain, or requires developers 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 15. FIRM Zones

<i>Firm Zone</i>	<i>Explanation</i>
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.

Development permits for all new building construction, or substantial improvements, are required by the Municipality in all A, AO, AH, A-numbered zones. Flood insurance purchase may be required in 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 FEMA 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 certificates on file.

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.

Table 16. 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)
09/09/1970	03/01/1977	None	025011	N/A	6
Total Premiums	Total Loss Dollars Paid	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
\$3,329	0	0	2,818	\$2.2 million	\$4.7 million
Skagway 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
\$554	\$796	0	0	0	0

Table 17. Housing Use Types in Skagway

Housing Types	Number of Structures
Total Housing Units	464
Occupied Housing (Households)	334
Vacant Housing	10
Vacant Due to Seasonal Use	120
Households located in the flood plain	2

Table 18. State and Local Floodplain Coordinators

Jurisdiction	Coordinator
Skagway Floodplain Coordinator	Municipality of Skagway Contact Person: Emily Rauscher, Permitting Official, Project Manager P.O. Box 415 Skagway, AK 99840 Phone: (907) 983-2297 Fax: (907) 983-2151 Email: e.rauscher@skagway.org Web: http://www.skagway.org
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 Hazard Mitigation Plan*, NFIP, Municipal records and past historical events Skagway has a **high** probability of flooding. Table 9 defines criteria used for determining high probability, as the hazard is present with a high probability of occurrence within the next ten years. Event has up to 1 in 1 years chance of occurring.

Previous Occurrences

The Bureau of Land Management (BLM) produced the report *Glacial Outburst Creates Flood on the Taiya River, Skagway, 2002* in 2005 and 2007 that describes the following glacier outburst that resulted in flooding in Dyea Flats.

A lateral moraine of West Creek Glacier in the Taiya River watershed near Skagway liquefied in July 2002, causing debris to slide into a glacial lake in front of the glacier terminus. This event triggered a tremendous flood at Klondike Gold Rush National Historic Park and the community of Dyea, causing extensive damage to bridges, roads, and property.

The 2002 glacial lake outwash event was created by the collapse of moraine 1. Moraine 1 is a lateral moraine to the West Creek Glacier that formed perpendicular to the No Name Glacier river valley. This configuration created a structure composed of glaciated fine material with steep side slopes that were disproportional to its relative height. As

the No Name Glacier receded, the area behind the moraine filled in with very fine sediment. This soil class characteristically has a considerable pore space volume, which results in its ability to retain large volumes of water as compared to coarse-textured soils. It is also more susceptible to erosional forces due to its small particle size (Miller, 1990). The relatively fine sediment of this moraine was subject to saturation from drainage coming from the No Name Valley. Steep wet and fine sediments created a high potential for slope stability failure.

The *DHS&EM Disaster Cost Index, 2007* lists events that have received state or federal disaster funding. The following was listed for the Skagway area.

Southeast Storm (AK-06-216) declared December 23, 2005 by Governor Murkowski: Beginning on November 18, 2005 and continuing through November 26, 2005, a strong winter storm with high winds and record rainfall occurred in the City/Borough of Juneau, the City/Borough of Haines, the City/Borough of Sitka, the City of Pelican, the City of Hoonah, and the **City of Skagway**, which resulted in widespread coastal flooding, landslides, and severe damage and threat to life and property, with the potential for further damage. The following conditions existed as a result of this disaster: severe damage to personal residences requiring evacuation and relocation of residents; to individuals personal and real property; to businesses; and to a marine highway system dock, the road systems eroded and blocked by heavy debris that prohibited access to communities and residents, and other public infrastructures, necessitating emergency protective measures and temporary and permanent repairs. The total estimated amount of assistance was approximately \$1.87 million. This includes the following: Individual Assistance totaling \$500,000 for 52 applicants and Public Assistance totaling \$1.1 million.

The *Geophysical Survey, 2007* (a partnership between: the Municipality of Skagway, the Cold Regions Research Lab and the National Park Service) noted that in 1897 an outburst flood destroyed part of Sheep Camp, killing several people.

The following Skagway timeline was compiled and edited by Gov. Brady, updated from the original published in January 2000 New Year's edition of The Skagway News.

- 1953 - In July, the Taiya River washed away home of Dyea homesteader Bill Matthews and other cabins were lost along West Creek.
- 1967 - Skagway River flooded. Dikes breached and Pullen Creek culvert washed out. Gov. Wally Hickel flew up to inspect damage.
- 1990 - Ships had trouble maneuvering in wind and ore dock was damaged. River rose to near flood stage, prompting push for more flood control.
- 1991-92 - City did emergency flood control in September 1991, got state's attention.

- 1993-94 – A disaster befell White Pass Railroad when the dock collapsed, sending a tidal wave across the bay, uprooting the ferry dock and spinning it into the Broadway Dock. One worker was killed in the debris. Gov. Hickel declared disaster. Damage to State Dock and small boat harbor exceeded \$1 million. White Pass vowed to rebuild railroad dock in time for 1995 cruise season.
- 1999-2000 - White Pass and state settled suit over 1994-dock damage, with railroad to pay \$1.875 million.

Taiya River Flood, 2002

On August 12, 2002, heavy rains and warm weather caused the Taiya River to rise from its average height of 15 feet to crest at 19 feet (as measured 1.5 miles upstream of outlet). In addition to flood damage in downstream areas including Dyea, localized flooding in the headwaters area resulted in extensive damage to NPS managed facilities at the Sheep Camp backcountry campground (located approximately 14 miles upstream of the outlet). (SCMP, 2007)

Repetitive Loss Properties

The risk assessment in all plans approved after October 1, 2008 must also address NFIP-insured structures that have been repetitively damaged by 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, at least ten years apart, in a rolling ten-year period. Specific property information is confidential, but the State DCRA Floodplain Coordinator related that within the Municipality of Skagway there have been **zero** properties that meet the FEMA definition of repetitive loss.

Impact

A flooding event in Skagway 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 Skagway could isolate the community from other areas of the state and cause wide spread damage.

Flood/Erosion Mitigation Goals and Projects

Goal 1. Reduce 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. Prevent future flood damage.

Goal 3. Increase public awareness

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

Please see Table 22, Mitigation Project Plan for further information on specific projects to mitigate flooding and erosion.

Project FLD-3 CMP, 2007 Projects (Goals 1 and 2)

- The National Park Service (NPS) is considering improving the safety of visitors hiking the Chilkoot Trail through relocation and replacement of a portion of the trail, a footbridge, two outhouses, and several campsites at Sheep Camp campground that were damaged and/or destroyed by flooding of the Taiya River during August 2002.
- The Municipality plans to construct additional flood control structures upstream of the Klondike Highway Bridge to further manage flood hazards and prevent destruction. The proposed work would include installation of revetments and dike structures to retain the 100-year flood on both sides of the river to approximately 5,300 feet upstream of the Skagway River Bridge, improvements to existing dikes, and regular dike inspection and periodic maintenance. Approval for the flood control project by permitting agencies has been received from the State of Alaska, but the permit from the Corps of Engineers is still pending. Skagway will begin construction once the Corps permit is received and funding is approved.
- The DNR Division of Geologic & Geophysical Surveys (DGGS) has mapped the surface geology of the lower Taiya River on the USGS Skagway B-1 quadrangle (March, 1982). The map shows the location of active floodplain alluvium and

inactive floodplain alluvium and the boundary of the active floodplain, inferred from these soil types. No mapping was done upstream of this point. However, the DGGs recommended that the mapped floodplain be extended northward from that delineated by March to the limits of vegetation shown on the USGS base map (memo from DGGs to the City of Skagway, undated).

- The NPS, KLGO, has submitted a funding request for the installation of an engineering log jam at the historic townsite of Dyea to prevent its further loss to riverine erosion (letter from NPS to City of Skagway, April 4, 2005).

Project FLD-4 The Geophysical Survey, 2007 (Goals 1 and 2) (a partnership between: the Municipality of Skagway, the Cold Regions Research Lab and the National Park Service), which is reproduced in its entirety in the appendix, lists that following potential mitigation projects:

- Additional information is needed to determine if buried glacier ice exists at these lakes and the level of associated hazard.

Priorities:

1. Boat Ramp Lake
2. Goat Lake
3. Lake 1161
4. Lateral Moraine Lake

- Survey the moraine and adjacent area to determine physical relationships between the lake bed, bedrock surface and moraine height and depth
- A detailed bathymetric survey of each lake
- Geophysical surveys of areas with possible buried glacier ice
- Analysis of shore and valley slope conditions affecting stability
- Analysis of glacier dynamics and ice face stability
- Continue biennial surveys to look for changing conditions, new proglacial lakes and ice dammed lakes

VERY ROUGH ESTIMATES

1. Boat Ramp Lake \$ 175,000
2. Goat Lake \$15,000 – 25,000
3. Lake 1611 \$15,000 - \$20,000
4. Lateral Moraine Lake – Monitor
5. Biennial Monitoring - \$10,000-\$15,000 (Helicopter for 2 days)

Assessments would be adaptive, early results would drive the study plan and costs.

Projects FLD-1, 2 - Comprehensive Economic Development Strategy (Goals 1 and 2), Community Development Projects

- Construction of a New Seawall, Municipality of Skagway, \$2.5m Ready for Construction
- Siren & lights at both ends of town for tsunami and other hazardous warnings Planning phase, Municipality of Skagway
- Flashing lights at docks for warning of flood inundation, Planning phase, Municipality of Skagway & Alaska Power & Telephone
- Flood Control of Skagway River, \$3 million, planning phase, Municipality, State, and Federal

Project FLD-6 Structure Elevation and/or Relocation (Goals 1 and 2)

A list of homes, commercial structures and critical facilities that are in danger of flooding and in erosion danger should be identified and mitigation projects for elevating and/or relocating the structures determined.

Project FLD-7 Skagway Maps (Goals 1, 2, 3)

Accurate flood maps should be prepared that delineate areas of flooding and upland areas.

Following construction of the flood control structures, the Municipality will initiate a FEMA map revision for Skagway to show the reduced 100-year flood zone. The designation of the floodplain as a natural hazard area in this Skagway CMP will be revised as necessary after the FEMA map revision is completed. The Department of Commerce, Community and Economic Development (DCCED), Division of Community Advocacy, has indicated its support for the FEMA map revision following construction of the flood control structures (DCCED memo to Municipality of Skagway, April 6, 2005). (SCMP, 2007)

Project FLD-8 Public Education (Goal 3)

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

property owners, potential property owners, and visitors about the hazards. In addition, dissemination of a brochure or flyer on flood hazards in Skagway could be developed and distributed to all households.

Section 2. Earthquake Hazard

Southeast Alaska sits on the boundary of two major tectonic plates: the Pacific plate in the west and the North American Plate in the east. The collision of these two plates has caused the uplift of the Coastal Mountain Range that runs the length of Southeast Alaska.

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.

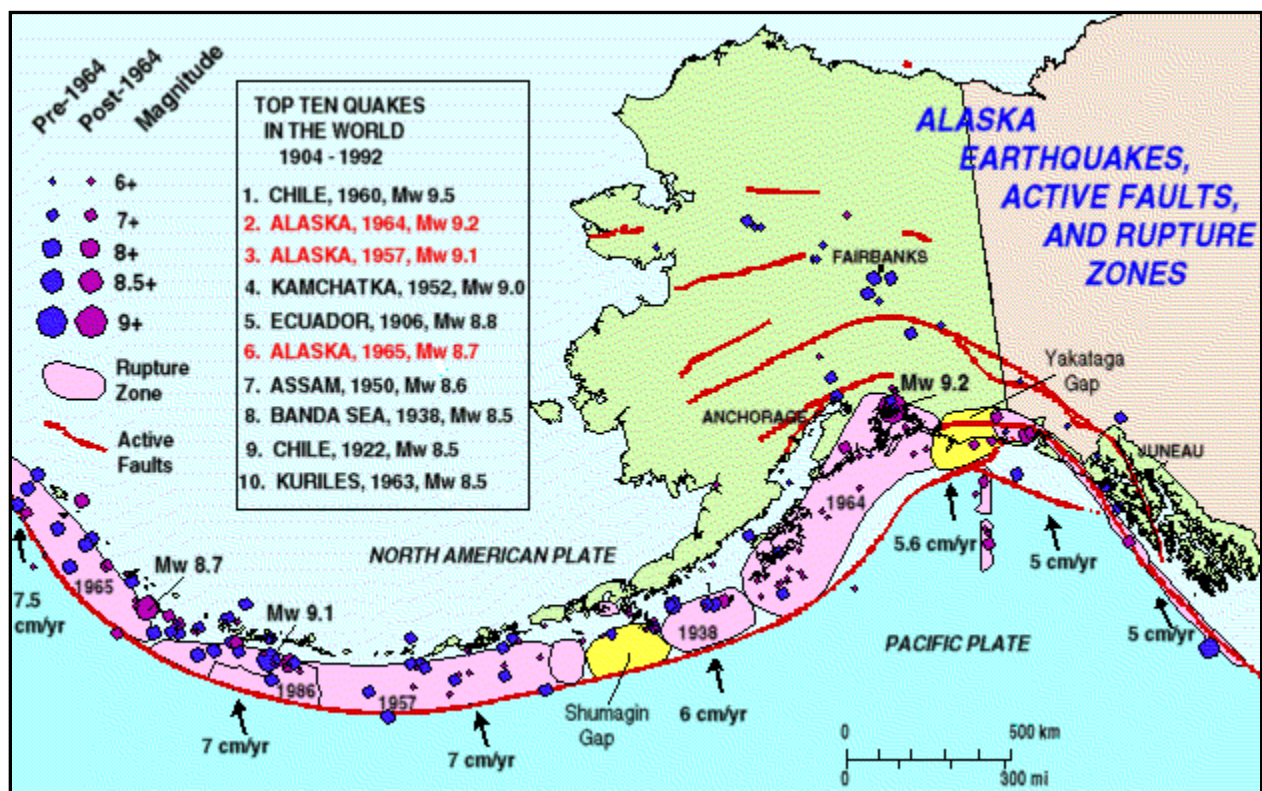
Earthquake-induced ground failure is often the result of liquefaction, which occurs when soil (usually sand and coarse silt with high water content) loses strength as a result of the shaking and acts like a viscous fluid.

