City of Cordova, Alaska

Local Hazards Mitigation Plan Update

Date of Plan January 22, 2018
Updated by: City of Cordova

LeMay Engineering & Consulting, Inc.

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Acronyms

A/L	Avalanche/Landslide
AV	Avalanche
AWCG	Alaska Wildfire Coordinating Group
BFE	Base Flood Elevation (100-year flood)
BZ	Blizzard
CDBG	Community Development Block Grant
CFR	Code of Federal Regulations
CTC	Cordova Telephone Cooperative
°F	degrees Fahrenheit
DCCED	(Alaska) Department of Commerce, Community and Economic Development
DCRA	Division of Community and Regional Affairs
DGGS	Division of Geological and Geophysical Surveys
DHS&EM	(Alaska) Division of Homeland Security and Emergency Management
DNR	Division of Natural Resources
E	Earthquake
EOC	Emergency Operation Center
FBFM	Flood Boundary and Floodway Maps
FEMA	Federal Emergency Management Agency
FIRM	Flood Insurance Rate Maps
FL	Flood
FLD	Flood Projects
Hvy Snow	Heavy Snow
HW	High Wind
HMPG	Hazard Mitigation Planning Grant
LHMP	Local Hazard Mitigation Plan
Mph	Mile Per Hours
NFIP	National Flood Insurance Program
NOAA	National Oceanographic and Atmospheric Administration
REAA	Rural Educational Assistance Area
SBA	Small Business Administration
SERVS	Oil Spill Response Facilities
SW	Severe Weather
T/S	Tsunami/Seiche Projects
USCOE	United States Army Corps of Engineers
USFS	United States Forest Service
USGS	United States Geological Survey

Chapter 1. Success and Changes

Mitigation Plan Update Summary

Numerous mitigation projects have been accomplished or initiated since this Local Hazard Mitigation Plan (LHMP) was last updated in 2013. In addition, some projects were added to the plan. The primary obstacle to implementation of larger projects is lack of funding and personnel. Funding is not anticipated to improve, thus, community resilience in the long-term could be compromised. Still, the priority of current projects remains the same. If funding eludes the most significant projects, work will continue on those projects that require fewer monetary resources. No records indicate that the plan was reviewed annually. Efforts to review the plan in this cycle will include a City Council workshop that will focus on their opportunity to use this LHMP in their prioritization efforts as they commit resources.

Community education with regards to this 2018 LHMP and its benefits will commence. Sharing the goals in this plan amongst the City Council, the Emergency Management Organization, and the public at large will increase the probability that the plan will actually be used, leading to a long-term community vision for increased resilience.

Mitigation Projects Successfully Accomplished

Flood and Erosion Projects

- 2015 FLD-9. Take Steps to Update FIRM Cordova Maps. High priority. **This has been accomplished by FEMA as part of a 2016 RiskMAP Study.**

- FL-11. Install upgraded stream flow and rainfall measuring gauges. **The National Oceanographic and Atmospheric Administration (NOAA) has completed this action and trained Storm Observers.**

- 2015 FL-16. Take steps to map the Six-Mile Subdivision. **This has been accomplished by FEMA as part of a 2016 RiskMAP Study.**

Severe Weather Projects

All severe weather projects were implemented in 2012 and have been continuing at regular intervals.

Wild land Fire Projects

All wild land fire projects have been implemented and have been continuing at regular intervals.

Earthquake Projects

All earthquake projects with the exception of two have been implemented and have been continuing at regular intervals. There is someone within the community with PDDA training that can evaluate buildings after an earthquake.

Tsunami/Seiche Projects

All tsunami/seiche projects with the exception of one have been implemented and have been continuing at regular intervals.

Avalanche/Landside Projects

- Project A/L-1. Prohibit new construction in avalanche zones. This code has been in place since 2001. **2018 Update:** The City has a red zone and does not allow building in this zone. There is one house in the red zone that has deed restrictions and cannot be rebuilt, if destroyed.

Volcano Projects

This hazard is new to the LHMP in 2018.

Technological, Public Health, Human-Caused, and Hazardous Materials Hazards

All of these projects have been implemented and have been continuing at regular intervals.

Chapter 2. Planning Process and Methodology

Introduction

The scope of this LHMP update is natural hazards: flooding, erosion, severe weather, wild land fire, earthquake, tsunami, avalanche, volcano, climate change, and man-made hazards such as oil spills, hazardous materials, and other hazards.

The City of Cordova LHMP includes information to assist the City government and residents with planning to avoid potential future disaster losses. The plan provides information on natural hazards that affect Cordova, descriptions of past disasters, and lists projects that may help the community prevent disaster losses. The plan was developed to help the City make decisions regarding hazards that have the potential to affect Cordova.

Plan Development Location

Cordova is located at the southeastern end of Prince William Sound in the Gulf of Alaska. The community was built on Orca Inlet, at the base of Eyak Mountain. It lies 52 air miles southeast of Valdez and 150 miles southeast of Anchorage.

The community lies at approximately 60.542780° North Latitude and -145.757500° (West) Longitude. (Sec. 28, T015S, R003W, Copper River Meridian.) Cordova is located in the Cordova Recording District. The area encompasses 61.4 square miles of land and 14.3 square miles of water.

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2017/2018 Plan Update Staff

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Plan Research

The original and updated plans were developed utilizing existing Cordova plans and studies as well as outside information and research. The following list contains the most significant of the plans, studies, and websites that were used in preparing this document. Please see the bibliography for additional sources.

1. *Alaska State Hazard Plan*. Prepared by and for DHS&EM. 2004, 2010, and 2013.

2. *Tsunami Inundation Maps of Cordova and Tatitlek, Alaska*. Prepared by the State of Alaska Department of Natural Resources, Division of Geological & Geophysical Surveys. 2014.

3. *RiskMap Report for the City of Cordova*. Prepared by FEMA, RiskMap, and Resilence Action Partners. 2016.

4. *Cordova Local Hazard Mitigation Plan.* Prepared by WHPacific and Eileen R. Bechtol, AICP, of Bechtol Planning & Development, 2008.

5. *Cordova Local Hazard Mitigation Plan Update.* Prepared by the City of Cordova, 2013.

6. *Cordova Comprehensive Plan,* Prepared by and for the City of Cordova. 2008.

7. Cordova Emergency Operation Plan. Prepared by and for the City of Cordova. 2017.

8. *Cordova Coastal Management Plan 2007 Amendment*. Prepared by Bristol Engineering for the Cordova Coastal District, 2007.

9. *Eyak River Flood Control Study.* Prepared by the U.S. Corps of Engineers (USCOE) for the City of Cordova. July 14, 2003.

10. *The Avalanche Hazard Analysis and Mitigation Recommendations for 5.3 and 5.5 Mile Paths, Copper River Highway, Cordova, Alaska.* Doug Fesler and Jill Fredston, 2000.

11. *Flood Mitigation Plan*. Prepared by and for the City of Cordova. 1996.

12. *Flood Insurance Study.* Prepared by U.S. Department of Housing & Urban Development Federal Insurance Administration (now FEMA) for the City of Cordova. October 1978.

13. Federal Emergency Management Agency How to Guides
    a. Getting Started: Building Support for Mitigation Planning (FEMA 386-1)
    b. Understanding Your Risks: Identifying Hazards and Estimating Losses (FEMA 386-2)
    c. Developing the Mitigation Plan: Identifying Mitigation Actions And Implementing Strategies (FEMA 386-3)
    d. Bringing the Plan to Life: Implementing the Hazard Mitigation Plan (FEMA 386-4)
    e. Using Benefit-Cost Review in Mitigation Planning (FEMA 386-5)

14. *Evaluation of Recent Channel Changes on the Scott River Near Cordova, Alaska.* Prepared by USDA-Forest Service Chugach National Forest Anchorage, Alaska, Blanchet, Hydrologist. December 1983.

15. *Local Mitigation Plan Review Guide*. (FEMA *October 2011)*

16. *Department of Commerce, Community, and Economic Development (DCCED) Division of Community and Regional Affairs (DCRA) Community Information*: https://www.commerce.alaska.gov/web/dcra/

17. *FEMA Benefit-Cost Analysis Website:* https://www.fema.gov/benefit-cost-analysis

18. American Planning Association: http://www.planning.org

19. Association of State Floodplain Managers: http://www.floods.org

20. Federal Emergency Management Agency: http://www.fema.gov/plan/hazard-mitigation-planning/

21. Community Rating System: https://www.fema.gov/community-rating-system

22. Flood Mitigation Assistance Program: https://www.fema.gov/hazard-mitigation-assistance

23. Hazard Mitigation Grant Program: https://www.fema.gov/hazard-mitigation-grant-program
24. Individual Assistance Programs: http://www.fema.gov/individual-assistance-program-tools

25. Interim Final Rule: https://www.fema.gov/media-library/assets/documents/4590

26. National Flood Insurance Program:
    http://www.fema.gov/national-flood-insurance-program

27. Public Assistance Program:
    http://www.fema.gov/public-assistance-local-state-tribal-and-non-profit/

Public Involvement

In Cordova, collaboration and review are most beneficial when participants are provided with a draft document to review and critique. Rather than begin the process at the stakeholder level, it is necessary for a rough draft to be developed which can be used by the community to provide constructive feedback. LeMay Engineering & Consulting, Inc. developed an updated plan from the 2013 City of Cordova LHMP.

Newsletter #1 was posted within the community of Cordova inviting residents to attend a public meeting in December. Then, LeMay Engineering & Consulting, Inc. held an introductory hazard mitigation plan committee meeting on December 11, 2017. Jennifer LeMay presented on the hazard mitigation planning process with respect to updating existing plans at this introductory meeting. Attendees of the meeting were: Samantha Greenwood, Leif Stavig, Joanie Behrands, and Paul Trumblee.

Newsletter #2 was posted in January within Cordova announcing the availability of the Draft LHMP Update for public review and inviting community members to attend the City Council meeting on February 21, 2018, at 7 pm. A second meeting with the Emergency Management Organization (local stakeholders who meet for monthly disaster preparation meetings) will be held on February 21, 2018, at 1:00 pm. A copy of the Draft LHMP was available for public review for 30-days at the City Office.

Input received was incorporated into the Draft LHMP. At both meetings, Jennifer LeMay summarized the Draft LHMP. Input received was incorporated into the Draft LHMP before submission of the LHMP Update to DHS&EM and FEMA. The City approved the LHMP and adopted the LHMP for implementation into their community on TBD.

The City Council meeting was noticed via the newspaper, radio, GCI scanner, flyers, and the city web page.

The below entities/communities were contacted and asked to participate in the LHMP Update.

Chugach Alaska Corporation, Regional Native Corporation
The Native Village of Eyak
Eyak Corporation
The Tatitlek Corporation
Copper River Watershed Project

Prince William Sound Science Center
Prince William Sound Regional Citizens' Advisory Council

Appendix A includes public involvement documentation such as newsletters, commitment letters, meeting sign-in sheets, and comments.

Plan Implementation

DHS&EM and FEMA will review and pre-approve the updated LHMP. After that pre-approval, Planning and Zoning will review and make a recommendation to the City Council to adopt the plan by resolution. The City Council has the authority to promote sound public policy regarding hazards. The LHMP will be assimilated into other Cordova plans and documents as they come up for review according to each plan's review schedule. See Table 1 for plan review schedules.

Continuing Review and Plan Development

The Cordova LHMP will be reviewed on an annual basis to determine whether the plan reflects the current situation in regards to natural hazards. If funding is available, the plan will be updated every five years, after a Federally-Declared Disaster, or as required by DHS&EM. The schedule for the plan update is to start the following tasks before the end of the five-year cycle (Figure 1). The City Planning Director is the responsible City employee assigned to this task, as time and funding allow.

Table 1. Cordova Plans

Document	Completed	Next Review
Cordova Comprehensive Plan	2008	5 years from adoption
Cordova Emergency Operations Plan	2014-2017	Annually; the Emergency Management Organization is the responsible entity for plan updates
Comprehensive Economic Development Strategy Plan	2003	As Needed
Avalanche Hazard Plan	2000	As Needed
Tourism Plan	1999	As Needed
Parks and Recreation Plan	2000	As Needed
Waterfront Plan	2000	As Needed

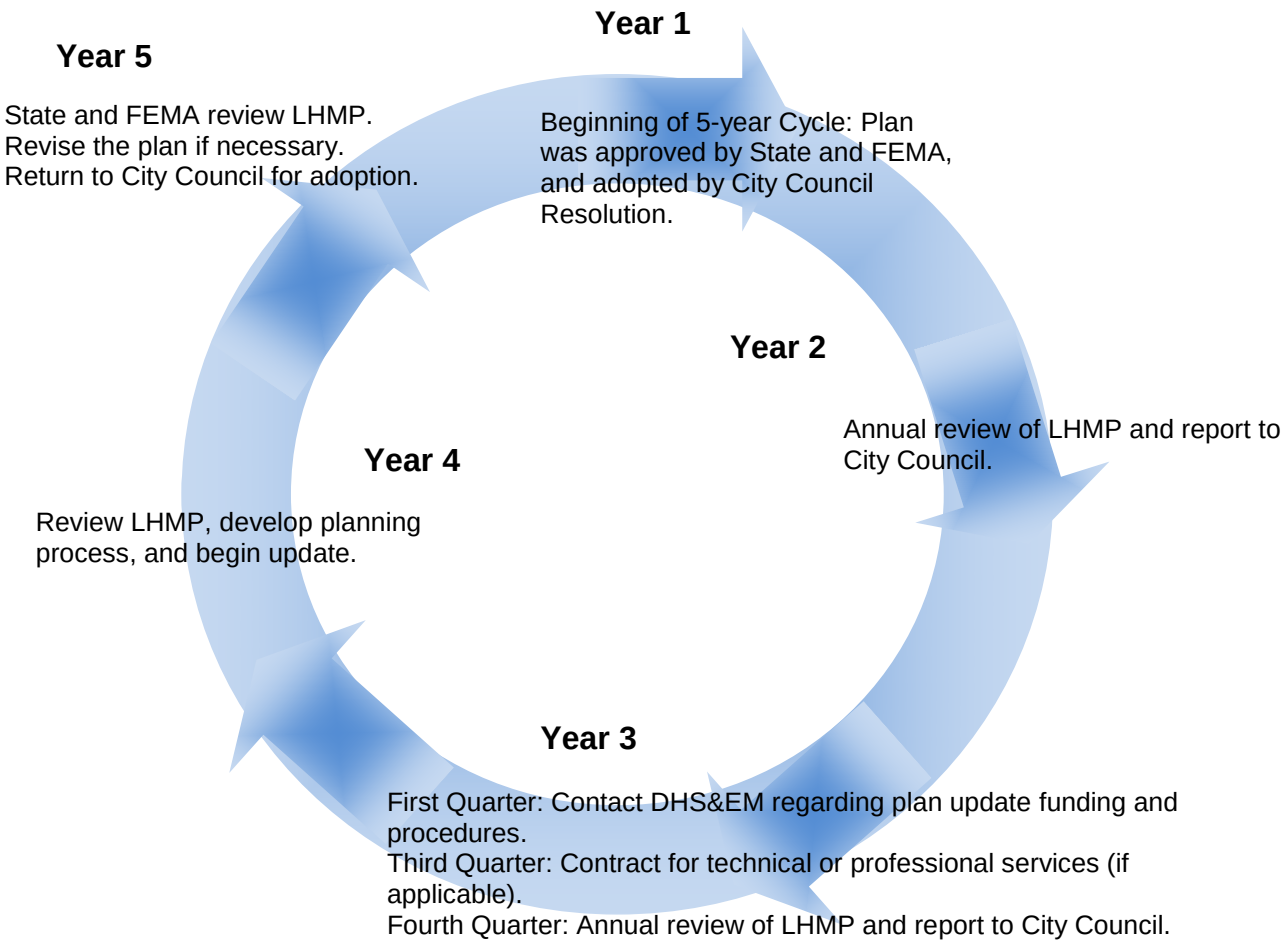

Figure 1. Hazard Mitigation Planning Cycle

Continued Public Involvement

The LHMP will be available for public review, and input will be accepted by the City Planner. Below is a list of the places where the plan will be available to the public.

1. City website: http://www.cityofcordova.net/document-central

2. A hard copy will be kept in the Planning Department at City Hall.

3. On an annual basis, the Planning Commission will review the plan at an annual meeting following all public notice procedures.

4. Once a year in March, a natural hazard survey will be included on the City's webpage. A reminder link will be included on the water bill. Received surveys will be compiled in a folder and included in the annual report, and considered during future plan updates. See Appendix E for survey.

Methodology

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

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

A risk assessment typically consists of three components:

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 4: Hazards.

2. Vulnerability Assessment – Step two is to identify the jurisdiction's vulnerability; the people, infrastructure, and property that are likely to be affected. It includes everyone who enters the jurisdiction including employees, commuters, shoppers, tourists, and others. This information can be found in Chapter 4: Hazards.

3. Risk analysis - Step three is the process of defining and analyzing the dangers to individuals, businesses, and government agencies posed by

potential natural and human-caused adverse events. This information can be found in Chapter 4: Hazards.

Hazards Identification Methodology

Alaska State Hazard Mitigation Plan, 2013 identified potential hazards, and local officials verified. Table 6 from the *Alaska State Hazard Mitigation Plan* is included in Chapter 4.

Vulnerability Assessment Methodology

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

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

Inventorying the City'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 to remain open during response and recovery phases.

Critical facilities may 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, shelters, hospital alternate care sites, pet shelter, and other emergency facilities;
- Transportation systems such as highways, water ways, harbor facilities, and airways;
- Utilities, water treatment plants, communications systems, and power facilities;
- High-potential loss facilities such as bulk fuel storage facilities; and
- Hazardous materials sites.

Other items to identify include economic elements, areas that require special considerations, historic, cultural and natural resource areas, and other City-determined important facilities.

Critical facilities are described in Chapter 3. A vulnerability matrix table of critical facilities as affected by each hazard is also provided in Chapter 4. This LHMP includes an inventory of critical facilities from the records and land use map.

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

Risk Assessment Methodology

An example of the results of a risk analysis would 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.

Federal Requirement for Risk Assessment

Federal regulations for LHMPs outlined in 44 Code of Federal Regulations (CFR) Part 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 Cordova LHMP meets those criteria are in Table 2.

Economic Analysis

FEMA and DHS&EM require that the city perform a benefit/cost analysis of mitigation projects when applying for grant funds for actual projects. This section briefly outlines what a cost/benefit analysis entails and provides information on where to obtain information when the city applies for project-specific grants.

Chapter 5, Mitigation Strategy, outlines Cordova's overall strategy to reduce its vulnerability to the effects of the hazards studied. Originally, the planning effort was limited to the *natural* hazards determined to be of the most concern: flooding/erosion, severe weather, earthquake, tsunami, avalanche, volcano, and climate change. Additions include *manmade* hazards such as technology, public health crisis, and hazardous material spills.

Table 2. Federal Requirements

Requirement	How is this addressed?
Identifying Hazards	Cordova City staff and the Cordova Emergency Management Organization identified natural hazards at community meetings, which were used in developing the LHMP. These hazards were updated in 2017/2018. Volcano and climate change were added in 2017/2018.
Profiling Hazard Events	Chapter 4, the hazard-specific sections of the Cordova LHMP, provides documentation for all-natural hazards that have the potential to affect the City. Where information was available, the LHMP lists relevant historical hazard events.
Assessing Vulnerability: Identifying Assets and Estimating Potential Losses of Critical Facilities	Vulnerability assessments for floods/erosion, severe weather, wild land fire, earthquakes, tsunamis, avalanches, volcanoes, and climate change have been completed and are contained in Chapter 4.
Assessing Vulnerability: Analyzing Development Trends	The Community Profile Section and Chapter 3 include a description of development in Cordova.

Chapter 3: Community Resources

Community Assets

This section outlines the resources, facilities, and infrastructure that, if damaged, could significantly impact public safety, economic conditions, and the environmental integrity of Cordova.

Community Maps and Photographs

Maps and Photographs are included in this LHMP following the Bibliography and preceding the appendices. Maps are included on pages 109 to 113.

Map 1. Cordova Regional Map
Map 2. Cordova Flood Rate Insurance Map
Map 3. Cordova Critical Infrastructure, Geo-Reference Photography
Map 4. Cordova Regional Critical Infrastructure
Map 5: Cordova Tsunami Hazard Zone Map

Critical Facilities: Those facilities and infrastructure necessary for emergency response efforts.

- Oil Spill Response Facilities (SERVS)
- Roads and Bridges
- Communications
- Utilities
- Hospital/Ilanka Community Health Center/Public Health Nurse
- Merle K. “Mud Hole” Smith Airport
- Cordova Municipal Airport
- City Hall
- Fire Department
- Police Department
- State Troopers
- Coast Guard
- Water Treatment Plant
- City Water
- Refuse
- Public Works—streets and other support
- Alaska Marine Highway and Ferry Terminal
- Cordova Harbor

Essential Facilities: Those facilities and infrastructure that supplement response efforts.

- 12 Designated Shelters (City has memorandums of understanding with each one)/Alternate Care Centers/Pet Shelters
- City Hall Buildings-Emergency Operation Center (EOC)
- Bulk Fuel Storage Tank Farm
- Cordova Telephone Cooperative (CTC)
- Mt. Eccles Elementary
- Cordova Junior/Senior High School
- USFS Building– Alternate EOC

Critical Infrastructure: Infrastructure that provides services to Cordova.

- CTC
- Evacuation Site behind Mt. Eccles Elementary
- Cordova Electric Power Network (CEC)
- Air Transportation Networks (Merle K. Smith & City Airport)
- Wastewater collection
- Water Supply Facilities including storage and delivery systems
- Power Generators including Humpback Creek, Power Creek hydro facilities
- Fuel Storage facilities (Shoreside Petroleum)
- Community Freezer facilities (canneries)
- Reservoir and water supply
- Landfill and Incinerator
- US Postal Service

Vulnerable Populations: Locations serving population that have special needs or require special consideration.

- Schools (Mt. Eccles Elementary, Junior/High School)
- Hospital
- Nursing Home (located in hospital)
- Elderly residents
- Tourists
- Functional Needs Population

Cultural and Historical Assets: Those facilities that augment or help define community character, and, if lost, would represent a significant loss for the community.

- Cordova Museum/Library & Archives
- Ilanka Cultural Center
- City Hall
- USFS
- Identified local historic structures/old town

- Masonic Temple
- Alaska Fishermen's Camp
- Cannery Row
- Graveyards

Community Resources

This section outlines the resources available to Cordova for mitigation and mitigation-related funding and training.

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

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

- **How-to Guides.** FEMA has developed a series of how-to guides to assist states, communities, and tribes in enhancing their hazard mitigation planning capabilities. The first four guides mirror the four major phases of hazard mitigation planning. The last five how-to guides address special topics that arise in hazard mitigation planning such as conducting cost-benefit analysis and preparing multi-jurisdictional plans. The use of worksheets, checklists, and tables make these guides a practical source of guidance to address all stages of the hazard mitigation planning process. They also include special tips on meeting Disaster Mitigation Act (DMA) 2000 requirements (https://www.fema.gov/media-library/resources-documents/collections/6).

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

- **Mitigation Resources for Success CD.** FEMA 372, September 2001. This CD contains a wealth of information about mitigation and is useful for state and local

government planners and other stakeholders in the mitigation process. It provides mitigation case studies, success stories, information about Federal mitigation programs, suggestions for mitigation measures to homes and businesses, appropriate relevant mitigation publications, and contact information.

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

- **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 the Alaska DCRA, Division of Community Advocacy, this program 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 the Federal Deposit Insurance Corporation or Federal Home Loan Bank Board may be permitted to waive early withdrawal penalties for Certificates of Deposit and Individual Retirement Accounts.

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

- **United States Small Business Administration (SBA).** 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 DHS&EM.

The following are websites that provide focused access to valuable planning resources for communities interested in sustainable development activities.

- **FEMA,** 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 – is 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.

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 a high priority item for the State of Alaska. Providing hazard mitigation training, current hazard information, and the facilitation of communication with other agencies would

encourage local hazard mitigation efforts. DHS&EM provides resources for mitigation planning on their website at https://ready.alaska.gov/.

- **DCRA, Division of Community and Regional Affairs:** Provides training and technical assistance on all aspects of the National Flood Insurance Program (NFIP) and flood mitigation.

- **Department of Health and Human 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 Veteran's Affairs:** Provides damage appraisals and settlements for Veterans Administration-insured homes, and assists with filing for survivor benefits.

Other Funding Sources and Resources

- **Real Estate Business.** Real estate disclosure is required by state law for properties within flood plains.

- **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.

- **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.

Local Resources

Cordova 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 City, and are summarized in the following tables.

