Haines Borough Multi-Hazard Mitigation Plan 2015

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Mayor Jan Hill
Diana Lapham, Deputy Mayor
Joanne Waterman
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Ron Jackson
Mike Case
Dave Berry

Haines Emergency Local Planning
Scott Bradford
Roc Ahrens
David Sosa

Haines Borough Staff
Carlos Jimenez
Former Public Facilities Director

Scott Bradford
Water/Sewer Plant Operator

Technical Assistance
Scott Nelsen
State Hazard Mitigation Planner
Alaska DHS&EM

Ann Gravier
State Hazard Mitigation Officer
Alaska DHS&EM

Photography
Cover Photo, Storm of 2005,
Scott Bradford

103 Third Avenue S.
P.O. Box 1209
Haines, Alaska 99827
Phone: (907) 766-2231
Fax: (907) 766-2716
Website: www.hainesalaska.gov

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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)
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 Resources
DOT&PF	(Alaska) Department of Transportation & Public Facilities
EOC	Emergency Operations Center
EOP	Emergency Operations Plan
FEMA	Federal Emergency Management Agency
HCMP	Haines Coastal Management Plan
HMHMP	Haines Multi-Hazard Mitigation Plan
HMP	Hazard Mitigation Plan
HMPG	Hazard Mitigation Planning Grant
MHMP	Multi-Hazard Mitigation Plan
MLLW	Mean Low Lower Water
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 Program)
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

Chapter 1. Planning Process

Purpose

The purpose of this Multi-Jurisdictional Hazard Mitigation Plan (MJMP) is to identify and coordinate risk mitigation efforts with State, Federal, and local partners and to fulfill the requirements set forth by the Code of Federal Regulations, Title 44 “Emergency Management and Assistance”, Part 201 “Mitigation Planning”, subsections 6 and 7 (44 CFR §201.6, §201.7):

> Hazard mitigation is any sustained action taken to reduce or eliminate long-term risk to people and property from natural hazards and their effects. This definition distinguishes actions that have a long-term impact from those that are more closely associated with immediate preparedness, response, and recovery activities. Hazard mitigation is the only phase of emergency management specifically dedicated to breaking the cycle of damage reconstruction, and repeated damage. As such, States, Territories, Indian Tribal governments, and communities are encouraged to take advantage of funding provided by HMA programs in both the pre- and post-disaster timeframes.

Current Federal regulations 44 CFR §201.6 and §201.7 require local communities and tribes, except under Regional Administrator approved “extraordinary circumstances” (§201.6(a)(3), to have a FEMA approved hazard mitigation plan for most of FEMA’s grant programs (all but PA Category A, B, and IA). Currently, Federal regulations require local plans to be formally updated and approved by FEMA every five years.

Authority

On October 30, 2000, Congress passed the Disaster Mitigation Act of 2000 (DMA 2000) (P.L. 106-390) which amended the Robert T. Stafford Disaster Relief and Emergency Assistance Act (Stafford Act) (Title 42 of the United States Code [USC] 5121 et seq.) by repealing the act’s previous mitigation planning section (409) and replacing it with a new mitigation planning section (322). This new section emphasized the need for State, Tribal, and local entities to closely coordinate mitigation planning and implementation efforts. In addition, it provided the legal basis for the Federal Emergency Management Agency’s (FEMA) mitigation plan requirements for mitigation grant assistance.

For implementation guidance, FEMA published the Final Rule in the Federal Register on September 16, 2009 [Docket ID FEMA-2006-0010], 44 CFR Part 201 with subsequent updates. The planning requirements for local entities are described in detail in Section 2 and are identified in their appropriate sections throughout this HMP.

Jurisdictions

In 2002, Borough residents voted to consolidate the first-class City of Haines and the third-class Haines Borough into a home rule borough. This action combined two separate governmental entities into one and mandated adding area wide planning,

platting, and land use regulation to the responsibilities of the local government. Areas of the Borough that already had planning and zoning powers, the former City of Haines, Mud Bay and Lutak, retained their respective zoning regulations. The remainder of the Borough has been zoned General Use as described in the Haines Borough Charter.

This is a multi-hazard single jurisdiction plan. The Borough corporate limits did not change when Haines became a borough.

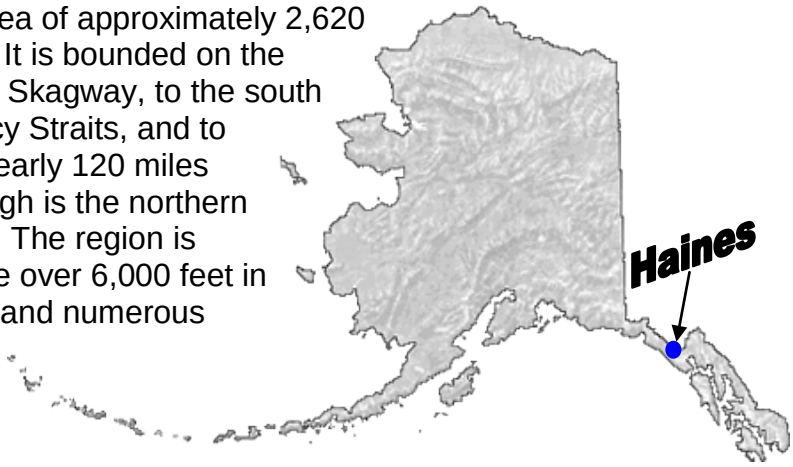
The scope of this plan is natural hazards: flooding/erosion, earthquake, snow avalanche, tsunami, and severe weather. However, some of the mitigation projects for the natural hazards would also mitigate impacts from manmade hazards, such as technological and economic hazards.

The Borough of Haines Multi-Hazard Mitigation Plan (MHMP) includes information to assist the borough government and residents in avoiding potential future disaster losses. The plan profiles natural hazards, chronicles past disasters, and lists projects to remedy or reduce disaster losses.

Plan Development

Location

The Haines Borough encompasses an area of approximately 2,620 square miles, or almost 1.7 million acres. It is bounded on the north and east by Canada and the City of Skagway, to the south by the City and Borough of Juneau and Icy Straits, and to the west by Glacier Bay National Park. Nearly 120 miles long and 80 miles at its widest, the Borough is the northern boundary of the Southeast Alaska region. The region is typified by snow-capped mountains, some over 6,000 feet in elevation, glaciated and forested valleys, and numerous streams and rivers descending to saltwater fjords.



Government

The Haines Borough is a "home rule" municipality with a manager form of government. The Borough Assembly is the sole legislative body creating and adopting any and all new borough laws and amendments or repealing laws and amendments.

The Assembly consists of six members elected to three-year staggered terms. The elected mayor serves as the presiding officer. A deputy mayor, chosen by the mayor among the assembly members, presides when the mayor is absent.

The Borough Assembly has powers and duties provided for by the Haines Borough Charter and Code, and State of Alaska statute (including Title 29).

Project Staff

The Borough of Haines staff project leads were Scott Bradford and Carlos Jimenez. The Haines Emergency Local Planning (H.E.L.P.) Committee reviewed the plan.

Scott Nelsen of the Division of Homeland Security and Emergency Management (DHS&EM) provided technical assistance and reviewed the drafts of this plan.

Plan Research

The plan was developed using existing Haines plans and studies as well as outside information and research. Outside sources are credited in parentheses after their inclusion.

1. *State of Alaska Hazard Mitigation Plan* (State HMP), prepared by DHS&EM, October 2013.

2. *Alaska DHS&EM Disaster Cost Index*, prepared by DHS&EM, 2015.

3. *Division of Community and Regional Affairs (DCRA) Community Information* http://commerce.state.ak.us/dnn/dcra/Home.aspx

4. *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)

5. *Haines Coastal Management Plan, Revised*. Prepared by Sheinberg Associates for the Borough of Haines. 2007. (The State Abandoned the Coastal Management Program in 2011.)

6. *Haines Comprehensive Plan*. Prepared by and for Borough of Haines. Updated 2012.

7. *Haines Emergency Operations Guide*. Prepared by the Haines Emergency Local Planning Committee. 2007

8. *Harbor Protection Alternatives.* Haines Borough August 21, 2013 draft. http://www.hainesalaska.gov/sites/default/files/fileattachments/ports/102029_04_spche_-_draft_alternative_analysis_report_08-22-13_final.pdf

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

10. *University of Alaska, Fairbanks, and Alaska Earthquake Information Center* (AEIC) website at: http://www.gi.alaska.edu/research

11. USGS Earthquake Probability Mapping: http://geohazards.usgs.gov/eqprob/2009/index.php

12. 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
Federal Emergency Management Agency: http://www.fema.gov/plan/
Community Rating System: http://www.fema.gov/national-flood-insurance-program-community-rating-system
Flood Mitigation Assistance Program: http://www.fema.gov/flood-mitigation-assistance-grant-program
Hazard Mitigation Grant Program: http://www.fema.gov/hazard-mitigation-grant-program
Individual Assistance Programs: http://www.fema.gov/individual-assistance-program-tools-frequently-asked-questions
National Flood Insurance Program: https://www.fema.gov/national-flood-insurance-program
Public Assistance Program: http://www.fema.gov/public-assistance-policy-and-guidance

Public Involvement

The H.E.L.P. Committee reviewed the draft and provided revisions to the plan at a meeting on _____. The committee is comprised of Haines Borough Fire Chief, Fire Department representatives, Police Chief, and Harbormaster. Proposed future seats on the H.E.L.P. Committee include representatives of Public Health, the School District and the local Health Clinic.

A copy of the MHMP was available for public perusal at the Borough Building, Fire Department, Public Works Department, Borough Library and a draft was put online at the Borough website at: http://www.hainesalaska.gov.

The Haines Assembly will adopt the plan after pre-approval by DHS&EM and FEMA.

The appendix includes a copy of the Haines Community Newsletter which was posted at local governmental offices, businesses, Haines Borough Library and on the Haines Borough website. The newsletter was also sent to the Chamber of Commerce, school board and other interested parties.

All meetings were advertised and open to the public, using normal public noticing procedures of the Borough.

All comments and/or revisions were incorporated into the plan.

Plan Implementation

The H.E.L.P. Committee was responsible for reviewing the plan and recommending approval to the Haines Assembly. The Haines Borough Assembly will be responsible for adopting the Haines 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 Haines plans and documents as they come up for review according to each plan's review schedule.

Table 1. Haines Plans

Document	Completed	Next Review
Haines Comprehensive Plan	2012	As Needed
Haines Legislative Priorities	FY 2015	Annually
Haines Operations Guide	2007	As needed
Haines Coastal Management Plan	2007	*Upon State participation in the coastal management program

**The State of Alaska is the only state not participating in the US Coastal Management Program.*

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 Haines 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 annually during the five-year cycle of the plan. 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.

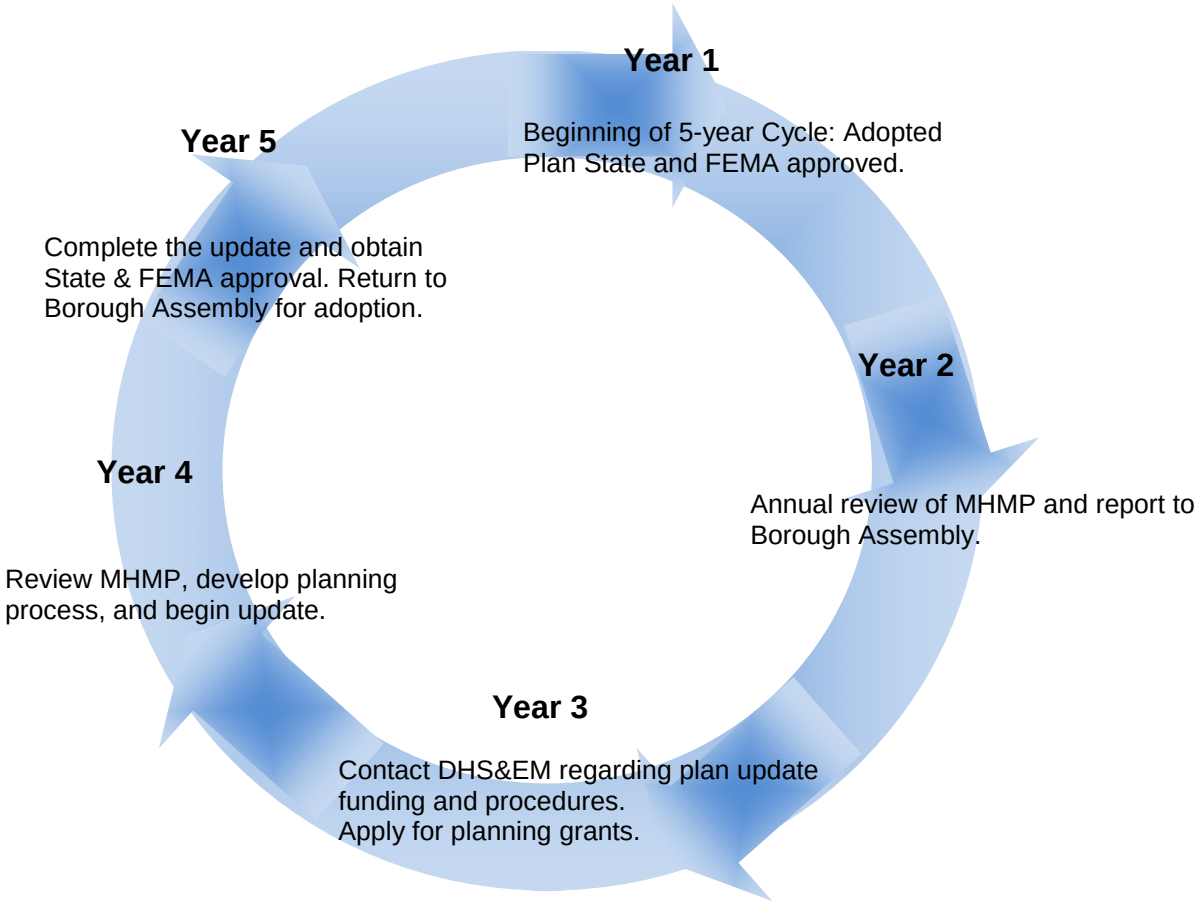
Updating the Plan

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 tasks required to monitor, evaluate and update the MHMP are illustrated on the proceeding page in Figure 1.

