City of Chefornak
Hazard Mitigation Plan

Prepared by
The City of Chefornak
Hazard Mitigation Planning Team

July 25, 2014

This document was prepared under a grant from the Federal Emergency Management Agency (FEMA)'s Grant Programs Directorate, U.S. Department of Homeland Security, and the Alaska Division of Homeland Security and Emergency Management.

Points of view or opinions expressed in this document are those of the authors and do not necessarily represent the official position or policies of FEMA's Grant Programs Directorate, the U.S. Department of Homeland Security, or the State of Alaska.

Front Cover Photo Acknowledgement:
Top Photo

1. DCRA: http://commerce.alaska.gov/DNN/Portals/4/Repository/Photos/CHEFORNA23.jpg

Bottom Film Clip Photos:

2. USACE: http://66.223.166.160/floodplain_data/Chefornak/Photos/Jun74_Aerial.pdf
3. Lower Kuskokwim School District (LKSD): http://www.lksd.org/sped/photos2.html
4. Flickr.com: https://www.flickr.com/photos/11510240@N05/1470717853l
5. DCRA: http://dcra.commerce.alaska.gov/PHOTOS/Chefornak/CHEFORNA114.JPG

U.S. Department of Homeland Security
Region X
130 228th Street, SW
Bothell, WA 98021-9796

FEMA

July 25, 2014

08-01-14P12:21 RCVD

Honorable Rosalie C. Mathew
Mayor, City of Chefornak
102 Complex Drive
P.O. Box 29
Chefornak, Alaska 99561

Dear Mayor Mathew:

The U.S. Department of Homeland Security's Federal Emergency Management Agency (FEMA) has approved the ***City of Chefornak Hazard Mitigation Plan*** as a local plan as outlined in 44 CFR Part 201. With approval of this plan, City of Chefornak is now eligible to apply for the Robert T. Stafford Disaster Relief and Emergency Assistance Act's hazard mitigation project grants through July 24, 2019.

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

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

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

Sincerely,

for

Mark Carey, Director
Mitigation Division

cc: Ann Gravier, Alaska Division of Homeland Security and Emergency Management

Enclosure

BH:bb

This page intentionally left blank

Table of Contents

1. Introduction 1-1
1.1 Hazard Mitigation Planning 1-1
1.2 Grant Programs with Mitigation Plan Requirements 1-1
1.2.1 Hazard Mitigation Assistance (HMA) Unified Programs 1-2
2. Community Description 2-1
2.1 Location, Geography, and History 2-1
2.2 Demographics 2-1
2.3 Economy 2-2
3. Planning Process 3-1
3.1 Planning Process Overview 3-1
3.2 Hazard Mitigation Planning Team 3-3
3.3 Public Involvement & Opportunity for Interested Parties to participate 3-3
3.4 Incorporation of Existing Plans and Other Relevant Information 3-5
3.5 Plan Maintenance 3-6
3.5.1 Implementation Into Existing Planning Mechanisms 3-6
3.5.2 Continued Public Involvement 3-6
3.5.3 Monitoring, Reviewing, Evaluating, and Updating the HMP 3-7
4. Plan Adoption 4-1
4.1 Adoption by Local Governing Bodies and Supporting Documentation 4-1
5. Hazard Profiles 5-1
5.1 Overview of a Hazard Analysis 5-1
5.2 Hazard Identification and Screening 5-1
5.3 Hazard Profile 5-3
5.3.1 Earthquake 5-4
5.3.2 Erosion 5-10
5.3.3 Flood 5-13
5.3.4 Ground Failure 5-20
5.3.5 Severe Weather 5-25
6. Vulnerability Analysis 6-1
6.1 Vulnerability Analysis Overview 6-1
6.2 Land Use and Development Trends 6-2
6.2.1 Land Use 6-2
6.3 Exposure Analysis For Current Assets 6-3
6.3.1 Asset Inventory 6-3
6.4 Repetitive Loss Properties 6-10
6.5 Vulnerability Analysis Methodology 6-11
6.6 Data Limitations 6-12
6.7 Vulnerability Exposure Analysis 6-12
6.7.1 Exposure Analysis – Hazard Narrative Summaries 6-14
6.8 Future Development 6-17
7. Mitigation Strategy 7-1
7.1 City of Chefornak's Capability Assessment 7-2

7.2 Developing Mitigation Goals 7-4
7.3 Identifying Mitigation Actions 7-5
7.4 Evaluating and Prioritizing Mitigation Actions 7-7
7.5 Mitigation Action Plan 7-9
7.6 Implementing Mitigation Strategy into Existing Planning Mechanisms 7-16
8. References 8-1

Tables

Table 1-1 HMA Eligible Activities 1-2
Table 3-1 Hazard Mitigation Planning Team 3-3
Table 3-2 Public Involvement Mechanisms 3-4
Table 3-3 Documents Reviewed 3-5
Table 5-1 Identification and Screening of Hazards 5-2
Table 5-2 Hazard Magnitude/Severity Criteria 5-4
Table 5-3 Hazard Probability Criteria 5-4
Table 5-4 Magnitude/Intensity/Ground-Shaking Comparisons 5-6
Table 5-5 Historical Earthquakes for Chefornak 5-7
Table 5-6 Historic Flood Events (NWS) 5-17
Table 5-7 Station:500754; Bethel WSO Airport 5-28
Table 5-8 Severe Weather Events 5-30
Table 6-1 Vulnerability Overview 6-2
Table 6-2 Estimated Population and Building Inventory 6-3
Table 6-3 Completed Projects 6-4
Table 6-4 Critical Facilities and Infrastructure 6-8
Table 6-5 Potential Hazard Exposure Analysis – Critical Facilities 6-13
Table 6-6 Potential Hazard Exposure Analysis – Critical Infrastructure 6-13
Table 6-7 Planned and Funded Projects 6-17
Table 7-1 Chefornak's Regulatory Tools 7-2
Table 7-2 Chefornak's Technical Specialists for Hazard Mitigation 7-3
Table 7-3 Financial Resources Available for Hazard Mitigation 7-3
Table 7-4 Mitigation Goals 7-5
Table 7-5 Potential Mitigation Actions 7-6
Table 7-6 Evaluation Criteria for Mitigation Actions 7-8
Table 7-7 Potential Funding Source Acronym List 7-9
Table 7-8 City of Chefornak's Mitigation Action Plan (MAP) 7-11

Figures

Figure 2-1 Chefornak Location Map 2-1
Figure 2-2 Chefornak's Historic Population 2-2
Figure 2-3 Aerial Photograph of the City of Chefornak 2-3
Figure 5-1 Active and Potentially Active Faults in Alaska 5-7
Figure 5-2 Earthquake Faults Adjacent to Chefornak 5-8
Figure 5-3 Chefornak's Earthquake Probability 5-9
Figure 5-4 Chefornak's Erosion Impact Area 5-12
Figure 5-5 Permafrost and Ground Ice Map of Alaska 5-23
Figure 5-6 Road Damage 5-24
Figure 5-7 Sink Hole Near Embankment 5-24
Figure 5-8 Statewide Rainfall Map 5-27
Figure 5-9 Chefornak's Historic and Predicted Precipitation 5-29
Figure 5-10 Chefornak's Historic and Predicted Temperatures 5-30

Appendices

A Funding Resources
B FEMA HMP Review Tool
C Community HMP Adoption Resolution
D Public Outreach
E Benefit-Cost Analysis Fact Sheet
F Plan Maintenance Documents

Acronyms/Abbreviations

°F	Degrees Fahrenheit
ACCIMP	Alaska Climate Change Impact Mitigation Program
ACWF	Alaska Clean Water Fund
ADWF	Alaska Drinking Water Fund
AEA	Alaska Energy Authority
AEEE	Alternative Energy And Energy Efficiency
AFG	Assistance To Firefighters Grant
AHFC	Alaska Housing Finance Corporation
AICC	Alaska Interagency Coordination Center
AK	Alaska
ANA	Administration For Native Americans
ARC	American Red Cross
ARRA	American Recovery and Reinvestment Act
ATV	All-Terrain Vehicle
AVCP	Association of Village Council Presidents
AVEC	Alaska Village Electric Cooperative
BIA	Bureau Of Indian Affairs
CCP	Citizen Corps Program
CDBG	Community Development Block Grant
CFR	Code Of Federal Regulations
CFP	Community Forestry Program
CGP	Comprehensive Grant Program
City	City Of Chefornak
CWSRF	Clean Water State Revolving Fund
DCCED	Department Of Commerce, Community, And Economic Development
DCRA	Division Of Community And Regional Affairs
DEC	Department Of Environmental Conservation
Denali	Denali Commission
DHS	Department Of Homeland Security
DHS&EM	Division Of Homeland Security And Emergency Management
DHSS	Department Of Health And Social Services
DGGS	Division Of Geological And Geophysical Survey
DMA 2000	Disaster Mitigation Act Of 2000
DMVA	Department Of Military And Veterans Affairs
DNR	Department Of Natural Resources
DOE	Department Of Energy
DOF	Division Of Forestry
DOI	Division Of Insurance
DOL	Department Of Labor
DOT/PF	Department Of Transportation And Public Facilities
DSS	Division Of Senior Services
EECBG	Energy Efficiency and Conservation Block Grant

Acronyms/Abbreviations

EOC	Emergency Operations Center
EMPG	Emergency Management Performance Grant
EPA	Environmental Protection Agency
EQ	Earthquake
ER	Erosion
EWP	Emergency Watershed Protection Program
FAA	Federal Aviation Administration
FEMA	Federal Emergency Management Agency
FL	Flood
FMA	Flood Mitigation Assistance
FP&S	Fire Prevention And Safety
ft	Feet
FY	Fiscal Year
g	Gravity
GF	Ground Failure
GIS	Geospatial Information System
Hazus	Hazard United States – Multi-Hazard Software
HMA	Hazard Mitigation Assistance
HMGP	Hazard Mitigation Grant Program
HMP	Hazard Mitigation Plan
HSGP	Homeland Security Grant Program
HUD	Housing And Urban Development
IBHS	Institute For Business And Home Safety
ICDBG	Indian Community Development Block Grant
IHBG	Indian Housing Block Grant
IHLGP	Indian Home Loan Guarantee Program
IHS	Indian Health Service
INAP	Indian And Native American Programs
IRS	Internal Revenue Service
Kts	Knots
kW	Kilowatt
M	Magnitude
MAP	Mitigation Action Plan
MGL	Municipal Grants And Loans
MMI	Modified Mercalli Intensity
mph	Miles Per Hour
msl	Mean Sea Level
NAHASDA	Native American Housing Assistance And Self Determination Act
NFIP	National Flood Insurance Program
NIMS	National Incident Management System
NOAA	National Oceanic And Atmospheric Administration
NRF	National Response Framework
NRCS	Natural Resources Conservation Service

Acronyms/Abbreviations

NWS	National Weather Service
PDM	Pre-Disaster Mitigation
PGA	Peak Ground Acceleration
PNP	Private Non-Profits
RCASP	Remote Community Alert Systems
RD	Rural Development
RDA	Regional Development Assistance
RFA	Rural Fire Assistance Grant
RL	Repetitive Loss
RPSU	Rural Power System Upgrade
RurAL CAP	Rural Alaska Community Action Program Incorporated
SAFER	Staffing For Adequate Fire And Emergency Response
SBA	U.S. Small Business Administration
SHMP	Alaska State Hazard Mitigation Plan
SHSP	State Homeland Security Program
SOA	State Of Alaska
Sq.	Square
Stafford Act	Robert T. Stafford Disaster Relief And Emergency Assistance Act
STAPLEE	Social, Technical, Administrative, Political, Legal, Economic, And Environmental
URS	URS Corporation
US or U.S.	United States
USACE	United States Army Corps Of Engineers
USC	United States Code
USDA	United States Department Of Agriculture
USGS	United States Geological Survey
VFA-RFA	Volunteer Fire Assistance Grant
VSW	Village Safe Water
WARN	Warning, Alert, And Response Network
WHIP	Wildlife Habitat Incentives Program
WTP	Water Treatment Plant

1

INTRODUCTION

Section One provides a brief introduction to hazard mitigation planning, the grants associated with these requirements, and a description of this Hazard Mitigation Plan (HMP).

1.1 HAZARD MITIGATION PLANNING

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

To implement these planning requirements, FEMA published an Interim Final Rule in the Federal Register on February 26, 2002 (FEMA 2002a), 44 CFR Part 201 with subsequent updates. The planning requirements for local entities are described in detail in Section 2 and are identified in their appropriate sections throughout this HMP.

In October 2007 and July 2008, FEMA combined and expanded flood mitigation planning requirements with local hazard mitigation plans (44 CFR §201.6). Furthermore, all hazard mitigation assistance program planning requirements were combined eliminating duplicated mitigation plan requirements. This change also required participating National Flood Insurance Program (NFIP) communities' risk assessments and mitigation strategies to identify and address repetitively flood damaged properties. Local hazard mitigation plans now qualify communities for several Federal Hazard Mitigation Assistance (HMA) grant programs.

This HMP complies with Title 44 CFR current as of September 28, 2012 and applicable guidance documents.

1.2 GRANT PROGRAMS WITH MITIGATION PLAN REQUIREMENTS

FEMA HMA grant programs provide funding to States, Tribes, and local entities that have a FEMA-approved State, Tribal, or Local Mitigation Plan. Two of the grants are authorized under the Stafford Act and DMA 2000, while the remaining three are authorized under the National Flood Insurance Act and the Bunning-Bereuter-Blumenauer Flood Insurance Reform Act.

The Hazard Mitigation Grant Program (HMGP) is a competitive, disaster funded, grant program. Whereas the other Unified Mitigation Assistance Programs: Pre-Disaster Mitigation (PDM) and Flood Mitigation Assistance (FMA) programs although competitive, rely on specific pre-disaster grant funding sources, sharing several common elements.

> *"Hazard mitigation is any sustained action taken to reduce or eliminate long-term risk to people and property from natural hazards and their effects. This definition distinguishes actions that have a long-term impact from those that are more closely associated with immediate preparedness, response, and recovery activities. Hazard mitigation is the only phase of emergency management specifically dedicated to breaking the cycle of damage,*

reconstruction, and repeated damage. As such, States, Territories, Indian Tribal governments, and communities are encouraged to take advantage of funding provided by HMA programs in both the pre- and post-disaster timeframes.

Together, these programs provide significant opportunities to reduce or eliminate potential losses to State, Tribal, and local assets through hazard mitigation planning and project grant funding. Each HMA program was authorized by separate legislative action, and as such, each program differs slightly in scope and intent.

The Hazard Mitigation Grant Program (HMGP) may provide funds to States, Territories, Indian Tribal governments, local governments, and eligible private non-profits (PNPs) following a Presidential major disaster declaration. The Pre-Disaster Mitigation (PDM) and Flood Mitigation Assistance (FMA) programs may provide funds annually to States, Territories, Indian Tribal governments, and local governments. While the statutory origins of the programs differ, all share the common goal of reducing the risk of loss of life and property due to natural hazards" (FEMA 2010).

1.2.1 Hazard Mitigation Assistance (HMA) Unified Programs

HMA grant program activities include:

Table 1-1 HMA Eligible Activities

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

(FEMA 2012)

The purpose of the HMGP is to reduce the loss of life and property due to natural disasters and to enable mitigation measures to be implemented during the immediate recovery from a disaster. Projects must provide a long-term solution to a problem, for example, elevation of a home to reduce the risk of flood damages as opposed to buying sandbags and pumps to fight the flood. In

addition, a project's potential savings must be more than the cost of implementing the project. Funds may be used to protect either public or private property or to purchase property that has been subjected to, or is in danger of, repetitive damage. The amount of funding available for the HMGP under a particular disaster declaration is limited. FEMA may provide a State or Tribe with up to 20 percent of the total aggregate disaster damage costs to fund HMGP project or planning grants. In Fiscal Year (FY) 2006 was approximately $232 million, FY 2007 was $316 million, FY 2008 was $1.246 billion, FY 2009 was $359 million, and FY 2010 was $23 million. The cost-share for these grants is 75 percent Federal/25 percent non-Federal. Communities that fulfill "Impoverished Community" criteria and receive FEMA Regional Administrator approval may be funded at percent 90 percent Federal/10 percent non-Federal.

The PDM grant program provides funds to State, Tribes, and local entities, including universities, for hazard mitigation planning and mitigation project implementation prior to a disaster event. PDM grants are awarded on a nationally competitive basis. Like HMGP funding, a PDM project's potential savings must be more than the cost of implementing the project. In addition, funds may be used to protect either public or private property or to purchase property that has been subjected to, or is in danger of, repetitive damage. The total amount of PDM funding available is appropriated by Congress on an annual basis. In FY 2008, PDM program funding totaled approximately $114 million, FY 2009 was $90 million, and FY 2010 was $100 million. The cost-share for these grants is 75 percent Federal/25 percent non-Federal.

The goal of the FMA grant program is to reduce or eliminate flood insurance claims under the NFIP. Particular emphasis for this program is placed on mitigating repetitive loss (RL) properties.

As the State Hazard Mitigation plan states:

> The City of Chefornak does not currently participate in the NFIP and is therefore ineligible for National Flood Insurance Act Grant Programs until they become a NFIP participant.

"The [FMA] provides pre-disaster grants to State and Local Governments for planning and flood mitigation projects. Created by the National Flood Insurance Reform Act of 1994, its goal is to reduce or eliminate NFIP claims. It is an annual nationally competitive program. Residential and non-residential properties may apply for FMA grants through their NFIP community and are required to have NFIP insurance to be eligible. FMA grant funds may be used to develop the flood portions of hazard mitigation plans or to do flood mitigation projects. FMA grants are funded 75% Federal and 25% applicant.

The Biggert-Waters Flood Insurance Reform Act of 2012 eliminated the Repetitive Flood Claims (RFC) and Severe Repetitive Loss (SRL) grant programs. Elements of these flood programs have been incorporated into FMA. The FMA program now allows for additional cost share flexibility:

- *Up to 100-percent Federal cost share for severe repetitive loss properties.*
- *Up to 90-percent Federal cost share for repetitive loss properties.*
- *Up to 75-percent Federal cost share for NFIP insured properties.*

The FMA program is available only to communities participating in the NFIP. In the State of Alaska, the Department of Commerce, Community, and Economic Development (DCCED) manages this program" (SHMP 2013).

HMP Layout Description

The HMP consists of the following sections and appendices:

Section 1 Introduction

Defines what a hazard mitigation plan is, delineates federal requirements and authorities, and introduces the Hazard Mitigation Assistance program listing the various grant programs and their historical funding levels.

Section 2 Community Description

Provides a general history and background of the City of Chefornak (City), including historical trends for population and the demographic and economic conditions that have shaped the area.

Section 3 Planning Process

Describes the HMP update's planning process, identifies the Planning Team Members, the meetings held as part of the planning process, and the key stakeholders within the City and the surrounding area. This section documents public outreach activities (support documents are located in Appendix D); the review and incorporation of relevant plans, reports, and other appropriate information; actions the City plans to implement to assure continued public participation; and their methods and schedule for keeping the plan current.

This section also describes the Planning Team's formal plan maintenance process to ensure that the HMP remains an active and applicable document throughout its 5-year lifecycle. The process includes monitoring, reviewing, evaluating (Appendix F – Maintenance Documents), updating the HMP; and implementation initiatives.

Section 4 HMP Adoption

Describes the community's HMP adoption process (support documents are located in Appendix C)

Section 5 Hazard Analysis

Describes the process through which the Planning Team identified, screened, and selected the hazards to for profiling in this version of the HMP. The hazard analysis includes the nature, previous occurrences (history), location, extent, impact, and future event recurrence probability for each hazard. In addition, historical impact and hazard location figures are included when available.

Section 6 Vulnerability Analysis

Identifies the City's potentially vulnerable assets—people, residential and nonresidential buildings (where available), critical facilities, and critical infrastructure. The resulting information identifies the full range of hazards that the City could face and potential social impacts, damages, and economic losses. Land use and development trends are also discussed.

Section 7 Mitigation Strategy

Defines the mitigation strategy which provides a blueprint for reducing the potential losses identified in the vulnerability analysis. This section lists the community's governmental authorities, policies, programs and resources.

The Planning Team developed a list of mitigation goals and potential actions to address the risks facing the City. Mitigation actions include preventive actions, property protection techniques, natural resource protection strategies, structural projects, emergency services, and public

information and awareness activities. Mitigation strategies were developed to address NFIP insured properties (if applicable) while encouraging participation with the NFIP and the reduction of flood damage to flood-prone structures.

Section 8 References

Lists reference materials and resources used to prepare this HMP.

Appendices

Appendix A Funding Resources:

Delineates Federal, State, and other potential mitigation funding sources. This section will aid the community with researching and applying for funds to implement their mitigation strategy.

Appendix B FEMA HMP Review Tool

Provides the FEMA Local Mitigation Plan Review Tool, which documents compliance with FEMA criteria.

Appendix C Community HMP Adoption Resolution

Provides the adoption resolution for the City of Chefornak.

Appendix D Public Outreach

Provides public outreach information, meeting minutes, correspondence, and newsletters.

Appendix E Benefit-Cost Analysis Fact Sheet

Contains the Benefit-Cost Analysis Fact Sheet used to prioritize mitigation actions.

Appendix F Plan Maintenance Documents

Provides the plan maintenance documents, such as an annual review sheet and the progress report form.

This page intentionally left blank

2

COMMUNITY DESCRIPTION

Section Two describes the location, geography, history; demographics; and land use development trends of the City of Chefornak and the Native Village of Chefornak.

2.1 LOCATION, GEOGRAPHY, AND HISTORY

*"Chefornak is located on the south bank of the Kinia River, at its junction with the Keguk River, in the Yukon-Kuskokwim Delta. The village lies within the Clarence Rhode National Wildlife Refuge, established for migratory waterfowl protection. Chefornak is 98 air miles southwest of Bethel and 490 miles southwest of Anchorage." (*Department of Community, Commerce, and Economic Development [DCCED], Division of Community and Regional Affairs [DCRA] 2012).

Figure 2-1 Chefornak Location Map

DCRA states, the City of "Chefornak is located in a marine climate. Precipitation averages 22 inches, with 43 inches of snowfall annually. Summer temperatures range from 41 to 57 °F. Winter temperatures range 6 to 24 °F." The City covers approximately 5.7 square (sq.) miles of land and approximately0.8 sq. miles of water. (DCRA 2013).

The following is a brief sketch of the City's history:

> *"The area has historically been occupied by Yup'ik Eskimos. In the early 1950s, Alexie Amagiqchik founded a small general store at the site. He had moved from a village on the Bering Sea to the new location one mile inland to escape potential floodwaters. Others from the original village followed and settled in Chefornak. The city was incorporated in 1974.*
>
> *A traditional Yup'ik Eskimo community, Chefornak residents practice a subsistence lifestyle with some commercial fishing…*
>
> *A state-owned 2,500' long by 28' wide gravel airstrip provides chartered and private air access year-round, and a seaplane base is available. Although there are no docking facilities, a number of fishing boats and skiffs are used for local travel. Snowmachines are relied upon during the winter. Winter trails are marked to Kipnuk (20 mi) and Kasigluk (83 mi)" (DCRA 2013).*

2.2 DEMOGRAPHICS

Figure 2-2 illustrates the historic population of the City.

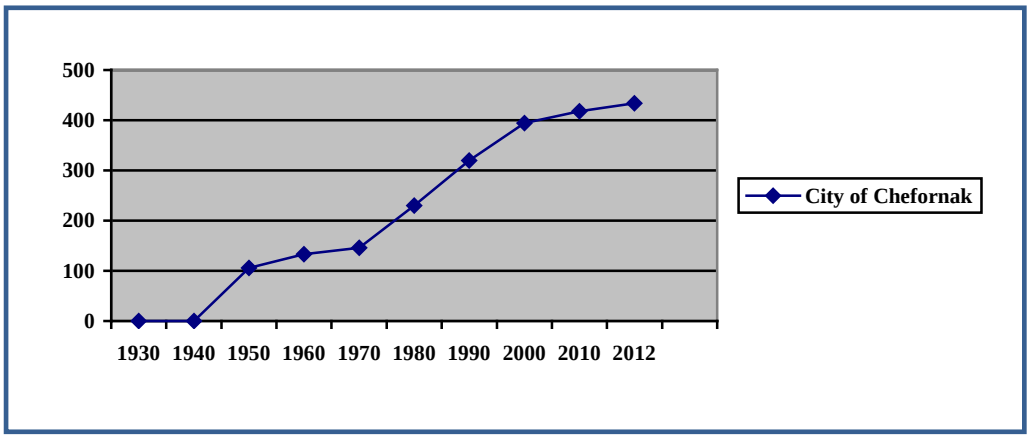

Figure 2-2 Chefornak's Historic Population

The 2010 census recorded 418 residents, of which the median age was 22 indicating a relatively young population. The population of Chefornak is expected to remain steady because over half of the population is between 4 and 34 years of age. Chefornak is mostly Alaska Native – Yup'ik Eskimo community. The male and female composition is split nearly 50 /50. The 2010 census revealed that there are 92 households with the average household having approximately five individuals. The most recent 2012 DCCED certified estimated population is 434.

2.3 ECONOMY

The City's economy is primarily based on subsistence as well as limited local, state, and federal jobs. Residents are employed by the City and Tribal Offices, the school, the US Post Office, and local businesses.

According to the 2010 census, the median household income in 2010 was $39,583 with a per capita income of $9,682. Approximately 26.6 % were reported to be living below the poverty level. The potential work force (those aged 16 years or older) in the City was estimated to be 157, of which 122 were actively employed. In 2010 the unemployment rate was 13.2 percent; however, this rate included part-time and seasonal jobs, and practical unemployment or underemployment is likely to be significantly higher.

Figure 2-3 depicts DCRA's 1995 aerial photograph of the City.

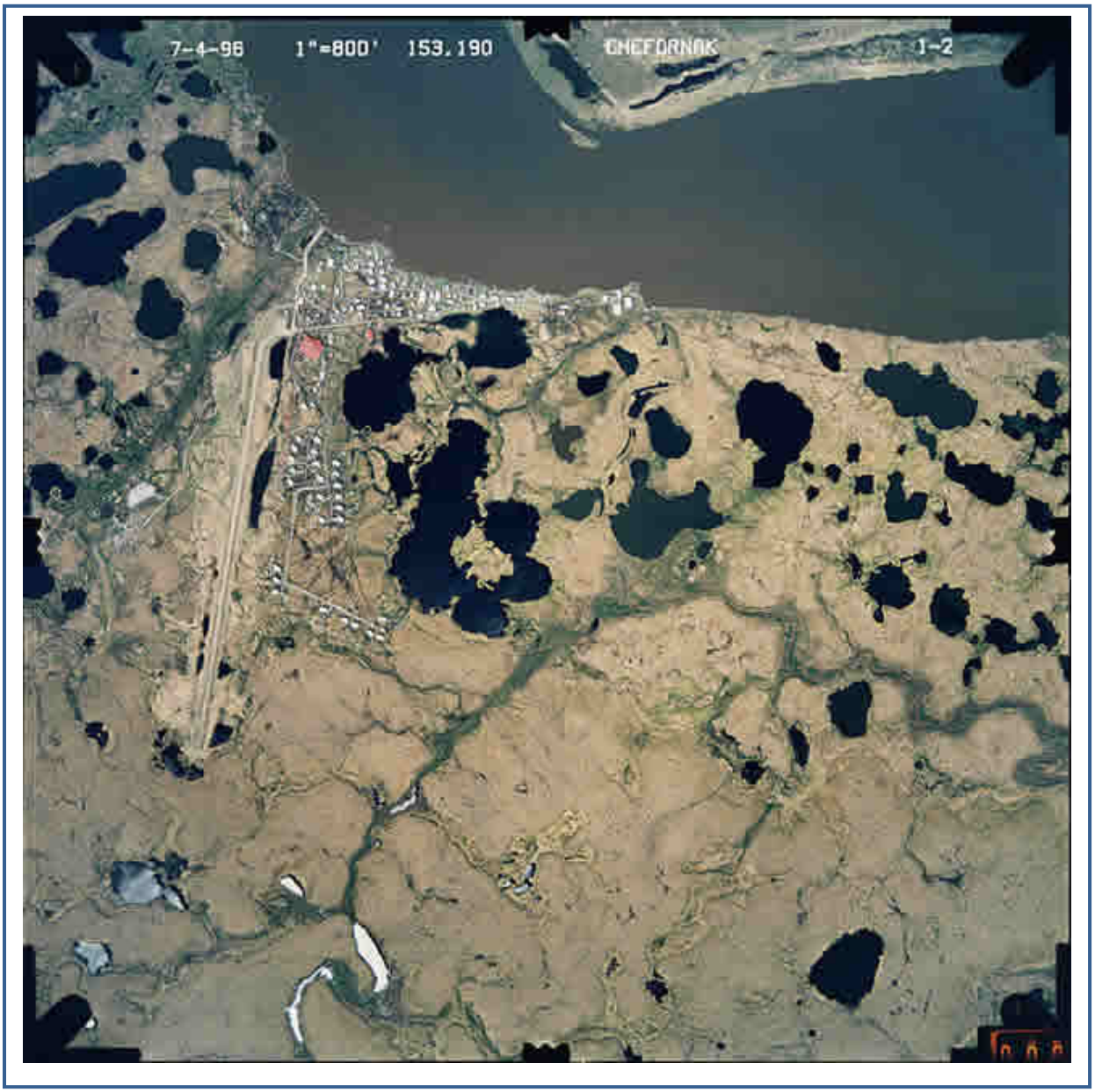

Figure 2-3 Aerial Photograph of the City of Chefornak (DCRA 2012)

This page intentionally left blank

Section Three provides an overview of the planning process; identifies the Planning Team Members and key stakeholders; documents public outreach efforts; and summarizes the review and incorporation of existing plans, studies, and reports used to develop this HMP. Outreach support documents and meeting information regarding the Planning Team and public outreach efforts are provided in Appendix F.

The requirements for the planning process, as stipulated in DMA 2000 and its implementing regulations are described below.

DMA 2000 Requirements
1. REGULATION CHECKLIST
Local Planning Process §201.6(b): An open public involvement process is essential to the development of an effective plan.
In order to develop a more comprehensive approach to reducing the effects of natural disasters, the planning process shall include: Element §201.6(b)(1): An opportunity for the public to comment on the plan during the drafting stage and prior to plan approval; §201.6(b)(2): An opportunity for neighboring communities, local and regional agencies involved in hazard mitigation activities, and agencies that have the authority to regulate development, as well as businesses, academia and other private and nonprofit interests to be involved in the planning process; and §201.6(b)(3): Review and incorporation, if appropriate, of existing plans, studies, reports, and technical information. §201.6(c)(1): [The plan shall document] the planning process used to develop the plan, including how it was prepared, who was involved in the process, and how the public was involved. §201.6(c)(4)(i): The plan maintenance process shall include a] section describing the method and schedule of monitoring, evaluating, and updating the mitigation plan within a five-year cycle. §201.6(c)(4)(iii): The plan maintenance process shall include a] discussion on how the community will continue public participation in the plan maintenance process.
ELEMENT A. Planning Process
A1. Does the Plan document the planning process, including how it was prepared and who was involved in the process for each jurisdiction? (Requirement §201.6(c)(1))
A2. Does the Plan document an opportunity for neighboring communities, local and regional agencies involved in hazard mitigation activities, agencies that have the authority to regulate development as well as other interests to be involved in the planning process? (Requirement §201.6(b)(2))
A3. Does the Plan document how the public was involved in the planning process during the drafting stage? (Requirement §201.6(b)(1))
A4. Does the Plan describe the review and incorporation of existing plans, studies, reports, and technical information? (Requirement §201.6(b)(3))
A5. Is there discussion of how the community(ies) will continue public participation in the plan maintenance process? (Requirement §201.6(c)(4)(iii))
A6. Is there a description of the method and schedule for keeping the plan current (monitoring, evaluating and updating the mitigation plan within a 5-year cycle?) (Requirement §201.6(c)(4)(i))
Does the updated plan document how the planning team reviewed and analyzed each section of the plan and whether each section was revised as part of the update process? (Not applicable until 2013 update).
Source: FEMA, October 2011.

3.1 PLANNING PROCESS OVERVIEW

The State of Alaska, Division of Homeland Security and Emergency Management (DHS&EM) provided funding and project oversight to URS Corporation to facilitate and guide Planning Team development and HMP development.

The planning process began in June, 2013 with Mayor Robert Jimmy selecting City Administrator Dora Tilly Mathew, as Planning Team Lead. She began HMP data gathering activities and URS coordination.

Ms. Rosalie Brown assumed Planning Team Lead position upon her election as Mayor in October 2013. She organized a Planning Team to continue assisting URS with data gathering, plan development, and information confirmation.

The Planning Team identified applicable City resources and capabilities during the meeting. URS explained how the HMP differed from current emergency plans. The Planning Team then discussed the City's rolls such as: acting as an advocate for the planning process, assisting with gathering information, and supporting public participation opportunities. There was also a brief discussion about hazards that affect the community such as erosion, sediment deposition, and permafrost impacts, which are increasing in intensity.

The Planning Team further discussed the hazard mitigation planning process, asking participants to help identify hazards that affect the City, to identify impacts to residential and critical facilities, and for assisting the Planning Team with identifying and prioritizing mitigation actions for potential future mitigation project funding

In summary, the following five-step process took place from June 2013 through July 2014.

1. Organize resources: Members of the Planning Team identified resources, including staff, agencies, and local community members, who could provide technical expertise and historical information needed in the development of the hazard mitigation plan.
2. Monitor, evaluate, and update the plan: The Planning Team developed a process to ensure the plan was monitored to ensure it was used as intended while fulfilling community needs. The team then developed a process to evaluate the plan to compare how their decisions affected hazard impacts. They then outlined a method to share their successes with community members to encourage support for mitigation activities and to provide data for incorporating mitigation actions into existing planning mechanisms and to provide data for the plans five year update.
3. Assess risks: The Planning Team identified the hazards specific to Chefornak and with the assistance of a hazard mitigation planning consultant (URS), developed the risk assessment for seven identified hazards. The Planning Team reviewed the risk assessment, including the vulnerability analysis, prior to and during the development of the mitigation strategy.
4. Assess capabilities: The Planning Team reviewed current administrative and technical, legal and regulatory, and fiscal capabilities to determine whether existing provisions and requirements adequately address relevant hazards.
5. Develop a mitigation strategy: After reviewing the risks posed by each hazard, the Planning Team developed a comprehensive range of potential mitigation goals and actions. Subsequently, the Planning Team identified and prioritized the actions for implementation.

3.2 HAZARD MITIGATION PLANNING TEAM

The 2013 local Planning Team leader was City Administrator Dora Tilly Mathews, with support from members City Clerk Alexandra Anderson, and Mayor Robert Jimmy, and the City Council. Ms. Rosalie Mathews was elected Mayor in October 2013 and assumed the Planning Team Leader role for this project.

Table 3-1 identifies the hazard complete mitigation Planning Team.

Table 3-1 Hazard Mitigation Planning Team

Name	Title	Organization	Key Input
Rosalie Mathew	Mayor	City of Chefornak	Planning Team Lead, HMP review.
Alexandra Lisa Anderson	City Clerk	City of Chefornak	Planning Team Member, data input and HMP review.
Robert Jimmy	Former Mayor	City of Chefornak	Planning Team Member, data input and HMP review.
Dora Tilly Mathew	Former City Administrator	City of Chefornak	Planning Team Member, data input and HMP review.
Members		Chefornak City Council	Planning Team Member, data input and HMP review.
Scott Simmons	Emergency Management, Hazard Mitigation, and Climate Change Planner	URS Corporation, Alaska	Responsible for HMP development, lead writer, project coordination.

3.3 PUBLIC INVOLVEMENT & OPPORTUNITY FOR INTERESTED PARTIES TO PARTICIPATE

URS extended an invitation to all individuals and entities identified on the project mailing list described the planning process and announced the upcoming communities' planning activities. The announcement was emailed to relevant academia, nonprofits, and local, state, and federal agencies on August 6, 2013. The following agencies were invited to participate and review the HMP:

- University of Alaska Fairbanks, Geophysical Institute, Alaska Earthquake Information Center (UAF/GI/AEIC)
- Alaska Native Tribal Health Consortium-Community Development (ANTHC)
- Alaska Volcano Observatory (AVO)
- Association of Village Council Presidents (AVCP)
- Denali Commission
- Alaska Department of Environmental Conservation (DEC)
- DEC Division of Spill Prevention and Response (DSPR)
- DEC Village Safe Water (VSW)
- Alaska Department of Transportation and Public Facilities (DOT/PF)
- Alaska Department of Community, Commerce, and Economic Development (DCCED)

- DCCED, Division of Community Advocacy (DCRA)
- Alaska Department of Military and Veterans Affairs (DMVA)
- DMVA, Division of Homeland Security and Emergency Management (DHS&EM)
- US Environmental Protection Agency (EPA)
- National Weather Service (NWS) Northern Region
- NWS Southeast Region
- NWS Southcentral Region
- Natural Resources Conservation Service (NRCS)
- US Department of Agriculture (USDA)
- USDA Division of Rural Development (RD)
- US Army Corps Of Engineers (USACE)
- US Bureau of Indian Affairs (BIA)
- US Bureau of Land Management (BLM)
- US Department of Housing and Urban Development (HUD)
- US Fish & Wildlife Service (USFWS)

Table 3-2 lists the community's public involvement initiatives focused to encourage participation and insight for the HMP effort.

Table 3-2 Public Involvement Mechanisms

Mechanism	Description
Newsletter #1 Distribution (September 2013)	In September 2013, the jurisdiction distributed a newsletter introducing the upcoming planning activity. The newsletter encouraged the whole community to provide hazard and critical facility information. It was posted at City Offices, bulletin boards, shopping centers, and DHS&EM's websites to enable the widest dissemination.
Agency Involvement eMail (August 6, 2013)	Invited agencies to participate in mitigation planning effort and to review applicable newsletters located on the DHS&EM Local All Hazard Mitigation Plan Development website at: http://ready.alaska.gov/plans/localhazmitplans.htm
Newsletter #2 Distribution (January, 2014)	In January, 2013, the jurisdiction distributed a newsletter describing the HMPs availability and present potential HMP projects for review. The newsletter encouraged the whole community to provide comments or input. It was posted at the City Office and community bulletin boards to ensure everyone was aware of the meeting.