Cordova is capable of initiating all the processes in Tables 3, 4, and 5 in order to implement mitigation projects:

Table 3. Legal and Technical Capability

Regulatory Tools (ordinances, codes, plans)	Do we HAVE these items…and the Local Authority to administer them? (Y/N)	Comments (Year of most recent update; problems administering it, etc.)
Building code	Yes	
Zoning ordinance	Yes	Ongoing Update, as necessary
Subdivision ordinance or regulations	Yes	Ongoing Update, as necessary
Special purpose ordinances (floodplain management, storm water management, hillside or steep slope ordinances, wildfire ordinances, hazard setback requirements)	Yes	Part of the NFIP
Growth management ordinances (also called "smart growth" or anti-sprawl programs)	No	
Site plan review requirements	Yes	
Comprehensive plan	Yes	.
A capital improvements list	Yes	
An economic development plan	Yes	Prince William Sound Economic Strategy that includes the Valdez/Cordova region
An emergency response plan	Yes	Plan is being implemented through training exercises
A post-disaster recovery plan	Yes	COOP Plan
Real estate disclosure requirements	State	No local requirement

Cordova has these employees to help implement mitigation projects:

Table 4. Personnel Capability

Staff/Personnel Resources	Does this manager have the fiscal responsibility Y/N	Department/Agency and Position
City Manager, Alan Lanning	Yes- city wide	City Administration Chief Administrative Officer
City Planner, Samantha Greenwood	Yes- for dept.	City Planning Department Planning Director
Police Chief, Mike Hicks	Yes	City Police Department
City Clerk, Susan Bourgeois	Yes	City Clerk Department Head
Public Works Director, Rich Rogers	Yes	City Public Works Department Head
Fire Department, Paul Trumblee	Yes	City Fire Department Fire Marshal, Department Head
Emergency Management Coordinator	Yes	Joanie Behrends
Engineer(s) or professional(s) trained in construction practices related to buildings and/or infrastructure	Yes	The Public Works Director is an engineer.
Planners or Engineer(s) with an understanding of natural and/or human-caused hazards	Yes	Fire Department, Paul Trumblee, Mike Hicks, Dick Groff, Joanie Behrends and others in Public Works, Planning Department, Samantha Greenwood, Leif Stavig
Floodplain Manager	Yes	Planning Director Samantha Greenwood
Surveyors	No	No certified surveyors, staff with surveying training and experience
Staff with education or expertise to assess the community's vulnerability to hazards	Yes	Fire Department, Paul Trumblee, Joanie Behrends, Dick Groff, and other Public Works staff, City Police Chief Mike Hicks, Planning Department, Samantha Greenwood, Leif Stavig
Personnel skilled in GIS and/or HAZUS	Yes	Planning Department Samantha Greenwood, Leif Stavig
Individuals familiar with the hazards of the community	Yes	Various City personnel, local agencies and organizations
Environmental Advisory Council	Yes	Various local non-profits and governmental agencies exist for this role

Table 5. Administrative and Technical Capability

Financial Resources	Accessible or Eligible to Use (Yes or No)
Community Development Block Grants (CDBG)	Yes
Capital improvements project funding	Yes, Pubic Works mostly but others as approved by Council
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	With Voter Approval
Incur debt through special tax and revenue bonds	With Voter Approval
Incur debt through private activity bonds	No
Withhold spending in hazard-prone areas	Yes

Chapter 4: Hazards

Alaska State Hazard Plan, 2013 Matrix

Table 6 was taken from the *Alaska State Hazard Mitigation Plan*, 2013. Cordova falls under the Chugach Rural Educational Assistance Area (REAA); each hazard denotes a hazard probability that might not match exactly with the specific previous occurrences sections under each hazard for Cordova.

Table 6. Hazard Matrix

Cordova					
Flood	**Wild land Fire**	**Earthquake**	**Volcano**	**Avalanche**	**Tsunami & Seiche**
Y-H	Y-M	Y-H	Y-L	Y-H	Y-H
Severe Weather	**Landslides**	**Erosion**	**Technological**	**Economic**	
Y-M	Y-L	Y-M	Y-L	Y-L	

Source: Alaska State Hazard Mitigation Plan, 2013

Y = Hazard is present in jurisdiction but probability unknown.

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

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

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

Table 7 is a table from the 2017 Cordova Emergency Management Plan summarizing hazards and vulnerabilities.

Identification of Assets and Vulnerability

The Hazard Vulnerability Matrices (Tables 8 and 9) list the City of Cordova facilities, utilities, and transportation systems, including the school district and hospital. The dollar values listed are from the City of Cordova Property Schedule for Renewing Businesses 2012-2013. The list is provided to identify City assets and provide an indication of each asset's vulnerability to natural hazards.

Table 7. City of Cordova Hazard Analysis Chart

HAZARD→		Flooding (Eyak Lake/River)		Fire		Earthquake	
VULNERABILITY ANALYSIS	Vulnerability zone	Buildings and streets near Eyak Lake and River, hospital		Entire census area including the boat harbor		Entire census area including the boat harbor	
	Population within vulnerability zone	Unknown		2,400 (5,000 summer)		2,400 (5,000 summer)	
	Property that may be affected	Private dwellings and outbuildings, Cordova City airstrip and hangers, Nirvana Park, water treatment plant, boat launch, hospital basement, CEC transfer station		Private and public structures, facilities, processors, public works, vehicles, aircraft, boats		Private and public structures, facilities, processors, public works, vehicles, aircraft, runways, bridges, fuel storage tanks, pipelines. Liquefaction and consequent structural damage on dredged soil fill.	
	Environment that may be affected	Shoreline and flood plain		Possibly nearby waters		Land and waters where hazardous materials are stored or present	
RISK ANALYSIS	Probability of occurrence	Moderate		Low		Moderate	
	Consequences to people	Damage or loss of shelter, hardship due to disruption of transportation. Loss of some medical services.		Possible loss of shelter, injury or death		Injuries and deaths, loss of shelter, disruption of vital services such as medical, water, sewer, power, and transportation	
	Consequences to property	Damage to structures, roads, facilities, well contamination.		Loss or damage of property		Damage to structures, roads, utilities, runways	
	Consequences to environment	Possible contamination from hazardous materials, sewage tanks present in flood plain, sedimentation of salmon spawning habitat, floating debris.		Possible contamination from hazardous materials released by fire		Contamination from hazardous materials released by damaged facilities; landslides; uplift & subsidence& and their effects (seiche etc.)	
	Probability of simultaneous emergencies	Moderate: high winds associated with storms		Low (earthquake, technological)		High (fire, tsunami, avalanche, landslides)	
SEVERITY RATING	**Categories**	**Severity**	**Points**	**Severity**	**Points**	**Severity**	**Points**
	History	High	6	Moderate	3	Moderate	3
	Vulnerability	Moderate	4	Low	3	Moderate	5
	Maximum threat	Moderate	4	High	8	High	9
	Probability	Moderate	4	Moderate	4	Moderate	4
	TOTAL	18		18		23	

HAZARD→		Volcano (ash fallout)		Avalanche		Tsunami	
VULNERABILITY ANALYSIS	Vulnerability zone	Entire census area		Power Creek hydro plant, 2.0 mi - 5.5 mi Copper River Hwy		Immediate coastal zone below 50 ft elevation	
	Population within vulnerability zone	2,400 (5,000 summer)		Unknown, <20		Unknown, <2,000	
	Property that may be affected	Private dwellings and outbuildings, airports and hangers, water treatment plant, engines, diesel generators		Private and public structures, facilities at 5.5 mi Copper River Hwy Power Creek hydro plant		Private and public structures, facilities, processors, public works, vehicles, aircraft, boats, docks, floats, City Hall, police/fire station	
	Environment that may be affected	Anything down wind of volcano		Possibly Eyak Lake		Land below 50 ft. elevation and waters where hazardous materials are stored or present	
RISK ANALYSIS	Probability of occurrence	Low		Moderate		Low	
	Consequences to people	Disruption of transportation and services, respiratory problems. Warnings issued by Volcano Observatory help mitigate.		Possible loss of shelter, injury or death; road blockage and it's consequences		Injuries and deaths, loss of shelter, disruption of vital services such as medical, water, sewer, power, and transportation	
	Consequences to property	Damage to structures, roads, facilities, engines		Loss or damage of structures, vehicles		Damage to structures, roads, utilities,	
	Consequences to environment	Ash in lakes and streams could disrupt salmon spawning		Possible contamination from hazardous materials released Power Creek hydro plant		Contamination from hazardous materials released by damaged facilities	
	Probability of simultaneous emergencies	Low (earthquake)		Low (earthquake); weather extremes		High (earthquake, fire, avalanche, seiche)	
SEVERITY RATING	**Categories**	**Severity**	**Points**	**Severity**	**Points**	**Severity**	**Points**
	History	Low	2	Moderate	4	Low	2
	Vulnerability	Low	2	Low	2	High	8
	Maximum threat	High	6	Moderate	4	High	8
	Probability	Low	2	Moderate	3	Low	3
	TOTAL	12		13		21	

HAZARD→		Weather Extremes		Landslide/Seiche		Oil Spill (Copper River)	
VULNERABILITY ANALYSIS	Vulnerability zone	Entire census area		Mountainous terrain within census area		Downstream any of the 3 pipeline crossings on Copper River tributaries	
	Population within vulnerability zone	2,400 (5,000 summer)		Unknown		Unknown, but most Cordovans rely economically on Copper River fisheries.	
	Property that may be affected	Roads, utilities, airports, residences, water sources and other structures		Roads, utilities, airports, residences and other structures		None in the Cordova area	
	Environment that may be affected	N/A		Unknown		Copper River watershed, Gulf of Alaska	
RISK ANALYSIS	Probability of occurrence	High		Low		Moderate	
	Consequences to people	High winds can cause injury or death, delays in ferry or air service. Severe cold can cause hypothermia and frostbite.		Possible loss of shelter, injury or death, especially with seiche		Probable loss of commercial fishing opportunity and income, loss of subsistence and recreation along Copper River	
	Consequences to property	Damage to structures, utilities, roads (flooding), ice loading damage to roofs		Loss or damage of structures, vehicles, roads, especially with seiche		None	
	Consequences to environment	N/A		Unknown		Depending on volume of oil spilled, could be severe damage to fish and wildlife resources.	
	Probability of simultaneous emergencies	Moderate (flooding, fire, transportation accidents, avalanche)		Moderate (earthquake, avalanche)		High (earthquake, fire, avalanche)	
SEVERITY RATING	**Categories**	**Severity**	**Points**	**Severity**	**Points**	**Severity**	**Points**
	History	Moderate	5	Low	2	Moderate	4
	Vulnerability	Low	2	Moderate	5	High	8
	Maximum threat	Low	2	Moderate	6	High	9
	Probability	High	7	Low	3	Moderate	4
	TOTAL	16		16		25	

HAZARD→		Oil Spill (PWS or Gulf)		Airline Crash		Weapons and Terrorism	
VULNERABILITY ANALYSIS	Vulnerability zone	Prince William Sound, Gulf of Alaska waters		Mudhole Smith Airport area and 6 mile subdivision		Entire city	
	Population within vulnerability zone	Unknown, but most Cordovans rely economically on commercial fisheries		None living in zone, but would affect those living in Cordova		Entire population	
	Property that may be affected	Unknown		Probably none except airport		Public and private facilities	
	Environment that may be affected	Prince William Sound, Gulf of Alaska waters and shoreline including the Copper River Delta.		West Copper River Delta		Incident specific	
RISK ANALYSIS	Probability of occurrence	Low		Low		Low	
	Consequences to people	Probable loss of commercial fishing opportunity and income, loss of subsistence and recreation, psychological trauma associated with technological disasters		Mass casualties, fatalities, disruption of travel and medical services		Mass casualties, fatalities, disruption of services	
	Consequences to property	Unknown		Unknown		Damage or destruction	
	Consequences to environment	Depending on volume of oil spilled, could be severe damage to fish and wildlife resources.		Possible fuel spill into wetlands		Degradation of air and water quality	
	Probability of simultaneous emergencies	Low		Low		Low	
SEVERITY RATING	**Categories**	**Severity**	**Points**	**Severity**	**Points**	**Severity**	**Points**
	History	High	9	Low	0	Low	0
	Vulnerability	High	9	Low	2	Low	3
	Maximum threat	High	10	Mod	4	High	7
	Probability	Low	2	Low	1	Low	1
	TOTAL	30		7		11	

Table 8. City of Cordova - Asset Matrix - Structures and Infrastructure

Building Name	Occ / Description	Address	Construction	Year Built	Sq. Ft	Building Value $
City Hall	City Offices	601 1st Street		2015		
Fire and Police	Fire and Police	602 Railroad Ave	Steel on Steel Frame	1976	11,920	3,102,000
Fire Dep't Van	2 connected Sealand Vans - for storage purposes	602 Railroad Ave				0
PWS Science Center	Office	Breakwater Ave	Frame	1964	2,900	395,000
Cordova Chamber of Commerce		404 First Street	Frame		600	164,000
Hospital		508 Chase Avenue	Reinforced Concrete	1986	43,440	17,080,979
ALANKA	Native Health Clinic					
5 Mile Fire Station		5 Mile Copper River Hwy	Steel	2001	2,400	357,000
Municipal Ocean Dock	Ocean Dock		Concrete /Steel	1968	32,060	8,410,000
North Containment Dock	Commercial Shipping		Concrete /Steel	1990	9,686	3,802,000
Harbor Bathroom		Breakwater Ave	Frame	1983	300	92,000
Old Grid Dock & Approach	PWS Science Center	Breakwater Ave	Wood Timber	1964	7,093	1,068,000
Harbormaster Building	Office	114 Nicholoff Way	Frame	1983	2,011	481,000
Coast Guard Dock	USCG	Breakwater Ave	Wood Timber	1960	13,152	2,483,000
Loading Dock with Hoist	Marine Advisory	Breakwater Ave	Wood Timber		4,940	1,036,000
Small Boat Harbor Approach		Breakwater Ave	Wood Piling		2,184	474,000
3 Stage Dock		Nicholoff Way	Wood Timber		3,843	798,000
New Grid Approach		Nicholoff Way	Steel / Timber	1982-1983	672	321,000
Approach No. 1	Small Boat Harbor		Steel / Timber		1,312	0
Approach No. 2	Small Boat Harbor		Steel / Timber		1,312	0

Building Name	Occ / Description	Address	Construction	Year Built	Sq. Ft	Building Value $
Approach No. 3	Small Boat Harbor		Steel / Timber		1,105	0
Approach No. 4	Small Boat Harbor		Steel / Timber		2,184	0
Inner Harbor Launch Ramp	Small Boat Harbor		Steel / Timber	2005		340,000
Float A	Small Boat Harbor		Wood / Concrete	2005	A-7410	1,206,000
Float B	Small Boat Harbor				B-9715	1,206,000
Float C	Small Boat Harbor				C-10452	1,046,000
Float D	Small Boat Harbor				D-6735	672,000
Float E and Approach No. 4	Small Boat Harbor				E-5453	1,416,000
Float F	Small Boat Harbor				F-2565	445,200
Float G and Approach No. 3	Small Boat Harbor				G-11556	2,696,000
Float H	Small Boat Harbor				H-15684	3,442,000
Float I and Approach No.2	Small Boat Harbor				I-15684	3,465,000
Float J	Small Boat Harbor				J-8064	1,776,000
Float K and Approach No. 1	Small Boat Harbor				K-13242	3,187,000
Float L	Small Boat Harbor		Wood / Concrete		L-7720	1,705,000
Float M	Small Boat Harbor		Wood / Concrete		M-5535	1,212,000
Boat Haul out Facility	Vessel Maintenance/Storage- Ocean Dock Subdivision		Steel/Concrete		143,150	2,000,000
Harbor - Forest Service Building	US Forest Service Building		Frame		816	196,000
Odiak Camper Park	Public Restrooms	1451 Whitshed Road	Frame	1976	792	62,000
Tourist Booth/big Gazebox	at Hollis Henrichs Park	Chase & Copper River Hwy	Frame	1985	100	13,568
Skaters Cabin		Power Creek Road	Log		684	143,000
Bidarki Rec. Center		103 Council	Frame	1933/ 1988/ 1989	11,450	2,345,000
Swimming Pool Building		610 Railroad Ave	HCB & Frame	1974	7,968	2,107,000

Building Name	Occ / Description	Address	Construction	Year Built	Sq. Ft	Building Value $
Ball field Restroom/Concession		101 South First St	Frame			124,000
Fleming Spit Restroom Bldg.		Shelter (Hippy) Cove	Orca Road	1999	182	63,000
Shelter Cove RV Park	Fleming Spit		prop in open			0
Shelter Cove Fish Cleaning Station	Fleming Spit					0
Odiak Pond	gazebo, boardwalk	CRH				84,800
Hollis Henrichs Park	restroom	CRH & Chase				147,000
Parks Maintenance Facility	(old CG bldg. by city dock)	Breakwater & Seafood				116,600
Nettie Hansen Park	playground equipment	4th St. & Browning	prop. In open	2007		42,400
Nettie Hansen Park		4th St. & Browning	prop. In open			25,000
Children's Memorial Park	playground equipment	101 S First St	prop. In open			0
Tot Park	playground equipment	101 S First St	prop. In open			30,000
Mt Eccles Estate Park Playground Equipment	Mt Eccles Estate		prop in open			10,000
Skate Park	fencing, ramps, prks&rec equip.	101 S First St	prop. In open			31,800
Nirvana Park	large covered shelter, P&R equip.	Lake Ave. & LeFevre				32,000
Public Works	Public Works Shop	.7 Whitshed Road	Wood/Steel Frame		7,260	1,511,000
Baler Building	Solid Waste Baler	Mile 1 Whitshed Road	Steel on Steel Frame	1985	6,132	861,000
17 Mile Landfill Bldg.	Storage & Shop	Sec 13, T16S, R1w	Steel	2000	2,400	320,000
ILP Building	District Office Modular	100 Fisherman's Ave	Frame		600	25,000
Cordova Jr./Sr. High School	School		100 Fisherman's Ave	HCB & Frame	1980	52,008
Mt. Eccles Elem. School	School	201 Adams	Steel on Steel Frame	1955	31,048	11,531,085
Elementary Playground	Playground equipment	201 Adams	Frame		2,736	7,835,301
Eyak Mt. Chairlift	Ski Resort	Eyak Mtn. Ski Area	Steel	1978		121,459

Building Name	Occ / Description	Address	Construction	Year Built	Sq. Ft	Building Value $
Eyak Mt. Chairlift Building/Bottom	Ski Resort	Eyak Mtn. Ski Area	Frame	1960	240	309,520
Eyak Mt. Chairlift Building/Midway	Ski Resort	Eyak Mtn. Ski Area	Steel	1978		10,000
Eyak Mt. Maintenance Shop	Ski Resort	Eyak Mtn. Ski Area	Frame	1980	240	15,000
Eyak Mt. Snack Shack	Ski Resort	Eyak Mtn. Ski Area	Frame	1960	600	253,100
Eyak Mt. Clubhouse/Rental Shop	Ski Resort	Eyak Mtn. Ski Area	Frame	1992	832	120,000
Eyak Mt. Water Tank	Ski Resort	Eyak Mtn. Ski Area	Steel	1980		151,000
Eyak Mt. Chairlift Building/Top	Ski Resort	Eyak Mtn. Ski Area	Frame	1975		253,000
Public Works - Water/Sewer 1	Sewage Treatment	Orca Inlet Drive	Joisted Masonry/ Frame	1975	1,560	10,000
Public Works - Water/Sewer 2	STP generator outbuilding	Orca Inlet Drive	fiberglass			548,000
Public Works - Water/Sewer 3	WWTP Garage	Orca Inlet Drive	Frame	1982	2,904	40,000
Public Works - Water/Sewer 4	Whisky Ridge Lift Station	Whitshed Road	Frame	1978	256	430,000
Public Works - Water/Sewer 5	Whisky Ridge gen. outbldg.	Whitshed Road	fiberglass			14,000
Public Works - Water/Sewer 6	Meals WTP	Whitshed Road	Frame	1975	240	32,860
Public Works - Water/Sewer 7	Meals Dam	Whitshed Road	Sheet Steel / Earth	1973		49,000
Public Works - Water/Sewer 8	Eyak WTP	Mile 1 Copper River Hwy	Frame	1984	4,428	0
Public Works - Water/Sewer 9	Wet Well/Dry Well Murchison Lift Station	Mile 1 Copper River Hwy			30,000	1,500,000
Public Works - Water/Sewer 10	Mews Pump Station	6th Street		Frame	1980	225
Public Works - Water/Sewer 11	Mews Water Tank	6th Street	Steel	1980		10.458
Public Works - Water/Sewer 12	1.5 mg Water Tank	5th Street	Steel	1980		240,000
Public Works - Water/Sewer 13	1.5 mg Pump house	5th Street	Frame			6,000,000
Public Works - Water/Sewer 14	Ferry Dock Lift Station	Ferry Dock Drive	Frame	1985	256	0

Building Name	Occ / Description	Address	Construction	Year Built	Sq. Ft	Building Value $
Public Works - Water/Sewer 15	Eyak Lift Station	LeFevre/Chase	Fiberglass/ Steel			30,000
Public Works - Water/Sewer 16	Odiak Lift Station	South 2nd	Frame			12,720
Public Works - Water/Sewer 17	Orca WTP	Chugach Cannery	Frame	1982		636,000
Public Works - Water/Sewer 18	Morpac Lift Station	Copper River Highway	Steel	1985	256	47,000
Public Works - Water/Sewer 19	Morpac Water Tank	Copper River Highway	Steel	1980		30,000
Public Works - Water/Sewer 20	CT (Murcheson) Water Tank	1 Mile Copper River	Steel			2,800,000
Public Works - Water/Sewer 21	CT (Meals) Water Tank	.75 Mile Whitshed Road	Steel			2,800,000
Public Works - Water/Sewer 22	Solid Handling Bldg.	Orca Inlet Drive	Steel	2007	2,772	2,800,000
Building #4x			Frame		400	627,000
Public Works – Refuse	EVOS Building/Waste Oil Storage	Mile 1 Whitshed Road	Concrete	1998		14,840
New Storage Garage		Whitshed Road				120,000
New Parks Maintenance Facility		.7 Whitshed Road				299,000
17 Mile Landfill Bldg.	Storage and Shop	Sec 13, T16S, R1W	Steel	2000	2,400	129,000
Orca Inlet Rec Area and M/U Field		Whitshed Road	prop in open			320,000

Reference: City of Cordova Property Schedule for Renewing Businesses, 2012-2013.

Table 9 depicts each of the facilities in Table 8 in relation to whether they are vulnerable to the listed natural hazards. There are no structures located in the currently delineated avalanche areas.

Table 9. Assets and Vulnerability Matrix - Structures and Infrastructure

Facility	Flood/ Erosion	Severe Weather	Wild land Fire	Earthquake	Tsunami	Avalanche/ Landslide	Volcanic Ash
City Hall		H		M	L		L
Fire and Police Department		H		M	L		L
PWS Science Center	M	H		M	L		L
Cordova Chamber of Commerce		H		M	L		L
Hospital	M	H		M	L		L
ALANKA	M	H		M	L		L
5 Mile Fire Station	M	H	L	M	L		L
Municipal Ocean Dock	M	H		M	L		L
North Containment Dock	M	H		M	L		L
Harbor Bathroom	M	H		M	L		L
Old Grid Dock & Approach	M	H		M	L		L
Harbormaster Building	M	H		M	L		L
Coast Guard Dock	M	H		M	L		L
Loading Dock with Hoist	M	H		M	L		L
Small Boat Harbor Approach	M	H		M	L		L
3 Stage Dock	M	H		M	L		L
New Grid Approach	M	H		M	L		L
Approach No. 1	M	H		M	L		L
Approach No. 2	M	H		M	L		L
Approach No. 3	M	H		M	L		L
Approach No. 4	M	H		M	L		L
Inner Harbor Launch Ramp	M	H		M	L		L
Float A	M	H		M	L		L
Float B	M	H		M	L		L
Float C	M	H		M	L		L
Float D	M	H		M	L		L

Facility	Flood/ Erosion	Severe Weather	Wild land Fire	Earthquake	Tsunami	Avalanche/ Landslide	Volcanic Ash
Float E	M	H		M	L		L
Float F	M	H		M	L		L
Float G	M	H		M	L		L
Float H	M	H		M	L		L
Float I	M	H		M	L		L
Float J	M	H		M	L		L
Float K	M	H		M	L		L
Float L	M	H		M	L		L
Float M	M	H		M	L		L
Harbor - Forest Service Building	M	H		M	L		L
Odiak Camper Park	M	H		M	L		L
Tourist Booth/big Gazebo		H		M	L		L
Skaters Cabin	M	H		M	L		L
Bidarki Rec. Center		H		M	L		L
Swimming Pool Building		H		M	L		L
Ball field Restroom/Concession	M	H		M	L		L
Fleming Spit Restroom Bldg.	M	H		M	L		L
Odiak Pond		H		M	L		L
Hollis Henrichs Park		H		M	L		L
Parks Maintenance Facility		H		M	L		L
Nettie Hansen Park		H		M			L
Children's Memorial Park		H		M	L		L
Tot Park		H		M			L
Skate Park		H		M	L		L
Nirvana Park	M	H		M	L		L
Baler Building		H	L	M			L
17 Mile Landfill Bldg.		H	L	M			L

Facility	Flood/ Erosion	Severe Weather	Wild land Fire	Earthquake	Tsunami	Avalanche/ Landslide	Volcanic Ash
Cordova Jr./Sr. High School		H		M	L		L
ILP Building		H		M	L		L
Mt. Eccles Elem. School		H		M			L
Elementary Playground		H		M			L
Eyak Mt. Chairlift		H	L	M			L
Eyak Mt. Chairlift Building		H	L	M			L
Eyak Mt. Maintenance Shop		H	L	M			L
Eyak Mt. Snack Shack		H	L	M			L
Eyak Mt. Clubhouse/Rental Shop		H	L	M			L
Eyak Mt. Water Tank		H	L	M			L
Eyak Mt. Chairlift Building/Top		H	L	M			L
Public Works - Water/Sewer –1	M	H	L	M	L		L
Public Works - Water/Sewer –2	M	H	L	M	L		L
Public Works - Water/Sewer -3	M	H	L	M	L		L
Public Works - Water/Sewer –4		H		M	L		L
Public Works - Water/Sewer -5		H	L	M	L		L
Public Works - Water/Sewer –6	M	H	L	M			L
Public Works - Water/Sewer –7	M	H	L	M			L
Public Works - Water/Sewer –8	M	H		M	L		L
Public Works - Water/Sewer –9	M	H	L	M	L		L
Public Works - Water/Sewer –10		H	L	M			L
Public Works - Water/Sewer –11		H	L	M			L
Public Works - Water/Sewer –12		H	L	M			L
Public Works - Water/Sewer –13		H	L	M			L
Public Works - Water/Sewer –14	M	H		M	L		L
Public Works - Water/Sewer –15	M	H		M	L		L
Public Works - Water/Sewer –16	M	H		M	L		L

Facility	Flood/ Erosion	Severe Weather	Wild land Fire	Earthquake	Tsunami	Avalanche/ Landslide	Volcanic Ash
Public Works - Water/Sewer –17		H	L	M			L
Public Works - Water/Sewer –18	M	H	L	M	L		L
Public Works - Water/Sewer –19		H	L	M			L
Public Works - Water/Sewer –20		H	L	M			L
Public Works - Water/Sewer –21		H	L	M			L
Public Works - Water/Sewer –22	M	H	L	M	L		L
Public Works - Refuse	M	H	L	M	L		L

Location of Identified Hazards

In summary, most identified hazards are area-wide. The principal natural hazards of flood, erosion, severe weather, earthquake, tsunami, avalanche, volcano, and climate change could potentially impact any part of Cordova. Manmade and technological hazards are also potentially area-wide.