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 5. AEIS Earthquake Active Faults



Location

The hazards of earthquake could potentially impact any part of Skagway. 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 Skagway 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.

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 are also found in southeastern Alaska. (AEIC)

The strongest shaking will occur in muskeg, 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)

Extent

The extent of an earthquake in Skagway could be **critical**. Table 8 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.

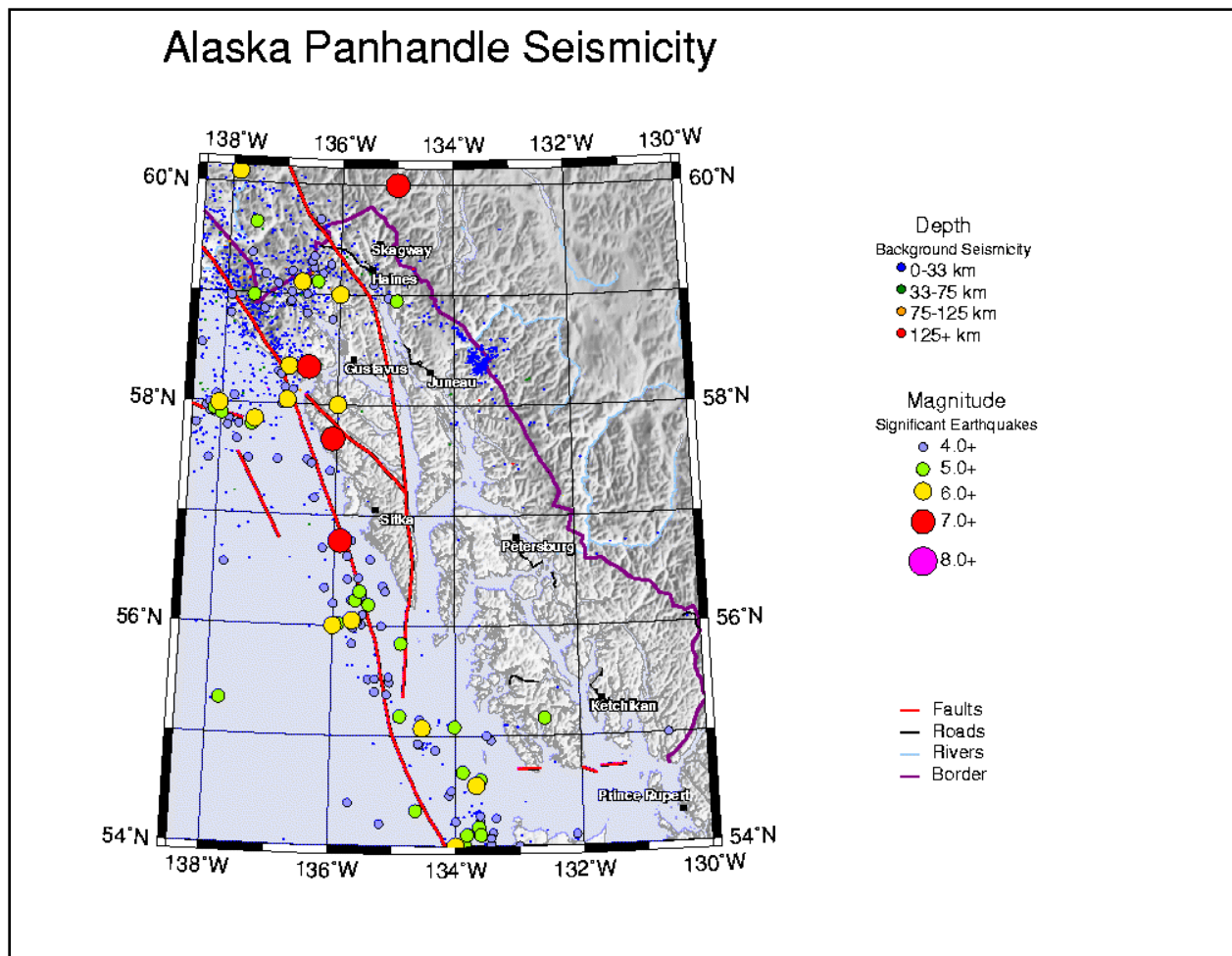
The Richter scale expresses magnitude as a decimal number. A 5.0 earthquake is a moderate event, 6.0 characterize a strong event, 7.0 is a major earthquake and a great earthquake exceeds 8.0. The scale is logarithmic and open-ended. (*State Hazard Mitigation Plan 2007*)

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 Skagway could be critical. Skagway is located near the Fairweather fault, which extends from south of Queen Charlotte Islands to Skagway. 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 Skagway in the future. This could be especially devastating because ground shaking can cause liquefaction of Skagway's thixotropic soils.

The following figure is from the UAF AEIC. It illustrates that a major earthquake has occurred near Skagway in the past and show that a fault is located near the Skagway area.

Figure 6. AEIC Alaska Panhandle Seismicity



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

Probability

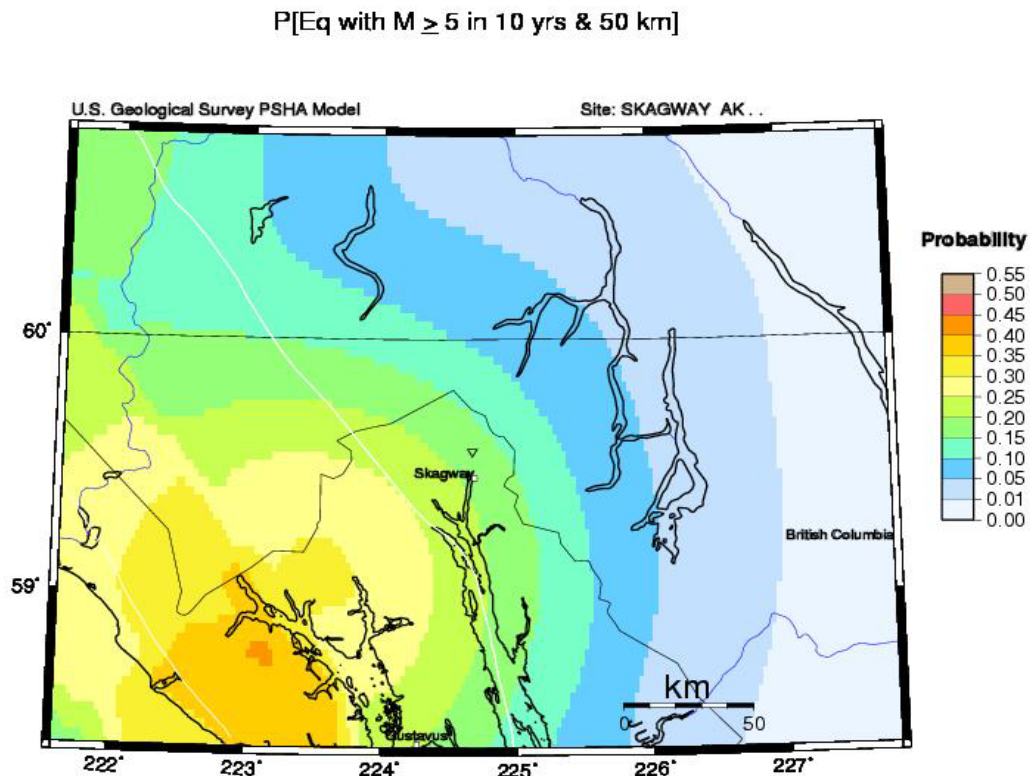
Skagway has a **high** probability of earthquake hazard. Table 9 lists the following criteria for a high probability: hazard is present with a high probability of occurrence with the next three years. Event has up to 1 in 1 year chance of occurring.

As stated above, Skagway is located near the Fairweather fault, which extends from south of Queen Charlotte Islands to Skagway. 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 Skagway in the future.

While it is not possible to predict an earthquake, the U.S. Geological Survey (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.

The following figure 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 Skagway is 20 percent.

Figure 7. USGS Probability Map



GMT 2008 Dec 7 03:40:31 Earthquake probabilities from USGS OFR_00-36 PSHA. 50 km maximum horizontal distance. Site of Interest: triangle. Fault traces are white; rivers blue. Epicenters $M \geq 5.0$ circles.

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

The *State Hazard Mitigation Plan Vulnerability Matrix*, Table 10, of this plan lists the probability of an earthquake occurring within one year in Skagway as high, which is defined as the event has up to 1 in 1 year chance of occurring.

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 Skagway. 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 following table was developed from the AEIC Database, using the following search criteria:

- 58.0 <= latitude <=60
- -137 <= longitude >= -134
- 0 to 350 feet depth
- 01/01/1898 to 5/31/2008
- Earthquakes of over 6.0 magnitudes

Table 19. Historical Earthquake Events

Date	Depth (feet)	Mb*	ML**	MS***
09/17/1899	0.0		6.9	6.9
01/18/1901	0.0		7.1	7.1
09/18/1939	0.0		6.0	
03/09/1952	15.0		6.0	6.0
07/10/1958	0.0	7.4	7.7	7.9
06/24/1991	0.0	5.5	6.1	5.5
01/06/2000	1.0	5.5	6.1	5.9

- * = **Mb** - Body wave Magnitude - Based on the amplitude of P (compressional) body-waves. This scale is most appropriate for deep earthquakes.
- ** = **ML** - Local Magnitude - The original magnitude relationship defined by Richter and Gutenberg for local earthquakes in 1935. It is based on the maximum amplitude of a seismogram recorded on a Wood-Anderson torsion seismograph. Although these instruments are no longer widely used, ML values are calculated using modern instruments with appropriate adjustments.
- *** = **Ms** - Surface wave Magnitude - A magnitude for distant earthquakes based on the amplitude of the Rayleigh surface wave.

Source: http://www.aeic.alaska.edu/html_docs/db2catalog.html

Impact

The impact on the community of Skagway of a high-magnitude earthquake could be extensive. Earthquake damage could be area-wide with potential damage to critical infrastructure. Limited building damage assessors are available in Skagway to determine structural 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.

Earthquake Mitigation Goal and Projects

Goal 1: Obtain funding to protect existing critical infrastructure from earthquake damage.

Project E-1 - If funding is available, perform an engineering assessment of the earthquake vulnerability of each identified critical infrastructure owned by the Municipality of Skagway.

Project 3-2 -- Identify buildings and facilities that must be able to remain operable during and following an earthquake event.

Project E-3 - Contract a structural engineering firm to assess the identified buildings and facilities to determine their structural integrity and devise a strategy to improve their earthquake resistance.

Section 3. Snow Avalanche

Hazard Description

Alaska experiences many snow avalanches every year. The exact number is undeterminable as most occur in isolated areas and go unreported. Avalanches tend to occur repeatedly in localized areas and can shear trees, cover communities and transportation routes, destroy buildings, and cause death. Alaska leads the nation in avalanche accidents per capita.

Avalanche Types

A snow avalanche is a swift, downhill moving snow mass. The amount of damage is related to the type of avalanche, the composition and consistency of the material in the avalanche, the force and velocity of the flow, and the avalanche path. There are two main types of snow avalanches; loose snow and slab. Other types that occur in Alaska include: cornice collapse, ice, and slush avalanches.

Loose Snow Avalanches

Loose snow avalanches, sometimes called point releases, generally occur when a small amount of uncohesive snow slips and causes more uncohesive snow to go downhill. They occur frequently as small local cold dry 'sluffs', which remove excess snow (involving just the upper layers of snow) keeping the slopes relatively safe.

They can be large and destructive, though. For example, wet loose snow avalanches occur in the spring are very damaging. Loose snow avalanches can also trigger slab avalanches. Loose snow avalanches typically occur on slopes above 35 degrees, leaving behind an inverted V-shaped scar. They are often caused by snow overloading (common during or just after a snowstorm), vibration, or warming (triggered by rain, rising temperatures or solar radiation).

Slab Avalanches

Slab avalanches are the most dangerous types of avalanches. They happen when a mass of cohesive snow breaks away and travels down the mountainside. As it moves, the slab breaks up into smaller cohesive blocks. Slab avalanches usually require the presence of structural weaknesses within interfacing layers of the snow pack. The weakness exists when a relatively strong, cohesive snow layer overlies weaker snow or is not well bonded to the underlying layer. The weaknesses are caused by changes in the thickness and type of snow covers due to changes in temperature or multiple snowfalls. The interface fails for several reasons. It can fail naturally by earthquakes, blizzards, temperature changes or other seismic and climatic causes, or artificially by human activity.