Initial contact was made with Mayor Robert Jimmy in June, 2013; who appreciated that the City was included within DHS&EM's Pre-Disaster Mitigation grant and the prospects of completing the hazard mitigation plan. He began directing HMP data acquisition efforts. City Administrator, Ms. Dora Tilly Mathews introduced the hazard mitigation planning project and introductory newsletter during the July, 2013 City Council Meeting describing the planning process and posted the first newsletter throughout the community (post office, public bulletin boards, etc.) announcing the HMP development processes and subsequent activities.

URS described the specific information needed from the Planning Team to assess critical facility vulnerability and population risk by the location, value, and population within residential properties and critical facilities. The Planning Team then identified five natural hazards:

earthquake, erosion, flood, ground failure, and severe weather which periodically impact the City with varying impacts and threat levels.

Mayor Rosalie Mathew guided the Planning Team with providing community asset data the winter of 2013 which identified community assets that are exposed, and their vulnerability, to specific hazards. The Planning Team further evaluated these facilities and their associated risks to facilitate URS creating a viable or realistic risk analysis and subsequent vulnerability assessment for Chefornak.

Ms. Rosalie Mathew held a Planning Team meeting was held on January 10, 2014 to review and prioritize the mitigation actions identified based on the results of the risk assessment. A second newsletter was prepared and delivered on January 20, 2014 describing the process to date, presenting the prioritized mitigation actions, and announcing the availability of the draft HMP for public review and comment.

The Planning Team held a special meeting February 13, 2014 to review the draft HMP for accuracy – ensuring it meets the City's needs. The meeting was productive with the Team discussing the plan development process, hazard impacts, mitigation strategy and plan maintenance requirements.

3.4 INCORPORATION OF EXISTING PLANS AND OTHER RELEVANT INFORMATION

During the planning process, the Planning Team reviewed and incorporated information from existing plans, studies, reports, and technical reports into the HMP. The following were available from D and were reviewed and used as references for the jurisdiction information and hazard profiles in the risk assessment of the HMP for the City (Table 3-3).

Table 3-3 Documents Reviewed

Existing plans, studies, reports, ordinances, etc.	Contents Summary (How will this information improve mitigation planning?)
Village Safe Water (VSW) RMW FY 2012 Annual Report	Provides insight into City Water/Wastewater infrastructure
Department of Conservation (DEC)/VSW SFY 2013 Capital Improvement Project (CIP) Request	Provides insight into City Water/Wastewater infrastructure
University of Alaska Fairbanks (UAF), Scenarios Network for Alaska & Arctic Planning (SNAP)	Provided community historic, current, and future predicted weather for the City
US Army Corps of Engineers, Alaska Baseline Erosion Assessment, 2009	Defined the State's erosion threats and categorical descriptions
USACE, Erosion Information Paper - Chefornak, Alaska, Current as of January 10, 2008	Defined the City's erosion impacts
US Army Corps of Engineers, Floodplain Manager's Reports, Community Specific 2011	Defined the area's historical flood impacts
State of Alaska, Department of Commerce, Community and Economic Development Community Profile	Provided historical and demographic information
State of Alaska Hazard Mitigation Plan (SHMP), 2010	Defined statewide hazards and their potential locational impacts

A complete list of references list is provided in Section 8.

3.5 PLAN MAINTENANCE

This section describes a formal plan maintenance process to ensure that the HMP remains an active and applicable document. It includes an explanation of how the City's Planning Team intends to organize their efforts to ensure that improvements and revisions to the HMP occur in a well-managed, efficient, and coordinated manner.

The following three process steps are addressed in detail here:

1. Implementation into existing planning mechanisms
2. Continued public involvement
3. Monitoring, reviewing, evaluating, and updating the HMP

3.5.1 Implementation Into Existing Planning Mechanisms

The requirements for implementation through existing planning mechanisms, as stipulated in the DMA 2000 and its implementing regulations, are described below.

DMA 2000 Requirements
1. REGULATION CHECKLIST
Incorporation into Existing Planning Mechanisms §201.6(b)(3): Review and incorporation, if appropriate, of existing plans, studies, reports, and technical information.
ELEMENT A Planning Process (Continued)
A4. Does the Plan describe the review and incorporation of existing plans, studies, reports, and technical information?
Source: FEMA, October 2011.

Once the HMP is community adopted and receives FEMA's final approval, Each Planning Team Member ensures that the HMP, in particular each Mitigation Action Project, is incorporated into existing planning mechanisms whenever possible. Each member of the Planning Team has undertaking the following activities.

- Conduct a review of the community-specific regulatory tools to assess the integration of the mitigation strategy. These regulatory tools are identified in the following capability assessment section
- Work with pertinent community departments to increase awareness of the HMP and provide assistance in integrating the mitigation strategy (including the Mitigation Action Plan) into relevant planning mechanisms. Implementation of these requirements may require updating or amending specific planning mechanisms

3.5.2 Continued Public Involvement

The requirements for continued public involvement, as stipulated in the DMA 2000 and its implementing regulations are described below.

DMA 2000 Requirements
1. REGULATION CHECKLIST
Continued Public Involvement §201.6(c)(4)(iii): The plan maintenance process shall include a] discussion on how the community will continue public participation in the plan maintenance process.
ELEMENT A Planning Process (Continued)
A5. Is there discussion of how the community(ies) will continue public participation in the plan maintenance process? (Requirement §201.6(c)(4)(iii))
Source: FEMA, October 2011.

The City is dedicated to involving the public directly in the continual reshaping and updating the HMP. A paper copy of the HMP and any proposed changes will be available at the City Office. An address and phone number of the Planning Team Leader to whom people can direct their comments or concerns will also be available at the City Office.

The Planning Team will continue to identify opportunities to raise community awareness about the HMP and the hazards that affect the area. This effort could include attendance and provision of materials at City-sponsored events, outreach programs, and public mailings. Any public comments received regarding the HMP will be collected by the Planning Team Leader, included in the annual report, and considered during future HMP updates.

3.5.3 Monitoring, Reviewing, Evaluating, and Updating the HMP

The requirements for monitoring, reviewing, evaluating, and updating the HMP, as stipulated in the DMA 2000 and its implementing regulations are described below.

DMA 2000 Requirements
Monitoring, Evaluating and Updating the Plan §201.6(c)(4)(i): The plan maintenance process shall include a] discussion on how the community will continue public participation in the plan maintenance process.
1. REGULATION CHECKLIST
ELEMENT A. Planning Process (Continued)
A6. Is there a description of the method and schedule for keeping the plan current (monitoring, evaluating and updating the mitigation plan within a 5-year cycle?)
Source: FEMA, October 2011.

This section provides an explanation of how Chefornak's Planning Team intends to organize their efforts to ensure that improvements and revisions to the HMP occur in a well-managed, efficient, and coordinated manner.

The following three process steps are addressed in detail below:

1. Review and revise the HMP to reflect development changes, project implementation progress, project priority changes, and resubmit
2. HMP resubmittal at the end of the plan's five year life cycle for State and FEMA review and approval

3. Continued mitigation initiative implementation

3.5.3.1 Monitoring the HMP

The HMP was prepared as a collaborative effort. To maintain momentum and build upon previous hazard mitigation planning efforts and successes, the City will continue to use the Planning Team to monitor, review, evaluate, and update the HMP. Each authority identified in the Mitigation Action Plan (MAP) matrix (Table 7-8) will be responsible for implementing the Mitigation Action Plan and determining whether their respective actions were effectively implemented. The Director of Public Safety, the hazard mitigation Planning Team Leader, (or designee), will serve as the primary point of contact and will coordinate local efforts to monitor, evaluate, revise, and tabulate HMP actions' status.

3.5.3.2 Reviewing the HMP

The City will review their success for achieving the HMP's mitigation goals and implementing the Mitigation Action Plan's activities and projects during the annual review process.

During each annual review, each agency or authority administering a mitigation project will submit a Progress Report (Appendix F) to the Planning Team. The report will include the current status of the mitigation project, including any project changes, a list of identified implementation problems (with an appropriate strategies to overcome them), and a statement of whether or not the project has helped achieve the appropriate goals identified in the plan.

3.5.3.3 Evaluating the HMP

The Annual Review Questionnaire (Appendix F) provides the basis for future HMP evaluations by guiding the Planning Team with identifying new or more threatening hazards, adjusting to changes to, or increases in, resource allocations, and garnering additional support for HMP implementation.

The Planning Team Leader will initiate the annual review two months prior to the scheduled planning meeting date to ensure that all data is assembled for discussion with the Planning Team. The findings from these reviews will be presented at the annual Planning Team Meeting. Each review, as shown on the Annual Review Worksheet, will include an evaluation of the following:

- Determine City authorities, outside agency, stakeholders, and resident's participation in HMP implementation success
- Identify notable risk changes for each identified and newly considered natural or human-caused hazards
- Consider land development activities and related programs' impacts on hazard mitigation
- Mitigation Action Plan implementation progress (identify problems and suggest improvements as necessary)
- Evaluate HMP local resource implementation for HMP identified activities

3.5.3.4 Updating the HMP

In addition to the annual review, the Planning Team will update the HMP every five years. The following section explains how the HMP will be reviewed, evaluated, and implementation successes described.

DMA 2000 Requirements
Reviewing, Evaluating, and Implementing the Plan §201.6(d)(3): A local jurisdiction must review and revise its plan to reflect changes in development, progress in local mitigation efforts, and changes in priorities, and resubmit if for approval within 5 years in order to continue to be eligible for mitigation project grant funding.
ELEMENT D. Planning Process (Continued) *Update activities not applicable to the plan version (Grayed text not applicable to initial HMP)*
D1. Was the Plan revised to reflect changes in development? (Requirement §201.6(d)(3))
D2. Was the Plan revised to reflect progress in local mitigation effort? (Requirement §201.6(d)(3))
D3. Was the Plan revised to reflect changes in priorities? (Requirement §201.6(d)(3))
Source: FEMA, October 2011.

The City of Chefornak will annually review the HMP as described in Section 3.5.3.2 and update the HMP every five years (or when significant changes are made) by having the identified Planning Team review all Annual Review Questionnaires (Appendix F) to determine the success of implementing the HMP's Mitigation Action Plan.

The Annual Review Questionnaire will enable the Team to identify possible changes in the HMP Mitigation Action Plan by refocusing on new or more threatening hazards, resource availability, and acquiring stakeholder support for the HMP project implementation.

No later than the beginning of the fourth year following HMP adoption, the Planning Team will undertake the following activities:

- Request grant assistance from DHS&EM to update the HMP (this can take up to one year to obtain and one year to update the plan)
- Ensure that each authority administering a mitigation project will submit a Progress Report to the Planning Team
- Develop a chart to identify those HMP sections that need improvement, the section and page number of their location within the HMP, and describing the proposed changes
- Thoroughly analyze and update the natural hazard risks
  - Determine the current status of the mitigation projects
  - Identify the proposed Mitigation Plan Actions (projects) that were completed, deleted, or delayed. Each action should include a description of whether the project should remain on the list, be deleted because the action is no longer feasible, or reasons for the delay
  - Describe how each action's priority status has changed since the HMP was originally developed and subsequently approved by FEMA

- Determine whether or not the project has helped achieve the appropriate goals identified in the plan
- Describe whether the community has experienced any barriers preventing them from implementing their mitigation actions (projects) such as financial, legal, and/or political restrictions and stating appropriate strategies to overcome them
- Update ongoing processes, and to change the proposed implementation date/duration timeline for delayed actions the City of Chefornak still desires to implement
- Prepare a "new" MAP matrix for the City of Chefornak

- Prepare a new Draft Updated HMP
- Submit the updated draft HMP to the Division of Emergency Management (DHS&EM) and FEMA for review and approval

3.5.3.5 Formal State and FEMA HMP Review

Completed Hazard Mitigation Plans do not qualify the City for mitigation grant program eligibility until they have been reviewed and adopted by the City Council, and received State and FEMA final approval.

The City will submit the draft HMP to the Division of Emergency Management (DHS&EM) for initial review and preliminary approval. Once any corrections are made, DHS&EM will forward the HMP to FEMA for their review and conditional approval.

Once the plan has fulfilled all FEMA criteria, the City will pass an HMP Adoption Resolution. A copy will be sent to FEMA for final HMP approval.

FEMA's final approval assures the City is eligible for applying for appropriate mitigation grant program funding. URS will send a final copy of the FEMA approved HMP to the City.

4

PLAN ADOPTION

Section Four explains how the City meets FEMA's HMP adoption requirements.

4.1 ADOPTION BY LOCAL GOVERNING BODIES AND SUPPORTING DOCUMENTATION

The requirements for the adoption of this HMP by the local governing body, as stipulated in the DMA 2000 and its implementing regulations are described below.

DMA 2000 Requirements
Local Plan Adoption §201.6(c)(5): [The plan shall include…] Documentation that the plan has been formally adopted by the governing body of the jurisdiction requesting approval of the plan (e.g., City Council, County commissioner, Tribal Council). For multi-jurisdictional plans, each jurisdiction requesting approval of the plan must document that it has been formally adopted.
1. REGULATION CHECKLIST
ELEMENT E. Plan Adoption
E1. Does the Plan include documentation that the plan has been formally adopted by the governing body of the jurisdiction requesting approval??) (Requirement §201.6(c)(5))
Source: FEMA, October 2011.

The City of Chefornak is represented in this HMP and meets the requirements of Section 409 of the Stafford Act and Section 322 of DMA 2000, and 44 CFR §201.6(c)(5).

The Chefornak City Council adopted the HMP on July 7, 2014 and submitted the final draft HMP to FEMA for formal approval.

A scanned copy of the City's formal adoption is included in Appendix C.

This page intentionally left blank

5

HAZARD ANALYSIS

Section Five identifies and profiles the hazards that could affect the City of Chefornak.

5.1 OVERVIEW OF A HAZARD ANALYSIS

A hazard analysis includes the identification, screening, and profiling of each hazard. Hazard identification is the process of recognizing the natural events that threaten an area. Natural hazards result from unexpected or uncontrollable natural events of sufficient magnitude. Human and Technological, and Terrorism related hazards are beyond the scope of this plan. Even though a particular hazard may not have occurred in recent history in the study area, all natural hazards that may potentially affect the study area are considered; the hazards that are unlikely to occur or for which the risk of damage is accepted as being very low, are eliminated from consideration.

Hazard profiling is accomplished by describing hazards in terms of their nature, history, magnitude, frequency, location, extent, and probability. Hazards are identified through historical and anecdotal information collection, existing plans, studies, and map reviews, and study area hazard map preparations when appropriate. Hazard maps are used to define a hazard's geographic extent as well as define the approximate risk area boundaries.

DMA 2000 Requirements
Identifying Hazards §201.6(c)(2)(i): The risk assessment shall include a] description of the type, location and extent of all natural hazards that can affect the jurisdiction. The plan shall include information on previous occurrences of hazard events and on the probability of future hazard events. §201.6(c)(2)(iii): For multi-jurisdictional plans, the risk assessment section must assess each jurisdiction's risks where they vary from the risks facing the entire planning area.
1. REGULATION CHECKLIST
ELEMENT B. HAZARD IDENTIFICATION AND RISK ASSESSMENT
B1. Does the Plan include a description of the type, location, and extent of all natural hazards that can affect each jurisdiction? B2. Does the Plan include information on previous occurrences of hazard events and on the probability of future hazard events for each jurisdiction? B3. Is there a description of each identified hazard's impact on the community as well as an overall summary of the community's vulnerability for each jurisdiction? B4. Does the Plan address NFIP insured structures within the jurisdiction that have been repetitively damaged by floods?
Source: FEMA, October 2011.

5.2 HAZARD IDENTIFICATION AND SCREENING

The requirements for hazard identification, as stipulated in DMA 2000 and its implementing regulations are described below.

For the first step of the hazard analysis, on October, 2013 the Planning Team reviewed eight possible hazards that could affect the Lower Kuskokwim REAA. They then evaluated and screened the comprehensive list of potential hazards based on a range of factors, including prior knowledge or perception of their threat and the relative risk presented by each hazard, the ability

to mitigate the hazard, and the known or expected availability of information on the hazard (Table 5-1). The Planning Team determined that five hazards pose a potential threat to the City: earthquake, erosion, flood, ground failure, and severe weather.

Table 5-1 Identification and Screening of Hazards

Hazard Type	Should It Be Profiled?	Explanation
Natural Hazards		
Earthquake	Yes	The City has experienced minimal earthquake impacts with no event within a 100 mile radius of the City.
Erosion	Yes	The City experiences riverine erosion along the Kinia River (Native name: Ooksokwak) River embankment from high water flow, riverine ice flows, wind, surface runoff, and boat traffic wakes.
Flood	Yes	Flooding is a minimal hazard for this location as the community is located on a high bluff. Snowmelt run-off and rainfall flooding occurs during spring thaw and the fall rainy season. Events occur from soil saturation. Several minor flood events cause damage. Severe damages occur from major floods.
Ground Failure (Permafrost, Subsidence)	Yes	Ground Failure occurs throughout Alaska from avalanches, landslides, and melting permafrost. However subsidence and permafrost are the primary hazards causing houses to shift due to ground sinking and upheaval.
Severe Weather (Cold, Drought, Rain, Snow, Wind, etc.)	Yes	Annual weather patterns, severe cold, heavy rain, freezing rain, snow accumulations, storm surge, and wind, are the predominate threats. Severe weather events cause fuel price increases and frozen pipes. Heavy snow loads potentially damage house roofs. Winds potentially remove or damage roofs and moved houses off their foundations.
Tsunami (Seiche)	No	This hazard does not exist for this location.
Volcano	No	This hazard does not exist for this location.
Wildland (Tundra) Fire	No	This hazard does not exist for this location.

5.3 HAZARD PROFILE

The requirements for hazard profiles, as stipulated in DMA 2000 and its implementing regulations are described below.

DMA 2000 Requirements
Profiling Hazards Requirement §201.6(c)(2)(i): [The risk assessment shall include a] description of the location and extent of all natural hazards that can affect the jurisdiction. The plan shall include information on previous occurrences of hazard events and on the probability of future hazard events.
1. REGULATION CHECKLIST
ELEMENT B. HAZARD IDENTIFICATION AND RISK ASSESSMENT
B1. Does the Plan include a description of the type, location, and extent of all natural hazards that can affect each jurisdiction? (Requirement §201.6(c)(2)(i)) B2. Does the Plan include information on previous occurrences of hazard events and on the probability of future hazard events for each jurisdiction?
Source: FEMA, October 2011.

The specific hazards selected by the Planning Team for profiling have been examined in a methodical manner based on the following factors:

- Nature (Type)
- History (Previous Occurrences)
- Location
- Extent (to include magnitude and severity)
- Impact (Section 5 provides general impacts associated with each hazard. Section 6 provides detailed impacts to Chefornak's residents and critical facilities)
- Probability of future events

NFIP insured Repetitive Loss (RL) structures are addressed in Section 6.0, Vulnerability Analysis.

Each hazard is assigned a rating based on the following criteria for magnitude/severity (Table 5-2) and probability (Table 5-3).

Estimating magnitude and severity are determined based on historic events using the criteria identified in the introductory narrative description of Section 5.3.

Table 5-2 Hazard Magnitude/Severity Criteria

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

Similar to estimating magnitude and severity, Probability is determined based on historic events, using the criteria identified above, to provide the likelihood of a future event (Table 5-3).

Table 5-3 Hazard Probability Criteria

Probability	Criteria
4 - Highly Likely	• Event is probable within the calendar year. • Event has up to 1 in 1 year chance of occurring (1/1=100 percent). • History of events is greater than 33 percent likely per year. • Event is "Highly Likely" to occur.
3 - Likely	• Event is probable within the next three years. • Event has up to 1 in 3 years chance of occurring (1/3=33 percent). • History of events is greater than 20per cent but less than or equal to 33 percent likely per year. • Event is "Likely" to occur.
2 - Possible	• Event is probable within the next five years. • Event has up to 1 in 5 years chance of occurring (1/5=20 percent). • History of events is greater than 10 percent but less than or equal to 20 percent likely per year. • Event could "Possibly" occur.
1 - Unlikely	• Event is possible within the next ten years. • Event has up to 1 in 10 years chance of occurring (1/10=10 percent). • History of events is less than or equal to 10 percent likely per year. • Event is "Unlikely" but is possible to occur.

The hazards profiled for the City of Chefornak are presented throughout the remainder of Section 5.3. The presentation order does not signify their importance or risk level.

5.3.1 Earthquake

5.3.1.1 Nature

An earthquake is a sudden motion or trembling caused by a release of strain accumulated within or along the edge of the earth's tectonic plates. The effects of an earthquake can be felt far beyond the site of its occurrence. Earthquakes usually occur without warning and after only a

few seconds can cause massive damage and extensive casualties. The most common effect of earthquakes is ground motion, or the vibration or shaking of the ground during an earthquake.

Ground motion generally increases with the amount of energy released and decreases with distance from the fault or epicenter of the earthquake. An earthquake causes waves in the earth's interior (i.e., seismic waves) and along the earth's surface (i.e., surface waves). Two kinds of seismic waves occur: P (primary) waves are longitudinal or compressional waves similar in character to sound waves that cause back and forth oscillation along the direction of travel (vertical motion), and S (secondary) waves, also known as shear waves, are slower than P waves and cause structures to vibrate from side to side (horizontal motion). There are also two types of surface waves: Raleigh waves and Love waves. These waves travel more slowly and typically are significantly less damaging than seismic waves.

In addition to ground motion, several secondary natural hazards can occur from earthquakes such as:

- **Surface Faulting** is the differential movement of two sides of a fault at the earth's surface. Displacement along faults, both in terms of length and width, varies but can be significant (e.g., up to 20 feet [ft]), as can the length of the surface rupture (e.g., up to 200 miles). Surface faulting can cause severe damage to linear structures, including railways, highways, pipelines, and tunnels.
- **Liquefaction** occurs when seismic waves pass through saturated granular soil, distorting its granular structure, and causing some of the empty spaces between granules to collapse. Pore water pressure may also increase sufficiently to cause the soil to behave like a fluid for a brief period and cause deformations. Liquefaction causes lateral spreads (horizontal movements of commonly 10 to 15 ft, but up to 100 ft), flow failures (massive flows of soil, typically hundreds of ft, but up to 12 miles), and loss of bearing strength (soil deformations causing structures to settle or tip). Liquefaction can cause severe damage to property.
- **Landslides/Debris Flows** occur as a result of horizontal seismic inertia forces induced in the slopes by the ground shaking. The most common earthquake-induced landslides include shallow, disrupted landslides such as rock falls, rockslides, and soil slides. Debris flows are created when surface soil on steep slopes becomes totally saturated with water. Once the soil liquefies, it loses the ability to hold together and can flow downhill at very high speeds, taking vegetation and/or structures with it. Slide risks increase after an earthquake during a wet winter.

The severity of an earthquake can be expressed in terms of intensity and magnitude. Intensity is based on the damage and observed effects on people and the natural and built environment. It varies from place to place depending on the location with respect to the earthquake epicenter, which is the point on the earth's surface that is directly above where the earthquake occurred. The severity of intensity generally increases with the amount of energy released and decreases with distance from the fault or epicenter of the earthquake. The scale most often used in the U.S. to measure intensity is the Modified Mercalli Intensity (MMI) Scale. As shown in Table 5-4, the MMI Scale consists of 12 increasing levels of intensity that range from imperceptible to catastrophic destruction. Peak ground acceleration (PGA) is also used to measure earthquake

intensity by quantifying how hard the earth shakes in a given location. PGA can be measured as acceleration due to gravity (g) (MMI 2006).

Magnitude (M) is the measure of the earthquake strength. It is related to the amount of seismic energy released at the earthquake's hypocenter, the actual location of the energy released inside the earth. It is based on the amplitude of the earthquake waves recorded on instruments, known as the Richter magnitude test scales, which have a common calibration (see Table 5-4).

Table 5-4 Magnitude / Intensity / Ground-Shaking Comparisons

Magnitude	Intensity	PGA (% *g*)	Perceived Shaking
0 – 4.3	I	<0.17	Not Felt
	II-III	0.17 – 1.4	Weak
4.3 – 4.8	IV	1.4 – 3.9	Light
	V	3.9 – 9.2	Moderate
4.8 – 6.2	VI	9.2 – 18	Strong
	VII	18 – 34	Very Strong
6.2 – 7.3	VIII	34 – 65	Severe
	IX	65 – 124	Violent
	X	124 +	Extreme
7.3 – 8.9	XI		
	XII		

(MMI 2006)

5.3.1.2 History

Accurate seismology for Alaska is relatively young. Therefore data is limited for acquiring long-term earthquake event data. The HMP's Alaska earthquake data is based on best available data; obtained from the US Geological Survey (USGS) and the State of Alaska, UAF Geophysical Institute's archives. Research included searching the US Geological Survey (USGS) earthquake database for events spanning from 1973 to present; none of which exceeded M5.0 located within 200 miles of the City.

Therefore the Planning Team determined that based on available recorded data, the City of Chefornak has a minor concern for earthquake damages because they have not experienced damaging impacts from their historical earthquake events and only need to be concerned with earthquakes with a magnitude > M5.0. This is substantiated by research for any earthquake event that occurred since 1939. No historical events occurred within 100 miles of the City using those parameters. Table 5-5 events were indicated when the research parameters was expanded to 218.5 miles (350Kms).

Table 5-5 Historical Earthquakes for Chefornak

Date	Time	Latitude	Longitude	Depth	Magnitude
8/3/2008	10:39:18 PM	62.599	-162.732	10	2.9
4/13/2008	5:44:36 PM	63.043	-163.001	19.4	2.7
3/21/2005	12:50:13 PM	62.748	-165.082	1	3

(USGS 2012)

North America's strongest recorded earthquake occurred on March 27, 1964 in Prince William Sound measuring M9.2 and was felt by many residents throughout Alaska. Chefornak did not experience ground motion from this historic event; neither did they experience ground shaking from the November 3, 2002 M7.9 Denali Earthquake.

Figure 5-1 shows the locations of active and potentially active faults in Alaska.

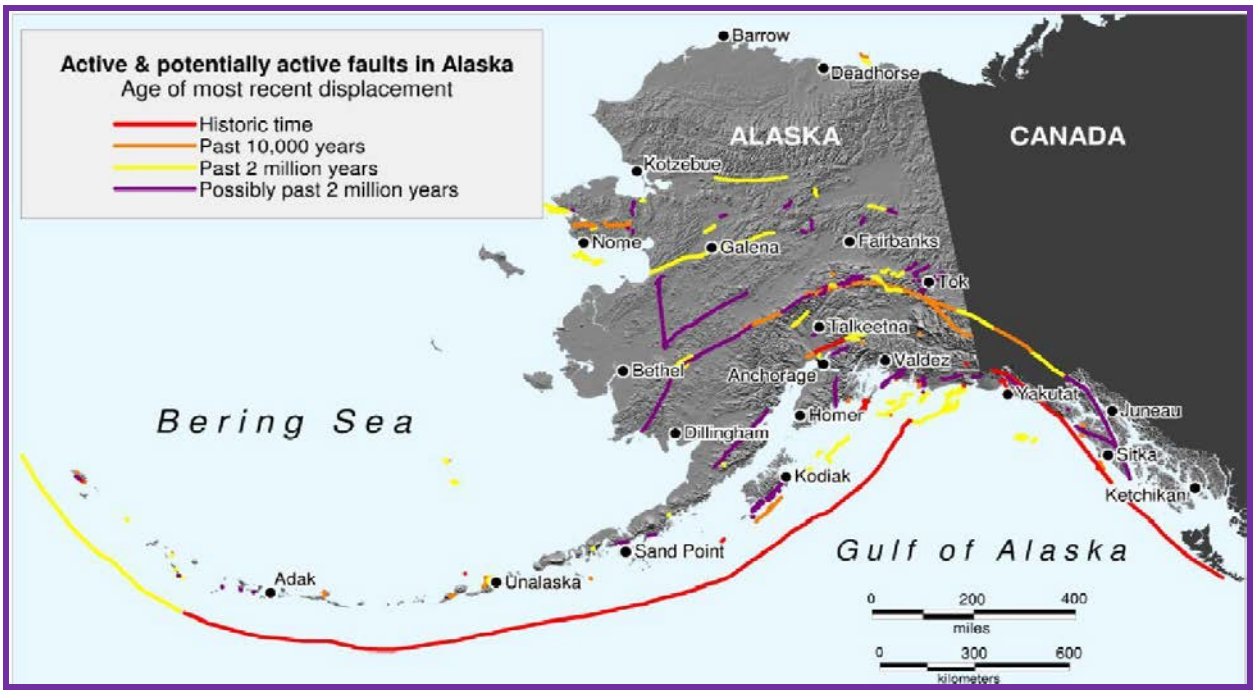

Figure 5-1 Active and Potentially Active Faults in Alaska

The largest recorded earthquake that has occurred more than 218 miles of the City measured M3.0, occurring on March 21, 2005. This earthquake did not cause any damage to critical facilities, residences, non-residential buildings, or infrastructure.

5.3.1.3 Location, Extent, Impact, and Probability of Future Events

Location

The entire geographic area of Alaska is prone to earthquake effects as well does the City of Chefornak who has experienced only three earthquakes since 1973 with an average of an average of approximately M2.5.

Figure 5-2 depicts earthquake fault proximity greater than the100 mile radius for Chefornak.

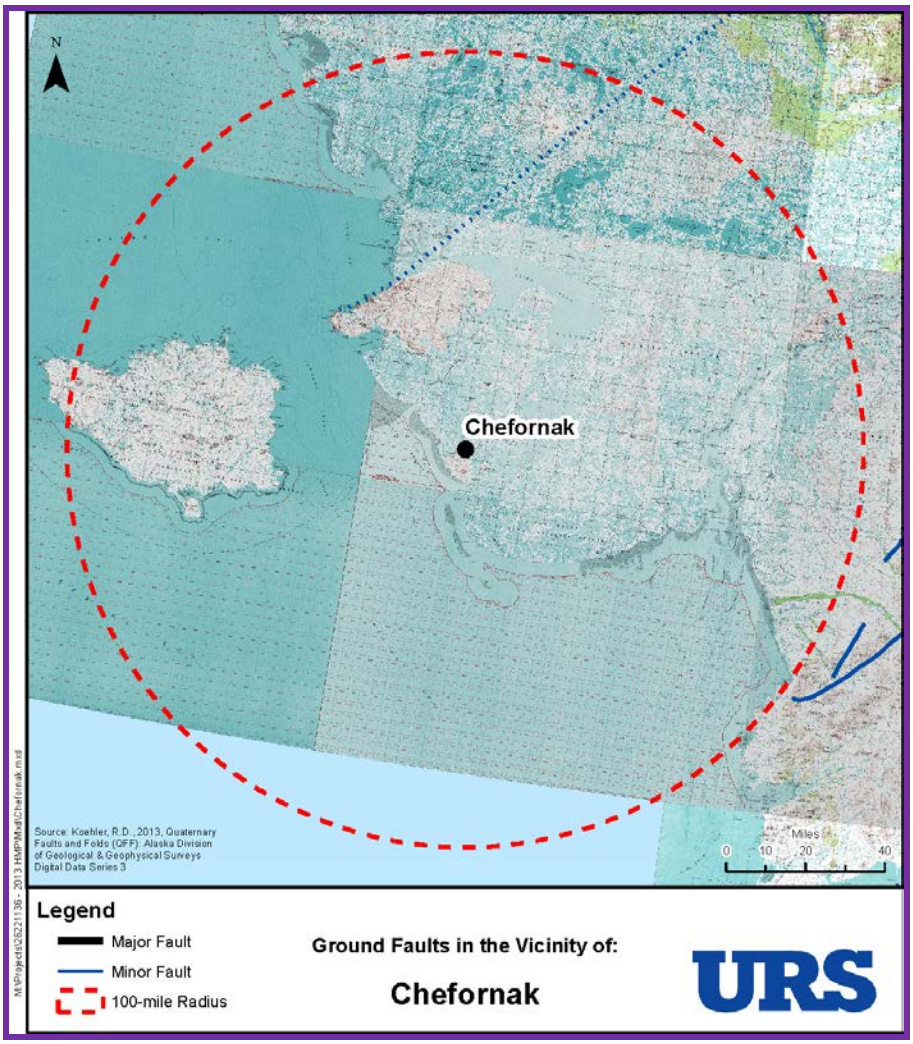

Figure 5-2 Earthquake Faults Adjacent to Chefornak (URS 2013)

Extent

Based on historic earthquake events and the criteria identified in Table 5-2, the magnitude and severity of earthquake impacts in the City are considered "Negligible" where injuries and/or illnesses would be treatable by first aid, critical facilities could expect to be shut-down for less than 24 hours, with less than 10 percent of property is severely damaged with no potential long-term damage to transportation, infrastructure, or the economy.

Impact

Alaska is located adjacent to the "Ring of Fire" which is more seismically active than the majority of the State. Impacts to the community such as significant ground movement that may result in infrastructure damage are not expected. Minor shaking may be seen or felt based on past events. Impacts to future populations, residences, critical facilities, and infrastructure are anticipated to remain the same.

Probability of Future Events

This 2009 Shake Map incorporates current seismicity in its development and is the most current map available for this area. Peter Haeussler, USGS, Alaska Region states, it is a viable representation to support probability inquiries.

> *"The occurrence of various small earthquakes does not change earthquake probabilities. In fact, in the most dramatic case, the probability of an earthquake on the Denali fault was/is the same the day before the 2002 earthquake as the day afterward. Those are time-independent probabilities. The things that change the hazard maps is changing the number of active faults or changing their slip rate" (Haeussler, 2009).*

While it is not possible to predict when an earthquake will occur, Figure 5-3 was generated using the United States Geological Survey (USGS) Earthquake Mapping Model and indicates a 0.0% probability that an M5.0 or greater earthquake occurring within 100 years and 100 miles of the City is "Unlikely" where an event has a 1 in 10 (1/10=10 percent) chance of occurring; due to an event history that is less than or equal to 10 percent likely per year.

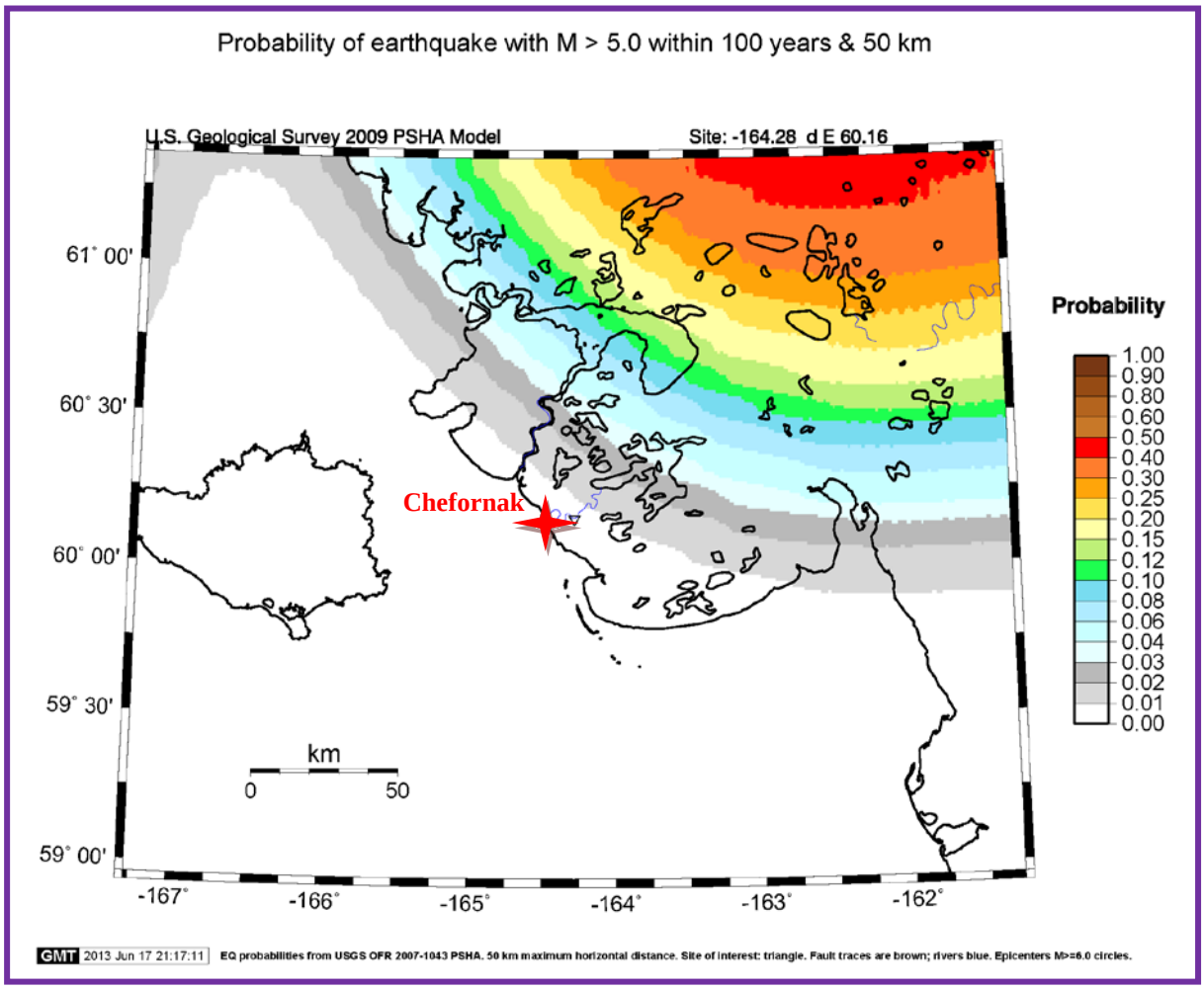

Figure 5-3 Chefornak's Earthquake Probability (USGS 2012)

5.3.2 Erosion

5.3.2.1 Nature

Erosion rarely causes death or injury. However, erosion causes property destruction, prohibits development, and impacts community infrastructure. Erosion is typically gradual land loss through wind or water scour. However, erosion can occur rapidly as the result of floods, storms or other event or slowly as the result of long-term environmental changes such as melting permafrost. Erosion is a natural process, but its effects can be easily exacerbated by human activity.