Flooding events, even for those properties unaffected directly, will suffer due to road closures, impacts to public safety (access and response capabilities), limited availability of perishable commodities, and isolation.

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

Wild land Fire could occur anywhere in the Cordova region as the area is heavily forested. However, the Cordova region is also a rain forest.

Earthquake damage would be area-wide with potential damage to critical infrastructure up to and including the complete abandonment of key facilities. Priority would have to be given to critical infrastructure to include: public safety facilities, health care facilities, shelters and potential shelters, and public utilities.

Avalanche and landslide danger is limited primarily to the identified avalanche and landslide areas depicted on Map 4. There are no critical facilities located in the avalanche and landslide areas.

Tsunami damage would impact the structures directly adjacent to the coastline.

Volcanic ash could occur anywhere in the Cordova region depending on wind direction.

Climate change would create an area-wide impact.

Technological or Cyber Threats could be area-wide, affecting all critical infrastructures and/or the total population. The same is true for nuclear, biological, or chemical threats.

Hazardous Material Spills could be either site-specific or area-wide with potential evacuation from critical infrastructure up to and including the complete abandonment of key facilities.

Oil Spill threat could be local or region-wide.

Public Health hazards could be area-wide, affecting the total population.

Other human-caused threats (like civil disobedience or mass transportation accidents) would be limited to the site.

Further location-specific information for each hazard is provided in Table 7.

Section 1. Floods and Erosion

Hazard Description and Characterization

Flood hazards in Cordova include storm surges, voluminous rainfall, snow and glacier melt, and release of glacier-dammed lakes.

Storm Surge Flooding
Storm surges are relatively long-term, local increases in water level resulting from offshore storms. Maximum hazard results when such a surge coincides with a maximum tide.

Rainfall/Snowmelt/Glacier Melt Flooding
Floods occur in rivers as a result of a large input of water to the drainage basin in the form of rainfall, snowmelt, glacier melt, or a combination of these inputs. In the Cordova 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.

Deposition
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.

Erosion
Erosion is a process that involves the wearing away, transportation, and movement of land. Erosion rates can vary significantly as 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.

Local Flood and Erosion Hazard Identification

The following section regarding hazard identification was taken from the *Eyak River Flood Control Study* prepared by USCOE for the City of Cordova on July 14, 2003.

The principal flood problem in Cordova is caused by high water in Eyak Lake. The Eyak River, which drains Eyak Lake, does not have the capacity for peak flow, and hence, the lake level rises. Persistent flooding in the Cordova area has also been caused by inflows of the Scott River into the Eyak River. These inflows raise the water surface of both the Eyak River and Eyak Lake.

The Eyak River is a small, clear water river that drains Eyak Lake and has a drainage area of 42 square miles. The Eyak River lies along the extreme western edge of the

Scott River delta and the eastern extent of the Heney Range. The Scott River delta is a long, broad delta with considerable topographic relief extending from the Scott Glacier to Prince William Sound. The Scott River is a glacial outwash river that is characterized by a tremendous sediment load and a multi-channeled, braided stream channel system that extends across the entire extent of its previously glaciated valley. Flow paths are highly-variable within the delta as stream channels meander, are abandoned for lower grade channels, or are captured by larger flows.

The additional flow and sediment deposition from the Scott River into the Eyak River has greatly restricted the natural flow from the Eyak drainage. Under these conditions, water surface elevations of the Eyak River upstream of the intrusions of the Scott River are held continuously high. The increased water surface elevations of the Eyak River, in turn, keep the water surface of Eyak Lake continuously high and well above normal.

Conditions have changed somewhat since the initiation of this study. Channel shifts at the foot of Scott Glacier and in the mid-floodplain area north of the Copper River Highway appear to have led to decreased flows of silt, glacial water into the Eyak River. During the summer of 2001, the flow from Scott Glacier shifted more to the east, away from the Eyak River. This has reduced the amount of Scott River stream flow and sediment into the Eyak River. If these conditions persist, the Eyak River may erode and transport the sediment shoals that have been deposited in it and return the stream channel to its base level. Average channel velocities during a two-year (50% probability) flood event are estimated to be three- feet per second, a sufficient velocity to erode the fine sediment that the shoals are composed of. This will return water surface elevations and flooding hazards to those present before the intrusion of the Scott River. It is not known how long these conditions may persist and whether the Eyak River will return to prior conditions.

Below the terminus of the Scott Glacier, the Scott River drainage forms a wide, low elevation flood plain of approximately 30 square miles. In its upper seven miles, this floodplain is bounded on both sides by steep valley walls, and averages about two miles in width. The lower section of the floodplain widens out into a broad delta, which coalesces with the delta of the Glacier River to the east.

In early July of 1983, a major shift in the water flow patterns down the Scott River drainage was noted at the Copper River Highway. This flow shift is likely related to a change in the channels of the Scott River from underneath the Scott Glacier which occurred at about the same time. However, the flow pattern change could have occurred through a major channel shift further down the valley, independent of the channel changes at the terminus of the Scott Glacier.

Previous to the July 1983 channel shift at the Copper River Highway, the majority of the turbid, summer, and fall glacial flows from the Scott River passed under the Mile 9 bridges on the Copper River Highway (and on the east side of the drainage). The Mile 7 Bridge passed primarily non-glacial waters from Laydick Creek. These flows were of much less volume than those under the Mile 9 Bridge.

At flood stage, individual channels in the Scott River drainage are incapable of holding all flows. Floodwaters rise and spread across the width of the valley, and high, turbid flows pass under all the highway bridges, which span the drainage.

Since the July 1983 flow shift, the majority of stream flow from Scott River passes under the Mile 7 Bridge and is now turbid glacial waters. Significantly less than half the flows of the Scott River now pass under the Mile 9 bridges (note that at low-summer stage, there is virtually no flow.)

The Scott River drainage area is 154 square miles, most of which is mountainous. Elevations range from sea level to 6,000 feet. The Scott Glacier covers 45% of the watershed, which receives approximately 150 inches of precipitation per year.

Outburst Floods from Scott Glacier

Along the east flank of Scott Glacier, about 1.5 miles above its terminus, the glacier blocks off a small, east-west trending valley. A lake of approximately 80 acres in surface area forms behind this glacial dam. Occasionally, outburst floods occur from this lake and the majority of its water volume drains out from under the glacier and flows down the Scott River valley. The recurrence interval of this outburst flood may be as frequent as once or twice a year (USGS, 1971). Apparently, these outburst floods are not of significant enough volume to have a strong downstream influence. Further up the Scott Glacier is another glacially dammed lake, which has occasional outburst floods. The lake is small enough that outburst floods would likely have a low impact on flooding downstream.

Based on the limited data concerning outburst floods from Scott Glacier, it was assumed that outburst flooding would have a minimal direct impact on the frequency or magnitude of major flood events on the Scott River. The outburst floods could redistribute substrate material sufficiently to cause changes in flow patterns within the upper Scott River floodplain. These changes in flow patterns could propagate to lower portions of the watershed and affect the amount of additional flow entering the Eyak River. In 2001, it appeared that channel shifts at the foot of the Scott Glacier led to decreased flows of Scott River water into the Eyak River (USCOE, 2003).

The Scott River is a heavily-braided stream that flows from the terminus of Scott Glacier. Downstream from the glacier the Scott River forms a wide, low elevation floodplain of approximately 30 square miles. The upper seven miles of this floodplain is bounded by steep valley walls, and averages about two miles in width. The lower section of the floodplain widens out into a broad delta that extends to the Gulf of Alaska.

Community Participation in the NFIP

The City of Cordova has been in partnership with NFIP since 1979. The function of the NFIP is to provide flood insurance to homes and businesses located in floodplains at a reasonable cost. In trade, the City of Cordova regulates new development and substantial improvement to existing structures in the floodplain. The program is based upon mapping areas of flood risk, and requiring local implementation to reduce flood damage primarily through requiring the elevation of structures above the base (100-year) flood elevations.

FIRMs were updated December 16, 2015. Table 10 contains Cordova-specific NFIP statistics.

Table 10. NFIP Statistics

Total by Community	
Total Number of Policies:	7
Insurance in Force:	$2,000,000
Total Number of Closed Paid Losses:	1
$ of Closed Paid Losses:	$64,529
Repetitive Loss Properties	0

Cordova Floodplain Coordinator	Samantha Greenwood, City Planner P.O. Box 1210 Cordova, Alaska 99574 Phone: (907) 424-6220, Email: planning@cityofcordova.net
State of AK Floodplain Coordinators	Floodplain Management Programs Coordinator Division of Community and Regional Affairs Department of Commerce, Community & Economic Development Contact Person: Jimmy C. Smith 550 West 7th Avenue, Suite 1640 Anchorage, AK 99501 Phone: (907) 269-4132 E-Mail: jimmy.smith@alaska.gov Web: https://www.commerce.alaska.gov/web/dcra/PlanningLandManagement/FloodplainManagement.aspx

Economic Considerations. The area of Cordova along the western shore of Eyak Lake is populated with single- and multi-family residential and commercial structures. All land suitable for development has been developed, and no changes in land use are expected over the 25-year period of analysis.

The developed area of Eyak on the east bank of the Eyak River consists primarily of single-family residential structures.

A structure inventory was conducted to identify all structures in the floodplain. The inventory identified 196 residential and commercial structures at risk of flooding from a 0.2% chance event, commonly referred to as a 500-year flood. At that time, the value of property, excluding utilities, within the 500-year flood plain of the Eyak River was estimated to be approximately $16 million.

Previous Occurrences of Flood and Erosion

The following information is from the DHS&EM Disaster Cost Index, 2016.

Cordova, September 16, 1983 The Governor proclaimed a Disaster Emergency after a flash flood generated by heavy rainfall destroyed portions of a pipeline system which provided the City of Cordova with approximately 60% of its water supply. Public assistance was provided for the purpose of repairing the city's water system.

Cordova, October 31, 1985 After heavy rains, a landslide destroyed water lines between Heney Creek catchment basin and the City. Disaster public assistance supported repair by the City.

Southcentral Alaska Flood (Major Disaster), October 12, 1986 FEMA-declared (DR-0782) on October 27, 1986 Record rainfall in South-central Alaska caused widespread flooding in Seward, Matanuska-Susitna Borough, and Cordova. The President declared a major disaster implementing all public and individual assistance programs, including SBA disaster loans and disaster unemployment insurance benefits.

96-180 South-central Fall Floods declared September 21, 1995 by Governor Knowles, then FEMA-declared (DR-1072) on October 13, 1996: On September 21, 1995, the Governor declared a disaster as a result of heavy rainfall in South-central Alaska. The Kenai Peninsula Borough, Matanuska-Susitna Borough, and the Municipality of Anchorage were initially affected. On September 29, 1995, the Governor amended the original declaration to include Chugach and the Copper River REAA areas, including the communities of Whittier and Cordova, and the Richardson, Copper River, and Edgerton Highway areas which suffered severe damage to numerous personal residences, flooding, eroding of public roadways, destruction & significant damage to bridges, flood control dikes and levees, water and sewer facilities, power and harbor facilities. On October 13, 1995, the President declared this event as a major disaster (AK-1072-DR) under the Robert T. Stafford Disaster Relief and Emergency Assistance Act. Individual Assistance totaled $699,000 for 190 applicants. Public Assistance totaled $7.97 million for 21 applicants with 140 DSRs. Hazard Mitigation totaled $1.2 million. The total for this disaster was $10.5 million.

06-220 2006 August Southcentral Flooding (AK-06-220) declared August 29, 2006 by Governor Murkowski, then FEMA declared (DR-1663) on October 16, 2006 Beginning on August 18, 2006 and continuing through August 24, 2006, a strong weather system centered, causing severe flooding resulting in severe damage and

threats to life and property in the Southcentral part of the State including the Matanuska-Susitna Borough, the City of Cordova, and the Copper River Highway area in the Chugach REAA, the Richardson Highway area in the Copper River REAA, and Delta/Greely REAA, the Denali Highway area, and the Alaska Railroad and Parks Highway areas in the Matanuska-Susitna Borough and the Denali Borough. Damage cost estimates were nearly $21 million in Public Assistance, primarily for damage to roads, bridges, and rail lines. Individual Assistance estimates were near $2 million. See photos on pages 114-120.

06-221 2006 October Southern Alaska Storm (AK-06-221) declared October 14, 2006 by Governor Murkowski Beginning on October 8, 2006 and continuing through October 13, 2006, a strong large area of low-pressure that developed in the Northern Pacific moved into the Southwest area of the state and produced hurricane-force winds throughout much of the state and heavy rains in the Southcentral and Northern Gulf coast areas, which resulted in severe flooding and wind damage and threats to life in the Southern part of the state, to include the Kenai Peninsula Borough including the Cities of Seward and Seldovia, the Chugach REAA including the City of Cordova and the City of Valdez and the Copper River REAA including the Richardson Highway to the Glennallen highways and drainages in the McCarthy areas. Total damages were estimated at $557,415 with a public assistance estimate of $456,855 less the USCOE Advanced Measures Assistance of $250,000 leaving $206,855.

Flood and Erosion Hazard Vulnerability

In 2016, FEMA, RiskMAP, and Resilience Action Partners completed a risk assessment for the City of Cordova. As part of this risk assessment, flood hazards were evaluated. The risk assessment utilized flood depth grids to identify 26 buildings that are located in the Special Flood Hazard Area of a 1-percent-annual-chance flood zone. As a result of this analysis, Cordova has a new IRM and 1-percent-annual-chance flood depth grids.

The updated 2016 Flood Insurance Study included 9.7 miles of coastline in Cordova and new detailed riverine studies for Eyak Lake and the Eyak River. In addition, an approximate riverine analysis was completed for Ibek Creek and Fleming Creek Numbers 1 and 2.

The 2016 Study concluded that 3.2% of Cordova buildings (26) were located in the special flood hazard area (Zones AE and A). Of these 26 buildings, only seven structures are covered by NFIP policies. This could be due to residents owning their homes (i.e., no mortgages), current floodplain regulations, or Letters of Map Amendment. The data from this analysis provides a foundation for the City to conduct flood insurance outreach to property owners that could benefit from purchasing flood insurance policies.

The table below from the 2016 RiskMAP study highlights some of the buildings in Cordova that would be affected by flooding.

Table 11. RiskMap Highlights for Potential Cordova Flooding

Community Building Name	Address	Building Value
Trident Seafood	8 properties	$6.1 Million
Alaska Department of Natural Resources	3 properties	$1.1 Million
City of Cordova	11 properties	$8.6 Million

Flood and Erosion Mitigation Goals and Projects:

Goals

Goal 1. **Support and encourage building practices that reduce damage from flooding in areas that are prone to flooding.**

Goal 2. **Develop base-flood elevations in areas that are prone to flooding.**

Goal 3: **Protect drinking water sources from flood infusion water.**

Goal 4: **Increase public knowledge about flood insurance, mitigation opportunities, floodplain functions, emergency service procedures, and potential hazards.**

Goal 5: **Evaluate erosion from gravel streets and roads.**

Projects **(listed numerically as FLD = FLOOD)**

The City of Cordova identified the following flood/erosion mitigation projects in 2008 and 2013. Table 12 contains updates for each project.

- **Project FLD-1: Six-Mile Subdivision Drainage System**
  Flooding could be mitigated greatly by a drainage system at Six-Mile Subdivision.
- **Project FLD-2: Alternative Water Source to Six Mile Subdivision**
- **Project FLD-3: Letter of Map Revision for FIRMs**
- **Project FLD-4: Design and Construct Flood Proofing for Hospital**
  The basement of the Cordova Hospital has flooded in recent years and would benefit by flood proofing techniques.

- **Project FLD-5: Heney Creek Waterline Replacement**
  During the 2006 flood, the Heney Creek water line was damaged. The water line needs studied to decide if it should be: 1) abandoned, 2) an alternative route be designed for the water line; or 3) replace the water line with a new line at Power Creek.

- **Project FLD-6: Power Creek Waterline Repair and/or Replacement**

- **Project FLD-7. Identify Drainage Patterns and Develop a Comprehensive Drainage System**

- **Project FLD-8: Structure Elevation and/or Relocation**
  A list of homes, commercial structures and critical facilities that are in danger of flooding and erosion should be identified, and mitigation projects for elevating and/or relocating the structures determined.

- **Project FLD-9: Take Steps to Update FIRM Cordova Maps**

- **Project FLD-10: Public Information**
  Increase public knowledge about mitigation opportunities, floodplain functions, emergency service procedures, and potential hazards. This would include advising property owners, potential property owners, and visitors about the hazards. In addition, dissemination of a brochure or flyer on flood hazards in Cordova could be developed and distributed to all households.

- **Project FLD-11: Install new stream flow and rainfall measuring gauges**

- **Project FLD-12: Apply for grants/funds to implement riverbank protection methods.**

- **Project FLD-13: Investigate obtaining a community rating system rating to lower flood insurance rates.**

- **Project FLD-14: Continue to obtain flood insurance for all City structures, and continue compliance with NFIP.**

- **Project FLD-15: Require that all new structures in the Flood Zone be constructed according to NFIP requirements and set back from the river shoreline to lessen future erosion concerns and costs.**

- **Project FLD-16: Take steps towards Mapping the Six-Mile Subdivision.**

- **Project FLD-17: Provide adequate storm drain and systems, ditches, surface hardening, and other resources to control erosion caused by floods.**

Table 12. Flooding/Erosion Mitigation Projects

Mitigation Projects	Benefits (pros)	Costs (cons)	Priority	Responsible Agency	Funding Sources	Estimated Timeframe
Flood/Erosion (FLD)						
Project FLD-1. Six-Mile Subdivision Drainage System **2018 Update:** This project has not been implemented due to limited staff and financial resources.	Benefit to Six-Mile Subdivision. Property Damage. Reduction of drinking water infiltration reduced.	Engineering Needed	High	City Planning Director	PDMG	>1 year
Project FLD-2. Alternative Water Source to Six Mile Subdivision **2018 Update:** This project has not been implemented due to limited staff and financial resources. The City is presently discussing this with the Alaska Department of Environmental Conservation.	PDMG** Funding Possible Benefit to entire community as septic systems could flood into the well.	Expensive >$3.5 million 5+ years to implement	High	City Planning Director	PDMG	>1 year
Project FLD-3. Letter of Map Revision for Flood Insurance Rate Maps for North and South Fill **2018 Update:** A new FIRM was completed on December 16, 2015.	Benefit to city and private properties within floodplain.	Staff time	Project has been completed.	City DCRA FEMA	City/ State Budgets	Project has been completed.

Mitigation Projects	Benefits (pros)	Costs (cons)	Priority	Responsible Agency	Funding Sources	Estimated Timeframe
Flood/Erosion (FLD) cont.						
Project FLD-4. Design and Construct Flood proofing for Hospital **2018 Update:** This has not been implemented.	Damage Reduction PDMG**, HMGP*** Benefit to public institution	0 – 1 years	High	Public Works	PDMG	>1 year
Project FLD-5. Heney Creek Waterline **2018 Update:** A solution has not been implemented.	Life/safety issue Benefit to entire community Reduction in property damage	Engineering needed. >$1.5 million >5 years	High	Public Works	PDMG	>5 years
Project FLD-6. Power Creek Hydro facility. Repair and/or Replacement **2018 Update:** Done by Cordova Electric Power Network (CEC).	Life/safety issue Benefit to entire community Reduction in property damage	Engineering needed >$1.5 million >5+ years	Low	CEC	FEMA DHS&EM	>1 year
Project FLD-7. Identify Drainage Patterns and Develop a Comprehensive Drainage System **2018 Update:** This project has not been implemented due to limited staff and financial resources. The last 3-4 years have been spent trying to meet Environmental Protection Agency water levels.	Benefit to entire community Property damage reduction	Engineering study needed >$50,000 1 – 5 years	Medium	City Planning Director	PDMG	>1 year

Mitigation Projects	Benefits (pros)	Costs (cons)	Priority	Responsible Agency	Funding Sources	Estimated Timeframe
Flood/Erosion (FLD) cont.						
Project FLD-8. Structure Elevation and/or Relocation **2018 Update:** This project has not been implemented due to limited staff and financial resources.	Life/Safety project Benefit to government facilities and private properties. Potential PDMG**, HMGP***, FMA****	Dollar cost unknown, >$50k 1 – 5-year implementation	Medium	City Planning Director	PDMG	>1 year
Project FLD-9. Take Steps to Update FIRM Cordova Maps **2018 Update:** A new FIRM was completed on December 16, 2015.	FEMA, PDMG**, HMGP*** and State DCRA funding available.	Expensive, at least $100,000	Project has been completed.	City Planning Director	PDMG	Project has been completed.
Project FLD-10. Public Education **2018 Update:** Flood information pamphlets are passed out at Public Health fairs.	DCRA funding may be available. Could be done yearly. Inexpensive <$1,000 City	Not clear if there would be community interest or participation.	Medium	Emergency Management Coordinator	City	Ongoing
Project FLD-11. Install upgraded stream flow and rainfall measuring gauges **2018 Update:** NOAA has completed this action.	Life/Safety project Benefit to government facilities and private properties. Potential PDMG**, HMGP***, FMA****	Dollar cost unknown, >$50k 1 – 5-year implementation	Project has been completed.	Emergency Management Coordinator	PDMG	Project has been completed.

Mitigation Projects	Benefits (pros)	Costs (cons)	Priority	Responsible Agency	Funding Sources	Estimated Timeframe
Flood/Erosion (FLD) cont.						
Project FLD-12. Apply for grants/funds to implement riverbank protection methods. **2018 Update:** This action has not been completed due to limited resources and funds.	Life/Safety project Benefit to government facilities and private properties. Potential PDMG**, HMGP***, FMA****	Dollar cost unknown, >$50k 1 – 5 year implementation	Medium	City Planning Director	PDMG	<1 year
Project FLD-13. Investigate obtaining a CRS rating to lower flood insurance rates. **2018 Update:** This action has not been completed due to limited resources and funds.	High capability by city to do on an annual basis Will reduce NFIP insurance for entire community.	Staff time.	Low	City Planning Director	City	<1 year
Project FLD-14. Continue to obtain flood insurance for all City structures, and continue compliance with NFIP. **2018 Update:** Ongoing	High capability by city to do on an annual basis. Public benefit to have public buildings insured through NFIP. Inexpensive, approx. $3,000/year.	Staff time	High	City Planning Director	City	Ongoing

Mitigation Projects	Benefits (pros)	Costs (cons)	Priority	Responsible Agency	Funding Sources	Estimated Timeframe
Flood/Erosion (FLD) cont.						
Project FLD-15. Require that all new structures in the flood zone be constructed according to NFIP requirements and set back from the river shoreline to lessen future erosion concerns and costs. **2018 Update:** A new FIRM was completed on December 16, 2015.	High capability by city to do on an annual basis. Public benefit to have public buildings insured through NFIP. Inexpensive, approx. $3,000/year.	Staff time	High **DONE**, if it is in the mapped flood zone	City Planning Director	City Budget	Completed.
Project FLD-16. Takes steps to Map the Six-Mile Subdivision as FIRM Maps **2018 Update:** A new FIRM was completed on December 16, 2015.	FEMA, PDMG**, HMGP*** and State DCRA funding available. USCOE facilitated project. Can be started immediately.	Expensive, at least $100,000	Project has been completed.	City Planning Director	PDMG	Project has been completed.
Project FLD-17: Provide adequate storm drain and systems, ditches, pneumtor, surface hardening, and other resources to control erosion caused by floods. **Added in 2018.**	Benefit to community. Potential PDMG, HMGP, FMA.	Dollar cost unknown.	Medium	Public Works	PDMG	1-3 years

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Section 2. Severe Weather

Hazard Description and Characterization

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, related to winter storms, extreme cold, and ice storms. High winds can combine with loose snow to produce a blinding blizzard and wind chill temperatures to 75 degrees Fahrenheit (°F) below zero. Extreme cold (-40°F to -60°F) and ice fog may last a week at a time. Heavy snow can impact the interior and is common along the southern coast. A quick thaw means certain flooding.

Local Severe Weather Hazard Identification

The Cordova area has a maritime climate, which is characterized by cool summers, mild winters, and heavy year-around precipitation. This type of climate is typical of the southeastern and southern coastal areas of Alaska where the ocean exerts a modifying influence and causes relatively low seasonal and diurnal temperature variations. Proximity to the ocean and the frequent lows which develop or move out of the Gulf of Alaska result in heavy precipitation. According to the USCOE, the design snow load factor for Cordova should be 100 pounds per square foot which is the highest in the state. In practical terms, it means that people have to guard against excessive snow accumulations on roofs, boats, and airplanes.

Cordova's winters are relatively mild (see Table 13). The coldest month (January) has an average daily temperature of about 23°F, and although temperatures as low as -33°F have been recorded, extremely cold weather is usually of short duration. On the other hand, summer temperatures in the community tend to be on the cool side, averaging between 50 and 55°F, with daily maximums reaching into the low 60s in July and August. The record high temperature in Cordova is 84°F, a mark set back in 1946.

Heavy Snow

Heavy snow, generally more than 12 inches of accumulation in less than 24 hours, can immobilize the community by bringing transportation to a halt. Until the snow can be removed, the airport and the one highway out of town (Copper River Highway) are impacted, even closed completely, stopping the flow of supplies and disrupting emergency and medical services.