Figure 1. Hazard Mitigation Planning Cycle



Continued Public Involvement

The following methods will be used for continued public involvement.

A copy of the MHMP will be put online at the Borough website: http://www.hainesalaska.gov

Places where the hazard plan will be kept:

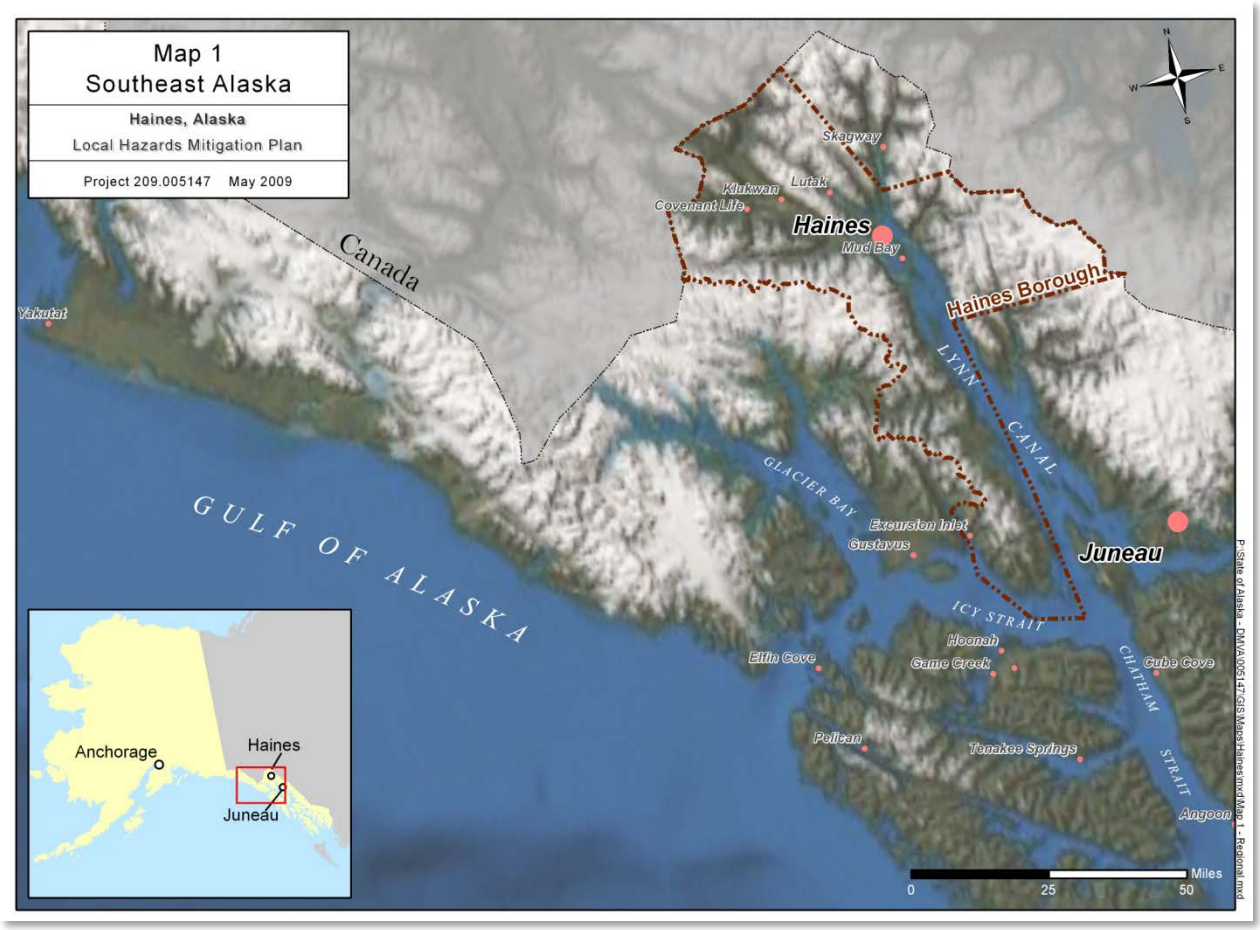
- Borough Building
- Fire Department
- Public Works Department
- Clerk's Office
- Library

On an annual basis Borough Manager or designee will review the plan; the H.E.L.P. Committee and the general public will also be solicited for the review using the method established under the public involvement section of this plan.

Chapter 2. Haines Community Profile and Capability Assessment

Section 1. Community Overview

Pronunciation	HAYNZ
Current Population	2,537 AKDOL 2014 Population Estimate
Incorporation Type	Home Rule Borough



Map 1. Regional Map

The following was reproduced from the State Division of Community and Regional Affairs (DCRA) website in 2009. The Borough boundary remains the same for 2015.

History, Culture and Demographics

The Haines area was historically Tlingit territory and was called "Dei Shu" by the Tlingit, meaning "end of the trail." The Chilkat Tlingit controlled the trading routes between the coast and the Interior. The first non-Native to settle here was George Dickinson, an

agent for the North West Trading Co., in 1880. In 1881, S. Young Hall, a Presbyterian minister, received permission from the Chilkat to build the Willard Mission and school. The mission was renamed Haines in 1884 in honor of Mrs. F.E. Haines, Secretary of the Presbyterian Women's Executive Society of Home Missions, who had raised funds for the mission's construction. During the Klondike gold rush in the late 1890s, it grew as a mining supply center, since the Dalton Trail from Chilkat Inlet to Whitehorse offered an easier route to the Yukon for prospectors. Gold was also discovered 36 miles from Haines in 1899 at the Porcupine District. Four canneries had been constructed in the area by the turn of the century. The first permanent U.S. military installation was constructed south of Haines in 1904, Fort William H. Seward. In 1922, the fort was renamed Chilkoot Barracks. Until World War II, it was the only U.S. Army post in Alaska. It was deactivated in 1946 and sold as surplus property to a group of veterans who established it as Port Chilkoot. The City of Port Chilkoot was incorporated in 1956. Haines Borough formed as a third-class borough on August 29, 1968. In 1970, Port Chilkoot merged with Haines into the City of Haines. In 1972, the post was designated a national historic site and the name, Fort William Seward, was restored. The last of the early canneries closed in 1972 due to declining fish stocks. Expansion of the timber industry in the early 1970s fueled growth. In 1974, the Borough annexed 420 square miles to the south, including Excursion Inlet. In 1978, it annexed the former military petroleum distribution facility at Lutak Inlet. The City of Haines and the Haines Borough were consolidated on October 17, 2002, resulting in the establishment of a home rule borough.

The population of the community consists of 9.2% Alaska Native or part Native. During the 2010 U.S. Census, total housing units numbered 1,631, vacant housing units numbered 120, and units used only seasonally numbered 53. However, the Alaska Department of Labor (AKDOL) reported 23 new housing units for 2013. U.S. Census data for Year 2010 showed 994 residents as employed, 588 of which were employed all four quarters. According to the AKDOL, the average annual unemployment rate in 2013 was 9.9%. The median household income was $40,772, per capita income was $22,090, and 10.67 percent of residents were living below the poverty level.

Facilities, Utilities, Schools and Health Care

Communities located within the Borough include: Covenant Life, Haines, Lutak, Mud Bay and Mosquito Lake. There are two schools located in the borough, attended by 268 students. Auxiliary health care is provided by Haines Volunteer Fire Department/EMS (766-2115/2121).

Economy and Transportation

The Borough School District, retail trade, business and transportation services, fishing and forestry provide the majority of employment in the Borough. 109 area residents hold commercial fishing permits. Many jobs are seasonal. Tourism and the traffic Haines draws as a result of its road connection to the State Ferry are important. Around 45,000 cruise ship passengers visit Haines annually. Haines is home to the world's largest

population of bald eagles, who feed from the warm spring-fed rivers. The Chilkat Bald Eagle Preserve is a major attraction, drawing visitors from around the world.

Haines is a major trans-shipment point because of its ice-free, deep water port and dock, and year-round road access to Canada and Interior Alaska. It is a northern terminus of the Alaska State Ferry System, and a hub for transportation to and from southeast Alaska. The Haines airport has a 4,600-foot runway.

Organizations Serving Haines Borough

The following local and regional organizations provide services to the people of the Haines Borough.

Borough - Haines Borough
P.O. Box 1209
Haines, AK 99827
Phone 907-766-2231
Fax 907-766-2716
E-mail jcozzi@haines.ak.us
Web http://www.hainesalaska.gov

School District - Haines Borough School District
P.O. Box 1289
Haines, AK 99827
Phone 907-766-6725
Fax 907-766-6794
E-mail ashley@hbsd.net
Web http://www.hbsd.net

Regional Organizations

Regional Native Health Corporation - Southeast Alaska Regional Health Consortium
3245 Hospital Dr.
Juneau, AK 99801
Phone 907-463-4000
Fax 907-463-4075
E-mail admin@searhc.org
Web http://www.searhc.org

Regional Native Non-Profit - Central Council Tlingit & Haida Indian Tribes of Alaska
320 W. Willoughby Ave., Suite 300
Juneau, AK 99801
Phone 907-586-1432
Fax 907-586-8970
E-mail econdev@ccthita.org
Web http://www.ccthita.org

Regional Development - Southeast Conference
P.O. Box 21989
Juneau, AK 99802
Phone 907-523-2327
Fax 907-463-5670
E-mail shellyw@seconference.org
Web http://www.seconference.org

Source: DCRA website: http://www.commerce.state.ak.us/dca/commdb/CIS.cfm .

Section 2. Haines Capability Assessment

Local Resources

Haines 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 Tables 2 and 3.

Table 2. Regulatory Tools

Regulatory Tools (ordinances, codes, plans)	Local Authority (Yes/No)	Year of Most Recent Update
Building code	No	
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)	Floodplain Regulations 1987 NFIP	Need new FIRMs
Growth management ordinances (also called "smart growth" or anti-sprawl programs)	No	
Site plan review requirements	Yes	
Comprehensive plan	Yes	2012
A capital improvements plan	Yes	Annually
An economic development plan	Yes	Part of Comp Plan
An emergency operations guide	Yes	Annually
A post-disaster recovery plan	No	
Real estate disclosure requirements	No	

Table 3. 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 encourages local hazard mitigation efforts. DHS&EM provides resources for mitigation planning on their website at http://www.ak-prepared.com.

- **DCCED/DCRA** provides training and technical assistance on all aspects of the National Flood Insurance Program (NFIP) 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 Veterans Administration (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 (PDM) Program and the Hazard Mitigation Grant Program (HMGP). 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). These resources 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 Haines MHMP. 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 inclusion of worksheets, checklists, and tables makes 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/hazard-mitigation-planning-overview

- **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 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 Haines 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 floodplains 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.

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 Haines MHMP meets those criteria are outlined on Table 4.

Table 4. Risk Assessments - Federal Requirements

Section §201.6(c)(2) Requirement	Haines Multi-Hazard Mitigation Plan Where it is Addressed in Plan
Identifying Hazards §201.6(c)(2)(i) B1. Does the Plan include a description of the type, location, and extent of all natural hazards that can affect each jurisdiction(s)?	Chapter 3, Section 3 identifies ***flood/erosion, earthquake, snow avalanche, tsunami and severe weather*** as the top five natural hazards in Haines.
Profiling Hazards §201.6(c)(2)(i) B2. Does the Plan include information on previous occurrences of hazard events and on the probability of future hazard events for each jurisdiction?	Chapter 4, Sections 1-5 include hazard-specific sections of the natural hazards that may affect the Borough. The MHMP includes **location, extent, impact** and **probability** for each natural hazard identified. The MHMP also provides hazard specific information on **previous occurrences** of hazards events.

Section §201.6(c)(2) Requirement	Haines Multi-Hazard Mitigation Plan Where it is Addressed in Plan
Assessing Vulnerability: Overview §201.6(c)(2)(i) B3. Is there a description of each identified hazard's impact on the community as well as an overall summary of the community's vulnerability for each jurisdiction?	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. Chapter 3, Section 1, Table 11. Hazard Asset Matrix lists structures; infrastructure and critical facilities located in the identified hazard areas. Chapter 3, Section 2, Table 12. Potential Dollar Losses of Borough Structures estimates potential dollar losses to borough owned facilities. The methodology used to obtain the losses is above the table.
Assessing Vulnerability: Addressing Repetitive Loss Properties §201.6(c)(2)(ii) B4. Does the Plan address NFIP insured structures within the jurisdiction that have been repetitively damaged by floods?	There are no repetitively damaged structures in the Borough of Haines. Chapter 4, Section 1, Flood/Erosion explains this requirement in more detail.