Coastal and riverine erosion are major threats as it threatens the community's embankment, structures, and utilities. These erosion events threaten existing and future development and infrastructure.

Coastal erosion, sometimes referred to as tidal, bluff, or beach erosion, may often encompass different categories altogether. For this profile, tidal erosion will be nested within the term erosion.

Coastal erosion is the loss of land resulting in disappearing beach or embankment material from natural activity or human influences. Coastal erosion occurs over the area roughly from the top of the embankment out into the near-shore region to about the 30 feet water depth. It is measured as the rate of change in the position or horizontal displacement of a shoreline over a period of time. Bluff or embankment recession is the most visible aspect of coastal erosion because of the dramatic change it causes to the landscape. As a result, this aspect of coastal erosion usually receives the most attention.

Erosion forces are embodied in waves, currents, and winds. Surface and ground water flow, and freeze-thaw cycles also play a role. All of these forces are present and cause damaging impacts to Chefornak's infrastructure. Coastal erosion can occur from rapid, short-term daily, seasonal, or annual natural events such as waves, coastal storms, storm surge, wind, and subsequent flooding; or from human activities including boat wakes and dredging. The most dramatic erosion often occurs during storms, particularly because the highest energy waves are generated under storm conditions.

Coastal erosion may also be due to multi-year impacts and long-term climatic change such as sea-level rise, lack of sediment supply, subsidence, or long-term human factors such as aquifer depletion or the construction of shore protection structures. Attempts to control erosion using shoreline protective measures such as groins, jetties, seawalls, or revetments can lead to increased erosion.

Riverine erosion also threatens Chefornak as they watch their embankment disappear at a predictable rate from each erosion event.

Riverine erosion results from flowing water forces and ice formations in and adjacent to river channels. This erosion affects the bed and banks of the Kinia River channel and can alter or preclude any channel navigation or riverbank development.

Attempts to control erosion using embankment protective measures such as groins, jetties, levees, or revetments can lead to increased erosion.

Land surface erosion results from flowing water across road surfaces due to poor or improper drainage during rain and snowmelt run-off which typically result from fall sea storms and winter snow accumulation.

Chefornak's 2008 erosion assessment also pointed out that other community specific factors exacerbate their erosion impacts:

> *"Piping water through the bank is another major cause of erosion. The water carries away finer materials and leaves mostly large volcanic boulders with a covering of tundra mat, according to a 2003 Corps Trip Report. Portions of the bank are lost when the mats break off and are destroyed while the naturally occurring boulders are often transported into deeper water by ice sheets during breakup. Ice jams in the river are rare" (USACE 2008)*

5.3.2.2 History

The Army Corp of Engineers (USACE) completed an erosion survey for the City of Chefornak during their 2009 Baseline Erosion Assessment. The USACE's *Erosion Information Paper, Chefornak, Alaska, Current as of January 10, 2008* listed the community as having a "Priority" erosion threat. The Erosion Information Paper stated:

> *"Chefornak has both coastal erosion occurring along the shoreline of the Bering Sea and river erosion along the south bank of the Kinia River. Storm surges, wind-driven waves, high tides, and late forming coastal ice reportedly contribute to coastal erosion. Natural river flow, water level fluctuations, flooding, spring break up, melting permafrost, boat wakes, steep shoreline slopes, pedestrian traffic, and vehicle traffic, all reportedly contribute to river erosion…*
>
> *Protective measures taken in recent years to reduce erosion damages in the community include placing fabric mats and constructing a jetty. The fabric proved to be effective until it lifted off during 2007. The bank has eroded approximately 2 feet since then. The jetty is still in place, in good condition, and effective, but the smaller sized gravel is beginning to wash away. The September 2003 trip report recommended reopening the Section 14 Stream Bank Protection Project to help control erosion in the area. The Corps 5-Year Development Plan lists $400,000 for a Chefornak investigation phase in 2008. The armoring around the barge landing is eroding away, possibly due to ice action. The community experiences 6 to 7 storms per year with the majority occurring in October…" (USACE 2008).*

5.3.2.3 Location, Extent, Impact, and Probability of Future Events

Location

The Army Corp of Engineers (USACE) completed an erosion survey for the City of Chefornak during their 2009 Baseline Erosion Assessment. The USACE's *Erosion Information Paper, Chefornak, Alaska, Current as of January 10, 2008* listed the community as having a "Priority Action" erosion threat classification. The Erosion Information Paper stated:

> *"Chefornak has both coastal erosion occurring along the shoreline of the Bering Sea and river erosion along the south bank of the Kinia River. Storm surges, wind-driven waves, high tides, and late forming coastal ice reportedly contribute to coastal erosion. Natural river flow, water level fluctuations, flooding, spring break up, melting permafrost, boat*

wakes, steep shoreline slopes, pedestrian traffic, and vehicle traffic, all reportedly contribute to river erosion." (USACE 2008)

Figure 5-4 depicts the USACE generated aerial photo of community's identified erosion impact area.

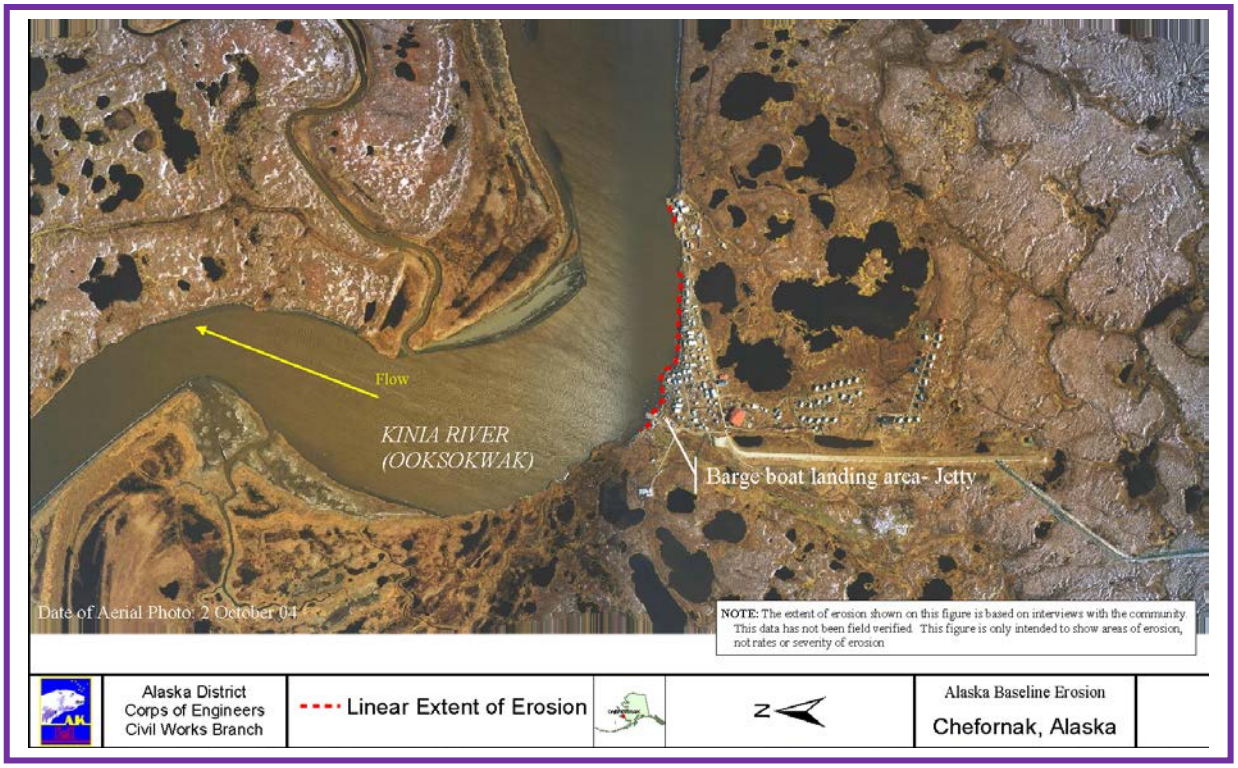

Figure 5-4 Chefornak's Erosion Impact Area (USACE 2008).

Extent

A variety of natural and human-induced factors influence the erosion process within the community. Coastal orientation and proximity to ocean waves, currents, and storm surges can influence erosion rates. Embankment composition also influences erosion rates, as sand and silt will erode easily, whereas boulders or large rocks are more erosion resistant. Other factors that may influence coastal erosion include:

- Embankment type
- Geomorphology
- Structure types along the embankment
- Encroachment amount within the high hazard zone
- Erosion area proximity to inducing riverine structures
- Topographic nature
- Development density
- Embankment elevation

- Embankment exposure to wind and boat wakes, and storm surge waves as they propogate upriver from the Bering Sea coastline

Climate change may also play a part in increasing coastal erosion. Rising sea/river water levels and retreating sea/riverine ice may leave stretches of coastline/shoreline open to increased wave action exposure during normal and winter storm conditions.

Chefornak's UACE erosion assessment indicated,

> *"The shoreline in front of the community has been eroding at a rate of 2 to 6 feet per year and the erosion area is estimated at 200 linear feet along the Kinia River where the river banks are 4 to 10 feet high…" (USACE 2008).*

Based on the USACE's 2008 Erosion Assessment, past erosion events, and the criteria identified in Table 5-2, the magnitude and severity of erosion impacts in the City are considered "Critical" with potential for critical facilities to be shut down for at least two weeks, and more than 25 percent of property or critical infrastructure being severely damaged.

Impact

Impacts from erosion include loss of land and any development on that land. Erosion can cause increased sedimentation of river deltas and hinder channel navigation—affecting marine transport. Other impacts include reduction in water quality due to high sediment loads, loss of native aquatic habitats, damage to public utilities (fuel headers and electric and water/wastewater utilities), and economic impacts associated with the costs of trying to prevent or control erosion sites.

The USACE 2008 erosion assessment determined the City's erosion classification as "Priority Acton" with the following potential impacts:

> *"Threatened structures and facilities include residences, outbuildings, sheds, fuel tanks, food storage structures, the road, the boat launch, storage and repair structures, utility poles, power generators, sites of significant cultural and archeological value, schools, boardwalks, and pathways. Some structures and facilities are 50 feet or less from the active erosion area, while others are less than 100 feet away" (USACE 2008)*

Probability of Future Events

Based on community and USACE identified historical and future predicted impacts with community facilities and structures located 50 to 100 feet from active erosion areas, and the criteria identified in Table 5-3; it is "Highly Likely" that erosion will occur in the next year as an event has up to 1 in 1 years (1/1=100 percent) chance of occurring) as the history of events is greater than 33 percent likely per year.

5.3.3 Flood

5.3.3.1 Nature

Flooding is the accumulation of water where usually none occurs or the overflow of excess water from a stream, river, lake, reservoir, glacier, or coastal body of water onto adjacent floodplains. Floodplains are lowlands adjacent to water bodies that are subject to recurring floods. Floods are natural events that are considered hazards only when people and property are affected.

Flood events not only impact communities with high water levels, or fast flowing waters, but sediment transport also impacts infrastructure and barge and other river vessel access limitations. Dredging may be the only option to maintain an infrastructure's viability and longevity.

Five primary types of flooding occur in the City affecting riverine and coastal locations: rainfall-runoff, snowmelt, storm surge, and ice override floods.

Rainfall-Runoff Flooding occurs in late summer and early fall. The rainfall intensity, duration, distribution, and geomorphic characteristics of the watershed all play a role in determining the magnitude of the flood. Rainfall runoff flooding is the most common type of flood. This type of flood event generally results from weather systems that have associated prolonged rainfall.

Snowmelt Floods typically occur from April through June. The depths of the snowpack and spring weather patterns influence the magnitude of flooding.

Ice-Jam floods occur when warming temperatures and rising water flows causes the ice to break-up and disconnect from the embankment. The large ice chunks begin to flow and move down river. The ice does not flow easily, often impacting with adjacent blocks resulting in occasional ice jams. Some ice jams quickly break apart, however, larger jams occur which create small dams causing the water to exert increasing pressure on the jam creating a damming effect. Water subsequently begins to build depth and often overtops adjacent embankments which flood upstream communities.

When the ice-jam breaks the built-up water rushes downstream with great force. Ice blocks scour the embankment, destroying infrastructure such as fuel headers, barge landings, and boat mooring structures. Large house sized ice blocks may even be driven above the embankment destroying any structure in its path. Communities are virtually helpless against such devastation.

Storm Surges, or coastal floods, occur when the sea is driven inland above the high-tide level onto land that is normally dry. Often, heavy surf conditions driven by high winds accompany a storm surge adding to the destructive-flooding water's force. The conditions that cause coastal floods also can cause significant shoreline erosion as the flood waters undercut roads and other structures. Storm surge is a leading cause of property damage in Alaska.

The meteorological parameters conducive to coastal flooding are low atmospheric pressure, strong winds (blowing directly onshore or along the shore with the shoreline to the right of the direction of the flow), and winds maintained from roughly the same direction over a long distance across the open ocean (fetch).

Communities that are situated on low-lying coastal lands with gradually sloping bathymetry near the shore and exposure to strong winds with a long fetch over the water are particularly susceptible to coastal flooding. Several communities and villages along the Bristol Bay coast, the Bering Sea coast, the Arctic coast, and the Beaufort Sea coast have experienced significant damage from coastal floods over the past several decades. Most coastal flooding occurs during the late summer or early fall season in these locations. As shorefast ice forms along the coast before winter, the risk of coastal flooding abates, but, later freeze-ups greatly increase the risk of erosion, storm surge flooding and ice override events.

Timing of events

Many floods are predictable based on weather patterns. Most of the annual precipitation is received from April through October with August being the wettest. Excess precipitation leads to flooding in early/late summer and/or fall. Spring snowmelt increases runoff, which can cause flooding. It also breaks the winter ice cover, which causes localized ice-jam floods.

5.3.3.2 History

The City experiences very little riverine flood impacts due to their above river location. However, their roads experience surface damages and erosion from heavy rainfall, snowmelt, and spring run-off. Spring run-off causes surface erosion damage to the community's road system and boardwalk substructure. The USACE 2008 erosion assessment described this damage as:

> *"Piping water through the bank is another major cause of erosion. The water carries away finer materials and leaves mostly large volcanic boulders with a covering of tundra mat, according to a 2003 Corps Trip Report. Portions of the bank are lost when the mats break off and are destroyed while the naturally occurring boulders are often transported into deeper water by ice sheets during breakup. Ice jams in the river are rare [at Chefornak]" (USACE 2008).*

The DHS&EM Disaster Cost Index delineates historical flood events affecting the City. The index lists the following events:

> ***"120. Lower Kuskokwim, September 4, 1990.*** *A severe storm compounded by high tides caused extensive flooding in coastal communities of the Kuskokwim and Bristol Bay areas and along the lower Kuskokwim River. The flooding caused damage to both public and private property. The disaster declaration authorized assistance to local governments, individuals and families affected by the flooding.*
>
> ***05-211 2004 Bering Strait Sea Storm declared October 28, 2004 by Governor Murkowski then FEMA declared (DR-1571) on November 15, 2004. Amended declaration to extend incident to October 24, 2004.*** *Between October 18 and 20, 2004, a severe winter storm with strong winds and extreme tidal surges occurred along the Western Alaska coastline, which resulted in severe damage and threat to life and property, specifically in the Bering Strait Regional Educational Attendance Area (REAA), including Elim, Nome, Koyuk, Shaktoolik, Unalakleet, and other communities; in the Northwest Artic Borough, including Kivalina, Kotzebue, and other communities; and in the City of Mekoryuk; with potentially unidentified damages in adjacent areas, and additional storm surges likely from continuing weather patterns in this area Alaska. Conditions that exist in the coastal communities of the Northwest Artic Borough as a result of this disaster: severe damage to roadways, power distribution systems, and drain fields. Conditions that exist in the coastal communities of the Bering Strait REAA as a result of this disaster: severe damage to gabions (used to protect shoreline), major damage to coastal highways and roads, damage to water and septic systems, damage to a bridge, damage to power distribution systems, damage to fuel storage tanks, fuel spills,*

and property damage. Conditions that exist in the City of Mekoryuk as a result of this disaster: major damage to sea wall and damage to roadways. On November 16, 2004, the declaration was amended to reflect a more accurate timeframe of the disaster. The City of St. George appealed the denial of funding decision for the breakwater. The appeal was granted, which increased the original estimate for total funding of this disaster by more than $3 million. The dates of the severe storm were changed to October 18 through October 24, 2004. Individual assistance totaled $1 million for 271 applicants. Public Assistance total $13 million for 60 potential applicants with 125 PW's. Hazard Mitigation totaled $800K. The total for this disaster is $17 million.

06-215 2005 West Coast Storm declared October 24, 2005 by Governor Murkowski then FEMA declared (DR-1618) on December 9, 2005. *Beginning on September 22, 2005 and continuing through September 26, 2005, a powerful fall sea storm produced high winds combined with wind-driven tidal surges resulting in severe and widespread coastal flooding and a threat to life and property in the Northwest Arctic Borough, and numerous communities within the Bering Strait (REAA 7), the Kashunamiut (REAA 55), the Lower Yukon (REAA 32) and the Lower Kuskokwim (REAA 31) Rural Education Attendance Areas including the cities of Nome, Kivalina, Unalakleet, Golovin, Tununak, Hooper Bay, Chevak, Mekoryuk and Napakiak. The following conditions existed as a result of this disaster: sever damage to personal residences requiring evacuation and sheltering of the residents; to businesses; to drinking water systems, electrical distribution systems, local road systems, airports, seawalls, and other public infrastructure; and to individual personal and real property; necessitating emergency protective measures and temporary and permanent repairs. On October 25, 2005, a request for a federal time extension was submitted. On December 9, 2005 a presidential disaster was declared (DR-1618) for Public Assistance for the Northwest Arctic Boro, Bering Strait REAA, Kashunamiut REAA (Chevak) and the Lower Kuskokwim REAA however, they failed to include the Lower Yukon REAA in the federal declaration. The State will write Project Worksheets for the Lower Yukon REAA under or State Public Assistance Declaration. Individual Assistance total is estimated at $209K, with 220 applicants. Public Assistance is around $3.63 million for 16 potential applicants with around 20 PW's. Hazard Mitigation total is $254K. The total cost for disaster is estimated at $5.33 million.*

12-236, 2011 West Coast Storm declared by Governor Parnell on December 5, 2011 then FEMA declared December 22, 2011 (DR-4050). *On November 7, 2011 the National Weather Service (NWS) issued the first of several coastal flood warnings for the western coastline of Alaska from Hooper Bay to the North Slope. The NWS warned of "a rapidly intensifying storm…expected to be an extremely powerful and dangerous storm…one of the worst on record." Over the next three days additional warnings in response to the 942 millibar low pressure system were issued for coastal villages as the storm moved northerly from the Aleutian Islands into the Bering and Chukchi Seas. The west coast was impacted with hurricane force winds exceeding 85 mph, high tidal ranges, and strong sea surges up to 10-ft above mean sea level (msl). Before the first storm had passed, a second equally-low pressure system (e.g., 942 millibar) impacted the western coastline from the Yukon-Kuskokwim Delta south to Bristol Bay. This combined weather extended the incident period for the state to November 13, 2011. The FEMA declaration was limited to the incident period from November 8 – 10, 2011.*

(DHS&EM 2013)

The US Army Corp of Engineers' Floodplain Manager's report indicated "There is no record of flooding in the community. However, the surrounding area is extremely low and is subject to frequent flooding" (USACE 2018).

Table 5-6 Historic Flood Events (NWS)

Location	Date	Event Type	Magnitude
Kuskokwim Delta (Zone)	11/11/2011	Coastal Flood	Blizzard, Snow, Wind, Coastal Flood: ($20K Damages) A strong Bering Sea storm produce strong wind and snow along the Kuskokwim Delta coast and the northern coast of Bristol Bay November 19th producing blizzard conditions. The strong wind generated a storm surge that resulted in coastal flooding in Goodnews Bay. Event Narrative: The public reported high wind and flooding in Goodnews Bay. Two 16 foot Lund boats were lost and a Connex floated off.
Kuskokwim Delta (Zone)	11/8/2011	Coastal Flood	Blizzard, Snow, Wind, Coast Flood: 95.5 mph (83 Kts) Episode Narrative: A strong Bering Sea storm produce strong wind and snow along the Kuskokwim Delta coast and the northern coast of Bristol Bay November 19th producing blizzard conditions. This storm produced high wind along with blizzard conditions and a storm surge that resulted in minor coastal flooding. The peak wind reached 83 mph at Shemya...The strong wind and long fetch resulted in a coast storm surge that produced minor coastal flooding in the Kuskokwim Delta region. Event Narrative: Report from the public at Kipnuk of water reaching homes.
Kuskokwim Delta (Zone)	9/6/2006	Coastal Flood	Storm Surge Flood: The Remnants of super typhoon Loke moved into the Bering Sea... Strong west wind across the Bering Sea that produced seas in excess of 30 feet; this surge coincided with very high astronomical tides along the Bristol Bay coast and the coast of the Kuskokwim Delta. The combination of the storm surge and the very high tides produced minor coastal flooding along the Bristol Bay coast and the Kuskokwim Delta coast.
Kuskokwim Delta (Zone)	10/17/2005	Flood	Storm Surge Flood: West wind gusting to 90 mph across the Pribilof Islands late Sunday night into the early morning hours Monday. The combination of the strong wind and long fetch produced a surge that coincided with high tides. Flooding occurred in the Bristol Bay area north to Kipnuk along the Kuskokwim Delta.
Kuskokwim Delta (Zone)	11/19/2004	Flood	Coastal Flood: Weather front moved across the Alaska Peninsula... Strong southeasterly winds resulted in... a west to southwest fetch across the Bering Sea, combined with high astronomical tide, resulted in coastal flooding across the west coast of the state.
Kuskokwim Delta (Zone)	10/18/2004	Flood	Storm Surge Flood: ($22K Damages) Long fetch of storm to hurricane force wind produced a storm surge. This surge pushed into the Bering Sea coast along the Kuskokwim Delta Monday night and Tuesday. The surge coupled with high tides resulted in coastal flooding and beach erosion. A 10,000 gallon bulk fuel tank located on the bank of Baird Inlet, Newtok AK, was at risk of sliding into the water as a result of the erosion from the high tides and storm surge. The tank was emptied and secured. The AWOS located at Hopper Bay was damaged by

Table 5-6 Historic Flood Events (NWS)

Location	Date	Event Type	Magnitude
			the storm and has been rendered inoperable.
Kuskokwim Delta (Zone)	9/9/2004	Flood	Storm Surge Flood: A strong storm in the Bering Sea created a long fetch with high wind. This produced a coastal storm surge resulting in minor coastal flooding along the Kuskokwim Delta.
Kuskokwim Delta (Zone)	12/9/2003	Storm Surge/Tide	Storm Surge, Tide: 104 mph (90.1 Kts) Strong wind across the Alaska Peninsula on the morning of the 8th. A ship outside of Cold Bay reported measured wind gusts of 104 mph. The strong long southwest fetch across the Bering Sea resulted in a coastal storm surge along the Yukon and Kuskokwim Delta and northern Bristol Bay.

(NCDC 2013)

5.3.3.3 Location, Extent, Impact, and Future Events Probability

Location

Chefornak is located on the south bank of the Kinia River junction with the Keguk River in the Yukon-Kuskokwim Delta, approximately 13.65 miles upriver from the Bering Sea coast. This relatively close proximity to the open ocean exposes the City to both sea storm and riverine induce high water flow events.

The USACE File Reverence NPAEN-A-FP, Flood Hazard Data sheet dated January 13, 1969 states:

> *"A 1-50' map has been marked with varying degrees of flood hazard. 40% of the community is in a high flood hazard area" (USACE 1969).*

However, the USACE Floodplain Manager's October 2011 report states the City has a limited riverine flood threat due to its location and freeboard above floodstage:

> *"The community is at the junction of the Keguk and Kinia Rivers. The Kinia River drains Dall Lake and numerous smaller lakes. Due to lake regulation the maximum flood level should not vary rapidly in stage. The village is located on a small rock outcropping and has 3-4 ft of freeboard above the flood stage. There is no record of flooding in the community. However, the surrounding area is extremely low and is subject to frequent flooding.*

The USACE Alaska Baseline Erosion Assessment, Erosion Information Paper – Chefornak, January 10, 2008 indicates the City does have periodic flood events; even with a relatively high free-board above the Kinia River:

> *"Storm surges, wind-driven waves, high tides, and late forming coastal ice reportedly contribute to coastal erosion. Natural river flow, water level fluctuations, flooding, spring break up, melting permafrost, boat wakes, steep shoreline slopes, pedestrian traffic, and vehicle traffic, all reportedly contribute to river erosion…*
>
> *Protective measures taken in recent years to reduce erosion damages in the community include placing fabric mats and constructing a jetty. The fabric proved to be effective until it lifted off during 2007. The bank has eroded approximately 2 feet since then. The*

jetty is still in place, in good condition, and effective, but the smaller sized gravel is beginning to wash away" (USACE 2008).

Extent

Floods are described in terms of their extent (including the horizontal area affected and the vertical depth of floodwaters) and the related probability of occurrence.

The following factors contribute to riverine flooding frequency and severity:

- Rainfall intensity and duration
- Antecedent moisture conditions
- Watershed conditions, including terrain steepness, soil types, amount, vegetation type, and development density
- The watershed's attenuating feature existence, including natural features such as swamps and lakes and human-built features such as dams
- The flood control feature existence, such as levees and flood control channels
- Flow velocity
- Sediment availability for transport, and the bed and embankment watercourse erodibility
- City location related to the base flood elevation as indicated with their certified high water mark

The City does not have a significant riverine flood threat. However, they do experience high water flow events and flood impact damages from snowmelt run-off and rain accumulation due to the surrounding wetlands and high water table. Therefore, based on past limited flood history and the criteria identified in Table 5-2, the extent of flooding in the City is considered "Limited" where critical facilities would shut-down for more than one week with more than 10 percent of property is severely damaged.

Impact

Nationwide, floods result in more deaths than any other natural hazard. Physical damage from floods includes the following:

- Structure flood inundation, causing water damage to structural elements and contents
- Erosion or scouring of stream banks, roadway embankments, foundations, footings for bridge piers, and other features
- Damage to structures, roads, bridges, culverts, and other features from high-velocity flow and debris carried by floodwaters. Such debris may also accumulate on bridge piers and in culverts, increasing loads on these features or causing overtopping or backwater damages
- Sewage and hazardous or toxic materials release as wastewater treatment plants or sewage lagoons are inundated, storage tanks are damaged, and pipelines are severed

Floods also result in economic losses through business and government facility closure, communications, utility (such as water and sewer), and transportation services disruptions.

Floods result in excessive expenditures for emergency response, and generally disrupt the normal function of a community.

Impacts and problems also related to flooding are deposition and stream bank erosion (erosion is discussed in detail in Section 5.3.2). Deposition is the accumulation of soil, silt, and other particles on a river bottom or delta. Deposition leads to the destruction of fish habitat, presents a challenge for navigational purposes, and prevents access to historical boat and barge landing areas. Deposition also reduces channel capacity, resulting in increased flooding or bank erosion. Stream bank erosion involves the removal of material from the stream bank. When bank erosion is excessive, it becomes a concern because it results in loss of streamside vegetation, loss of fish habitat, and loss of land and property (BKP 1988).

Probability of Future Events

Based on previous occurrences, USACE Floodplain Manager's report, and criteria in Table 5-3, It is "Unlikely" the City will experience a significant riverine flood; there is a 1 in 10 year (1/10=10 percent) chance of occurring; .history of events is less than or equal to 10 percent likely per year.

5.3.4 Ground Failure

5.3.4.1 Nature

Ground failure describes avalanche, landslide, subsidence, unstable soils, and other gravitational soil movement. Soil movement influences can include rain, snow, and/or water saturation induced avalanches or landslides; as well as be influenced by seismic activity, melting permafrost, river or coastal embankment undercutting, or a combination of steep slope conditions.

Landslides are a dislodgment and fall of a mass of soil or rocks along a sloped surface, or for the dislodged mass itself. The term is used for varying phenomena, including mudflows, mudslides, debris flows, rock falls, rockslides, debris avalanches, debris slides, and slump-earth flows. The susceptibility of hillside and mountainous areas to landslides depends on variations in geology, topography, vegetation, and weather. Landslides may also be triggered or exacerbated by indiscriminate development of sloping ground, or the creation of cut-and-fill slopes in areas of unstable or inadequately stable geologic conditions.

Additionally, landslides often occur with other natural hazards, thereby exacerbating conditions, such as:

- Earthquake ground movement can trigger events ranging from rock falls and topples to massive slides
- Intense or prolonged precipitation that causes flooding can also saturate slopes and cause failures leading to landslides
- Wildfires can remove vegetation from hillsides significantly increasing runoff and landslide potential

Development, construction, and other human activities can also provoke ground failure events. Increased runoff, excavation in hillsides, shocks and vibrations from construction, non-engineered fill places excess load to the top of slopes, and changes in vegetation from fire,

timber harvesting and land clearing have all led to landslide events. Broken underground water mains can also saturate soil and destabilize slopes, initiating slides. Something as simple as a blocked culvert can increase and alter water flow, thereby increasing the potential for a landslide event in an area with high natural risk. Weathering and decomposition of geologic material, and alterations in flow of surface or ground water can further increase the potential for landslides.

The USGS identifies six landslide types, distinguished by material type and movement mechanism including:

- **Slides,** the more accurate and restrictive use of the term landslide, refers to a mass movement of material, originating from a discrete weakness area that slides from stable underlying material. A *rotational slide* occurs when there is movement along a concave surface; a *translational slide* originates from movement along a flat surface.
- **Debris Flows** arise from saturated material that generally moves rapidly down a slope. A debris flow usually mobilizes from other types of landslide on a steep slope, then flows through confined channels, liquefying and gaining speed. Debris flows can travel at speeds of more than 35 mph for several miles. Other types of flows include debris avalanches, mudflows, creeps, earth flows, debris flows, and lahars.
- **Lateral Spreads** are a type of landslide generally occurs on gentle slope or flat terrain. Lateral spreads are characterized by liquefaction of fine-grained soils. The event is typically triggered by an earthquake or human-caused rapid ground motion.
- **Falls** are the free-fall movement of rocks and boulders detached from steep slopes or cliffs.
- **Topples** are rocks and boulders that rotate forward and may become falls.
- **Complex** is any combination of landslide types.

In Alaska, earthquakes, seasonally frozen ground, and permafrost are often agents of ground failure. Permafrost is defined as soil, sand, gravel, or bedrock that has remained below 32°F for two or more years. Permafrost can exist as massive ice wedges and lenses in poorly drained soils or as relatively dry matrix in well-drained gravel or bedrock. During the summer, the surficial soil material thaws to a depth of a few feet, but the underlying frozen materials prevent drainage. The surficial material that is subject to annual freezing and thawing is referred to as the “active layer”.

Seasonal freezing can cause frost heaves and frost jacking. Frost heaves occur when ice forms in the ground and separates sediment pores, causing ground displacement. Frost jacking causes unheated structures to move upwards. Permafrost is frozen ground in which a naturally occurring temperature below 32ºF has existed for two or more years. (DHS&EM 2010).

Indicators of a possible ground failure include:

- Springs, seeps, or wet ground that is not typically wet
- New cracks or bulges in the ground or pavement
- Soil subsiding from a foundation

- Secondary structures (decks, patios) tilting or moving away from main structures
- Broken water line or other underground utility
- Leaning structures that were previously straight
- Offset fence lines
- Sunken or dropped-down road beds
- Rapid increase in stream levels, sometimes with increased turbidity
- Rapid decrease in stream levels even though it is raining or has recently stopped and
- Sticking doors and windows, visible spaces indicating frames out of plumb

The State of Alaska 2010 State Hazard Mitigation Plan provides additional ground failure information defining mass movement types, topographic and geologic factors which influence ground failure which may pertain to Chefornak.

5.3.4.2 History

There are few written records defining ground failure impacts. However, the USACE Erosion Information Paper – Chefornak, Alaska January 10, 2008 reports that melting permafrost contributes to embankment and shoreline erosion (one of the many ground failure impacts) for the City:

> ***"Description of Erosion Problem***
>
> *Chefornak has both coastal erosion occurring along the shoreline of the Bering Sea and river erosion along the south bank of the Kinia River… Natural river flow, water level fluctuations, flooding, spring break up, melting permafrost, boat wakes, steep shoreline slopes, pedestrian traffic, and vehicle traffic, all reportedly contribute to river erosion. The shoreline in front of the community has been eroding at a rate of 2 to 6 feet per year and the erosion area is estimated at 200 linear feet along the Kinia River where the river banks are 4 to 10 feet high" (USACE 2008).*

5.3.4.3 Location, Extent, Impact, and Probability of Future Events

Location

There are various ground failure locations throughout Chefornak identified by various sources that may include USACE, NRCS, USGS, as well as other agencies' developed plans, and studies. Land subsidence such as melting permafrost and floodwater soil saturation most commonly exacerbates ground failure incidents.

According to permafrost and ice conditions map (Figure 5-5) developed for the National Snow and Ice Data Center/World Data Center for Glaciology located in the State Hazard Mitigation Plan (SHMP) (DHS&EM 2010 & 2013), shows that Chefornak has discontinuous permafrost as supported by soil investigations during the City's 2001 Sanitation Master Plan development process where permafrost was sporadically occurred and ground water encountered throughout the City.

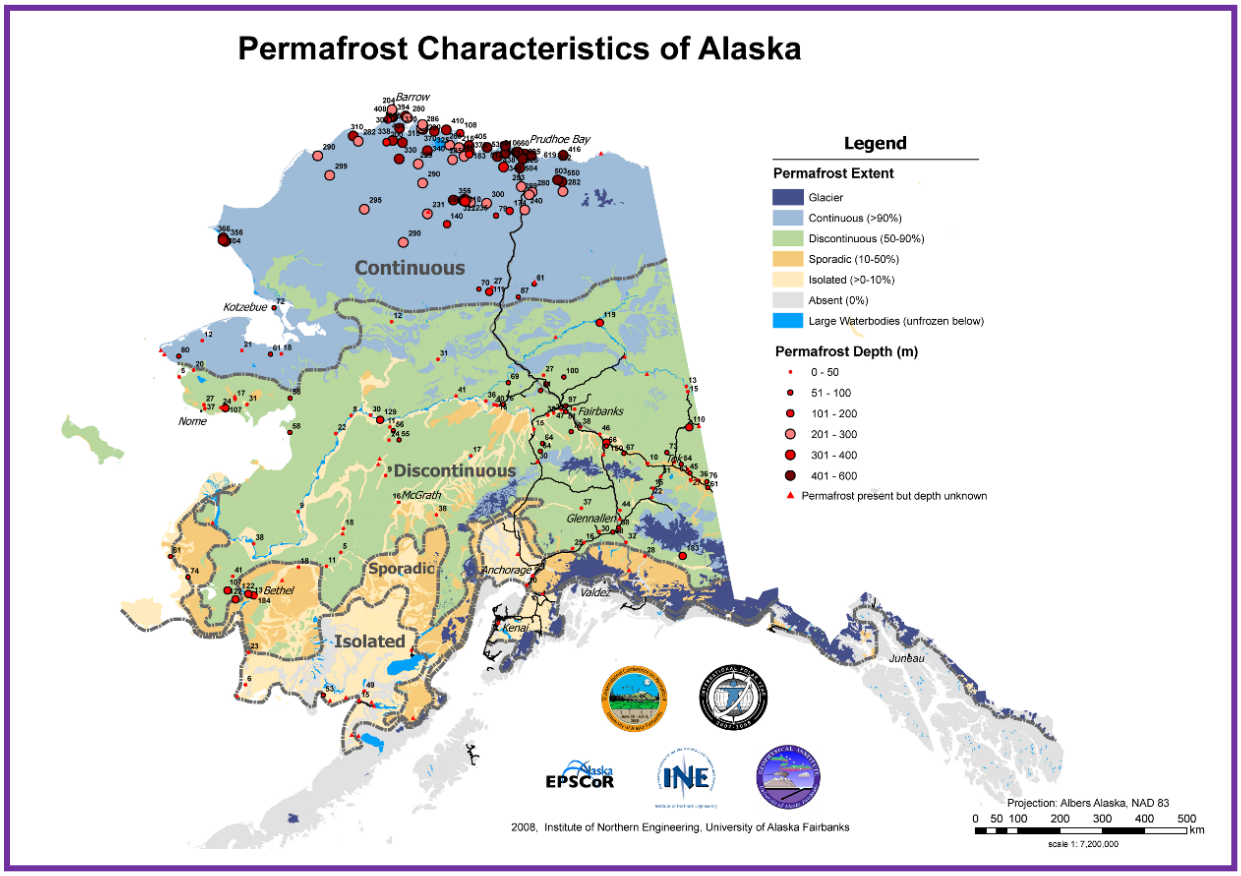

Figure 5-5 Permafrost and Ground Ice Map of Alaska (Jorgenson et al 2008)

The Planning Team indicated that Chefornak has not experienced significant ground failure impacts. However, water collects in low terrain depressions and sipes toward adjacent water bodies or the surrounding wetlands. This action is damaging roads, boardwalks, and community trails; threatening adjacent buildings and other infrastructure.

The City's high water table is exhibited with a pervasively wet surrounding terrain. Surface water may indirectly accelerate permafrost melting which in-turn affects structural and road surface integrity and subsequent failure.

Figures 5-6 and 5-7 depict soil saturation damages such as siping and sink holes as water melts permafrost and overly saturated soils collapse.

Photo 1: Erosion through the road to the BIA

Figure 5-6 Road Damage (USACE 2008)

Photo 2: A small sink hole near the top of the bank.

Figure 5-7 Sink Hole, Near Embankment (USACE 2008)

Extent

The damage magnitude could range from minor with some repairs required and little to no damage to transportation, infrastructure, or the economy to major if a critical facility (such as the airport) were damaged and transportation was effected.