Accumulations of snow can cause roofs to collapse and knock down trees and power lines. Heavy 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

Table 13. Cordova Weather Summary, from 1995 - 2012

	Daily Extremes				Monthly Extremes				Max. Temp.		Min. Temp.	
	High	Date	Low	Date	Highest Mean	Year	Lowest Mean	Year	>= 90 F	<= 32 F	<= 32 F	<= 0 F
	F	dd/yyyy or yyyymmdd	F	dd/yyyy or yyyymmdd	F	-	F	-	# Days	# Days	# Days	# Days
January	58	21/1961	-4	12/1969	38.0	2001	13.6	1969	0.0	10.7	23.8	0.4
February	59	05/1995	-2	20/1956	38.3	1998	22.7	1956	0.0	6.3	20.5	0.1
March	51	31/1957	-13	03/1956	37.5	2005	27.4	2007	0.0	3.1	22.3	0.2
April	64	28/1989	3	27/1959	42.4	1993	36.2	1956	0.0	0.1	11.3	0.0
May	73	24/1969	23	04/1956	49.6	2004	40.7	1956	0.0	0.0	1.1	0.0
June	78	11/1959	34	05/1956	56.8	1959	48.1	1956	0.0	0.0	0.0	0.0
July	80	09/1971	35	18/1964	59.5	2004	52.2	2012	0.0	0.0	0.0	0.0
August	81	08/1957	35	01/1964	61.0	2004	52.4	1955	0.0	0.0	0.0	0.0
September	71	01/1960	28	24/1970	54.7	1995	45.5	1992	0.0	0.0	0.5	0.0
October	64	06/1969	16	09/1959	47.2	2002	35.9	1968	0.0	0.1	7.2	0.0
November	55	04/1957	4	30/1990	43.7	2002	26.0	1955	0.0	4.2	17.2	0.0
December	52	17/1969	-23	14/1964	39.5	1986	19.0	1964	0.0	8.0	21.9	0.3
Annual	81	19570808	-23	19641214	44.1	1997	37.8	1956	0.0	32.5	125.8	0.9
Winter	59	19950205	-23	19641214	37.9	1987	20.7	1969	0.0	25.0	66.1	0.7
Spring	73	19690524	-13	19560303	42.1	1993	35.2	1956	0.0	3.2	34.7	0.2
Summer	81	19570808	34	19560605	59.0	2004	52.2	2008	0.0	0.0	0.0	0.0
Fall	71	19600901	4	19901130	47.4	2002	37.3	1955	0.0	4.3	24.9	0.0

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

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, falls from roofs while shoveling snow, snow and ice falling from roofs, and hypothermia caused by overexposure to the cold weather.

High Winds

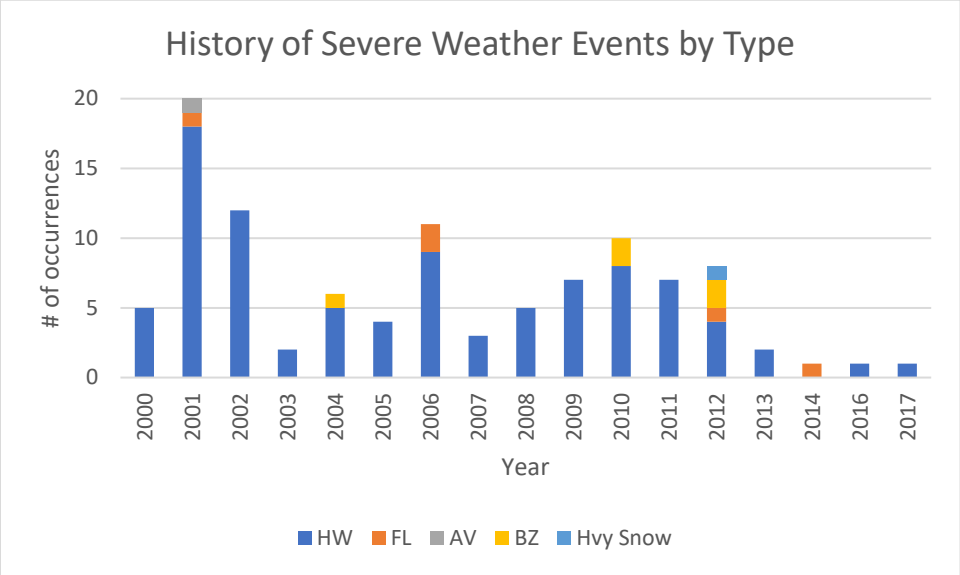
Another major weather factor in the community is high winds. The wind chill factor can bring temperatures down to -50°F, which can lead to frozen pipes and dangerous conditions for outdoor activities. While most home and business owners are prepared

for the heavy winds and low temperatures, construction practices must be followed to protect against the high winds.

Previous Occurrences of Severe Weather

Cordova is impacted by severe weather quite often. Figure 2 provides a visual representation of the severe weather events that have occurred in or near the City of Cordova from 2000 to 2017. The severe weather events are: high wind (HW), flood (FL), avalanche (AV), blizzard (BZ) and heavy snow (Hvy Snow).

Figure 2. History of Severe Weather Events by Type



The following more serious occurrences are listed in the 2016 DHS&EM Disaster Cost Index, which spans from 1977 to 2016.

Wind storm that occurred on December 22, 1999 Planning Commissioners at the August 12, 2007 public meeting related their recollections of this wind storm with wind gusts of over 150 miles per hour (mph) that damaged roofs, structures, and roads.

Hazard Mitigation Cold Weather, 1990. The Presidential Declaration of Major Disaster for the Omega Block cold spell of January and February 1989 authorized federal funds for mitigation of cold weather damage in future events. The Governor's declaration of disaster provided the State matching funds required for obtaining and using this federal money.

Storm Events, 2006. During August and October of 2006, there were two significant storm events that caused erosion damage to city roads, the Copper River Highway, water lines, Eyak Lake airport runway, and the two hydroelectric generating facilities. City damage estimates were $100,000 for waterlines, $100,000 for city roads, and $10,000,000 for the two hydroelectric facilities. Valuable Eyak Lake and Eyak River

salmon habitat could have been impacted by erosion, but damage potential was not quantified. Structural and nonstructural protective measures that were used by the community included: (a) riprap and gabions along Eyak Lake and the Eyak River, (b) chip sealing of roads, (c) root wads and willow plantings, and (d) dikes, and (e) local development ordinances that required 20-foot setbacks from Eyak Lake and re-vegetation of disturbed areas. These protective measures had been effective, but were damaged during storm events and required maintenance. See photos on pages 117-124.

2012 Prince William Sound Winter Storm (AK12-238) declared February 9, 2012 by Governor Sean Parnell

Beginning in mid-December 2011 and continuing through January 2012, the City of Cordova and the Prince William Sound area began receiving snowfall that put them on a pace to approach or break record seasonal precipitation accumulations. On December 12, the City of Cordova began working in emergency snow removal status. Avalanches across roadways and extreme conditions had limited or cut off access to airports and other critical infrastructure and endangered public, private, and commercial facilities throughout the communities. Total damages are still to be determined, but were over $900,000.

Severe Weather Hazard Vulnerability

The entire community is obviously vulnerable to severe weather. The citizens of Cordova are vulnerable to bitter cold weather, heavy snowfall, and high winds. Alaskans are known for self-efficiency and hardy behavior in the face of often inclement weather. Citizens who do not live on the road system must be able to survive without outside assistance several times throughout most winters.

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.**

Goal 4: **Evaluate current street equipment that cleans up severe weather events.**

Projects (listed numerically as SW = SEVERE WEATHER)

The City of Cordova identified the following severe weather mitigation projects in 2008 and 2013. Table 14 contains updates for each project.

- **Project SW-1 Research and consider instituting the National Weather Service program of *"Storm Ready"*.**

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

To be officially Storm Ready, a community must:

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

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

- **Project SW-2: Conduct special awareness activities, such as Winter Weather Awareness Fair, Flood Awareness Week, etc.**

- **Project SW-3: Expand public awareness about NOAA Weather Radio for continuous weather broadcasts and warning tone alert capability**.

- **Project SW-4: Encourage weather-resistant building construction materials and practices.**

- **Project SW-5: Evaluate current heavy equipment for snow/debris and other needs created by severe weather conditions.**

- **Project SW-6: Perform Storm Drain Analysis. Provide solutions and efficiencies for…**

Table 14. Severe Weather Mitigation Projects

Mitigation Projects	Benefits (pros)	Costs (cons)	Priority	Responsible Agency	Funding Sources	Estimated Timeframe
Severe Weather (SW)						
Project SW-1. Research and consider instituting the National Weather Service program of *"Storm Ready"*. **2018 Update:** This project has been implemented.	Life/Safety issue Risk reduction Benefit to entire community Inexpensive State assistance available Could be implemented annually	EMPG grant	This project was completed in Summer, 2012.	Emergency Management Coordinator	City	Complete
Project SW-2. Conduct special awareness activities, such as Winter Weather Awareness Week, Flood Awareness Week, etc. **2018 Update:** This project has been implemented.	Life/Safety issue Risk reduction Benefit to entire community Inexpensive State assistance available Could be an annual event	EMPG grant	This project was completed.	Emergency Management Coordinator	City DCRA DHS&EM	Complete
Project SW-3. Expand public awareness about NOAA Weather Radio for continuous weather broadcasts and warning tone alert capability **2018 Update:** This project has been implemented.	Life/Safety issue Risk reduction Benefit to entire community Inexpensive State assistance available Could be an annual event	EMPG grant	This project was completed.	Emergency Management Coordinator	NOAA	Complete

Mitigation Projects	Benefits (pros)	Costs (cons)	Priority	Responsible Agency	Funding Sources	Estimated Timeframe
Severe Weather (SW)						
Project SW-4. Encourage weather resistant building construction materials and practices. **2018 Update:** This project has been implemented.	Risk and damage reduction. Benefit to entire community.	Would require ordinance change. Potential for increased staff time. Research into feasibility necessary. Political and public support not determined. 1 – 5-year implementation	This project was completed.	City Planning Director	City	Complete
Project SW-5: Evaluate current heavy equipment for snow/debris and other needs created by severe weather conditions. **New in 2018.**	Risk and damage reduction.	Staff time	High	Public Works	City	1 year
Project SW-6: Perform Storm Drain Analysis. Provide solutions and efficiencies for… **New in 2018.**	Benefit to entire community.	Staff time	High	Public Works	City	1 year

Section 3. Wild land Fire

Hazard Description and Characterization

Wild land fires occur in every state in the country, and Alaska is no exception. Each year, between 600 and 800 wild land fires, mostly between March and October, burn across Alaska causing extensive damage.

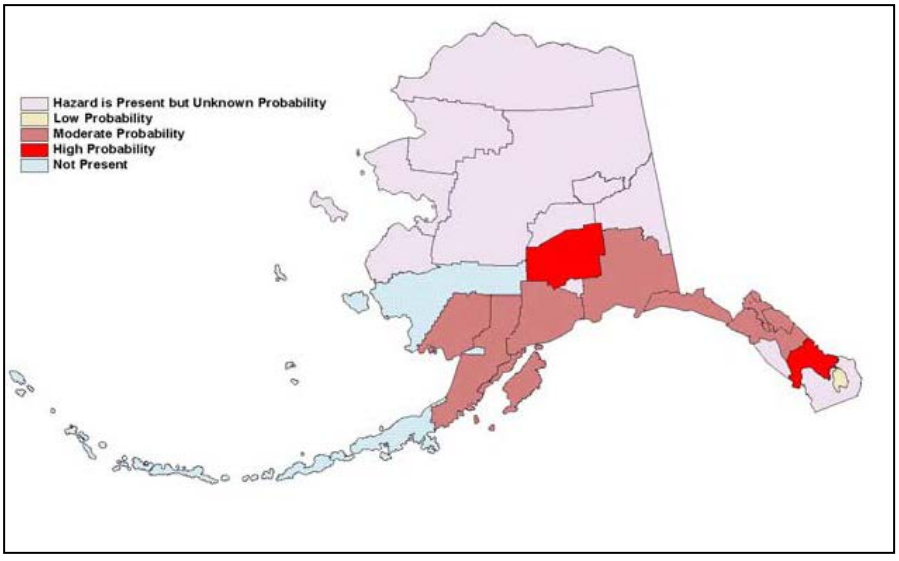
Wild land fire risk is increasing in Alaska due to the spruce bark beetle infestation. The beetles lay eggs under the bark of a tree. When the larvae emerge, they eat the tree's phloem, which is what the tree uses to transport nutrients from its roots to its needles. If enough phloem is lost, the tree will die. The dead trees dry out and become highly flammable.

Local Wild land Fire Hazard Identification

Though Cordova has a moderate probability of occurrence, it is listed as a critical protection area by the Alaska Interagency Fire Management Plan. Please see map and explanation on the following pages.

The following map from the Alaska State Hazard Plan depicts Cordova as being in a moderate probability area of the state.

Figure 3. Alaska Hazard Plan - Fire Risk Map



Cordova is located in a full protection area of the state protection option areas. Full protection is a suppression action provided on a wild land fire that threatens uninhabited private property, high-valued natural resource areas, and other high-valued areas such as identified cultural and historical sites. The suppression objective is to control the fire

at the smallest acreage reasonably possible. The allocation of suppression resources to fires receiving the full protection option is second in priority only to fires threatening a critical protection area.

Wild land Fire Hazard Vulnerability

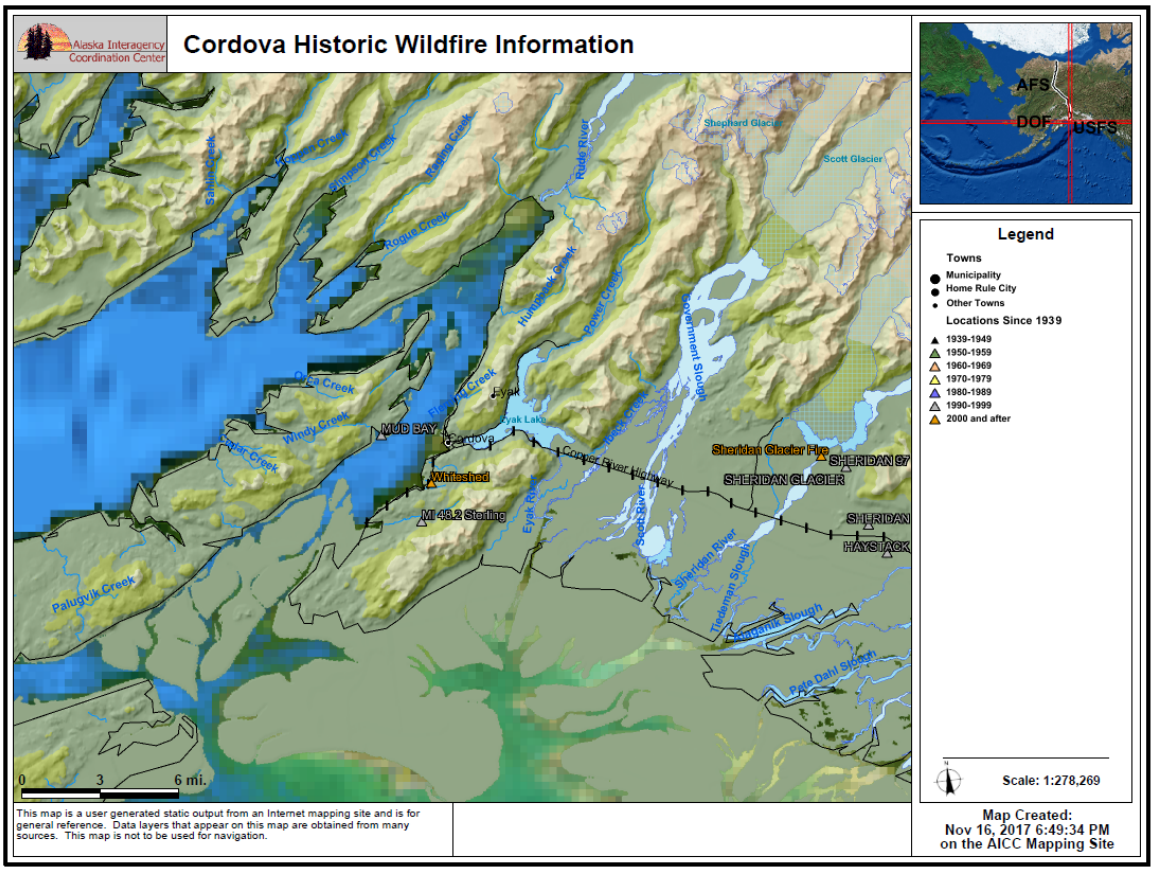
Cordova is at low risk for wild land fire. The conclusion is based upon the lack of historical events and limited vulnerability (Table 7).

Previous Occurrences of Wild land Fire

Even though the 2013 Alaska State Hazard Plan lists Cordova as having a moderate chance of wild land fire, there have been no recorded incidents of serious wild land fire in Cordova.

Only eight wildland fire events have occurred near Cordova (within a 20-mile radius) between 1939 and 2017, of which two burned more than five acres of land. Figure 4 provides visualization of the wild land fires that have occurred near Cordova.

Figure 4. Historic Wildland Fires



Wild land Fire Mitigation Goals and Projects

Goals

Goal 1: **Establish building regulations to mitigate against fire damage.**

Goal 2: **Conduct outreach activities to encourage the use of Fire Wise development techniques.**

Goal 3: **Encourage the evaluation of emergency plans with respect to wild land fire assessment.**

Goal 4: **Acquire information on the danger of wild land fires and how best to prepare.**

Projects (listed numerically as WF = WILD LAND FIRE)

The City of Cordova identified the following wild land fire mitigation projects in 2008 and 2013. Table 15 contains updates for each project.

- **Project WF-1: Continue to support the fire department with adequate firefighting equipment and training.**

- **Project WF-2: Promote education of building design, siting, and materials for construction.**

  The Alaska Fire Wise Program is designed to educate people about wild land fire risks and mitigation opportunities. It is part of a national program that is operated in the State by the Alaska Wildfire Coordinating Group (AWCG).

- **Project WF-3: Enhance public awareness of potential risk to life and personal property. Encourage mitigation measures in the immediate vicinity of their property.**

Table 15. Wildland Fire Mitigation Projects

Mitigation Projects	Benefits (pros)	Costs (cons)	Priority	Responsible Agency	Funding Sources	Estimated Timeframe
Wild land Fire (WF)						
Project WF-1. Continue to support the local fire department with adequate firefighting equipment and training. **2018 Update:** Ongoing. A Memorandum of Understanding has been signed with the USFS.	Life/Safety issue Risk reduction Benefit to entire community State assistance available Annual project.	Dollar cost not determined. Staff time to research grants	High	Fire Chief	City Budget	Ongoing
Project WF-2. Promote Fire Wise building design, siting, and materials for construction. **2018 Update:** Ongoing.	Life/Safety issue Risk reduction Benefit to entire community, Annual project. State assistance available	Dollar cost not determined. Staff time to research grants	High	City Program Coordinator	City Budget	Ongoing
Project WF-3. Enhance public awareness of potential risk to life and personal property. Encourage mitigation measures in the immediate vicinity of their property. **2018 Update:** Ongoing.	Life/Safety issue Risk reduction Benefit to entire community Inexpensive State assistance available Could be implemented annually	Staff time	High	City Program Coordinator	City Budget	Ongoing

Section 4. Earthquake

Hazard Description and Characterization

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

Local Earthquake Hazard Identification

Prince William Sound is backed by the Chugach Mountains in its central and eastern portions, and by the Kenai Mountains at its western edge. The highest sections of the Kenai-Chugach Range consist of extremely rugged northeast trending ridges from 7,000 to 13,000 feet high. The lower sections consist of massive mountains five to ten miles wide and between 3,000 to 6,000 feet in height. All higher parts of the range are buried in ice fields that feed massive valley and piedmont glaciers. The coastline is deeply indented by drowned glacial valleys, and there are numerous islands, particularly in the more westerly portions of the Sound. Like the mountain ridges, the major fjords and islands also trend in a northeasterly direction.

The Cordova, Rude River/Bagley, and the Eyak Faults run parallel through Cordova, dipping north as indicated by the Alaska Department of Natural Resources' Quaternary Faults and Folds Map.

The March 1964 earthquake wrought major changes in the physical landscape of the Cordova area. Little structural damage occurred in town, and the only fatality occurred at Point Whitshed. However, the tectonic uplift which took place in the Cordova area had a much greater impact upon this community than structural damage had upon some other communities in Southcentral Alaska. Uplifts of 6.5 to 7.5 feet were recorded on the tide gauges at Cordova. Extensive coastal tracts of mud flats, beaches, and reefs throughout the area that were formerly exposed only at lowest minus tides became permanently exposed.

In the immediate Cordova area, the effects of tectonic uplift were described by the USGS as follows:

"At Cordova, all dock facilities were raised so high that they could be reached by boats only at highest tides. Several nearby canneries had to extend their docks more than 100 feet to permit access. The area in the vicinity of the city dock and the small boat basin was above water at most tides; an extensive and difficult dredging project, together with new breakwaters and dock repairs, was necessary to make the facilities usable. In the course of this work, which was done by the USCOE, the boat basin was much enlarged, and about 20 acres of new land, eventually usable for industrial purposes, was made from the material dredged from the boat basin. It was also

necessary for the USCOE to dredge a new channel through almost the entire length of Orca Inlet for use by fishermen."

Cordova was once referred to as the clam processing capital of the world. The earthquake effectively eliminated that very important local industry.

In practical terms, the earthquake also ended Cordova's capacity to serve as a deep-water port. This had rather significant economic implications for the community. Cordova has considered several options and has been discussing the possibility of re-establishing itself as a deep-water port; however, to date, no decisions have been made on this issue. (Cordova, 2006)

The following figures were obtained from the University of Alaska, Fairbanks, and Alaska Earthquake Information Center website at: http://earthquake.alaska.edu/.

Figure 5. AEIS Earthquake Active Faults

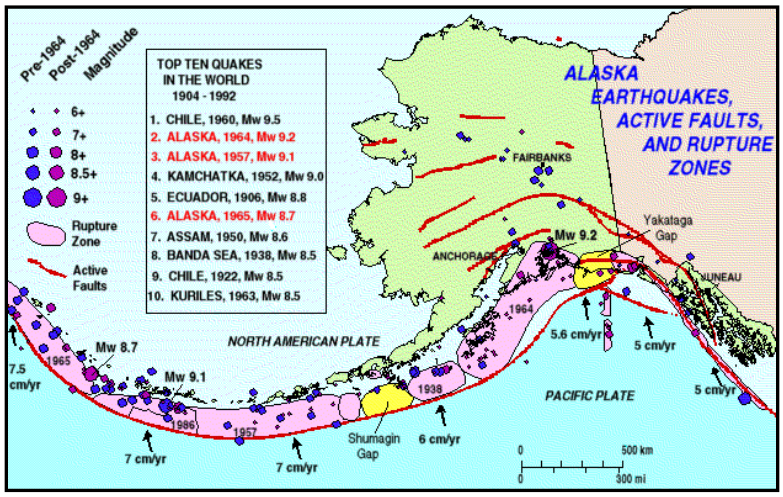


Figure 6. USGS Cordova Earthquake Probability Map

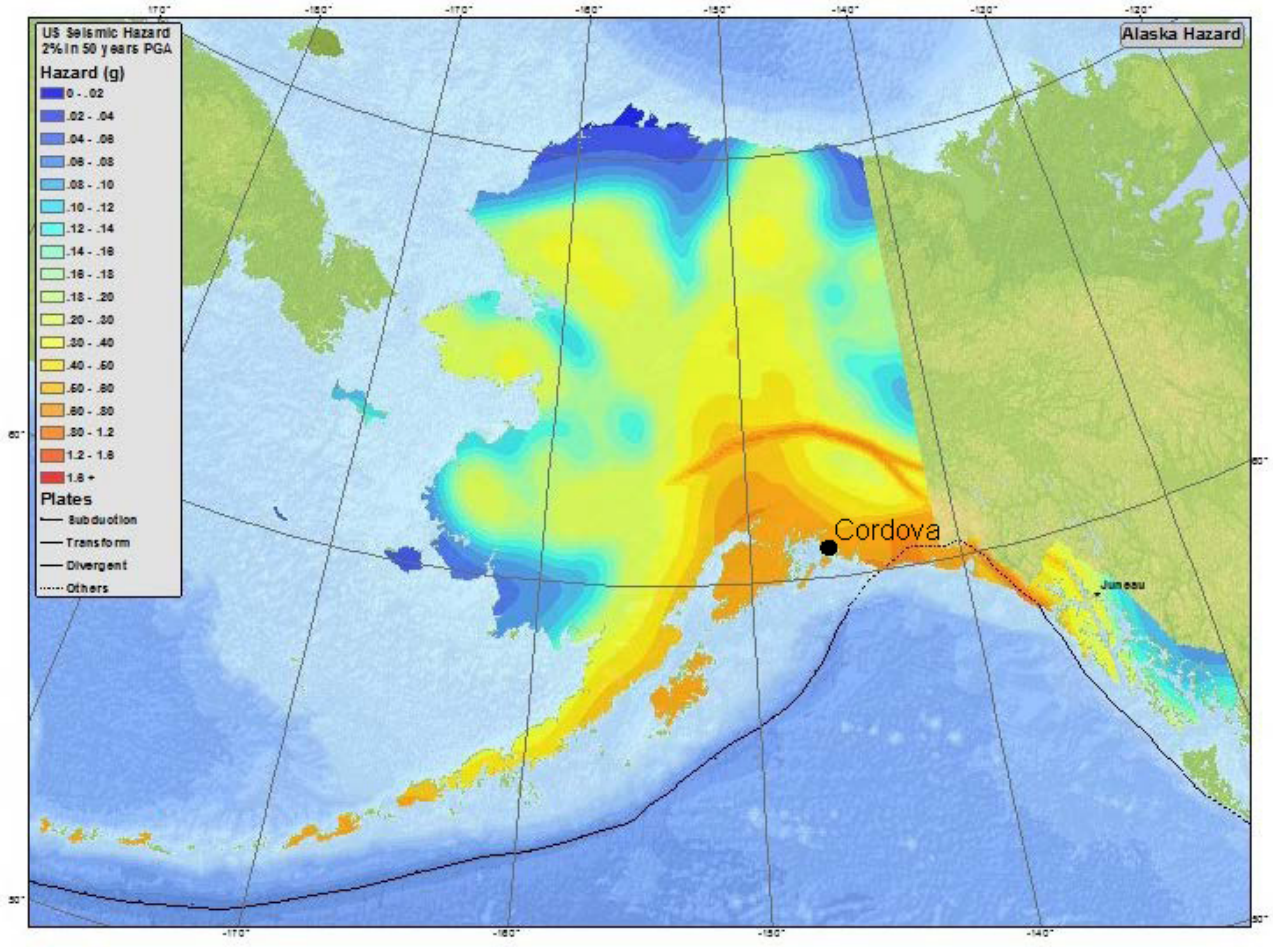


Figure 6 indicates that the USGS earthquake probability model places the probability of an earthquake with a likelihood of experiencing moderate shaking (0.80 g to 1.20g peak ground acceleration) at a 2% probability in 50 years, based on the USGS Alaska hazard model.