Section 2. Vulnerability Assessment Methodology

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

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

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

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

Critical facilities include:

- Essential facilities, which are necessary for the health and welfare of an area and are essential during response to a disaster, including hospitals, fire stations, police stations, and other emergency facilities;
- Transportation systems such as highways, airways and waterways;
- Utilities, water treatment plants, communications systems, power facilities;
- High potential loss facilities such as bulk fuel storage facilities; and
- Hazardous materials sites.
- Other items to identify critical facilities include economic elements, areas that require special considerations, historic, cultural and natural resource areas and other jurisdiction-determined important facilities.

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

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

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

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

The description of each of the identified hazards includes a narrative and in some cases a map of the location or it is noted if the hazard is area wide.

- The **extent** (i.e. magnitude or severity) of potential hazard events, based on the criteria listed in Table 5.

Table 6 was used to rank the extent of each hazard. Sources of information to determine the extent include the *State of Alaska Hazard Mitigation Plan (State HMP)*, historical or past occurrences and other outside sources.

Table 5. Extent of Hazard Ranking

Magnitude/Severity	Criteria to Determine Extent
Catastrophic	Multiple deaths Complete shutdown of facilities for 30 or more days More than 50% of property severely damaged
Critical	Injuries and/or illnesses result in permanent disability Complete shutdown of critical facilities for at least 2 weeks More than 25% of property is severely damaged
Limited	Injuries and/or illnesses do not result in permanent disability Complete shutdown of critical facilities for more than one week More than 10% of property is severely damaged
Negligible	Injuries and/or illnesses are treatable with first aid Minor quality of life lost Shutdown of critical facilities and services for 24 hours or more Less than 10% of property is severely damaged

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

Table 6, taken from the State HMP categorizes hazard probability.

Table 6. 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 of Alaska Hazard Mitigation Plan*, *State Disaster Cost Index*, Borough 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 Borough of Haines. Table 7 and Table 8 reference the State HMP.

Alaska Hazard Mitigation Plan Matrices

Table 7. State Hazard Vulnerability Matrix

Haines Borough					
Flood	**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				

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
Source: State of Alaska Hazard Mitigation Plan, 2013

Table 8. State Previous Occurrences of Hazards Matrix from 1978 to Present

Haines Borough					
Flood	**Wildland Fire**	**Earthquake**	**Volcano**	**Avalanche**	**Tsunami & Seiche**
4-L	Z	Z	Z	1-L	Z
Severe Weather	**Ground Failure**				
1-L	Z				

Extent:
Z = Zero
L = Limited
T = Total
Number: Occurrences
Source: State of Alaska-Hazard Mitigation Plan, 2013

Section 4. Natural Hazards Profiled in the Plan

Information in the following table was a result of consultation with the local public, the above tables from the State HMP, Haines plans and reports, and interviews and newspaper articles.

Table 9. Identification of Natural Hazards and Decision to Profile

Hazard	Yes/No	Decision to Profile Hazard
Flood/Erosion	Yes	Designated as a high hazard in the State HMP. Participates in NFIP, has had limited damage in the past.
Wildland Fire	No	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 Haines at being over 300 miles away.
Snow Avalanche Landslide	Yes	Designated as a high hazard in the State HMP
Tsunami	Yes	Designated as a low hazard in State HMP
Severe Weather	Yes	Designated as a high hazard in the State HMP
Ground Failure	No	Designated as a hazard in the state plan but with an unknown probability.

See Chapter 4, Section 6, Hazards not Profiled in Plan, for more information on the hazards not present in the community.

Section 5. Assessing Vulnerability

Overview

The vulnerability overview section is a summary of Haines'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 show existing infrastructure and facilities and illustrate the natural hazards located in Haines.

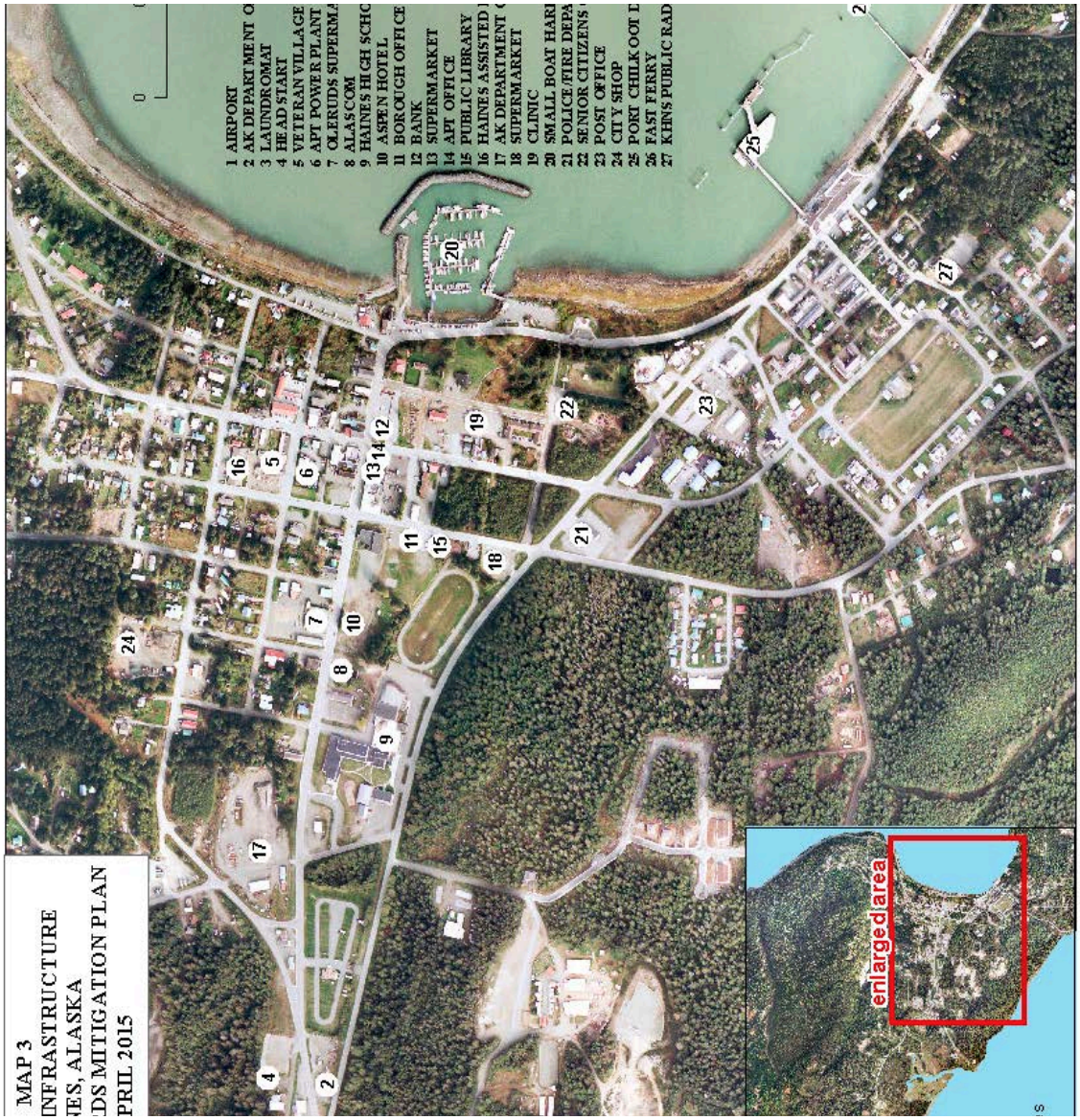
1. Map 2. Critical Infrastructure

2. Map 3. Regional Infrastructure

3. Figure 2. HCMP Designated Natural Hazards

Coastal Storm, 2005, photos from Fire Chief Scott Bradford

Map 2 Critical Infrastructure



Map 3 Regional Infrastructure

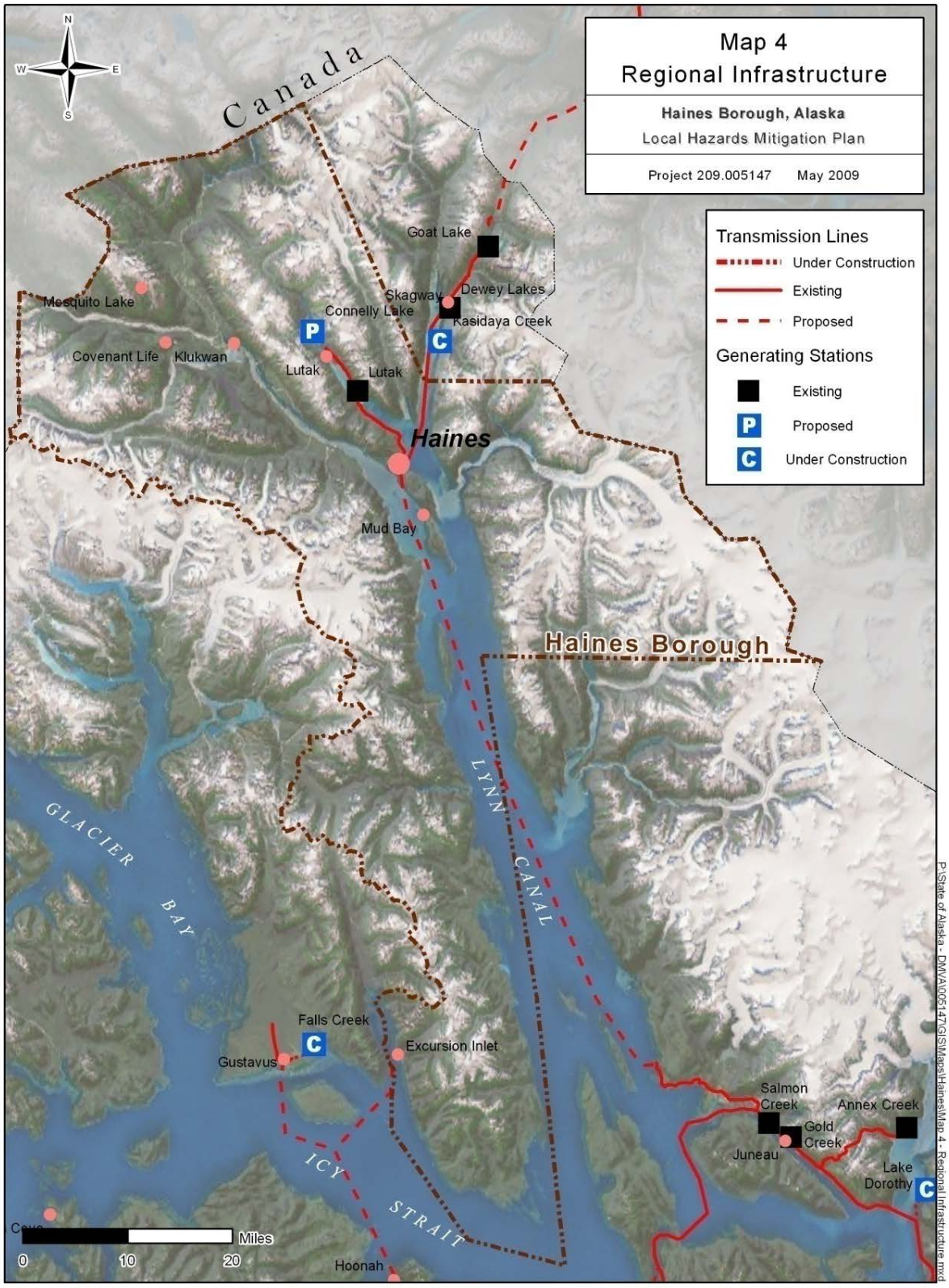


Figure 2. HCMP Natural Hazards

Source: *HCMP, 2007*

Hazard Asset Matrix

Table 10 Hazard Asset Matrix contains a list of facilities, business and infrastructure shown on Maps 3 and 4, and their vulnerability to identified natural hazards and whether, based on its location, each asset has a low, moderate or high vulnerability to specific natural hazards.

Table 10. Hazard Asset Matrix

Structure/Facility	Flood/ Erosion	Earthquake	Snow Avalanche	Tsunami	Severe Weather
1. Airport	M	H			H
2. ADF&G		H			H
3. Laundromat		H			H
4. Head Start	M	H			H
5. Veterans Village		H			H
6. Haines Light & Power		H			H
7. Olerud's Supermarket		H			H
8. Alascom		H			H
9. Haines High School		H			H
10. Aspen Hotel		H			H
11. Borough Office		H			H
12. Bank		H			H
13. Supermarket		H			H
14. APT office		H			H
15. Public Library		H			H
16. Haines Assisted Living		H			H
17. DOT	M	H			H
18. Supermarket	M	H			H
19. Clinic	M	H			H
20. Small Boat Harbor		H			H
21. Police /Fire Department		H			H
22. Senior Citizens Center	M	H			H
23. Post Office	M	H			H
24. City Shop		H			H
25. Port Chilkoot Dock	M	H			H
26. Haines/Skagway Ferry		H			H
27. KNHS Public Radio		H			H
Regional Infrastructure	M	H			H

Not Mapped

Not Mapped

Estimating Potential Dollar Losses

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

Table 11. Potential Dollar Losses of Borough Structures

Occupancy Description	Construction Type	Square Feet	Year Built	Building Value	Contents	Total Value
Administration Bldg	Frame	3,552	1961	$1,385,280	$137,800	$1,523,080
Ice House	Frame	640	2007	$609,280	$28,400	$637,680
Maintenance Shop	Frame	3,500	1970	$350,000	$100,000	$450,000
New Maintenance Shop	Metal Frame	5,760	2008	$1,036,800	$150,000	$1,186,800
Public Safety Bldg	Frame	12,000	1980	$4,320,000	$500,000	$4,820,000
Sewer Control Bldg	Mixed	800	1980	$200,000	$899,400	$1,099,400
Sewer Treatment Plant	Mixed	8,075	1980	$9,685,200	$31,227	$9,716,427
Sewer Shop Building	Mixed	1,240	1980	$2,294,000	$43,000	$272,400
FAA Tank/ Inst Bldg	Mixed	120	2000	$1,574,952	$75,000	$1,649,952
Water Treatment Plant	Mixed	2,000	1973	$2,190,642	$500,000	$2,690,642
Barnett Dr, Pump House	Frame	144	2013	$75,000	$75,000	$150,000
Young Rd Pump House	Frame	192	1999	$80,000	$30,000	$110,000
Chilkat Center	Mixed	20,230	1977	$7,080,500	$150,400	$7,230,900
Harbor Restrooms	Frame	500	1950	$160,000		$160,000
Human Resources	Frame	4,080	1940	$200,000		$200,000
Mosquito Lake Firehall	Non Combust	4,550	1983	$978,500	$86,000	$1,064,500
Museum	Frame	4,753	1979	$1,544,725	$1,813,300	$3,358,025
Natatorium (Pool)	Steel Frame	11,010	1982	$3,699,360	$91,900	$3,791,260
Library	Frame	8,130	2003	$3,008,100	$1,015,300	$4,023,400
Pt Chilkoot Dock	Frame	7,950	2013	$5,565,000		$5,565,000
Pt Chilkoot Dock Bathrooms	Frame		2011	$361,500	$15,000	$376,500
Tlingit Park Restroom	Frame	200	2010	$75,000		$75,000
Visitor Center Restroom	Frame	600	1998	$192,000		$192,000
Visitor Info Center	Frame	1,008	1983	$250,000	$15,000	$265,614
		101,034		**$46,915,839**	**$2,899,027**	**$50,608,580**

Vulnerability – Future Structures in Hazard Zones

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

Development permits for all new building construction, or substantial improvements, are required by the Borough in all A, AO, AH, A-numbered Zones. Flood insurance purchase may be required in flood zones A, AO, AH, A-numbered zones as a condition

of loan or grant assistance. An Elevation Certificate is required as part of the development permit. The Elevation Certificate is a form published by the Federal Emergency Management Agency required to be maintained by communities participating in the NFIP. According to the NFIP, local governments maintain records of elevations for all new construction, or substantial improvements, in floodplains and must keep the certificates on file.

Portage Cove Shoreline. The U.S. Army Corps of Engineers Flood Hazard Boundary Map, and the Haines Borough Floodplain and Hazards Map indicate that run-up from a tsunami, seiche or high storm surge could adversely affect the Portage Cove shoreline up to 25 feet above Mean Low Lower Water (MLLW).

Sawmill Creek Floodplain. This area includes all geographic depressions, ponds, streams, and improved drainage routes at or near the elevation of Sawmill Creek. These areas are indicated on the Haines Borough Floodplain and Figure 2, Hazards Map. Management in this area shall be to protect property from flood hazards and flood bearing capacity of the floodplain.

11 AAC 112.210(c): Development in a natural hazard area may not be found consistent 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.

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 Haines.

Hazard Description

Flood hazards in Haines include voluminous rainfall, snow melt, glacier outburst, and coastal storms.

Rainfall/Snowmelt/Glacier Melt Flooding

Riverine flooding occurs as a result of a large volume of water to the drainage basin in the form of rainfall, snowmelt, glacier melt, or a combination of these inputs. In the Haines 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.

Coastal Storm Surge or coastal floods, occur when the sea moves inland above the high-tide level onto land that is normally dry. Often, large waves driven by high winds accompany a storm surge.

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 property.

Coastal Erosion: Coastal erosion is a common term used to describe the retreat of the shoreline along the ocean. It is measured as the rate of change in the position or horizontal displacement of a shoreline over a period of time. Erosion rates are not uniform, and are accelerated by intense natural and human activities. Climatic factors

such as sea-level rise, increased storm activity, and land subsidence exacerbate coastal erosion in Alaska. According to the National Oceanic and Atmospheric Administration (NOAA), global average sea levels rose a total of 7.7 inches between 1870 and 2004.

Further information on coastal erosion can be found in FEMA-55, *Coastal Construction Manual*, FEMA's *Multi-hazard 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

Extensive flood hazard areas exist throughout the floodplains of all riverine systems in the Haines Borough.

Sudden changes in main channel alignment and course are common as has occurred at Klukwan and the Tsirku River Fans. Sloughs, riverine islands, river deltas, and tributary channels are all subject to sudden flood immersion and scouring. As a result, existing lowland physical features are sometimes not considered permanent. Salmon and wildlife habitat, salmon enhancement project areas, and human developments in flood prone areas are continually subject to negative impacts from flooding.

Flood hazard areas in the developed core area of the coastal district are well identified on the 1989 Floodplain and Flood Hazards Map of the Haines Borough and through FEMA. Flood and geophysical hazard areas in the Tanani Bay and Lutak Inlet areas are primarily within the Johnson Creek, Mink Creek, and unnamed industrial water source drainages. In this area, some minor landslide and avalanche activity can also occur on higher slopes, especially in association with the deeply cut drainages of the three creeks.

Seasonal storm winds can create wind damage, wind-driven water damage, and high runoff inundation. However, wind damage in the Haines coastal area is rare due to the semi-sheltered location of the community. Winds up to 40 knots in summer (southeasterly), and winter (northerly) can impact the community with occasional gusts to 60 knots. Related water damage is usually minor, but more frequent in areas where human development has encroached

into natural drainages and floodplains. During periods of high seasonal rains and storm-driven high tides the Haines area is subject to the effects of 100-year floods up to 25 feet above MLLW (*HCMP, 2007).*

National Flood Insurance Rate Maps

Map 2, page 25 shows 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 Haines are from mapping that was completed in 1989. 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 may suffer due to road closures, impacts to public safety (access and response capabilities), limited availability of perishable commodities, and isolation.

Portage Cove Shoreline. Figure 2, page 28**,** indicates that run-up from a tsunami, seiche or high storm surge could adversely affect the Portage Cove shoreline up to 25 feet above MLLW.

Sawmill Creek Floodplain. This area includes all geographic depressions, ponds, streams, and improved drainage routes at or near the elevation of Sawmill Creek. Page 28 depicts the location of this area. Management in this area shall be to protect property from flood hazards and flood bearing capacity of the floodplain.

11 AAC 112.210(c): Development in a natural hazard area may not be found consistent [with the HCMP] 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.

Extent

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 *Alaska State All-Hazards Risk Mitigation Plan*. Based on these factors and using the criteria established in Table 6. Extent of Hazard Ranking, page 20 the Borough of Haines has a ***critical*** extent of flooding not due to tsunami, which is covered in Chapter 4, Section 4, Tsunami Hazard.

Community Participation in the NFIP

The Borough of Haines participates in the NFIP. Table 11. Hazard Asset Matrix, page 29 lists critical facilities located in the “A” flood zone, which is described below.

The function of the NFIP is to provide flood insurance at a reasonable cost to homes and businesses located in floodplains. In trade, the Borough of Haines 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 on 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.

Table 12 describes the FIRM zones.

Table 12. FIRM Zones

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

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

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 13 lists the NFIP Statistics provided from DCRA; this compares Haines statistics with that of the State as of July 14, 2015.

Table 13. NFIP Statistics

Emergency Program Date Identified	Regular Program Entry Date	Map Date	NFIP Community Number	CRS Rating Number	Total # of Current Policies (07/14/15)
09/10/1975	05/01/1987	05/01/1987	020008	N/A	2
Total Loss Dollars Paid Since 1978	**Average Value of Loss Since 1978**	**Repetitive Loss**	**Insurance In Force**		
0	0	0	$700,000.00		

Source: DCRA, Floodplain Management
Taunnie Boothby, State Floodplain Manager

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 Borough of Haines there have been ***zero*** properties that meet the FEMA definition of repetitive loss.

Probability

Based on the State HMP, NFIP, Borough records, and past historical events Haines has a ***high*** probability of flooding. Table 7. Probability Criteria Table, page 21 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 year chance of occurring.

Previous Occurrences

The *DHS&EM Disaster Cost Index, 2015* lists the following events in the Haines area that have received state or federal disaster funding.

AK 06-216. December 23, 2005. Disaster declared 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 Borough 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.

AK 93-160 August 14, 1992. Haines Highway Disaster. This disaster was declared in order for the State DOT/PF to request $1.8 million in Federal Highway Administration emergency funds (under Title 23 U.S.C., Section 125) to repair damages relating to

flooding of the Klehini River 30 miles north of Haines. No expenditure of State Disaster Relief Funds was required.

AK 88-70. February 29, 1988 The city experienced severe damage to streets from flooding and runoff triggered by extremely heavy rainfall. The State made available $150,000 in disaster funds to assist in the repair of the city streets.

AK 85-33. January 25, 1985 After prolonged and excessive rainstorms caused permanent damage to the city sewer system, the Governor proclaimed a Disaster Emergency to provide funds to repair the system through a categorical public assistance grant.

Impact

A flooding event in Haines 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 Haines could isolate the community from other areas of the state and cause widespread damage.

Flood/Erosion Mitigation Goals and Projects

Goals

Goal 1. Reduce or prevent future flood damage.

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

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

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

Goal 2. Increase public awareness

Increase public knowledge about mitigation opportunities, floodplain functions, emergency service procedures, and potential hazards. Active participation in the NFIP is a proven method of increasing public awareness.

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 Haines could be developed and distributed to all households.

Projects

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

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

FLD-3. Updated FIRM Haines Maps (Goal 1, 2)

FLD-4. Public Education (Goal 2)

FLD-5. Pursue obtaining a CRS rating to lower flood insurance rates (Goal 1, 2)

FLD-6. Continue to obtain flood insurance for all Borough structures, and continue compliance with NFIP (Goal 1, 2)

FLD-7. Require that all new structures be constructed according to NFIP requirements and set back from the shoreline to lessen future erosion concerns and costs (Goal 1, 2)

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 an average of about once a year; magnitude 8 earthquakes average about 14 years between events.

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

Ground shaking is due to the three main classes of seismic waves generated by an earthquake. Primary waves are the first ones felt, often as a sharp jolt. Shear or

secondary waves are slower and usually have a side-to-side movement. They can be very damaging because structures are more vulnerable to horizontal than vertical motion. Surface waves are the slowest, although they can carry the bulk of the energy in a large earthquake. The damage to buildings depends on how the specific characteristics of each incoming wave interact with the buildings' height, shape, and construction materials.

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

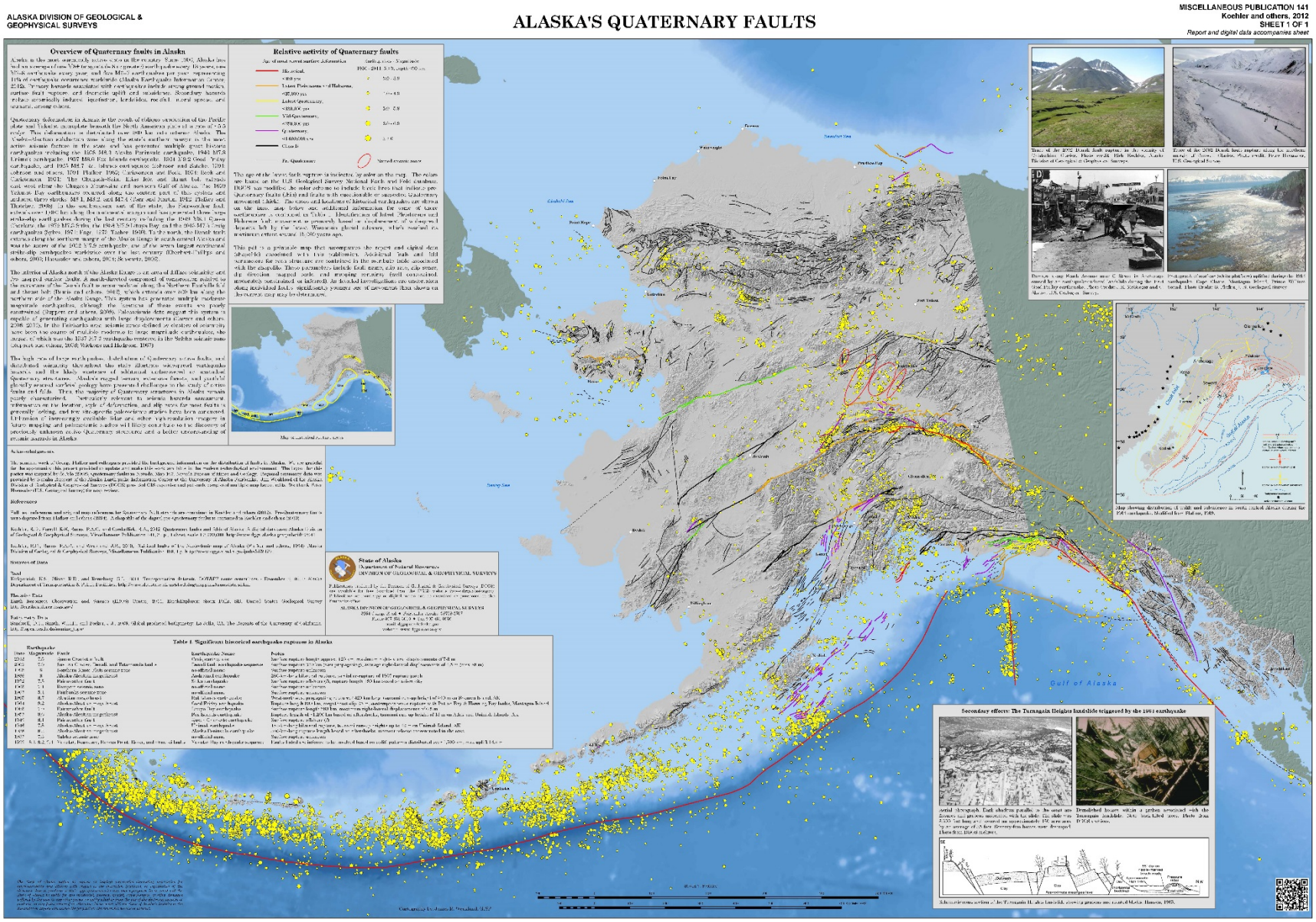
Strike-slip faults are where each side of the fault moves horizontally. Normal faults have one side dropping down relative to the other side. Thrust (reverse) faults have one side moving up and over the fault relative to the other side.