Based on research and the Planning Team's knowledge of past ground failure and various degradation events and the criteria identified in Table 5-2, the extent of ground failure impacts in the City are considered limited. Impacts would not occur quickly but over time with warning signs. Therefore this hazard would not likely cause injuries or death, neither would it shutdown critical facilities and services. However, 10 percent of property is could be severely damaged.

Impact

Impacts associated with ground failure include surface subsidence, infrastructure, building, and/or road damage. Ground failure does not typically pose a sudden and catastrophic hazard; however landslides and avalanches may. Ground failure damage occurs from improperly designed and constructed buildings that settle as the ground subsides, resulting in structure loss or expensive repairs. It may also impact buildings, communities, pipelines, airfields, as well as road and bridge design costs and location. To avoid costly damage to these facilities, careful planning and location and facility construction design is warranted.

Probability of Future Events

Even though there are few written records defining ground failure impacts for the City, the Planning Team has solid evidence of annually recurring ground failure damages throughout the community – to structures, roads, harbor areas, and the airport. The Planning Team stated the probability for ground failure follows the criteria in Table 5-3, the future damage probability resulting from ground failure is "Unlikely in the next 10 years, event has up to 1 in 10 years (1/10=10 percent) chance of occurring as, events are less than or equal to 10 percent likely per year.

5.3.5 Severe Weather

5.3.5.1 Nature

Severe weather occur throughout Alaska with extremes experienced by the City of Chefornak that includes thunderstorms, lightning, hail, heavy and drifting snow, freezing rain/ice storm, extreme cold, and high winds. The City experiences periodic severe weather events such as the following:

Heavy Rain occurs rather frequently over the coastal areas along the Bering Sea and the Gulf of Alaska. Heavy rain is a severe threat to Chefornak**.**

Heavy Snow generally means snowfall accumulating to four inches or more in depth in 12 hours or less or six inches or more in depth in 24 hours or less.

Drifting Snow is the uneven distribution of snowfall and snow depth caused by strong surface winds. Drifting snow may occur during or after a snowfall.

Freezing Rain and Ice Storms occur when rain or drizzle freezes on surfaces, accumulating 12 inches in less than 24 hours. Ice accumulations can damage trees, utility poles, and communication towers which disrupts transportation, power, and communications.

Extreme Cold is the definition of extreme cold varies according to the normal climate of a region. In areas unaccustomed to winter weather, near freezing temperatures are considered "extreme". In Alaska, extreme cold usually involves temperatures between -20 to -70°F. Excessive cold may accompany winter storms, be left in their wake, or can occur without storm

activity. Extreme cold accompanied by wind exacerbates exposure injuries such as frostbite and hypothermia.

High Winds occur in Alaska when there are winter low-pressure systems in the North Pacific Ocean and the Gulf of Alaska. Alaska's high wind can equal hurricane force but fall under a different classification because they are not cyclonic nor possess other hurricane characteristics. In Alaska, high winds (winds in excess of 60 mph) occur rather frequently over the coastal areas along the Bering Sea. High winds are a severe threat to Chefornak.

Strong winds occasionally occur over the interior due to strong pressure differences, especially where influenced by mountainous terrain, but the windiest places in Alaska are generally along the coastlines.

Winter Storms include a variety of phenomena described above and as previously stated may include several components; wind, snow, and ice storms. Ice storms, which include freezing rain, sleet, and hail, can be the most devastating of winter weather phenomena and are often the cause of automobile accidents, power outages, and personal injury. Ice storms result in the accumulation of ice from freezing rain, which coats every surface it falls on with a glaze of ice. Freezing rain is most commonly found in a narrow band on the cold side of a warm front, where surface temperatures are at or just below freezing temperatures. Typically, ice crystals high in the atmosphere grow by collecting water vapor molecules, which are sometimes supplied by evaporating cloud droplets. As the crystals fall, they encounter a layer of warm air where they particles melt and collapse into raindrops. As the raindrops approach the ground, they encounter a layer of cold air and cool to temperatures below freezing. However, since the cold layer is so shallow, the drops themselves do not freeze, but rather, are supercooled, that is, in liquid state at below-freezing temperature. These supercooled raindrops freeze on contact when they strike the ground or other cold surfaces.

Snowstorms happen when a mass of very cold air moves away from the polar region. As the mass collides with a warm air mass, the warm air rises quickly and the cold air cuts underneath it. This causes a huge cloud bank to form and as the ice crystals within the cloud collide, snow is formed. Snow will only fall from the cloud if the temperature of the air between the bottom of the cloud and the ground is below 40 degrees Fahrenheit. A higher temperature will cause the snowflakes to melt as they fall through the air, turning them into rain or sleet. Similar to ice storms, the effects from a snowstorm can disturb a community for weeks or even months. The combination of heavy snowfall, high winds and cold temperatures pose potential danger by causing prolonged power outages, automobile accidents and transportation delays, creating dangerous walkways, and through direct damage to buildings, pipes, livestock, crops and other vegetation. Buildings and trees can also collapse under the weight of heavy snow.

Winter storm floods are discussed in Section 5.3.3.

Figure 5-8 displays Alaska's annual rainfall map based on Parameter-elevation Regressions on Independent Slopes Model (PRISM) that combines climate data from National Oceanic Atmospheric Administration (NOAA) and Natural Resources Conservation Service (NRCS) climate stations with a digital elevation model to generate annual, monthly, and event-based climatic element estimates such as precipitation and temperature.

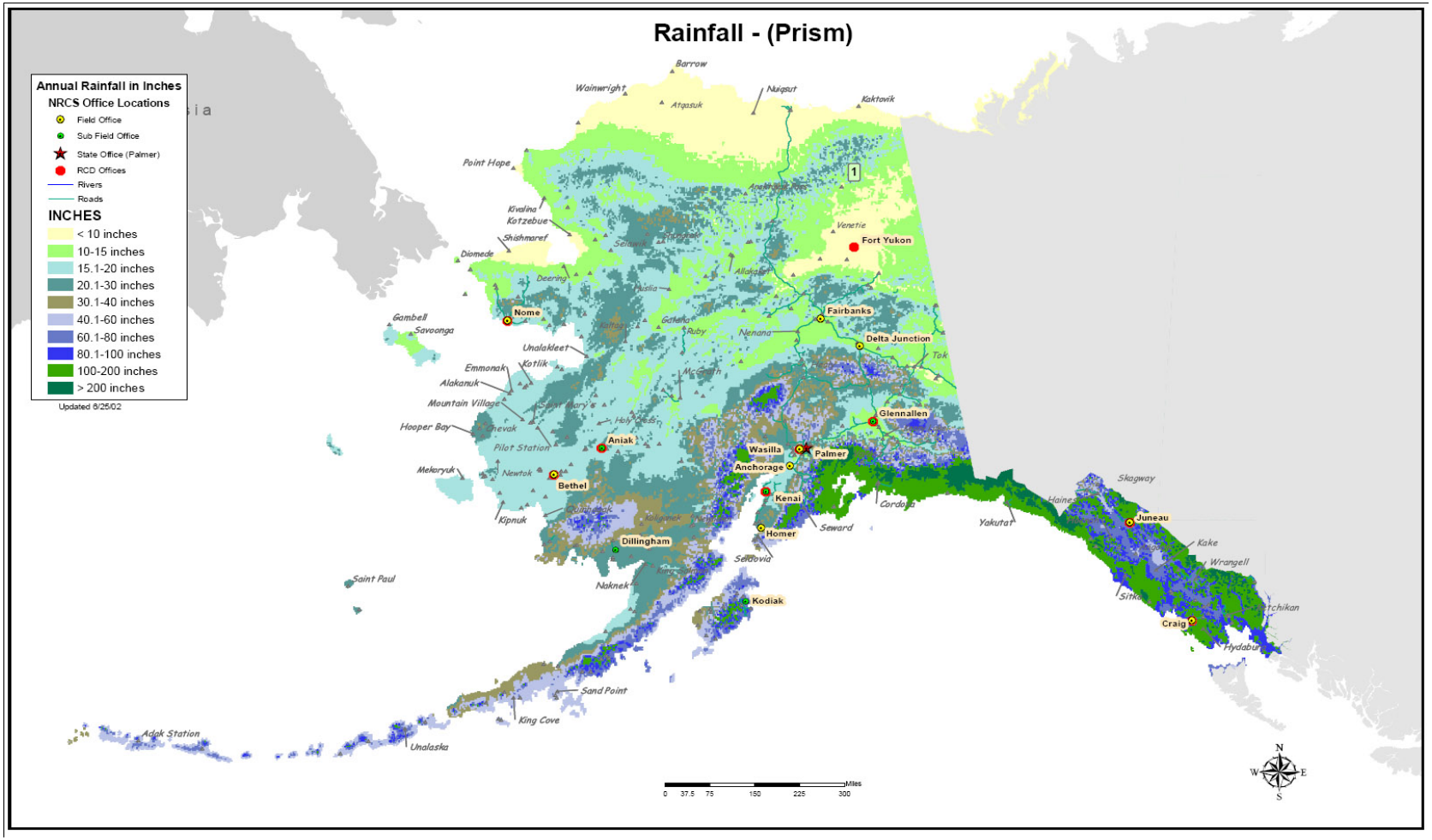

Figure 5-8 **Statewide Rainfall Map** (USDA PRISM 2013)

5.3.5.2 *History*

The Kuskokwim Delta is continually impacted by severe weather events. Hurricane force wind, storm surge, and cold typically have disastrous results. Table 5-7 summarizes precipitation and snowfall trends for the Bethel area providing a representation of the typical weather events which may have impacted the City.

Table 5-7 Station:500754; Bethel WSO Airport

From Year=1949 To Year=2006

	Precipitation											Total Snowfall		
Month	Mean (in.)	High (in.)	Year	Low (In.)	Year	1 Day Max. (dd-mm-yyyy)		>= 0.01 in.	>= 0.10 in.	>= 0.50 in.	>= 1.00 in.	Mean (in.)	High (in.)	Year
January	0.73	6.48	1952	0.04	2004	1.76	01-03-1952	9	2	0	0	7.4	57.4	1952
February	0.67	3.41	1951	0	1984	1.03	02-27-1996	8	2	0	0	6.9	35.8	1951
March	0.74	3.44	1991	0	1986	0.85	03-15-1951	10	2	0	0	8.6	36.1	1951
April	0.7	3.89	1979	0.02	1985	0.92	04-18-1983	9	2	0	0	5	14.3	1975
May	0.97	3.63	2002	0.02	1954	1.35	05-02-2012	11	3	0	0	1.9	7.7	1998
June	1.52	4.3	1999	0.25	1974	1.36	06-11-1981	12	5	0	0	0.1	2.2	1963
July	2.15	4.19	2001	0.49	1957	1.43	07-27-1952	15	6	1	0	0	0	1950
August	3.38	12.37	1951	0.99	1976	2.3	08-12-1951	18	9	2	0	0	0	1950
September	2.4	5.4	2005	0.42	1968	1.97	09-28-1971	16	7	1	0	0.3	5.5	2004
October	1.41	3.23	2005	0.11	1965	1.37	10-04-74	12	4	0	0	3.9	12.8	1978
November	1.25	4.23	2003	0.04	1969	1.45	11-08-2000	12	4	0	0	9.4	34.7	1994
December	1.06	6.17	1951	0.05	1956	1.18	12-23-1970	11	3	0	0	10.2	47	1951
Annual	*16.96*	*40.42*	*1951*	*7.29*	*1976*	*2.3*	*08-12-1951*	*144*	*51*	*6*	*1*	*53.7*	*149.5*	*1951*
Winter	*2.46*	*14.9*	*1952*	*0.45*	*1974*	*1.76*	*01-03-1952*	*27*	*7*	*1*	*0*	*24.5*	*123.6*	*1952*
Spring	*2.4*	*6.36*	*1951*	*0.74*	*1966*	*1.35*	*05-02-2002*	*30*	*8*	*0*	*0*	*15.5*	*42.2*	*1951*
Summer	*7.05*	*16.91*	*1951*	*2.71*	*1976*	*2.3*	*08-12-1951*	*46*	*21*	*3*	*0*	*0.1*	*2.2*	*1963*
Fall	*5.06*	*10.2*	*2005*	*1.69*	*1969*	*1.97*	*09-28-1971*	*40*	*15*	*2*	*0*	*13.6*	*36.2*	*1994*

Table updated on Jul 28, 2006

For monthly and annual means, thresholds, and sums:
Months with 5 or more missing days are not considered
Years with 1 or more missing months are not considered
Seasons are climatological not calendar seasons

Winter =
Dec., Jan., and Feb.

Summer =
Jun., Jul., and Aug.

Spring =
Mar., Apr., and May

Fall =
Sep., Oct., and Nov.

DHS&EM's Disaster Cost Index records the following severe weather disaster events which may have affected the area:

> *"83.* ***Omega Block Disaster, January 28, 1989 & FEMA declared (DR-00826) on May 10, 1989.*** *The Governor declared a statewide disaster to provide emergency relief to communities suffering adverse effects of a record breaking cold spell, with temperatures as low as -85 degrees. The State conducted a wide variety of emergency actions, which included: emergency repairs to maintain & prevent damage to water, sewer & electrical systems, emergency resupply of essential fuels & food, & DOT/PF support in maintaining access to isolated communities.*
>
> ***12-236, 2011 West Coast Storm declared by Governor Parnell on December 5, 2011 then FEMA declared December 22, 2011 (DR-4050).*** *On November 7, 2011 the National Weather Service (NWS) issued the first of several coastal flood warnings for the western coastline of Alaska from Hooper Bay to the North Slope. The NWS warned of "a rapidly intensifying storm…expected to be an extremely powerful and dangerous storm…one of the worst on record." Over the next three days additional warnings in response to the 942 millibar low pressure system were issued for coastal villages as the storm moved northerly from the Aleutian Islands into the Bering and Chukchi Seas. The west coast was impacted with hurricane force winds exceeding 85 mph, high tidal ranges, and strong sea surges up to 10-ft above mean sea level (msl). Before the first storm had passed, a second equally-low pressure system (e.g., 942 millibar) impacted the western coastline from the Yukon-Kuskokwim Delta south to Bristol Bay. This combined weather extended the incident period for the state to November 13, 2011. The FEMA declaration was limited to the incident period from November 8 – 10, 2011.*
>
> ***12-241, 2012 October Kuskokwim Delta Flood declared by Governor Parnell on November 26, 2012.*** *On October 5, 2012, a strong Fall storm moved north into the Bering Sea and produced severe winds, heavy rain, and storm surges up to 4 feet above mean tide levels in the Kuskokwim Delta, with severe impact to the Native Village of Napaskiak. The impact of the storm resulted in floodwaters surrounding the tribal-owned maintenance garage undermining and shifting the building and foundation; damage to the driveway ramp to the maintenance yard; and substantial damage to community boardwalks"(DHSEM 2013).*

Figures 5-9 and 5-10 depict the City of Chefornak's historic and future predicted precipitation and temperatures.

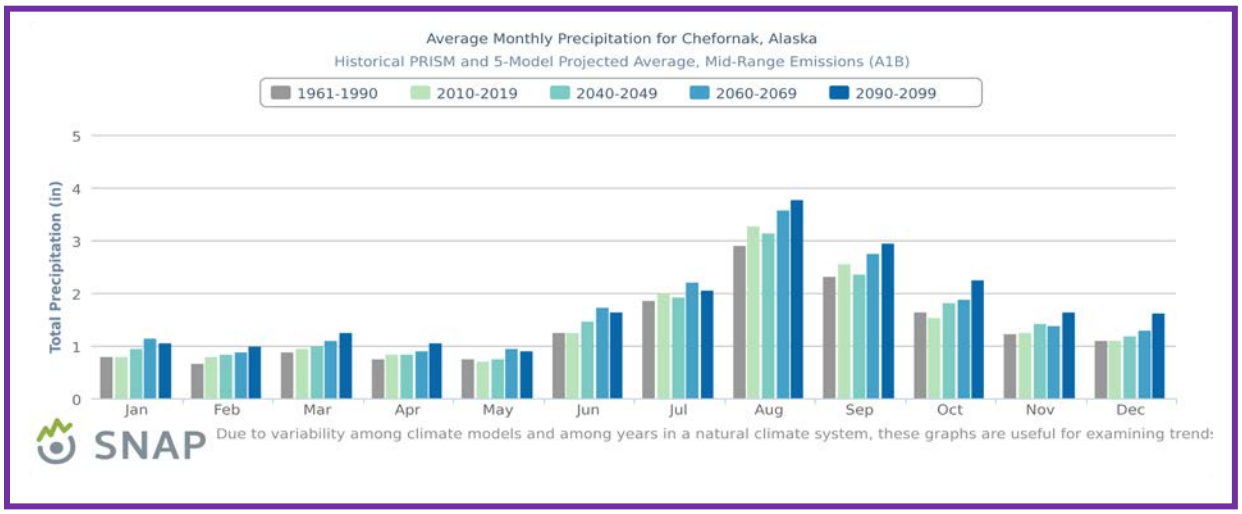

Figure 5-9 Chefornak's Historic and Predicted Precipitation (SNAP 2012).

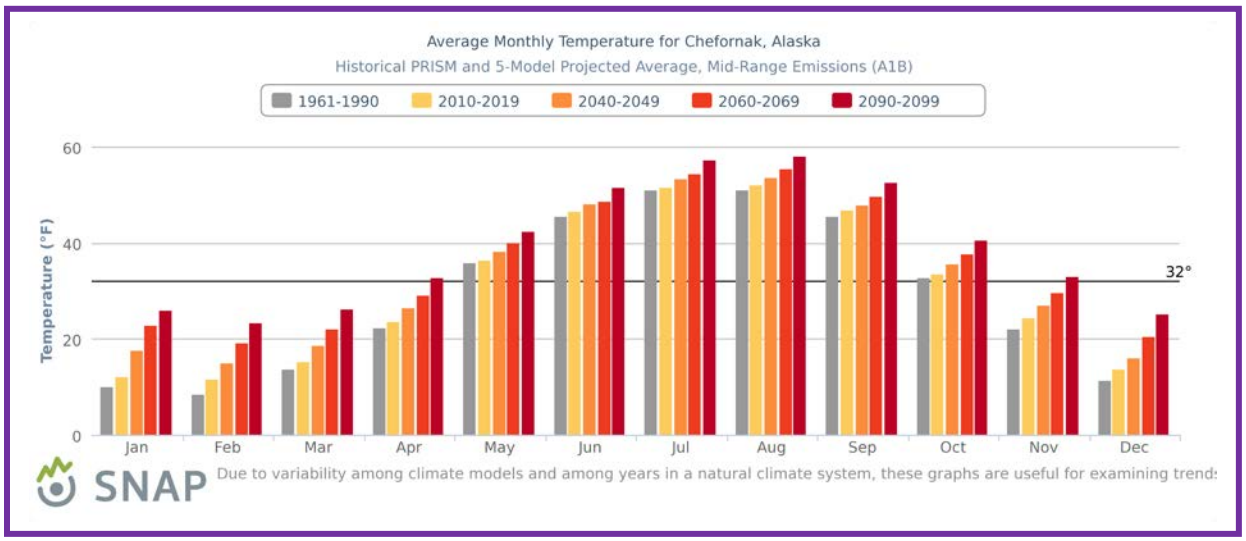

Figure 5-10 Chefornak's Historic and Predicted Temperatures (SNAP 2012)

Table 5-8 provides a representative sample of over 160 major storm events the National Weather Service (NWS) identified for the Kuskokwim Delta's Weather Zone. Each weather event may not have specifically impacted the Chefornak area.

These storm events are listed due to their close proximity to listed communities or by location within the identified zone.

Table 5-8 Severe Weather Events

Location	Date	Event Type	Magnitude
Kuskokwim Delta (Zone)	1/28/2013	Blizzard	Blizzard, Snow, Wind: 55 mph (48 Kts) Event Narrative: Toksook Bay reported peak conditions in the Kuskokwim Valley during this event, with visibility reduced to one-quarter of a mile with snow and winds gusting to 48 kts.
Kuskokwim Delta (Zone)	1/19/2013	Blizzard	Blizzard, Snow, Wind: Event Narrative: Toksook Bay reported peak event conditions in the Kuskokwim Delta, with one quarter of a mile in snow and blowing snow with northeast winds gusting to 44 kt.
Kuskokwim Delta (Zone)	12/26/2012	Blizzard	Blizzard, Snow, Wind: A strong storm moved to the Bering Sea coast producing strong wind and snow with blowing snow. This resulted in blizzard conditions in the Kuskokwim Delta.
Kuskokwim Delta (Zone)	12/8/2012	Blizzard	Blizzard, Snow, Wind: Storm spread snow along with strong wind across the Central Aleutians to the Pribilof Islands and the Bristol Bay and Kuskokwim Delta areas resulting in blizzard conditions.
Kuskokwim Delta (Zone)	4/8/2012	Blizzard	Blizzard: A large intense Bering Sea storm and associated front produced blizzard conditions along the coast of the Kuskokwim Delta.
Kuskokwim Delta (Zone)	4/4/2012	Blizzard	Blizzard, Snow, Wind: A strong storm moved across the central Aleutian Islands into the eastern Bering Sea April 3rd. Snow and strong wind associated with this storm produced blizzard conditions across the central Aleutians to the Pribilof Islands and the Kuskokwim Delta.
Kuskokwim Delta (Zone)	2/1/2012	Blizzard	Blizzard, Snow, Wind: A ... storm produced high wind and blizzard conditions from the

Table 5-8 Severe Weather Events

Location	Date	Event Type	Magnitude
			Alaska Peninsula to the Kuskokwim Delta ... One man died after he went out into the blizzard on a snow machine near Toksook Bay in the Kuskokwim Delta.
Kuskokwim Delta (Zone)	11/8/2011	Coastal Flood	Blizzard, Snow, Wind, Coast Flood: 95 mph (83 knots [Kts]) This storm produced high wind along with blizzard conditions and a storm surge that resulted in minor coastal flooding...in the Kuskokwim Delta region.
Kuskokwim Delta (Zone)	4/6/2011	High Wind, Blizzard	Blizzard, Snow, Wind: 78 mph (67 Kts) ...Wind gust reached 72 to 78 mph along the Aleutian Islands, Alaska Peninsula and Pribilof Islands. This storm also produced blizzard conditions across the Pribilof Islands to the Bering Sea coast and Bristol Bay coast...
Kuskokwim Delta (Zone)	12/20/2009	High Wind	Blizzard, Snow, Wind: 78 mph (67.7 Kts) Bering Sea Storm produced localized high wind along the Kuskokwim Delta and Bristol Bay coast of Alaska. The peak wind was 78 mph in this region. Platinum measured a peak gust of 68 KT. Based upon this observation it is estimated gust were at least this high in Kuskokwim Bay.
Kuskokwim Delta (Zone)	3/28/2009	Blizzard	Blizzard, Snow, Wind: 115 mph (100 kts) An intense storm ... packed high wind and snow as it moved across the Alaska Peninsula to the Bering Sea coast. Strong wind peaked at 100 KT at Saint Georg...
Kuskokwim Delta (Zone)	2/25/2009	Blizzard	Blizzard, Snow, Wind, Coastal Storm Surge: 100+ mph (115+ Kts) ($200K Damages) Hurricane force storm produced blizzard conditions along the Bering Sea coast from Bristol Bay north across the Kuskokwim Delta. Wind gusts in excess of 100 mph in the Pribilof Islands and in Bristol Bay. Extensive damage occurred to many homes and buildings.
Kuskokwim Delta (Zone)	1/19/2008	High Wind	Blizzard, Snow, Wind: 79 mph (69 Kts) ... High wind blew through portions of the Aleutians, then moved to the Bristol Bay Coast... The strong southeast flow pushed ample moisture into the Alaska Range dumping 14 inches of snow in that region on the 20th.
Kuskokwim Delta (Zone)	1/30/2007	High Wind	Blizzard, Snow, Wind: 127 mph (110 Kts) $100K Damages High Wind. Wide spread power outages plagued the Kuskokwim Delta with this storm along with roofs being blown off two houses, two houses shifted on their foundation and minor tidal overflow along Kuskokwim Bay. Unconfirmed wind gusts were reported to 127 mph at Sand Point on the Alaska Peninsula with this storm.
Kuskokwim Delta (Zone)	9/6/2006	Coastal Flood	Storm Surge Flood: Remnants of super typhoon Loke produced seas in excess of 30 feet; this surge coincided with very high astronomical tides along the Bristol Bay coast and the coast of the Kuskokwim Delta. The combination of the storm surge and the very high tides produced minor coastal flooding along the Bristol Bay coast and the Kuskokwim Delta coast.
Kuskokwim Delta (Zone)	10/17/2005	Flood	Storm Surge Flood: 90 mph (78 Kts) West wind gusting to 90 mph; combination of the strong wind and long fetch produced a surge that coincided with high tides. Flooding occurred in the Bristol Bay area north to Kipnuk along the Kuskokwim Delta.

Table 5-8 Severe Weather Events

Location	Date	Event Type	Magnitude
Kuskokwim Delta (Zone)	3/23/2000	Extreme Cold	Extreme Cold, Wind Chill: -50°F A Napakiak man, Herman Motgin, age 31, died of hypothermia Friday after he was found next to his snowmachine on the trail between Bethel and Napakiak. He was discovered in a hypothermic state... still breathing. He was taken to the Napakiak clinic, Motgin was pronounced Motgin dead [soon after]. The weather around Bethel, according to an article in the Anchorage Daily News, was "...severe Thursday night, with high winds, blowing snow, and wind chills of...(missing in the article...but estimated at near -50°F)".
Kuskokwim Delta (Zone)	12/27/1998	Cold/Wind Chill	Extreme Cold, Wind Chill: Brisk northeast wind combined with very cold air to produce wind chills from -40 to locally -70°F across the area.

(NWS 2013)

5.3.5.3 Location, Extent, Impact, and Probability of Future Events

Location

The entire Kuskokwim Delta area, which includes the City of Chefornak, experiences periodic severe weather impacts. The most common to the area are extreme cold, severe winter storms, sea storm surge and high winds. Table 5-11 provides a representation of the City's recurring severe weather events that have impacted the area since 2006.

Extent

The entire City is equally vulnerable to the severe weather effects. The City experiences severe storm conditions with moderate snow depths; wind speeds exceeding 90 mph; and extreme low temperatures that reach -50ºF.

Based on past severe weather events and the criteria identified in Table 5-2, the extent of severe weather in the City are considered "Limited" where injuries do not typically result in permanent disability, complete shutdown of critical facilities occurs for more than one week, and more than 10 percent of property is severely damaged.

Impact

The intensity, location, and the land's topography influence a severe weather event's impact within a community. Hurricane force winds, rain, snow, and storm surge can be expected to impact the entire City of Chefornak.

Heavy snow can immobilize a community by bringing transportation to a halt. Until the snow can be removed, airports and roadways are impacted, even closed completely, stopping the flow of supplies and disrupting emergency and medical services. Accumulations of snow can cause roofs to collapse and knock down trees and power lines. Heavy snow can also damage light aircraft and sink small boats. A quick thaw after a heavy snow can cause substantial flooding. The cost of snow removal, repairing damages, and the loss of business can have severe economic impacts on cities and towns.

Injuries and deaths related to heavy snow usually occur as a result of vehicle and or snow machine accidents. Casualties also occur due to overexertion while shoveling snow and hypothermia caused by overexposure to the cold weather.

Extreme cold can also bring transportation to a halt. Aircraft may be grounded due to extreme cold and ice fog conditions, cutting off access as well as the flow of supplies to communities. Long cold spells can cause rivers to freeze, disrupting shipping and increasing the likelihood of ice jams and associated flooding.

Extreme cold also interferes with the proper functioning of a community's infrastructure by causing fuel to congeal in storage tanks and supply lines, stopping electric generation. Without electricity, heaters and furnaces do not work, causing water and sewer pipes to freeze or rupture. If extreme cold conditions are combined with low or no snow cover, the ground's frost depth can increase, disturbing buried pipes. The greatest danger from extreme cold is its effect on people. Prolonged exposure to the cold can cause frostbite or hypothermia and become life-threatening. Infants and elderly people are most susceptible. The risk of hypothermia due to exposure greatly increases during episodes of extreme cold, and carbon monoxide poisoning is possible as people use supplemental heating devices.

Probability of Future Events

Based on previous occurrences and the criteria identified in Table 5-3, it is “Highly Likely” a severe weather will continue to impact the City with events having up to 1 in 1 years (1/1=100 percent) chance of occurring as the history of events is greater than 33 percent likely per year.

This page intentionally left blank

Section Six outlines the vulnerability process for determining potential losses for the community from various hazard impacts.

6.1 VULNERABILITY ANALYSIS OVERVIEW

A vulnerability analysis predicts the extent of exposure that may result from a hazard event of a given intensity in a given area. The analysis provides quantitative data that may be used to identify and prioritize potential mitigation measures by allowing communities to focus attention on areas with the greatest risk of damage. A vulnerability analysis is divided into eight steps:

1. Asset Inventory
2. Exposure Analysis For Current Assets
3. Repetitive Loss Properties
4. Land Use and Development Trends
5. Vulnerability Analysis Methodology
6. Data Limitations
7. Vulnerability Exposure Analysis
8. Future Development

This section provides an overview of the vulnerability analysis for current assets, and area future development initiatives.

DMA 2000 Recommendations
Assessing Risk and Vulnerability, and Analyzing Development Trends §201.6(c)(2)(ii): The risk assessment shall include a] description of the jurisdiction's vulnerability to the hazards described in paragraph (c)(2)(i) of this section. This description shall include an overall summary of each hazard and its impact on the community. *All plans approved after October 1, 2008 must also address NFIP insured structures that have been repetitively damaged by floods.* The plan should describe vulnerability in terms of: §201.6(c)(2)(ii)(A): The types and numbers of existing and future buildings, infrastructure, and critical facilities located in the identified hazard areas; §201.6(c)(2)(ii)(B): An estimate of the potential dollar losses to vulnerable structures identified in … this section and a description of the methodology used to prepare the estimate. §201.6(c)(2)(ii)(C): Providing a general description of land uses and development trends within the community so that mitigation options can be considered in future land use decisions. §201.6(c)(2)(iii): For multi-jurisdictional plans, the risk assessment section must assess each jurisdiction's risks where they vary from the risks facing the entire planning area.
1. REGULATION CHECKLIST
ELEMENT B. Risk Assessment, Assessing Vulnerability, Analyzing Development Trends
B3. Is there a description of each identified hazard's impact on the community as well as an overall summary of the community's vulnerability for each jurisdiction? (Requirement §201.6(c)(2)(ii))
B4. Does the Plan address NFIP insured structures within each jurisdiction that have been repetitively damaged by floods?
C2. Does the Plan address each jurisdiction's participation in the NFIP and continued compliance with NFIP requirements, as appropriate? (Requirement §201.6(c)(3)(ii))
Source: FEMA, October 2011.

The requirements for a vulnerability analysis as stipulated in DMA 2000 and its implementing regulations are described here.

- A summary of the community's vulnerability to each hazard that addresses the impact of each hazard on the community.
- Identification of the types and numbers of RL properties in the identified hazard areas.
- An identification of the types and numbers of existing vulnerable buildings, infrastructure, and critical facilities and, if possible, the types and numbers of vulnerable future development.
- Estimate of potential dollar losses to vulnerable structures and the methodology used to prepare the estimate.

Table 6-1 lists Chefornak's infrastructures' hazard vulnerability.

Table 6-1 Vulnerability Overview

Hazard	Area's Hazard Vulnerability			
	Percent of Jurisdiction's Geographic Area	Percent of Population	Percent of Building Stock	Percent of Critical Facilities and Utilities
Earthquake	100	100	100	100
Erosion	10	<5	<15	<15
Flood	40	60	40	40
Ground Failure	100	100	100	100
Weather	Weather	100	100	100

6.2 LAND USE AND DEVELOPMENT TRENDS

6.2.1 Land Use

Land use in the City is predominately residential with limited area for commercial services and community (or institutional) facilities. Suitable developable vacant land is in short supply within the boundaries of the City, and open space and various hydrological bodies surround the community. One area of town is classified as airport land use.

The Department of Conservation (DEC) Village Safe Water (VSW) program describes the City's water and wastewater capability as:

> *"Treated well water serves 12 watering points but experiences saltwater intrusion. Many residents use untreated surface water…*
>
> *[The City uses] Honeybuckets and storage tanks [for waste treatment facilities].*
>
> *(DEC 2011).*

6.3 EXPOSURE ANALYSIS FOR CURRENT ASSETS

6.3.1 Asset Inventory

Asset inventory is the first step of a vulnerability analysis. Assets that may be affected by hazard events include population (for community-wide hazards), residential buildings (where data is available), and critical facilities and infrastructure. The critical facility and infrastructure assets and associated values throughout the City of Chefornak are addressed in Section 6.3.1.2.

6.3.1.1 Population and Building Stock

Population data for the City were obtained from the 2010 U.S. Census and the DCRA. The US Census reports the City's total population for 2010 as 418 and 2012 DCRA data reported a population of 434 (Table 6-2).

Table 6-2 Estimated Population and Building Inventory

Population		Residential Buildings	
2010 Census	DCCED 2011 Data	Total Building Count	Total Value of Buildings[1]
418	434	99	US Census: $16,711,200 City: $19,800,000

[1] Sources: U.S. Census 2010, and 2012 DCCED population data. US Census listed housing value at $168,800. The Project Team determined that the average structural replacement value of all single-family residential buildings is $200,000 per structure due to rural construction expense adjustment.

Estimated replacement values for those structures, as shown in Table 6-2, were obtained from the 2010 U.S. Census. However, the Planning Team stated that residential replacement values are generally understated because replacement costs exceed Census structure estimates due to material purchasing, barge or airplane delivery, and construction in rural Alaska. The Planning Team estimates an average 30ft by 40 ft (1,200 sq ft) residential structure costs $200,000. A total of 99 single-family residential buildings were considered in this analysis.

6.3.1.2 Existing Infrastructure

The City of Chefornak has benefited from numerous funding opportunities to assist them with upgrading their infrastructure such as drilling 9 wells and providing numerous watering points throughout the community. However, the City still experiences saltwater intrusion within these facilities. This requires many residents to rely on surface water sources for potable water. These sources are not reliable-safe systems.

Table 6-3 list the City's identified "completed" infrastructure improvement projects. They provide a depiction of the community's ongoing development trends and focus toward improving aging infrastructure.