Previous Occurrence of Earthquakes

The City of Cordova has experienced several earthquake/seismic events with magnitude 5.0 or greater. Table 16 proves information on these past seismic events, indicating the latitude/longitude of the epicenter, depth of the quake, and magnitude. In addition to the earthquakes shown in the table below, there have been 13 additional earthquakes greater than magnitude 2.5 from 1957 to November 2017 within a 100-kilometer radius of Cordova.

Table 16. Past Seismic Events magnitude 5.0 or greater from 1957-2017

Date and Time	Latitude	Longitude	Depth	Mag.
2002-02-25T21:19:25.330Z	60.56	-147.155	2.1	5
2000-03-01T23:05:14.530Z	60.167	-145.887	20	5.5
2000-02-27T02:22:14.630Z	60.292	-146.072	33	5.1
1995-06-06T04:04:58.210Z	60.261	-146.424	15	5.4
1984-09-20T04:28:04.090Z	60.306	-146.098	26.3	5.1
1984-09-20T04:17:24.440Z	60.322	-146.001	18.2	5.5
1983-08-09T15:58:21.700Z	60.121	-147.216	28.3	5
1983-07-12T15:10:03.400Z	61.031	-147.286	37	6.6
1974-05-27T14:01:43.500Z	60.328	-146.016	21	5.7
1973-09-06T10:59:36.700Z	61.039	-146.828	29	5.5
1973-01-09T11:57:21.000Z	60.311	-145.996	18	5.1
1970-08-18T17:52:08.000Z	60.538	-145.537	25	6
1965-05-01T21:27:54.000Z	60.35	-146.176	15	5.6
1964-10-10T20:06:39.000Z	60.455	-146.074	15	5.6
1964-09-16T01:50:35.000Z	60.003	-147.093	20	5.9
1964-05-29T10:17:36.000Z	60.001	-146.624	10	5.6
1964-05-01T06:01:56.000Z	60.291	-146.239	20	5.7
1964-04-08T19:50:19.000Z	60.343	-146.027	15	5.6
1964-04-05T19:28:19.000Z	60.141	-146.939	15	5.6
1964-04-04T04:54:00.000Z	59.92	-146.813	20	6
1964-03-30T07:09:35.000Z	59.758	-145.854	10	6.4
1964-03-28T14:49:15.000Z	60.201	-146.842	12.5	6.3
1964-03-28T14:47:38.000Z	60.206	-146.767	12.5	6.4
1964-03-28T12:03:19.000Z	60.304	-146.518	25	5.7
1964-03-28T03:36:16.000Z	60.908	-147.339	25	9.2

Earthquake Hazard Vulnerability

In 2016, FEMA, RiskMAP, and Resilience Action Partners completed a risk assessment for the City of Cordova. As part of this risk assessment, earthquake hazards were evaluated. The risk assessment used the 1964 9.0-magnitude seismic event as well as the Prince William Sound 8.5-magnitude event to determine shaking intensity for Cordova. For the 9.0-magnitude event, Cordova will experience Very Strong to Severe shaking (according to the Modified Mercalli Intensity Scale). The 8.5-magnitude event results in reduced intensity where Moderate to Strong shaking intensity is expected.

Buildings constructed between 1941 and 1975 are “Moderate Code,” meaning some seismic hazard was considered in the design of the building. Structures built after 1975 in Cordova are considered to be “High Code,” meaning strict regulations to design for earthquakes were implemented into the construction of buildings. By identifying structures built prior to 1941, the community of Cordova can identify and prioritize future

earthquake retrofits. In addition to considering the year a structure was built, priority for retrofit should also be given to structures built of non-reinforced masonry. A severe earthquake could level or severely damage older buildings, especially those constructed of non-reinforced masonry. Newer structures, built under recent building codes, would probably sustain less damage, but are vulnerable to the soil conditions of the building site.

Table 17 from the 2016 RiskMAP study highlights some of the buildings in Cordova that would be affected by earthquakes.

Table 17. RiskMAP highlights for potential Cordova earthquakes

Community Building Name	Address	Building Value
Trident Seafood	8 properties	$6.1 Million
Shoreside Petroleum	4 properties	$1.1 Million
Alaska Department of Natural Resources	3 properties	$1.1 Million
City of Cordova	11 properties	$8.6 Million
Ocean Beauty Seafood	3 properties	$2.4 Million

Earthquake Mitigation Goals and Projects

Goals

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

Goal 2: **Maintain the current level of commitment to earthquake preparation**

Projects (listed numerically as E = EARTHQUAKE)

The City of Cordova identified the following earthquake mitigation projects in 2008 and 2013. Table 18 contains updates for each project.

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

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

- **Project E-3: Contract a structural engineering firm to assess the identified buildings and facilities to determine their structural integrity and strategy to improve their earthquake resistance. Retrofit or upgrade critical structures as recommended by Structural Engineer.**

- **Project E-4: Continue to educate all City employees and citizens with regards to earthquake preparedness, particularly with regards to the current EOP, Incident Command structure, Cordova COOP plan, and personal Responder READY courses.**

Table 18. Earthquake Mitigation Projects

Mitigation Projects	Benefits (pros)	Costs (cons)	High	Responsible Agency	Funding Sources	Estimated Timeframe
Earthquake (E)						
Project E-1. Perform an engineering assessment of the earthquake vulnerability of each identified critical infrastructure owned by the City of Cordova. **2018 Status:** This was not implemented to limited resources.	Life/Safety issue/Risk reduction Benefit to entire community Inexpensive State assistance available Could be an annual event	Staff time	Medium.	Emergency Management Coordinator/ Public Works	State Grants	1 year
Project E-2. Identify buildings and facilities that must be able to remain operable during and following an earthquake event. **2018 Status:** This has been completed.	Life/Safety issue/Risk reduction Benefit to entire community Inexpensive State assistance available Could be an annual event	EMPG staff time	Project has been completed.	Emergency Management Coordinator/ Public Works	City budget DHS&EM	Complete

Mitigation Projects	Benefits (pros)	Costs (cons)	High	Responsible Agency	Funding Sources	Estimated Timeframe
Earthquake (E)						
Project E-3. Contract a structural engineering firm to assess the identified bldgs. and facilities and bridges. Retrofit or upgrade critical structures as recommend by Structural Engineer. **2018 Status:** This has not been completed due to lack of resources.	Benefit to entire community Risk reduction	Feasibility and need analysis needed. 1 – 5 years	High	Emergency Management Coordinator/Public Works	PDMG	>5 years
Project E-4. Continue to educate all City employees and citizens, with regards to earthquake preparedness. **2018 Status:** The community regularly trains under the Alaska Shield exercises as well as regular Fire Department and EMPG programming.	Benefit to entire community Risk reduction	EMPG staff time	High	Emergency Manager/Public Works	City budget DHS&EM	Ongoing

Section 5. Tsunami and Seiche Hazard

Hazard Description and Characterization

A ***tsunami*** is a series of ocean waves generated by any rapid large-scale disturbance of the seawater. These waves can travel at speeds of up to 600 miles per hour in the open ocean. Most tsunamis are generated by earthquakes, but they may also be caused by volcanic eruptions, landslides (above or under sea in origin), undersea slumps, or meteor impacts.

Tsunami damage is a direct result of three factors:

1. *Inundation* (the extent to which the water covers the land).
2. *Wave action* that will impact structures and moving objects that become projectiles.
3. *Coastal erosion.*

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 as a result 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, in that the onset of the first wave can be a few minutes, giving virtually no time for warning.

Local Tsunami Hazard Identification

Local Tsunami

These are waves that are generated from nearby waters and could reach the community before a warning is issued. Local tsunamis are normally caused by a strong earthquake whose epicenter is located a short distance away. Such an earthquake can trigger massive landslides or changes in the underwater terrain that will create large waves in the immediate area. Historically, such waves have been the highest, reaching heights of 100 feet or more and up to one-mile inland. Cordova is considered to have a local tsunami hazard.

Map 7 on page 116 illustrates the tsunami inundation zone.

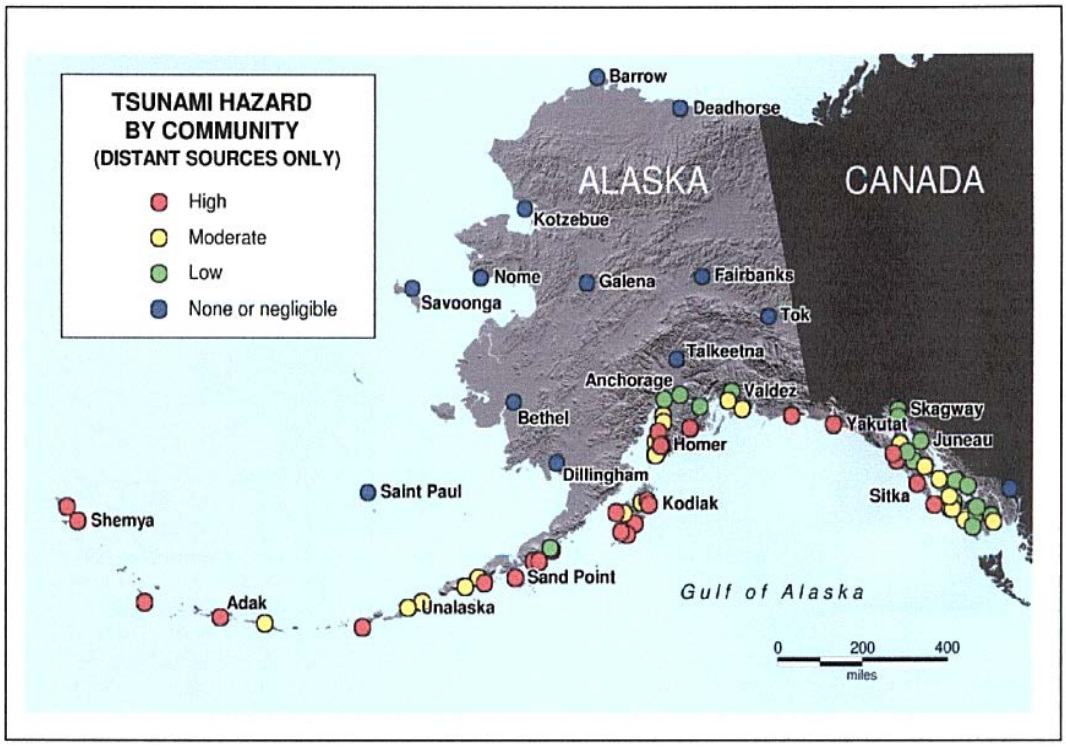
Distant Source Tsunami
This is a tsunami that is generated so far away that the earthquake was either not felt or only slightly felt. The waves from a distant source tsunami are generally smaller than those created by a local tsunami. There will normally be sufficient time for officials to issue a warning and alert the public to possible danger. Cordova is considered to have a low potential danger from a distant source tsunami. This means that a wave of 35 feet with water reaching up to ¼ mile inland is possible.

Extent or Severity of Tsunami Hazard in Cordova

Figure 7 lists tsunami hazards by community. Port and harbor facilities, public works facilities, structures, vehicles, equipment, and transportation facilities such as docks, float systems, and roads could all be affected.

Figure 7. Tsunami Hazard by Community

Environment that could be affected include wetlands with inclusive flora and fauna, and coastal vegetation.



Source: Alaska State Hazard Mitigation Plan, 2013

Previous Occurrences of Tsunamis/Seiches

1964 Earthquake Tsunami

The 1964 earthquake triggered several tsunamis, one major tectonic tsunami, and about 20 local submarine and sub aerial landslide tsunamis. The major tsunami hit between 20 and 45 minutes after the earthquake. The locally-generated tsunamis struck between two and five minutes after being created and caused most of the deaths and damage. Tsunamis caused more than 90% of the deaths – 106 Alaskans and 16 Californian and Oregonian residents were killed. While there was tsunami damage throughout the area, the effects were most significant in Kodiak, Seward, Whittier,

Chenega, and Valdez. There was a small wave run up from a tsunami at Cordova, but it did not cause any damage.

There are no other reports of tsunami occurrences in Cordova.

Tsunami/Seiche Hazard Vulnerability

In 2016, FEMA, RiskMAP, and Resilience Action Partners completed a risk assessment for the City of Cordova. As part of this risk assessment, tsunami inundation maps were created based on modeling for 13 various earthquake-generated tsunami scenarios. Results of this assessment show that an 8.8-magnitude earthquake in Prince William Sound would result in a "worst case" tsunami inundation hazard for Cordova, resulting in a 6-meter wave that would strike land roughly one hour after the earthquake. Building losses for this scenario were estimated at $40 Million.

For this RiskMap study, the Cordova building data were compared to the geographic extent of the "worst case" tsunami. The results are shown in the table below.

Table 19. RiskMAP "Worst Case" Potential Tsunami Results

Community	Total Estimated Building Value	Building Value in Tsunami Zone	Number of Buildings in Tsunami Zone	% of Buildings in Tsunami Zone
Cordova	$295 Million	$40 Million	107	13%

Table 20 highlights the buildings in Cordova that would be affected by tsunami.

Table 20. RiskMAP Highlights for Potential Cordova Tsunami Hazard

Community Building Name	Address	Building Value
Trident Seafood	8 properties	$6.1 Million
Shoreside Petroleum	4 properties	$1.1 Million
Alaska Department of Natural Resources	3 properties	$1.1 Million
City of Cordova	11 properties	$8.6 Million
Ocean Beauty Seafood	3 properties	$2.4 Million

Tsunami/Seiche Mitigation Goals and Projects

Goals

Goal 1. Continue Public Education about Tsunamis and Seiches.

Goal 2. Finish Tsunami Ready Community Designation.

Goal 3. Develop accurate inundation maps for the Port of Cordova.

Goal 4. Continue Updating Cordova Emergency Operations Plan.

Projects **(listed numerically as T/S= TSUNAMI/SEICHE)**

The City of Cordova identified the following tsunami/seiche mitigation projects in 2008 and 2013. Table 21 contains updates for each project.

- **Project T/S-1: Continue Participation in the Tsunami Awareness Program.**
- **Project T/S-2: Finish Tsunami Ready Community Designation.**
- **Project T/S-3: Inundation Mapping.**
- **Project T/S-4: Continue Using the Emergency Operations Plan in exercises regarding natural hazards including tsunami danger.**
- **Project T/S-5: The Police/Jail/Fire Station/Alaska State Troopers building is located in the tsunami inundation area. This building needs to be relocated.**
- **Project T/S-6: Improve "high ground" parking areas for tsunami evacuations.**
- **Project T/S-7: Evaluate heavy equipment and other equipment needed to remove debris.**

Table 21. Tsunami/Seiche Mitigation Projects

Mitigation Projects	Benefits (pros)	Costs (cons)	High	Responsible Agency	Funding Sources	Estimated Timeframe
Tsunami/Seiche (T/S)						
Project T/S-1: Participation in the Tsunami Awareness Program. **Update in 2018:** Two tsunami sirens have been installed and are tested every Wednesday at noon.	Life/Safety issue/Risk reduction Benefit to entire community Inexpensive State assistance available Could be an annual event	Staff time	Project has been completed.	Emergency Management Coordinator	PDMG	Complete
Project T/S-2. Tsunami Ready Community Designation **Update in 2018:** As of 2017, Cordova is a Tsunami-Ready community with the National Weather Service.	Life/Safety issue/Risk reduction Benefit to entire community Inexpensive State assistance available Could be an annual event	Staff time	Project has been completed.	Emergency Management Coordinator	PDMG	Complete
Project T/S-3. Inundation Mapping **Update in 2018:** DNR DGGS published Tsunami Inundation Maps in 2014.	FEMA, PDMG, HMGP and State DCRA funding available. USCOE facilitated project. 1 – 5-year project.	Expensive, at least $100,000	Project has been completed.	Emergency Management Coordinator	PDMG	Complete

Mitigation Projects	Benefits (pros)	Costs (cons)	High	Responsible Agency	Funding Sources	Estimated Timeframe
Tsunami/Seiche (T/S)						
Project T/S-4. Update Cordova Emergency Operations Plan **Update in 2018:** The plan was updated in 2017.	Life/Safety issue/Risk reduction Benefit to entire community Inexpensive State assistance available 1 – 5 years, or as needed.	EMPG Grant	Project has been completed.	Emergency Management Coordinator/ Public Works	PDMG	Complete
Project T/S-5. Relocate the Police/Jail/Fire Station/Alaska State Troopers building outside the tsunami inundation area. **New in 2018**	Life/Safety issue/Risk reduction Benefit to entire community Inexpensive State assistance available 1 – 5 years, or as needed.	PDMG Grant	High	Public Works	PDMG	>5 years
Project T/S-6: Improve "high ground" parking areas for tsunami evacuations. **New in 2018**	Life/Safety issue/Risk reduction Benefit to entire community State assistance available	PDMG Grant	High	Public Works	PDMG	1 year
Project T/S-7: Evaluate heavy equipment and other equipment needed to remove debris. **New in 2018**	Life/Safety issue/Risk reduction Benefit to entire community Inexpensive State assistance available	PDMG Grant	High	Public Works	PDMG	1 year

Section 6. Avalanche and Landslides

Hazard Description and Characterization

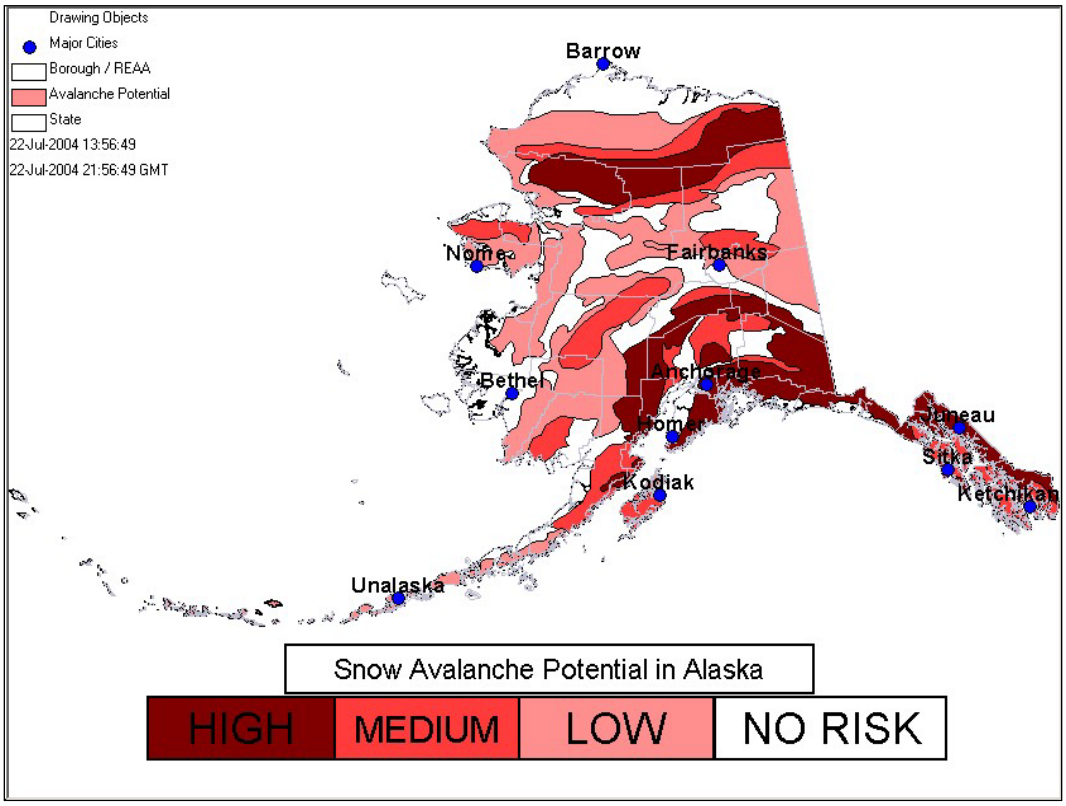
Avalanches

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.

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.

The following figure depicts that Cordova faces a high avalanche threat.

Figure 8. Snow Avalanche Potential in Alaska



Source: 2013 Alaska State Hazard Plan

Local Avalanche/Landslide Hazard Identification

Alaska has a long history of snow avalanches. It has been estimated that there have been over 4,500 avalanche disaster events in the past 200 years. 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. As a result of more than 11 million dollars' worth of damage, a federal avalanche disaster was declared for the first time in U.S. history.

There are three areas right now that are prone to avalanches in Cordova.

1. Shepard Point (no road yet, but there might be in the future once a deep-water port is built; the Native Village of Eyak recently received a USCOE permit).
2. Mile 2.5 of the Copper River Highway
3. Mile 5.0 Loop Road (two chutes).

The City has a memorandum of understanding with the State of Alaska for avalanche monitoring.

Previous Occurrences of Avalanches and Landslides

April 15, 1999. A heavy-equipment operator died in an avalanche in a steep canyon north of the city, at the end of Power Creek Road. He was running a backhoe as part of the construction of a hydroelectric power plant when the slope gave way.

January 26, 2000. The most damaging avalanche in the winter of 1999-2000 (the year that Alaska declared an avalanche disaster) occurred in Cordova, near milepost 5.5 of the Copper River Highway, and was approximately ½ mile wide. It killed one resident (in her home) and severely injured another who was buried roughly 15-feet deep for more than six hours. Five houses and two warehouses were destroyed along with numerous outbuildings, cars, and boats. The Copper River Highway, the only road to the airport in a community accessible only by plane or boat, was blocked for more than 1,000 feet, and 1,400 feet of transmission line was destroyed. It resulted in about one million dollars in damage. Avalanches had struck in that spot before, including one in 1971.

This event was the impetus for the urban avalanche rescue response, avalanche hazard mapping and mitigation analysis, zoning ordinance, and federal buyout assistance program. FEMA's Hazard Mitigation Grant Program helped relocate at-risk homes after the 2000 Cordova avalanches. The response to this accident may set an important precedent for the inevitable future urban avalanche disasters in the United States.

On December 11, 2001, five snow machines were caught in an avalanche on Whit shed Road. Two snowmobilers were buried; one was killed, in that avalanche.

Another Cordovan died on March 8, 2008, in an avalanche on Mount Eyak. He was a snow safety expert who warned that avalanche conditions in the mountains around Cordova over the weekend were "considerable." The same avalanche injured another Cordova man, while two people skied away safely. The four were checking snow conditions.

Three separate avalanches closed the Copper River Highway during the winter of 2012. On January 6th, 2012 avalanches simultaneously closed the Copper River Highway at Mile 2.5 and Mile 5.5. On April 17th, Copper River Highway was again closed with a significant avalanche at Mile 5.2. There were no associated damages or injuries from these avalanches.

In 2014, there was an avalanche at Mile 5.3. There were no associated damages or injuries from this avalanche.

As for landslides, there has been one reported occurrence between 1977 and 2018.

Cordova, October 31, 1985: After heavy rains, a landslide destroyed water lines between Heney Creek catchment basin and the city. Disaster public assistance supported repair by the city.

Avalanche/Landslide Hazard Vulnerability

Avalanches that can affect infrastructure or transportation are a hazard primarily at Mile 2.3, Mile 5.3, and Mile 5.5 of the Copper River Highway, portions of New England Cannery Road, Shepard Point, Loop Road, Eyak property, and Power Creek Hydro Power Plant.

Avalanche/Landslides Mitigation Goals and Projects

Goals

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

Goal 2. **Have comprehensive information regarding avalanche and landslide hazards and unstable soils throughout Cordova'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.**

Projects (listed numerically as A/L = AVALANCHE/LANDSLIDE)

The City of Cordova identified the following avalanche/landslide mitigation projects in 2008 and 2013. Table 22 contains updates for each project.

- **Project A/L-1. Prohibit new construction in avalanche zones**.

- **Project A/L-2: Utilize appropriate methods of structural avalanche control.**

Containment structures, depending on their design, can prevent snow loads from releasing and forming an avalanche, and/or protect structures by diverting or containing avalanche debris. Such structures include snow fences, diversion/containment structures, snow nets, and reforestation.

- **Project A/L-3. Enact buyout of homes in avalanche paths**.

- **Project A/L-4: Prohibit removal of vegetation in areas prone to landslides.**

Removal of vegetation from slopes can compromise the integrity of the soil and lead to landslides. Requests to remove vegetation should be handled through a permit process that involves an assessment of the area for landslide hazard.

- **Project A/L-5: Install warning signage in mapped landslide zones**.

- **Project A/L-6: Continue to educate public, specifically back country users, about avalanche and landslide hazards. Information can be disseminated to the public through the City web site, press releases, media ads, avalanche awareness classes, and other methods.**

- **Project A/L-7: Complete the avalanche mapping and mitigation alternatives overview of other avalanche areas within the City of Cordova, including Power Creek and Shepard Point.**

- **Project A/L-8: Encourage good record-keeping of past, present, and future avalanche events affecting private land in the Cordova area. Such records are invaluable for planning and mitigation.**

- **Project A/L-9: Add a Geologic Layer to Cordova's mapping system.**

Table 22. Avalanche/Landslide Mitigation Projects

Mitigation Projects	Benefits (pros)	Costs (cons)	Priority	Responsible Agency	Funding Source	Estimated Timeframe
Avalanche/Landslide (A/L)						
Project A/L-1. Prohibit new construction in avalanche zones. **2018 Update:** The City has a red zone and does not allow building in this zone. New construction is allowed in the blue zone. See Appendix B for 2015 zoning map.	Life/Safety issue/Risk reduction Benefit to entire community No direct cost to implement State assistance available 1 – 5 years to adopt ordinance.	Private property issues. Staff time.	Project has been completed.	City Planning Director	City budget	Complete
Project A/L-2. Utilize appropriate methods of structural avalanche control. **2018 Update:** The State uses gates to close the roads. Additionally, elementary school buses do not run on days with high avalanche hazards.	Life/Safety issue/Risk reduction Benefit to entire community Federal or State assistance available	Engineering and structural design needed. Dollar cost not determined. >$25,000 Long timeframe to implement, 5+ years.	Project has been completed.	City Planning Director	PDMG	Complete

Mitigation Projects	Benefits (pros)	Costs (cons)	Priority	Responsible Agency	Funding Source	Estimated Timeframe
Avalanche/Landslide (A/L)						
Project A/L-3. Enact buyout of homes in avalanche paths. **2018 Update:** Buyout was completed in 2001.	Life/Safety issue/Risk reduction Benefit to entire community PDMG or HMPG projects.	Political Support not determined. Private property issues. Staff time. Expensive, >$100k. Long timeframe 5+ years.	Project has been completed.	City Planning Director	PGMG	Complete
Project A/L-4. Prohibit removal of vegetation in areas prone to landslides. **2018 Update:** The City would like to delete this project in the next LHMP Update as it is not applicable to developed areas.	Life/Safety issue/Risk reduction Benefit to entire community Inexpensive State assistance available Could be an ongoing project	Staff time	Project will be deleted.	City Planning Director	City Budget	None
Project A/L-5. Install warning signage in mapped landslide zones. **2018 Update:** The City needs to map land slide zones first and then install signage.	Life/Safety issue/Risk reduction Benefit to entire community Federal and State assistance available	Mapped landslide zones do not exist at this time. <$10,000	Low	City Planning Director	PDMG	5+ years to implement.