Earthquake-induced ground failure is often the result of liquefaction, which occurs when soil (usually sand and course silt with high water content) loses strength as a result of the shaking and acts like a viscous fluid. Liquefaction causes three types of ground failures: lateral spreads, flow failures, and loss of bearing strength. In the 1964 earthquake, over 200 bridges were destroyed or damaged due to lateral spreads. Flow failures damaged the port facilities in Seward, Valdez and Whittier.

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

Figure 3 was obtained from the University of Alaska, Fairbanks (UAF), and Alaska Earthquake Information Center (AEIC) website at: http://www.aeic.alaska.edu/.

Figure 3. Alaska's Quaternary Faults



Location

Local subsidiary faults to the Chatham Strait Fault are the Chilkat River Fault, the Chilkoot Fault, the Takhin Fault, and faults in the saddle area of Haines. These faults are, for the most part, concealed by water or valley floor deposits, thus their exact location and character can only be inferred.

The hazards of earthquakes could potentially impact any part of Haines. 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 Haines 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 ends 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 Haines could be ***critical***. Table 6. Extent of Hazard Ranking, page 20, 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.

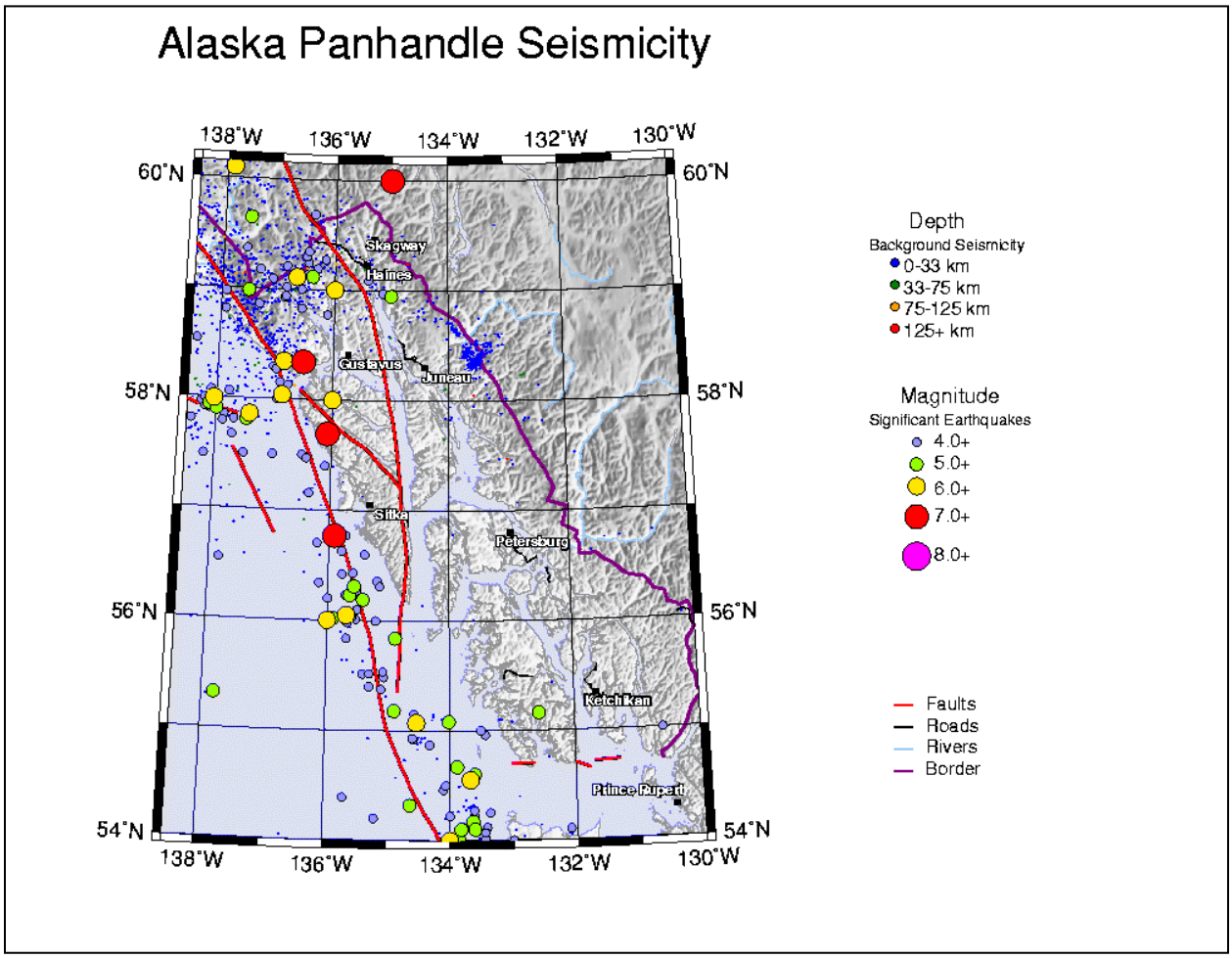
The Richter Scale expresses magnitude as a decimal number. A magnitude of 2 or less is called a microearthquake; they cannot even be felt by people and are recorded only on local seismographs. Events with magnitudes of about 4.5 or greater are strong enough to be recorded by seismographs all over the world. But the magnitude would need 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 Haines could be critical. Haines is located near the Fairweather fault, which extends from south of Queen Charlotte Islands to Haines. 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 Haines in the future. This could be especially devastating because ground shaking can cause liquefaction of Haines's thixotropic soils.

Figure 4 is from the UAF AEIC. It illustrates that a major earthquake has occurred near Haines in the past and show that a fault is located near the Haines area.

Figure 4. AEIC Alaska Panhandle Seismicity



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

Probability

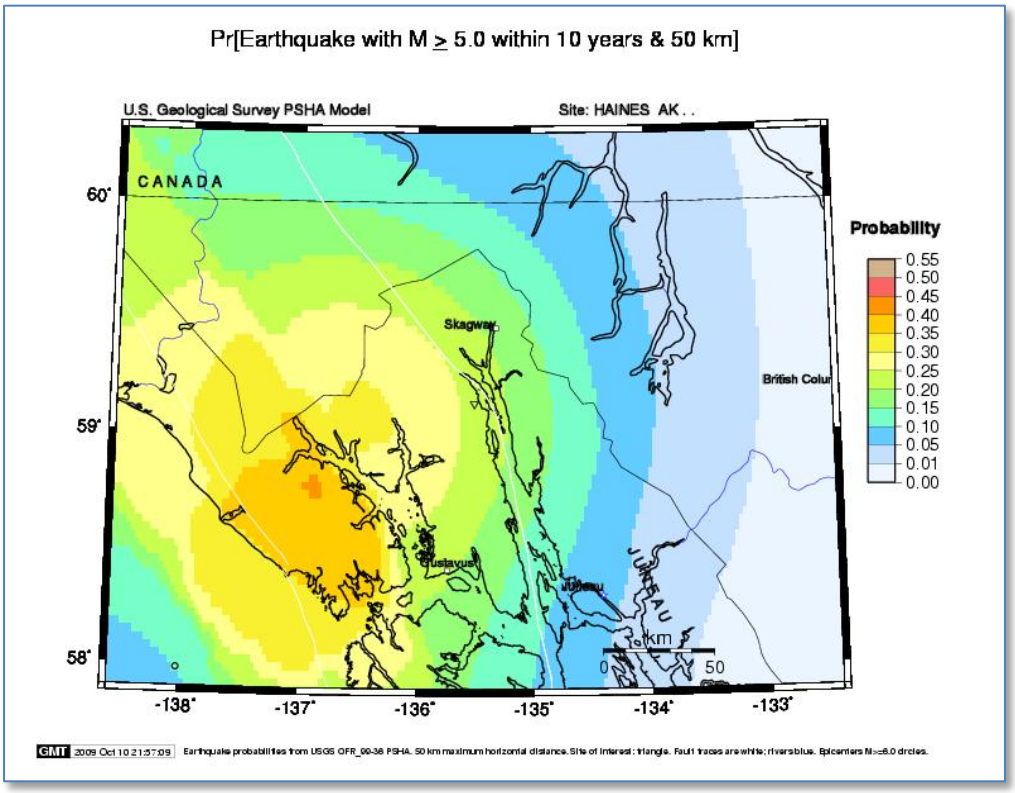
Haines has a ***high*** probability of earthquake hazard. Table 7. Probability Criteria Table, page 21, lists the following criteria for a high probability: hazard is present with a high probability of occurrence with the next three years. Event has up to 1 in 1 year chance of occurring.

As stated above, Haines is located near the Fairweather fault, which extends from south of Queen Charlotte Islands to Haines. The fault moves right-laterally approximately 2.25 inches per year. A study by the U.S. Geological Survey (USGS) predicts a magnitude 8 or greater earthquake will occur near Haines in the future.

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

Figure 5 was developed by using the USGS website (see source for web address) and indicates 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 Haines is 20 percent.

Figure 5. USGS Probability Map



Source: USGS Earthquake Probability Mapping: http://geohazards.usgs.gov/eqprob/2009/index.php

Previous Occurrences

The largest potential geological hazard in the Haines area is earthquakes. The area lies within an extremely active tectonic zone, where large-scale faulting is common. Haines is part of a belt in the second most seismically active region in Alaska and constitutes a part of the highly active circum-pacific seismic belt where earthquakes of magnitude 8 or greater have occurred. Seismic records indicate that over 100 significant earthquakes have been recorded in the Haines area since 1899 (HCMP, 2007).

Earthquakes of moderate size, between 6.0 and 7.0 on the Richter scale, can be expected to occur on the order of once or twice per century. There are no known earthquake epicenters within the Haines coastal zone; however, in November 1987 an earthquake registering 5.3 on the Richter scale had its epicenter near Haines. This earthquake also had several preliminary quakes and aftershocks (HCMP, 2007).

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 Haines. 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 (AEIC).

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
- 01/01/1964 to 7/31/2015
- Earthquakes of over 6.0 magnitudes

Table 14. Historical Earthquake Events

Date	Depth (km)	Mb	ML	MS
03/28/1964	4.0	6.1	6.1	
09/04/1965	30.0	7.0	7.0	6.8
12/22/1965	38.0	6.4	6.4	
04/23/1968	22.0	6.2	6.5	6.5
11/17/1987	10.0	6.6	7.1	6.9
11/30/1987	10.0	6.7	7.1	7.6
02/21/1991	20.2	6.3		6.5
01/06/2000	1.0	5.5	6.1	5.9

Mb - Body wave Magnitude - Based on the amplitude of P (compression) 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 greatest potential earthquake effects include compaction, settlement, liquefaction, subsidence and ground fracturing of poorly consolidated, water-saturated deposits, as well as sliding on steep slopes of fine grained plastic sediments and damage from waves induced by submarine sliding.

The impact on the community of Haines 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 Haines 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.

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

E-2. Contract a structural engineering firm to assess the identified buildings and facilities.

E-3. Conduct mock emergency exercises to identify response vulnerabilities.

E-4. Nonstructural mitigation projects

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

Section 3. Snow Avalanche and Landslides

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 sheer 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 snow slips and causes more snow to slide 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 cover due to changes in temperature or multiple snowfalls. The interface may fail 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 “stauchwall”. 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 gulley. 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 snowpack 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. Terrain with slopes below 25 degrees, are usually not steep enough to stress the snow pack resulting in a slide. Terrain with slopes above 60 degrees is too steep, causing snow to 'sluff' off and preventing accumulation. 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.

Location

Backcountry areas are prone to snow avalanches. The developed areas of Haines are not prone to snow avalanche risk. Potentially affected areas surrounding Haines are shown on Map 4 Regional Infrastructure, page 27.