When a slab is released, it accelerates, gaining speed and mass as it travels downhill. The slab is defined by fractures. The uppermost fracture delineating the top line of the slab is termed the "crown surface", the area above that is called the crown. The slab sides are called the flanks. The lower fracture indicating the base of the slab is called the "stauwall". The surface the slab slides over is called the "bed surface". Slabs can range in thickness from less than an inch to 35 feet or greater.

Cornice Collapse

A cornice is an overhanging snow mass formed by wind blowing snow over a ridge crest or the sides of a gully. The cornice can break off and trigger bigger snow avalanches when it hits the wind-loaded snow pillow.

Icefall Avalanche

Icefall avalanches result from the sudden fall of broken glacier ice down a steep slope. They can be unpredictable as it is hard to know when icefalls are imminent. Despite what some people think, they are unrelated to temperature, time of day or other typical avalanche factors.

Slush Avalanches

Slush avalanches occur mostly in high latitudes such as in the Brooks Range. They have also occurred in the mountain areas of Alaska's Seward Peninsula and occasionally in the Talkeetna Mountains near Anchorage. Part of the reason they are more common in high latitudes is because of the rapid onset of snowmelt in the spring. Slush avalanches can start on slopes from 5 to 40 degrees but usually not above 25 to 30. The snow pack is totally or partially water saturated. The release is associated with a bed surface that is nearly impermeable to water. It is also commonly associated with heavy rainfall or sudden intense snowmelt. Additionally, depth hoar is usually present at the base of the snow cover.

Slush avalanches can travel slowly or reach speeds over 40 miles per hour. Their depth is variable as well, ranging from 1 foot to over 50 feet deep.

Avalanche Terrain Factors

There are several factors that influence avalanche conditions, with the main ones being slope angle, slope aspect and terrain roughness. Other factors include slope shape, vegetation cover, elevation, and path history. Avalanches usually occur on slopes above 25 degrees. Below 25 degrees, there usually is not enough stress on the snow pack to get it to slide. Above 60 degrees, the snow tends to 'sluff' off and does not have the opportunity to accumulate. Avalanches can occur outside this slope angle range, but are not as common. Slope aspect, also termed orientation, describes the direction a slope faces with respect to the wind and sun. Leeward slopes loaded by wind-transported snow are problematic because the wind-deposited snow increases the stress and enhances slab formation.

Intense direct sunlight, primarily during the spring months, can weaken and lubricate the bonds between the snow grains, weakening the snow pack. Shaded slopes are potentially unstable because the weak layers are held for a longer time in an unstable state.

Terrain influences snow avalanches because trees, rocks, and general roughness act as anchors, holding snow in place. However, once an anchor is buried by snow, it loses its effectiveness. Anchors make avalanches less likely but do not prevent them unless the anchors are so close together that a person could not travel between them.

Avalanche Path

The local terrain features determine an avalanche's path. The path has three parts: the starting zone, the track, and the run-out zone.

The starting zone is where the snow breaks loose and starts sliding. It is generally near the top of a canyon, bowl, ridge, etc., with steep slopes between 25 and 50 degrees. Snowfall is usually significant in this area.

The track is the actual path followed by an avalanche. The track has milder slopes, between 15 and 30 degrees, but this is where the snow avalanche will reach maximum velocity and mass. Tracks can branch, creating successive runs that increase the threat, especially when multiple releases share a run-out zone.

The run-out zone is a flatter area (around 5 to 15 degrees) at the path base where the avalanche slows down, resulting in snow and debris deposition.

The impact pressure determines the amount of damage caused by a snow avalanche. The impact pressure is related to the density, volume (mass) and velocity of the avalanche. (*2007 State Hazard Mitigation Plan*)

Location

Backcountry areas are prone to snow avalanches. Potentially affected areas roads and infrastructure areas include Skagway Road, South Klondike Highway, White Pass, Chilkat Pass, and Whitehorse areas.

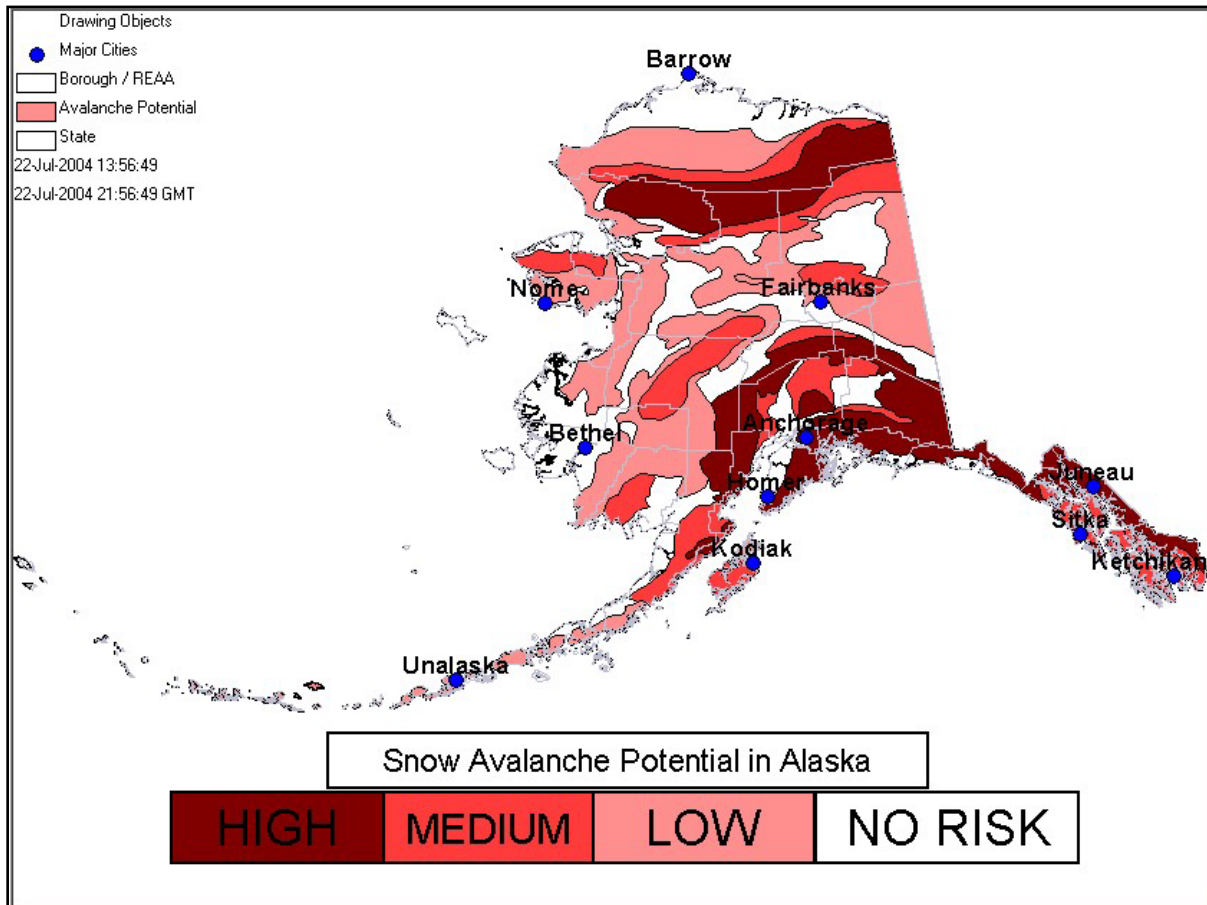
Extent

The extent of damage due to a snow avalanche can be expected to be **critical**. Injuries may be caused by an unanticipated avalanche striking one the major transportation routes to the Yukon. Complete shutdown of critical facilities involving the transportation routes and infrastructure could occur causing extreme financial hardship.

Probability

The *State Hazard Mitigation Plan* Vulnerability Matrix, Table 10, lists the probability of a snow avalanche in Skagway as **high**. The hazard is present with a high probability of occurrence within the calendar year. Even has up to 1 in 1year chance of occurring.

Figure 8. Snow Avalanche Potential in Alaska



Source: *State Hazard Mitigation Plan*

Previous Occurrences

Alaska has a long history of snow avalanches. It has been estimated that there have been over 4,500 avalanche disaster events in the past 200 years. The Palm Sunday avalanche, April 3, 1898 is considered to be the deadliest event of the Klondike gold rush. The Chilkoot Trail, near Skagway, experienced multiple slides that day, including three with fatalities. The first fatal slide killed three people. The second one killed the entire Chilkoot Railroad and Transportation Company crew who were trying to evacuate an avalanche prone area further up the trail. The third slide occurred in about the same location as the second, killing approximately 70 people who were following the trail left by the construction crew. The exact death toll is unknown because of the transient nature of those involved and inefficiencies in the identification process.

Late 1999 and early 2000 saw avalanches in Cordova, Valdez, Anchorage, Whittier, Cooper Landing, Moose Pass, Summit, Matanuska-Susitna Valley, and Eklutna from the Central Gulf Coast Storm. The most damaging avalanche occurred in Cordova, near milepost 5.5 of the Copper River Highway and was approximately 0.5 mile wide. It

resulted in one death, at least 10 damaged structures, and about 1 million dollars in damage.

Avalanches had struck in that spot before, including one in 1971. (*2007 State Hazard Mitigation Plan*)

Impact

The greatest danger from snow avalanche is in the backcountry in Municipality. Several times in the past, as described in the previous occurrence section, Skagway has been isolated from road closures due to snow avalanches. Infrastructure damage is also a high risk in Skagway, as well as the potential for injuries or death.

Snow Avalanche Goals and Projects

- Goal 1.** Reduce Skagway's vulnerability to avalanche hazards in terms of threat to life and property.
- Goal 2.** Have comprehensive information regarding avalanches throughout Skagway's developed area, including areas that will be developed in the future.
- Goal 3.** Increase public awareness of avalanche and landslide dangers and hazard zones.

Project S/A-1 - Prohibit new construction in avalanche areas. (Goals 1, 2, 3)

Project S/A 2 - Utilize appropriate methods of structural avalanche control. (Goals 1, 2,3)

Project S/A 3 - Enact buyout of homes in avalanche paths. (Goals 1, 2, 3)

Project S/A 4 - Install warning signage in avalanche areas. (Goals 1, 2, 3)

Project S/A - 5 Continue to educate public about avalanche hazards. Information can be disseminated to the public through the Municipality web site, press releases, media ads, and other methods. (Goals 1, 2, 3)

Section 4. 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 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

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. Loading on the delta from added weight such as trains or a warehouse or added fill can add to an area's instability.

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 and may be caused by 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 cause more devastation and give residents only a few minutes to seek safety. Distant tsunamis originating in places like Chile, Japan, Russia, or other parts of 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, 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 reaches 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

The underwater front slope of the active Skagway River delta, south of the port and harbor, is subject to underwater landslide. Sliding of delta fronts can occur due to normal sediment accumulation, caused by the increasing weight and steepness or the mass of sediment; or may be triggered by earthquakes or other destabilizing forces. (SCMP 2007)

The *SCMP, 2007* designates areas in Taiya Inlet subject to underwater landslides and locally-generated tsunamis as a natural hazard area under the provisions of 11 AAC 114.250(b). These areas are showed on Figure 1, Section 2.

In 2002, the Alaska Division of Geological and Geophysical Surveys (DGGs) published *Tsunami Hazard Mapping of Alaska Coastal Communities*, Alaska GEO Survey News Newsletter, Vol. 6, No. 2. This publication stated that DGGs was in the process of conducting new bathymetric surveys in Alaska. The goal was to complete tsunami-inundation maps for Homer–Seldovia and the next three priority areas, Seward, Sitka, and Sand Point, by 2004.

As of the date of this MHMP the inundation maps are not completed. The community infrastructure and residences directly adjacent to the coastline of Skagway can be assumed to be in danger of a tsunami but until the inundation maps are completed the critical facilities are not mapped.

Extent

A tsunami in Skagway could be of a **critical** extent. Skagway has been designated by DHS&EM and DGGs as having a high potential for both local and Pacific-wide tsunamis. Skagway is located directly on the Gulf of Alaska and is not protected by islands, as is much of Southeastern Alaska. It is possible for a critical event that could cause injuries and property damage.