Table 6-3 Completed Projects

Agency	Fiscal Year	Status	Project Description	Funded Stage	Total Cost
Denali Commission (Denali)	2007	Funded	New Clinic Design Design of a 2500 square foot (sf) clinic in a roadless community of 439 residents. See also project number AN04-GA8 for construction under Award 0146-DC-2004-I29.	Project Close-out Complete	51400
Housing and Urban Development (HUD)	2007	Funded	Indian Housing Block Grant (IHBG) - Comments: Native American Housing Assistance and Self Determination Act (NAHASDA) administration, operating & construction funds	Construction	258152
HUD	2006	Funded	IHBG/NAHASDA administration, operating & construction funds	Completed	255234
Denali	2006	Funded	Teacher Housing Renovation and Repair Chefornak: This was a renovation and repair project on 4 units. All of the interior window casings and trim were redone, all tub surrounds were replaced, all rotten 2X6 rafters were replaced, all sheetrock cracks were repaired, all doors were replaced .	Project Close-out Complete	71757
HUD	2005	Funded	IHBG/NAHASDA administration, operating & construction funds	Completed	249006
Division of Community and Regional Affairs (DCRA)	2005	Funded	Community Projects & Improvements Capital Matching	Completed	27535
Alaska Energy Authority (AEA)- Rural Power System Upgrade (RPSU)	2005	Funded	AEA/RPSU Powerhouse & Distribution system upgrade OTHER FUNDING: Denali Commission $2,809,830; Community Matching Grant Program $125,282. Design and construction for a new powerhouse including one 150 kilo-watt (kW) generator and two 450 kW generators for a total capacity of 1,050 kW, distribution upgrades...	Completed	2932111
Alaska Native Tribal Health Consortium (ANTHC)	2004	Funded	Construct a new health clinic.	Complete	1149214
ANTHC	2004	Funded	Design studies and construction planning of new clinic. Project design is complete.	Design	51400
Denali	2004	Funded	New Clinic Construction Construction of a 2500 sf Clinic in a roadless community of 439 residents. Total project cost upon completion was $1,414,240.00 See also project number AN04-G99 for design under Award 0071-DC-2002-I24.	Project Close-out Complete	1362840
HUD	2004	Funded	IHBG/NAHASDA administration, operating & construction funds	Completed	266955

Table 6-3 Completed Projects

Agency	Fiscal Year	Status	Project Description	Funded Stage	Total Cost
Denali	2004	Funded	Bulk Fuel Facility This project consisted of a bulk fuel facility to provide diesel storage to the City of Chefornak and Lower Kuskokwim School District, and diesel and gasoline storage to the Chefarnamute Native Corp. The 3 cell tank farm has a storage capacity of 266,000	Project Close-out Complete	3187226
HUD	2003	Funded	IHBG/NAHASDA administration, operating & construction funds	Completed	289316
DCRA	2003	Funded	CP&I /Community Facilities Upgrade Capital Matching	Completed	26316
HUD	2002	Funded	IHBG/NAHASDA administration, operating & construction funds	Completed	254987
Denali	2002	Funded	Power System Upgrade Design and construction for a new powerhouse including one 150 kW generator and two 450 kW generators for a total capacity of 1,050 kW, distribution upgrades and a recovered heat system.	Project Close-out Complete	2922730
Bureau of Indian Affairs (BIA)	2002	Funded	Winter Trail Marking to Kasigluk (83 mi.)	Completed	27888
Federal Aviation Administration (FAA)	2002	Funded	Construct New Airport - OTHER FUNDING: Department of Transportation (DOT)/ Public Facilities (PF)	Completed	7461638
AEA/ Bulk Fuel (BF)	2001	Funded	Bulk Fuel Facilities Construction/Upgrades, Repairs OTHER FUNDING: Denali Commission $$738,950; HUD/CDBG $500,000; EPA $1,316,640; DEC $42,000. Construct bulk fuel facility to provide diesel storage to the City of Chefornak and Lower Kuskokwim School District, and diesel and gasoline storage to the Chefornak	Completed	3187226
DCRA	2001	Funded	Generator Purchase - Phase II - Capital Matching	Completed	26316
HUD	2000	Funded	IHBG/NAHASDA administration, operating & construction funds	Completed	243149
DCRA	2000	Funded	New Generators - Capital Matching	Completed	50282
DCRA	2000	Funded	Generator Purchase - Capital Matching	Completed	26316
Department of Conservation (DEC)/ Village Safe Water (VSW)	2000	Funded	Sanitation Boardwalk DOT - 2000 - $1,344,596. Construction of approximately 6,000 linear feet of new sanitation boardwalk and other transportation improvements in Chefornak.	Completed	1344596
Alaska Housing Finance Corporation (AHFC)	1999	Funded	Mutual help housing, 5 low income units NAHASDA administration, operating & construction funds	Completed	1141665
HUD	1999	Funded	IHBG/NAHASDA administration, operating & construction funds	Completed	243149

Table 6-3 Completed Projects

Agency	Fiscal Year	Status	Project Description	Funded Stage	Total Cost
ANTHC	1999	Funded	Upgrade central water, sewer, and solid waste facilities. This is a Village Safe Water managed project. Please contact the lead agency for additional details. Project on hold pending water source development.	Construction	925118
DEC/VSW	1999	Funded	Sanitation Facilities Improvement Project Indian Health Service (IHS) Regular - 1999 - $868,000. Re-awarded to design and construct a temporary washeteria.	Design	1418000
DOT/PF	1999	Funded	Sanitation Road/Boardwalk Reconstruct the boardwalks to 12 feet wide and construct 3 bridges. Total of 12,800 feet. In conjunction with VSW project.	Completed	2064130
DCRA	1999	Funded	Community Building Capital Matching	Completed	26316
HUD	1998	Funded	IHBG/NAHASDA administration, operating & construction funds	Completed	255813
DCRA	1998	Funded	Fire Department Building, Ph II Capital Matching	Completed	26316
DEC/VSW	1998	Funded	Flush Tank & Haul, Ph I Water Improvements, water treatment plant (WTP) Modifications (cont'd), Boardwalk RD - 1998 - $1,600,000.	Completed	1600000
DEC/VSW	1998	Funded	Water/Sewer Improvements	Completed	280000
DCRA	1997	Funded	Fire Department Building Capital Matching	Completed	26316
DEC/VSW	1997	Funded	Water/Sewer Improvements USDA/RD $280,000.. Construct water treatment plant and connect to well field in preparation for community system	Completed	280000
HUD	1997	Funded	Bulk Fuel Storage Tank, Indian Community Development Block Grant (ICDBG) Program	Completed	500000
AEA	1997	Funded	Electric Generator Upgrade	Completed	100000
DCRA	1996	Funded	Fire Department Building Capital Matching	Completed	26316
AEA	1996	Funded	Diesel Generator OTHER FUNDING: RDA Funding $50K. Replace generator with new 200 KW unit	Completed	100000
DCRA	1996	Funded	Upgrade Electric Generation System – Regional Development Assistance (RDA) Grant	Completed	100000
DCRA	1996	Funded	Upgrade Electric Generation System - RDA Grant	Completed	290750
DCRA	1995	Funded	Fire Department Building Capital Matching	Completed	26316

Table 6-3 Completed Projects

Agency	Fiscal Year	Status	Project Description	Funded Stage	Total Cost
DEC/VSW	1995	Funded	Wastewater System OTHER FUNDING: EPA/IG - 1995 - $500,000. Began construction summer 98. New well field in preparation for flush haul system did not provide adequate quality water. Still investigating possible water sources.	Completed	500000
DCRA	1994	Funded	Fire Department Building Capital Matching	Completed	26316
HUD/ Community Grant Program (CGP)	1993	Funded	Housing Modernization Replace cook stoves - 36 units in 2 projects	Completed	39000
DEC/VSW	1992	Funded	Water/Sewer System Drilled 3 new wells in 1994; drilled 6 additional wells in 1995 to develop a water supply	Completed	2147500
DEC/VSW	1985	Funded	Water/Sewer Study Study to investigate the existing groundwater source and alternative surface water sources	Completed	45000

(DCRA 2013)

6.3.1.3 Existing Critical Facilities

A critical facility is defined as a facility that provides essential products and services to the general public, such as preserving the quality of life in the City and fulfilling important public safety, emergency response, and disaster recovery functions. The critical facilities profiled in this plan include the following:

- Government facilities, such as city and tribal administrative offices, departments, or agencies
- Emergency response facilities, including police department and firefighting equipment
- Educational facilities, including K-12
- Care facilities, such as medical clinics, congregate living health, residential and continuing care, and retirement facilities
- Community gathering places, such as community and youth centers
- Utilities, such as electric generation, communications, water and waste water treatment, sewage lagoons, landfills.

The City's critical facilities and infrastructure are listed in Table 6-4.

Table 6-4 Critical Facilities and Infrastructure

Facility Type	Estimated No. of Occupants	Facilities	Address	Latitude	Longitude	Estimated Value	Building Type	Earthquake	Erosion	Flood	Ground Failure	Severe Weather
Government	20	City Offices & Complex	Second Street	60.15888	-164.27857	$1,000,000	W2	X			X	X
	15	Tribal Council Office, CVRF Office, Community Center & Temporary Church	Second Street	Unknown	Unknown	$500,000	W2	X			X	X
	0	Civic Center	Complex Drive	60.15888	-164.27857	$750,000	W2	X			X	X
	20	Robert Jimmy New BIA Building	Airport Way	Unknown	Unknown	$1,000,000	W2	X			X	X
	0	US Post Office	Second Street	Unknown	Unknown	$500,000	W1	X			X	X
	0	Alaska National Guard Armory	A Street	Unknown	Unknown	$500,000	W1	X			X	X
Emergency Response	1	Public Safety Building	E Street	60.1574	-164.27933	$105,264	W2	X			X	X
Education	173	Chaptnguak School, K-12	Second Street	Unknown	Unknown	$44,182,623	W2	X			X	X
	20	Association of Village Council Presidents (AVCP) Head Start & Teacher Housing	A Street	Unknown	Unknown	$1,000,000	W1	X	X	X	X	X
Medical Care	6	Chefornak Health Clinic	Housing area	60.15932	-164.27778	$2,563,454	W1	X			X	X
Community	20	Chefarnrmute, Inc. Offices, Store, & Storage	D Street	Unknown	Unknown	$1,500,000	W2	X			X	X
	1	Temporary Church	Tribal Council Office	60.15888	-164.27857		W1	X			X	X
	1	Parish Building	Second Street	Unknown	Unknown	$200,000	W1	X			X	X
	1	Visiting Priest Residence	Second Street	Unknown	Unknown	$200,000	W1	X			X	X
	0	Community Hall	City Office Building	Unknown	Unknown			X			X	X
	10	Hardware/General Store		60.15888	-164.27857	$1,000,000	W2	X			X	X
	10	Avugiak's Store & Storage	Second Street	Unknown	Unknown	$1,000,000	W2	X			X	X
	4	Teacher Housing	Second Street	Unknown	Unknown	$400,000	W2	X			X	X
	1	Teacher Housing - Chefarnrmute Inc. Rental	Third Street	Unknown	Unknown	$200,000	W1	X			X	X
	3	CVS Fish Plant & Community Freezer	E Street	Unknown	Unknown	$250,000	W2	X			X	X
	0	Old Power Plant & Storage	Third Street	Unknown	Unknown	$200,000	W1	X			X	X

Table 6-4 Critical Facilities and Infrastructure

Facility Type	Estimated No. of Occupants	Facilities	Address	Latitude	Longitude	Estimated Value	Building Type	Earthquake	Erosion	Flood	Ground Failure	Severe Weather
	0	VPSO Residence	E Street	Unknown	Unknown	$300,000	W1	X			X	X
	0	Cemetery	First Street	Unknown	Unknown	$20,000	N/A	X	X	X	X	X
Roads	0	**Chefornak Road Miles @ ~$200,000/mile**	**Approximately 3.25 Miles**	N/A	N/A	$650,000	HRD2	X			X	X
		Airport Road	2,035					X			X	X
		First Street	250					X			X	X
		Second Street	2,762					X			X	X
		Third Street	4,454					X			X	X
		A Street	767					X			X	X
		B Street	500					X			X	X
		D Street	360					X			X	X
		E Street	968					X			X	X
		F Street	1,151					X			X	X
		F Street	1,757					X			X	X
		Kris Jane Street	246					X			X	X
		Tank Farm Road	712					X	X		X	X
		Landfill Road	2,050					X			X	X
Boardwalk	0	Sanitation Boardwalk	12,800 Linear ft	N/A	N/A	$3,408,726	N/A	X	X		X	X
Bridge	0	Boardwalk Bridges-1	N/A	Unknown	Unknown	$10,000	N/A	X			X	X
		Boardwalk Bridges-2				$10,000		X			X	X
		Boardwalk Bridges-3				$10,000		X			X	X
Transportation	0	Chefornak Airport Runways 16/34	N/A	60.14923	-164.28564	$16,000,000	APTR	X			X	X
	0	Boat Launch & Dock	N/A	Unknown	Unknown	$20,000	N/A	X	X	X	X	X
	0	Airport Equipment Storage #1	Airport	Unknown	Unknown	$500,000	S2M	X			X	X
	1	Airport Equipment Storage #2	Airport	Unknown	Unknown	$500,000	S2M	X			X	X
	2	Water &Sewer Garage-Storage	F Street	Unknown	Unknown	$500,000	S2M	X			X	X
Utilities	0	School Generator Plant	Second Street	Unknown	Unknown	$750,000	EPPM	X			X	X
	0	Power Plant & Generator	Second Street	Unknown	Unknown	$1,000,000	EPPM	X			X	X
	0	Bulk Fuel Storage Tanks	F Street	Unknown	Unknown	$1,500,000	OTF	X	X		X	X
	1	Chefornak Potable Water Treatment System	A Street	60.15962	-164.2661	$280,000	PWTP	X			X	X
	0	Community Well Field (9 wells)	diverse areas	Unknown	Unknown	$2,147,500	PWE	X			X	X
	3	Naterkaq Light	Second Street	Unknown	Unknown	$6,548,505	EPPS	X			X	X

Table 6-4 Critical Facilities and Infrastructure

Facility Type	Estimated No. of Occupants	Facilities	Address	Latitude	Longitude	Estimated Value	Building Type	Earthquake	Erosion	Flood	Ground Failure	Severe Weather
		Plant										
	0	Electric Distribution System	Citywide	Unknown	Unknown		ESSM	X	X		X	X
	0	School Fuel Storage Tank Farm	Second Street	60.15852	-164.28013	$1,000,000	OTF	X			X	X
	0	Tank Farm for Gas and Oil	F Street	60.16037	-164.27978	$3,187,226	OTF	X			X	X
	0	Gas/Fuel Pumping Station	Boat Dock Area (F Street?)	Unknown	Unknown	$75,000	AFF	X			X	X
	0	Chefornak Class III Municipal Landfill	Landfill Road	60.15921	-164.26482	$40,000	N/A	X			X	X
	0	Sewage Lagoon	Airport Way	Unknown	Unknown		N/A	X			X	X
		Wastewater Treatment Plant	Airport Way	Unknown	Unknown		WWTS	X			X	X
	0	Water & Sewer Pumphouse	Third Street	Unknown	Unknown	$8,600,241	PPSA	X			X	X
	0	Water & Sewer Project Connex Building	A Street	Unknown	Unknown		S1L	X			X	X
	0	School Internet - Satellite	150,000	Unknown	Unknown	$20,000	CBO	X			X	X
	0	United Utilities - Satellite	Kris Jane Street	Unknown	Unknown	$50,000	CBO	X			X	X
	0	United Utilities - Telephone	Kris Jane Street	Unknown	Unknown	$20,000	CBO	X			X	X
Total Occ	313				**Total Damages:**	$104,183,539						

(Chefornak 2013, DHS&EM 2009a)

6.4 REPETITIVE LOSS PROPERTIES

This section estimates the number and type of structures at risk to repetitive flooding. (Properties which have experienced RL, the extent of flood depth, and damage potential.)

DMA 2000 Requirements
Addressing Risk and Vulnerability to NFIP Insured Structures §201.6(c)(2)(ii): The risk assessment shall include a] description of the jurisdiction's vulnerability to the hazards described in paragraph (c)(2)(i) of this section. This description shall include an overall summary of each hazard and its impact on the community. *All plans approved after October 1, 2008 must also address NFIP insured structures that have been repetitively damaged by floods.* The plan should describe vulnerability in terms of: §201.6(c)(2)(ii)(A): The plan should describe vulnerability in terms of] the types and numbers of existing and future buildings, infrastructure, and critical facilities located in the identified hazard areas; §201.6(c)(2)(ii)(B): The plan should describe vulnerability in terms of an] estimate of the potential dollar losses to vulnerable structures identified in paragraph (c)(2)(ii)(A) of this section and a description of the methodology used to prepare the estimate; §201.6(c)(2)(ii)(C): The plan should describe vulnerability in terms of] providing a general description of land uses and development trends within the community so that mitigation options can be considered in future land use decisions. §201.6(c)(3)(ii): The mitigation strategy shall include a] section that identifies and analyzes a comprehensive range of specific mitigation actions and projects being considered to reduce the effects of each hazard, with particular emphasis on new and existing buildings and infrastructure.
1. REGULATION CHECKLIST
ELEMENT B. NFIP Insured Structures
B4. Does the Plan address NFIP insured structures within the jurisdiction that have been repetitively damaged by floods?
C2. Does the Plan address each jurisdiction's participation in the NFIP and continued compliance with NFIP requirements, as appropriate?
Source: FEMA, October 2011.

6.4.1.1 NFIP Participation

The City of Chefornak does not participate in the NFIP neither do they have a repetitive flood property inventory that meets NFIP criteria as the loss thresholds are substantially below FEMA values.

6.5 VULNERABILITY ANALYSIS METHODOLOGY

A conservative exposure-level analysis was conducted to assess the risks of the identified hazards. This analysis is a simplified assessment of the potential effects of the hazards on values at risk without consideration of probability or level of damage.

The methodology used a two pronged effort. First, The Project Team used the State's Critical Facility Inventory and locally obtained GPS coordinate data to identify critical facility locations in relation to potential hazard's threat exposure and vulnerability. Second this data was used to develop a vulnerability assessment for those hazards where geospatial information system (GIS) based hazard mapping information was available.

Replacement structure and contents values were determined by the community for their physical assets. The community's aggregate exposure was calculated by assuming the worst-case scenario (that is, the asset would be completely destroyed and would have to be replaced) for each physical asset located within a hazard area. A similar analysis was used to evaluate the proportion of the population at risk. However, the analysis simply represents the number of people at risk; no estimate of the number of potential injuries or deaths was prepared.

6.6 DATA LIMITATIONS

The vulnerability estimates provided herein use the best data currently available, and the methodologies applied result in a risk approximation. These estimates may be used to understand relative risk from hazards and potential losses. However, uncertainties are inherent in any loss estimation methodology, arising in part from incomplete scientific knowledge concerning hazards and their effects on the built environment as well as the use of approximations and simplifications that are necessary for a comprehensive analysis.

It is also important to note that the quantitative vulnerability assessment results are limited to the exposure of people, buildings, and critical facilities and infrastructure to the identified hazards. It was beyond the scope of this HMP to develop a more detailed or comprehensive assessment of risk (including annualized losses, people injured or killed, shelter requirements, loss of facility/system function, and economic losses). Such impacts may be addressed with future updates of the HMP.

6.7 VULNERABILITY EXPOSURE ANALYSIS

There is limited GIS data available for the City of Chefornak. The results of the GIS based exposure analysis for loss estimations in the City are summarized in Tables 6-5 and 6-6. The following discussion contains data from GIS analysis and information obtained from the Project Team.

Table 6-5 Potential Hazard Exposure Analysis – Critical Facilities

		Government and Emergency Response		Educational		Medical		Community	
Hazard Type	Methodology	* # Bldgs / # Occ	Value ($)	* # Bldgs / # Occ	Value ($)	* # Bldgs / # Occ	Value ($)	* # Bldgs / # Occ	Value ($)
Earthquake	Descriptive	6/55	4,355,264	2/193	45,182,623	2/6	2,563,454	13/51	5,270,000
Erosion	Within 300 ft of erosion areas	0/0	0	1/20	1,000,000	0/0	0	1/0	20,000
Flood	Descriptive	0/0	0	1/20	1,000,000	0/0	0	1/0	20,000
Ground Failure	Descriptive	6/55	4,355,264	2/193	45,182,623	2/6	2,563,454	13/51	5,270,000
Severe Weather	Descriptive	6/55	4,355,264	2/193	45,182,623	2/6	2,563,454	13/51	5,270,000

Table 6-6 Potential Hazard Exposure Analysis – Critical Infrastructure

		Highway		Boardwalks		Boardwalk Bridges		Transportation Facilities		Utilities	
Hazard Type	Methodology	Miles	Value ($)	Miles	Value ($)	No.	Value ($)	# Bldgs / # Occ	Value ($)	# Bldgs / # Occ	Value ($)
Earthquake	Descriptive	~3.25	3,250,000	~2.42	3,408,726	3	30,000	5/3	17,520,000	18/2	25,218,472
Erosion	Within 300 ft of erosion areas	0	0	~2.42	3,408,726	0	0	1/0	20,000	2/0	8,048,505
Flood	Descriptive	0	0	0/0	0	0	0	1/0	20,000	0/0	0
Ground Failure	Descriptive	~3.25	3,250,000	~2.42	3,408,726	3	30,000	5/3	17,520,000	18/2	25,218,472
Severe Weather	Descriptive	~3.25	3,250,000	~2.42	3,408,726	3	30,000	5/3	17,520,000	18/2	25,218,472

6.7.1 Exposure Analysis – Hazard Narrative Summaries

Earthquake

The City and surrounding area can expect to experience limited earthquake ground movement that may result in infrastructure damage. Intense shaking may be seen or felt based on past events. Although all structures are exposed to earthquakes, buildings within the City constructed with wood have slightly less vulnerability to the effects of earthquakes than those with masonry.

Based on earthquake probability (PGA) maps produced by the USGS, the entire City area is not at risk of experiencing significant earthquake impacts as a result of its close proximity to known earthquake faults.

The probability is low (see Section 5.3.1.3) that the community will experience "severe" ground movement that may cause personal injury or damage infrastructure.

The entire existing, transient, and future population, residential structures and critical facilities are not exposed to significant earthquake impacts. However, if such an event were to occur, the following would potentially be affected:

- 418 people in 99 residences (approximate value $19,800,000)
- 55 people in 6 government and emergency response facilities (approximate value $4,355,264)
- 193 people in 2 educational facilities (approximate value $45,182,623)
- 6 people in 2 medical facility (approximate value $2,563,454)
- 51 people in 13 community facilities (approximate value $5,270,000)
- 3.25 road system miles (approximate value $3,250,000)
- 2.42 sanitation boardwalk system miles (approximate value $3,408,726)
- 3 bridge (approximate value $30,000)
- 3 people in 5 transportation facilities (approximate value $17,525,000)
- 2 people in 18 utility facilities (approximate value $25,218,472)

Impacts to future populations, residential structures, critical facilities, and infrastructure are anticipated at the same historical impact level.

Erosion

Impacts from erosion include loss of land and any development on that land. Erosion can cause increased sedimentation of harbors and river deltas and hinder channel navigation, reduction in water quality due to high sediment loads, loss of native aquatic habitats, damage to public utilities (beaches, docks, harbors, and electric and water/wastewater utilities), and economic impacts associated with costs trying to prevent or control erosion sites. Only a building's or facility's location can lessen its vulnerability to erosion in Chefornak.

Based on the USACE local knowledge, areas within the City affected by snow-melt, rain run-off, and storm surge are located adjacent to the Kuskokwim River and the Bering Sea (Section 5.3.2.3).

This includes approximately:

- 40 people in 8 residences (approximate value $1,600,000)
- 20 people in 1 educational facilities (approximate value $1,000,000)
- 1 community facility (approximate value $20,000)
- 2.42 sanitation boardwalk system miles (approximate value $3,408,726)
- 1 transportation facilities (approximate value $20,000)
- 2 utility facilities (approximate value $8,048,505)

Impacts to future populations, residential structures, critical facilities, and infrastructure are anticipated at the same impact level.

Flood

Typical flood impacts associated with flooding is water damage to structures and contents, roadbed erosion and damage, boat strandings, areas of standing water in roadways, and damage or displacement of fuel tanks, power lines, or other infrastructure. Buildings on slab foundations, not located on raised foundations, and/or not constructed with materials designed to withstand flooding events (e.g., cross vents to allow water to pass through an open area under the main floor of a building) are more vulnerable to the impacts of flooding (see Section 5.3.3.3).

No detailed 100 year flood analysis has been prepared for the City. However, future impacts may include approximately:

- 40 people in 8 residences (approximate value $1,600,000)
- 20 people in 1 educational facilities (approximate value $1,000,000)
- 1 community facility (approximate value $20,000)
- 1 transportation facilities (approximate value $20,000)

The City anticipates that impacts to future populations, residential structures, critical facilities, and infrastructure will be at the same historical impact level.

Ground Failure

Impacts associated with ground failure include surface subsidence, infrastructure, structure, and/or road damage. Buildings that are built on slab foundations and/or not constructed with materials designed to accommodate the ground movement associated with building on permafrost and other land subsidence and impacts are more vulnerable damage.

The potential ground failure impacts from melting permafrost subsidence can be widespread. Impacts could affect transportation, utility systems, and water and waste treatment infrastructure along with public, private, and business structures located adjacent to riverine embankments, or within alluvial fans or natural drainages. Response and recovery efforts will likely vary from

minor cleanup to more extensive utility system rebuilding. Utility disruptions are usually local and terrain dependent. Damages may require reestablishing electrical, communication, and gas pipeline connections occurring from specific breakage points. Initial debris clearing from emergency routes and high traffic areas may be required. Water and wastewater utilities may need treatment to quickly improve water quality by reducing excessive water turbidity and reestablishing waste disposal capability.

Ground failure is indiscriminant; hazards periodically cause structure and infrastructure displacement due to ground shifting, sinking, and upheaval. According to mapping completed by the DGGS, Chefornak has discontinuous permafrost deposits (see Section 5.3.4.3).

There have been periodic ground failure incidents in area.

Threatened facilities include:

- 418 people in 99 residences (approximate value $19,800,000)
- 55 people in 6 government and emergency response facilities (approximate value $4,355,264)
- 193 people in 2 educational facilities (approximate value $45,182,623)
- 6 people in 2 medical facility (approximate value $2,563,454)
- 51 people in 13 community facilities (approximate value $5,270,000)
- 3.25 road system miles (approximate value $3,250,000)
- 2.42 boardwalk system miles (approximate value $3,408,726)
- 3 bridge (approximate value $30,000)
- 3 people in 5 transportation facilities (approximate value $17,520,000)
- 2 people in 18 utility facilities (approximate value $25,218,472)

Impacts to future populations, residential structures, critical facilities, and infrastructure are anticipated at the same impact level.

Severe Weather

Impacts associated with severe weather events includes roof collapse, trees and power lines falling, damage to light aircraft and sinking small boats, injury and death resulting from snow machine or vehicle accidents, overexertion while shoveling all due to heavy snow. A quick thaw after a heavy snow can also cause substantial flooding. Impacts from extreme cold include hypothermia, halting transportation from fog and ice, congealed fuel, frozen pipes, utility disruptions, frozen pipes, and carbon monoxide poisoning. Additional impacts may occur from secondary weather hazards or complex storms such as extreme high winds combined with freezing rain, high seas, and storm surge. Section 5.3.5.3 provides additional detail regarding severe weather impacts. Buildings that are older and/or not constructed with materials designed to withstand heavy snow and wind (e.g., hurricane ties on crossbeams) are more vulnerable to the severe weather damage.

Based on information provided by the City of Chefornak and the National Weather Service, the entire existing, transient, and future population, residential structures, and critical facilities are exposed to future severe weather impacts.

This includes approximately:

- 418 people in 99 residences (approximate value $19,800,000)
- 55 people in 6 government and emergency response facilities (approximate value $4,355,264)
- 193 people in 2 educational facilities (approximate value $45,182,623)
- 6 people in 2 medical facility (approximate value $2,563,454)
- 51 people in 13 community facilities (approximate value $5,270,000)
- 3.25 road system miles (approximate value $3,250,000)
- 2.42 boardwalk system miles (approximate value $3,408,726)
- 3 bridge (approximate value $30,000)
- 3 people in 5 transportation facilities (approximate value $17,520,000)
- 2 people in 18 utility facilities (approximate value $25,218,472)

Impacts to future populations, residential structures, critical facilities, and infrastructure are anticipated at the same impact level.

6.8 FUTURE DEVELOPMENT

Table 6-7 delineates Chefornak's future, planned, and funded projects and their tentative completion status. This is presented as a representative sample of the community's ability to manage complex grant programs as well as demonstrate their efforts to improve their infrastructure.

Table 6-7 Planned and Funded Projects

Agency	Fiscal Year	Status	Project Description	Funded Stage	Total Cost
Alaska Native Tribal Health Consortium (ANTHC)	2010	Funded	Water treatment plant and sewer service improvements in Chefornak, Alaska.	Preliminary	1885199
ANTHC	2010	Funded	Sewer improvements in Chefornak, Alaska.	Preliminary	1711924
Department of Transportation (DOT)/ Public Facilities (PF)	2010	Funded	Airport Relocation This amendment increases the Fiscal year (FY) 10 Governor's Budget by $2,600,000 Federal Funds for a new FY10 project total of $16,000,000. Complete construction of a new airport. Reshape embankments and place surfacing material on the runway, taxiway, apron and access road	Preliminary	16000000

Table 6-7 Planned and Funded Projects

Agency	Fiscal Year	Status	Project Description	Funded Stage	Total Cost
Denali	2010	Funded	Association of Village Council Presidents (AVCP) – Department of Energy (DOE) Energy Efficiency and Conservation Block Grant Match Match funding to the US DOE Efficiency and Conservation Block Grant (EECBG) program's Alaska Tribal Allocation through the American Recovery and Reinvestment Act (ARRA). The match funding from DC represents 10% of eligible applicant allocations for any approved energy efficiency: **Chefornak**, Eek, Hooper Bay, Kipnuk, Kongiganak, Newtok, Nunam Iqua, Nunapitchuk, Oscarville, Toksook Bay, Tuluksak, Tununak, Umkumiut and Kalskag	In-Progress	1181480
Housing and Urban Development (HUD)	2009	Funded	Indian Housing Block Grant (IHBG) - Comments: Native American Housing Assistance and Self Determination Act (NAHASDA) administration, operating & construction funds	Contract	253943
Department of Education and Early Development (DEED)	2009	Funded	Chaptnguak K-12 School Renovation and Addition	Preliminary	44182623
Denali	2009	Funded	The scope of work under this Financial Assistance Award consists of provision by the RurAL Community Action Program, Inc., (RurAL CAP) of project grant management and technical assistance to the City of Chefornak for Landfill Cleanup and Repairs. The City	Equipment Purchase	40000
Department of Transportation/Public Facilities (DOT/PF)	2009	Funded	Airport Relocation Airport Improvement Program: Construction	Preliminary	7600000
HUD	2008	Funded	IHBG/NAHASDA administration, operating & construction funds	Design	223814
DOT/PF	2008	Funded	Airport Relocation Legislative Grant	Design	754000

(DCRA 2012)

7

MITIGATION STRATEGY

Section Seven outlines the six-step process for preparing a mitigation strategy including:

1. Identifying each jurisdiction's existing authorities for implementing mitigation action initiatives
2. NFIP Participation
3. Developing Mitigation Goals
4. Identifying Mitigation Actions
5. Evaluating Mitigation Actions
6. Implementing the Mitigation Action Plan (MAP)

DMA requirements for developing a comprehensive mitigation strategy include:

DMA 2000 Requirements
Identification and Analysis of Mitigation Actions §201.6(c)(3): [The plan shall include the following:] A *mitigation strategy* that provides the jurisdiction's blueprint for reducing the potential losses identified in the risk assessment, based on existing authorities, policies, programs, and resources, and its ability to expand on and improve these existing tools. §201.6(c)(3)(i): [The hazard mitigation strategy shall include a] description of mitigation goals to reduce or avoid long-term vulnerabilities to the identified hazards. §201.6(c)(3)(ii): [The mitigation strategy shall include a] section that identifies and analyzes a comprehensive range of specific mitigation actions and projects being considered to reduce the effects of each hazard, with particular emphasis on new and existing buildings and infrastructure. §201.6(c)(3)(iii): [The hazard mitigation strategy shall include an] action plan, describing how the action identified in paragraph (c)(3)(ii) of this section will be prioritized, implemented, and administered by the local jurisdiction. Prioritization shall include a special emphasis on the extent to which benefits are maximized according to a cost benefit review of the proposed projects and their associated costs. §201.6(c)(3)(iv): [For multi-jurisdictional plans, there must be identifiable action items specific to the jurisdiction requesting FEMA approval or credit of the plan. Requirement §201.6(c)(4): [The plan shall include a] process by which local governments incorporate the requirements of the mitigation plan into other planning mechanisms such as comprehensive or capital improvements, when appropriate.
ELEMENT C. Mitigation Strategy
C1. Does the plan document each jurisdiction's existing authorities, policies, programs and resources and its ability to expand on and improve these existing policies and programs?
C2. Does the Plan address each jurisdiction's participation in the NFIP and continued compliance with NFIP requirements, as appropriate? *(Addressed in Section 6.4)*
C3. Does the Plan include goals to reduce/avoid long-term vulnerabilities to the identified hazards?
C4. Does the Plan identify and analyze a comprehensive range of specific mitigation actions and projects for each jurisdiction being considered to reduce the effects of hazards, with emphasis on new and existing buildings and infrastructure?
C5. Does the Plan contain an action plan that describes how the actions identified will be prioritized (including cost benefit review), implemented, and administered by each jurisdiction?
C6. Does the Plan describe a process by which local governments will integrate the requirements of the mitigation plan into other planning mechanisms, such as comprehensive or capital improvement plans, when appropriate?
Source: FEMA, October 2011.

7.1 CITY OF CHEFORNAK'S CAPABILITY ASSESSMENT

The City's capability assessment reviews the technical and fiscal resources available to the community.

DMA 2000 Requirements
Incorporation into Existing Planning Mechanisms §201.6(c)(3): [The plan shall include the following:] A *mitigation strategy* that provides the jurisdiction's blueprint for reducing the potential losses identified in the risk assessment, based on existing authorities, policies, programs, and resources, and its ability to expand on and improve these existing tools.
ELEMENT C. Incorporate into Other Planning Mechanisms
C1. Does the plan document each jurisdiction's existing authorities, policies, programs and resources and its ability to expand on and improve these existing policies and programs?
C6. Does the Plan describe a process by which local governments will integrate the requirements of the mitigation plan into other planning mechanisms, such as comprehensive or capital improvement plans, when appropriate?
Source: FEMA, October 2011.

This section outlines the resources available to the City of Chefornak for mitigation and mitigation related funding and training. Tables 7-1, 7-2, and 7-3 delineate the City's regulatory tools, technical specialists, and financial resource available for project management. Additional funding resources are identified in Appendix A.

Table 7-1 Chefornak's Regulatory Tools

Regulatory Tools (ordinances, codes, plans)	Existing Yes/No?	Comments (Year of most recent update; problems administering it, etc.)
Comprehensive Plan	No	
Land Use Plan	No	
Tribal Land Use Plan	No	
Emergency Response Plan	No	
Wildland Fire Protection Plan	No	
Building code	No	The City can exercise this authority.
Zoning ordinances	No	The City can exercise this authority.
Subdivision ordinances or regulations	No	The City can exercise this authority.
Special purpose ordinances	No	The City can exercise this authority.

Local Resources

The City 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 hazard mitigation Planning Team, and are summarized below.

Table 7-2 Chefornak's Technical Specialists for Hazard Mitigation

Staff/Personnel Resources	Yes / No	Department/Agency and Position
Planner or engineer with knowledge of land development and land management practices	No	The City hires consultants to fulfill these tasks.
Engineer or professional trained in construction practices related to buildings and/or infrastructure	No	The City hires consultants to fulfill these tasks.
Planner or engineer with an understanding of natural and/or human-caused hazards	No	The City hires consultants to fulfill these tasks.
Floodplain Manager	No	The City can coordinate with the State Floodplain Manager.
Surveyors	No	The City hires consultants to fulfill these tasks.
Staff with education or expertise to assess the jurisdiction's vulnerability to hazards	Yes	The City hires consultants to fulfill these tasks.
Personnel skilled in Geospatial Information System (GIS) and/or Hazards Us-Multi Hazard (Hazus-MH) software	No	The City hires consultants to fulfill these tasks.
Scientists familiar with the hazards of the jurisdiction	No	City can work with U.S. Fish & Wildlife Service (USFWS) and Fish & Game (ADF&G), and the Alaska Department of Transportation and Public Facilities
Emergency Manager	Yes	The City Mayor, City Administrator, or Tribal President as applicable.
Finance (Grant writers)	Yes	City or Tribal Bookkeeper as applicable.
Public Information Officer	Yes	The City Mayor, City Administrator, or Tribal President as applicable

Table 7-3 Financial Resources Available for Hazard Mitigation

Financial Resource	Accessible or Eligible to Use for Mitigation Activities
General funds	Can exercise this authority with voter approval
Payment in Lieu of Taxes (PILT)	Provides operating support funding
Municipal Energy Assistance Program (MEAP)	Provides operating support funding
Community Development Block Grants (CDBG)	Can exercise this authority with voter approval
Capital Improvement Project Funding	Can exercise this authority with voter approval
Authority to levy taxes for specific purposes	Can exercise this authority with voter approval
Incur debt through general obligation bonds	Can exercise this authority with voter approval
Incur debt through special tax and revenue bonds	Can exercise this authority with voter approval
Incur debt through private activity bonds	Can exercise this authority with voter approval
Hazard Mitigation Grant Program (HMGP)	FEMA funding which is available to local communities after a Presidentially-declared disaster. It can be used to fund both pre- and post-disaster mitigation plans and projects.

Table 7-3 Financial Resources Available for Hazard Mitigation

Financial Resource	Accessible or Eligible to Use for Mitigation Activities
Pre-Disaster Mitigation (PDM) grant program	FEMA funding which available on an annual basis. This grant can only be used to fund pre-disaster mitigation plans and projects only
Flood Mitigation Assistance (FMA) grant program	FEMA funding which is available on an annual basis. This grant can be used to mitigate repetitively flooded structures and infrastructure to protect repetitive flood structures. ***Note:*** *Chefornak does not qualify for this funding source because they do not participate in the NFIP.*
United State Fire Administration (USFA) Grants	The purpose of these grants is to assist state, regional, national or local organizations to address fire prevention and safety. The primary goal is to reach high-risk target groups including children, seniors and firefighters.
Fire Mitigation Fees	Finance future fire protection facilities and fire capital expenditures required because of new development within Special Districts.

The Planning Team developed the mitigation goals and potential mitigation actions to address identified potential hazard impacts for the City of Chefornak within Section 5.3.

7.2 DEVELOPING MITIGATION GOALS

The requirements for the local hazard mitigation goals, as stipulated in DMA 2000 and its implementing regulations are described below.

DMA 2000 Requirements
Local Hazard Mitigation Goals §201.6(c)(3)(i): The hazard mitigation strategy shall include a description of mitigation goals to reduce or avoid long-term vulnerabilities to the identified hazards.
ELEMENT C. Mitigation Goals
C3. Does the Plan include goals to reduce/avoid long-term vulnerabilities to the identified hazards?
Source: FEMA, October 2011.

The exposure analysis results were used as a basis for developing the mitigation goals and actions. Mitigation goals are defined as general guidelines that describe what a community wants to achieve in terms of hazard and loss prevention. Goal statements are typically long-range, policy-oriented statements representing community-wide visions. As such, eleven goals were developed to reduce or avoid long-term vulnerabilities to the identified hazards (Table 7-4).

Table 7-4 Mitigation Goals

No.	Goal Description
Multi-Hazards (MH)	
MH 1	Promote recognition and mitigation of all natural and manmade hazards that affect the City of Chefornak (City).
MH 2	Promote cross-referencing mitigation goals and actions with other City and Tribal planning mechanisms and projects.
MH 3	Reduce possibility of losses from all natural and manmade hazards that affect the Community.
Natural Hazards	
EQ 4	Reduce structural vulnerability to **earthquake (ER)** damage.
ER 5	Reduce **erosion (ER)** damage and loss possibility.
FL 6	Reduce **flood (FL)** damage and loss possibility.
GF 7	Reduce **ground failure (GF)** damage and loss possibility.
SW 8	Reduce structural vulnerability to **severe weather (SW)** damage.

7.3 IDENTIFYING MITIGATION ACTIONS

The requirements for the identification and analysis of mitigation actions, as stipulated in DMA 2000 and its implementing regulations are described below.

DMA 2000 Requirements
Identification and Analysis of Mitigation Actions §201.6(c)(3)(ii): [The mitigation strategy shall include a] section that identifies and analyzes a comprehensive range of specific mitigation actions and projects being considered to reduce the effects of each hazard, with particular emphasis on new and existing buildings and infrastructure.
ELEMENT C. Mitigation Actions
C4. Does the Plan identify and analyze a comprehensive range of specific mitigation actions and projects for each jurisdiction being considered to reduce the effects of hazards, with emphasis on new and existing buildings and infrastructure?
Source: FEMA, October 2011.

After developing mitigation goals, the Planning Team reviewed a comprehensive list of potential mitigation actions that were identified during this HMP development process.

The Planning Team assessed the potential mitigation actions to carry forward into the mitigation strategy. Mitigation actions are activities, measures, or projects that help achieve the goals of a mitigation plan. Mitigation actions are usually grouped into three broad categories: property protection, public education and awareness, and structural projects.