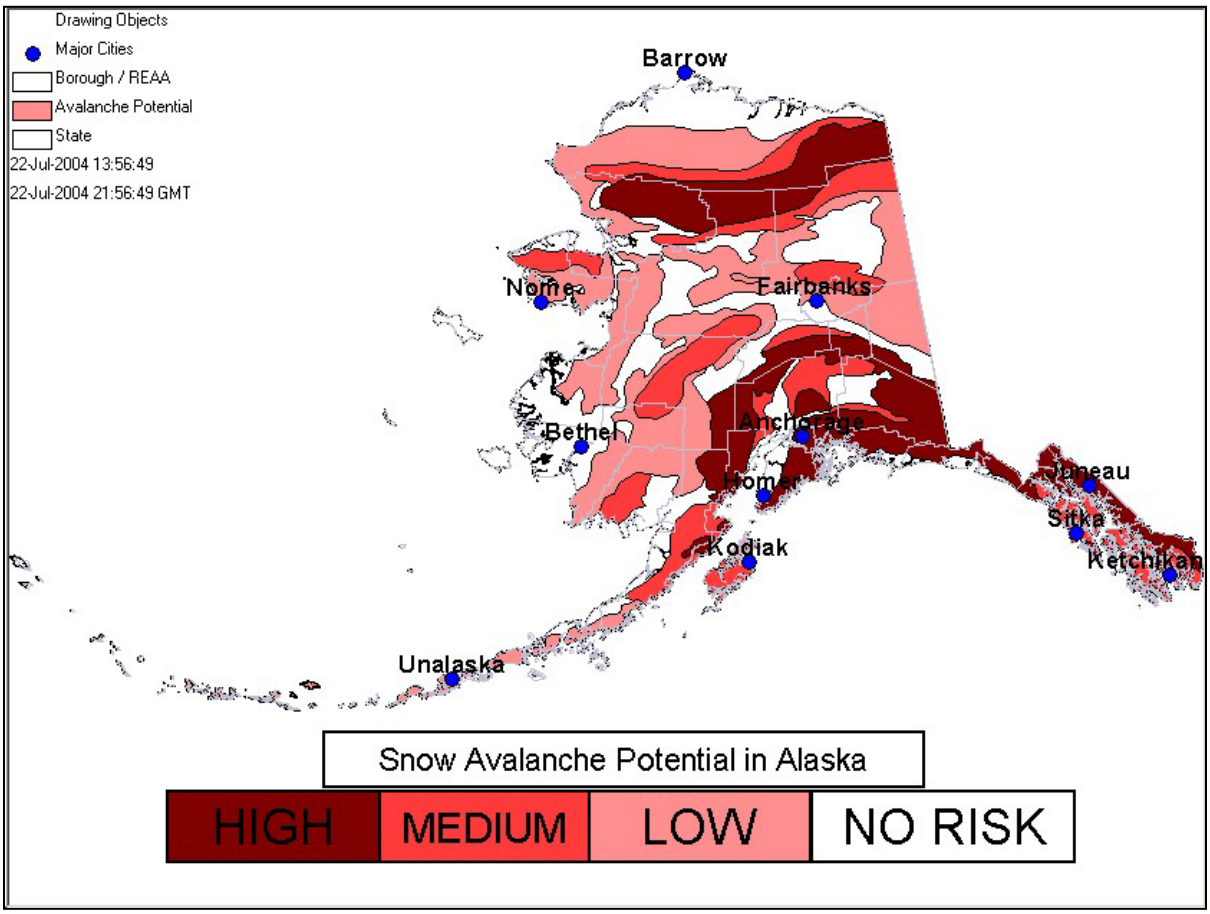
Extent

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

Table 8. State Hazard Vulnerability Matrix, on page 22, lists the probability of a snow avalanche in Haines as ***high***. The hazard is present with a high probability of occurrence within the calendar year. Event has up to 1 in 1 year chance of occurring.

Figure 6. Snow Avalanche Potential in Alaska



Source: *State of Alaska Hazard Mitigation Plan*

Previous Occurrences

Alaska has a long history of snow avalanches and landslides. 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.

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 (*Alaska State All-Hazard Risk Mitigation Plan*).

No disaster-level avalanche events have been recorded in Haines, although transportation impacts and infrastructure damage have been documented. One recent slow moving landslide did damage homes and public infrastructure in January 2012.

Haines Slope Failure:

I. <u>SUBJECT</u>: 2012 Haines Slope Failure

Commencing on January 16, 2012, and continuing, a geological event is occurring in the Haines Borough. The hillside immediately above the Lutak Road approx. ¾ mile from Haines, is slowly moving downhill, undermining and cracking homes, public utilities, and transportation infrastructure along portions of the Oceanview and Lutak Roads, and Front Street. The Haines Borough, along with State and contracted engineers, are monitoring the slope and are evaluating potential steps to address the issue. On February 3, the Haines Borough adopted Resolution 12-02-330 declaring a local disaster and requesting state assistance for repairs and temporary housing.

Impact

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

Snow Avalanche Goals and Projects

Goal 1. Reduce Haines's vulnerability to avalanche hazards in terms of threat to life and property.

Goal 2. Have comprehensive information regarding avalanches throughout Haines'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.

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

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

S/A-3 Determine if there are homes in avalanche paths (Goal 1, 2, 3).

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

S/A-5 Continue to educate public about avalanche hazards. Information can be disseminated to the public through the Borough web site, press releases, media ads, and other methods (Goal 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 waves 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 event occurs, a tsunami could reach the shore within a few minutes. From the source of the tsunami-generating event, waves travel outward in all directions in ripples. As these waves approach coastal areas, the time between successive wave crests varies from 5 to 90 minutes. The first wave is usually not the largest in the series of waves, nor is it the most significant. One coastal community may experience no damaging waves while another may experience destructive deadly waves. Some low-lying areas could experience severe inland inundation of water and deposition of debris of more than 1000 feet inland.

The Alaska and Aleutian Seismic Zone that threatens Alaska has a predicted occurrence (84 percent probability between 1988 and 2008) of an earthquake with magnitude greater than 7.4 in Alaska. According to the West Coast and Alaska Tsunami

Warning Center (WCATWC), if an earthquake of this magnitude occurs, Alaska's coastlines can be expected to flood within 15 minutes.

Types of Tsunami

Tele-Tsunami

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

No part of Alaska is expected to have significant damage due to a tele-tsunami. Only one tele-tsunami has caused damage in Alaska; the 1960 Chilean tsunami. Damage occurred to pilings at MacLeod Harbor, Montague Island on Cape Pole, and 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 larger tsunamis. An earthquake usually, but not always, triggers this type of landslide and they are usually confined to the bay or lake of origin. One earthquake can trigger multiple landslides and landslide generated tsunamis. Low tide is a factor for submarine landslides because low tide leaves part of the water-saturated sediments exposed without the support of the water.

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

Seiches

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

Characteristics of Tsunamis

Debris: As the tsunami wave comes ashore, it brings with it debris from the ocean, including man-made debris such as 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 and pound them with debris, and erode beaches and coastal structures.

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

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

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

Location

Tsunami Inundation Mapping for Alaska Communities

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

Extent

Major tsunami effects from earthquakes near, or outside, the region is less likely due to the location of Haines at the end of a long fjord. Haines's location 100 miles up the Lynn Canal, with sheltering from the Chilkat Islands and Peninsula, will tend to dissipate the energy of distant oncoming tsunami shock waves. The Anchorage earthquake of 1964, with its destructive tsunami effects in the outside waters coastal zone, created only several additional tidal bounces in the upper Lynn Canal of magnitude close to the normal daily tidal extremes at the time.

A tsunami in Haines could be of a **limited** extent. Haines has been designated by DHS&EM and DGGS as having a low potential for a Pacific-wide tsunami. It is possible for an event that could cause injuries and property damage as defined on Table 5. Extent of Hazard Ranking, page 20.

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. A tsunami wave entering flood control channels could reach a mile or more inland, especially if it enters at high tide.

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

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

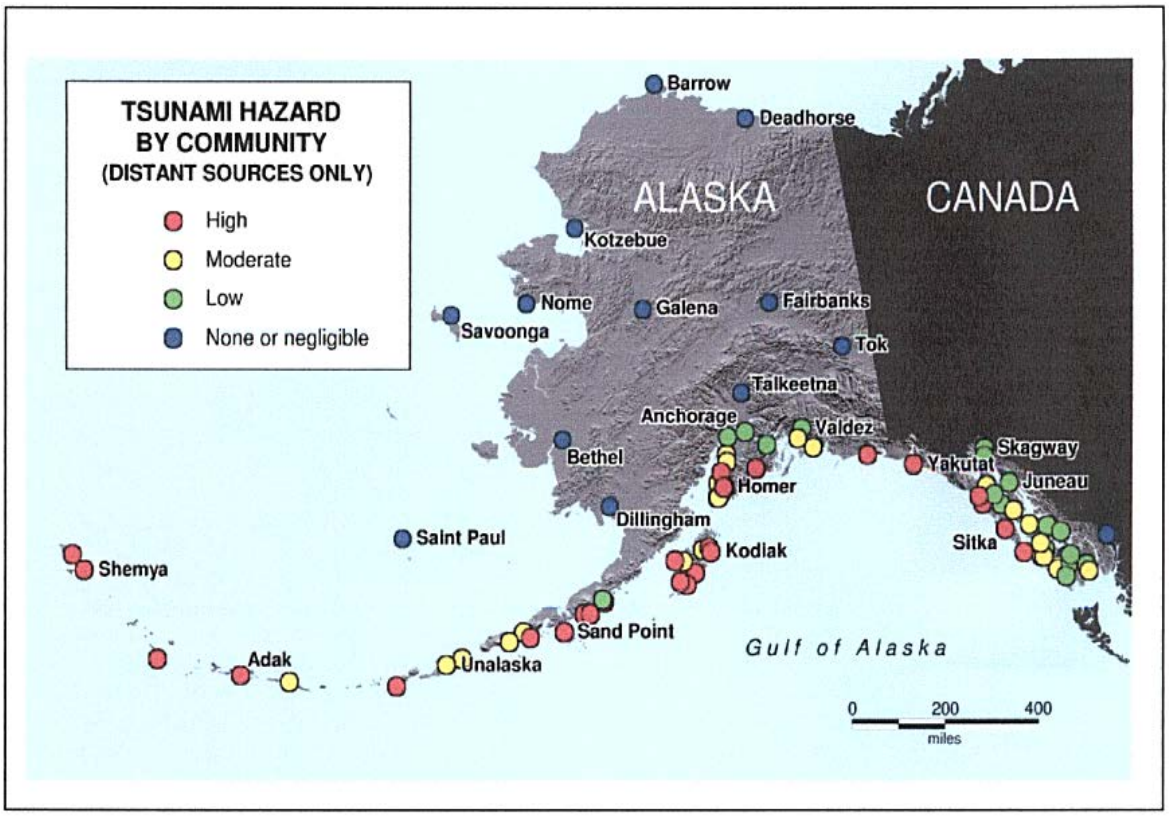
Fault movement: Strike-slip movements that occur under the ocean create little or no tsunami hazard. However, vertical movements along a fault on the seafloor displace water and create a tsunami hazard.

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

Probability

Figure 7. Tsunami Hazard Probability by Community



Source: *State of Alaska Hazard Mitigation Plan*

Haines 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

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 the waves 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.

There is no written record of a tsunami causing damage specific to the Haines Borough.

Impact

A tsunami event in Haines 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 Haines could isolate the community from other areas of the state and cause widespread damage.

Tsunami Mitigation Goals and Projects:

Goals

Goal 1. Increased Public Education about Tsunamis and Seiches.

Goal 2. Consider on a community basis the benefits of participation in the Tsunami Ready Community Designation Program.

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

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

Projects

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

T-2: Consider Participation in the Tsunami Awareness Programs (Goal 2)

T-3. Update Haines Emergency Operations Guide, as needed, Conduct Emergency Operation Plan Exercises (Goal 1, 4)

T-4. Inundation Mapping (Goal 3)

Obtain tsunami inundation maps for Haines. 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 Haines'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, Haines 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 32ºF, 0ºC) 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.

Seasonal storm winds can create wind damage, wind-driven water damage, and high runoff inundation. However, wind damage in the Haines coastal area is rare due to the semi-sheltered location of the community. Winds up to 40 knots in summer (southeasterly), and winter (northerly) can impact the community with occasional gusts to 60 knots. Related water damage is usually minor, but more frequent in areas where

human development has encroached into natural drainages, and floodplains. During periods of high seasonal rains and storm driven high tides the Haines area is subject to the effects of 100-year floods up to 25 feet above MLLW.

The following paragraphs are from the *Haines Comprehensive Plan, 2012*.