The following factors will affect the severity of a tsunami:

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 the tsunami 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:

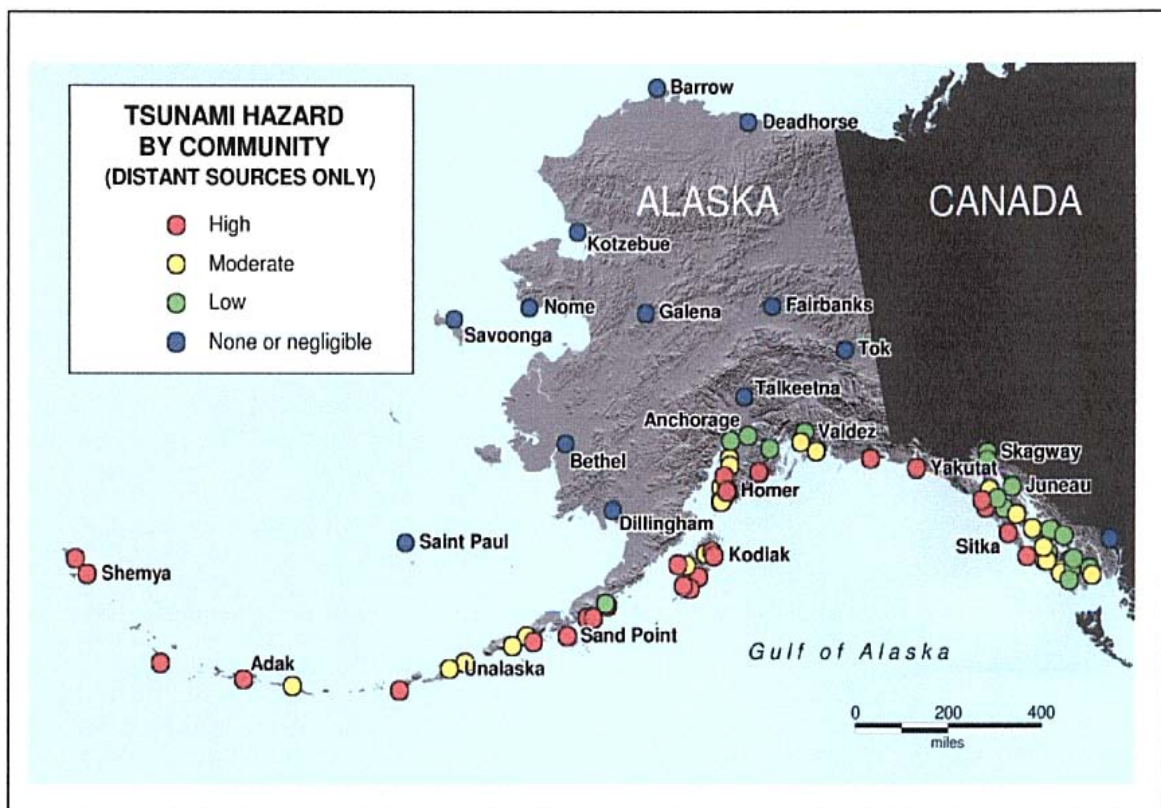
Fault movement: Strike-slip movements that occur under the ocean create little or no tsunami hazard. However, vertical movements along a fault on the seafloor displace water and create a tsunami hazard.

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.

Probability

Figure 9. Tsunami Hazard Probability by Community



Source: Alaska Hazards Mitigation Plan, 2007

Skagway 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 years chance of occurring.

Previous Occurrences

An underwater landslide on November 3, 1994, on the east side of the Skagway Harbor occurred during one of the lowest tides of the year, producing a locally generated tsunami with estimated amplitude of 9 to 11 meters (Kulikov, et. al, 1996). There was no earthquake trigger for that landslide. Since the tide was very low, the wave did not leave the inlet basin. However, the wave caused the death of one person and destroyed a cargo terminal and 1.5 km of railway lines. There has been considerable scientific and legal interest and investigation of the circumstances of that event, but no follow up work to further assess risk, potential for damage, or appropriate prevention or response measures. (SCMP, 2007)

Engineering work can create slopes that may become unstable and fail - causing tsunamis. On the evening of November 3, 1994 in Skagway, Alaska, construction of a railroad dock extension is thought to have overloaded the sediments on which it was built. About 1 million cubic meters of rubble and sediment slid into the fjord. The resulting tsunami, up to 12 m high, surged across the harbor.

In addition to the \$20 million loss and one death on the dock itself, around two million dollars' worth of damage was caused to small boats and a ferry terminal (unoccupied at the time). (Geological Society of London)

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 tsunami in Alaska. In 1883, debris from the Saint Augustine volcano triggered tsunami that inundated Port Graham with waves 30 feet high.

Impact

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

Tsunami Mitigation Goals and Projects:

- Goal 1.** Increased Public Education about Tsunamis and Seiches.
- Goal 2.** Continue the Tsunami Ready Community Designation Program.
- Goal 3.** Develop accurate inundation maps for the Skagway coastline.
- Goal 4.** Update Skagway Emergency Operations Plan, as needed.

Project T1 - Tsunami Ready Community Designation T-1. (Goal 2)

- Continue to support and fund the Tsunami Ready Program.

Project T2, 3 - Emergency Operation Plan Exercises (Goals 1 and 4)

- Use the Emergency Operations Plan in exercises regarding natural hazards including tsunami danger. Participate in the Tsunami Awareness programs and maintain Tsunami Ready Community designation

Project T4 - Inundation Mapping (Goal 3)

- Obtain tsunami inundation maps for Skagway. Without these maps, communities must rely on historical or estimated information for land use and evacuation route planning. Inundation maps will provide more accurate and precise information.

Section 5: Severe Weather

As a consequence of Skagway's location deep within the coast mountain range, the area is influenced both by the rainforest climate of Southeast Alaska and the continental climate typical of interior Alaska and Canada. As a result, Skagway is much drier than the rest of Southeast Alaska with an average of 29 inches of precipitation annually.

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.

Winter Storms

Winter storms originate as mid-latitude depressions or cyclonic weather systems. High winds, heavy snow, and cold temperatures usually accompany them. To develop, they require:

- Cold air - Subfreezing temperatures (below 32°F, 0°C) in the clouds and/or near the ground to make snow and/or ice.
- Moisture - The air must contain moisture in order to form clouds and precipitation.
- Lift - A mechanism to raise the moist air to form the clouds and cause precipitation.

Heavy Snow

Heavy 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, or even closed completely, stopping the flow of supplies and disrupting emergency and medical services.

Accumulations of snow can knock down trees and power lines and cause roofs to collapse. Heavy 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 Skagway on an area wide basis.

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

Extent

Extreme weather could result in a **critical** situation in Skagway. Injuries and/or illness could result from excessive rainfall or snowfall, and with high winds, cause shutdown of critical facilities, damage property and isolate Skagway.

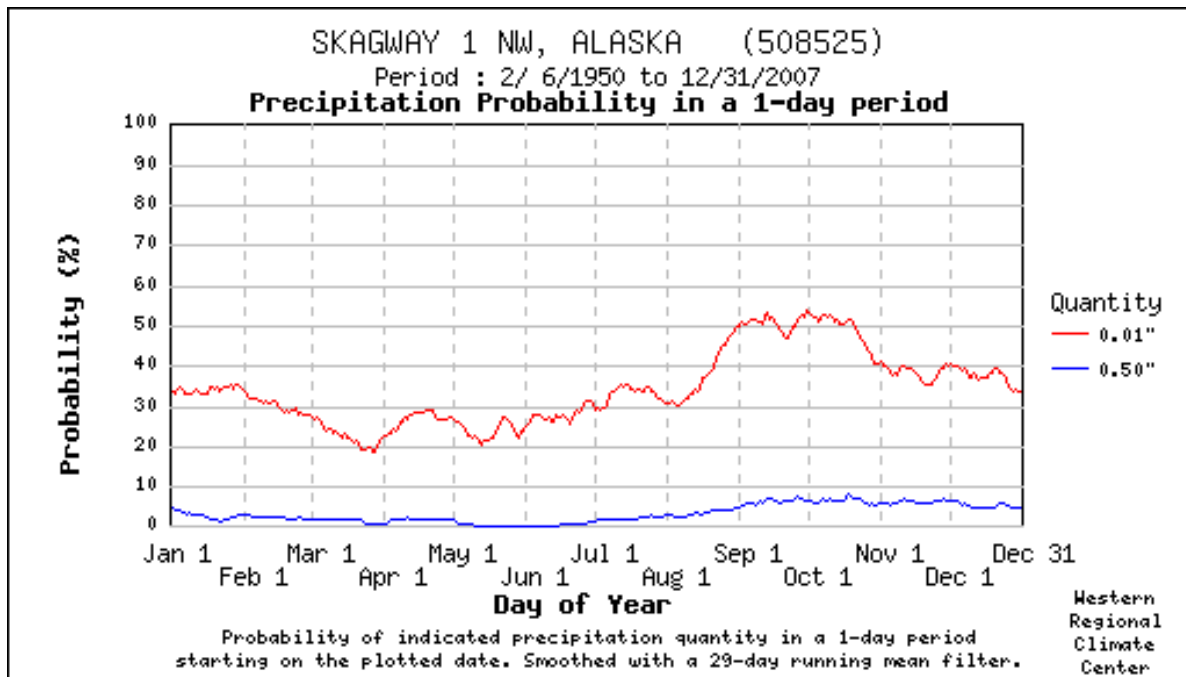
The *State Hazard Mitigation Plan* lists severe weather as creating two limited damage events in Skagway.

Probability

Skagway has a moderate probability of severe weather, which is defined, as the hazard is present with a moderate probability of occurrence within the calendar year. Event has up to 1 in 3 years chance of occurring.

The following figure from the Western Regional Climate Center shows that Skagway has a less than 10% chance of at least a half-inch of rainfall most days.

Figure 10. Precipitation Probability in a 1-day period



Previous Occurrences

Southeast Alaska, November 26, 1984: A hurricane force windstorm and wind driven tides caused extensive damage to public and private property in five Southeast Alaskan communities. The State provided public and individual assistance grants and temporary housing in Juneau, **Skagway**, Kake, Angoon and Tenakee Springs. SBA provided disaster loan assistance and the American Red Cross made grants to meet immediate needs of victims. The Governor's request for a Presidential declaration was denied.

Southeast Storm (AK-06-216) declared December 23, 2005 by Governor Murkowski: Beginning on November 18, 2005 and continuing through November 26, 2005, a strong winter storm with high winds and record rainfall occurred in the City/Borough of Juneau, the City/Borough of Haines, the City/Borough of Sitka, the City of Pelican, the City of Hoonah, and the **City of Skagway**, which resulted in widespread coastal flooding, landslides, and severe damage and threat to life and property, with the potential for

further damage. The following conditions exist as a result of this disaster: severe damage to personal residences requiring evacuation and relocation of residents; to individuals personal and real property; to businesses; and to a marine highway system dock, the road systems eroded and blocked by heavy debris that prohibited access to communities and residents, and other public infrastructures, necessitating emergency protective measures and temporary and permanent repairs. The total estimated amount of assistance is approximately \$1.87 million. This includes the following: Individual Assistance totaling \$500K for 52 applicants and Public Assistance totaling \$1.1 million for 14 applicants. There was no hazard mitigation. (DHS&EM Disaster Cost Index)

The following table from the Western Regional Climate Center illustrates the temperate climate in Skagway.

Table 20. Skagway Temperature Summary

SKAGWAY, ALASKA
 Period of Record General Climate Summary – Temperature
 From Year=1950 To Year=2008, Table Updated July 14, 2008

	Max.	High	Date	Low	Date	Highest Mean	Year	Lowest Mean	Year
	F	F	dd/yyyy or yyyymmdd	F	dd/yyyy or yyyymmdd	F	-	F	-
January	28.2	50	06/1958	-16	03/1965	31.9	2001	11.0	1959
February	33.4	48	24/1963	-7	09/2008	35.1	1964	20.5	1965
March	37.7	58	29/1954	-5	05/1951	37.2	2005	24.7	2007
April	50.3	76	27/1958	10	06/1954	45.1	1958	34.9	2002
May	60.8	82	31/1958	22	11/1952	54.6	2005	46.7	1952
June	67.0	87	20/2004	5	19/1962	60.1	1958	51.4	1962
July	67.7	85	10/1953	38	20/1963	60.9	2004	56.5	2002
August	66.3	91	17/2004	28	26/1952	60.7	2004	55.2	2000
September	58.4	83	04/1957	22	28/1954	55.7	1957	48.3	2000
October	48.7	68	07/1957	20	20/1961	45.5	1957	39.0	1961
November	37.4	56	01/2003	-6	23/1963	38.6	1957	18.1	2006
December	32.7	50	02/1963	-20	15/1964	34.1	2005	10.2	1964
Annual	49.0	91	20040817	-20	19641215	43.6	2005	40.0	1961

	Max.	High	Date	Low	Date	Highest Mean	Year	Lowest Mean	Year
	F	F	dd/yyyy or yyyymmdd	F	dd/yyyy or yyyymmdd	F	-	F	-
Winter	31.4	50	19580106	-20	19641215	30.8	1960	16.1	1965
Spring	49.6	82	19580531	-5	19510305	45.6	2005	37.3	2002
Summer	67.0	91	20040817	5	19620619	60.4	2004	55.8	1962
Fall	48.2	83	19570904	-6	19631123	46.6	1957	37.2	2006

Western Regional Climate Center, wrccl@dri.edu

Impact

Because of its remote location, Skagway must be very self-reliant. Severe weather can cut off air access limiting medevac availability and access to goods and services, including groceries and medical supplies. Severe wind and heavy snow can cause extensive damage to critical structures including residences and public facilities.

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

Severe Weather Mitigation Goals and Projects

- 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.

Project SW1 - Storm Ready (Goal 1, 2, 3)

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 tornados 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

Project SW2 - Conduct special awareness activities, such as Winter Weather Awareness Week, Flood Awareness Week, etc. (Goals 1, 2, 3)

Project SW3 - Expand public awareness about NOAA Weather Radio for continuous weather broadcasts and warning tone alert capability. (Goals 1, 2, 3)

Project SW4 - Encourage weather resistant building construction materials and practices. (Goals 1, 2, 3)

Section 6. Hazards not Profiled in Plan

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), monitors 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 Skagway as being over 200 miles away. (<http://www.avo.alaska.edu/>)

Wildland Fire

The soil conditions and abundant rainfall combine to make wildland fire hazard unlikely. There are areas located within the NPS, KLGO park areas that may benefit from controlled burns. Since the area is located with the NPS the Municipality did not assess the risk at this time.

Ground Failure

Future addition during plan update.

Chapter 5: Mitigation Strategy

Benefit - Cost Review

This chapter of the plan outlines Skagway'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, erosion, tsunami, snow avalanche, severe weather and earthquake*; however the mitigation strategy will be regularly updated as additional hazard information is added and new information becomes available.