On January 14, 2014, the Planning Team selected 12 natural hazard mitigation actions for potential Mitigation Action Plan (MAP) implementation during the five-year life cycle of this HMP. The Planning Team placed particular emphasis on projects and programs that reduce the effects of hazards on both new and existing buildings and infrastructure as well as facilities

located in potential flood zones to comply with NFIP requirements should the City join the NFIP.

The table breaks out the project criteria as considered, selected, ongoing, and completed. The Planning Team considered projects from a comprehensive list for each hazard type. They identified numerous "ongoing" mitigation actions currently in-process or those that were listed in other City planning documents. The Planning Team then selected "newly identified" actions identified through this plan development activity that would most benefit the community.

These 'Considered" projects are listed in Table 7-5 below.

Table 7-5 Potential Mitigation Actions
(Ongoing and newly selected items were identified for MAP implementation)

Supports Goal No.	Hazard	Criteria *Considered Selected Ongoing Completed*	Action Description
Multi- Hazards (MH)			
MH 1	Promote recognition and mitigation of all natural hazards that affect the City of Chefornak (City)	**S**	Identify and pursue funding opportunities to implement mitigation actions.
		S	Disseminate FEMA pamphlets to educate and encourage homeowners concerning structural and non-structural retrofit benefits.
		C	Acquire emergency warning sirens to communicate critical emergency warnings and alerts.
MH 2	Cross reference Mitigation goals and actions with other City and Tribal planning mechanisms and projects.	**S**	The City will strive manage their existing plans to ensure they incorporate mitigation planning provisions into all community planning processes such as comprehensive, capital improvement, and land use plans, etc. to demonstrate multi-benefit considerations and facilitate using multiple funding source consideration.
		S	Prohibit new construction in identified mitigatable hazard impact areas (avalanche, flood, erosion, etc.) or require building to applicable building codes for other hazard impacts (earthquake, volcanic ash, weather, etc.).
MH 3	Reduce possibility of losses from all natural hazards that affect the Community.	**S**	Acquire (buy-out), demolish, or relocate structures from hazard prone area (erosion, flood, ground failure, etc.) Property deeds "must be" restricted for open space uses for perpetuity to keep people from rebuilding in known hazard areas.
		S	Encourage utility companies to evaluate and harden vulnerable infrastructure elements for sustainability.
Natural Hazards			
EQ 4	Reduce vulnerability of structures to earthquake damage.	None	This identified hazard does is not considered a significant threat to the Community.
ER 5	Reduce possibility of damage and losses from erosion.	**S**	Pursue opportunities to protect the City's eroding embankment by identifying and implementing more viable mitigation initiatives such as better designed: Rip-rap (large rocks), sheet pilings, gabion baskets, articulated matting, concrete, asphalt, vegetation, or other armoring or protective materials to provide Kinia River bank protection.

Table 7-5 Potential Mitigation Actions
(Ongoing and newly selected items were identified for MAP implementation)

Supports Goal No.	Hazard	Criteria *Considered Selected Ongoing Completed*	Action Description
FL 6	Reduce the possibility of damage and losses from flooding.	S	Determine and implement most cost beneficial and feasible mitigation actions for locations with repetitive flooding, significant historical damages, or road closures.
		S	Increase culvert sizes to increase their drainage capacity or efficiency.
		S	Protect wastewater treatment systems flood protection to prevent erosion or flooding damage and sewage lagoon out-wash.
GF 7	Reduce possibility of damage and losses from ground failure.	S	Promote permafrost sensitive construction practices in permafrost areas.
SW 8	Reduce vulnerability of structures to severe weather damage.	S	Develop and implement programs to coordinate maintenance and mitigation activities to reduce risk to public infrastructure from severe winter storms (snow load, ice, and wind).

7.4 EVALUATING AND PRIORITIZING MITIGATION ACTIONS

The requirements for the evaluation and implementation of mitigation actions, as stipulated in DMA 2000 and its implementing regulations are described below.

DMA 2000 Requirements: Mitigation Strategy - Implementation of Mitigation Actions
Implementation of Mitigation Actions §201.6(c)(3)(iii): [The hazard mitigation strategy shall include an] action plan, describing how the action identified in paragraph (c)(3)(ii) of this section will be prioritized, implemented, and administered by the local jurisdiction. Prioritization shall include a special emphasis on the extent to which benefits are maximized according to a cost benefit review of the proposed projects and their associated costs.
ELEMENT C. MITIGATION STRATEGY
C5. Does the Plan contain an action plan that describes how the actions identified will be prioritized (including cost benefit review), implemented, and administered by each jurisdiction? (Requirement §201.6(c)(3)(iv)); (Requirement §201.6(c)(3)(iii))
Source: FEMA, October 2011.

The Planning Team evaluated and prioritized each of the mitigation actions on January 14, 2014 to determine which actions would be included in the Mitigation Action Plan. The Mitigation Action Plan represents mitigation projects and programs to be implemented through the cooperation of multiple entities in the City. To complete this task, the Planning Team first prioritized the hazards that were regarded as the most significant within the community (earthquake, erosion, flood, ground failure, and severe weather).

The Planning Team reviewed the simplified social, technical, administrative, political, legal, economic, and environmental (STAPLEE) evaluation criteria (Table 7-6) and the Benefit-Cost Analysis Fact Sheet (Appendix G) to consider the opportunities and constraints of implementing each particular mitigation action. For each action considered for implementation, a qualitative statement is provided regarding the benefits and costs and, where available, the technical feasibility. A detailed cost-benefit analysis is anticipated as part of the application process for those projects the City chooses to implement.

Table 7-6 Evaluation Criteria for Mitigation Actions

Evaluation Category	Discussion "It is important to consider…"	Considerations
Social	The public support for the overall mitigation strategy and specific mitigation actions.	Community acceptance Adversely affects population
Technical	If the mitigation action is technically feasible and if it is the whole or partial solution.	Technical feasibility Long-term solutions Secondary impacts
Administrative	If the community has the personnel and administrative capabilities necessary to implement the action or whether outside help will be necessary.	Staffing Funding allocation Maintenance/operations
Political	What the community and its members feel about issues related to the environment, economic development, safety, and emergency management.	Political support Local champion Public support
Legal	Whether the community has the legal authority to implement the action, or whether the community must pass new regulations.	Local, State, and Federal authority Potential legal challenge
Economic	If the action can be funded with current or future internal and external sources, if the costs seem reasonable for the size of the project, and if enough information is available to complete a Federal Emergency Management Agency (FEMA) Benefit-Cost Analysis.	Benefit/cost of action Contributes to other economic goals Outside funding required FEMA Benefit-Cost Analysis
Environmental	The impact on the environment because of public desire for a sustainable and environmentally healthy community.	Effect on local flora and fauna Consistent with community environmental goals Consistent with local, state, and Federal laws

On January 14, 2014, the hazard mitigation Planning Team prioritized 12 natural hazard mitigation actions that were selected to carry forward into the Mitigation Action Plan (MAP).

The hazard mitigation Planning Team considered each hazard's history, extent, and probability to determine each potential actions priority. A rating system based on high, medium, or low was used.

- High priorities are associated with actions for hazards that impact the community on an annual or near annual basis and generate impacts to critical facilities and/or people.

- Medium priorities are associated with actions for hazards that impact the community less frequently, and do not typically generate impacts to critical facilities and/or people.
- Low priorities are associated with actions for hazards that rarely impact the community and have rarely generated documented impacts to critical facilities and/or people.

Prioritizing the mitigation actions within the MAP matrix (Table 7-8) was completed to provide the City with an implementation approach.

7.5 MITIGATION ACTION PLAN

Table 7-7 delineates the acronyms used in the Mitigation Action Plan (Table 7-8). See Appendix A for summarized agency funding source descriptions.

The City's Mitigation Action Plan, Table 7-8, depicts how each mitigation action will be implemented and administered by the Planning Team. The MAP delineates each selected mitigation action, its priorities, the responsible entity, the anticipated implementation timeline, and provides a brief explanation as to how the overall benefit/costs and technical feasibility were taken into consideration.

Table 7-7 Potential Funding Source Acronym List

City of Chefornak (City)

Chefornak Tribal Council (Tribe)

Assistance to Native Americans (ANA)
Native American Housing Assistance and Self Determination Act (NAFSMA),

Bureau of Indian Affairs (BIA)
Housing Improvement Program (HIP)

Federal Management Agency (FEMA) /
Hazard Mitigation Assistance (HMA) Grant Programs,
Emergency Management Program Grant (EMPG)
Debris Management Grant
Flood Mitigation Assistance Grants
National Earthquake Hazards Reduction Program (NEHRP)
National Dam Safety Program (NDS)

US Department of Homeland Security (DHS)
Citizens Corp Program (CCP)
Emergency Operations Center (EOC)
Homeland Security Grant Program (HSGP)
Emergency Management Performance Grant (EMPG)
State Homeland Security Program (SHSP)

US Department of Commerce (DOC) /
Remote Community Alert Systems Program (RCASP)
National Oceanic and Atmospheric Administration (NOAA)

Denali Commission (Denali)
Energy Program,
Solid Waste Program

Alaska Department of Military and Veterans Affairs (DMVA),
Division of Homeland Security and Emergency Management (DHSEM)
Mitigation Section (for PDM & HMGP projects and plan development)
Preparedness Section (for community planning)
State Emergency Operations Center (SEOC for emergency response)

Alaska Department of Community, Commerce, and Economic Development (DCCED)
Division of Community and Regional Affairs (DCRA) /
Community Development Block Grant (CDBG)
Alaska Climate Change Impact Mitigation Program (ACCIMP)
Flood Mitigation Assistance Grants (FMA)

Alaska Department of Transportation
State Road Repair Funding

Alaska Energy Authority (AEA)
AEA/Bulk Fuel (ABF)
Alternative Energy and Energy Efficiency (AEEE)

Alaska Department of Environmental Conservation (DEC) /
Village Safe Water (VSW),
Alaska Drinking Water Fund (ADWF),
Alaska Clean Water Fund [ACWF],
Clean Water State Revolving Fund (CWSRF)

US Army Corp of Engineers (USACE) /
Planning Assistance
Capital Projects: Erosion, Flood, Ports & Harbors,

Alaska Division of Forestry (DOF) /
Volunteer Fire Assistance and Rural Fire Assistance Grant (VFAG/RFAG),
Assistance to Firefighters Grant (AFG),
Fire Prevention and Safety (FP&S),
Staffing for Adequate Fire and Emergency Response Grants (SAFER)
Emergency Food and Shelter (EF&S)

US Department of Agriculture (USDA) /
Emergency Watershed Protection Program (EWP])
Emergency Conservation Fund (ECF),
Rural Development (RD)

US Geological Survey (USGS)
Alaska Volcano Observatory (AVO)

Natural Resources Conservation Service (NRCS) /
Emergency Watershed Protection Program (EWP)
Wildlife Habitat Incentives Program (WHIP)
Watershed Planning

US Army Corps of Engineers (USACE) /
Planning Assistance Program
Capital Projects: Erosion, Flood, Ports & Harbors

Bering Straits Regional Housing Authority (BSRHA)

University of Alaska Fairbanks
Cold Climate Housing and Research Center (CCHRC)
Sustainable Northern Communities (SNC)

Lindbergh Foundation Grant Programs (LFGP)

Rasmuson Foundation Grants (LFG)

Table 7-8 City of Chefornak's Mitigation Action Plan (MAP)

(Italicized Projects were brought forward from cross referenced – Identified Plans)

Goal / Action ID	Description	Priority (High, Medium, Low)	Responsible Department	Potential Funding Source(s)	Timeframe (1-3 Years 2-4 Years 3-5 Years)	Benefit-Costs (BC) / Technical Feasibility (T/F)
MH 1.1	Identify and pursue funding opportunities to implement mitigation actions.	High	City of Chefornak, Native Village of Chefornak Tribal Council (The Native Council is included as a viable responsible entity in order to obtain Administration for Native Americans (ANA) funding, the Tribe would need to be the applicant for those projects)	City, Tribe	Ongoing	B/C: This ongoing activity is essential for the City as there are limited funds available to accomplish effective mitigation actions. T/F: This activity is ongoing demonstrating its feasibility.
MH 1.2	Disseminate FEMA pamphlets to educate and encourage homeowners concerning structural and non-structural retrofit benefits.	Medium	City, Tribe	City, Tribe, FEMA HMA programs, AFG, FP&S, and SAFER	1-3 years	B/C: Sustained mitigation outreach programs have minimal cost and will help build and support area-wide capacity. This type activity enables the public to prepare for, respond to, and recover from disasters. T/F: This low cost activity can be combined with recurring community meetings where hazard specific information can be presented in small increments. This activity is ongoing demonstrating its feasibility.
MH 2.1	The City will strive manage their existing plans to ensure they incorporate mitigation planning provisions into all community planning	Medium	City, Tribe	City, Tribe, Denali Commission, DCRA	1-3 years	B/C: Coordinated planning ensures effective damage abatement and ensures proper attention is assigned to reduce losses and damage to structures and residents.

Table 7-8 City of Chefornak's Mitigation Action Plan (MAP)

(Italicized Projects were brought forward from cross referenced – Identified Plans)

Goal / Action ID	Description	Priority (High, Medium, Low)	Responsible Department	Potential Funding Source(s)	Timeframe (1-3 Years 2-4 Years 3-5 Years)	Benefit-Costs (BC) / Technical Feasibility (T/F)
	processes such as comprehensive, capital improvement, and land use plans, etc. to demonstrate multi-benefit considerations and facilitate using multiple funding source consideration.					T/F: This is feasible to accomplish as cost can be associated with plan reviews and updates. The action relies on staff and review committee availability and willingness to serve their community.
MH 2.2	Prohibit new construction in identified mitigatable hazard impact areas (avalanche, flood, erosion, etc.) or require building to applicable building codes for other hazard impacts (earthquake, volcanic ash, weather, etc.).	High	City, Tribe	City, Tribe, DCRA, Denali Commission	3-5 years	B/C: Building code development, implementation and enforcement can effectively reduce future losses to hazardous events. Building codes can actually assist bush communities through making maximum use of materials and shipping costs the first time. T/F: This project is technically feasible as the community need only demonstrate cost savings by demonstrating losses from history utility impacts and down time.
MH 3.1	Acquire (buy-out), demolish, or relocate structures from hazard prone area (erosion, flood, ground failure, etc.) Property deeds "must be" restricted for open space uses for perpetuity to keep people from rebuilding in known hazard areas.	High	City, Tribe	City, Tribe, HMA, NRCS, ANA, USACE, USDA, Lindbergh	1-5 years	B/C: This project would remove threatened structures from hazard areas, eliminating future damage while keeping land clear for perpetuity. F: This project is feasible using existing staff skills, equipment, and materials. Acquiring contractor expertise may be required for large facilities.

Table 7-8 City of Chefornak's Mitigation Action Plan (MAP)

(Italicized Projects were brought forward from cross referenced – Identified Plans)

Goal / Action ID	Description	Priority (High, Medium, Low)	Responsible Department	Potential Funding Source(s)	Timeframe (1-3 Years 2-4 Years 3-5 Years)	Benefit-Costs (BC) / Technical Feasibility (T/F)
MH 3.2	Encourage utility companies to evaluate and harden vulnerable infrastructure elements for sustainability.	Medium	City, Tribe	City, Tribe, HMA, AFG, FP&S, SAFER, ANA, EFSP	3-5 years	B/C: This project would ensure threatened infrastructures are available for use – their loss would exacerbate potential damages and further threaten survivability. F: This project is feasible using existing staff skills, equipment, and materials.
ER 5.1	Pursue opportunities to protect the City's eroding embankment by identifying and implementing more viable mitigation initiatives such as better designed: Rip-rap (large rocks), sheet pilings, gabion baskets, articulated matting, concrete, asphalt, vegetation, or other armoring or protective materials to provide Kinia River bank protection.	High	City, Tribe	City, Tribe, HMA, ANA, NRCS, USACE	3-5 years	B/C: Improving embankment and slope stability will greatly reduce potential infrastructure and residential losses. Project costs would outweigh replacement costs of lost facilities. T/F: The community has the skill to implement this action. Specialized skills may need to be contracted-out with materials and equipment barged in depending on the method selected.
FL 6.1	Determine and implement most cost beneficial and feasible mitigation actions for locations with repetitive flooding, significant historical damages, or road closures.	High	City, Tribe	City, Tribe, HMA, NRCS, USACE, USDA/EWP, USDA/ECP, DCRA/ ACCIMP	1-3 years	B/C: Flood hazard mitigation is among FEMA's highest national priorities. FEMA desires communities focus on repetitive flood loss properties. This activity will ensure the City and Tribal Councils focus on priority flood locations and projects. T/F: Low to no cost makes this outreach activity very feasible.

Table 7-8 City of Chefornak's Mitigation Action Plan (MAP)

(Italicized Projects were brought forward from cross referenced – Identified Plans)

Goal / Action ID	Description	Priority (High, Medium, Low)	Responsible Department	Potential Funding Source(s)	Timeframe (1-3 Years 2-4 Years 3-5 Years)	Benefit-Costs (BC) / Technical Feasibility (T/F)
FL 6.2	Increase culvert sizes to increase their drainage capacity or efficiency.	High	City, Tribe	City, Tribe, HMA, ANA, Denali Commission, NRCS, USACE, USDA/EWP, USDA/ECP, DCRA/ ACCIMP	2-4 years	B/C: Improving water flow capability will greatly reduce potential infrastructure and residential losses. Project costs would outweigh replacement costs of lost facilities. T/F: The community has the skill to implement this action. Specialized skills may need to be contracted-out with materials and equipment barged in depending on the method selected.
FL 6.3	Raise sewage lagoon containment embankment and reinforce to prevent erosion or flooding damage and sewage lagoon out-wash. Harden with rip-rap (large rocks), gabion baskets, articulated matting, concrete, asphalt, vegetation, or other armoring or protective materials to reduce or prohibit damage from erosive forces and lagoon washout.	High	City, Tribe	City, Tribe, HMA, ANA, NRCS, USACE	3-5 years	B/C: Improving embankment stability will greatly reduce potential infrastructure and residential losses as well as assure the health of residents from sewage intrusion throughout the community. Project costs would outweigh replacement costs of lost facilities. T/F: The community has the skill to implement this action. Specialized skills may need to be contracted-out with materials and equipment barged in depending on the method selected.
GF 7.1	Promote ground failure and permafrost sensitive construction practices in hazard impact areas.	Medium	City, Tribe	City, Tribe, HMA, ANA	2-4 years	B/C: This outreach project would decrease damage to facilities if they were sited and used the most appropriate construction practices.

Table 7-8 City of Chefornak's Mitigation Action Plan (MAP)

(Italicized Projects were brought forward from cross referenced – Identified Plans)

Goal / Action ID	Description	Priority (High, Medium, Low)	Responsible Department	Potential Funding Source(s)	Timeframe (1-3 Years 2-4 Years 3-5 Years)	Benefit-Costs (BC) / Technical Feasibility (T/F)
						T/F: Technically feasible as the community is currently working with UAF and other entities to determine most viable permafrost construction practices.
SW 8.1	Develop and implement programs to coordinate maintenance and mitigation activities to reduce risk to public infrastructure from severe winter storms (snow load, ice, and wind).	Low	City, Tribe	City, Tribe, DCCED/CDBG, Denali Commission	3-5 years	B/C: Scheduling maintenance and implementing mitigation activities will potentially reduce severe winter storm damages caused by heavy snow loads, wind, and freezing rain. TF: This type activity is technically feasible within the community typically using existing labor, equipment, and materials. Specialized methods are not new to rural communities as they are used to importing required contractors.

7.6 IMPLEMENTING MITIGATION STRATEGY INTO EXISTING PLANNING MECHANISMS

The requirements for implementation through existing planning mechanisms, as stipulated in the DMA 2000 and its implementing regulations, are described here.

DMA 2000 Requirements
Incorporation into Existing Planning Mechanisms §201.6(c)(4)(ii): [The plan shall include a] process by which local governments incorporate the requirements of the mitigation plan into other planning mechanisms such as comprehensive or capital improvement plans, when appropriate.
ELEMENT C. Incorporate into Other Planning Mechanisms
C6. Does the Plan describe a process by which local governments will integrate the requirements of the mitigation plan into other planning mechanisms, such as comprehensive or capital improvement plans, when appropriate?
Source: FEMA, October 2011.

After the adoption of the HMP, each Planning Team Member will ensure that the HMP, in particular each Mitigation Action Project, is incorporated into existing planning mechanisms. Each member of the Planning Team will achieve this incorporation by undertaking the following activities.

- Review the community-specific regulatory tools to determine where to integrate the mitigation philosophy and implementable initiatives. These regulatory tools are identified in Section 7.1 capability assessment.
- Work with pertinent community departments to increase awareness for implementing HMP philosophies and identified initiatives. Provide assistance with integrating the mitigation strategy (including the Mitigation Action Plan) into relevant planning mechanisms (i.e. Comprehensive Plan, Capital Improvement Project List, Transportation Improvement Plan, etc.).
- Implementing this philosophy and activities may require updating or amending specific planning mechanisms.

8

REFERENCES

Section Eight lists reference materials and resources used to prepare this HMP.

AICC (Alaska Interagency Coordination Center) 2012. Available: http://fire.ak.blm.gov/aicc.php. (June 2013).

APRFC 2013. Alaska Pacific River Forecast Center (APRFC) Photo Gallery. 2013, Available: http://aprfc.arh.noaa.gov/gallery2/main.php. (August 2013)

AVO 2008. Alaska Volcano Observatory (AVO) 2008. Map showing Monitoring Status of Alaska Volcanoes, 2008). Available: http://www.avo.alaska.edu/images/image.php?id=14033. (June 2013).

AVO 2009a. AVO. *The eruption of Redoubt Volcano, Alaska, December 14, 1989-August 31, 1990*. Available: http://www.dggs.dnr.state.ak.us/pubs/pubs?reqtype=citation&ID=13450. (June 2013).

AVO 2009b. AVO. *Service Review, Mount Redoubt Volcanic Eruptions, March – April 2009*. Available: http://www.nws.noaa.gov/om/assessments/pdfs/redoubt.pdf. (June 2013).

AVO 2013a. AVO. About Alaska's Volcanoes. Available: http://www.avo.alaska.edu/volcanoes/about.php. (June 2013)

AVO 2013b. Alaska's volcanic activity. Available: http://www.avo.alaska.edu/. (June 2013).

BKP 1988. Baker, V.R.; Kochel, R.C.; Patton, P.C. *Flood Geomorphology*, Published by Wiley-Interscience, April 1988. Available: http://books.google.com/books?id=snLfvo2w-ngC&pg=PA176&lpg=PA176&dq=geomorphology+debris+deposition+during+floods&source=bl&ots=cixFlUnKLb&sig=3gLzWfoyciL3vcYfCOIUcky-ErM&hl=en&ei=E-JxSs-8CYzatAOL2tTMDA&sa=X&oi=book_result&ct=result&resnum=5. (June 2013).

Brown et al 2001. Brown, J., O.J. Ferrians Jr., J.A. Heginbottom, and E.S. Melnikov, 2001, revised February 2001. Circum-Arctic Map of permafrost and ground-ice conditions. Boulder, CO: National Snow and Ice Data Center/World Data Center for Glaciology, Digital Media. http://nsidc.org/data/ggd318.html. (June 2013).

Census (United States Census Bureau) 2010. American Fact Finder, Chefornak Alaska. http://factfinder2.census.gov/faces/nav/jsf/pages/index.xhtml. (June 20132).

DCRA 2013. DCCED/DCRA, Community Plans and Infrastructure Libraries 2013. Available http://www.commerce.state.ak.us/dca/commdb/CF_Plans.cfm. (June 2013).

DEC 2011. Department of Environmental Conservation (DEC) – Village Safe Water (VSW) Program, State Fiscal Year (SFY) 2011 Capital Improvement Project (CIP) Request. Available: http://www.dec.alaska.gov/water/vsw/pdfs/2011CIPList.pdf. (August 2013).

DEC 2012. DEC/VSW Remote Maintenance Worker (RMW) Program Annual Report. Available:

http://www.dec.alaska.gov/Water/rmw/pdfs/FY%2012%20RMW%20Annual%20Report%20(maps%20only).pdf. (August 2013).

DGGS (Division of Geological and Geophysical Survey [DGGS]) Publications. 2009. Available: http://www.dggs.alaska.gov/pubs/id/22331. (August 2013)

DHS&EM (Division of Homeland Security and Emergency Management) 2010. *Alaska State Hazard Mitigation Plan, 2010* Available: http://www.ak-prepared.com/plans/documents/SHMP_2010_UPDATE_ENTIRE_FINAL_COMPLETE.pdf. (June 2013).

DHS&EM (Division of Homeland Security and Emergency Management) 2013. *Alaska State Hazard Mitigation Plan, 2013.* Available: http://ready.alaska.gov/plans/documents/2013%20State%20Mitigation%20Plan%20Draft.pdf (October 2013).

DHS&EM 2012. *Critical Facilities Inventory*, 2012. (June 2013).

DHS&EM 2013. *Disaster Cost Index 2013*. (July 2013).

DOF (Alaska Division of Forestry). 2013. Role of Fire in the Alaskan Environment. http://forestry.alaska.gov/fire/fireplans.htm. (June 20132)

DNR 2009. Department of Natural Resources (DNR) Coastal Processes and Erosion Response Seminar. October 6-9, 2009. Available: http://dnr.alaska.gov/coastal/acmp/Enews/coastal_processes/index.html and http://dnr.alaska.gov/coastal/acmp/Enews/coastal_processes/Revetments.pdf. (June 2013).

FEMA 2002. *Mitigation Planning How-To Guides.* U.S. Department of Homeland Security, FEMA 386-1. Available: http://www.fema.gov/hazard-mitigation-planning-resources#1. (June 2013).

FEMA 2010a. FEMA Mitigation Planning Fact Sheet. Available: http://www.fema.gov/library/viewRecord.do?id=2066. (June 2013)

FEMA 2012. FEMA FY 2011 Hazard Mitigation Assistance (HMA Unified Guidance, September 25, 2012). Available: http://www.fema.gov/library/viewRecord.do?id=4225. (June 2013)

FEMA 2011. FEMA Local Mitigation Planning Handbook, March 20, 2013. Available: http://www.fema.gov/library/viewRecord.do?id=7209. (June 2013)

FEMA 2012a. FEMA *Flooding and Flood Risks*. Available: http://www.floodsmart.gov/floodsmart/pages/flooding_flood_risks/ffr_overview.jsp. (June 2013).

FEMA 2012b. FEMA *Flood Frequently Asked Questions* Available: http://www.floodsmart.gov/floodsmart/pages/faqs/faqs_flood.jsp. (June 2013).

FEMA 2012d. FEMA Flood Facts. Available: http://www.floodsmart.gov/floodsmart/pages/flood_facts.jsp. (June 2013).

FEMA 2012e. FEMA Community Status Book Report. Available http://www.fema.gov/cis/AK.html. (April 02, 2012)

Haeussler, P. USGS (United States Geologic Survey). 2009. E-mail correspondence concerning Shake Maps. (September 2012).

Jorgenson et al 2008. Jorgenson, T., Yoshikawa, K., Kanevskiy, M., Shur, Y., Romanovsky, V., Marchenko, S., Grosse, G., Brown, J., and Jones, B (2008). Permafrost characteristics of Alaska – A new permafrost map of Alaska. In: Kane, D.L. and Hinkel, K.M. (eds.), Institute of Northern Engineering, University of Alaska Fairbanks, *Extended Abstracts of the Ninth International Conference on Permafrost*, June 29-July 3, Fairbanks, Alaska, 2008, pp. 121-122.Available: http://permafrost.gi.alaska.edu/sites/default/files/AlaskaPermafrostMap_Front_Dec2008_Jorgenson_etal_2008.pdf. (June 2013).

MMI 2013. *Modified Mercalli Intensity Scale.* Michigan Technical University. Available: http://www.geo.mtu.edu/UPSeis/Mercalli.html. (July 2012).

NCDC (National Climate Data Center) Severe Weather Data 2013. Available: http://www.ncdc.noaa.gov/data-access/severe-weather. (June 2013)

NOAA 2001. *Winter Storms: The Deceptive Killers: A Preparedness Guide.* National Weather Service. Available: http://www.nws.noaa.gov/om/winterstorm/winterstorms.pdf. (June 2013).

NOAA 2013. *National Weather Service Definitions*. Available: http://www.weather.gov/glossary/index.php?letter=F. (June 2013).

NOAA 2013. Coast Pilot 9 – 30th Edition, 2012, Updated June 2, 2013. Available: http://www.nauticalcharts.noaa.gov/nsd/coastpilot_w.php?book=9.(June 2013).

NWS 2013. National Weather Service (NWS), Climate Search Results 2013. Available: http://www.arh.noaa.gov/clim/climDataSearch.php?stnid=CTEA2 (June 2013).

UAF/SNAP 2013. University of Alaska Fairbanks (UAF), Scenarios Network for Alaska and Arctic Planning (SNAP), 2013. *Historic, current, and predicted weather data*. Available: http://www.snap.uaf.edu/charts.php. (August 2013).

USACE 2011. U.S. Army Corps of Engineers (USACE), 2011. *Civil Works Branch, Alaska Floodplain Management Flood Hazard Data*, Chefornak, *Alaska.* Available: http://66.223.166.160/usace_disclaimer.html. (June 2013).

USACE 2008. US Army Corps of Engineers, Alaska Baseline Erosion Assessment, Erosion *Information Paper – Chefornak, Alaska, Current as of January 10, 2008*. Available: http://66.223.166.160/usace_disclaimer.html. August 2013.

USDA (U.S. Department of Agriculture) 2013. USDA/Natural Resources Conservation Services (NRCS) Prism Data, Alaska Rainfall Map. Available: http://www.nrcs.usda.gov/wps/portal/nrcs/detail/ak/technical/?cid=nrcs142p2_035894. (August 2013).

USGS 2013. USGS *NEIC Historic Earthquake Search Results*. Available: http://earthquake.usgs.gov/earthquakes/eqarchives/epic/. (June 2013).

USGS 2013. National Earthquake Information Center, 2009 Probability Mapping: Available: https://geohazards.usgs.gov/eqprob/2009/index.php. (June 2013).

WRCC 2013. Western Regional Climate Center, 2012. Available: http://www.wrcc.dri.edu/narratives/ALASKA.htm. (June 2013) or http://www.wrcc.dri.edu/. (June 2013).

Appendix A

Funding Resources

This page intentionally left blank.

Federal Funding Resources

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

- FEMA, through its Emergency Management Institute, offers training in many aspects of emergency management, including hazard mitigation. FEMA has also developed a large number of documents that address implementing hazard mitigation at the local level. Five key resource documents are available from FEMA Publication Warehouse (1-800-480-2520) and are briefly described here:
    - 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 describe 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 DMA 2000 requirements (http://www.fema.gov/plan/mitplanning/resources.shtm#1).
    - 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.
    - A Guide to Recovery Programs FEMA 229(4), September 2005. The programs described in this guide may all be of assistance during disaster incident recovery. Some are available only after a Presidential declaration of disaster, but others are available without a declaration. Please see the individual program descriptions for details. (http://www.fema.gov/txt/rebuild/ltrc/recoveryprograms229.txt)
    - The Emergency Management Guide for Business and Industry. FEMA 141, October 1993. This guide provides a step-by-step approach to emergency management planning, response, and recovery. It also details a planning process that businesses can follow to better prepare for a wide range of hazards and emergency events. This effort can enhance a business's ability to recover from financial losses, loss of market share, damages to equipment, and product or business interruptions. This guide could be of great assistance to a community's industries and businesses located in hazard prone areas.
    - The FEMA Hazard Mitigation Assistance (HMA Unified Guidance, June 1, 2010. The guidance introduces the five HMA grant programs, funding opportunities, award

information, eligibility, application and submission information, application review process, administering the grant, contracts, additional program guidance, additional project guidance, and contains information and resource appendices(FEMA 2009).

- FEMA also administers emergency management grants (http://www.fema.gov/help/site.shtm) and various firefighter grant programs (http://www.firegrantsupport.com/) such as
  - Emergency Management Performance Grant (EMPG). This is a pass through grant. The amount is determined by the State. The grant is intended to support critical assistance to sustain and enhance State and local emergency management capabilities at the State and local levels for all-hazard mitigation, preparedness, response, and recovery including coordination of inter-governmental (Federal, State, regional, local, and tribal) resources, joint operations, and mutual aid compacts state-to-state and nationwide. Sub-recipients must be compliant with National Incident Management System (NIMS) implementation as a condition for receiving funds. Requires 50% match.
  - National Earthquake Hazards Reduction Program (NEHRP). The National Earthquake Hazards Reduction Program (NEHRP) seeks to mitigate earthquake losses in the United States through both basic and directed research and implementation activities in the fields of earthquake science and engineering.

    The NEHRP is the Federal Government's coordinated approach to addressing earthquake risks. Congress established the program in 1977 (Public Law 95-124) as a long-term, nationwide program to reduce the risks to life and property in the United States resulting from earthquakes. The NEHRP is managed as a collaborative effort among FEMA, the National Institute of Standards and Technology, the National Science Foundation, the United States Geological Survey, and the Department of Interior.

    The four goals of the NEHRP are to:

    - Develop effective practices and policies for earthquake loss-reduction and accelerate their implementation.
    - Improve techniques to reduce seismic vulnerability of facilities and systems.
    - Improve seismic hazards identification and risk-assessment methods and their use.
    - Improve the understanding of earthquakes and their effects.

    Information may be found at:
    http://www.fema.gov/plan/prevent/earthquake/nehrp.shtm, and
    http://www.ehow.com/info_7968511_disaster-research-grant-funding.html

  - Assistance to Fire Fighters Grant (AFG), Fire Prevention and Safety (FP&S), Staffing for Adequate Fire and Emergency Response Grants (SAFER), and Assistance to Firefighters Station Construction Grant programs. Information can be found at: (http://forestry.alaska.gov/fire/vfarfa.htm).

- Department of Homeland Security (DHS) provides the following grants:
  - Homeland Security Grant Program (HSGP), State Homeland Security Program (SHSP) are 80% pass through grants. SHSP supports implementing the State Homeland Security Strategies to address identified planning, organization, equipment, training, and exercise needs for acts of terrorism and other catastrophic events. In addition, SHSP supports implementing the National Preparedness Guidelines, the NIMS, and the National Response Framework (NRF). Must ensure at least 25% of funds are dedicated towards law enforcement terrorism prevention-oriented activities.
  - Citizen Corps Program (CCP). The Citizen Corps mission is to bring community and government leaders together to coordinate involving community members in emergency preparedness, planning, mitigation, response, and recovery activities.
  - Emergency Operations Center (EOC) This program is intended to improve emergency management and preparedness capabilities by supporting flexible, sustainable, secure, strategically located, and fully interoperable Emergency Operations Centers (EOCs) with a focus on addressing identified deficiencies and needs. Fully capable emergency operations facilities at the State and local levels are an essential element of a comprehensive national emergency management system and are necessary to ensure continuity of operations and continuity of government in major disasters or emergencies caused by any hazard. Requires 25% match.
- U.S. Department of Commerce's grant programs include:
  - Remote Community Alert Systems (RCASP) grant for outdoor alerting technologies in remote communities effectively underserved by commercial mobile service for the purpose of enabling residents of those communities to receive emergency messages. This program is a contributing element of the Warning, Alert, and Response Network (WARN) Act.
  - National Oceanic and Atmospheric Administration (NOAA), provides funds to the State of Alaska due to Alaska's high threat for tsunami. The allocation supports the promotion of local, regional, and state level tsunami mitigation and preparedness; installation of warning communications systems; installation of warning communications systems; installation of tsunami signage; promotion of the Tsunami Ready Program in Alaska; development of inundation models; and delivery of inundation maps and decision-support tools to communities in Alaska.
- Department of Agriculture (USDA). Disaster assistance provided includes: Emergency Conservation Program, Non-Insured Assistance, Emergency Forest Restoration Program, Emergency Watershed Protection, Rural Housing Service, Rural Utilities Service, and Rural Business and Cooperative Service. (http://www.fsa.usda.gov/FSA/webapp?area=home&subject=diap&topic=landing)
- Department of Energy (DOE), Office of Energy Efficiency and Renewable Energy, Weatherization Assistance Program (http://www1.eere.energy.gov/wip/wap.html). 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.