Mitigation Projects	Benefits (pros)	Costs (cons)	Priority	Responsible Agency	Funding Source	Estimated Timeframe
Avalanche/Landslide (A/L)						
Project A/L-6. Continue to educate public about avalanche and landslide hazards. **2018 Update:** The City has completed this and considers the project ongoing. When avalanche danger is high, the Emergency Management Coordinator goes door to door with a risk report at Mile 5 Loop Road. A local avalanche expert forecasts danger levels and provides update on a website.	Life/Safety issue/Risk reduction Benefit to entire community Inexpensive State assistance available Could be an annual event	Staff time /Emergency Management Coordinator	High	Emergency Management Coordinator	City Budget	Ongoing
Project A/L-7 Complete the avalanche mapping and mitigation alternatives overview of other avalanche areas within the City of Cordova. **2018 Update:** The City has not implemented this project due to limited resources.	Life/Safety issue/Risk reduction Benefit to entire community	Specialists needed. Dollar cost not determined. >$25,000 Long timeframe to implement, 5+ years.	High	Emergency Manager	PDMG	>5 years

Mitigation Projects	Benefits (pros)	Costs (cons)	Priority	Responsible Agency	Funding Source	Estimated Timeframe
Avalanche/Landslide (A/L)						
Project A/L-8. Encourage good record-keeping of past, present, and future avalanche events affecting private land in the Cordova area. **2018 Update:** The City has implemented this project and considers it ongoing.	Life/Safety issue/Risk reduction Benefit to entire community Inexpensive	Staff time /Emergency Management Coordinator	High	City Planning Director	City Budget	Ongoing
Project A/L-9. Add a Geologic Layer to Cordova's mapping system. **2018 Update:** The City has not implemented this project due to limited resources. There is an exposed fault line at Nelson Bay/Shephard Bay that can be seen from Google Earth.	Life/Safety issue/Risk reduction Benefit to entire community	Engineering/Geology Contractor /Emergency Management Coordinator	High	Public Works	City Budget	< 1 year

Section 7. Volcanic Ash

Hazard Description and Characterization

Alaska is home to 41 historically active volcanoes stretching across the entire southern portion of the State from the Wrangell Mountains to the far Western Aleutians. An average of 1-2 eruptions per year occurs in Alaska. In 1912, the largest eruption of the 20th century occurred at Novarupta and Mount Katmai, located in what is now Katmai National Park and Preserve on the Alaska Peninsula.

Volcanic Ash

Volcanic ash, also called tephra, is fine fragments of solidified lava ejected into the air by an explosion or rising hot air. The fragments range in size, with the larger falling nearer the source. Ash is a problem near the source because of its high temperatures (may cause fires), burial (the weight can cause structural collapses), and impact of falling fragments. Further away, the primary hazard to humans is decreased visibility and inhaling the fine ash, but lightning in large ash clouds can also pose a hazard. Ash will also interfere with the operation of mechanical equipment including aircraft. In Alaska, this is a major problem as many of the major flight routes are near historically active volcanoes. Ash accumulation may also interfere with the distribution of electricity due to shorting of transformers and other electrical components (ash is an excellent conductor of electricity).

The largest volcanic eruption of the 20th century occurred at Novarupta Volcano in June 1912. It started by generating an ash cloud that grew to thousands of miles wide during the three-day event. Within four hours of the eruption, ash started falling on Kodiak, darkening the city. It became hard to breathe because of the ash and sulfur dioxide gas. The water became undrinkable and unable to support aquatic life. Roofs collapsed under the weight of the ash. Some buildings were destroyed by ash avalanches while others burned after being struck by lightning from the ash cloud. Similar conditions could be found all over the area. Some villages ended up being abandoned, including Katmai and Savonoski villages. The ash and acid rain also negatively affected animal and plant life. Large animals were blinded, and many starved because their food was eliminated.

The ash fall from this eruption was significantly greater than the 2005 and 2009 eruptions of Redoubt, Spurr and Augustine Volcanoes. Fourteen earthquakes of magnitude 6 to 7 were associated with this event.

Volcanic Ash Hazard Identification

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, DNR/DGGS, and UAF/GI). AVO has published hazard assessments for local volcanoes, including Spurr, Redoubt, Iliamna, Augustine, and the Katmai Group, and provides warnings of likely eruptions.

Previous Occurrences of Volcanic Ash

Cordova has been impacted by one volcanic ashfall event – 1992 Redoubt eruption. Air travel was impacted, and fishing vessels were out in the grounds unable to run through ash to return to the harbor.

Volcanic Ash Hazard Vulnerability

Alaska is home to 41 historically active volcanoes stretching across the entire southern portion of the State from the Wrangell Mountains to the far Western Aleutians. An average of 1-2 eruptions per year occurs in Alaska. Cordova is vulnerable to ash fall based on wind direction.

Volcanic Ash Mitigation Goals and Projects

Goals

Goal 1. Increase public awareness of volcanic ash.

Projects **(listed numerically as V = VOLCANO)**

The City of Cordova identified the following volcano mitigation projects in 2018. Table 23 contains updates for each project.

- **Project V-1. Continue to educate the public about what to do in case of volcanic ashfall.**
- **Project V-2. Determine water usage levels and filtration limits of current system, to determine whether water rationing may be necessary in the event ashfall impacts drinking water supply.**
- **Project V-3. Ensure a local supply of ash masks and store at emergency shelters.**

Table 23. Volcanic Ash Fall Mitigation Projects

Mitigation Projects	Benefits (pros)	Costs (cons)	Priority	Responsible Agency	Funding Source	Estimated Timeframe
Volcanic Ash Fall (VAF)						
Project VAF-1. Continue to educate the public about what to do in case of volcanic ashfall. **2018 Update:** The community trains for "Shelter in Place." They built an actual miniature house for people to practice taping windows, etc. at the Community Health Fair and pass out flyers.	Life/Safety issue/Risk reduction Benefit to entire community Inexpensive	Staff time /Emergency Management Coordinator	High	City Emergency Coordinator	City Budget	Ongoing
Project VAF-2. Determine water usage levels and filtration limits of current system, to determine whether water rationing may be necessary in the event ashfall impacts drinking water supply.	Life/Safety issue/Risk reduction Benefit to entire community Inexpensive	Staff time /Emergency Management Coordinator	High	Public Works	City Budget	< 1 year

Mitigation Projects	Benefits (pros)	Costs (cons)	Priority	Responsible Agency	Funding Source	Estimated Timeframe
Volcanic Ash Fall (VAF)						
Project V-3. Ensure a local supply of ash masks and store at emergency shelters. **2018 Update:** The City keeps a shelter kit for each shelter (12 totes) at the elementary school. The City has a large supply of N95 masks for community dispersal at the mile 5 substation. 2500 more are requested for the upcoming 2019 Alaska Shield exercise.	Life/Safety issue/Risk reduction Benefit to entire community	Emergency Management Coordinator	High	Emergency Management Coordinator	City Budget	< 1 year

Section 8. Climate Change

Hazard Description and Characterization

For this LHMP, climate change refers to the long-term variation in atmospheric composition and weather patterns on a global scale. Global climate change may occur gradually due to small variations or rapidly due to large catastrophic forces. Greenhouse gasses, especially carbon dioxide (CO_2) and methane (CH_4), are commonly regarded as the most significant factors influencing the Earth's current climate.

Significant atmospheric variations may also be influenced by more than one event, for instance, an asteroid impact and a major eruption over a longer time period. For scientists studying climate change, both hazards imply different time periods. Therefore, the time period estimates for previous climate change events tend to vary and cannot be accurately applied to current predictive climate change models, which now must account for human activity. This is significant because hazard mitigation planning relies greatly upon the historical record.

Climate Change Hazard Identification

Through studies of the historical record, climate change affects water acidity, atmospheric composition, precipitation, weather patterns and temperatures.

Climate Change Hazard Vulnerability

Climate change has the potential to aggravate natural disasters along the coastline, particularly flooding. Climate change will continue to exacerbate the issue.

Climate change consists of warmer weather, more extremes, snow apocalypse (see photos of storm from 2012 on pages 123 and 124), and no coastal erosion. Climate change impacts severe weather.

Section 9. Technological, Public Health, Human-Caused, and Hazardous Materials Hazards

Hazard Description and Characterization

The hazards discussed in this section include:

Technological and Cyber Threats
Nuclear, Biological, or Chemical Attack/Materials
Civil Disorder/Disturbance
Public Health Emergencies
Mass Transportation Accidents
Hazardous Material Threats
Oil Spills

Technological and Cyber Threats

Modern society functions through technology and cyber communications networks. Technological threats are defined as a potential loss or disruption in the City of service delivery, information, or information and telecommunication systems. The continued escalation of cyber-attacks on government, financial, and business computer systems are considered terrorist-related acts.

Nuclear, Biological, or Chemical Attack

Of all the possible disasters and hazards imagined, a strategic nuclear, biological, or chemical attack could be the most devastating and far-reaching in consequences. Regardless where the attack originated, domestic or foreign, the impact on life and property and preparedness, response, and recovery activities are similar. While preventing an attack may be outside the capacity of the City and its citizens, general all-hazard mitigation actions for other hazards will often support loss reduction in an attack. For example, a building retrofitted for seismic hazard that addresses lateral force resistance also improves the structure's survival in a bombing.

Civil Disorder/Disturbances

There is little information on civil disorder events in Alaska. As with the hazard of terrorism, even in the absence of a historical record of events of this hazard, it has been included in the State Hazard Mitigation Plan because of the potential it could occur in the State. Thus, it is also included in Cordova's plan.

Public Health Emergencies

Public health emergencies can take many forms - disease epidemics, large-scale incidents of food or water contamination, or extended periods without adequate water and sewer services. There can also be harmful exposure to chemical, radiological, or biological agents, and large-scale infestations of disease-carrying insects or rodents. This section focuses on emerging public health concerns and potential pandemics. Public health emergencies can occur as primary events by themselves, or they may be secondary to another disaster or emergency, such as earthquake, flood, or hazardous material incident. The common characteristic of most public health emergencies is that they adversely impact, or have the potential to adversely impact, a large number of people.

Mass Transportation Accidents

For the purpose of this LHMP, mass transportation is defined as the means, or system, that transfers large groups of individuals from one place to another. This section simply addresses only the potential transportation accidents involving people, not materials.

Hazardous Materials Threats

Hazardous Air Quality

Some inhalable highly-toxic hazardous substances can be released into the air as a gas, such as chlorine or ammonia. A flammable hazardous substance can produce toxic smoke. An airborne release would most likely occur from a stationary source or from a transportation incident. Airborne hazardous substances will generally have a limited vulnerability zone before they are dispersed into the atmosphere. The vulnerability zone is determined by changing wind speed and direction.

Contaminated Drinking Water Supply

If a liquid hazardous substance is released near a drinking water well or City reservoir, the entire City water system could be compromised. Polluted drinking water is a significant health threat that is sorely underreported and oft-ignored. There are a number of threats to drinking water: improperly disposed of chemicals; animal wastes; pesticides; human wastes; wastes injected deep underground; and naturally-occurring substances can all contaminate drinking water. Likewise, drinking water that is not properly treated or disinfected, or which travels through an improperly maintained distribution system, may also pose a health risk.

Contaminated Wastewater Disposal System

An on-site septic system, or a drain connected to city sewer, could be contaminated by the disposal of hazardous substances. If the groundwater becomes contaminated, the affected well and/or neighboring wells may also become contaminated.

Oil Spill Threats

Oil and hazardous substance handling can pose a significant threat to Alaska's economy and environment. The State's social and economic history has been altered by oil development and expanding chemical use since the discovery and development of the Kenai and Cook Inlet oil and gas fields in the 1950s and 1960s. Alaskans have long recognized the need for protecting our natural resources and prudent oil and hazardous substances management and have developed laws to ensure it will happen. These laws prohibit the discharge of oil or hazardous substances, require prompt reporting when a spill does occur, and mandate containment, control, removal, and proper disposal of all waste materials. Under existing State and Federal law, the spiller is responsible for cleanup.

Local Technological, Public Health and Human-Caused Hazard Identification

Specific sites in Cordova that could be affected by Technological, Public Health, Human –Caused, Hazardous Materials, or Oil Spill threats are as follows:

- Technological and Cyber Threat could affect All Critical Infrastructure and Key Resources. While the importance to Alaska's urban locations is clear, even Alaska's vast rural areas with isolated populations depend on technology for commerce, medical, and other vital services. In fact, in some ways, Cordova's remoteness makes the City more dependent on technology for information, the Internet, telecommunications, and networked systems. Other targets for cyber terrorism include public works facilities, utilities, oil and gas, and transportation facilities such as airports, bridges and ferries, schools, medical facilities, other State, and Federal facilities within Cordova.

- Nuclear, Biological, or Chemical Attack/Materials could have City-wide impact upon the entire population. While the use of these weapons against Cordova is unlikely, as long as such weapons exist, there is always a potential risk. Given Alaska's strategic location and assets, there is also risk for traditional war-related attacks using conventional weapons.

- Civil Disorder/Disturbances could have City-wide impact upon the entire population. It is assumed that Cordova is not likely to experience civil disorder as a hazard, barring some extraordinary and unpredictable circumstance. The communities/groups considered to be most vulnerable to this hazard are those with concentrations of populations and large gathering places, such as sports stadiums, and universities. Cordova does not fall into that category. However, a prolonged disaster, with serious shortages of food or supplies could create an environment of civil disorder anywhere.

- Public Health Emergencies could have city-wide impact upon the entire population. Public health emergencies can be statewide, regional, or localized in scope and magnitude. Each of the potential Public Health Emergencies would be handled in much the same way. Specific guidelines (specifically for Pandemic Flu, but can be used for any Public Health Emergency) can be found in the Cordova Emergency Operations Plan, Annex L.

- Mass Transportation Accidents would be site-specific and could occur anywhere along the Alaska Marine Highway, Mile 13 Airport, City Airport, and school bus and tour bus routes. Mass transportation accidents in Cordova would include public airlines, tour buses, school buses, and the Alaska Marine Highway. The peak periods are related to seasonal population or special events or time of day (school bus runs).

- Hazardous Material Threats could have site-specific impact in the canneries (ammonia, for example) or businesses, as well as City-wide impact upon the entire population, possibly requiring evacuation.

- Oil Spill Threats

  Oil and hazardous substance handling poses a significant threat, both to Cordova's economy and environment. Much effort over the past 20 years has focused particularly upon oil spill mitigation and response. This plan defers entirely to that research and to those recommendations. For more information, refer to the Cordova Emergency Operation Plan, Annex K.

Previous Occurrences of Technological, Public Health and Human-Caused Hazards

Historically, Cordova has been fortunate to not experience many significant episodes of these types of hazards. The exception to that is the 1989 Exxon Valdez Oil Spill, the worst human–caused disaster in Alaska's history, the impact of which was community wide and remains with Cordova to this day.

With regards to Hazardous Materials, the U.S. Environmental Protection Agency (EPA) has classified over 300 substances as Extremely Hazardous Substances (EHS). Some of these chemicals are commonly used in Cordova.

Technological, Public Health and Human-Caused Hazard Vulnerability

The Hazard Vulnerability Analysis for this section is often difficult to describe. In the absence of specific intelligence information on threats or historical hazard events, the degree of vulnerability to these hazards is difficult to assess. Vulnerability is based on general prediction and estimation, rather than on historical evidence of impact to the

City's population, property, or environment. Thus, they have not been included in the formal Hazard Vulnerability Analysis. Nevertheless, given the potential for future loss, prudence dictates that the vulnerability to these hazards at least be considered.

Technological, Public Health and Human-Caused Mitigation Goals and Projects

Goals

Goal 1: Mitigate the effects of these hazards by understanding the extent of the risk and the extent of the City's capability to respond.

Goal 2: Educate the public about the dangers of these hazards and how to prepare for the possible effects.

Goal 3. Continue, as a community, to support all Oil Spill trainings/exercises.

Goal 4: Enhance Local Hazmat Response Team capabilities.

Projects **(listed numerically as TPHH = Technological, Public Health, Human-Caused, Hazardous Materials)**

The City of Cordova identified the following TPHH mitigation projects in 2008 and 2013. Table 24 contains updates for each project.

- **Project TPHH-1: Identify and organize local resources.**
- **Project TPHH-2: Support community-wide mitigation training/education about non-natural hazards.**
- **Project TPHH-3: Encourage improved training, education, planning and safety in the production, use and transportation of oil and hazardous substances. (Local Hazmat Response Team members).**
- **Project TPHH-4: Participate in regional oil spill drills/exercises.**

Table 24. TPHH Mitigation Projects

Mitigation Projects	Benefits (pros)	Costs (cons)	High	Responsible Agency	Funding Sources	Estimated Timeframe
TPHH						
Project TPHH-1: Identify and organize local resources. **2018 Update:** Completed and ongoing.	Life/Safety issue/Risk reduction Benefit to entire community Inexpensive	Staff time	High	Emergency Management Coordinator	City budget	Ongoing
Project TPHH-2. Support community-wide mitigation training/education about non-natural hazards. **2018 Update:** Completed and ongoing.	Life/Safety issue/Risk reduction Benefit to entire community	Staff time	Medium	Emergency Management Coordinator	City budget	Ongoing
Project TPHH-3. Encourage improved training, education, planning, and safety in the production, use, and transportation of hazardous substances. **2018 Update:** Completed and ongoing.	Life/Safety issue/Risk reduction Benefit to entire community Inexpensive	Staff time	High	Emergency Management Coordinator	DHS&EM	Ongoing
Project TPHH-4: Participate in regional oil spill drills/exercises. **2018 Update:** Completed and ongoing.	Life/Safety issue/Risk reduction Benefit to entire community Inexpensive Could be annual event	Staff Time/ EMPG staff	High	Emergency Management Coordinator	City Budget	Ongoing

Chapter 5: Mitigation Strategy

Benefit - Cost Review

This chapter of the LHMP outlines Cordova's overall strategy to reduce its vulnerability to the effects of the hazards studied. Currently, the planning effort is limited to the hazards determined to be of the most concern: flooding, erosion, severe weather, earthquake, tsunami, climate change, and technological/public-caused, and hazardous materials; however, the mitigation strategy will be regularly updated as additional hazard information is added and new information becomes available.

The projects listed in Tables 12, 14, 15, 18, 21, 22, 23, and 24 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.

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

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 city functionality.

    A. Hazard probability.

    B. Hazard severity.

Other criteria that was used to developing the benefits – costs listing depicted in Tables 12, 14, 15, 18, 21, 22, 23, and 24:

1. Vulnerability before and after Mitigation

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

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

1. List of Benefits

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

2. Costs

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

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

The Cordova Planning Commission will hold another round of public meetings on the LHMP Update. The plan is subject to final Cordova City Council approval after pre-approval is obtained by DHS&EM.

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

Glossary of Terms

A-Zones

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

Acquisition

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

Asset

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

Base Flood

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

Base Flood Elevation (BFE)

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

Base Floodplain

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

Building

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

Building Code

The regulations adopted by a local governing body setting forth standards for the construction, addition, modification, and repair of buildings and

other structures for the purpose of protecting the health, safety, and general welfare of the public.

Community

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

Community Rating System (CRS)

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

Critical Facility

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

Designated Floodway

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

Development

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

Digitize

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

Disaster Mitigation Act (DMA)

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

Earthquake

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

Elevation

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

Emergency Operations Plan

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

Erosion

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

Federal Disaster Declaration

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

Federal Emergency Management Agency (FEMA)

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

Flood

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

Flood Disaster Assistance

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

Flood Elevation

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

Flood Hazard

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

Flood Insurance Rate Map

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

Flood Insurance Study

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

Floodplain

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

Floodplain Management

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

Floodplain Management Regulations

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

which provide standards for the purpose of flood damage prevention and reduction.

Flood Zones

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

Flood Zone Symbols

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

Geographic Information System

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

Governing Body

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

Hazard

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

Hazard Event

A specific occurrence of a particular type of hazard.

Hazard Identification

The process of identifying hazards that threaten an area.

Hazard Mitigation

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

Hazard Mitigation Grant Program

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

Hazard Profile

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

Hazard and Vulnerability Analysis

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

Mitigate

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

Mitigation Plan

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

National Flood Insurance

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

One Hundred (100)-Year

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

Planning

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

Repetitive Loss Property

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

Risk

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

Riverine

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

Riverine Flooding

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

Runoff

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

Seiche

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

Seismicity

Describes the likelihood of an area being subject to earthquakes.

State Disaster Declaration

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

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

Topography

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

Tribal Government

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

Tsunami

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

Vulnerability

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

Vulnerability Assessment

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

Watercourse

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

Watershed

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

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16. Federal Emergency Management Agency How to Guides

    a. Getting Started: Building Support for Mitigation Planning (FEMA 386-1)
    b. Understanding Your Risks: Identifying Hazards and Estimating Losses (FEMA 386-2)
    c. Developing the Mitigation Plan: Identifying Mitigation Actions And Implementing Strategies (FEMA 386-3)

d. Bringing the Plan to Life: Implementing the Hazard Mitigation Plan (FEMA 386-4)
e. Using Benefit-Cost Review in Mitigation Planning (FEMA 386-5)

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26. Hazard Mitigation Grant Program: https://www.fema.gov/hazard-mitigation-grant-program
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American Planning Association:	http://www.planning.org
Association of State Floodplain Managers:	http://www.floods.org
Developing the Implementation Strategy:	www.pro.gov.uk
Federal Emergency Management Agency:	http://www.fema.gov/fima/planning.shtm
Community Rating System:	http://www.fema.gov/nfip/crs.htm
Flood Mitigation Assistance Program:	http://www.fema.gov/fima/planfma.shtm
Hazard Mitigation Grant Program:	http://www.fema.gov/fima/hmgp
Individual Assistance Programs:	http://www.fema.gov/rrr/inassist.shtm
Interim Final Rule:	http://www.access.gpo.govl
National Flood Insurance Program:	http://www.fema.gov/nfip
Public Assistance Program:	http://www.fema.gov/rrr/pa

Appendix

List of Maps

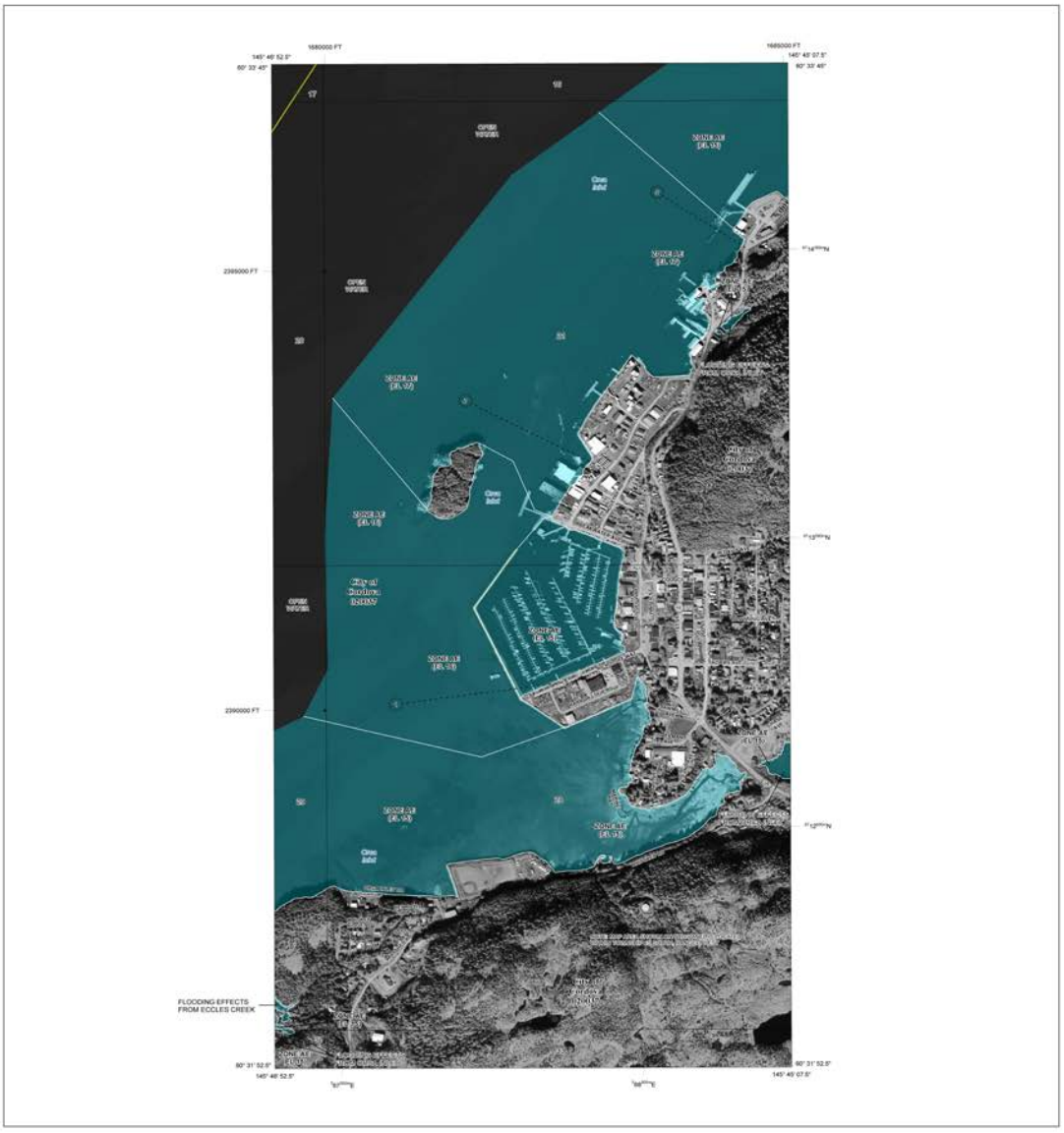
Map 1. Cordova Regional Map
Map 2. Cordova Flood Rate Insurance Map (0200370042C)
Map 3. Cordova Flood Rate Insurance Map (0200370061C)
Map 4. Cordova Flood Rate Insurance Map (0200370062C)
Map 5. Cordova Critical Infrastructure
Map 6. Cordova Regional Critical Infrastructure
Map 7. Tsunami Hazard Zones

Photos

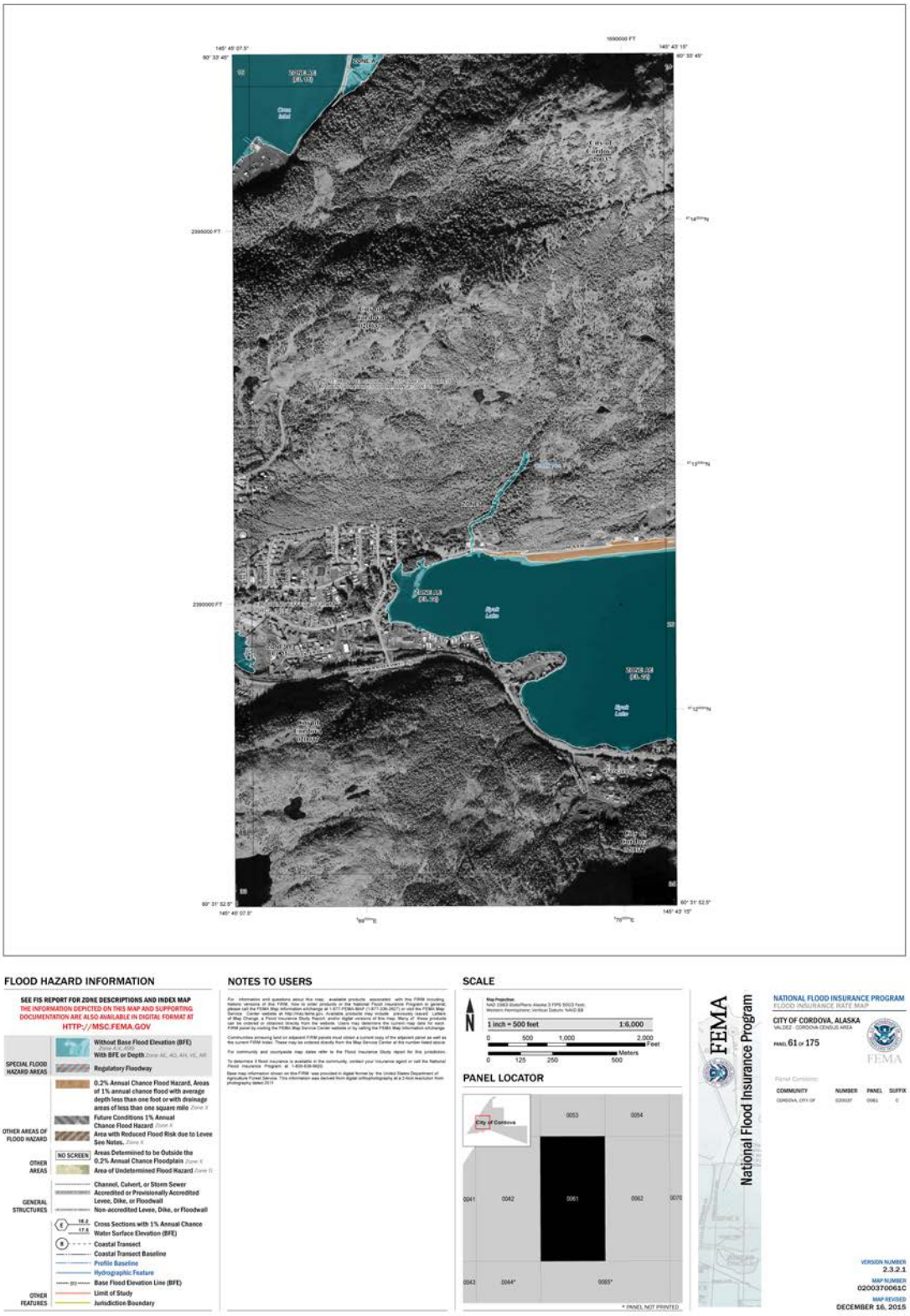
Photos 1. Orca Creek, 11/01/06
Photos 2. Airport and Eyak Lake, 10/31/06
Photos 3. Cordova Flood Pictures, 10/10/06
Photos 4. Cordova Flood Pictures, 10/10/06
Photos 5. Cordova Flood Pictures, 10/10/06
Photos 6. Power Creek, October 2006
Photos 7. Damage to Hydro Plant, 10/31/06
Photos 8. Damage from Snow, January 2012
Photos 9. Avalanche April 2012

Map 1. Cordova Regional Map

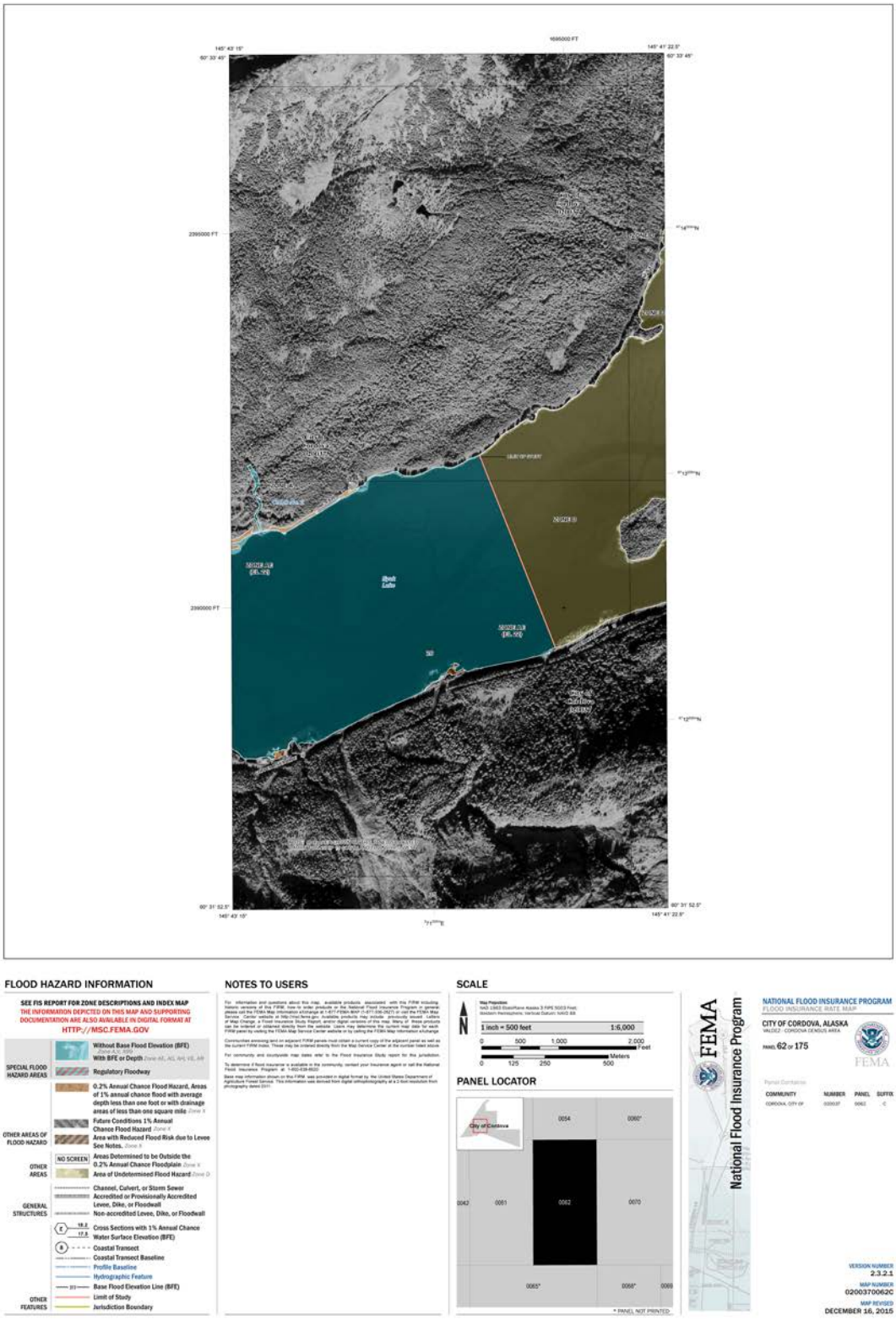
Map 2. Cordova Flood Rate Insurance Map (0200370042C)



Map 3. Cordova Flood Rate Insurance Map (0200370061C)

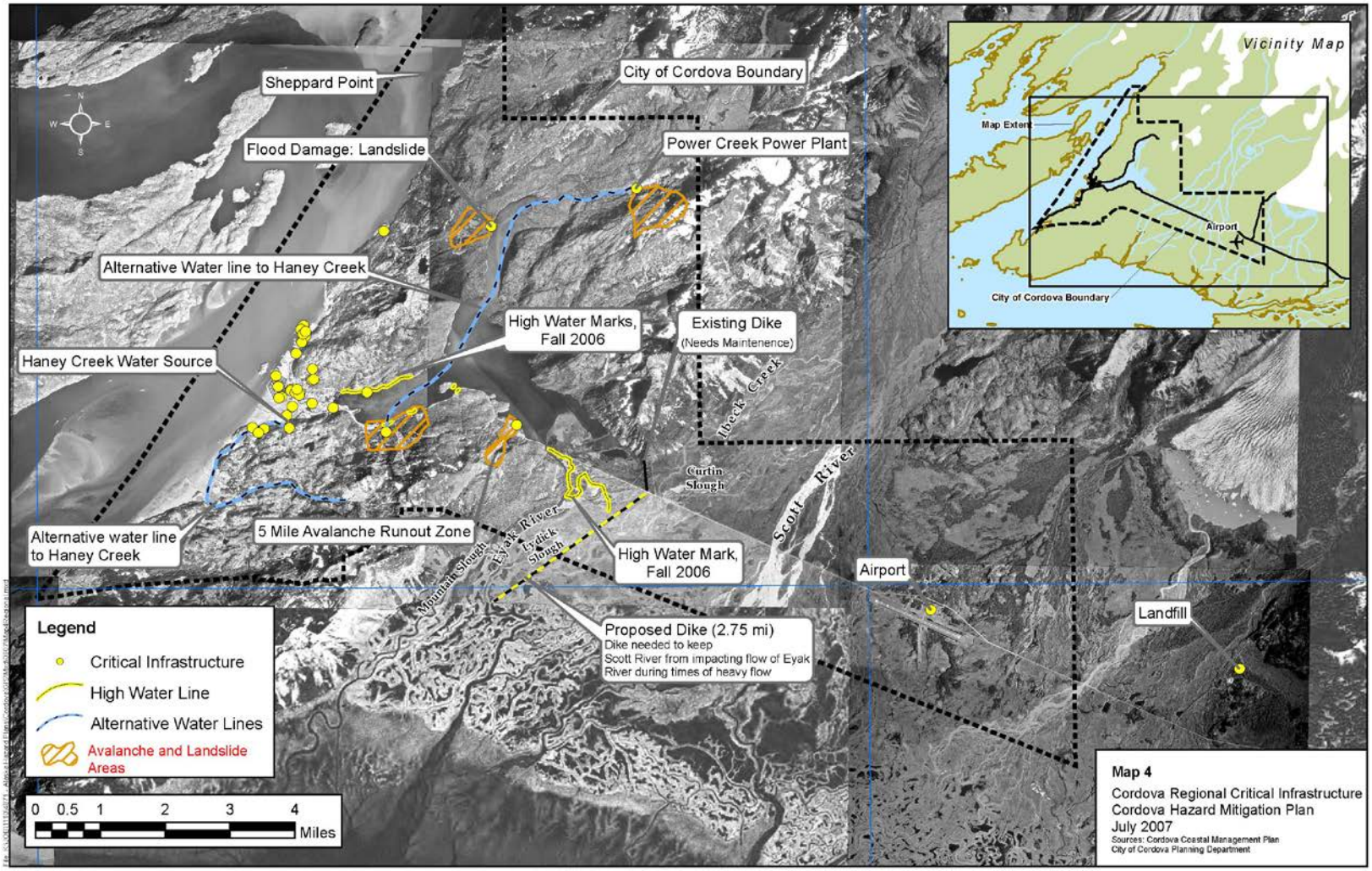


Map 4. Cordova Flood Rate Insurance Map (0200370062C)



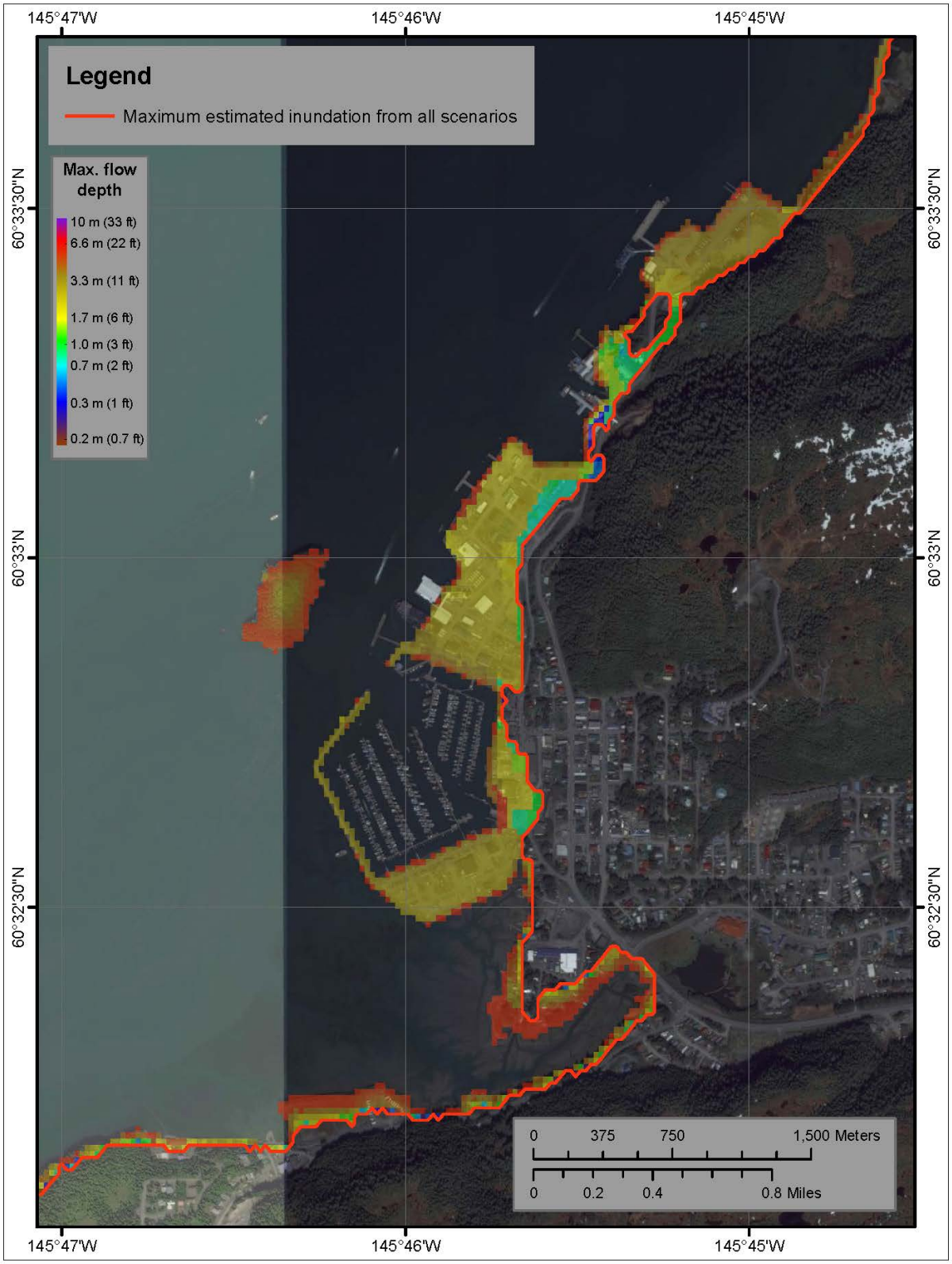
Map 5. Cordova Critical Infrastructure

Map 6. Cordova Regional Critical Infrastructure



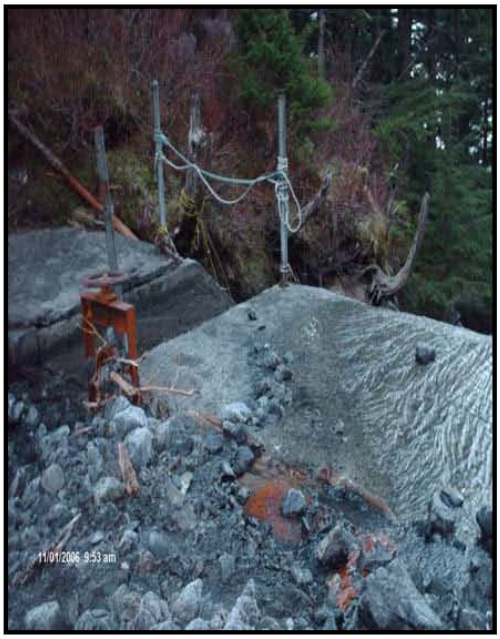
Map 7. Tsunami Hazard Zones

Cordova: Maximum composite potential inundation extent from all scenarios, and maximum composite flow depths over dry land. The DEM corresponds to the present-day MHHW datum.



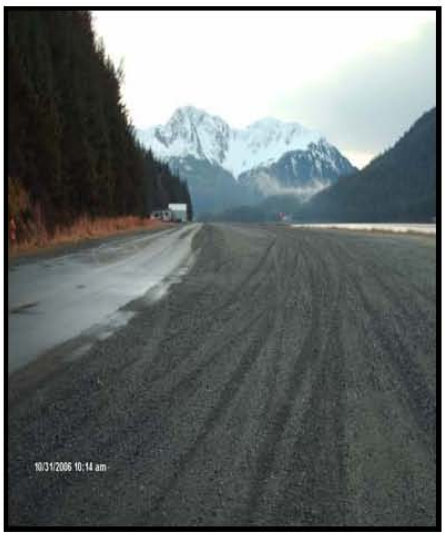
Photos 1. Orca Creek, 11/01/06

Cordova – Orca Creek
November 1, 2006
Water Supply Intake Clogged, Holding Pond filled with Bedload



Photos 2. Airport and Eyak Lake, 10/31/06

Cordova – Dept. of Transportation
October 31, 2006 Flood Pictures



Cordova Municipal Airport

Repaired

Eyak Lake Erosion

Eyak Lake Erosion - Repaired

Photos 3. Cordova Flood Pictures, 10/10/06

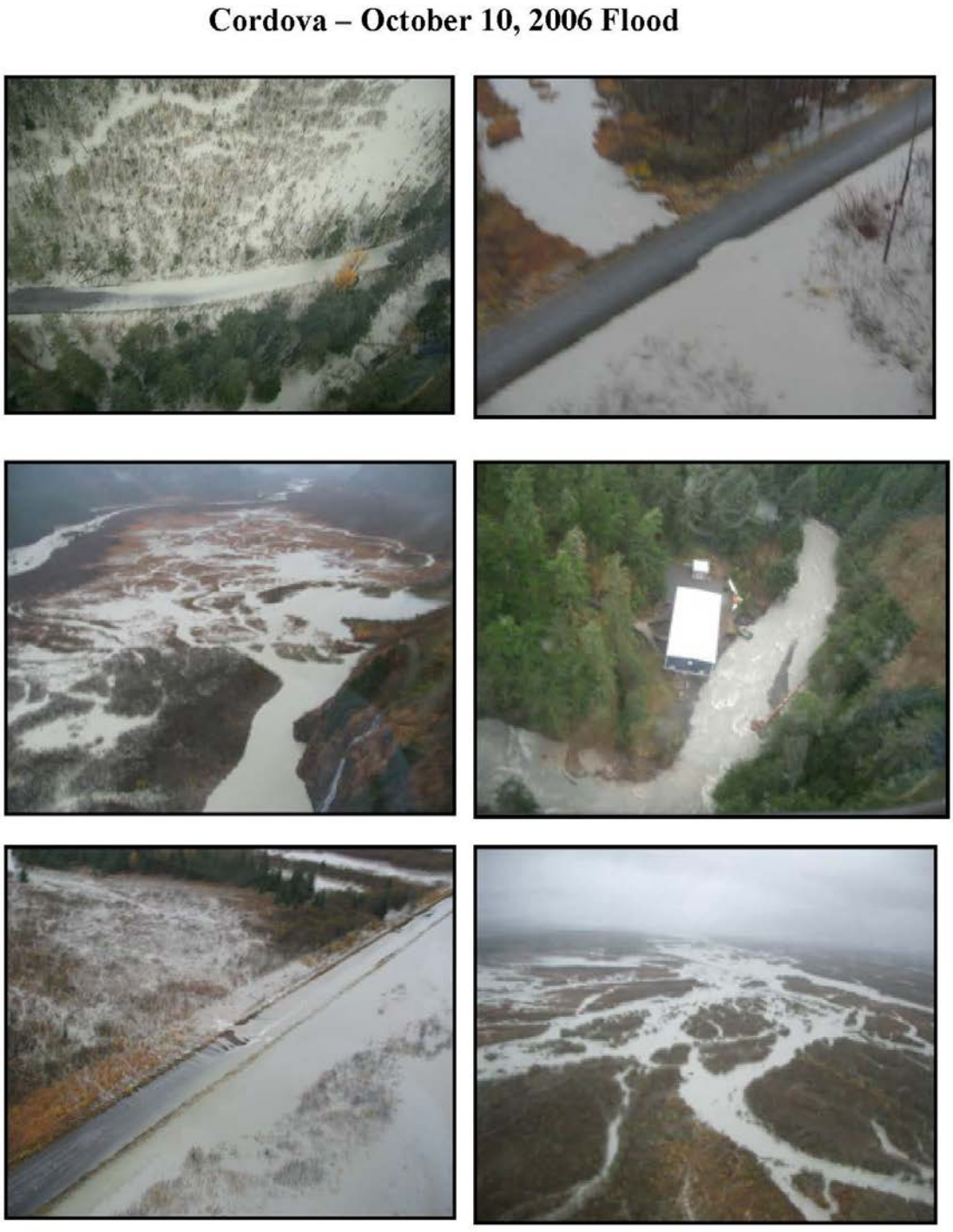
Cordova – October 10, 2006 Flood





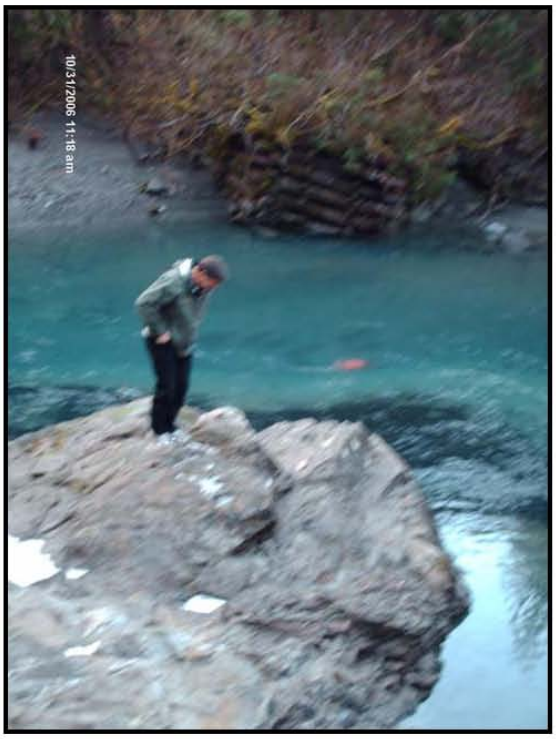

Photos 4. Cordova Flood Pictures, 10/10/06

Photos 5. Regional Flood Pictures, 10/10/06



Photos 6. Power Creek, October 2006

Power Creek, October 2006
USGS Survey Mark and Gage Site



Photos 7. Damage to Hydro Plant, 10/31/06

Cordova – October 31, 2006
Damage to Humpback Creek Hydro plant

Photos 8. Damage from Snow, January 2012

Photos 9. Avalanche, April 2012


STOP

Appendix A: Public Involvement

CITY OF CORDOVA

December 4, 2017

Brent Nichols, CFM
State of Alaska
DMVA DHS&EM
P.O. Box 5750
Joint Base Elmendorf-Richardson, Alaska 99505-5750

Mr. Nichols:

This letter serves as the City of Cordova's Letter of Commitment to support DMVA DHS&EM and LeMay Engineering & Consulting, Inc. in their Federal Emergency Management Agency (FEMA) Pre-Disaster Mitigation (PDM) planning grant to update the 2008 hazard mitigation plan for the City of Cordova. The end goal of this grant is a State- and FEMA- approved hazard mitigation plan that the City of Cordova will adopt.

Sincerely,

Alan Lanning
City Manager

601 First Street P.O. Box 1210 Cordova, Alaska 99574 Phone (907) 424-6200 Fax (907) 424-6000

Hazard Mitigation Plan Update for Cordova, Alaska

Newsletter #1: December 2017

The State of Alaska, Department of Military and Veterans Affairs, Division of Homeland Security and Emergency Management (DHS&EM) was awarded a Pre-Disaster Mitigation Program grant from the Federal Emergency Management Agency (FEMA) to update the 2008 hazard mitigation plan (HMP) for the City of Cordova. This plan will assist the City as a valuable resource tool in making decisions. Additionally, communities must have a State- and FEMA-approved and community-adopted HMP plan to receive FEMA pre- and post- disaster grants.

LeMay Engineering & Consulting, Inc. was contracted to assist Cordova with preparing a 2017 HMP update. The HMP will identify all applicable natural hazards. The plan will identify the people and facilities potentially at risk and ways to mitigate damage from future hazard impacts.

Join the planning team and offer your advice: Any interested community member may join the planning team. To join, call or send Jennifer LeMay an email at jlemay@lemayengineering.com. The purpose of this newsletter is to introduce this project and encourage public involvement during this process. The goal is to receive comments, identify key issues or concerns, and improve mitigation ideas.

Attend the December 11, 2017, City Meeting at 9 am at City Hall: The agenda will be a summary of the hazard mitigation plan process by Jennifer LeMay. You're invited to provide input to the plan. Specifically, we'll be discussing which of the following hazards are realistic for Cordova: earthquake, tsunami, flood/erosion, ground failure/avalanche, severe weather, wildland fire, and climate change? Also, what facilities are critical to your community? What mitigation actions should be implemented to prevent damage from potential hazards?

For more information, contact:
Sam Greenwood, Cordova City Planner (907) 424-6220
Patrick LeMay, PE, Planner (907) 250-9038
Jennifer LeMay, PE, PMP, Lead Planner (907) 350-6061
Brent Nichols, DMVA, DHS&EM Project Manager (907) 428-7085

City of Cordova Hazard Mitigation Plan Committee Introductory Meeting

December 11, 2017

9 AM at City Office

Name	Organization	Contact Information (phone or email)
Leif Stavig	City of Cordova	907-424-6220 planning2@cityofcordova.net
Samantha Greenwood	City of Cordova	907-424-6233 planning@cityofcordova.net
Jessie Bertrands	City of Cordova	763-242-6535
Paul Trumblee	City of Cordova Fire Marshal	907-424-6117 fire@cityofcordova.net
Jennifer LeMay	LeMay Engineering + Consulting, Inc.	350-6061 jlemay@lemayengineering.com

Hazard Mitigation Planning Process

Updates to existing plans

Plans must be updated every five years and approved by DHS&EM and FEMA and then adopted by the community by resolution for the community to remain eligible for FEMA grant funding

This is a public process. Everyone who wants to be involved will be given the opportunity to be involved in this process. Send Jennifer LeMay, PE, PMP an email if you'd like more information at jlemay@lemayengineering.com or call her at (907) 350-6061.

We welcome public input and will have a public comment hearing at a public meeting for you to provide input on the plan.

Which hazards are applicable for your community?

- Flood
- Erosion
- Wildland Fire
- Tsunami/Seiche
- Earthquake
- Volcano
- Avalanche
- Ground Failure/Landslide
- Permafrost Degradation
- Severe Weather
- Climate Change

We're interested in information related to:

- hazard identification,
- profiles,
- previous occurrences,
- probability of occurrences, and
- typical recurrence intervals

for each potential hazard.

Plan Process

- Today's introductory meeting
- Gathering of data
- Draft Plan available for public comment (December is our goal month)
- Public hearing for Draft Plan (public comment period)
- State/FEMA review and pre-approval
- Newsletter announcing Final Plan (the public may still comment)
- City and/or Tribal adoption
- Final Approval from State/FEMA (prior to April 23, 2018).

After Plan is completed, approved, and adopted, your community will be eligible to apply for mitigation project funds from DHS&EM and FEMA for five years until the plan requires another update.

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Brent Nichols, CFM, State of Alaska DHS&EM Hazard Mitigation Officer (907) 428-7085

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December 11, 2017

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Emergency Management Specialist (EMS) II & Certified Floodplain Manager (CFM)
Department of Military and Veterans Affairs (DMVA)
Division of Homeland Security and Emergency Management (DHS&EM)
P.O. Box 5750
JBER, AK 99505-5750

Subject: Draft Hazard Mitigation Plan Introductory Meeting Trip Report, Cordova, Alaska

On December 11, 2017, Jennifer LeMay, PE, PMP of LeMay Engineering & Consulting, Inc. traveled to Cordova, Alaska. The purpose of this trip was to attend the Introductory Community meeting and summarize the plan update process. Four people were present: City Planning Director Samantha Greenwood, Planner Leif Stavig, Emergency Management Coordinator Joanie Behrends, and Fire Marshal Paul Trumblee. I led meeting attendees through the list of hazards, critical facilities, vulnerabilities, and mitigation actions. Comments were as follows:

1. The State had provided LeMay Engineering & Consulting, Inc. with the 2008 Plan to update. The City updated the Plan in 2013 on their own nickel, and FEMA approved the 2013 Plan Update on June 26, 2013.
2. The RiskMap was completed in January 2016. This will be valuable information to include in the 2018 Update.
3. The Cordova Emergency Management Operation Plan was updated in 2017. Tab 5 would be an excellent table to include in the Plan Update.
4. Cordova has an Emergency Management Organization (EMO) instead of a LEPC. The EMO consists of 60-80 people. The EMO will make a recommendation to the Planning and Zoning Commission for approval of the LHMP Update.
5. Add volcano and climate change as hazards to be profiled. Climate change consists of warmer weather, more extremes, snow apocalypse, and no coastal erosion. Climate change impacts severe weather.
6. There are 12 shelters; these are not City-owned infrastructure, but memorandums of understanding are in place.
7. The City will update their critical infrastructure map.
8. The community is growing residentially and commercially. Expansion of White Shed road has led to growth. Younger children are growing up and staying to raise their families. Ocean Beauty has built a new bunkhouse, meal house, and fish meal plant, and Trident has added a 300-bed bunkhouse. Many Coast Guard retirees move back to Cordova when they are done with their service. The population of Cordova doubles in the summertime due to the U.S. Forest Service, Fish & Game, fishing, and canneries work.
9. I will give a presentation at the February 20 EMO luncheon. A public hearing of the Draft Plan Update will be an agenda item at the February 21 Planning and Zoning Commission meeting at 7 pm. The City requires the Draft Plan Update be submitted no later than January 22nd.

If you have any questions, please do not hesitate to call me at (907) 350-6061.

12/11/17
Jennifer L. LeMay, PE, PMP/Date
LeMay Engineering & Consulting, Inc.

Hazard Mitigation Plan Update for Cordova, Alaska

Newsletter #2: January 22, 2018

LeMay Engineering & Consulting, Inc. was contracted to assist Cordova with preparing a 2018 HMP update. The HMP will identify all applicable natural hazards. The plan will identify the people and facilities potentially at risk and ways to mitigate damage from future hazard impacts.

Offer your comments on the Draft HMP Update: The goal of Newsletter #2 is to announce the availability of the draft update and invite you to provide comments, identify key issues or concerns, and improve mitigation ideas. This plan has been posted at the Cordova City Office Planning Department for your review. Comments can be provided verbally to Jennifer LeMay at (907) 350-6061 or emailed to: jlemay@lemayengineering.com.

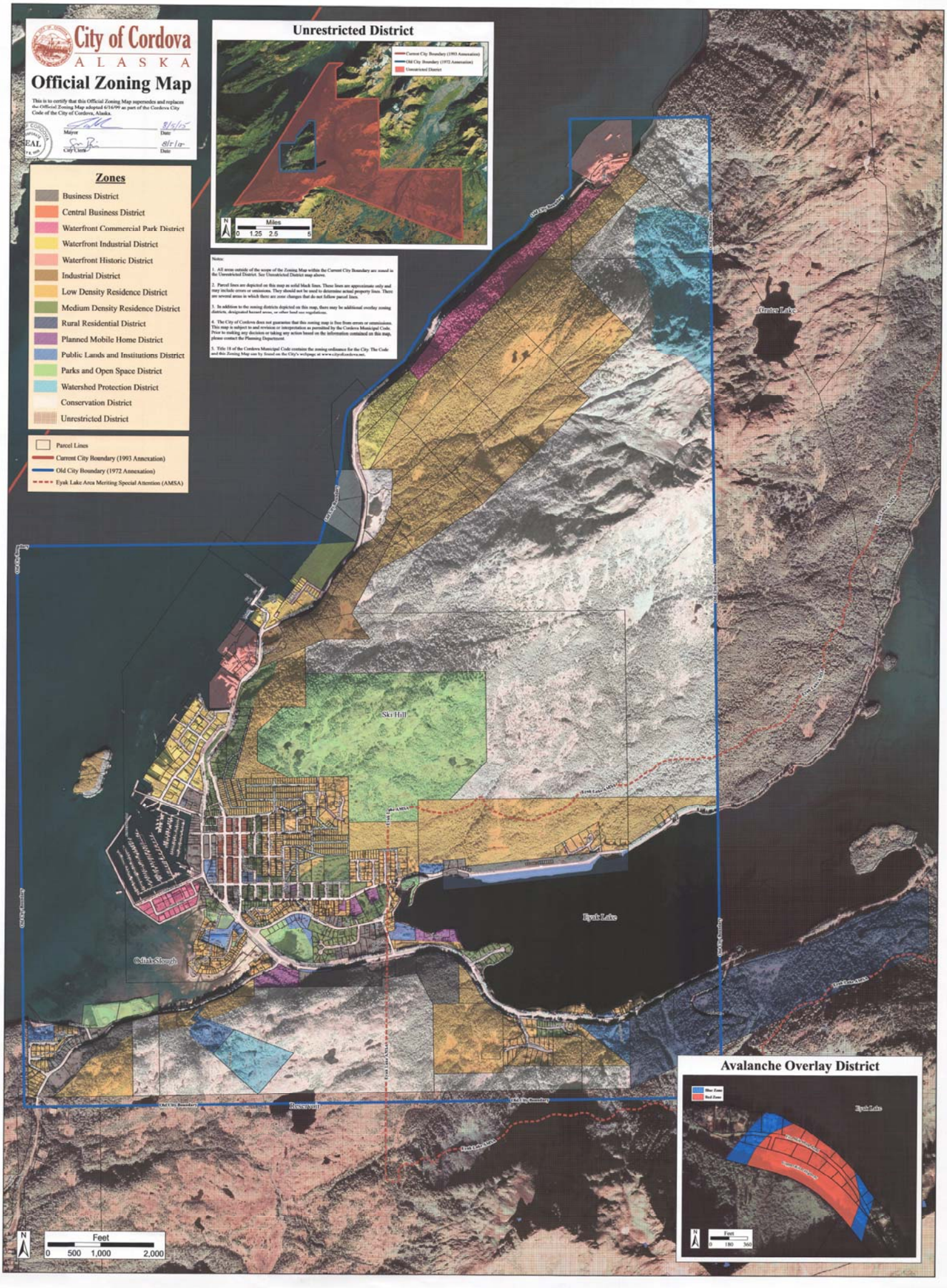
Attend either the Wednesday, February 21, 2018, Emergency Management Organization Monthly Luncheon at 1 pm or the City Council Meeting at 7 pm. One of the agenda items at both meetings will be a summary of the Draft Plan Update by Jennifer LeMay. You can request a copy of the plan be emailed to you now by emailing jlemay@lemayengineering.com You're invited to provide input to the plan and can present your comments verbally. We'll be discussing:

- 2018 Plan Hazards, which include:
  - Flood
  - Erosion
  - Severe Weather
  - Earthquake
  - Tsunami
  - Wild land Fires
  - Avalanches
  - Volcanic Ash
  - Climate Change
  - Technological, Public Health and Human-Caused Hazards

  What would be your top three hazards from the above list?
- Critical Infrastructure
- Vulnerability Overview
- Mitigation Projects

For more information, contact:
Sam Greenwood, Cordova City Planner (907) 424-6220
Joanie Behrend, Emergency Management Coordinator (763) 242-6535
Jennifer LeMay, PE, PMP, Lead Planner (907) 350-6061
Brent Nichols, DMVA, DHS&EM Project Manager (907) 428-7085

Appendix B: Area Use Map


City of Cordova
ALASKA
Official Zoning Map
This is to certify that this Official Zoning Map supersedes and replaces the Official Zoning Map adopted 6/16/99 as part of the Cordova City Code of the City of Cordova, Alaska.
Mayor
Date
City Clerk
Date
SEAL
Zones
Business District
Central Business District
Waterfront Commercial Park District
Waterfront Industrial District
Waterfront Historic District
Industrial District
Low Density Residence District
Medium Density Residence District
Rural Residential District
Planned Mobile Home District
Public Lands and Institutions District
Parks and Open Space District
Watershed Protection District
Conservation District
Unrestricted District
Parcel Lines
Current City Boundary (1993 Annexation)
Old City Boundary (1972 Annexation)
Eyak Lake Area Meriting Special Attention (AMSA)
Unrestricted District
Current City Boundary (1993 Annexation)
Old City Boundary (1972 Annexation)
Unrestricted District
N
Miles
0 1.25 2.5 5
Notes:
1. All areas outside of the scope of the Zoning Map within the Current City Boundary are zoned in the Unrestricted District. See Unrestricted District map above.
2. Parcel lines are depicted on this map as solid black lines. These lines are approximate only and may include errors or omissions. They should not be used to determine actual property lines. There are several areas in which there are zone changes that do not follow parcel lines.
3. In addition to the zoning districts depicted on this map, there may be additional overlay zoning districts, designated hazard areas, or other land use regulations.
4. The City of Cordova does not guarantee that this zoning map is free from errors or omissions. This map is subject to and revision or interpretation as permitted by the Cordova Municipal Code. Prior to making any decision or taking any action based on the information contained on this map, please contact the Planning Department.
5. Title 18 of the Cordova Municipal Code contains the zoning ordinance for the City. The Code and this Zoning Map can by found on the City's webpage at www.cityofcordova.net.
Old City Boundary
Ski Hill
Eyak Lake
Eyak Slough
Reservoir
Center Lake
Eyak Lake AMSA
Eyak Lake Trail
N
Feet
0 500 1,000 2,000
Avalanche Overlay District
Blue Zone
Red Zone
Eyak Lake
N
Feet
0 180 360

Appendix C: FEMA Review Tool

Appendix D: Benefit-Cost Analysis Fact Sheet

Benefit-Cost Analysis Fact Sheet

Hazard mitigation projects are specifically aimed at reducing or eliminating future damages. Although hazard mitigation projects may sometimes be implemented in conjunction with the repair of damages from a declared disaster, the focus of hazard mitigation projects is on strengthening, elevating, relocating, or otherwise improving buildings, infrastructure, or other facilities to enhance their ability to withstand the damaging impacts of future disasters. In some cases, hazard mitigation projects may also include training or public-education programs if such programs can be demonstrated to reduce future expected damages.

A Benefit-Cost Analysis (BCA) provides an estimate of the "benefits" and "costs" of a proposed hazard mitigation project. The benefits considered are avoided future damages and losses that are expected to accrue as a result of the mitigation project. In other words, benefits are the reduction in expected future damages and losses (i.e., the difference in expected future damages before and after the mitigation project). The costs considered are those necessary to implement the specific mitigation project under evaluation. Costs are generally well determined for specific projects for which engineering design studies have been completed. Benefits, however, must be estimated probabilistically because they depend on the improved performance of the building or facility in future hazard events, the timing and severity of which must be estimated probabilistically.

All Benefit-Costs must be:

- Credible and well documented
- Prepared in accordance with accepted BCA practices
- Cost-effective (BCR $\geq$ 1.0)

General Data Requirements:

- All data entries (other than Federal Emergency Management Agency [FEMA] standard or default values) MUST be documented in the application.
- Data MUST be from a credible source.
- Provide complete copies of reports and engineering analyses.
- Detailed cost estimate.
- Identify the hazard (flood, wind, seismic, etc.).
- Discuss how the proposed measure will mitigate against future damages.
- Document the Project Useful Life.
- Document the proposed Level of Protection.
- The Very Limited Data (VLD) BCA module cannot be used to support cost-effectiveness (screening purposes only).
- Alternative BCA software MUST be approved in writing by FEMA HQ and the Region prior to submittal of the application.

Damage and Benefit Data

- Well documented for each damage event.
- Include estimated frequency and method of determination per damage event.
- Data used in place of FEMA standard or default values MUST be documented and justified.

- The Level of Protection MUST be documented and readily apparent.
- When using the Limited Data (LD) BCA module, users cannot extrapolate data for higher frequency events for unknown lower frequency events.

Building Data

- Should include FEMA Elevation Certificates for elevation projects or projects using First Floor Elevations (FFEs).
- Include data for building type (tax records or photos).
- Contents claims that exceed 30 percent of building replacement value (BRV) MUST be fully documented.
- Method for determining BRVs MUST be documented. BRVs based on tax records MUST include the multiplier from the County Tax Assessor.
- Identify the amount of damage that will result in demolition of the structure (FEMA standard is 50 percent of pre-damage structure value).
- Include the site location (i.e., miles inland) for the Hurricane module.

Use Correct Occupancy Data

- Design occupancy for Hurricane shelter portion of Tornado module.
- Average occupancy per hour for the Tornado shelter portion of the Tornado module.
- Average occupancy for Seismic modules.

Questions to Be Answered

- Has the level of risk been identified?
- Are all hazards identified?
- Is the BCA fully documented and accompanied by technical support data?
- Will residual risk occur after the mitigation project is implemented?

Common Shortcomings

- Incomplete documentation.
- Inconsistencies among data in the application, BCA module runs, and the technical support data.
- Lack of technical support data.
- Lack of a detailed cost estimate.
- Use of discount rate other than FEMA-required amount of 7 percent.
- Overriding FEMA default values without providing documentation and justification.
- Lack of information on building type, size, number of stories, and value.
- Lack of documentation and credibility for FFEs.
- Use of incorrect Project Useful Life (not every mitigation measure = 100 years).

Appendix E: Plan Maintenance Documents

Annual Review Questionnaire

PLAN SECTION	QUESTIONS	YES	NO	COMMENTS
PLANNING PROCESS	Are there internal or external organizations and agencies that have been invaluable to the planning process or to mitigation action			
	Are there procedures (e.g., meeting announcements, plan updates) that can be done more efficiently?			
	Has the Task Force undertaken any public outreach activities regarding the MHMP or implementation of mitigation actions?			
HAZARD PROFILES	Has a natural and/or human-caused disaster occurred in this reporting period?			
	Are there natural and/or human-caused hazards that have not been addressed in this HMP and should be?			
	Are additional maps or new hazard studies available? If so, what have they revealed?			
VULNERABILITY ANALYSIS	Do any new critical facilities or infrastructure need to be added to the asset lists?			
	Have there been changes in development patterns that could influence the effects of hazards or create additional risks?			
MITIGATION STRATEGY	Are there different or additional resources (financial, technical, and human) that are now available for mitigation planning within the			
	Are the goals still applicable?			
	Should new mitigation actions be added to the a community's Mitigation Action Plan?			
	Do existing mitigation actions listed in a community's Mitigation Action Plan need to be reprioritized?			
	Are the mitigation actions listed in a community's Mitigation Action Plan appropriate for available resources?			

Mitigation Action Progress Report

Progress Report Period: _____ (date) to _____ (date)

Project Title: _____ Project ID# _____

Responsible Agency: _____

Address: _____

City: _____

Contact Person: _____ Title: _____

Phone #(s): _____ email address: _____

List Supporting Agencies and Contacts:

_____

_____

Total Project Cost: _____

Anticipated Cost Overrun/Underrun: _____

Date of Project Approval: _____ Start date of the project: _____

Anticipated completion date: _____

Description of the Project (include a description of each phase, if applicable, and the time frame for completing each phase): _____

_____

_____

_____

Milestones	Complete	Projected Date of Completion

Plan Goal (s) Addressed:

Goal: _____

Indicator of Success: _____

_____

_____

_____

Project Status

☐ Project on schedule

☐ Project completed

☐ Project delayed*

*explain: _____

_____

☐ Project canceled

Project Cost Status

☐ Cost unchanged

☐ Cost overrun*

*explain: _____

_____

☐ Cost underrun*

*explain: _____

_____

Summary of progress on project for this report:

A. What was accomplished during this reporting period?

_____

_____

_____

_____

B. What obstacles, problems, or delays did you encounter, if any?

_____

_____

_____

_____

C. How was each problem resolved?

_____

_____

_____

_____

Next Steps: What is/are the next step(s) to be accomplished over the next reporting period?

Other Comments:

Community Local Hazard Mitigation Plan Survey

This survey is an opportunity for you to share your opinions and participate in the mitigation planning process. The information that you provide will help us better understand your concerns for hazards and risks, which could lead to mitigation activities that will help reduce those risks and the impacts of future hazard events.

The hazard mitigation process is not complete without your feedback. All individual responses are strictly confidential and will be used for mitigation planning purposes only.

Please help us by taking a few minutes to complete this survey and return it to:

City Planning Director, Cordova

PO Box 1210

Cordova, AK 99574

Vulnerability Assessment

The following questions focus on how vulnerable the community or its facilities are to damage from a particular hazard type using the following vulnerability scale:

0= Don't Know 1 =Minimally Vulnerable 2=Moderately Vulnerable 3=Severely Vulnerable

1. How vulnerable to damage are the *structures* in the community from:

a. Flooding?	0 1 2 3
b. Wildfire?	0 1 2 3
C. Earthquakes?	0 1 2 3
d. Volcanoes?	0 1 2 3
e. Snow Avalanche?	0 1 2 3
f. Tsunami/Seiches?	0 1 2 3
g. Severe weather storms?	0 1 2 3
h. Ground failure (landslide, permafrost)?	0 1 2 3
i. Coastal erosion?	0 1 2 3
j. Climate change?	0 1 2 3
k. Other hazards?	0 1 2 3
Please Specify:	

2. How vulnerable to damage are the *critical facilities* within our community from:

[Critical facilities include airport, community shelter, bulk fuel storage tanks, generators, health clinic, law enforcement office (VPO, VPSO, police department), school, public works, e.g. washeteria/water

treatment, reservoir/water supply, satellite dish, communications tower, landfills, sewage lagoons, and stores.]

a. Flooding?	0 1 2 3
b. Wildfire?	0 1 2 3
C. Earthquakes?	0 1 2 3
d. Volcanoes?	0 1 2 3
e. Snow Avalanche?	0 1 2 3
f. Tsunami/Seiches?	0 1 2 3
g. Severe weather storms?	0 1 2 3
h. Ground failure (landslide, permafrost)?	0 1 2 3
i. Coastal erosion?	0 1 2 3
j. Climate change?	0 1 2 3
k. Other hazards?	0 1 2 3

Please Specify:

3. How vulnerable to displacement, evacuation or life-safety is the community from:

a. Flooding?	0 1 2 3
b. Wildfire?	0 1 2 3
C. Earthquakes?	0 1 2 3
d. Volcanoes?	0 1 2 3
e. Snow Avalanche?	0 1 2 3
f. Tsunami/Seiches?	0 1 2 3
g. Severe weather storms?	0 1 2 3
h. Ground failure (landslide, permafrost)?	0 1 2 3
i. Coastal erosion?	0 1 2 3
j. Climate change?	0 1 2 3
k. Other hazards?	0 1 2 3

Please Specify:

4. Do you have a record of damages incurred during past flood events? Yes No

If yes, please describe:_____

_____

_____

Preparedness

Preparedness activities are often the first line of defense for protection of your family and the community. In the following list, please check those activities that you have done, plan to do in the near future, have not done, or are unable to do. *Please check one answer for each preparedness activity*.

Have you or someone in your household:	Have Done	Plan to do	Not Done	Unable to do
Attended meetings or received written information on natural disasters or emergency preparedness?	☐	☐	☐	☐
Talked with family members about what to do in case of a disaster or emergency?	☐	☐	☐	☐
Made a "Household/Family Emergency Plan" in order to decide what everyone would do in the event of a disaster?	☐	☐	☐	☐
Prepared a "Disaster Supply Kit" extra food, water, medications, batteries, first aid items, and other emergency supplies)?	☐	☐	☐	☐
In the last year, has anyone in your household been trained in First Aid or CPR?	☐	☐	☐	☐

5. Would you be willing to make your home more resistant to natural disasters? ☐ Yes ☐ No

6. Would you be willing to spend more money on your home to make it more disaster resistant? ☐ Yes ☐ No ☐ Don't know

7. How much are you willing to spend to better protect your home from natural disasters? *(Check only one)*

☐	Less than $100	☐	Desire to relocate for protection
☐	$100-$499	☐	Other, please explain
☐	$500 and above		
☐	Nothing / Don't know		
☐	Whatever it takes		

Mitigation Activities

A component of the Local Hazard Mitigation Plan activities is developing and documenting additional mitigation strategies that will aid the community in protecting life and property from the impacts of future natural disasters.

Mitigation activities are those types of actions you can take to protect your home and property from natural hazard events such as floods, severe weather, and wildfire. Please check the box

for the following statements to best describe their importance to you. Your responses will help us determine your community's priorities for planning for these mitigation activities.

Statement	Very Important	Somewhat Important	Neutral	Not Very Important	Not Important
Protecting private property	☐	☐	☐	☐	☐
Protecting critical facilities (clinic, school, washeteria, police/fire department, water/sewer, landfill)	☐	☐	☐	☐	☐
Preventing development in hazard areas	☐	☐	☐	☐	☐
Protecting natural environment	☐	☐	☐	☐	☐
Protecting historical and cultural landmarks	☐	☐	☐	☐	☐
Promoting cooperation within the community	☐	☐	☐	☐	☐
Protecting and reducing damage to utilities, roads, or water tank	☐	☐	☐	☐	☐
Strengthening emergency services (clinic workers, police/fire)	☐	☐	☐	☐	☐

8. Do you have other suggestions for possible mitigation actions/strategies?

_____

_____

_____

_____

_____

General Household Information

9. Please indicate your age: _____

and Gender: ☐ Male ☐ Female

10. Please indicate your level of education:

☐	Grade school/no schooling	☐	College degree
☐	Some high school	☐	Postgraduate degree

☐	High school graduate/GED	☐	Other, please specify
☐	Some college/trade school		

11. How long have you lived in your community?

☐ Less than 5 years ☐ 5 to 10 years ☐ 11 to 20 years ☐ 21 or more years

12. Do you have internet access? ☐ Yes ☐ No

13. Do you own or rent your home? ☐ Own ☐ Rent

If you have any questions regarding this survey or would like to learn about other ways that you can participate in the development of the Local Hazard Mitigation Plan, please contact the City Administrator.

Thank You for Your Participation!

This survey may be submitted anonymously; however, if you provide us with your name and contact information below we will have the ability to follow up with you to learn more about your ideas or concerns (optional):

Name: _____

Address: _____

_____

Phone: _____