The projects listed on Table 21, Benefit and Costs Listing, 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 actions 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 Municipality considered the following factors in prioritizing the mitigation projects.

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 depicted in Table 21:

- 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.

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 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 bchelpine@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 PDMG and 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

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).

Priorities 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.

Mitigation Projects	Benefits (pros)	Costs (cons)	Priority
Flood/Erosion (FLD)			
FLD-1. Wave Barrier	Ready for Construction	\$2.5 million	Medium
FLD-2. The NPS, KLGO, has submitted a funding request for the installation of an engineering log jam at the historic townsite of Dyea to prevent its further loss to riverine erosion.	Planning Phase	Cost to be determined	Medium
FLD-3. <i>Geophysical Survey, 2007 Project</i> (a partnership between: the Municipality of Skagway, the Cold Regions Research Lab and the National Park Service) mitigation projects. (Please see Page 45)	Planning and Initial Site Survey completed. Multi-Agency Support	Rough Estimates: 1. Boat Ramp Lake \$ 175,000 2. Goat Lake \$15,000 – \$25,000 3. Lake 1611 \$15,000 - \$20,000 4. Lateral Moraine Lake – Monitor 5. Biennial Monitoring - \$10,000-\$15,000 (Helicopter for 2 days)	Medium

Mitigation Projects	Benefits (pros)	Costs (cons)	Priority
FLD-4. 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-5. 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-6. Updated FIRM Skagway Maps	State DCRA funding available. USCOE facilitated project.	Expensive, at least \$100,000	High
FLD-7. 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-8. Consider obtaining a CRS rating to lower flood insurance rates.	High capability by Municipality to do on an annual basis Will reduce NFIP insurance for entire community. <\$1,000/year	Staff time.	High
FLD-9. Continue to obtain flood insurance for all Municipality structures, and continue compliance with NFIP.	High capability by Municipality to do on an annual basis. Public benefit to have public buildings insured through NFIP. Inexpensive, approx.\$3,000/year.	Staff time	High

Mitigation Projects	Benefits (pros)	Costs (cons)	Priority
FLD-10. 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 to have public buildings insured through NFIP.	Staff time	High
Earthquake (E)			
E-1. If funding is available, perform an engineering assessment of the earthquake vulnerability of each identified critical infrastructure owned by the Municipality of Skagway.	Life/Safety issue/Risk reduction Benefit to entire community State assistance available.	Staff time	High
E-2. 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 State assistance available	Staff time	High
Snow Avalanche (S/A)			
S/A-1. Prohibit new construction in avalanche areas.	Life/Safety issue/Risk reduction Benefit to entire community No direct cost to implement State assistance available 1 – 5 years to adopt ordinance.	Political Support not determined. Private property issues. Staff time.	Medium
S/A-2. Utilize appropriate methods of structural avalanche control.	Life/Safety issue/Risk reduction Benefit to entire community Federal or State assistance available	Engineering and structural design needed. Dollar cost not determined. Long timeframe to implement + years.	Low

Mitigation Projects	Benefits (pros)	Costs (cons)	Priority
S/A-3. Enact buyout of homes in avalanche paths.	Life/Safety issue/Risk reduction Benefit to entire community PDM or HMPG projects.	Political Support not determined. Private property issues. Staff time. Expensive, >\$100,000. Long timeframe 5+ years.	Low
S/A-4. Continue to educate public about avalanche and landslide hazards.	Life/Safety issue/Risk reduction Benefit to entire community State assistance available	Staff time	High
Tsunami (T)			
T-1. Siren and lights at both ends of town for Tsunami and other hazardous warnings	Life/Safety Project	Staff time, Cost	High
T-2. Continued Participation Tsunami Ready Community Designation	Life/Safety issue/Risk reduction Benefit to entire community State assistance available	Staff time	High
T-3. Inundation Mapping	USCOE facilitated project. 1 – 5 year project.	Expensive, at least \$100,000	Medium
T-4. Update Skagway Emergency Operations Plan, as needed	Life/Safety issue/Risk reduction Benefit to entire community State assistance available	Staff time	Medium
Severe Weather (S/W)			

Mitigation Projects	Benefits (pros)	Costs (cons)	Priority
S/W-1. Research and consider instituting the National Weather Service program of "Storm Ready".	Life/Safety issue Risk reduction Benefit to entire community 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 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 State assistance available	Staff time	High
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 Project Plan

Table 22 presents Skagway 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. Mitigation Project Plan

Mitigation Projects	Responsible Agency	Cost	Funding Sources	Estimated Timeframe	Annual Review
Flood/Erosion (FLD)					
FLD-1. Wave Barrier	Municipality USCOE FEMA	\$2,500,000	Muni	1 year	
FLD-2. Flashing lights at docks for warning of flood inundation	Municipality of Skagway & Alaska Power & Telephone	N/A	PDM	<1 year	
FLD-3. The NPS, KLGO, has submitted a funding request for the installation of an engineering log jam at the historic townsite of Dyea to prevent its further loss to riverine erosion.	NPS, KLGO	N/A	NPS	>5 years	

Mitigation Projects	Responsible Agency	Cost	Funding Sources	Estimated Timeframe	Annual Review
FLD-4. <i>Geophysical Survey, 2007 Project</i> (a partnership between: the Municipality of Skagway, the Cold Regions Research Lab and the National Park Service) mitigation projects. (Please see Page 45)	Municipality Cold Regions Research Lab NPS, KLGO	Rough Estimates: 1. Boat Ramp Lake \$ 175,000 2. Goat Lake \$15,000 – 25,000 3. Lake 1611 \$15,000 - \$20,000 4. Lateral Moraine Lake – Monitor 5. Biennial Monitoring - \$10,000- \$15,000	Muni NPS PDM FMA	>5 years	
FLD-5. Identify Drainage Patterns and Develop a Comprehensive Drainage System	FEMA	N/A	PDM FMA	>1 year	
FLD-6. Structure Elevation and/or Relocation	FEMA DHS&EM	N/A	PDM FMA	>1 year	
FLD-7. Updated FIRM Skagway Maps	FEMA	>\$100,000	FMA PDM	<1 year	
FLD-8. Public Education	Municipality DHS&EM	Staff Time	Municipality	Ongoing	
FLD-9. Pursue obtaining a CRS rating to lower flood insurance rates.	Municipality	Staff Time	Municipality	<1 year	

Mitigation Projects	Responsible Agency	Cost	Funding Sources	Estimated Timeframe	Annual Review
FLD-10. Continue to obtain flood insurance for all Municipality structures, and continue compliance with NFIP.	Municipality	\$1,500	Municipality	Ongoing	
FLD-11. Require that all new structures be constructed according to NFIP requirements and set back from the shoreline to lessen future erosion concerns and costs.	Municipality	Staff Time	Municipality Budget	Ongoing	
Earthquake (E)					
E-1. If funding is available, perform an engineering assessment of the earthquake vulnerability of each identified critical infrastructure owned by the Municipality of Skagway Municipality.	Municipality DHS&EM	To be determined	State Grants	>1 year	
E-2. Identify buildings and facilities that must be able to remain operable during and following an earthquake event.	Municipality DHS&EM DCRA	Staff Time	State Grants	>1 year	
Snow Avalanche (S/A)					
S/A-1. Prohibit new construction in avalanche areas.	Municipality	Staff Time	Municipality & Municipality Budget	Ongoing	
S/A-2. Utilize appropriate methods of structural avalanche control.	FEMA	>\$25,000	PDM	>5 years	
S/A-3. Enact buyout of homes in avalanche paths.	FEMA	>\$25,000	PDM	>5 years	

Mitigation Projects	Responsible Agency	Cost	Funding Sources	Estimated Timeframe	Annual Review
S/A-4. Install warning signage in mapped avalanche areas.	State DOT	<\$10,000	PDM	Ongoing	
S/A-5. Continue to educate public about avalanche hazards.	Municipality	Staff Time	Municipality & Municipality Budget	Ongoing	
Tsunami (T)					
T-1. Siren and lights at both ends of town for Tsunami and other hazardous warnings	Municipality DHS&EM	Not determined	DHS&EM NOAA NTHMP	>1 year	
T-2: Continued Participation in the Tsunami Awareness Programs.	Municipality DHS&EM	Staff Time	DHS&EM NOAA NTHMP	>5 years	
T-3. Continued Tsunami Ready Community Designation	Municipality DHS&EM	Staff Time	Municipality DHS&EM	>5 years	
T-4. Inundation Mapping	NOAA NTHMP DHS&EM	>\$15,000	NOAA NTHMP	>5 years	
Severe Weather (SW)					
SW-1. Research and consider instituting the National Weather Service program of "Storm Ready".	Municipality	Staff Time	Municipality DHS&EM	<1 year	
SW-2. Conduct special awareness activities, such as Winter Weather Awareness Week, Flood Awareness Week, etc.	Municipality DCRA DHS&EM	Staff Time	Municipality DCRA DHS&EM	<1 year	
SW-3. Expand public awareness about NOAA Weather Radio for continuous weather broadcasts and warning tone alert capability	Municipality	Staff Time	NOAA	Ongoing	

Mitigation Projects	Responsible Agency	Cost	Funding Sources	Estimated Timeframe	Annual Review
SW-4. Encourage weather resistant building construction materials and practices.	Municipality	Staff Time	Municipality	<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)

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, tsunamis, 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 is. 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: Public Involvement Strategy Skagway Newsletter



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 Homeland Security and Emergency Management

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 Skagway

The Alaska Division of Homeland Security and Emergency Services has funded a local hazards mitigation plan for Skagway. 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 Skagway, 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 a Skagway Planning and Zoning Commission Meeting on May 8, 2008 at 5:30 p.m. in the Borough Assembly 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 Skagway LHMP development. If you would like more information or have questions or comments, you can reach the planning team by phone or email:



Local Contacts,
Marjorie D. Harris, Borough Clerk
907.983.2297
m.harris@skagway.org

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.yz.net



Ervin Petty
DHS&EM Mitigation Section
907.428.7015 or
800.478.2337 ervin.petty@alaska.gov

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 8, 2008, 5:30 p.m.

Where: Borough Assembly 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.



Skagway Planning Commission Agenda – May 8, 2009

Municipality of Skagway
Planning & Zoning Commission Agenda
Thursday May 8, 2008 at 5:30 p.m.
Borough Assembly Chambers

1. Call to Order:
2. Roll Call:
3. Approval of Agenda:
4. Approval of Minutes:
 - A. Regular Meeting 04/10/2008
5. Public Comment/Correspondence (*Other than listed on the agenda*):

Eileen Bechtol; Local Hazard Mitigation Planning

Dave Schirokauer, Biologist, Natural Resources Program Manager Klondike Gold Rush National Historical Park; 15-20 minute power point presentation; results of the Summer 2007 Geohazard Survey

6. Unfinished Business:
7. New Business:
 - A. Conditional Use Permit Application No. 08-40; from Alaska Mountain Guides Adventures Inc. to add a ropes course to their rock climbing operation on ADL 107159, a portion of Lot 8, US Survey 5110 within Section 17, Township 27 South, Range 60 East, Copper River Meridian on the Klondike Highway
 - B. Replat of Lot 1A, Block 2, Skagway Townsite into 3 lots, Skagway Properties, LLC; Dave & Jeannie Vogel, Jim & Donna Stamper and Ralph Gorichanaz and Kristin Cyr
8. Commission Discussion:
9. Adjournment:

Next Meeting: June 12, 2008 at 5:30 p.m.

**-Application materials are due at the Borough Offices by 5:00 p.m.
Thursday, May 29, 2008-
-All applications and supporting materials are available for review at the
Borough Offices-**



Municipality of Skagway
Borough
Gateway to the Klondike
Local Hazards Mitigation Plan

Presentation to Skagway Borough Planning -
Zoning Commission

May 8, 2008

Eileen R. Bechtol, BP&D

**Which of These Hazards are
Present in Skagway?**

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

Mitigation

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



Objectives

- What is a Local Hazards Mitigation Plan?
- Why Does a Community Need One?
- What are the Planning Steps?



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.



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.



How is it Created, Planning Steps?

- Local Hazard Mitigation Plan Requirements (FEMA 44 CFR § 201.6).
- The process used to develop the mitigation plan is just as important as the plan itself.
- Public involvement in planning process; contributors comment prior to drafting stage and after FEMA pre-approval.



How is it Created, Planning Steps?

- Local Hazard Mitigation Plan Requirements (FEMA 44 CFR § 201.6).
- The process used to develop the mitigation plan is just as important as the plan itself.
- Public involvement in planning process; contributors comment prior to drafting stage and after FEMA pre-approval.

Current and Future Land Uses and Development Trends

Comprehensive Plan Update. Prepared by Sheinberg Associates for Municipality of Skagway. 2009.

Policies and Actions

It is the policy of the Municipality of Skagway to:

7.1 Have a well defined land use pattern that (a) fosters economic development, (b) provides for adequate housing, (c) offers both dispersed and more urban recreation opportunities, and (d) preserves and enhances historic, valuable and unique features of the community.

7.2 Provide an adequate supply of residential, commercial, industrial zoned land to help ensure ordered growth and implement the policies of the Municipality of Skagway.

7.3 Identify municipally owned parcels (and possible select private or other publicly owned parcels) that are suitable for public facilities and designate for these purposes.

7.4 Create a public land and recreation (PLR) zoning district to provide more certainty and predictability about where public facilities, recreation and open space will occur.