  - The Tribal Energy Program offers financial and technical assistance to Indian tribes to help them create sustainable renewable energy installations on their lands. This program promotes tribal energy self-sufficiency and fosters employment and economic development on America's tribal lands. (http://www1.eere.energy.gov/wip/tribal.html)

- US Environmental Protection Agency (EPA). Under EPA's Clean Water State Revolving Fund (CWSRF) program, each state maintains a revolving loan fund to provide independent and permanent sources of low-cost financing for a wide range of water quality infrastructure projects, including: municipal wastewater treatment projects; non-point source projects; watershed protection or restoration projects; and estuary management projects. (http://yosemite.epa.gov/R10/ecocomm.nsf/6da048b9966d22518825662d00729a35/7b68c420b668ada5882569ab00720988!OpenDocument)
  - Public Works and Development Facilities Program. This program provides assistance to help distressed communities attract new industry, encourage business expansion, diversify local economies, and generate long-term, private sector jobs. Among the types of projects funded are water and sewer facilities, primarily serving industry and commerce; access roads to industrial parks or sites; port improvements; business incubator facilities; technology infrastructure; sustainable development activities; export programs; brownfields redevelopment; aquaculture facilities; and other infrastructure projects. Specific activities may include demolition, renovation, and construction of public facilities; provision of water or sewer infrastructure; or the development of stormwater control mechanisms (e.g., a retention pond) as part of an industrial park or other eligible project. (http://cfpub.epa.gov/fedfund/program.cfm?prog_num=51)

- Department of Health and Human Services, Administration of Children & Families, Administration for Native Americans (ANA). The ANA awards funds through grants to American Indians, Native Americans, Native Alaskans, Native Hawaiians, and Pacific Islanders. These grants are awarded to individual organizations that successfully apply for discretionary funds. ANA publishes in the Federal Register an announcement of funds available, the primary areas of focus, review criteria, and the method of application. (http://www.acf.hhs.gov/programs/ana/programs/program_information.html)
- Department of Housing and Urban Development (HUD) provides a variety of disaster resources. They also partner with Federal and state agencies to help implement disaster recovery assistance. Under the *National Response Framework* the FEMA and the Small Business Administration (SBA) offer initial recovery assistance. (http://www.hud.gov/info/disasterresources_dev.cfm)
  - HUD, 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. (http://www.hud.gov/offices/cpd/communitydevelopment/programs/108/index.cfm)

- HUD, Office of Homes and Communities, Section 184 Indian Home Loan Guarantee Programs (IHLGP). The Section 184 Indian Home Loan Guarantee Program is a home mortgage specifically designed for American Indian and Alaska Native families, Alaska Villages, Tribes, or Tribally Designated Housing Entities. Section 184 loans can be used, both on and off native lands, for new construction, rehabilitation, purchase of an existing home, or refinance.
- Because of the unique status of Indian lands being held in Trust, Native American homeownership has historically been an underserved market. Working with an expanding network of private sector and tribal partners, the Section 184 Program endeavors to increase access to capital for Native Americans and provide private funding opportunities for tribal housing agencies with the Section 184 Program. (http://www.hud.gov/offices/pih/ih/homeownership/184/)
- HUD/CDBG 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 (http://www.hud.gov/offices/cpd/communitydevelopment/programs/)

- Department of Labor (DOL), 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. (http://www.workforcesecurity.doleta.gov/unemploy/disaster.asp)
  - The Workforce Investment Act contains provisions aimed at supporting employment and training activities for Indian, Alaska Native, and Native Hawaiian individuals. The Department of Labor's Indian and Native American Programs (INAP) funds grant programs that provide training opportunities at the local level for this target population. (http://www.dol.gov/dol/topic/training/indianprograms.htm)
- U.S. Department of Transportation (DOT), Hazardous Materials Emergency Preparedness Grant. DOT increases State, Territorial, Tribal and local effectiveness in safely and efficiently handling hazardous materials accidents and incidents, enhances implementation of the Emergency Planning and Community Right-to-Know Act of 1986, and encourages a comprehensive approach to emergency training and planning by incorporating the unique challenges of responses to transportation situations, through planning and training. Requires a 20% local match.
- Federal Financial Institutions. Member banks of Federal Deposit Insurance Corporation, Financial Reporting Standards 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 (IRS), Disaster Tax Relief. Provides extensions to current year's tax return, allows deductions for disaster losses, and allows amendment of previous year’s tax returns (http://www.irs.gov/newsroom/article/0,,id=108362,00.html).

- Natural Resources Conservation Service (NRCS) has several funding sources to fulfill mitigation needs. Further information is located at: http://www.ak.nrcs.usda.gov/sitemap.html
    - The Emergency Watershed Protection Program (EWP). This funding source is designed is to undertake emergency measures, including the purchase of flood plain easements, for runoff retardation and soil erosion prevention to safeguard lives and property from floods, drought, and the products of erosion on any watershed whenever fire, flood or any other natural occurrence is causing or has caused a sudden impairment of the watershed.
    - Wildlife Habitat Incentives Program (WHIP). This is a voluntary program for conservation-minded landowners who want to develop and improve wildlife habitat on agricultural land, nonindustrial private forest land, and Indian land.
    - Watershed Planning. NRCS watershed activities in Alaska are voluntary efforts requested through conservation districts and units of government and/or tribes. The watershed activities are lead locally by a "watershed management committee" that is comprised of local interest groups, local units of government, local tribal representatives and any organization that has a vested interest in the watershed planning activity. This committee provides direction to the process as well as provides the decision-making necessary to implement the process. Technical assistance is provided to the watershed management committee through a "technical advisory committee" comprised of local, state and federal technical specialist. These specialists provide information to the watershed management committee as needed to make sound decisions. NRCS also provides training on watershed planning organization and process.
- U.S. Small Business Administration (SBA) Disaster Assistance provides information concerning disaster assistance, preparedness, planning, cleanup, and recovery planning. (http://www.sba.gov/category/navigation-structure/starting-managing-business/managing-business/running-business/emergency-preparedness-and-disaster-)
    - May provide low-interest disaster loans to individuals and businesses that have suffered a loss due to a disaster. (http://www.sba.gov/category/navigation-structure/loans-grants/small-business-loans/disaster-loans). Requests for SBA loan assistance should be submitted to DHS&EM.
- United States Army Corps of Engineers (USACE) Alaska District’s Civil Works Branch studies potential water resource projects in Alaska. These studies analyze and solve water resource issues of concern to the local communities. These issues may involve navigational improvements, flood control or ecosystem restoration. The agency also tracks flood hazard data for over 300 Alaskan communities on floodplains or the sea coast. These data help local communities assess the risk of floods to their communities and prepare for potential future floods (http://www.poa.usace.army.mil/en/cw/index.htm). The USACE is a member and co-chair of the Alaska Climate Change Sub-Cabinet.
- Grants.gov. was established as a governmental resource named the E-Grants Initiative, part of the President's 2002 Fiscal Year Management Agenda to improve government services to the public. The concept has its origins in the Federal Financial Assistance

Management Improvement Act of 1999, also known as Public Law 106-107. The Grants Policy Committee (GPC), a committee of the U.S. Chief Financial Officers (CFO) Council consisting of grants policy experts from across the federal government assumed responsibility for implementing P.L. 106-107, working to enhance federal financial assistance even after P.L. 106-107 expired in November 2007. The Council on Financial Assistance Reform (COFAR), created in October 2011, continues to assist the Federal financial assistance community with delivery, management, coordination, and accountability of Federal grants and cooperative agreements.

Today, www.Grants.gov is a central storehouse for information on over 1,000 grant programs and provides access to approximately $500 billion in annual awards.

State Funding Resources

- Department of Military and Veterans Affairs (DMVA): Provides damage appraisals and settlements for VA-insured homes, and assists with filing of survivor benefits. (http://veterans.alaska.gov/links.htm)
    - DHS&EM within DMVA is responsible for improving hazard mitigation technical assistance for local governments for the State of Alaska. Providing hazard mitigation training, current hazard information and communication facilitation with other agencies will enhance local hazard mitigation efforts. DHS&EM administers FEMA mitigation grants to mitigate future disaster damages such as those that may affect infrastructure including elevating, relocating, or acquiring hazard-prone properties. (http://ready.alaska.gov/plans/mitigation.htm)

      DHS&EM also provides mitigation funding resources for mitigation planning on their Web site at http://www.ak-prepared.com/plans/mitigation/localhazmitplan.htm.
- Division of Senior Services (DSS): Provides special outreach services for seniors, including food, shelter and clothing. (http://www.hss.state.ak.us/dsds/seniorInfoResources.htm)
- Division of Insurance (DOI): Provides assistance in obtaining copies of policies and provides information regarding filing claims. (http://www.dced.state.ak.us/insurance/)
- DCRA within the DCCED administers the HUD/CDBG, FMA Program, and the Climate Change Sub-Cabinet's Interagency Working Group's program funds and administers various flood and erosion mitigation projects, including the elevation, relocation, or acquisition of flood-prone homes and businesses throughout the State. This division also administers programs for State's" distressed" and "targeted" communities. (http://www.commerce.state.ak.us/dca/)
    - DCRA Planning and Land Management staff provide Alaska Climate Change Impact Mitigation Program (ACCIMP) funding to Alaskan communities that meet one or more of the following criteria related to flooding, erosion, melting permafrost, or other climate change-related phenomena: Life/safety risk during storm/flood events; loss of critical infrastructure; public health threats; and loss of 10% of residential dwellings.

      The Hazard Impact Assessment is the first step in the ACCIMP process. The HIA identifies and defines the climate change-related hazards in the community,

establishes current and predicted impacts, and provides recommendations to the community on alternatives to mitigate the impact. The community may then pursue these recommendations through an ACCIMP Community Planning Grant. (http://commerce.alaska.gov/dca/planning/accimp/hazard_impact.html)

- Department of Environmental Conservation (DEC). DEC's primary roles and responsibilities concerning hazards mitigation are ensuring safe food and safe water, and pollution prevention and pollution response. DEC ensures water treatment plants, landfills, and bulk fuel storage tank farms are safely constructed and operated in communities. Agency and facility response plans include hazards identification and pollution prevention and response strategies. (http://dec.alaska.gov/)
  - The Division of Water's Village Safe Water Program works with rural communities to develop sustainable sanitation facilities. Communities apply each year to VSW for grants for sanitation projects. Federal and state funding for this program is administered and managed by the State of Alaska's Village Safe Water (VSW) program. VSW provides technical and financial support to Alaska's smallest communities to design and construct water and wastewater systems. In some cases, funding is awarded by VSW through the Alaska Native Tribal Health Consortium, who in turn assist communities in design and construct of sanitation projects.
  - Municipal Grants and Loans (MGL) Program. The Department of Environmental Conservation / Division of Water administer the Alaska Clean Water Fund (ACWF) and the Alaska Drinking Water Fund (ADWF). The division is fiscally responsible to the Environmental Protection Agency (EPA) to administer the loan funds as the EPA provides capitalization grants to the division for each of the loan funds. In addition, it is prudent upon the division to administer the funds in a manner that ensures their continued viability.
  - Under EPA's Clean Water State Revolving Fund (CWSRF) program, each state maintains a revolving loan fund to provide independent and permanent sources of low-cost financing for a wide range of water quality infrastructure projects, including: municipal wastewater treatment projects; non-point source projects; watershed protection or restoration projects; and estuary management, [and stormwater management] projects. (http://yosemite.epa.gov/R10/ecocomm.nsf/6da048b9966d22518825662d00729a35/7b68c420b668ada5882569ab00720988!OpenDocument)

    Alaska's Revolving Loan Fund Program, prescribed by Title VI of the Clean Water Act as amended by the Water Quality Act of 1987, Public Law 100-4. DEC will use the ACWF account to administer the loan fund. This Agreement will continue from year-to-year and will be incorporated by reference into the annual capitalization grant agreement between EPA and the DEC. DEC will use a fiscal year of July 1 to June 30 for reporting purposes. (http://www.epa.gov/region10/pdf/water/srf/cwsrf_alaska_operating_agreement.pdf)

- Department of Transportation and Public Facilities (DOT/PF) personnel provide technical assistance to the various emergency management programs, to include mitigation. This assistance is addressed in the DHS&EM-DOT/PF Memorandum of

Agreement and includes but is not limited to: environmental reviews, archaeological surveys, and historic preservation reviews.

- DOT/PF and DHS&EM coordinate buy-out projects to ensure that there are no potential right-of-way conflicts with future use of land for bridge and highway projects, and collaborate on earthquake mitigation.
- Additionally, DOT/PF provides the safe, efficient, economical, and effective State highway, harbor, and airport operation. DOT/PF uses it's Planning, Design and Engineering, Maintenance and Operations, and Intelligent Transportation Systems resources to identify hazards, plan and initiate mitigation activities to meet the transportation needs of Alaskans, and make Alaska a better place to live and work. DOT/PF budgets for temporary bridge replacements and materials necessary to make the multi-modal transportation system operational following natural disaster events.

- DNR administers various projects designed to reduce stream bank erosion, reduce localized flooding, improve drainage, and improve discharge water quality through the stormwater grant program funds. Within DNR,
  - The Division of Geological and Geophysical Survey (DGGS) is responsible Alaska's mineral, land, and water resources use, development, and earthquake mitigation collaboration.

    Their geologists and support staff are leaders in researching Alaska's geology and implementing technological tools to most efficiently collect, interpret, publish, archive, and disseminate information to the public. Information is available at: (http://www.dggs.dnr.state.ak.us/index.php?menu_link=publications&link=publications_search#)
  - The DNR's Division of Forestry (DOF) participates in a statewide wildfire control program in cooperation with the forest industry, rural fire departments and other agencies. Prescribed burning may increase the risks of fire hazards; however, prescribed burning reduces the availability of fire fuels and therefore the potential for future, more serious fires. (http://forestry.alaska.gov/pdfs/08FireSuppressionMediaGuide.pdf)
  - DOF also manages various wildland fire programs, activities, and grant programs such as the FireWise Program (http://forestry.alaska.gov/fire/firewise.htm), Community Forestry Program (CFP) (http://forestry.alaska.gov/community/), Assistance to Fire Fighters Grant (AFG), Fire Prevention and Safety (FP&S), Staffing for Adequate Fire and Emergency Response Grants (SAFER), and Volunteer Fire Assistance and Rural Fire Assistance Grant (VFA-RFA) programs (http://forestry.alaska.gov/fire/vfarfa.htm). Information can be found at http://forestry.alaska.gov/fire/current.htm.

Other Funding Resources

The following 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.

- Rural Alaska Community Action Program Inc. (RurAL CAP) In the nearly 50 years since it began, it is difficult to imagine any aspect of rural Alaskan lives which has not been touched in some way by the people and programs of RurAL CAP. From Head Start, parent education, adult basic education, and elder-youth programs, to Native land claims and subsistence rights, energy and weatherization programs, and alcohol and substance abuse prevention, RurAL CAP has left a lasting mark on the history and development of Alaska and its rural Peoples. (http://ruralcap.com/?page_id=334)

  From its earliest days to the present, RurAL CAP's success can be attributed to the direct involvement of rural Alaskans in its programs and in the decision making processes which affect their lives, and to the belief in and respect for those Peoples by the board and staff of RurAL CAP.

  - Weatherization Assistance Program assists low to moderate income households in weatherization needs. The program is available to homeowners as well as renters and includes; single family homes, cabins, mobile homes, condominiums and multifamily dwellings.

    Services *may* include improvements such as; air sealing, caulking and insulation, doors and windows, exterior paint, heating system test and tune, ventilation and moisture control. Major home repairs are not classified under weatherization and thus are not eligible under the program. (http://www.weatherizeme.org/Applications/RUR/Wx%20app%20Rural%2004-13.pdf)

  - Energy Programs. VISTA Energy Program (VEP) Members work on projects like energy efficiency education, planning and capacity building for renewable energy options, and home energy efficiency education. VEP helps rural Alaskan communities reduce their energy bills.

    VEP Members build partnerships, developed funding proposals, and worked with their sponsoring council to raise money and in-kind resources for energy projects in their communities.

  - Environment. RurAL CAP has several interwoven projects under the Environmental Program. All of these projects were created to respond to the needs rural Alaskans reported in community assessments conducted by AmeriCorps members. All of these interconnected projects address local environmental issues with local solutions, connect rural Alaskans to each other to share resources, and are connected to the RAVEN AmeriCorps program.

    RurAL CAP's environmental programs surround issues of solid waste, backhaul efforts, the RAVEN AmeriCorps program, subsistence and indoor air quality. The programs include the Denali Solid Waste Grants, EPA Community Environmental Demonstration Projects, Solid Waste Management Technical Assistance, RAVEN AmeriCorps Members, Subsistence in Alaska, and Alaska Village Indoor Air Quality.

  - Solid Waste Management. RurAL CAP continues to host an expert solid waste liaison, Ted Jacobson, through funding provided by the Environmental Protection Agency (EPA) and Senior Services America, Inc. The liaison provides solid waste management technical assistance to rural communities through training, site visits,

hands-on demonstrations, and remote contact. Resources are provided for dump management activities, collaborating with funders for funding and technical assistance on solid waste management, recycling, and backhaul.

- American Planning Association (APA), http://www.planning.org - a non-profit professional association that serves as a resource for planners, elected officials, and citizens concerned with planning and growth initiatives.
- Institute for Business and Home Safety (IBHS), http://ibhs.org - an initiative of the insurance industry to reduce deaths, injuries, property damage, economic losses, and human suffering caused by natural disasters.
- American Red Cross (ARC). Provides for the critical needs of individuals such as food, clothing, shelter, and supplemental medical needs. Provides recovery needs such as furniture, home repair, home purchasing, essential tools, and some bill payment may be provided.
- Crisis Counseling Program. Provides grants to State and Borough Mental Health Departments, which in turn provide training for screening, diagnosing and counseling techniques. Also provides funds for counseling, outreach, and consultation for those affected by disaster. (http://dialoguemakers.org/Resourses4states+Nonprofits.htm)
- Denali Commission. Introduced by Congress in 1998, the Denali Commission is an independent federal agency designed to provide critical utilities, infrastructure, and economic support throughout Alaska. With the creation of the Denali Commission, Congress acknowledged the need for increased inter-agency cooperation and focus on Alaska's remote communities. Since its first meeting in April 1999, the Commission is credited with providing numerous cost-shared infrastructure projects across the State that exemplifies effective and efficient partnership between federal and state agencies, and the private sector. (http://www.denali.gov/index.php?option=com_content&view=section&id=1&Itemid=3)
    - The Energy Program primarily funds design and construction of replacement bulk fuel storage facilities, upgrades to community power generation and distribution systems, alternative-renewable energy projects, and some energy cost reduction projects. The Commission works with the Alaska Energy Authority (AEA), Alaska Village Electric Cooperative (AVEC), Alaska Power and Telephone and other partners to meet rural communities' fuel storage and power generation needs.
    - The goal of the solid waste program at the Denali Commission is to provide funding to address deficiencies in solid waste disposal sites which threaten to contaminate rural drinking water supplies.
- University of Alaska Fairbanks, Cold Climate Housing and Research Center (CCHRC). The Sustainable Northern Shelter program was initiated in 2008 to address the need for sustainable rural housing in northern climates. CCHRC designers work with local residents and housing authorities to develop homes that reflect the culture, environment, and local resources of individual communities. The designs emphasize energy efficiency, affordability, and durability.

- CCHRC has developed several prototype homes that can be easily and affordably reproduced throughout communities to provide much-needed housing. The program, which started with an experimental house made out of spray foam in Anaktuvuk Pass, has grown to encompass more than a dozen villages throughout Alaska. (http://www.cchrc.org/sustainable-northern-communities).

- Lindbergh Foundation Grants. Each year, The Charles A. and Anne Morrow Lindbergh Foundation provides grants of up to $10,580 (a symbolic amount representing the cost of the Spirit of St. Louis) to men and women whose individual initiative and work in a wide spectrum of disciplines furthers the Lindberghs' vision of a balance between the advance of technology and the preservation of the natural/human environment. (http://www.lindberghfoundation.org/docs/index.php/our-grants)

- Rasmuson Foundation Grants. The Rasmuson foundation invests both in individuals and well-managed 501(c)(3) organizations dedicated to improving the quality of life for Alaskans.

  Rasmuson Foundation awards grants both to organizations serving Alaskans through a base of operations in Alaska, and to individuals for projects, fellowships and sabbaticals. To be considered for a grant award, grant seekers must meet specific criteria and complete and submit the required application according to the specific guidelines of each program. (http://www.rasmuson.org/index.php?switch=viewpage&pageid=5)

  - Tier 1 Awards: Grants of up to $25,000 for capital projects, technology updates, capacity building, program expansion, and creative works.
  - Tier 2 Awards: Grants over $25,000 for projects of demonstrable strategic importance or innovative nature.
  - Pre-Development Program: Guidance and technical resources for planning new, sustainable capital projects.

  The Foundation seeks to support not-for-profit organizations that are focused and effective in the pursuit of their goals, with special consideration for those organizations that demonstrate strong leadership, clarity of purpose and cautious use of resources.

  The Foundation trustees believe successful organizations can sustain their basic operations through other means of support and prefer to assist organizations with specific needs, focusing on requests which allow the organizations to become more efficient and effective. The trustees look favorably on organizations which demonstrate broad community support, superior fiscal management and matching project support. (http://www.rasmuson.org/index.php)

Appendix B

FEMA Hazard Mitigation Plan (HMP) Review Tool

This page intentionally left blank.

APPENDIX A:
LOCAL MITIGATION PLAN REVIEW TOOL

The *Local Mitigation Plan Review Tool* demonstrates how the Local Mitigation Plan meets the regulation in 44 CFR §201.6 and offers States and FEMA Mitigation Planners an opportunity to provide feedback to the community.

- The Regulation Checklist provides a summary of FEMA's evaluation of whether the Plan has addressed all requirements.
- The Plan Assessment identifies the plan's strengths as well as documents areas for future improvement.
- The Multi-jurisdiction Summary Sheet is an optional worksheet that can be used to document how each jurisdiction met the requirements of the each Element of the Plan (Planning Process; Hazard Identification and Risk Assessment; Mitigation Strategy; Plan Review, Evaluation, and Implementation; and Plan Adoption).

The FEMA Mitigation Planner must reference this *Local Mitigation Plan Review Guide* when completing the *Local Mitigation Plan Review Tool*.

Jurisdiction: **City of Chefornak**	**Title of Plan:** **City of Chefornak Hazard Mitigation Plan**	**Date of Plan:** **February 2014**
Local Point of Contact: Rosalie Mathew	**Address:** PO Box 29 Chefornak, AK 99561	
Title: Mayor		
Agency: City of Chefornak		
Phone Number: 907.867.8147	**E-Mail:** Mayor_kts@yahoo.com	

State Reviewer: **Scott Nelsen**	**Title: Mitigation Planner**	**Date: 25 February 2014**

FEMA Reviewer: Brett Holt	**Title:** Mitigation Planner	**Date:** April 4, 2014
Date Received in FEMA Region 10	February 25, 2014	
Plan Not Approved		
Plan Approvable Pending Adoption	April 4, 2014	
Plan Approved	July 25, 2014	

SECTION 1:
REGULATION CHECKLIST

INSTRUCTIONS: The Regulation Checklist must be completed by FEMA. The purpose of the Checklist is to identify the location of relevant or applicable content in the Plan by Element/sub-element and to determine if each requirement has been 'Met' or 'Not Met.' The 'Required Revisions' summary at the bottom of each Element must be completed by FEMA to provide a clear explanation of the revisions that are required for plan approval. Required revisions must be explained for each plan sub-element that is 'Not Met.' Sub-elements should be referenced in each summary by using the appropriate numbers (A1, B3, etc.), where applicable. Requirements for each Element and sub-element are described in detail in this *Plan Review Guide* in Section 4, Regulation Checklist.

1. REGULATION CHECKLIST Regulation (44 CFR 201.6 Local Mitigation Plans)	Location in Plan (section and/or page number)	Met	Not Met
ELEMENT A. PLANNING PROCESS			
A1. Does the Plan document the planning process, including how it was prepared and who was involved in the process for each jurisdiction? (Requirement §201.6(c)(1))	Section 3	X	
A2. Does the Plan document an opportunity for neighboring communities, local and regional agencies involved in hazard mitigation activities, agencies that have the authority to regulate development as well as other interests to be involved in the planning process? (Requirement §201.6(b)(2))	pp. 3-3 to 3-4	X	
A3. Does the Plan document how the public was involved in the planning process during the drafting stage? (Requirement §201.6(b)(1))	Section 3.3, Page 3-3	X	
A4. Does the Plan describe the review and incorporation of existing plans, studies, reports, and technical information? (Requirement §201.6(b)(3))	pp. 3-5 to 3-6, Section 8	X	
A5. Is there discussion of how the community(ies) will continue public participation in the plan maintenance process? (Requirement §201.6(c)(4)(iii))	Section 3.5.2, Page 3-6	X	
A6. Is there a description of the method and schedule for keeping the plan current (monitoring, evaluating and updating the mitigation plan within a 5-year cycle)? (Requirement §201.6(c)(4)(i))	Section 3.5.3,Page 3-7	X	
ELEMENT A: REQUIRED REVISIONS			

1. REGULATION CHECKLIST Regulation (44 CFR 201.6 Local Mitigation Plans)	Location in Plan (section and/or page number)	Met	Not Met
ELEMENT B. HAZARD IDENTIFICATION AND RISK ASSESSMENT			
B1. Does the Plan include a description of the type, location, and extent of all natural hazards that can affect each jurisdiction(s)? (Requirement §201.6(c)(2)(i))	Section 5	X	
B2. Does the Plan include information on previous occurrences of hazard events and on the probability of future hazard events for each jurisdiction? (Requirement §201.6(c)(2)(i))	Section 5	X	
B3. Is there a description of each identified hazard's impact on the community as well as an overall summary of the community's vulnerability for each jurisdiction? (Requirement §201.6(c)(2)(ii))	Section 5 and Section 6	X	
B4. Does the Plan address NFIP insured structures within the jurisdiction that have been repetitively damaged by floods? (Requirement §201.6(c)(2)(ii))	Page 1-3 Section 6.4.1.1, Page 6-10	X	
ELEMENT B: REQUIRED REVISIONS			
ELEMENT C. MITIGATION STRATEGY			
C1. Does the plan document each jurisdiction's existing authorities, policies, programs and resources and its ability to expand on and improve these existing policies and programs? (Requirement §201.6(c)(3))	Section 7.1, Page 7-2 Tables 7-1, 7-2, 7-3, Page 7-2	X	
C2. Does the Plan address each jurisdiction's participation in the NFIP and continued compliance with NFIP requirements, as appropriate? (Requirement §201.6(c)(3)(ii))	Section 1.1, Page 1-3 Section 6.4.1.1 Page 6-10 & 6-11	X	
C3. Does the Plan include goals to reduce/avoid long-term vulnerabilities to the identified hazards? (Requirement §201.6(c)(3)(i))	Section 7.2 Table 7-4, Page 7-4	X	
C4. Does the Plan identify and analyze a comprehensive range of specific mitigation actions and projects for each jurisdiction being considered to reduce the effects of hazards, with emphasis on new and existing buildings and infrastructure? (Requirement §201.6(c)(3)(ii))	pp. 7-11 to 7-15	X	
C5. Does the Plan contain an action plan that describes how the actions identified will be prioritized (including cost benefit review), implemented, and administered by each jurisdiction? (Requirement §201.6(c)(3)(iv)); (Requirement §201.6(c)(3)(iii))	pp. 7-11 to 7-15	X	
C6. Does the Plan describe a process by which local governments will integrate the requirements of the mitigation plan into other planning mechanisms, such as comprehensive or capital improvement plans, when appropriate? (Requirement §201.6(c)(4)(ii))	p. 7-16	X	
ELEMENT C: REQUIRED REVISIONS			

1. REGULATION CHECKLIST Regulation (44 CFR 201.6 Local Mitigation Plans)	Location in Plan (section and/or page number)	Met	Not Met
ELEMENT D. PLAN REVIEW, EVALUATION, AND IMPLEMENTATION (applicable to plan updates only)			
D1. Was the plan revised to reflect changes in development? (Requirement §201.6(d)(3))	N/A	N/A	
D2. Was the plan revised to reflect progress in local mitigation efforts? (Requirement §201.6(d)(3))	N/A	N/A	
D3. Was the plan revised to reflect changes in priorities? (Requirement §201.6(d)(3))	N/A	N/A	
ELEMENT D: REQUIRED REVISIONS			
ELEMENT E. PLAN ADOPTION			
E1. Does the Plan include documentation that the plan has been formally adopted by the governing body of the jurisdiction requesting approval? (Requirement §201.6(c)(5))	Section 4.1, Page 4-1	X	
E2. For multi-jurisdictional plans, has each jurisdiction requesting approval of the plan documented formal plan adoption? (Requirement §201.6(c)(5))	N/A		
ELEMENT E: REQUIRED REVISIONS			
ELEMENT F. ADDITIONAL STATE REQUIREMENTS (OPTIONAL FOR STATE REVIEWERS ONLY; NOT TO BE COMPLETED BY FEMA)			
F1.			
F2.			
ELEMENT F: REQUIRED REVISIONS			

SECTION 2:

A. Plan Strengths and Opportunities for Improvement

This section provides a discussion of the strengths of the plan document and identifies areas where these could be improved beyond minimum requirements.

Element A: Planning Process

Plan Strengths:

- The plan includes a summary of the five steps taken during the planning process as well as a memo summarizing the project kickoff meeting that was held.
- The public involvement initiatives included contacting a diverse group of relevant academia, nonprofits, and local, state, and federal agencies announcing upcoming planning activities and requesting input on identifying hazards and critical facilities as well as comments on the draft plan which was made available in the City office.
- The plan includes a summary of how information from various documents that were reviewed for incorporation in the plan will improve mitigation planning. The plan also uses citations to further document how the relevant information from other resources was incorporated into the plan.
- The plan includes copies of the plan maintenance documents that will be used during the monitoring, reviewing, evaluating, and updating of the plan, including an annual review questionnaire and mitigation action progress report.

Opportunities for Improvement:

- In addition to distributing newsletters and making copies of the draft plan available for review and comment, consider using more diverse methods of participation, such as surveys, questionnaires, and workshops to solicit public feedback.
- Include a summary of any public comments on hazard identification, critical facilities, or the overall draft plan that were received.

Element B: Hazard Identification and Risk Assessment

Plan Strengths:

- The plan includes a community profile that provides a description of the location, geography, history, demographics, and economy of the community as well as a summary of the local land use and development trends and future development.
- The plan includes a table that identifies which hazards pose the greatest threat to the community and should be further analyzed. Hazard profiles describe the nature, history, location, extent, impact, and future event probability for each of the identified hazards.
- The plan clearly defines the descriptors that are used for hazard probability and extent (magnitude/severity).
- Maps are provided to delineate the location of areas affected by hazards.
- A detailed vulnerability exposure analysis was used to determine the number of people and the number and value of residences, critical facilities, and critical infrastructure exposed to each of the identified hazards based on a worst-case scenario. The plan describes the methodology used and data limitations for the vulnerability estimates.

- The plan summarizes the community's vulnerability to each of the hazards by determining the percent of the community's geographic area, population, building stock, and critical facilities and utilities that are vulnerable to each of the identified hazards.

Opportunities for Improvement:

- Consider expanding the vulnerability assessment to include a scenario-based analysis that estimates potential losses resulting from various hazard events (e.g., 100- and 500-year flood events or MMI 5.0 and 7.0 earthquakes).

Element C: Mitigation Strategy

Plan Strengths:

- The plan includes a capability assessment that outlines the community's regulatory tools, technical specialists, and financial resources available for hazard mitigation. Appendix A also identifies additional Federal and state funding resources available.
- The exposure analysis results were used as the basis for developing the mitigation goals and actions.
- The plan includes a list of the mitigation actions that were considered as well as those actions that were selected for implementation. This list includes a comprehensive range of actions, including prevention, property protection, natural resource protection, structural projects, and education and awareness.
- The plan links the mitigation strategy to the hazard identification and vulnerability assessment by identifying hazard-specific goals. The plan also links each mitigation action to the hazard it will mitigate.
- The Hazard Mitigation Team prioritized mitigation actions that were chosen to carry forward into the Mitigation Action Plan after considering each hazard's history, extent, and probability as well as the overall benefit/costs and technical feasibility.
- The Mitigation Action Plan Matrix identifies the priority, responsible entity, potential funding sources, timeframe, benefit/costs, and technical feasibility for each selected mitigation action.
- The Planning Team members will review the regulatory tools identified in the capability assessment to determine where to integrate the mitigation philosophy and implementation initiatives. They will also provide assistance integrating the mitigation strategy into relevant planning mechanisms (i.e., community, land use, capital improvement, transportation improvement, sanitation plans, etc.).

Opportunities for Improvement:

- Make additional linkages between the vulnerability assessment, hazard risk, and mitigation strategy. For example, target mitigation actions at specific locations/areas that have been identified as vulnerable to a hazard.
- Consider estimating the cost of implementation for the actions included in the Mitigation Action Plan.

B. Resources for Implementing Your Approved Plan

- The **Local Mitigation Plan Review Guide and Tool** resource is available through FEMA's Library and should be referred to for the next plan update. http://www.fema.gov/library/viewRecord.do?id=4859
- The **Local Mitigation Planning Handbook** is available. While the requirements under §201.6 have not changed, the Handbook provides guidance to local governments on developing or updating hazard mitigation plans to meet the requirements is available through the FEMA Library website. You can find it in the FEMA Library at http://www.fema.gov/library/viewRecord.do?id=7209.
- The **Mitigation Ideas: A Resource for Reducing Risk from Natural Hazards** resource presents ideas for how to mitigate the impacts of different natural hazards, from drought and sea level rise, to severe winter weather and wildfire. The document also includes ideas for actions that communities can take to reduce risk to multiple hazards, such as incorporating a hazard risk assessment into the local development review process. You can find it in the FEMA Library at http://www.fema.gov/library/viewRecord.do?id=6938.
- The **Integrating Hazard Mitigation Into Local Planning: Case Studies and Tools for Community Officials** resource provides practical guidance on how to incorporate risk reduction strategies into existing local plans, policies, codes, and programs that guide community development or redevelopment patterns. It includes recommended steps and tools to assist with local integration efforts, along with ideas for overcoming possible impediments, and presents a series of case studies to demonstrate successful integration in practice. You can find it in the FEMA Library at http://www.fema.gov/library/viewRecord.do?id=7130.
- **Region 10 Integrating Natural Hazard Mitigation into Comprehensive Planning**: This resource is specific to Region 10 states and provide examples of how communities are integrating natural hazard mitigation strategies into comprehensive planning. It expected to be released later this year. You can find it in the FEMA Library at http://www.fema.gov/media-library/assets/documents/89725.
- The FEMA Region X **Risk Mapping, Analysis, and Planning program (RiskMAP)** releases a monthly newsletter that includes information about upcoming events and training opportunities, as well as hazard and risk related news from around the Region. Past newsletters can be viewed at http://www.starr-team.com/starr/RegionalWorkspaces/RegionX/Pages/default.aspx. If you would like to receive future, email rxnewsletter@starr-team.com.
- The mitigation strategy includes projects that are eligible for FEMA's grant programs. Contact the State Hazard Mitigation Officer, Ann Gravier, at ann.gravier@alaska.gov for application information.

This page intentionally left blank

Appendix C

Community HMP Adoption Resolution

This page intentionally left blank.

City of Chefornak
101 Complex Drive, P.O. Box 29
Chefornak, Alaska 99561
(907) 867-8147
(907) 867-8704 (Fax)

Resolution #04-14

RESOLUTION OF ADOPTION

City of Chefornak, State of Alaska, Hazard Mitigation Plan

WHEREAS the City of Chefornak is vulnerable to damages from natural hazard events which pose a threat to public health and safety and could result in property loss and economic hardship;

WHEREAS a Hazard Mitigation Plan (The Plan) was developed through the work of Chefornak's Planning Team, and interested parties within the Chefornak area;

WHEREAS the Plan recommends hazard mitigation actions that will protect the people and property affected by natural hazards that face the City, that will reduce future public, private, community, and personal costs of disaster response and recovery; and that will reinforce Chefornak's leadership in emergency preparedness efforts;

WHEREAS the Disaster Mitigation Act of 2000 (P.L. 106-390) (DMA 2000) and associated Federal regulations published under 44 CFR Part 201 require the City council to Formally adopt a Hazard Mitigation Plan subject to the approval of the Federal Emergency Management Agency to be eligible for the Federal Hazard mitigation projects and activities funds;

WHEREAS the City held public meetings to receive Plan comments as required by DMA 2000;

NOW THEREFORE BE IT RESOLVED by the City Council of Chefornak that:

1. The Plan is hereby adopted as official plan of the City of Chefornak.

2. The City's officials identified in the Planning Process (Section 3) and the Mitigation Action Plan (Section 7) are hereby directed to implement the recommended actions assigned to them. These officials will report quarterly on their activities, accomplishments, and progress to the City Council.

3. The City of Chefornak's Hazard Mitigation Planning Team will provide annual progress reports on the status of the implemented Mitigation Action Plan's projects to the Planning Team Leader. The Planning Team shall submit this report to the City Council annually by the Plan's adoption anniversary date.

4. The Planning Team will complete periodic updates of the Plan as indicated in the Plan Maintenance Section (Section 3), but no less frequently than every five years.

NOW THEREFORE, BE IT RESOLVED by the City Council that the City of Chefornak adopts the City of Chefornak's Hazard Mitigation Plan, dated 7 - 11, 2014 as this jurisdiction's Hazard Mitigation Plan, and resolves to execute the actions in the Plan.

ADOPTED this 07 - 11, 2014 at the City Council.

Rosalie C Mathew

Rosalie C. Mathew, Mayor
City of Chefornak

This page intentionally left blank

Appendix D

Public Outreach Activities

This page intentionally left blank

Simmons, Scott

From: Simmons, Scott
Sent: Tuesday, August 06, 2013 2:24 PM
To: 'mewest@alaska.edu'; 'hdenny@anthc.org'; 'tneal@usgs.gov'; 'swhite@avcp.org'; 'steve.heppner.bia.ak@gmail.com'; 'kato_howard@ak.blm.gov'; 'jneimeyer@denali.gov'; 'leslie.pearson@alaska.gov'; 'ryan.anderson@alaska.gov'; 'Alice.Edwards@alaska.gov'; 'taunnie.boothby@alaska.gov'; 'scott.nelsen@alaska.gov'; 'alan.wien@alaska.gov'; 'terri.lomax@alaska.gov'; 'Soderlund.Dianne@epamail.epa.gov'; 'john.lingaas@noaa.gov'; 'joel.curtis@noaa.gov'; 'sam.albanese@noaa.gov'; 'meg.mueller@ak.usda.gov'; 'merlaine.kruse@ak.usda.gov'; 'greg.magee@alaska.gov'; 'Anna_Plager@dnr.state.ak.us'; 'kerry_walsh@dnr.state.ak.us'; 'John_Dunker@dnr.state.ak.us'; 'Steve_Clautice@dnr.state.ak.us'; 'patricia_burns@dnr.state.ak.us'; 'Steve_McGroarty@dnr.state.ak.us'; 'Mac_McLean@dnr.state.ak.us'; 'Margie_Goatley@dnr.state.ak.us'; 'Bruce.R.Sexauer@poa02.usace.army.mil'; 'colleen.bickford@hud.gov'; 'ak_le@fws.gov'
Cc: Dunable, Erin; DHSEM Scott Nelsen
Subject: Hazard Mitigation Plan Development Project Initial Notice

Dear Potential HMP Development Participants,

URS Corporation has received a 2013 contract from the State Division of Homeland Security and Emergency Management (DHS&EM) to develop 11 Local All-Hazard Mitigation Plans for the following communities:

- City of Brevig Mission
- City of Chefornak
- Village of Circle
- City of Eagle
- City of Eek
- City of Elim
- City of Koyuk
- City of Marshall
- City of Mountain Village
- City of Napaskiak
- City of Toksook Bay
-

We invite you to participate in this important community planning effort during the development process. Community newsletters will be located on the DHS&EM Local/Tribal All Hazard Mitigation Plan Development website at: http://ready.alaska.gov/plans/localhazmitplans.htm as the communities finalize them.