> The maritime climate near the ocean inlets quickly gives way to alpine and sub-arctic conditions up the mountain valleys. Because of Its distance from the exposed coast, more northerly latitude, proximity to Interior regions, and local mountains, Haines enjoys a climate which is characteristically drier than most of Southeast Alaska throughout the year. Near the coast, maximum summer highs reach Into the 90s with extreme winter lows of -15 degrees Fahrenheit. Average annual precipitation is about 50 inches in the townsite area with a greater percentage falling as snow than in most other parts of Southeast Alaska. Haines receives about 12 feet of snow per year with 27 feet falling at the Canadian border.
>
> The Haines Borough has about 18 hours of official daylight in the latter part of June diminishing to only 6 hours by December 20. The growing season is about 140 days a year.
>
> The prevailing winds over Lynn Canal are northerly throughout much of the year except during the summer months when they are southeasterly, weaker and more variable. Throughout the year the prevailing winds bring relatively warm, nearly saturated air into Southeast Alaska. In winter, a high pressure area will frequently develop over northern British Columbia and the Yukon Territory while a strong low pressure area is centered over the western Gulf of Alaska. The resulting large pressure gradient generates extremely strong winds that blow through the mountain passes and down Lynn Canal. The funneling effect of the mountains which surround Lynn Canal causes winds to be channeled in a northerly or southerly direction. Occasionally during the winter extremely strong down slope winds occur. These winds may blow steadily at 20 to 30 miles per hour with gusts occasionally over 50 mph. The mountains around the Chilkat - Chilkoot River valleys channel surface winds up and down river.
>
> As is characteristic of Southeast Alaska, a low cloud ceiling and/or high winds may occasionally delay flights in and out of the Haines airport. Local travel plans typically take weather patterns into account.
>
> Existing air quality in Haines is excellent. There are no major industrial sources of air pollution and automobile traffic is light. Haines is classified as a Class II air shed by the Alaska Department of Environmental Conservation (ADEC) under the authority of the Federal Clean Air Act administered for all categories of air pollution (Class II air sheds are generally pollution free and will allow industrial development).

Location

The hazards of severe weather impact Haines on an area wide basis. A severe weather event would create an area wide impact and could damage structures and potentially isolate Haines from the rest of the state.

Extent

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

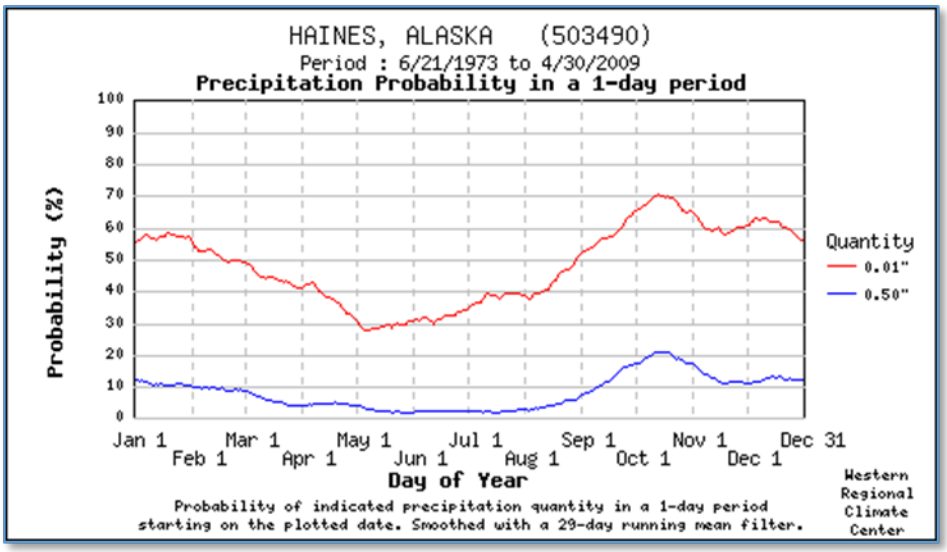
The State HMP lists severe weather as creating two limited damage events in Haines.

Probability

Haines 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.

Figure 8 from the Western Regional Climate Center shows that Haines has a less than 10% chance of at least a half-inch of rainfall most days.

Figure 8. Precipitation Probability in a 1-day Period



Previous Occurrences

In mid-September of 1967, 6.5 inches of rain fell in a 5-day period, and inundated the Haines Highway from mile 7 to mile 16, impacted another 35 miles of the highway damaging the roadbed and bridges, and closed the highway for two days (HCMP).

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, **Haines**, 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 **Borough of Haines**, the City/Borough of Sitka, the City of Pelican, the City of Hoonah, and the Municipality 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 $500,000 for 52 applicants and Public

Assistance totaling $1.1 million for 14 applicants. There was no hazard mitigation (DHS&EM Disaster Cost Index).

Table 15. Haines Temperature Summary from the Western Regional Climate Center illustrates the temperate climate in Haines.

Table 15. Haines Temperature Summary

HAINES, ALASKA (503490)
Period of Record Monthly Climate Summary
Period of Record : 8/07/1911 to 1/20/2015

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Average Max. Temperature (F)	29.7	33.5	38.8	48.8	57.4	63.5	65.2	64.5	57.1	47.4	35.6	31.6	47.8
Average Min. Temperature (F)	19.6	22.8	26.5	34.1	41.9	48.5	51.3	49.7	44.5	37.3	25.9	22.3	35.4
Average Total Precipitation (in.)	5.08	4.06	3.10	2.31	1.54	1.45	1.51	2.68	5.65	8.40	6.15	5.81	47.74
Average Total Snowfall (in.)	30.5	27.2	8.9	2.2	0.1	0.0	0.0	0.0	0.2	2.2	22.1	28.3	121.7
Average Snow Depth (in.)	0	0	0	0	0	0	0	0	0	0	0	0	0

Percent of possible observations for period of record.
Max. Temp.: 90.4% Min. Temp.: 90.6% Precipitation: 91.5% Snowfall: 90.2% Snow Depth: 88.8%

Source: *Western Regional Climate Center, wrcc@dri.edu*

Impact

Because of its remote location, Haines 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 Haines from the rest of the state.

Severe Weather Mitigation Goals and Projects

Goals

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

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

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

Projects

SW-1. Research and consider instituting the National Weather Service program of *"Storm Ready"* (Goal 1, 2, 3)

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.

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

SW-3. Expand public awareness about NOAA Weather Radio for continuous weather broadcasts and warning tone alert capability (Goal 2)

SW-4. Encourage weather resistant building construction materials and practices (Goal 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 (AVO) and its constituent organizations (USGS, DGGS, and UAF).

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 Haines 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 Borough that may benefit from controlled burns.

Ground Failure

Haines is absent of permafrost, although some ground heaving is present on rare occasions.

Chapter 5. Mitigation Strategy

Benefit - Cost Review

The methods for conducting a Benefit Cost Review are outlined in the FEMA *How-To-Guide Benefit-Cost Review in Mitigation Planning* (FEMA 386-5). Further information addressing HMP development may be accessed online at:
http://www.fema.gov/media-library/assets/documents/5756

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

Due to monetary as well as other limitations, it is often impossible to implement all mitigation actions. Therefore, the most cost-effective 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. The factors of life-safety and critical facilities steered the prioritization towards projects with likely good benefit-cost ratios. The following factors were used in assigning the priority on the benefit cost listing table.

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 Borough functionality.

4. Hazard probability.

5. Hazard severity.

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 (FEMA 386-5).

Benefit-Cost Analysis

The following section, written by FEMA, explains how to perform a benefit –cost analysis (BCA). The complete guidelines document, a benefit-cost analysis document and benefit-cost analysis technical assistance are available online http://www.fema.gov/benefit-cost-analysis

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.

The latest software for preparing Benefit-Cost Analysis is available from FEMA at http://www.fema.gov/benefit-cost-analysis

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.

Mitigation Strategy Review and Update

The projects listed on Table 16. Mitigation Projects, are a comprehensive list from the original HMP, along with the progress and status of a potential project. Some projects were revised to incorporate new techniques and programs, such as Risk Map.

Table 16. Mitigation Projects

Mitigation Projects	Benefits (pros)	Progress	Status or Priority
Flood/Erosion (FLD)			
FLD-1. Identify Drainage Patterns and Develop a Comprehensive Drainage System	Benefit to entire community Property damage reduction	Engineering study needed >$50,000 1 – 5 years	Medium
FLD-2. Structure Elevation and/or Relocation	Life/Safety project Benefit to government facilities and private properties.	Dollar cost unknown, >$50,000 1 – 5 year implementation	Medium
FLD-3. Updated FIRM Haines Maps	Federal and/or state funding available. Benefit of protecting property values and accurate flood insurance rates.	Could be accomplished with a RiskMap study within 5 years.	High
FLD-4. Public Education	DCRA / DHS&EM funding may be available. Could be done annually. Inexpensive <$1,000	Secure a onetime funding opportunity within 2 years.	Medium
FLD-5. Consider obtaining a CRS rating to lower flood insurance rates.	High capability by Borough to do on an annual basis Will reduce NFIP insurance for entire community. <$1,000/year	Considered but not pursued. Action carried into 2015 update as a low priority	Low
FLD-6. Continue to obtain flood insurance for all Borough structures, and continue compliance with NFIP.	High capability by Borough to do on an annual basis. Public benefit to have all at risk buildings insured through NFIP. Inexpensive, approx.$3,000/year.	NFIP insurance is current as of 2015 and maintained.	Complete and Continuing

Mitigation Projects	Benefits (pros)	Progress	Status or Priority
FLD-7. Require that all new structures be constructed according to NFIP requirements and set back from the rivers and shoreline to lessen future erosion concerns and costs.	High capability by Borough to do on an annual basis. Public benefit to have all at risk buildings insured through NFIP. Inexpensive, approx. $3,000/year.	No additional construction since the previous HMP. By ordinance 18.120.060, all structures must comply with the current floodplain map.	Completed 2010
Earthquake (E)			
E-1. Identify buildings and facilities that must be able to remain operable during and following an earthquake event.	Life/Safety issue/Risk reduction Benefit to entire community Inexpensive State assistance available	Action retained for 2015 HMP. Added to EOP development. Timeline 1-5 years	High
E-2. Perform an earthquake vulnerability assessment of the identified buildings and facilities.	Benefit to entire community Risk reduction	Need to contract a specialized engineering firm. Timeline 1 – 5 years	Medium
E-3. Conduct mock emergency exercises to identify response vulnerabilities.	Life/Safety issue/Risk reduction Benefit to entire Borough State assistance available	Action retained for 2015 HMP. A funding option is to participate in the State's earthquake exercises.	High
E-4. Nonstructural mitigation projects (i.e. assessing methods for securing building contents)	Life/Safety issue/Risk reduction Benefit to entire Borough State assistance available	Staff time. Would need to first assess Borough interest.	High
Snow Avalanche (S/A)			
S/A-1. Prohibit new construction in avalanche areas. **Seek possible private property buyout grants.*	Life/Safety issue/Risk reduction Benefit to entire community No direct cost to implement	Reviewed for 2015; may require voluntary property buyouts. Timeline 5 years or more	High
S/A-2. Utilize appropriate methods of structural avalanche control.	Life/Safety issue/Risk reduction Benefit to entire community Federal or State assistance available	An environmental study, engineering and structural design necessary to determine cost benefit. Timeline 5 years or more.	Medium
S/A-3. Determine if there are any homes in an avalanche path.	Life/Safety issue/Risk reduction Benefit to entire community	Action completed utilizing prior avalanche history and slope properties.	Completed 2012
S/A-4. Install warning signage in mapped avalanche areas.	Provides a clear warning without a language barrier.	Some signs are installed; more needed	High

Mitigation Projects	Benefits (pros)	Progress	Status or Priority
S/A-5. Educate public about avalanche hazards.	Could be a formal school presentation and community awareness campaigns.	Action reviewed and retained for 2015	High
Tsunami (T)			
T-1. Siren and lights at both ends of town for Tsunami and other hazardous warnings	Life/Safety Project Federal and State assistance available	Action retained for 2015 HMP. Timeline 3-5 years.	Medium
T-2. Consider Participation in the Tsunami Ready Community Designation	Life/Safety issue/Risk reduction Benefit to entire community State assistance available	Action removed upon 2015 review. Haines has a low risk to tsunami.	Removed
T-3. Inundation Mapping	Life/Safety issue/Risk reduction Benefit to entire community Federal/State assistance available	Action removed upon 2015 review. Haines has a low risk to tsunami.	Removed
T-4. Update Haines Emergency Operations Guide, as needed	Life/Safety issue/Risk reduction Benefit to entire community State assistance available	Action retained for 2015 HMP. Timeline 3-5 years.	Medium
Severe Weather (S/W)			
S/W-1. Research and consider instituting the National Weather Service program of *"Storm Ready"*. * action removed	Life/Safety issue Risk reduction Benefit to entire community Inexpensive State assistance available	Action reviewed in 2015 and determined not feasible.	Completed 2010
S/W-1 formerly S/W-2. Conduct special awareness activities, such as Winter Weather Awareness Week, Flood Awareness Week, etc.	Life/Safety issue Risk reduction Benefit to entire community Inexpensive State assistance available Could be an annual event	Retained for 2015 HMP as S/W-1. Timeline 1-3 years.	High

Mitigation Projects	Benefits (pros)	Progress	Status or Priority
S/W-3. Expand public awareness about NOAA Weather Radio for continuous weather broadcasts and warning tone alert capability	Life/Safety issue Risk reduction Benefit to entire community Inexpensive State assistance available Could be an annual event	Action completed in 2010, but continues annually. Action retained for 2015 HMP.	Complete and Continuing
S/W-4. Encourage weather resistant building construction materials and practices.	Risk and damage reduction. Benefit to entire community.	Action is publicly advised but not ordered.	Complete and Continuing

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 Strategy

Table 17 presents the Haines mitigation strategy and includes a brief description of the projects, lead agencies, costs, potential funding sources and an estimated timeframe for each project. The cost review method is further described in the FEMA *How-To-Guide Benefit-Cost Review in Mitigation Planning* (FEMA 386-5).

Table 17. Mitigation Strategy

Mitigation Projects	Responsible Agency	Cost	Funding Sources	Estimated Timeframe
FLD-1. Identify Drainage Patterns and Develop a Comprehensive Drainage System	Borough Mayor & Manager	N/A	FEMA NRCS USACE	1-5 years
FLD-2. Structure Elevation and/or Relocation	Borough Mayor & Manager	N/A	FEMA	1-5 years
FLD-3. Updated FIRM Haines Maps	Borough Mayor & Manager	>$100,000	FEMA	Within 5 years
FLD-4. Public Education	Borough Mayor & Manager	Staff Time	Borough DHS&EM	2 years
FLD-6. Continue to obtain flood insurance for all Borough structures, and continue compliance with NFIP.	Borough Council	<$1,500	Borough	Accomplished Annually
E-1. Identify buildings and facilities that must be able to remain operable during and following an earthquake event.	Borough Mayor, Council, Manager	Staff Time	State Grants FEMA	1-3 years
E-2. Perform an earthquake vulnerability assessment of the identified buildings and facilities.	Borough Council	To be Determined	State Grants FEMA	3-5 years
E-3. Conduct mock emergency exercises to identify response vulnerabilities.	Borough Manager	>$25,000	State Grants FEMA	Within 5 years
E-4. Nonstructural mitigation projects (i.e. assessing methods for securing building contents)	Borough	Staff time	Borough	1-2 years
S/A-1. Prohibit new construction in avalanche areas. **Seek possible private property buyout grants.*	Borough Mayor & Council	Staff Time	Borough Budget	3-5 years

Mitigation Projects	Responsible Agency	Cost	Funding Sources	Estimated Timeframe
S/A-2. Utilize appropriate methods of structural avalanche control.	Borough Manager Council	>$25,000	State FEMA USACE	2-5 years
S/A-3. Determine if there are homes in avalanche paths.	Borough Manager	>$25,000	State FEMA USACE	3-5 years
S/A-4. Install warning signage in mapped avalanche areas.	Borough Mayor & Manager & DOT	<$10,000	Borough DHS&EM	1-3 years
S/A-5. Continue to educate public about avalanche hazards.	Borough Mayor Manager Council	Staff Time	Borough DHS&EM FEMA	Accomplish Annually
T-1. Siren and lights at both ends of town for Tsunami and other hazardous warnings	Borough Manager DHS&EM	To be determined	DHS&EM NOAA NTHMP	Within 5 years
T-4. Update Haines Emergency Operations Guide with current tsunami information.	Borough Manager	>$20,000	Borough DHS&EM	Within 5 years
SW-2. Conduct special awareness activities, such as Winter Weather Awareness Week, Flood Awareness Week, etc.	Borough Mayor Council Manager	Staff Time	Borough DCRA DHS&EM	1-3 years then annually
SW-3. Expand public awareness about NOAA Weather Radio for continuous weather broadcasts and warning tone alert capability	Borough Mayor Manager	Staff Time	Borough NOAA DHS&EM	Accomplish Annually
SW-4. Encourage weather resistant building construction materials and practices.	Borough Mayor Manager Council	Staff Time	Borough	Accomplish Annually

Acronyms used on this table

NTHMP National Tsunami Hazard Mitigation Program
NOAA National Oceanographic and Atmospheric Administration

Chapter 6. Resources

6.1 Hazard Mitigation Funding

6.1.1 State Mitigation Funding

Direct State Disaster Mitigation Funding
While the State of Alaska has Public Assistance and Individual Assistance programs under State declared disasters, it does not have a State disaster mitigation program. However, there have been a few occasions in which the Governor and/or Legislature have elected to identify and fund mitigation work through the State Disaster Relief Fund (DRF). These actions were taken under discretionary authority and no permanent State mitigation program was established.

State Provision of Non-Federal Match to Federal Mitigation Programs
Many federal mitigation programs require a local match of non-federal funds. The match required varies with the program regulations and community being granted funds. There are several mitigation programs in which the State of Alaska provides the entire non-federal match for local communities resulting in 100% funds being granted to the community for mitigation. These programs, described in detail below, include the Public Assistance (406 mitigation) and Hazard Mitigation Grant Program (HMGP) which are funded under federally declared disasters. The matching funds are paid through the State DRF. Therefore, while these programs are listed below under “Federal mitigation programs” for convenience, the State provides substantial funding for these programs, sometimes in the millions of dollars. On occasion the State has likewise provided a portion of the non-Federal match for National Resource Conservation Service (NRCS) projects.

State of Alaska Supporting Mitigation Programs

Division of Homeland Security and Emergency Management Disaster Relief Fund
The State of Alaska provides State funding for Public Assistance (PA) and Individual Assistance (IA) in State declared disasters and cost share funds for federally declared disasters through the State Disaster Relief Fund.

Department of Commerce, Community & Economic Development

Community Development Block Grants
These grants fund community projects and planning activities improving health, safety and essential community services.

Alaska Regional Development Organizations
The Alaska Regional Development Organizations (ARDORs) fund cooperative economic development.

Rural Development Assistance Mini-Grants
These grants partially fund plan development, feasibility engineering studies, and capital projects. Mini-grants are awarded by the State Legislature.

Unincorporated Community Grants
These grants are awarded by the State Legislature to unincorporated communities and nonprofits for a wide range of projects and programs.

6.1.2 Federal Mitigation Funding

There are several Federal agencies and programs funding mitigation projects in the State of Alaska. Mitigation grants are administered through the DHS&EM as the grantee to local communities functioning as sub-grantees with the State providing the required matching funds for HMGP. Table 18 is an overview of grant programs and their eligible activities.

Table 18 FEMA HMA Eligible Activities

Activities	HMGP	PDM	FMA
1. Mitigation Projects	√	√	√
Property Acquisition and Structure Demolition	√	√	√
Property Acquisition and Structure Relocation	√	√	√
Structure Elevation	√	√	√
Mitigation Reconstruction			
Dry Floodproofing of Historic Residential Structures	√	√	√
Dry Floodproofing of Non-residential Structures	√	√	√
Minor Localized Flood Reduction Projects	√	√	√
Structural Retrofitting of Existing Buildings	√	√	
Non-Structural Retrofitting of Existing Buildings and Facilities	√	√	
Safe Room Construction	√	√	
Infrastructure Retrofit	√	√	
Soil Stabilization	√	√	
Wildfire Mitigation	√	√	
Post-disaster Code Enforcement	√		
5% Initiative Projects	√		
2. Hazard Mitigation Planning	√	√	√
3. Management Costs	√	√	√

FEMA administers Hazard Mitigation Assistance (HMA) grants through Congressional authorization of the Robert T. Stafford Disaster Relief and Emergency Assistance Act of 2000 as amended (DMA 2000). While many features of the HMA grants overlap, such as the benefit cost analysis (BCA) requirement, each grant program has specific features. Detailed guidance for these grants is provided by FEMA at http://www.fema.gov/library/viewRecord.do?id=3649.

Federal Disaster Mitigation Grants

406 Public Assistance Mitigation
FEMA Public Assistance repair projects are eligible for additional mitigation funds through (406 PA mitigation). Section (406) of the Stafford Act stipulates the mitigation project must relate directly to the disaster damages.

Hazard Mitigation Grant Program
In contrast, whenever there is a presidentially declared disaster in the State of Alaska, FEMA offers mitigation grant funds based on a percentage of the overall Federal share of disaster costs (15% in 2013). This program, called the Hazard Mitigation Grant Program (HMGP), was created in 1988 by the Stafford Act, Section 404 (404 mitigation) and allows HMGP funds to be used anywhere in the State if it is stipulated in the State disaster declaration to the President. While HMGP is funded through a presidentially declared disaster, HMGP funds are not used to repair disaster damage but to reduce future disaster losses through mitigation projects and planning.

Federal Unmet Needs Program
Unmet Needs is a program activated in specific disasters based upon a Congressional determination there are unmet needs following a disaster. Mitigation funds may be available for jurisdictions receiving an unmet needs allocation. Mitigation projects are specified in the Unmet Needs allocation. The Unmet Needs funds up to 75% of an approved project.

Additional Primary Federal Mitigation Programs

Pre-Disaster Mitigation Grant Program
The FEMA Pre-Disaster Mitigation (PDM) grant program funds mitigation projects and planning for State, local, and eligible tribal organizations.

The PDM program is annual, subject to Congressional appropriation, and nationally competitive. PDM sets aside a minimum monetary amount for each State and offers any remaining funds for national competition. Congress controls the PDM program and may award PDM funds in lieu of any competitive application process.

The State is the grantee of PDM funds and communities are the sub-grantees. Grant awards are a 75 % Federal/25 % applicant cost share match. Communities identified as “small and impoverished” (Appendix 10) are eligible for 90% Federal and 10% applicant match. The State of Alaska does not pay the applicant match for the PDM program.

Earthquake Hazards Reduction State Assistance Program
In 2012 and 2013 the State of Alaska received funds through the FEMA Earthquake Hazards Reduction State Assistance Program (EHRSAP). These funds were awarded through FEMA to States with earthquake hazards based upon specific Congressional authorization and are designed to support State earthquake program activities. Out of the total Congressional allocation, a portion of the funds are awarded to each state based upon a FEMA earthquake risk calculation. FEMA intends to continue this program subject to Congressional appropriation. The State of Alaska has used EHRSAP funds to support earthquake active fault mapping and earthquake/tsunami

education outreach displays. The SHMO manages and administers these funds.

Hazard Mitigation Technical Assistance Program

Through the Hazard Mitigation Technical Assistance Program (HMTAP), FEMA creates technical products for Federal, State, and local community use. FEMA administers HMTAP contracts with State advisement. HMTAPs continue to be a potential tool to accomplish specific, clearly defined mitigation planning work as identified by the SHMO.

Department of Commerce National Oceanic and Atmospheric Administration

National Tsunami Hazard Mitigation Grant Program

The National Tsunami Hazard Mitigation Grant Program (NTHMP) combines Federal and State partners involved in mitigating tsunami risk. This NOAA directed program includes Federal partners from the USGS, FEMA and NSF, and States with tsunami risk. The State of Alaska serves as a member of the Coordination Committee for the NTHMP and is the grantee for NTHMP funds allocated to Alaska. In Alaska, NTHMP funds are combined with State managed projects, local community sub-grants, and intra-state reimbursable services agreements (RSAs) for tsunami hazard mapping, outreach and warning systems. See Appendix 6 for the project selection process and prioritization criteria. In Alaska, the NTHMP is managed though the SHMO.

Remote Community Alert Systems Program

The Remote Community Alert Systems Program (RCASP) funds multi-hazard warning communication systems for remote communities with limited 911 services, cell phone access, and communications capability. Where appropriate, the State directly manages the project (Unincorporated community in the Unorganized Borough) or sub-grants the funds. To date funds have been used to install multi-hazard community warning sirens. In Alaska the RCASP is managed through the SHMO.

Small Business Administration

Business Physical Disaster Loans are available for businesses and non-profit organizations in the area of a declared Federal disaster or Small Business Administration (SBA) declared disaster. SBA often sends representatives on federally declared disasters to present their disaster loan program.

Department of Agriculture

Natural Resource Conservation Service

Emergency Watershed Protection Program

The Natural Resource Conservation Service (NRCS) is responsible for the Emergency Watershed Protection (EWP) program. EWP provides financial and technical assistance to remove debris from streams, protect destabilized stream banks, establish cover on critically eroding lands, establish conservation practices, and purchase flood plain easements.

Department of Defense

U.S. Army Corps of Engineers

The U. S. Army Corps of Engineers (USACE) has accomplished many extensive hazard mitigation studies and projects in Alaska, including the 2009 Kivalina community seawall and the Chena River flood control project in the Fairbanks North Star Borough. Funding

for USACE projects and studies is dependent on Congressional appropriation and program requirements.

Additional Federal Agencies

Department of Agriculture

U.S. Forest Service

Department of Commerce

National Oceanic & Atmospheric Administration – See above under NTHMP and RCASP.
National Weather Service
Office of Coastal Resource Management

Department of Defense

USACE Army Corps of Engineers - National Flood Proofing Committee

Department of Health, Education & Welfare

Center for Disease Control (CDC)

Department of Housing & Urban Development

Community Development Block Grant
HOME Investment Partnerships Program

Department of the Interior

U.S. Geological Survey
U.S. Fish & Wildlife Service
Bureau of Land Management
Bureau of Indian Affairs

Environmental Protection Agency

Department of Transportation

Federal Highway Administration
Federal Aviation Administration

National Trust for Historic Preservation

Additional Mitigation Grant Resources

Information about other grant programs may be found in these sources:

- FEMA Disaster Assistance: A Guide to Recovery Programs

http://www.fema.gov/media-library/assets/documents/6341

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 Borough 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 computer use.

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 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 as 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 established 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 mean 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 Borough that is the assembly of a borough or the council of a city.

Hazard

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

Hazard Event

A specific occurrence of a particular type of hazard.

Hazard Identification

The process of identifying hazards that threaten an area.

Hazard Mitigation

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

Hazard Mitigation Grant Program

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

Hazard Profile

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

Hazard and Vulnerability Analysis

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

Mitigate

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

Mitigation Plan

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

National Flood Insurance

The Federal program, created by an act of Congress in 1968, which 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 $1,000 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 a 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

Community Newsletter

Email Correspondence