7.5 Prioritize land use and facilities at the Port for water dependent and water related uses. Land and water uses and activities in the Port of Skagway Area Meriting Special Attention (AMSA) area will be conducted to minimize potentially adverse effects on:

- The use and development of the small boat harbor and adjacent staging areas;
- The use and development of the Port's transshipment and marine vessel servicing facilities;
- Fishing activities; and
- Pedestrian and coastal access, in areas safe and appropriate for such uses.

7.6 Ensure an efficient blend of industrial, transshipment and visitor oriented land use and facilities in the Skagway port and waterfront. Use landscaping, defined pedestrian paths and signage, and design to buffer between differing uses and provide safety of motorized and non motorized movement.

7.7 Accommodate industrial expansion if high volume transshipment opportunities are realized.

7.8 Adhere to the Dyea Flats and Dewey Lakes Special Management Plans; the Pullen Creek, Port of Skagway, Skagway River and Yakutania Point AMSA Plans; and other area plans adopted by ordinance.

7.9 Provide a variety of recreation opportunities including dispersed outdoor recreation, developed parks and trails, ballfields, and indoor recreation facilities and programming. Opportunities for youth and senior citizens deserve special attention. Systematically implement the Skagway Comprehensive Trail Plan.

7.10 Complete a Master Plan for the area south of (but including) Seven Pastures along the river to provide predictability and ensure current and future uses are compatible. Pursue municipal acquisition of the land adjacent to the Skagway River from the State. Anticipated uses in this area, what is subject to periodic flooding, may include picnic areas, disc golf/frisbee, a 3 hole golf area, additional playing fields, community gardens, an ATV trail, and similar uses.

7.11 Support establishing local garden and agricultural land uses through the Municipality in all but residential areas.

7.12 Ensure that development along anadromous streams uses best management practices, including setbacks as appropriate, to maintain and enhance natural vegetation, water quality, fish passage and habitat, reduce erosion and maintain natural water flow, particularly in Pullen Creek. Provide a higher level of protection and stewardship on land that is in public ownership.

Action: Investigate the feasibility of providing tax incentives and tax relief for property owners who implement riparian or wetland habitat protection and conservation measures and improvements to their land, such as easements, restoration and assured Best Management Practices maintenance activities.

Action: Where development or other causes have led to serious stream bank erosion, undertake programs in cooperation with private owners and seek funding to restore degraded stream banks and prevent further erosion in a manner that provides erosion protection and safe fish habitat.

7.13 Maintain and improve surface water, groundwater and marine water quality in the Municipality of Skagway so that waters are in compliance with federal and state water quality standards.

Figure 11. Current Land Use – 2009 Comprehensive Plan

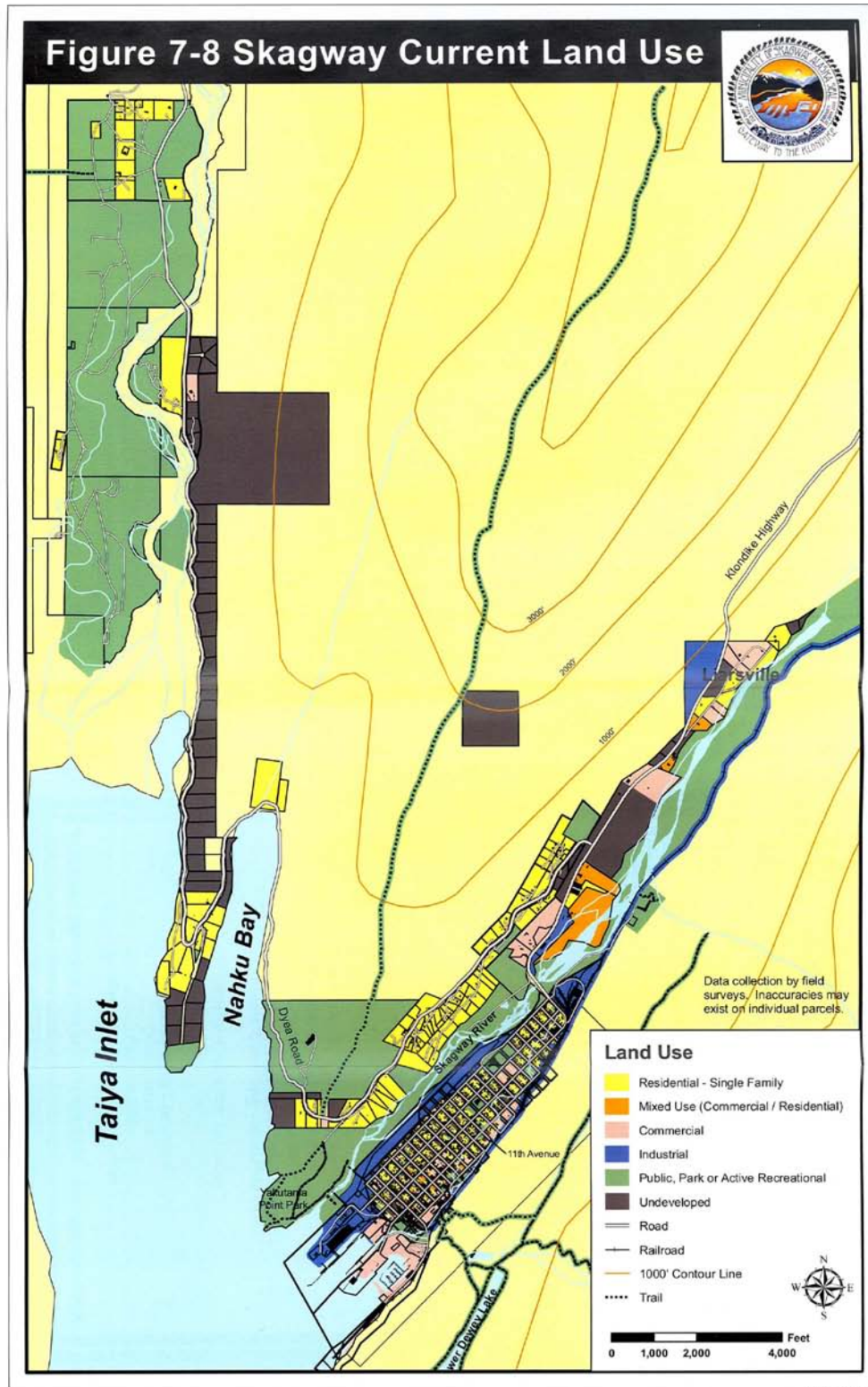


Figure 12. Current Land Use Growth Townsite - 2009 Comprehensive Plan

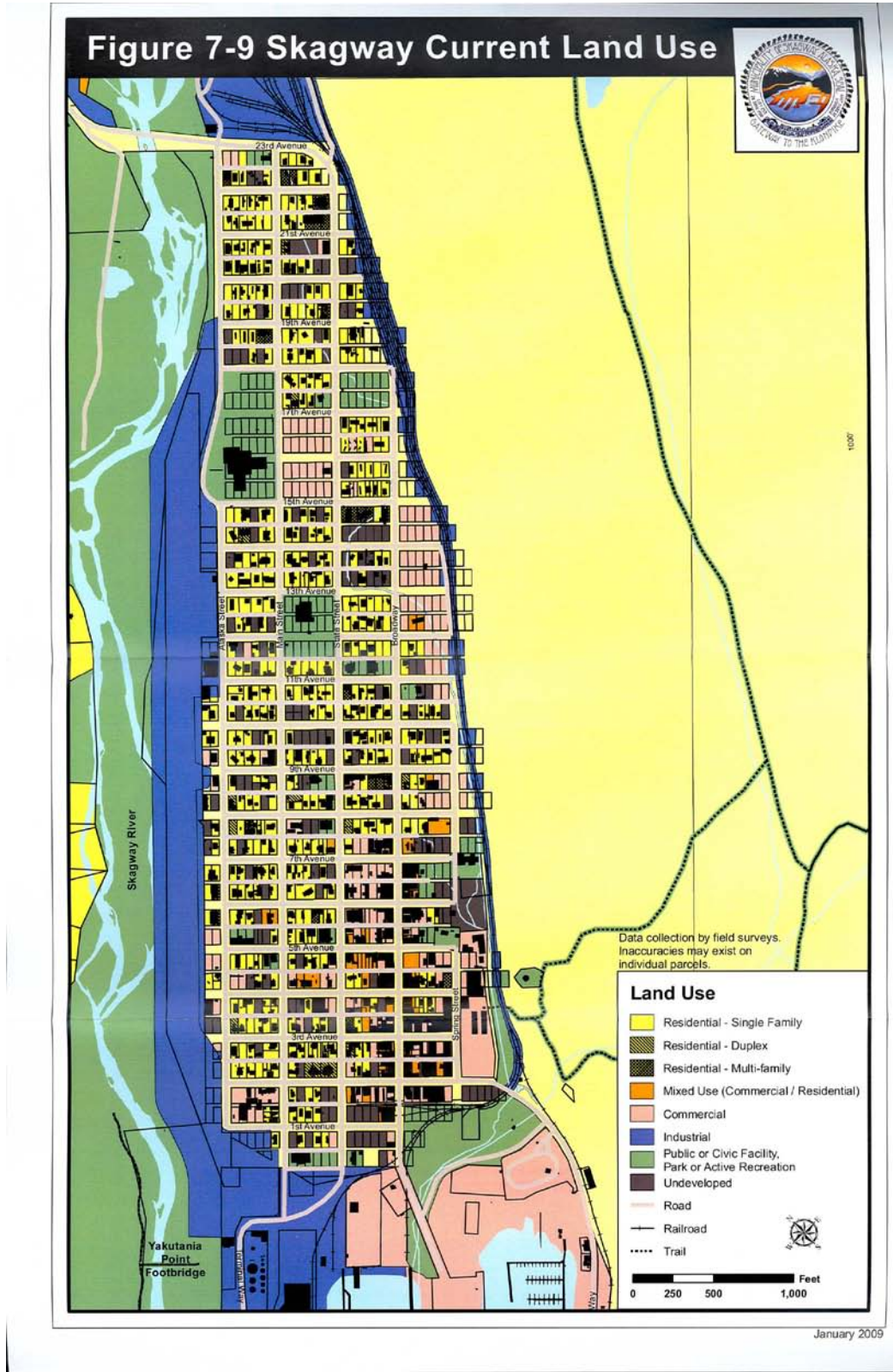


Figure 13. Future Growth Vicinity Map - 2009 Comprehensive Plan

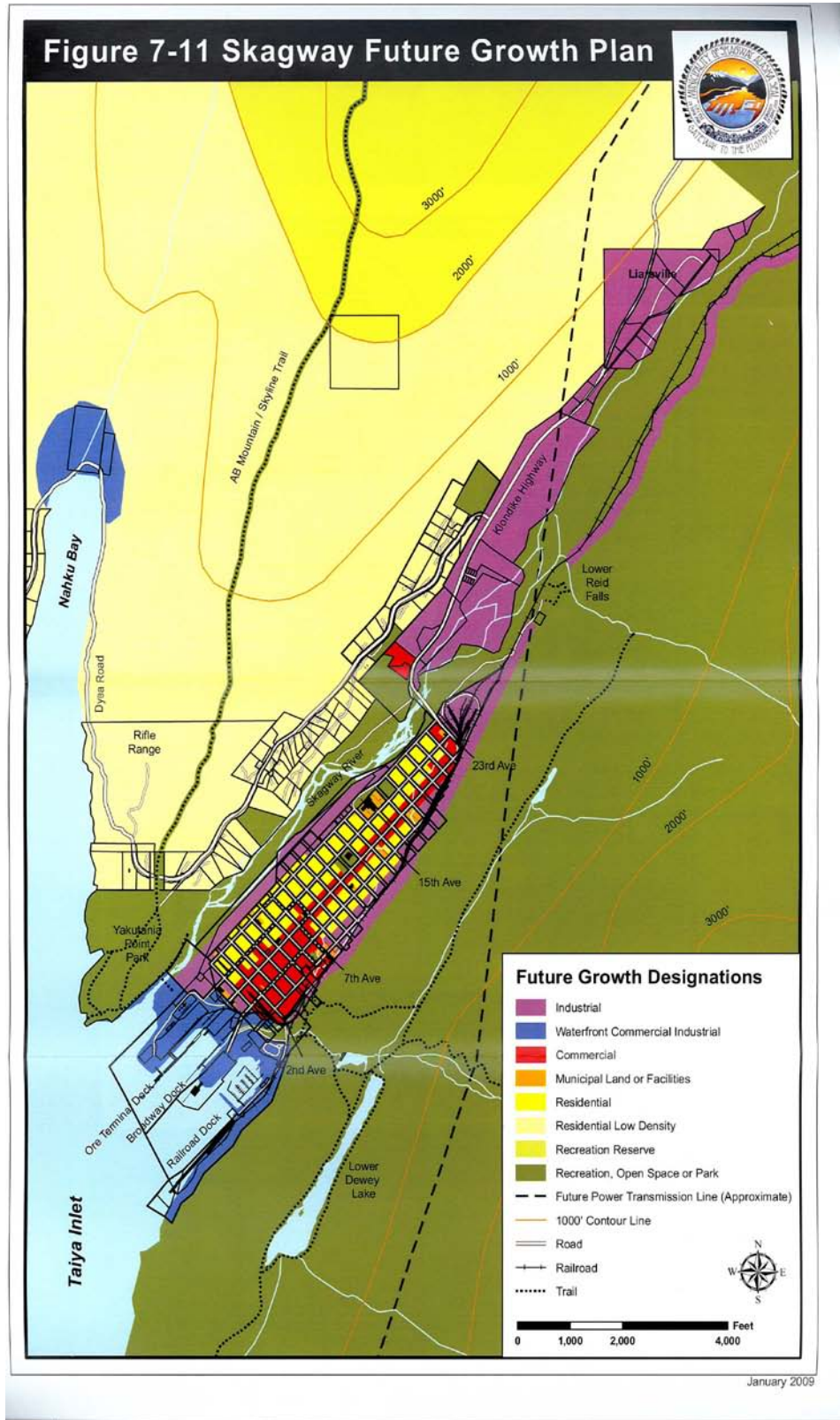
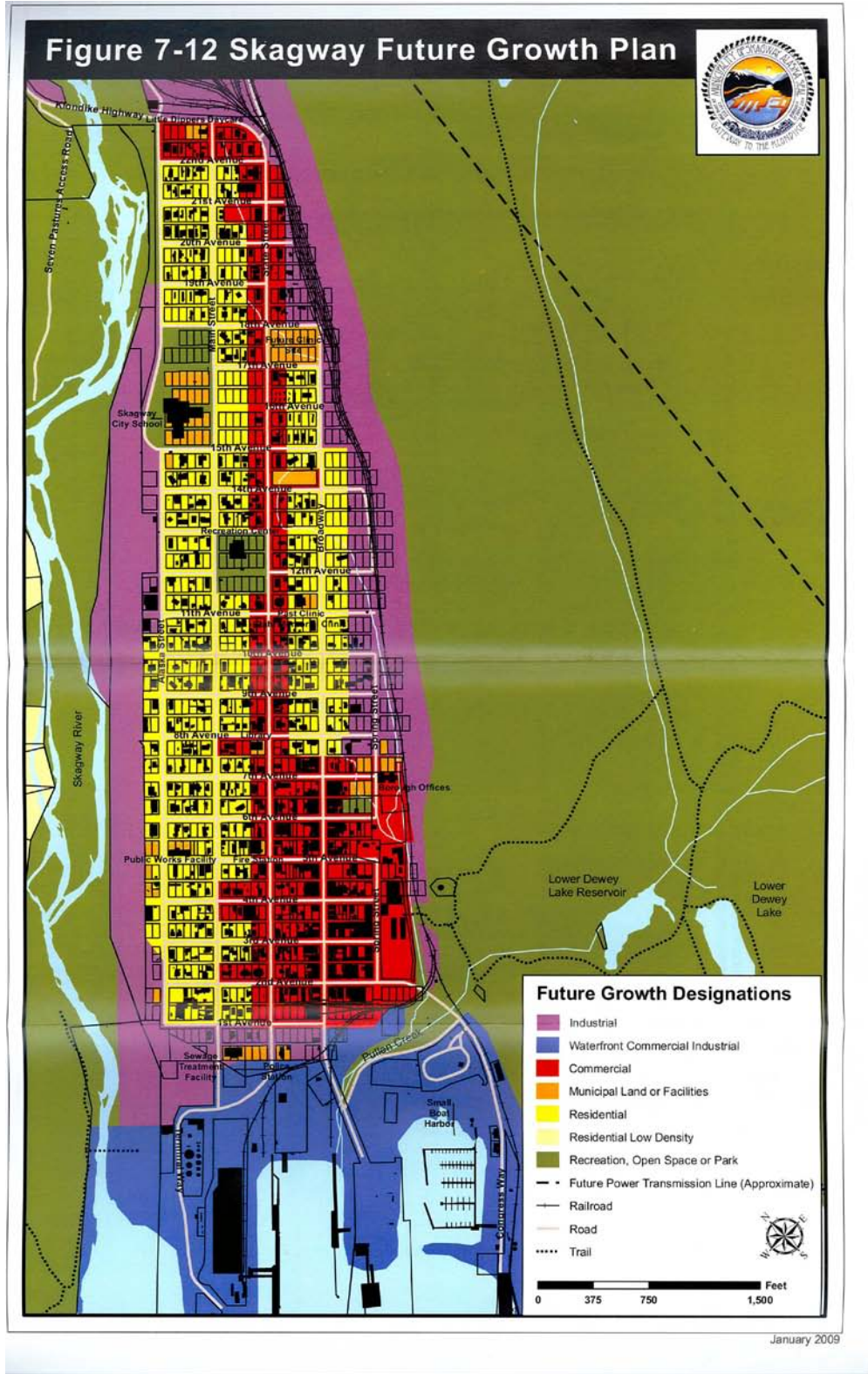


Figure 14. Future Growth Townsite - 2009 Comprehensive Plan





FEMA

December 30, 2009

Honorable Thomas D. Cochran
Mayor, City of Skagway
P.O. Box 415
Skagway, Alaska 99840

RECEIVED
JAN 04 2010
cc: Mayor & Assembly
MUNICIPALITY OF SKAGWAY

Dear Mayor Cochran:

The U.S. Department of Homeland Security's Federal Emergency Management Agency (FEMA) has approved the *Municipality of Skagway Multi-Hazard Mitigation Plan* as a local plan as outlined in 44 CFR Part 201. With approval of this plan, the Municipality of Skagway is now eligible to apply for the Robert T. Stafford Disaster Relief and Emergency Assistance Act's hazard mitigation project grants through December 30, 2014.

The plan's approval provides eligibility to apply for hazard mitigation projects through your State. All requests for funding will be evaluated individually according to the specific eligibility and other requirements of the particular program under which the application is submitted. For example, a specific mitigation activity or project identified in the plan may not meet the eligibility requirements for FEMA funding, and even eligible mitigation activities are not automatically approved for FEMA funding under any of the aforementioned programs.

Over the next five years, we encourage your community to follow the plan's schedule for monitoring and updating the plan, and to develop further mitigation actions. The plan must be reviewed, revised as appropriate, and resubmitted for approval within five years in order to continue project grant eligibility.

If you have questions regarding your plan's approval or FEMA's mitigation grant programs, please contact our State counterpart, Alaska Division of Homeland Security and Emergency Management, which coordinates and administers these efforts for local entities.

Sincerely,

Mark Carey, Director
Mitigation Division

cc: Mark Roberts, Alaska Division of Homeland Security and Emergency Management

KM:bb



FEMA

November 4, 2009

Mr. Erv Petty
State Hazard Mitigation Planner
Alaska Division of Homeland Security
and Emergency Management
P.O. Box 5750
Fort Richardson, Alaska 99505-5750

Dear Mr. Petty:

As requested, the U.S. Department of Homeland Security's Federal Emergency Management Agency (FEMA) has completed a pre-adoption review of the following plans:

- City of Craig Multi-Hazard Mitigation Plan
- City of Hoonah Multi-Hazard Mitigation Plan
- Municipality of Skagway Multi-Hazard Mitigation Plan

The plans successfully contain the required criteria, excluding the adoption, for hazard mitigation plans, as outlined in 44 CFR Parts 201. The plan review worksheets are enclosed. This letter serves as Region 10's commitment to approve each plan upon receiving documentation of each city's adoption of its plan.

Each plan will not be formally approved by FEMA until it is adopted. Each city is not eligible for mitigation project grants until its plan is formally approved by FEMA.

Please contact our Regional Mitigation Planning Manager, Kristen Meyers, at (425) 487-4543 with any questions.

Sincerely,

A handwritten signature in black ink, appearing to read "Ryan Ike".

Ryan Ike
Risk Analysis Branch Chief
Mitigation Division

Enclosures

KM:bb

LOCAL MITIGATION PLAN REVIEW SUMMARY

The plan cannot be approved if the plan has not been formally adopted. Each requirement includes separate elements. All elements of the requirement must be rated "Satisfactory" in order for the requirement to be fulfilled and receive a score of "Satisfactory." Elements of each requirement are listed on the following pages of the Plan Review Crosswalk. A "Needs Improvement" score on elements shaded in gray (recommended but not required) will not preclude the plan from passing. Reviewer's comments must be provided for requirements receiving a "Needs Improvement" score.

Prerequisite(s) (Check Applicable Box)	NOT MET	MET
1. Adoption by the Local Governing Body: §201.6(c)(5) OR	X	
2. Multi-Jurisdictional Plan Adoption: §201.6(c)(5) AND		N/A
3. Multi-Jurisdictional Planning Participation: §201.6(a)(3)		N/A
Planning Process	N	S
4. Documentation of the Planning Process: §201.6(b) and §201.6(c)(1)		X
Risk Assessment	N	S
5. Identifying Hazards: §201.6(c)(2)(i)		X
6. Profiling Hazards: §201.6(c)(2)(i)		X
7. Assessing Vulnerability: Overview: §201.6(c)(2)(ii)		X
8. Assessing Vulnerability: Addressing Repetitive Loss Properties: §201.6(c)(2)(ii)		X
9. Assessing Vulnerability: Identifying Structures, Infrastructure, and Critical Facilities: §201.6(c)(2)(ii)(B)		N/A
10. Assessing Vulnerability: Estimating Potential Losses: §201.6(c)(2)(ii)(B)		X
11. Assessing Vulnerability: Analyzing Development Trends: §201.6(c)(2)(ii)(C)		N/A
12. Multi-Jurisdictional Risk Assessment: §201.6(c)(2)(iii)		N/A

*States that have additional requirements can add them in the appropriate sections of the *Local Multi-Hazard Mitigation Planning Guidance* or create a new section and modify this Plan Review Crosswalk to record the score for those requirements.

SCORING SYSTEM

Please check one of the following for each requirement.

N – Needs Improvement: The plan does not meet the minimum for the requirement. Reviewer's comments must be provided.

S – Satisfactory: The plan meets the minimum for the requirement. Reviewer's comments are encouraged, but not required.

Mitigation Strategy	N	S
13. Local Hazard Mitigation Goals: §201.6(c)(3)(i)		X
14. Identification and Analysis of Mitigation Actions: §201.6(c)(3)(ii)		X
15. Identification and Analysis of Mitigation Actions: NFIP Compliance: §201.6(c)(3)(ii)		X
16. Implementation of Mitigation Actions: §201.6(c)(3)(iii)		X
17. Multi-Jurisdictional Mitigation Actions: §201.6(c)(3)(iv)		N/A

Plan Maintenance Process	N	S
18. Monitoring, Evaluating, and Updating the Plan: §201.6(c)(4)(ii)		X
19. Incorporation into Existing Planning Mechanisms: §201.6(c)(4)(ii)		X
20. Continued Public Involvement: §201.6(c)(4)(iii)		X

Additional State Requirements*	N	S
Insert State Requirement		N/A
Insert State Requirement		N/A
Insert State Requirement		N/A

LOCAL MITIGATION PLAN APPROVAL STATUS

PLAN NOT APPROVED

See Reviewer's Comments

PLAN APPROVED

PENDING ADOPTION

Jurisdiction: Skagway, Alaska

Local Mitigation Plan Review and Approval Status

Jurisdiction: Municipality of Skagway	Title of Plan: Municipality of Skagway Multi-Hazard Mitigation Plan	Date of Plan: May 2009
Local Point of Contact: Emily Rauscher	Address: P.O. Box 415 Skagway, AK 99840	
Title: Permitting Official		
Agency: Muni of Skagway		
Phone Number: (907) 983-2297	E-Mail: E.Rauscher@skagway.org	

State Reviewer:	Title:	Date:
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FEMA Reviewer: Kristen Meyers	Title: Mitigation Planning Manager	Date: September 21, 2009, October 31, 2009
Date Received in FEMA Region X	August 7, 2009, October 2, 2009	
Plan Not Approved		
Plan Approved	Pending Adoption	
Date Approved		

Jurisdiction:	DFIRM		NFIP Status*			
	In Plan	NOT in Plan	Y	N	N/A	CRS Class
1. Municipality of Skagway		X	X			

* Notes: Y = Participating N = Not Participating N/A = Not Mapped

Jurisdiction: Skagway, Alaska

PREREQUISITE(S)

1. Adoption by the Local Governing Body

Requirement §201.6(c)(5): [The local hazard mitigation plan **shall** include] documentation that the plan has been formally adopted by the governing body of the jurisdiction requesting approval of the plan (e.g., City Council, County Commissioner, Tribal Council).

Element	Location in the Plan (section or annex and page #)	Reviewer's Comments	SCORE	
			NOT MET	MET
A. Has the local governing body adopted new or updated plan?		Plan to be adopted after FEMA review	X	
B. Is supporting documentation, such as a resolution, included?		See above	X	
SUMMARY SCORE			X	

2. Multi-Jurisdictional Plan Adoption

Requirement §201.6(c)(5): For multi-jurisdictional plans, each jurisdiction requesting approval of the plan **must** document that it has been formally adopted.

Element	Location in the Plan (section or annex and page #)	Reviewer's Comments	SCORE	
			NOT MET	MET
A. Does the new or updated plan indicate the specific jurisdictions represented in the plan?				N/A
B. For each jurisdiction, has the local governing body adopted the new or updated plan?				N/A
C. Is supporting documentation, such as a resolution, included for each participating jurisdiction?				N/A
SUMMARY SCORE				N/A

3. Multi-Jurisdictional Planning Participation

Requirement §201.6(a)(3): Multi-jurisdictional plans (e.g., watershed plans) may be accepted, as appropriate, as long as each jurisdiction has participated in the process ... Statewide plans will not be accepted as multi-jurisdictional plans.

Element	Location in the Plan (section or annex and page #)	Reviewer's Comments	SCORE	
			NOT MET	MET
A. Does the new or updated plan describe how each jurisdiction participated in the plan's development?				N/A
B. Does the updated plan identify all participating jurisdictions, including new, continuing, and the jurisdictions that no longer participate in the plan?		N/A – New Plan		N/A
SUMMARY SCORE				N/A

Jurisdiction: Skagway, Alaska

PLANNING PROCESS: §201.6(b): *An open public involvement process is essential to the development of an effective plan.*

4. Documentation of the Planning Process

Requirement §201.6(b): *In order to develop a more comprehensive approach to reducing the effects of natural disasters, the planning process shall include:*

- (1) *An opportunity for the public to comment on the plan during the drafting stage and prior to plan approval;*
- (2) *An opportunity for neighboring communities, local and regional agencies involved in hazard mitigation activities, and agencies that have the authority to regulate development, as well as businesses, academia and other private and non-profit interests to be involved in the planning process; and*
- (3) *Review and incorporation, if appropriate, of existing plans, studies, reports, and technical information.*

Requirement §201.6(c)(1): *[The plan shall document] the planning process used to develop the plan, including how it was prepared, who was involved in the process, and how the public was involved.*

Element	Location in the Plan (section or annex and page #)	Reviewer's Comments	SCORE	
			N	S
A. Does the plan provide a narrative description of the process followed to prepare the new or updated plan?	pp 2-4	The plan's development is described.		X
B. Does the new or updated plan indicate who was involved in the current planning process? (For example, who led the development at the staff level and were there any external contributors such as contractors? Who participated on the plan committee, provided information, reviewed drafts, etc.?)	p 2	The Municipality Clerk and Permitting Official were involved in the planning process with the help of a contractor.		X
C. Does the new or updated plan indicate how the public was involved? (Was the public provided an opportunity to comment on the plan during the drafting stage and prior to the plan approval?)	p 4 Appendix	The public was engaged through a meeting and via the municipal website. The plan was available at various Municipally offices Recommended Revision: Include information on the attendance at the public meeting, feedback received, and the method used to distribute the newsletter. Additionally, there a placeholders in the plan (p 4) for additional meeting information; add information about any additional public meetings.		X
D. Does the new or updated plan discuss the opportunity for neighboring communities, agencies, businesses, academia, nonprofits, and other interested parties to be involved in the planning process?		There is no information about the involvement of interested parties. Required Revision (Sept 2009): Provided information on the role of other interested parties in the planning process. Revision (Oct 2009): The newsletter and notices of all meetings regarding the SMHMP were distributed to the Planning Commission, Assembly, all other Skagway boards and commission, the Chamber of Commerce, area business and other governmental		X
E. Does the planning process describe the review and incorporation, if appropriate, of existing plans, studies, reports, and technical information?	pp 2-4	The Plan Research section describes the resources used to develop the HM Plan.		X

Jurisdiction: Skagway, Alaska

F. Does the updated plan document how the planning team reviewed and analyzed each section of the plan and whether each section was revised as part of the update process?		N/A – New Plan		N/A
SUMMARY SCORE				X

RISK ASSESSMENT: §201.6(c)(2): *The plan shall include a risk assessment that provides the factual basis for activities proposed in the strategy to reduce losses from identified hazards. Local risk assessments must provide sufficient information to enable the jurisdiction to identify and prioritize appropriate mitigation actions to reduce losses from identified hazards.*

5. Identifying Hazards

Requirement §201.6(c)(2)(i): *[The risk assessment shall include a] description of the type ... of all natural hazards that can affect the jurisdiction.*

Element	Location in the Plan (section or annex and page #)	Reviewer's Comments	SCORE	
			N	S
A. Does the new or updated plan include a description of the types of all natural hazards that affect the jurisdiction?	Ch 3, Sec 4	Plan identifies tsunami, flood/erosion, earthquake, snow avalanche, and severe weather.		X
SUMMARY SCORE				X

6. Profiling Hazards

Requirement §201.6(c)(2)(i): *[The risk assessment shall include a] description of the ... location and extent of all natural hazards that can affect the jurisdiction. The plan shall include information on previous occurrences of hazard events and on the probability of future hazard events.*

Element	Location in the Plan (section or annex and page #)	Reviewer's Comments	SCORE	
			N	S
A. Does the risk assessment identify the location (i.e., geographic area affected) of each natural hazard addressed in the new or updated plan?	Ch 4	The location of each hazard is identified.		X
B. Does the risk assessment identify the extent (i.e., magnitude or severity) of each hazard addressed in the new or updated plan?	Ch 4	The extent of each hazard is identified.		X
C. Does the plan provide information on previous occurrences of each hazard addressed in the new or updated plan?	Ch 4	The previous occurrences for each hazard are addressed.		X
D. Does the plan include the probability of future events (i.e., chance of occurrence) for each hazard addressed in the new or updated plan?	Ch 4	The probability of future events is addressed for each hazard.		X
SUMMARY SCORE				X

Jurisdiction: Skagway, Alaska

7. Assessing Vulnerability: Overview

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

Element	Location in the Plan (section or annex and page #)	Reviewer’s Comments	SCORE	
			N	S
A. Does the new or updated plan include an overall summary description of the jurisdiction’s vulnerability to each hazard?	Ch 3, 4	The vulnerability of Skagway to each hazard is described.		X
B. Does the new or updated plan address the impact of each hazard on the jurisdiction?	Ch 4	The potential impacts of each hazard are described.		X
SUMMARY SCORE				X

8. Assessing Vulnerability: Addressing Repetitive Loss Properties

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

Element	Location in the Plan (section or annex and page #)	Reviewer’s Comments	SCORE	
			N	S
A. Does the new or updated plan describe vulnerability in terms of the types and numbers of repetitive loss properties located in the identified hazard areas?	pp 45-46	Skagway has zero repetitive loss properties.		X
SUMMARY SCORE				X

9. Assessing Vulnerability: Identifying Structures

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

Element	Location in the Plan (section or annex and page #)	Reviewer’s Comments	SCORE	
			N	S
A. Does the new or updated plan describe vulnerability in terms of the types and numbers of existing buildings, infrastructure, and critical facilities located in the identified hazard areas?	Ch 3	The vulnerability of each critical facility is addressed.		X
B. Does the new or updated plan describe vulnerability in terms of the types and numbers of future buildings, infrastructure, and critical facilities located in the identified hazard areas?		N/A		N/A
SUMMARY SCORE				N/A

Jurisdiction: Skagway, Alaska

10. Assessing Vulnerability: Estimating Potential Losses

Requirement §201.6(c)(2)(ii)(B): [The plan **should** describe vulnerability in terms of an] estimate of the potential dollar losses to vulnerable structures identified in paragraph (c)(2)(ii)(A) of this section and a description of the methodology used to prepare the estimate

Element	Location in the Plan (section or annex and page #)	Reviewer's Comments	SCORE	
			N	S
A. Does the new or updated plan estimate potential dollar losses to vulnerable structures?	Ch 3	The potential losses to critical facilities are addressed.		X
B. Does the new or updated plan describe the methodology used to prepare the estimate?	Ch 3	Methodology used in potential loss estimates is explained.		X
SUMMARY SCORE				X

11. Assessing Vulnerability: Analyzing Development Trends

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

Element	Location in the Plan (section or annex and page #)	Reviewer's Comments	SCORE	
			N	S
A. Does the new or updated plan describe land uses and development trends?		N/A		N/A
SUMMARY SCORE				N/A

12. Multi-Jurisdictional Risk Assessment

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

Element	Location in the Plan (section or annex and page #)	Reviewer's Comments	SCORE	
			N	S
A. Does the new or updated plan include a risk assessment for each participating jurisdiction as needed to reflect unique or varied risks?				N/A
SUMMARY SCORE				N/A

Jurisdiction: Skagway, Alaska

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

13. Local Hazard Mitigation Goals

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

Element	Location in the Plan (section or annex and page #)	Reviewer’s Comments	SCORE	
			N	S
A Does the new or updated plan include a description of mitigation goals to reduce or avoid long-term vulnerabilities to the identified hazards?	Ch 4	Plan includes goals for each identified hazard.		X
SUMMARY SCORE				X

14. Identification and Analysis of Mitigation Actions

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

Element	Location in the Plan (section or annex and page #)	Reviewer’s Comments	SCORE	
			N	S
A. Does the new or updated plan identify and analyze a comprehensive range of specific mitigation actions and projects for each hazard?	Ch 4, 5	Mitigation actions are identified for each hazard.		X
B Do the identified actions and projects address reducing the effects of hazards on new buildings and infrastructure?	Ch 4, 5	Actions are identified that address new building, such as weather resistant construction.		X
C. Do the identified actions and projects address reducing the effects of hazards on existing buildings and infrastructure?	Ch 4, 5	Actions are identified that address existing development.		X
SUMMARY SCORE				X

Jurisdiction: Skagway, Alaska

15. Identification and Analysis of Mitigation Actions: National Flood Insurance Program (NFIP) Compliance

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

Element	Location in the Plan (section or annex and page #)	Reviewer’s Comments	SCORE	
			N	S
A. Does the new or updated plan describe the jurisdiction (s) participation in the NFIP?	Ch 4, Sec 1	Skagway’s participation in NFIP is described in the flood hazard section.		X
B. Does the mitigation strategy identify, analyze and prioritize actions related to continued compliance with the NFIP?	Ch 5	Flood actions 6-10 address continued compliance with the NFIP.		X
SUMMARY SCORE				X

16. Implementation of Mitigation Actions

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

Element	Location in the Plan (section or annex and page #)	Reviewer’s Comments	SCORE	
			N	S
A. Does the new or updated mitigation strategy include how the actions are prioritized? (For example, is there a discussion of the process and criteria used?)	Ch 5	Plan includes a prioritization process.		X
B. Does the new or updated mitigation strategy address how the actions will be implemented and administered, including the responsible department, existing and potential resources and the timeframe to complete each action?	Ch 5	Strategy includes responsible agency, timeline, potential funding source, and estimated cost for each mitigation action.		X
C. Does the new or updated prioritization process include an emphasis on the use of a cost-benefit review to maximize benefits?	Ch 5	The prioritization process includes benefit-cost review.		X
D. Does the updated plan identify the completed, deleted or deferred mitigation actions as a benchmark for progress, and if activities are unchanged (i.e., deferred), does the updated plan describe why no changes occurred?		N/A – New Plan		N/A
SUMMARY SCORE				X

Jurisdiction: Skagway, Alaska

17. Multi-Jurisdictional Mitigation Actions

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

Element	Location in the Plan (section or annex and page #)	Reviewer's Comments	SCORE	
			N	S
A. Does the new or updated plan include identifiable action items for each jurisdiction requesting FEMA approval of the plan?				N/A
B. Does the updated plan identify the completed, deleted or deferred mitigation actions as a benchmark for progress, and if activities are unchanged (i.e., deferred), does the updated plan describe why no changes occurred?		N/A – New Plan		N/A
SUMMARY SCORE				N/A

PLAN MAINTENANCE PROCESS

18. Monitoring, Evaluating, and Updating the Plan

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

Element	Location in the Plan (section or annex and page #)	Reviewer's Comments	SCORE	
			N	S
A. Does the new or updated plan describe the method and schedule for monitoring the plan, including the responsible department?	p 5	The plan will be monitored annually, coordinated by the Borough Manager.		X
B. Does the new or updated plan describe the method and schedule for evaluating the plan, including how, when and by whom (i.e. the responsible department)?	p 5	The plan will be evaluated annually via report, coordinated by the Borough Manager.		X
C. Does the new or updated plan describe the method and schedule for updating the plan within the five-year cycle?	pp 6-7	A schedule and method for update is provided.		X
SUMMARY SCORE				X

Jurisdiction: Skagway, Alaska

19. Incorporation into Existing Planning Mechanisms

Requirement §201.6(c)(4)(ii): [The plan **shall** include a] process by which local governments incorporate the requirements of the mitigation plan into other planning mechanisms such as comprehensive or capital improvement plans, when appropriate.

Element	Location in the Plan (section or annex and page #)	Reviewer's Comments	SCORE	
			N	S
A. Does the new or updated plan identify other local planning mechanisms available for incorporating the mitigation requirements of the mitigation plan?	p 4-5	The plan identifies 5 existing mechanisms to incorporate the HM Plan into.		X
B. Does the new or updated plan include a process by which the local government will incorporate the mitigation strategy and other information contained in the plan (e.g., risk assessment) into other planning mechanisms, when appropriate?	p 4-5	The HM Plan will be incorporated into other mechanisms during their scheduled updates.		X
C. Does the updated plan explain how the local government incorporated the mitigation strategy and other information contained in the plan (e.g., risk assessment) into other planning mechanisms, when appropriate?		N/A – New Plan		N/A
SUMMARY SCORE				X

Continued Public Involvement

Requirement §201.6(c)(4)(iii): [The plan maintenance process **shall** include a] discussion on how the community will continue public participation in the plan maintenance process.

Element	Location in the Plan (section or annex and page #)	Reviewer's Comments	SCORE	
			N	S
A. Does the new or updated plan explain how continued public participation will be obtained? (For example, will there be public notices, an on-going mitigation plan committee, or annual review meetings with stakeholders?)	p 7	The HM Plan will be available on the website and at multiple locations for public viewing and comment. The public will also be engaged during annual review.		X
SUMMARY SCORE				X

END OF REVIEW