Please feel free to contact me and to forward this email to the most appropriate person within your agency (please cc me so I may update the contact list) involved with hazard assessments, hazard mitigation plan development or community specific hazard information or planning suggestions.

I encourage you to provide this information at your earliest convenience to allow me include it (with appropriate acknowledgments) within the Draft HMPs prior to State and FEMA review.

Kind Regards

-Scott-

R. Scott Simmons
Emergency Management | *Hazard Mitigation* | *Climate Change Adaptation Planner*

NOTE: *We have moved we now have new office address and phone numbers effective Immediately:*

3201 C Street, Suite 200 | Anchorage, AK 99503
Ph: 907.433.6711 | 800.909.6787 | Fax: 907.644.6930
eMail Address: scott.simmons@urs.com

This e-mail and any attachments contain URS Corporation confidential information that may be proprietary or privileged. If you receive this message in error or are not the intended recipient, you should not retain, distribute, disclose or use any of this information and you should destroy the e-mail and any attachments or copies.

Simmons, Scott

From: Dunable, Erin
Sent: Wednesday, July 03, 2013 3:02 PM
To: citychefornak@yahoo.com
Cc: Simmons, Scott
Subject: Chefornak Hazard Mitigation Plan
Attachments: @

Alexandra,
Per our discussion, I am providing an overview of the Hazard Mitigation Plan Development Project and have attached a draft newsletter, for your use selecting your Planning Team. I've also attached a list of critical facilities for your review. These are the same as those identified in the newsletter, just in a different format. **Can you let us know if there are any facilities we missed or any that we should delete and if possible, put an "X" for the facility if they're impacted by the hazards listed on the right.** We've pre-filled some hazards we think affect your community, but feel free to **uncheck any that are not relevant for the facility listed**.

This project is being funded by FEMA through the Alaska Division of Homeland Security and Emergency Management (DHS&EM) and there is **no cost to your community**. DHS&EM hired URS Corporation (URS) to assist each community in developing a Hazard Mitigation Plan (HMP).

Mitigation is defined as "any sustained action taken to reduce or eliminate long-term risk to life and property from natural, manmade or technological hazards and their impacts." HMPs identify hazards which routinely impact a community, define those hazards so community members understand their nature and their impact within the community, and the describe the extent of the potential impacts. The HMP also includes a strategy to reduce or avoid future damages from the identified hazards.

URS has been developing HMPs nationwide since 2000. Our Alaska office has completed approximately 60 State, Borough (County) and local community, State reviewed, and FEMA approved Hazard Mitigation Plans to-date. URS's role in this project is to ensure that the HMP meets state and federal requirements -- part of this requirement is to describe the process in which the community was involved. We are at the beginning stages of this project, and it is our experience that successful plans are a result of an involved community.

We suggest that the community nominate a Planning Team Leader and then select 4-5 team members to assist with the HMP. Team members should have knowledge of natural hazards that continually cause damages; what facilities are critical for protection from these hazards; as well as, what resources and capabilities are available within the community to mitigate those hazards.

We suggest you look for team members from the City and Village Councils; elders; employees from the health clinic, school, volunteer fire fighters, law enforcement, etc. We suggest no more than four or five members on this team; however, some communities have chosen to involve their entire City or Tribal Councils.

URS will write the plan, but the City of Toksook Bay Planning Team will assist URS to:

- Identify which hazards routinely impact your community;
- Gather and provide historical disaster damage information;
- Identify the community's critical facilities and their location within each identified hazard's impact area;
- Determine estimated replacement costs of critical facilities;
- Define the community's population risk and critical facility vulnerabilities;
- Develop hazard mitigation goals;
- Identify potential projects which could reduce or eliminate each hazard's impact and subsequent damages;

- Identify potential funding sources; and
- Describe the plan's development process, community member participant involvement, agency involvement, public participation processes, and continued plan maintenance and the process for incorporating updates.

There will be opportunities for the entire community to review the Team's work during the public involvement processes because FEMA requires at least two public involvement activities. These activities can include distributing community wide brochures or newsletters, holding public meetings, or participating in planning workgroup teleconferences.

URS will provide two (2) newsletters. The first newsletter (see attached draft) will introduce the project and explain the planning process and encourage public involvement by asking the community to identify known hazards and to confirm their critical infrastructure as identified by DHS&EM. **Once you have chosen your Team, please provide us with their names and we'll finalize the newsletter, so that you may share it with your community**. The second newsletter, will introduce the draft HMP and encourage the community to review and provide comments to make the plan better or more usable to mitigate your hazards.

We are available to attend City Council meetings via teleconference to explain the process, if that's helpful to you and can provide a toll free dial-in number for your use. We can also invite DHS&EM's Mitigation Section staff to attend via teleconference to answer any questions you may have.

The following is a link to a few examples of the Hazard Mitigation Plans URS and specifically Scott Simmons, URS Project Manager has written: http://ready.alaska.gov/plans/localhazmitplans.htm (Alatna, Allakaket, Hughes, Kaltag, and Nulato Hazard Mitigation Plans listed on this page; URS wrote the Petersburg HMP before Scott joined URS).

Please feel free to contact myself or Scott Simmons (433-6711, scott.simmons@urs.com) with any questions

Thank you,
Erin

Erin Dunable
Marine Mammal Biologist & Project Manager

URS Corporation
700 G Street, Suite 500
Anchorage, AK 99501
Direct: 907-261-9737
Toll Free: 800-909-6787
Fax: 907-562-1297
Erin.Dunable@urs.com

This e-mail and any attachments contain URS Corporation confidential information that may be proprietary or privileged. If you receive this message in error or are not the intended recipient, you should not retain, distribute, disclose or use any of this information and you should destroy the e-mail and any attachments or copies.

<<
Chefornak Newsletter 1 .pdf (113.5KB)
Chefornak CriticalFacility-HazardsSpreadsheet.xlsx (28.0KB)

(141.5KB)
>>

CITY OF CHEFORNAK HAZARD MITIGATION PLAN

Newsletter #1 **October 2013**

This newsletter discusses the preparation of the City of Chefornak Hazard Mitigation Plan. It has been prepared to inform interested agencies, stakeholders, and the public about the project and to solicit comments. This newsletter can also be viewed on the State of Alaska Division of Homeland Security and Emergency Management Website at http://www.ready.alaska.gov/plans/localhazmitplans.htm .

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 prepare Hazard Mitigation Plans (HMP) for fifteen Alaskan Communities. The City of Chefornak was selected for participation in this effort.

URS was contracted to assist the community with preparing a FEMA approvable hazard mitigation plan 2013.

The City of Chefornak Hazard Mitigation Plan will identify all natural hazards, such as earthquake, erosion, flood, severe weather, and wildland fire hazards, etc. The plan will also identify the people and facilities potentially at risk and ways to mitigate damage from future hazard impacts. The public participation and planning process is documented as part of these projects.

What is Hazard Mitigation?

Across the United States, natural and human-caused disasters have increasingly caused injury, death, property damage, and business and government service interruptions. The toll on individuals, families, and businesses can be very high. The time, money, and emotional effort required to respond to and recover from these disasters takes public resources and attention away from other important programs and problems.

The people and property in the State of Alaska are at risk from a variety of natural hazards that can potentially cause human injury, property damage, or environmental harm.

Hazard mitigation projects eliminate the risk or reduce the hazard impact severity to people and property. Projects may include short- or long-term activities to reduce exposure to or the effects of known hazards. Hazard mitigation activities include relocating or elevating buildings, replacing insufficiently sized culverts, using alternative construction techniques, or developing, implementing, or enforcing building codes, and education.

Why Do We Need A Hazard Mitigation Plan?

Communities must have a State, FEMA approved, and community adopted mitigation plan to receive a project grant from FEMA's pre- and post- disaster grants identified in their Hazard Mitigation Assistance and other agency's mitigation grant programs. The City of Chefornak plans to apply for mitigation funds after our plan is complete.

A FEMA approved and community adopted HMP enables the Local government to apply for the Hazard Mitigation Grant Program (HMGP), a disaster related assistance program. Applicants typically compete on a statewide basis.

The Pre-Disaster Mitigation (PDM) and the National Insurance Program's Flood Mitigation Assistance (FMA), grant programs are nationally competitive funding programs. These grants use the same application process and eligibility requirements.

The Planning Process

There are very specific federal requirements that must be met when preparing a hazard mitigation plan. These requirements are commonly referred to as the Disaster Mitigation Act of 2000, or DMA2000 criteria. Information about the criteria and other applicable laws and regulations may be found at: http://www.fema.gov/mitigation-planning-laws-regulations-guidance.

The DMA2000 requires the plan to include and document the following topics:

- Plan development process
- Identify hazards specific to the community
- Identify the population's and structures' risks
- Define the jurisdiction's mitigation goals
- List the community's mitigation strategy, selected actions, and implemented projects
- Provide a copy of the community's HMP Adoption Resolution

FEMA has prepared Planning Guidance which are available at: http://www.fema.gov/library/viewRecord.do?fromSearch=fromsearch&id=4859; and "How to" Guides that explain in detail how each of the DMA2000 requirements are met.

The How-To Guides are available at http://www.fema.gov/hazard-mitigation-planning-resources . The City's Hazard Mitigation Plan will follow those guidelines.

We are currently in the very beginning stages of preparing the plan. We will be conducting a public meeting to introduce the project and planning team, and to gather comments from our community residents. Specifically we will complete the hazard identification task, and collect data to conduct the risk assessment.

DHS&EM has previously identified natural hazards that occur in the Lower Kuskokwim Regional Educational Attendance Area (REAA) that may also occur specifically in Chefornak.

We Need Your Help

Please use the following table to identify any hazards you have observed in your area that DHS&EM is not aware of AND any additional natural hazards that may not be on the list.

Chefornak Hazard Worksheet		
Hazard	Lower Kuskokwim REAA*	City of Chefornak
Earthquake	Yes, Medium	No
Erosion	Yes	Yes
Flood	Yes, High	Yes
Ground Failure: (Permafrost & Subsidence)	No	Yes
Severe Weather	Yes, Medium	Yes
Tsunami & Seiche	No	No
Volcano	No	No
Wildland Fire	Yes, High	No
**Hazard Matrix from the 2010 State of Alaska Hazard Mitigation Plan for the Lower Kuskokwim REAA.*		

DHS&EM identified critical facilities within the City of Chefornak as part of the Alaska Critical Facilities Inventory, but the list of critical facilities needs to be updated and the estimated value and location (latitude/longitude) determined.

In addition, the number and value of structures, and the number of people living in each structure will need to be documented. Once this information is collected we will determine which critical facilities, residences, and populations are vulnerable to specific hazards in Chefornak. Please add additional facilities if needed.

Chefornak Critical Facilities*	
Facility Type	Facility Name
City Offices & Complex	Store 3
Tribal Council Office, CVRF Office, Community Center & Temporary Church	Teacher's Quarters, Teacher's Housing, & Teacher Housing - Chefarnrmute Inc. Rental
Civic Center	Teacher Housing
Robert Jimmy New BIA Building	CVS Fish Plant
US Post Office	Old Power Plant & Storage
Alaska National Guard Armory	VPSO Residence
Fire Station	Cemetery
Police Station	Chefornak Airport Runways 16/34
School P-12	Boat Dock
AVCP Head Start & Teacher Housing	Public Safety Building
Chefornak Health Clinic	Airport Equipment Storage
Chefarnrmute, Inc. Offices, Store, & Storage	W&S Garage Storage
Church	Chefornak Water Treatment System
Parish Building	Naterkaq Light Plant
Visiting Priest Residence	Chefornak Class III Municipal Landfill
Community Hall	Sewage Lagoon
Community Freezer	Tank Farm for Gas and Oil
Hardware/General Store	Gas/Fuel Pumping Station
Avugiak's Store & Storage	Oil Dispenser
Store 2	United Utilities
** Alaska Critical Facilities Inventory*	

Please email or fax updated hazard and critical facility information directly to URS or provide it to your community planning & project team leader.

The Planning Team

The planning team is being led by Mayor Rosalie Mathew with assistance from Alexandra Lisa Anderson, Robert Jimmy, Dora Tilly Mathew, and the City Council. URS Corporation has been contracted by DHS&EM to provide assistance and guidance to the planning team throughout the planning process.

Public Participation

Public involvement will continue throughout the project. The goal is to receive comments, identify key issues or concerns, and improve ideas for mitigation. When the Draft City of Chefornak Hazard Mitigation Plan is complete, the results will be presented to the community before DHS&EM and FEMA approval and community adoption.

We encourage you to take an active part in preparing the City of Chefornak's Hazard Mitigation Plan development effort. The purpose of this newsletter is to keep you informed and to allow you every opportunity to voice your opinion regarding these important projects. Please contact your community representative or Scott Simmons, URS directly if you have any questions, comments, or requests for more information:

City of Chefornak
Rosalie Mathew
Mayor
P.O. Box 29
Chefornak, AK 9999561
907.867.8147
citychefornak@yahoo.com

URS Corporation
Scott Simmons, Hazard Mitigation, Emergency Management, and Climate Change Planner
700 G Street, Suite 500
Anchorage, Alaska 99501
907.261.9706 or 800.909.6787
scott.simmons@urs.com

Division of Homeland Security & Emergency Management
Scott Nelsen, State Support
PO Box 5750
Anchorage, AK 99505-5750
907.428.7010 or 800.478.2337
scott.nelsen@alaska.gov

URS

FAX TRANSMISSION

700 G Street, Suite 500
Anchorage, Alaska 99501

Phone: 800.909.6787
Fax: 907.562.1297

TO:

Name: City Administrator Dora Tilly Mathew or Mayor Robert Jimmy	**Fax Number:** 907.867.8704	**Date:** December 9, 2013
Company: City of Chefornak	**Phone Number:** 907.867.8147	**Number of Pages:** 8 including cover page

FROM:

Name: Scott Simmons	**Fax Number:** 907-562.1297	**Direct Phone Number:** 907.261.9706
Subject: We will review the listed Goals and Projects for Inclusion within your Hazard Mitigation Plan.		

Comments:

I would like to schedule a teleconference to review and select mitigation activities to complete the mitigation strategy for your HMP. This is the last section of the plan to complete. Once this is done I will send you a draft HMP for your Planning Team's review.

We will use the attached document to identify existing or "ongoing" mitigation actions, "consider" those actions the community *may* desire to implement. We will then "select" from those considered those actions the City feels they would like to implement during the HMP's five (5) year life cycle.

This list is not all inclusive. The City can add projects they have identified in other City Plans such as Comprehensive, Community Development, Business, Sanitation, Utility, and/or Capital Improvement Plans and initiatives etc.

I have attached the mitigation goals and actions list we will work from:

CONFIDENTIALITY NOTICE

The information in this facsimile transmission is intended solely for the stated recipient of this transmission. If you have received this fax in error, please notify the sender immediately by telephone. If you are not the intended recipient, please be advised the dissemination, distribution, or copying of the information contained in this fax is strictly prohibited.

Mitigation Goals and Action Items Considered

Table 7-x Mitigation Goals

No.	Goal Description
Multi-Hazards (MH)	
MH 1	Promote recognition and mitigation of all natural and manmade hazards that affect the City of Chefornak (City).
MH 2	Promote cross-referencing mitigation goals and actions with other City and Tribal planning mechanisms and projects.
MH 3	Reduce possibility of losses from all natural and manmade hazards that affect the Community.
Natural Hazards	
EQ 4	Reduce potential vulnerability to **earthquake** (EQ) damage and loss.
ER 5	Reduce potential **erosion** (ER) damage and loss.
FL 6	Reduce potential **flood** (FL) damage and loss.
GF 7	Reduce potential **ground failure** (GF) damage and loss.
SW 8	Reduce potential vulnerability to **severe weather** (SW) damage and loss.

Sample Mitigation Action Items To Consider

Hazard	Status *Considered* *Selected* *Ongoing*	Description
Multi-Hazards (MH)		
MH 1		Identify and pursue funding opportunities to implement mitigation actions.
		Hold an annual or biennial "hazard meeting" to provide information to residents about recognition and mitigation of all natural hazards that affect the City of Chefornak
		Establish a formal role for the Hazard Mitigation Planning Team to develop a sustainable process to implement, monitor, review, and evaluate community wide mitigation actions.
		Develop, produce, and distribute information materials concerning mitigation, preparedness, and safety procedures for all identified natural hazards.
		Develop and implement strategies and educational outreach programs for debris management from natural hazard events.
		Disseminate FEMA pamphlets to educate and encourage homeowners concerning structural and non-structural retrofit benefits.
		Develop outreach program to educate residents concerning benefits of increased seismic resistance and modern building code compliance during rehabilitation or major repairs for residences or businesses.
		Develop outreach program with school district contests having students develop, display, and explain mitigation projects or initiatives.
		Investigate benefits of, and potentially Join the National Flood Insurance Program to reduce monetary losses to individuals and the community.
		Develop an outreach program to educate public concerning NFIP participation benefits, floodplain development, land use regulation, and NFIP flood insurance availability to facilitate continued compliance with the NFIP.
		Develop outreach program to educate residents concerning flood proofed wells, sewer/septic or other non-residential facilities.
		Identify critical facilities and vulnerable populations based on identified (and mapped where applicable) high hazard areas.
		Identify evacuation routes away from high hazard areas and develop outreach program to educate the public concerning warnings and evacuation procedures.
		Acquire emergency warning sirens to communicate critical emergency warnings and alerts.
		Update public emergency notification procedures and develop an outreach program for potential hazard impacts or events.
		Develop outreach program to educate residents concerning flood proofed wells, sewer/septic or other non-residential facilities.
MH 2		The City will strive to manage their existing plans to ensure they incorporate mitigation planning provisions into all community planning processes such as comprehensive, capital improvement, and land use plans, etc. to demonstrate multi-benefit considerations and facilitate using multiple funding source consideration.
		Review ordinances and develop outreach programs to assure oil, propane, and septic tanks are properly anchored and hazardous materials are properly stored and protected from known natural hazards such as flood or seismic events.
		Integrate the Mitigation Plan hazard analysis findings for enhanced emergency planning.
		Develop, incorporate, and enforce building ordinances commensurate with building codes to reflect survivability from flood, fire, wind, seismic, and other hazards to ensure occupant safety.
		Develop and incorporate mitigation provisions and recommendations into all

Sample Mitigation Action Items To Consider

Hazard	Status *Considered* *Selected* *Ongoing*	Description
		community plans and community development processes to maintain protect critical infrastructure, residences, and population from natural hazard impacts.
		Update or develop, implement, and maintain jurisdictional debris management plans.
		Prohibit new construction in identified mitigatable hazard impact areas (avalanche, flood, erosion, etc.) or require building to applicable building codes for other hazard impacts (earthquake, volcanic ash, weather, etc.).
		Identify and list repetitively flooded structures and infrastructure, analyze the threat to these facilities, and raise mitigation action priorities to protect the threatened population.
		Perform hydrologic and hydraulic engineering, and drainage studies and analyses. Use information obtained for feasibility determination and project design. This information should be a key component, directly related to a proposed project.
		Develop prioritized list of mitigation actions for threatened critical facilities and other buildings or infrastructure.
		Develop process to regulate future development in high hazard impact areas (For example, require permitting, geotechnical review, and soil stabilization technique implementation, etc.).
		Update Emergency Response Plans to discuss volcanic ashfall, tsunami, and stormwater event management, prioritize response actions, and initiate actions to fill capability gaps.
MH 3		Acquire (buy-out), demolish, or relocate structures from hazard prone area (erosion, flood, ground failure, etc.) Property deeds “must be” restricted for open space uses for perpetuity to keep people from rebuilding in known hazard areas.
		Encourage utility companies to evaluate and harden vulnerable infrastructure elements for sustainability.
		Increase power line wire size and incorporate quick disconnects (break---away devices) to reduce ice load and windstorm power-line failure during severe wind or winter ice storm events.
		Harden utility headers located along river embankments to mitigate potential flood, debris, and erosion damages.
		Purchase and install generators with main power distribution disconnect switches for identified and prioritized critical facilities susceptible to short term power disruption. (i.e. first responder, medical facilities, schools, correctional facilities, and water and sewage treatment plants, etc.)
		Develop vegetation projects to restore erosion, ground failure, or other hazard impact damages and to provide slope stability in avalanche or landslide areas.
		Develop, implement, and enforce floodplain management ordinances.
		Update the Storm-Water Management Plan to include regulations to control flood runoff and to minimize ground failure from saturated soils, steep slope collapse, and erosion or scour.
		Develop a vegetation management plan addressing slope-stabilizing root strength to maintain or encourage precipitation containment. ()
		Develop land use guidelines to minimize hazard impacts and damages such as: reduce vegetation removal to maintain slope stability from rain, snowmelt run-off, and erosion impacts.

Sample Mitigation Action Items To Consider

Hazard	Status *Considered* *Selected* *Ongoing*	Description
Natural Hazards		
EQ 4		Evaluate critical public facilities with significant seismic vulnerabilities and complete retrofit. (e.g. evaluate fire stations, public works buildings, potable water systems, wastewater systems, electric power systems, and bridges, etc.)
		Inspect, prioritize, and retrofit any critical facility or public infrastructure that does not meet current State Adopted Building Codes.
		Install non-structural seismic restraints for large furniture such as bookcases, filing cabinets, heavy televisions, and appliances to prevent toppling damage and resultant injuries to small children, elderly, and pets.
ER 5		Develop mitigation initiatives such as: Rip-rap (large rocks), sheet pilings, gabion baskets, articulated matting, concrete, asphalt, vegetation, or other armoring or protective materials to provide river bank protection.
		Harden culvert entrance bottoms with asphalt, concrete, rock, or similar material to reduce erosion or scour.
		Install walls at the end of a drainage structure to prevent embankment erosion at its entrance or outlet. (end- or wing-walls).
FL 6		Develop and maintain NFIP compliant Repetitive Loss, Severe Repetitive Loss, and Repetitive Flood Claim (RFC) property inventory. Inventory should include property type, structure type, number of buildings, and their geo-referenced locations.
		Establish flood mitigation priorities for critical facilities, residential structures, and commercial buildings located within the identified flood hazard area(s) (100- and 500-year floodplains, stormwater, etc.) based on current base flood elevation (BFE) survey elevation data.
		Determine and implement most cost beneficial and feasible mitigation actions for locations with repetitive flooding, significant historical damages, or road closures.
		Elevate residential, public, or critical facilities at least two feet above the (BFE).
		Install NOAA/NWS stream flow and rainfall measuring gauges.
		Dry flood-proof non-residential, historical, and/or residential structures. (Make watertight or impermeable to flood water).
		• *Anchor building to prevent flotation, collapse, or lateral movement.*
		• *Install watertight closure doors and windows.*
		• *Reinforce walls to withstand floodwater pressures and impact forces generated by floating debris.*
		• *Use membranes and other sealants during construction to reduce floodwater seepage through walls and wall openings.*
		• *Install pumps to control interior water levels*
		• *Install check valves to prevent floodwater or sewage flow entrance through utilities openings.*
		• *Locate electrical, mechanical, utility, and other valuable-damageable equipment and contents above the expected flood level.*
		• *Construct protective berm, floodwall, or small levee around a building to prevent floodwater intrusion.*
		Increase culvert sizes to increase their drainage capacity or efficiency.
		Construct debris basins to retain debris in order to prevent downstream drainage

Sample Mitigation Action Items To Consider

Hazard	Status *Considered* *Selected* *Ongoing*	Description
		structure clogging.
		Install debris cribs over culvert inlets to prevent inflow of coarse bed-load and light floating debris.
		Create detention storage basins, ponds, reservoirs etc. to allow water to temporarily accumulate excess water to reduce pressure on culverts; and construct low water crossings to allow water to ultimately return to its watercourse at a reduced flow rate.
		Create relief drainage ditch-openings using culverts or bridges to relieve rapid water accumulation during high water-flow events.
		Protect wastewater treatment systems flood protection to prevent erosion or flooding damage and sewage lagoon out-wash.
GF 7		Complete a ground failure location inventory (avalanche, landslide, permafrost, sink holes, etc.); identify and potentially map threatened critical facilities, residential buildings, infrastructure, and other essential buildings.
		Develop, implement, and enforce a property development "ground failure" risk assessment for any structure that may be sited in potentially vulnerable locations.
		Identify and seasonally restrict recreational and construction activities in high avalanche and landslide areas.
		Promote permafrost sensitive construction practices in permafrost areas.
SW 8		Develop and implement programs to coordinate maintenance and mitigation activities to reduce risk to public infrastructure from severe winter storms (snow load, ice, and wind).
		Develop and implement tree clearing mitigation programs to keep trees from threatening lives, property, and public infrastructure from severe weather events.
		Develop, implement, and maintain partnership program with electrical utilities to use underground utility placement methods where possible to reduce or eliminate power outages from severe winter storms. Consider developing incentive programs.
		Develop personal use and educational outreach training for a "safe tree harvesting" program. Implement along utility and road corridors to prevent or reduce potential winter storm damage.

Table 7-7 delineates the acronyms used in the Mitigation Action Plan (Table 7-8). See Appendix A for complete agency funding source descriptions.

Table 7-7 Potential Funding Source Acronym List

City of (City)

Tribal Council (Tribe)

Federal Management Agency (FEMA)
Hazard Mitigation Assistance (HMA) Grant Programs,
Emergency Management Program Grant (EMPG)
Debris Management Grant
Flood Mitigation Assistance Grants
National Earthquake Hazards Reduction Program (NEHRP)
National Dam Safety Program (NDS)

US Department of Homeland Security (DHS)
Citizens Corp Program (CCP)
Emergency Operations Center (EOC)
Homeland Security Grant Program (HSGP)
Emergency Management Performance Grant (EMPG)
State Homeland Security Program (SHSP)

US Department of Commerce (DOC)
Remote Community Alert Systems Program (RCASP)
National Oceanic and Atmospheric Administration (NOAA)

US Department of Housing and Urban Development (HUD)
Rural Housing & Economic Development (RHED)
Fair Housing Initiatives Program (FHIP)

Denali Commission (Denali)
Energy Program,
Solid Waste Program,

Alaska Department of Military and Veterans Affairs (DMVA),
Division of Homeland Security and Emergency Management (DHSEM)
Mitigation Section (for PDM & HMGP projects and plan development)
Preparedness Section (for community planning)
State Emergency Operations Center (SEOC for emergency response)

Alaska Department of Community, Commerce, and Economic Development (DCCED),
Division of Community and Regional Affairs (DCRA)
Community Development Block Grant (CDBG)
Alaska Climate Change Impact Mitigation Program (ACCIMP)
Flood Mitigation Assistance Grants (FMA)

Alaska Department of Transportation
State road repair funding

Alaska Energy Authority (AEA)
AEA/Bulk Fuel (ABF)
AEA/Alternative Energy and Energy Efficiency (AEEE)

Alaska Department of Environmental Conservation (DEC)
V*illage Safe Water (VSW),*
DEC/Alaska Drinking Water Fund (ADWF),
DEC/Alaska Clean Water Fund [ACWF],
DEC/Clean Water State Revolving Fund (CWSRF)

US Army Corp of Engineers (USACE)
Planning Assistance Program
Capital Projects: Erosion, Flood, Ports & Harbors,

Alaska Division of Forestry (DOF)
Volunteer Fire Assistance and Rural Fire Assistance Grant (VFAG/RFAG),
Assistance to Firefighters Grant (AFG),
Fire Prevention and Safety (FP&S),

Staffing for Adequate Fire and Emergency Response Grants (SAFER)
Emergency Food and Shelter (EF&S)

US Department of Agriculture (USDA)
Emergency Watershed Protection Program (EWP])
Emergency Conservation Fund (ECF),
Rural Development (RD)

US Geological Survey (USGS)
Alaska Volcano Observatory (AVO)

Assistance to Native Americans (ANA)
(NAFSMA),

Natural Resources Conservation Service (NRCS)
Emergency Watershed Protection Program (EWP)
Wildlife Habitat Incentives Program (WHIP)
Watershed Planning

Bering Straits Regional Housing Authority (BSRHA)

Bureau of Indian Affairs (BIA)
Housing Improvement Program (HIP)

Lindbergh Foundation Grant Programs

Rasmuson Foundation Grants

This information will be used in the City's Mitigation Action Plan, Table 7-8 (not shown), to depict how each mitigation action will be implemented and administered by the Planning Team.

The MAP delineates each selected mitigation action, its priorities, the responsible entity, the anticipated implementation timeline, and provides a brief explanation as to how the overall benefit/costs and technical feasibility were taken into consideration.

URS will complete the table then return to you for review before insertion into your draft HMP.

January 15, 2014

City of Chefornak
P.O. Box 29
Brevig Mission, AK 99561

RE: City of Chefornak Draft Hazard Mitigation Plan Review

Dear Mayor Mathew,

Please give me a call when you receive this.

Here is your Draft Hazard Mitigation Plan for your review. This plan is not completed yet. Please make it available for the public to also review. You may desire to place a copy in the City and Tribal Offices or some other location more suitable for your community. You may want to punch holes and place it in a 3-ring binder to make it easier for people to review. Also, please make a log sheet, have people sign it, and keep track of any comments to help us make the changes that may be beneficial to the community. Please send me the log sheet so I may insert it into the plan to demonstrate the public review process.

There are two ways you may make changes in the document.

- You may write directly on a copy and send it back to me with the changes indicated by inserting slips of paper to direct me to specific pages. or
- If there are only a few changes or corrections or if no edits are needed, you can call me and we can make the changes or answer any questions over the phone.

I have also enclosed the second newsletter for posting in the community informing every one of its availability for review.

We would like to have the draft reviewed and comments returned by January 29, 2014.

R. Scott Simmons
Emergency Management, Hazard Mitigation, and
Climate Change Adaptation Planner

Direct: 907.261.9706
scott.simmons@urs.com

URS Corporation
700 G Street, Suite 500
Anchorage, AK 99501
Toll Free: 800.909.6787
Phone: 907.562.3366
Fax: 907.562.1297

CITY OF CHEFORNAK DRAFT HAZARD MITIGATION PLAN (HMP) REVIEW

January 2014 **Newsletter 2**

This newsletter discusses the preparation of the City of Chefornak Hazard Mitigation Plan. It has been prepared to inform interested agencies, stakeholders, and the public about the project and to solicit comments. This newsletter can also be viewed on the State of Alaska Division of Homeland Security and Emergency Management Website at: *http://www.ready.alaska.gov/plans/localhazmitplans.htm*.

HMP Development

The Association of Village Council Presidents was one of 11 communities selected by the State of Alaska, Division of Homeland Security and Emergency Management (DHS&EM) for a Hazard Mitigation Planning (HMP) development project. The plan identifies natural hazards that affect the community including earthquake, erosion, flood, ground failure, severe weather, and tundra/wildland fire. The HMP also identifies the people and facilities potentially at risk and potential actions to mitigate community hazards. The public participation and planning process is documented as part of the project.

What is Hazard Mitigation?

Across the United States, natural disasters have increasingly caused injury, death, property damage, and business and government service interruptions. The toll on individuals, families, and businesses can be very high. The time, money, and emotional effort required to respond to and recover from these disasters take public resources and attention away from other important programs and problems.

People and property throughout Alaska are at risk from a variety of hazards that have the potential for causing human injury, property damage, or environmental harm.

The purpose of hazard mitigation is to implement projects that reduce the risk severity of hazards on people and property. Mitigation programs may include short-term and long-term activities to reduce hazard impacts or exposure to hazards. Mitigation could include education, construction or planning projects. Hazard mitigation activity examples include relocating buildings, developing or strengthening building codes, and educating residents and building owners.

Why Do We Need A Hazard Mitigation Plan?

A community is only eligible to receive grant money for mitigation programs by preparing and adopting a hazard mitigation plan. Communities must have an approved mitigation plan to receive grant funding from the Federal Emergency Management Agency (FEMA) for eligible mitigation projects.

The Planning Process

There are very specific federal requirements that must be met when preparing a HMP. These requirements are commonly referred to as the Disaster Mitigation Act of 2000, or DMA2000 criteria. Information about the criteria may be found on the Internet at: http://www.fema.gov/mitigation-planning-laws-regulations-guidance.

The DMA2000 requires the plan to document the following topics:

- Planning process
- Community Involvement and HMP review
- Hazard identification
- Risk assessment
- Mitigation Goals
- Mitigation programs, actions, and projects
- A resolution from the community adopting the plan

FEMA has prepared a Local Planning Review Guide) and (available at: http://www.fema.gov/library/viewRecord.do?fromSearch=fromsearch&id=4859). It explains how the HMP meets each of the DMA2000 requirements. FEMA has prepared and "Mitigation Planning Guidance" and "How to Guides" (available at: http://www.fema.gov/hazard-mitigation-planning-resources). The City's Hazard Mitigation Plan will follow those guidelines.

The planning process kicked-off in June, 2013 by establishing a local planning committee and holding a public meeting. The planning committee examined the full spectrum of hazards listed in the State Hazard Mitigation Plan and identified Chefornak hazards the HMP would address.

After the first public meeting, the City Planning Team and URS began identifying critical facilities, compiling the hazard profiles, assessing capabilities, and conducting the risk assessment for the identified hazards. Critical facilities are facilities that are critical to the recovery of a community in the event of a disaster. After collection of this information, URS helped to determine which critical facilities and estimated populations are vulnerable to the identified hazards in Chefornak.

A mitigation strategy was the next component of the plan to be developed. Understanding the community's local

capabilities and using information gathered from the public and the local planning committee and the expertise of the consultants and agency staff, a mitigation strategy was developed. The mitigation strategy is based on an evaluation of the hazards, and the assets at risk from those hazards. Mitigation goals and a list of potential actions/projects were developed as the foundation of the mitigation strategy.

Mitigation goals are defined as general guidelines that explain what a community wants to achieve in terms of hazard and loss prevention. Goals are positively stated future situations that are typically long-range, policy-oriented statements representing community-wide visions. Mitigation actions and projects are undertaken in order to achieve your stated objectives. On January 14, 2014, the local planning committee identified projects and/or actions for each hazard that focus on six categories: prevention, property protection, public education and awareness, natural resource protection, emergency services, and structural projects. A representative sample of the mitigation actions identified as a priority by the planning team are listed below, and explained in more detail in the plan.

The selected projects and/or actions will potentially be implemented over the next five years as funding becomes available. A maintenance plan was also been developed for the hazard mitigation plan. It outlines how the community will monitor progress on achieving the projects and actions that will help meet the stated goals and objectives, as well as an outline for continued public involvement.

The draft plan is available in the City and Tribal offices for public review and comment. Comments should be made via email, fax, or phone to Scott Simmons (listed below) and be received no later than January 29, 2014. The plan will be provided to DHS&EM and FEMA for their preliminary approval and returned to Chefornak City Council for formal adoption.

The Planning Committee

The plan was developed with the assistance from the community's planning committee consisting of a cross section from the community. Planning Team members who helped with developing the plan include Team Leader, Rosalie Mathew, with assistance from Alexandra Lisa Anderson, Robert Jimmy, and Dora Tilly Mathew, the City Council, and URS Corporation.

Sample of the City of Chefornak's Mitigation Actions. Review the draft HMP for a complete list.		
Identify and pursue funding opportunities to implement mitigation actions.	Disseminate FEMA pamphlets to educate and encourage homeowners concerning structural and non-structural retrofit benefits.	Encourage utility companies to evaluate and harden vulnerable infrastructure elements for sustainability.
The City will strive manage their existing plans to ensure they incorporate mitigation planning provisions into all community planning processes such as comprehensive, capital improvement, and land use plans, etc. to demonstrate multi-benefit considerations and facilitate using multiple funding source consideration.	Prohibit new construction in identified mitigatable hazard impact areas (avalanche, flood, erosion, etc.) or require building to applicable building codes for other hazard impacts (earthquake, volcanic ash, weather, etc.).	Acquire (buy-out), demolish, or relocate structures from hazard prone area (erosion, flood, ground failure, etc.) Property deeds "must be" restricted for open space uses for perpetuity to keep people from rebuilding in known hazard areas.
Pursue opportunities to protect the City's eroding embankment by identifying and implementing more viable mitigation initiatives such as better designed: Rip-rap (large rocks), sheet pilings, gabion baskets, articulated matting, concrete, asphalt, vegetation, or other armoring or protective materials to provide Kinia River bank protection.	Raise sewage lagoon containment embankment and reinforce to prevent erosion or flooding damage and sewage lagoon out-wash. Harden with rip-rap (large rocks), gabion baskets, articulated matting, concrete, asphalt, vegetation, or other armoring or protective materials to reduce or prohibit damage from erosive forces and lagoon washout.	Develop and implement programs to coordinate maintenance and mitigation activities to reduce risk to public infrastructure from severe winter storms (snow load, ice, and wind)
Determine and implement most cost beneficial and feasible mitigation actions for locations with repetitive flooding, significant historical damages, or road closures.	Increase culvert sizes to increase their drainage capacity or efficiency.	Promote ground failure and permafrost sensitive construction practices in hazard impact areas.

We encourage you to learn more about the City of Chefornak's Hazard Mitigation Plan. The purpose of this newsletter is to keep you informed and to allow you every opportunity to voice your opinion regarding this important project. If you have any questions, comments, or requests for more information, please contact:

Scott Simmons, Hazard Mitigation, Emergency Management, and Climate Change Planner
URS Corporation
700 G Street, Suite 500
Anchorage, Alaska 99501
907.261.9706 or 800.909.6787
scott.simmons@urs.com

Scott Nelsen, Emergency Management Specialist
DHS&EM
P.O. Box 5750
Fort Richardson, Alaska 99506
907.428.7010 or 800.478.2337
scott.nelsen@alaska.gov

Appendix E

Benefit–Cost Analysis Fact Sheet

This page intentionally left blank

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 F

Plan Maintenance Documents

This page intentionally left blank

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 appropri-ate for available resources?			

Mitigation Action Progress Report

Progress Report Period: _____ to _____
(date) (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

Page 2 of 3

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: