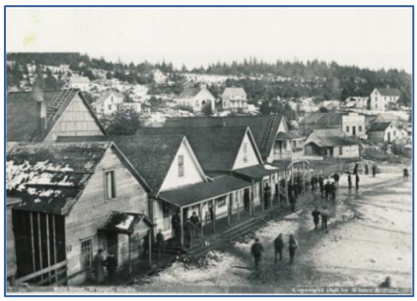
City and Borough of Wrangell Multi-Jurisdictional Hazard Mitigation Plan

April 2019

Prepared by:

AECOM
Alaska



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 Acknowledgment:
City and Borough of Wrangell Photos: (http://www.wrangell.com/photos)

TABLE OF CONTENTS

1.0 INTRODUCTION 1-1
- **1.1** OVERVIEW 1-1
- **1.2** AUTHORITIES AND REQUIREMENTS 1-1
- **1.3** MITIGATION PLAN REQUIREMENTS - GRANT PROGRAMS 1-3
  - 1.3.1 Hazard Mitigation Assistance (HMA) Grant Programs 1-5
  - 1.3.2 MJHMP Layout Description 1-7

2.0 COMMUNITY DESCRIPTION 2-1
- **2.1** PLANNING AREA LOCATION, GEOGRAPHY, AND HISTORY 2-1
- **2.2** DEMOGRAPHICS 2-4
- **2.3** ECONOMY 2-5

3.0 PLANNING PROCESS 3-1
- **3.1** OVERVIEW 3-2
- **3.2** PLANNING TEAM 3-3
- **3.3** PUBLIC INVOLVEMENT AND OPPORTUNITIES FOR INTERESTED PARTIES TO PARTICIPATE 3-4
  - 3.3.1 Wrangell Cooperative Association and the Central Council of the Tlingit and Haida Indian Tribes of Alaska's "Public" Determination 3-5
- **3.4** LEGACY 2009 HMP REVIEW AND ANALYSIS 3-5
- **3.5** 2016 UPDATE HMP PLANNING ACTIVITIES 3-8
- **3.6** PLAN MAINTENANCE 3-10
  - 3.6.1 Incorporating Existing Plans and Other Relevant Information 3-10
  - 3.6.2 Integrating THMP Precepts into Existing Planning Mechanisms 3-11
  - 3.6.3 Continued Public Involvement 3-12
  - 3.6.4 Monitoring, Reviewing, Evaluating, and Updating the MJHMP 3-12
  - 3.6.5 Formal State and FEMA MJHMP Review 3-15
  - 3.6.6 Tribal or Native Village Mitigation Grant Application Process Considerations 3-16

4.0 JURISDICTIONAL ADOPTION 4-1
- **4.1** JURISDICTIONAL ADOPTION 4-1
- **4.2** TRIBAL GOVERNMENT MJHMP ADOPTION 4-1

5.0 HAZARD ANALYSIS 5-1
- **5.1** OVERVIEW 5-1
- **5.2** HAZARD IDENTIFICATION AND SCREENING 5-1
- **5.3** PLANNING AREA AND HAZARD PROFILES 5-2
  - 5.3.1 Earthquake 5-4
  - 5.3.2 Flood 5-13
  - 5.3.3 Ground Failure 5-25
  - 5.3.4 Tsunami and Seiche 5-29
  - 5.3.5 Volcanic Hazards 5-35
  - 5.3.1 Weather 5-45
  - 5.3.2 Wildland Fire 5-59

6.0 VULNERABILITY ASSESSMENT 6-1

6.1 OVERVIEW 6-1
6.2 CULTURAL AND HISTORIC RESOURCE 6-2
6.2.1 Cultural and Sacred Site Sensitivity 6-3
6.3 LAND USE AND DEVELOPMENT TRENDS 6-3
6.3.1 City and Borough Land Use 6-3
6.3.2 Tribal Traditional Land Use 6-10
6.4 CURRENT ASSET EXPOSURE ANALYSIS 6-10
6.4.1 Asset Inventory 6-10
6.5 NATIONAL FLOOD INSURANCE PROGRAM PARTICIPATION 6-24
6.5.1 Repetitive Loss Properties 6-24
6.5.2 Wrangell's Legacy Flood Hazard Mapping 6-24
6.6 VULNERABILITY ASSESSMENT METHODOLOGY 6-27
6.7 DATA LIMITATIONS 6-28
6.8 VULNERABILITY EXPOSURE ANALYSIS 6-28
6.8.1 Exposure Analysis – Narrative Summaries 6-30
6.9 FUTURE DEVELOPMENT 6-33
7.0 MITIGATION STRATEGY 7-39
7.1 OVERVIEW 7-39
7.2 COMMUNITY NAME'S CAPABILITY ASSESSMENT 7-39
7.3 DEVELOPING MITIGATION GOALS 7-45
7.4 IDENTIFYING MITIGATION ACTIONS 7-46
7.5 EVALUATING AND PRIORITIZING MITIGATION ACTIONS 7-50
7.6 MITIGATION ACTION PLAN 7-52
7.7 MONITORING MITIGATION STRATEGY PROGRESS 7-57
7.7.1 Reviewing HMP Successes 7-57
7.7.2 Wrangell's Project Successes 7-57
7.8 IMPLEMENTING MITIGATION STRATEGY INTO EXISTING PLANNING MECHANISMS 7-58
8.0 REFERENCES 8-1
9.0 APPENDICES 1

Appendix A Funding Resources
Appendix B FEMA Review Tool, Multi-Jurisdictional Hazard Mitigation Plan (MJHMP)
Appendix C Community MJHMP Adoption Resolutions
Appendix D – Public Outreach Activities
Appendix E – Benefit-Cost Analysis Fact Sheet
Appendix F – Plain Maintenance Documents

LIST OF FIGURES

Figure 2-1 Wrangell's Location Map 2-1
Figure 2-2 City and Borough of Wrangell's Historic Population 2-4
Figures 2-3 CBW Employment Industry Delineation 2-6
Figure 2-5 City and Borough of Wrangell Boundary 2-7
Figure 5-1 Alaska's Known Active Faults 5-10
Figure 5-2 Neotectonic Map of Alaska, Wrangell-Petersburg Area 5-11
Figure 5-3 Wrangell Reservoir Locations 5-20
Figure 5-4 Aerial Image of Wrangell's Reservoirs 5-21
Figure 5-5 Topographic Image of Wrangell's Reservoirs 5-21
Figure 5-6 Wrangell's Potential Failure Dam Inundation Areas 5-22
Figure 5-7 Permafrost Characteristics of Alaska 5-27
Figure 5-8 7.5 Earthquake – No Tsunami Event 5-30
Figure 5-9 Wrangell Island Location 5-31
Figure 5-10 Wrangell Location at Confluence of Three Major Straits 5-32
Figure 5-11 Wrangell Area Inactive Volcanoes 5-40
Figure 5-12 1912 Katmai Volcano Impact 5-41
Figure 5-13 North Pacific Air Travel Routes 5-42
Figure 5-14 Novarupta's Historic Ashfall Timeline 5-43
Figure 5-15 Statewide Rainfall Map 5-47
Figure 5-16 Wrangell Airport WSO Climate Summary 5-48
Figure 5-17 Wrangell's Historic and Predicted Temperature Ranges 5-50
Figure 5-18 Wrangell's Historic and Predicted Temperatures 5-51
Figure 5-19 Wrangell's Monthly Climate Data Summary 5-51
Figures 5-20 USA.com Weather Data 5-54
Figure 5-21 Wrangell's Historical Wildfire Locations 5-61

LIST OF TABLES

Table 1-1 Jurisdictional Mitigation Plan Requirements 1-2
Table 1-2 HMA Eligible Activities 1-5
Table 3-1 Hazard Mitigation Planning Team 3-3
Table 3-2 Legacy HMP Review and Update Needs Determination 3-7
Table 3-3 Public Involvement Mechanisms 3-8
Table 3-4 Documents Reviewed 3-10
Table 5-1 Identification and Screening of Hazards 5-1
Table 5-2 Hazard Magnitude/Severity Criteria 5-3
Table 5-3 Hazard Recurrence Probability Criteria 5-3
Table 5-4 Wrangell's Historical Earthquakes Since 2009 5-9
Table 5-5 Alaska's Historic Aleutian Tsunamis Waves 5-30
Table 5-6 Volcanoes in Alaska's Aleutian Chain 5-37
Table 5-7 Aleutian Volcano Eruption Events 5-38
Table 5-8 AVO Published Aleutian Volcano Hazard Assessments 5-39
Table 5-9 Wrangell's Winter Wind Speeds 5-52
Table 5-10 Wrangell's Severe Weather Event Sample 5-54
Table 5-10 Wrangell's Historical Wildfires Since 1939 within 50 Miles 5-60
Table 6-1 Vulnerability Overview 6-2
Table 6-2 Estimated Population and Building Inventory 6-10
Table 6-3 The City and Borough of Wrangell's Critical Facilities and Infrastructure 6-14
Table 6-4 FEMA Community Status Book Report 6-24
Table 6-5 Flood Insurance Rate Maps (FIRMs) for Wrangell 6-25
Table 6-6 Potential Hazard Exposure Analysis – Critical Facilities 6-29
Table 6-7 Potential Hazard Exposure Analysis – Critical Infrastructure 6-29
Table 6-8 Proposed Wrangell Capital Budget Requests FY 2017-18 6-35
Table 6-9 Proposed Wrangell Capital Budget Requests FY 2017-18 6-37
Table 7-1 City and Borough of Wrangell's Regulatory Tools 7-40
Table 7-2 City and Borough of Wrangell's (CBW) Technical Specialists 7-41
Table 7-3 WCA and CCTHITA's Technical Specialists 7-41
Table 7-4 City and Borough of Wrangell's Financial Resources 7-43
Table 7-5 Wrangell Cooperative Association's Tribal Financial Resources 7-43
Table 7-6 CCTHITA's Tribal Financial Resources 7-43
Table 7-7 Federal Agency Mitigation Programs 7-44
Table 7-8 Mitigation Goals 7-45
Table 7-9 Wrangell MJHMP Update – Existing and New Mitigation Actions 7-47
Table 7-10 Evaluation Criteria for Mitigation Actions 7-51
Table 7-11 Potential Funding Source Acronym List 7-53
Table 7-12 Wrangell's Combined Mitigation Action Plan (MAP) 7-55
Table 7-13 Wrangell's Project Progress 7-58

Acronyms/Abbreviations

°F	Degrees Fahrenheit
AAC	Alaska Administrative Code
ACCIMP	Alaska Climate Change Impact Mitigation Program
ACIA	Arctic Climate Impact Assessment
ACWF	Alaska Clean Water Fund
ADWF	Alaska Drinking Water Fund
AEA	Alaska Energy Authority
AEC	Alaska Earthquake Center
AECOM	AECOM, Consultant, or Contractor
AEEE	Alternative Energy and Energy Efficiency
AEIS	Alaska Economic Information System
AFG	Assistance to Firefighters Grant
AHFC	Alaska Housing Finance Corporation
AICC	Alaska Interagency Coordination Center
AIDEA	Alaska Industrial Development and Export Authority
AK	Alaska
AMF	Airport Maintenance Facility
ANA	Administration for Native Americans
ARC	American Red Cross
ARW	Airport Runway
AVEC	Alaska Village Electric Cooperative
B/C	Benefit vs. Cost or Benefit/Cost
BCA	Benefit Cost Analysis
BFE	Base Flood Elevation
BIA	U.S. Bureau of Indian Affairs
BLM	Bureau of Land Management
CBO	Communications Building-Other
CCTHITA	Central Council of the Tlingit and Haida Indian Tribes of Alaska
CCP	Citizen Corps Program
CDBG	Community Development Block Grant
CEHHWG	Climate, Ecosystems & Human Health Work Group
CFR	U.S. Code of Federal Regulations
CFP	Community Forestry Program
CGP	Comprehensive Grant Program
CIG	Conservation Innovation Grant
City	City and Borough of Wrangell

Acronyms/Abbreviations

CIP	Capital Improvement Plan, City and Borough of Wrangell
CO-OP	Cooperative
Corp	Corporation
CP	Comprehensive Plan, City and Borough of Wrangell
CRS	Community Rating System
CTA	Conservation Technical Assistance
CVRF	Coastal Villages Region Fund
CWSRF	Clean Water State Revolving Fund
DCCED	Department of Commerce, Community, and Economic Development
DCI	Disaster Cost Index
DCRA	Division of Community and Regional Affairs
DEC	Department of Environmental Conservation
Denali	Denali Commission
DHS	U.S. 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	U.S. 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
EMPG	Emergency Management Performance Grant
EOC	Emergency Operations Center
EOP (or ERP)	Emergency Operations Plan (or Emergency Response Plan)
EPA	U.S. Environmental Protection Agency
EPPS	Energy Production Plant-Small
EQ	Earthquake
EQIP	Environmental Quality Incentives Program
EWP	Emergency Watershed Protection Program
FAA	Federal Aviation Administration
FEMA	Federal Emergency Management Agency
FHBM	Flood Hazard Boundary Map

Acronyms/Abbreviations

FHF	Flood Hazard Factors
FHWA	Federal Highway Administration
FIRM	Flood Insurance Rate Maps
FIS	Flood Insurance Study
FL	Flood
FMA	Flood Mitigation Assistance
FPM or FPC	Floodplain Manager or Coordinator
FP&S	Fire Prevention and Safety
ft	Feet
FY	Fiscal Year
g	Gravity
GF	Ground Failure
GIS	Geospatial Information System
Hazus	Hazards US – Multi-Hazard Software
HMA	Hazard Mitigation Assistance
HMGP	Hazard Mitigation Grant Program
HMP	Hazard Mitigation Plan
HRD1	Highway/Road - One Lane
HRD2	Highway/Road - Two Lane
HSGP	Homeland Security Grant Program
HUD	Housing and Urban Development
HWBO	Highway Bridge-Other (includes wood)
IBHS	Institute for Business And Home Safety
ICDBG	Indian Community Development Block Grant
IGAP	Indian General Assistance Program
IHBG	Indian Housing Block Grant
IHLGP	Indian Home Loan Guarantee Program
INAP	Indian and Native American Programs
IRA	Indian Reorganization Act
IRRP	Indian Reservation Road Program
IRS	Internal Revenue Service
Kt(s)	Knot(s)
LEG	Legislative Energy Grant
LEPC	Local Emergency Planning Committee
M	Magnitude
MAP	Mitigation Action Plan
MGL	Municipal Grants And Loans

Acronyms/Abbreviations

MJHMP	Multi-Jurisdictional Hazard Mitigation Plan
MMI	Modified Mercalli Intensity
mph	Miles Per Hour
msl	Mean Sea Level
MJHMP	Multi-Jurisdictional Hazard Mitigation Plan
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
NPS	National Park Service
NRF	National Response Framework
NRCS	Natural Resources Conservation Service
NTHMP	National Tsunami Hazard Mitigation Program
NTWC	National Tsunami Warning Center
NWS	National Weather Service
OTF	Oil Tank Farm
PDM	Pre-Disaster Mitigation
PGA	Peak Ground Acceleration
PNP	Private Non-Profits
PPSB	Potable Water Pumping Station
PSI	Periodic Safety Inspection
PSTS	Water Storage Tank-Steel
PWE	Potable Water Well
PWPB	Potable Water Pipelines-Buried
PWS	Port Waterfront Structures (Harbor)
PWTS	Potable Water Treatment (Plant)-Small
RCASP	Remote Community Alert Systems
RD	Rural Development
RL	Repetitive Loss
RurALCAP	Rural Alaska Community Action Program
SAFER	Staffing For Adequate Fire and Emergency Response
SBA	US 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

Acronyms/Abbreviations

STAPLEE	Social, Technical, Administrative, Political, Legal, Economic, and Environmental
T/F	Technical / Feasibility
TTP	Tribal Transportation Program
US or U.S.	United States
USACE	U.S. Army Corps of Engineers
UAF	University of Alaska-Fairbanks
USC	U.S. Code
USDA	U.S. Department of Agriculture
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
VFA-RFA	Volunteer Fire Assistance and Rural Fire Assistance Grant
VSW	Village Safe Water
WARN	Warning, Alert, and Response Network
WCA	Wrangell Coop Association
WTF	Water Treatment Facility
WWTS	Wastewater Treatment (Plant)-Small

This page intentionally left blank

1.0 INTRODUCTION

This section provides a brief introduction to hazard mitigation planning, the grants associated with these requirements, and a description of this Multi-Jurisdictional Hazard Mitigation Plan (MJHMP).

1.1 OVERVIEW

In recent years, local hazard mitigation planning (HMP) has been driven by 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's) 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 and tribal entities are described in detail in Section 2 and are identified in their appropriate sections throughout this MJHMP.

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 and tribal hazard mitigation plans now qualify communities for several Federal Hazard Mitigation Assistance (HMA) grant programs.

This MJHMP complies with Title 44 CFR current as of June 2018 and applicable guidance documents. Source: FEMA 2018

1.2 AUTHORITIES AND REQUIREMENTS

Section 322 of the Robert T. Stafford Disaster Relief and Emergency Assistance Act (Stafford Act) 42 U.S.C. 5165, as amended by the Disaster Mitigation Act of 2000 (DMA) (P.L. 106-390), provides for states, local, and Indian tribal governments to undertake a risk-based approach to reducing risks to natural hazards through mitigation planning. The National Flood Insurance Act of 1968, 42 U.S.C. 4001 et seq., as amended, further reinforces the need and requirement for mitigation plans, linking flood mitigation assistance programs to state, tribal, and local mitigation plans.

FEMA has implemented the various hazard mitigation provisions through 44 CFR Part 201. This regulation emphasizes the need for state, local, and Indian Tribal governments to closely coordinate mitigation planning and implementation efforts, in addition to describing the requirement for a state, local, or tribal mitigation plan as a condition of pre- and post-disaster assistance…

In recognition of tribal sovereignty and the government-to-government relationship that FEMA has with Indian Tribal governments, FEMA amended 44 CFR Part 201 at 72 Fed. Reg. 61720, on October 31, 2007, and again at 74 Fed. Reg. 47471, on September 16, 2009, to consolidate and clarify the requirements for Indian Tribal governments, to establish tribal mitigation plans separately from state and local mitigation plans, and finalize the mitigation planning rule.

Indian tribal governments with an approved Tribal Mitigation Plan in accordance with 44 CFR 201.7 may apply for assistance from FEMA as a grantee. If the Indian Tribal government coordinates with the State for review of their Tribal Mitigation Plan, then the Indian Tribal government also has the option to apply as a subgrantee through a state or another tribe. A grantee is an entity such as a state, territory, or Indian Tribal government to which a grant is awarded and that is accountable for the funds provided. A subgrantee is an entity, such as a community, local, or Indian Tribal government; state-recognized tribe; or a private non-profit (PNP) organization to which a subgrant is awarded and that is accountable to the grantee for use of the funds provided.

If the Indian Tribal government is eligible as a grantee or subgrantee because it has an approved Tribal Mitigation Plan and has coordinated with the State for review, it can decide which option it wants to take on a case-by-case basis with respect to each Presidential Disaster Declaration, and for each grant program under a Declaration, but not on a project-by-project basis within a grant program. For example, an Indian Tribal government can participate as a subgrantee for Public Assistance (PA), but as a grantee for the Hazard Mitigation Grant Program (HMGP) under the same Declaration. However, the Indian Tribal government would not be able to request grantee status under HMGP for one HMGP project, then request subgrantee status for another HMGP project under the same Declaration.

Under the Stafford Act and the National Flood Insurance Act, local, and tribal governments must have an approved, adopted hazard mitigation plan to meet the eligibility requirements for certain assistance types, which may differ depending on whether the local or Indian tribal government intends to apply as a grantee or subgrantee. Table 1-1 defines mitigation plan requirements for State, Tribal, and Local governments applying for certain FEMA Grants.

Table 1-1 Jurisdictional Mitigation Plan Requirements

Enabling Legislation	FEMA Assistance Program		Is Mitigation Plan Required?	
			State / Tribal Applicant	Tribal / Local-Applicant
Stafford Act	Individual Assistance (IA)		No	No
	Public Assistance	Categories A and B (e.g., debris removal, emergency protective measures)	No	No
		Categories C through G (Permanent work – e.g., repairs to publicly owned buildings)	Yes	No
	Fire Management Assistance Grants (FMAG)		Yes	No
	Hazard Mitigation Grant Program (HMGP)	Planning grant	Yes+	No
		Project grant	Yes+	Yes++
	Pre-Disaster Mitigation (PDM)	Planning grant	No	No
		Project grant	Yes*	Yes**
National Flood Insurance Act	Flood Mitigation Assistance (FMA)	Planning grant	Yes*	No
		Project grant	Yes*	Yes**

Table 1-1 Jurisdictional Mitigation Plan Requirements

Enabling Legislation	FEMA Assistance Program	Is Mitigation Plan Required?	
		State / Tribal Applicant	Tribal / Local-Applicant
Notes	+ At the time of the Presidential major disaster declaration and at the time of obligation of HMGP grant funds. ++ At the time of obligation of HMGP grant funds for mitigation projects.		
	* By the application deadline and at the time of obligation of the PDM or FMA award. ** By the application deadline and at the time of obligation of PDM or FMA grant funds for mitigation projects.		

Source: FEMA 2017

1.3 MITIGATION PLAN REQUIREMENTS - GRANT PROGRAMS

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. Excerpts from FEMA's 2015 HMA Guidance, Part I, is as follows:

> *The U.S. Department of Homeland Security (DHS) FEMA HMA programs present a critical opportunity to reduce the risk to individuals and property from natural hazards, while simultaneously reducing reliance on Federal disaster funds. On March 30, 2011, the President signed Presidential Policy Directive 8 (PPD-8): National Preparedness, and the National Mitigation Framework was finalized in May 2013. The National Mitigation Framework comprises seven core capabilities, including:*
>
> - *Threats and Hazard Identification*
> - *Risk and Disaster Resilience Assessment*
> - *Planning*
> - *Community Resilience*
> - *Public Information and Warning*
> - *Long-Term Vulnerability Reduction*
> - *Operational Coordination*
>
> *HMA programs provide funding for eligible activities that are consistent with the National Mitigation Framework's Long-Term Vulnerability Reduction capability. HMA programs reduce community vulnerability to disasters and their effects, promote individual and community safety and resilience, and promote community vitality after an incident. Furthermore, HMA programs reduce response and recovery resource requirements in the wake of a disaster or incident, which results in a safer community that is less reliant on external financial assistance.*
>
> *Hazard mitigation is defined as 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. Accordingly, States, territories, federally-recognized tribes, and local communities are encouraged to take advantage of funding that HMA programs provide in both the pre- and post-disaster timelines.*

In addition to hazard mitigation, FEMA's Risk Mapping, Assessment, and Planning (Risk MAP) Program provides communities with education, risk communication, and outreach to better protect its citizens. The Risk MAP project lifecycle places a strong emphasis on community engagement and partnerships to ensure a whole community approach that reduces flood risk and builds more resilient communities. Risk MAP risk assessment information strengthens a local community's ability to make better and more informed decisions. Risk MAP allows communities to better invest and determine priorities for projects funded under HMA. These investments support mitigation efforts under HMA that protect life and property and build more resilient communities.

The whole community includes children, individuals with disabilities, and others with access and functional needs; those from religious, racial, and ethnically diverse backgrounds; and people with limited English proficiency. Their contributions must be integrated into mitigation/resilience efforts, and their needs must be incorporated as the whole community plans and executes its core capabilities.

WHOLE COMMUNITY

A. HMA Commitment to Resilience and Climate Change Adaptation

FEMA is committed to promoting resilience as expressed in PPD-8: National Preparedness; the President's State, Local, and Tribal Leaders Task Force on Climate Preparedness and Resilience; the Administrator's 2011 FEMA Climate Change Adaptation Policy Statement (Administrator Policy 2011-OPPA-01); and the 2014–2018 FEMA Strategic Plan. Resilience refers to the ability to adapt to changing conditions and withstand and rapidly recover from disruption due to emergencies. The concept of resilience is closely related to the concept of hazard mitigation, which reduces or eliminates potential losses by breaking the cycle of damage, reconstruction, and repeated damage. Mitigation capabilities include, but are not limited to, community-wide risk reduction projects, efforts to improve the resilience of critical infrastructure and key resource lifelines, risk reduction for specific vulnerabilities from natural hazards and climate change, and initiatives to reduce future risks after a disaster has occurred.

FEMA is supporting efforts to streamline the HMA programs so that these programs can better respond to the needs of communities nationwide that are addressing the impacts of climate change. FEMA, through its HMA programs:

- *Develops and encourages adoption of resilience standards in the siting and design of buildings and infrastructure*
- *Modernizes and elevates the importance of hazard mitigation*

FEMA has issued several policies that facilitate the mitigation of adverse effects from climate change on the built environment, structures and infrastructure. Consistent with the 2014–2018

FEMA Strategic Plan, steps are being taken by communities through engagement of individuals, households, local leaders, representatives of local organizations, and private sector employers and through existing community networks to protect themselves and the environment by updating building codes, encouraging the conservation of natural and beneficial functions of the floodplain, investing in more resilient infrastructure, and engaging in mitigation planning. FEMA plays an important role in supporting community-based resilience efforts, establishing policies, and providing guidance to promote mitigation options that protect critical infrastructure and public resources.

FEMA encourages better integration of Sections 404 and 406 of the Robert T. Stafford Disaster Relief and Emergency Assistance Act, as amended (Stafford Act), Title 42 of the United States

Code (U.S.C.) 5121 et seq., to promote more resilience during the recovery and mitigation process. FEMA regulations that implement Sections 404 and 406 of the Stafford Act allow funding to incorporate mitigation measures during recovery activities. Program guidance and practice limits Section 406 mitigation to the damaged elements of a structure. This limitation to Section 406 mitigation may not allow for a comprehensive mitigation solution for the damaged facility; however, Section 404 funds may be used to mitigate the undamaged portions of a facility.

Recognizing that the risk of disaster is increasing as a result of multiple factors, including the growth of population in and near high-risk areas, aging infrastructure, and climate change, FEMA promotes climate change adaptation by:

- *Incorporating sea level rise in the calculation of Benefit-Cost Analysis (BCA)*
- *Publishing a new HMA Job Aid on pre-calculated benefits for hurricane wind retrofit measures, see HMA Job Aid (Cost Effectiveness Determination for Residential Hurricane Wind Retrofit Measures Funded by FEMA)*
- *Encouraging floodplain and wetland conservation associated with the acquisition of properties in green open space and riparian areas*
- *Reducing wildfire risks*
- *Preparing for evolving flood risk*
- *Encouraging mitigation planning and developing mitigation strategies that encourage community resilience and smart growth*
- *Encouraging the use of building codes and standards (the American Society of Civil Engineers/Structural Engineering Institute [ASCE/SEI] 24-14, Flood Resistant Design and Construction) wherever possible.*

Note: *For additional information, see http://www.fema.gov/climate-change. Source FEMA 2015*

1.3.1 Hazard Mitigation Assistance (HMA) Grant Programs

Table 1-2 lists HMA eligible grant program activities:

Table 1-2 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	✓	✓	✓
Generators	✓	✓	
Localized Flood Risk Reduction Projects	✓	✓	✓
Non-localized Flood Risk Reduction Projects	✓	✓	
Structural Retrofitting of Existing Buildings	✓	✓	✓
Non-structural Retrofitting of Existing Buildings and Facilities	✓	✓	✓
Safe Room Construction	✓	✓	
Wind Retrofit for One- and Two-Family Residences	✓	✓	
Infrastructure Retrofit	✓	✓	✓

Table 1-2 HMA Eligible Activities

Activities	HMGP	PDM	FMA
Soil Stabilization	✓	✓	✓
Wildfire Mitigation	✓	✓	
Post-Disaster Code Enforcement	✓		
Advance Assistance	✓		
5 Percent Initiative Projects	✓		
Miscellaneous/Other[1]	✓	✓	✓
2. Hazard Mitigation Planning	✓	✓	✓
Planning Related Activities	✓		
3. Technical Assistance			✓
4. Management Cost	✓	✓	✓

[1] Miscellaneous/Other indicates that any proposed action will be evaluated on its own merit against program requirements. Eligible projects will be approved provided funding is available.

Source: FEMA 2015

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. The 2015 HMA Guidance provides the following programmatic information:

> *HMGP is authorized by Section 404 of the Stafford Act, 42 U.S.C. 5170c. The key purpose of HMGP is to ensure that the opportunity to take critical mitigation measures to reduce the risk of loss of life and property from future disasters is not lost during the reconstruction process following a disaster.*
>
> *HMGP funding is available, when authorized under a Presidential major disaster declaration, in the areas of the State requested by the Governor. Federally-recognized tribes may also submit a request for a Presidential major disaster declaration within their impacted areas (see http://www.fema.gov/media-library/assets/documents/85146). The amount of HMGP funding available to the Applicant is based on the estimated total Federal assistance, subject to the sliding scale formula outlined in Title 44 of the Code of Federal Regulations (CFR) Section 206.432(b) that FEMA provides for disaster recovery under Presidential major disaster declarations. The formula provides for up to 15 percent of the first $2 billion of estimated aggregate amounts of disaster assistance, up to 10 percent for amounts between $2 billion and $10 billion, and up to 7.5 percent for amounts between $10 billion and $35.333 billion. For States with enhanced plans, the eligible assistance is up to 20 percent for estimated aggregate amounts of disaster assistance not to exceed $35.333 billion.*
>
> *The Period of Performance (POP) for HMGP begins with the opening of the application period and ends no later than 36 months from the close of the application period.*
>
> *PDM is designed to assist States, territories, federally-recognized tribes, and local communities to implement a sustained pre-disaster natural hazard mitigation program to reduce overall risk to the population and structures from future hazard events, while also reducing reliance on Federal funding in future disasters.*

The City and Borough of Wrangell (CBW) does not currently participate in FEMA's National Flood Insurance Program (NFIP) and is therefore ineligible for Flood Mitigation Assistance (FMA) associated grant program funding opportunitiy participation.

Congressional appropriations provide the funding for PDM.

The total amount of funds distributed for PDM is determined once the appropriation is provided for a given fiscal year. It can be used for mitigation projects and planning activities.

The POP for PDM begins with the opening of the application period and ends no later than 36 months from the date of subapplication selection.

FMA is authorized by Section 1366 of the National Flood Insurance Act of 1968, as amended (NFIA), 42 U.S.C. 4104c, with the goal of reducing or eliminating claims under the National Flood Insurance Program (NFIP). FMA was created as part of the National Flood Insurance Reform Act (NFIRA) of 1994. The Biggert-Waters Flood Insurance Reform Act of 2012 (Public Law 112-141) consolidated the Repetitive Flood Claims and Severe Repetitive Loss grant programs into FMA. FMA funding is available through the National Flood Insurance Fund (NFIF) for flood hazard mitigation projects as well as plan development and is appropriated by Congress. States, territories, and federally-recognized tribes are eligible to apply for FMA funds. Local governments are considered subapplicants and must apply to their Applicant State, territory, or federally-recognized tribe.

The POP for FMA begins with the opening of the application period and ends no later than 36 months from the date of subapplication selection" Source: FEMA 2015.

As the State Hazard Mitigation Plan states:

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. Source: SHMP 2013

1.3.2 MJHMP Layout Description

The MJHMP 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 and Borough of Wrangell (CBW), including historical trends for population and the demographic and economic conditions that have shaped the area.

Section 3 Planning Process

Describes the MJHMP update's planning process, identifies the planning team members, the meetings held as part of the planning process, and the key stakeholders within City and Borough of Wrangell and the Wrangell Cooperative Association's and the surrounding area. This section documents public outreach activities (support documents are located in Appendix D); including document reviews and relevant plans, reports, and other appropriate information data utilized for MJHMP development; actions the 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 MJHMP remains an active and applicable document throughout its five-year lifecycle. The process includes monitoring, reviewing, evaluating (Appendix F – Maintenance Documents), updating the MJHMP; and implementation initiatives.

Section 4 Jurisdictional Adoption

Describes the City and Borough of Wrangell and the Wrangell Cooperative Association's MJHMP 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 MJHMP. 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 Assessment

Identifies Wrangell area's potentially vulnerable assets—people, residential and non-residential buildings (where available), critical facilities, and critical infrastructure. The resulting information identifies the full range of hazards the Wrangell area 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 Wrangell area. 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 MJHMP.

Appendices

Appendix A: Lists 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: Provides the FEMA Local Mitigation Plan Review Tool, which documents compliance with FEMA criteria.

Appendix C: Provides the City and Borough of Wrangell and the Wrangell Cooperative Association's adoption resolution.

Appendix D: Provides public outreach information, including newsletters.

Appendix E: Explains the Benefit-Cost Analysis process used to prioritize mitigation actions and determine a project's benefit potential.

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

This page intentionally left blank

2.0 COMMUNITY DESCRIPTION

This section provides the City and Borough of Wrangell and the Wrangell Cooperative Association's location, geography, history, and demographic information.

2.1 PLANNING AREA LOCATION, GEOGRAPHY, AND HISTORY

The City and Borough of Wrangell and the Wrangell Cooperative Association are recognized governmental entities that are both located within and have authority within the same geographic area. For purposes of this Plan, the area includes the borough boundaries of the City and Borough of Wrangell.

The Wrangell Community Profile defines the city of Wrangell's location on Wrangell Island as being "located 90 miles north of Ketchikan in Southeast Alaska, near the mouth of the Stikine River. By air, Wrangell is approximately 1 hour 30 minutes (155 air miles) south from Juneau, and 3 hours from Anchorage and Seattle (just over 700 air miles each). The city of Wrangell is located on the northern tip of Wrangell Island." (Source: Wrangell, 2016)

Figure 2-1 Wrangell's Location Map

The following information is excerpted from the "History of Wrangell" (http://www.wrangell.com/visitorservices/history-wrangell).

...Wrangell is the third oldest community in Alaska, and the second oldest community in Southeast, and the ONLY city in Alaska to be ruled by four nations and under three flags... Tlingit, Russia, England, and the United States

Since the last Ice Age

A significant portion of the North American continent was buried under miles of glaciers during the last of the "Ice Age". However, recent archaeological and paleontological evidence indicates that at least a portion of Southeast Alaska, the outer coast, may have been ice-free during the late Pleistocene. Three archaeological sites within the Tongass National Forest have been reliably dated in excess of 9,000 years BP: Hidden Falls at approximately 9860 BP; Groundhog Bay at approximately 10,180 years BP and On-Your-Knees Cave, with rare human remains, at approximately 9730 BP.

The Tlingits

Tlingit influence in Southeast is well documented in the literature. The Tlingit migration stories describe the early migration of the Tlingit through the Canadian interior, the discovery of "the hole in the ice", and the subsequent discovery of the "land of plenty" when a couple was brave enough to explore where the hole led to. Local Wrangell Tlingits believe the hole in the ice was in fact the Stikine River corridor, perhaps a river beneath the glacier that led from the Canadian interior to a series of lush island along the coast of Southeast Alaska during the last of the "Ice Age".

Subsequent movement into the area by the Haida and Tsimshian impacted the Tlingits and brought competing interests for the resources. Disputes over resources are commonly described in ethnographic accounts, along with descriptions of the Stikine Tlingits as fierce warriors who

were able and willing to fight against their neighbors. Tlingits were equally well known as seasoned negotiators and traders. Trade networks from Southeast extended into the interior of Canada and up the Copper River and beyond. George Vancouver was the first recorded white man to come to the Wrangell area. He came in 1793, while on a survey expedition and just missed discovering the nearby Stikine River. Captain Cleveland visited the "Village of Steeken" on April 16, 1799, where he did some fur trading with the Indians.

Under the Russian Flag

It wasn't until the early 1800's that the Native Alaskans were visited by outside forces. Lt. Dionysius Zarembo, commander of the Russian-American Company ship Chichagof, landed at present day Wrangell in 1833. Wrangell started in 1834 as the Russian Redoubt St. Dionysus. The Russians established the Fort in order to preserve their interests in the region. Both the Spanish and English had also been carefully scouting the extent of Russian settlement with an eye towards occupation themselves

Stikine Tlingit Chief Shakes V, recognized some advantages of cooperation with the Russians, and moved the Tlingit village from its former site at "old town" to Shakes Island in the heart of the current city of Wrangell to be near the Russian Redoubt. Aleuts, Eskimos and Interior Athabaskans were brought to Southeast as sea otter hunters for the Russian companies…

In June of 1834, shortly after the Russian Redoubt was completed, Peter Sheen Ogden with eight officers, and 80 plus Hudson Bay Company employees, supplies and trading goods, sailed north to establish a post on the Stikine River… the Hudson Bay ship neared Redoubt St. Dionysius, Lt. Zarembo refused to allow them to anchor and ordered the ship to leave at once. Ogden protested to the Chief Russian in Sitka, Baron von Wrangel, saying that the British had as much right as the Russians to trade for fur on the Stikine…

Under the British Flag

Ogden went to Vancouver and talked with Dr. John McLoughlin who was in charge of all Hudson Bay Company posts on the Pacific Coast. The two men agreed that the Russian government should pay the Hudson Bay Company for the furs they had been denied from the Stikine Valley. Dr. McLoughlin prepared a claim for his company of 21,150 pounds, 10 shillings, sterling seeking reimbursement by the Russian government. A settlement was reached and the Hudson Bay Company withdrew its claim in exchange for a lease to the Alaskan mainland from Portland Canal to Cape Spencer. ... On May 30, 1840, the Hudson Bay Company ship Beaver reached Fort Dionysius. The Russian flag was lowered and the British flag raised. The fort was renamed Fort Stikine. John McLoughlin Jr. was made commander of the fort. Eighteen Hudson Bay Company men were left to gather the furs and defend Fort Stikine... Soon after the transfer of Fort Stikine to the British, there were several failed attempts by the Tlingits to capture the fort. The Hudson Bay Company leased the fur lands of the Stikine area for more than 20 years and continued to operate the fort until the purchase of Alaska from Russia in 1867 by the United States.

Under the American Flag

The 1867 purchase of Alaska from Russia was known as "Seward's Folly" after William H. Seward, The Secretary of Interior. Most in the federal government believed Alaska was nothing but ice, snow and glaciers, with little value other than for the exported furs. Gold, however, had been discovered on the Stikine River in 1861. There were three Gold Rushes in and around Wrangell. The first one occurred when a man named Buck Choquette found gold on the Stikine River in 1861 on what is now call Buck's Bar. Buck Choquette was a Hudson Bay company employee. He was the first white man to find gold. Until Skagway came into existence, Wrangell served as the trade center for all the gold rushes, offering access to the Klondike fields through

the Stikine River corridor and then on into the interior to the Yukon River. At one point over 10,000 persons were in Wrangell at one time, waiting for supplies and transportation up the Stikine. To put that into perspective, Wrangell has a current population of 2300 people! A number of buildings from this time period still exist in Wrangell.

In 1868 a military post was established and a new fort was built in Wrangell at a cost of $26,000. The American's named the fort after Baron von Wrangel of the Russian-American Company. The fort, located where the present day post office is, was composed of a stockade with narrow gun holes and several block houses. Inside the walls were barracks, officers' quarters, and supply sheds made of logs. South of the fort was the Tlingit village of about 35 houses and 500 inhabitants. The Fort Wrangell Post Office was established in 1869. The fort was abandoned in 1877.

Not long after the purchase of Alaska, the fishing industry got its start with the establishment of several canneries throughout Southeast. The canneries were responsible for the eventual development of the large fish traps at stream mouths that dramatically impacted the salmon runs. These traps were later outlawed, but had serious impacts to the local economies, particularly the Tlingit groups who had traditionally procured their subsistence resources from these streams… The second gold rush started in 1872 when two prospectors named Thibert and McCullough came to Wrangell with gold they found at Dease Lake in the Cassiar country in Canada. Then, when gold was discovered in the Klondike, Wrangell became a mining center for the third time. Thousands of people went up the Stikine in 1898 to travel the Teslin Trail to the Klondike. During the 1898 gold rush, famed Marshall Wyatt Earp spent 10 days as Wrangell's marshall. He declined to become a full-time town marshall since he was on his way, with his wife, to strike his fortune in the Klondike. Some locals jokingly claim that "Wrangell was too wild for Wyatt!"

An 1898 issue of the Stikine River Journal gives an excellent picture of the rapid growth of Wrangell during the gold rush when it lists the stores in town. Included on the list are two sawmills, one cigar factory, two manufacturing jewelers, one fish cannery, three tin shops, two blacksmith shops, several carpenter and cabinet shops, one ship yard, about ten laundries, one plumbing shop, one copper shop, two breweries, two newspapers, and numerous lodging houses and restaurants. Most of the shops were false front buildings clustered along both sides of Front Street. In 1898, Front Street was constructed of boards placed on pilings over the water. Today, the downtown area is built on gravel fill and still has the false front look of the gold rush days. Unfortunately, two devastating fires, one in 1906 and the other in 1952, destroyed most of the historic buildings...

Missionaries came during the early 1870's establishing the first Presbyterian and Catholic churches and schools. Noted naturalist John Muir spent quite a lot of time in Wrangell in the 1880's, staging many of his explorations of southeast Alaska out of Wrangell… Wrangell continued developing as a town and Wrangell incorporated as a city in 1903...

In 1902, the creation of the Alexander Archipelago Forest Reserve and its subsequent transformation into the Tongass National Forest five years later, set in motion a series of events which eventually led to Southeast Alaska's and Wrangell's largest, employers during the mid to late 1900's - the wood and fiber companies. As with other southeast communities, Wrangell's primary economic base became fishing and timber...

…In 1912 the Alaska Native Brotherhood (ANB) was created, thus forming a solid political group whose aim was to achieve political equality for the Native Alaskans. In 1924, successful arguments led to the Natives receiving citizenship and the right to vote. The ANB and Alaska Native Sisterhood further exercised their political power by successfully lobbying the federal Bureau of Indian Affairs to build the the first Native boarding school, the Wrangell Institute, in Wrangell in 1932...

There were two salmon canneries within the City limits of Wrangell in 1929 as well as two shrimp and crab canneries that employed over 150 people. Fur farming was also very important in the Wrangell area. Wrangell and surrounding islands had fox, mink, beaver, marten and muskrat farms. During the 1920's to present day, Wrangell continues to be a center for mining, serving as a supply area for the gold fields of the Cassiar Country in Canada. On August 14, 1920, the first airplanes ever to come to Wrangell appeared and landed on Sergief Island at the mouth of the Stikine River. The four World War I DeHavilland bi-planes were on a round-trip flight from New York to Nome. Wrangell has survived two fires which destroyed the downtown areas, has survived the boom and bust cycles of the gold rushes, the fishing industry and timber history.... Source Wrangell, 2018

2.2 DEMOGRAPHICS

Prior to 2010, the U.S. Census figures were for the City of Wrangell, only. In May of 2008, the City was dissolved and the City and Borough of Wrangell was incorporated with expanded boundaries, therefore current population data for the expanded Borough boundaries only goes back to 2010. Wrangell's 2015 Watefront Master Plan provided data that shows the community's population spanning from 1997 through 2017 to fill in the gaps.

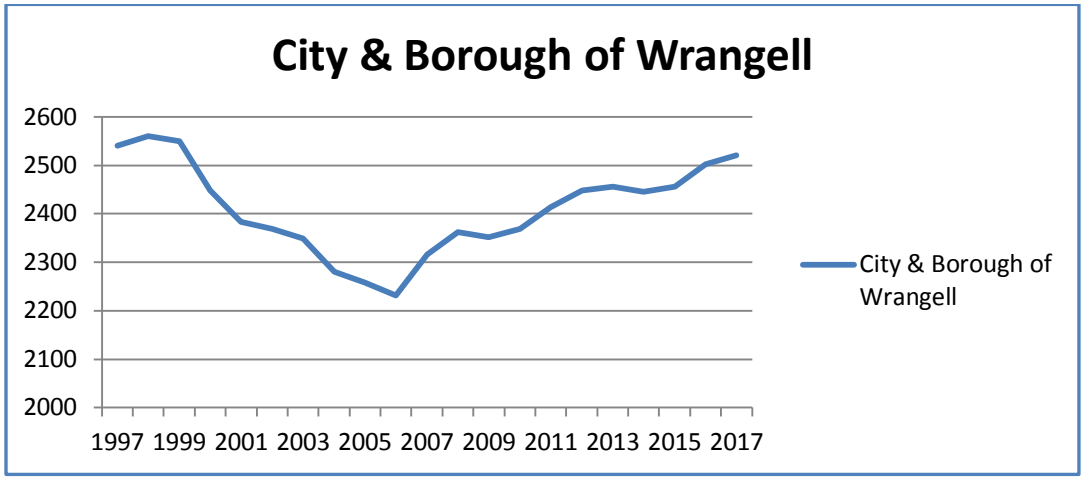


Figure 2-2 City and Borough of Wrangell's Historic Population

Figure 2-2 portrays population decreased from a high of 2,560 in 1998 declining steadily to a low of 2,232 in 2006. As described in the Wrangell Waterfront Master Plan, "…the Alaska Pulp Company sawmill closed and salmon prices tumbled in the 1990's, the local economy was devastated. Between 1994 and 2006, the population of the community fell by 18% (losing more than 500 residents)."

The population has been growing to 2,456 in 2017 which is only slightly more than Wrangell's 2000 population of 2,448.

2017 U.S. Census estimated 2,521 residents, of which the median age was 48.8 indicating a middle aged population. The City and Borough's population is expected to continue slow growth with an upward trend for the foreseeable future. Over half of current population is between 25 and 64 years of age.

72.5 percent of the current population is reported as white, with 16.2 percent having an American Indian or Alaska Native heritage. The male and female composition is approximately 52.4 and

47.6 percent respectively. The 2017 Census estimate revealed that there are 1,053 households with the average household having approximately 2.2 individuals. The most recent 2017 DCCED certified population is 2,387. Figure 2-2 illustrates Wrangell's historic population.

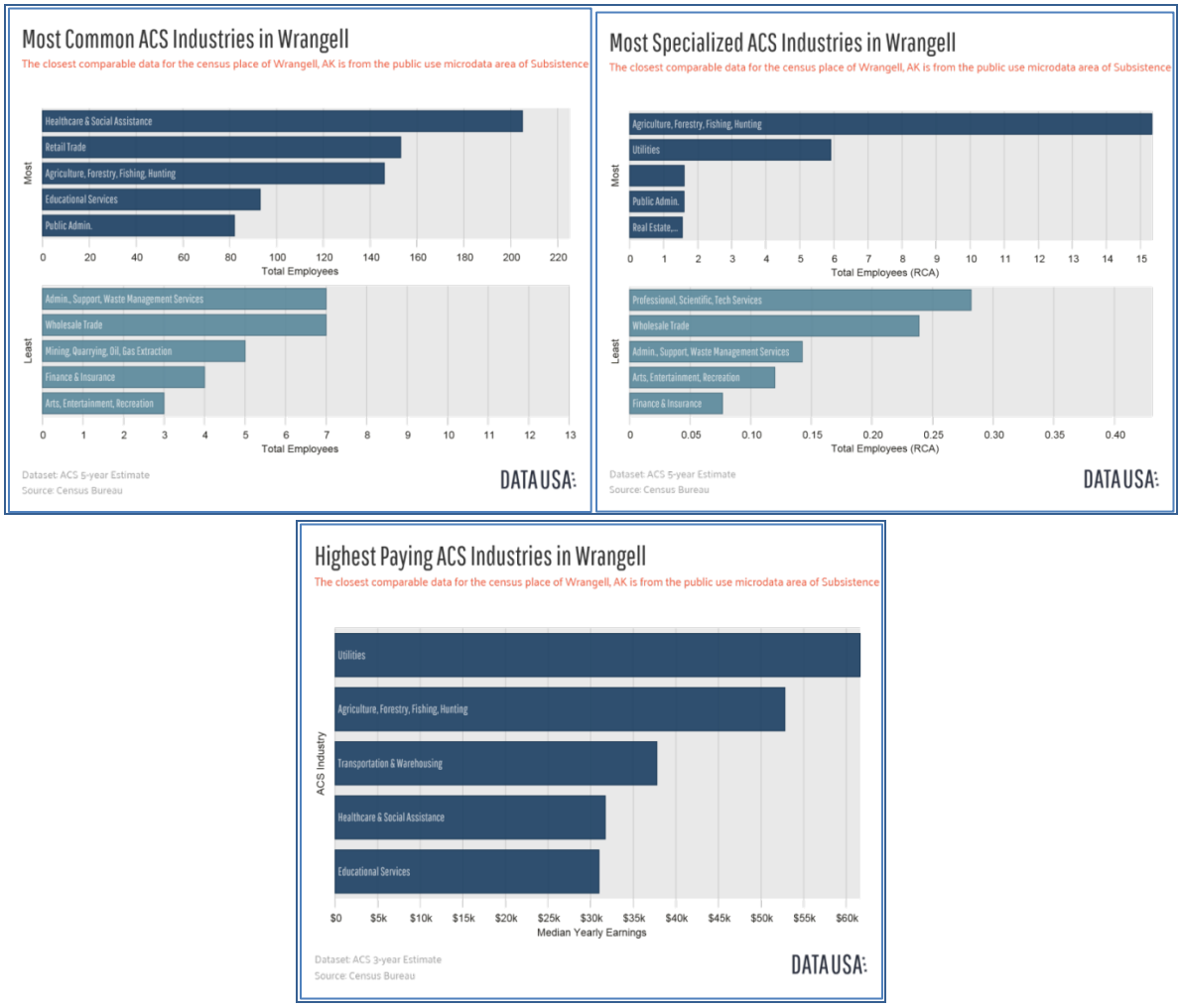
2.3 ECONOMY

According to the 2017 Census estimates, the median household income in Wrangell was $52,986 with a per capita income of $29,782. Approximately 9.9 percent were reported to be living below the poverty level. The potential work force (those aged 16 years or older) in Wrangell was estimated to be 1,972, of which 1,181 were actively employed. In 2017 the unemployment rate was 7.2 percent; however, this rate included part-time and seasonal jobs, and practical unemployment or underemployment is likely to be significantly higher.

Wrangell's Community Profile states:

> *Wrangell's economy, while historically based on the wood products and fishing industries, is now driven by tourism and marine industries.*
>
> *Fishing and fish processing are a very important segment of the local economy. Fleets of shrimp, crab, troll, seine, gillnet, and trawler vessels are based in Wrangell. There are two seafood processors and a crab processor. The community has completed several marine industry enhancement projects, including the recent completion of a marine service and repair yard with two travel lifts to support the commercial and recreational boats transiting the Inside Passage.*
>
> *Independent visitor tourism plays a major role during the summer months from May through September. Wrangell's Downtown Revitalization project to rebuild infrastructure and enhance the downtown commercial corridor is recently completed. The local Tlingit tribe completed reconstruction of Chief Shakes Tribal House. Fishing, hiking, museum, sightseeing, flightseeing and wildlife charters, petroglyphs and local art are available for independent travelers arriving by ferry or jet, yachts and cruise ship passengers.*
>
> *Public sector employment is also a significant contributor to the local economy. This includes employees of the City and Borough of Wrangell, Wrangell School District, Wrangell Medical Center, local employees of state agencies including Health and Social Services, Fish and Game, Transportation and Public Safety; and local federal employees of the Postal Service, Customs and US Forest Service. Source: Wrangell, 2016*

The following Data USA graphics (Figures 2-3) displays industry specific employment information for the Wrangell area:



Figures 2-3 CBW Employment Industry Delineation
Source: Data USA, 2018

Figure 2-4 Wrangell Employment Earnings Summary
Source: 2015 Waterfront Master Plan

The 2015 Waterfront Master Plan depicts the Wrangell area's employment earning sources (Figure 2-4). Government wages provided 31 percent (from 325 jobs), maritime 24 percent

(commercial fishing, fish process, and (seafood related-315 jobs); health and social services 17 percent, and tourism/visitor industry 8 percent (100 jobs) and remaining with other smaller jobs.

Figure 2-5 depicts the City and Borough of Wrangell's land boundary map. The entirety of these lands supports a subsistence economy and lifestyle.

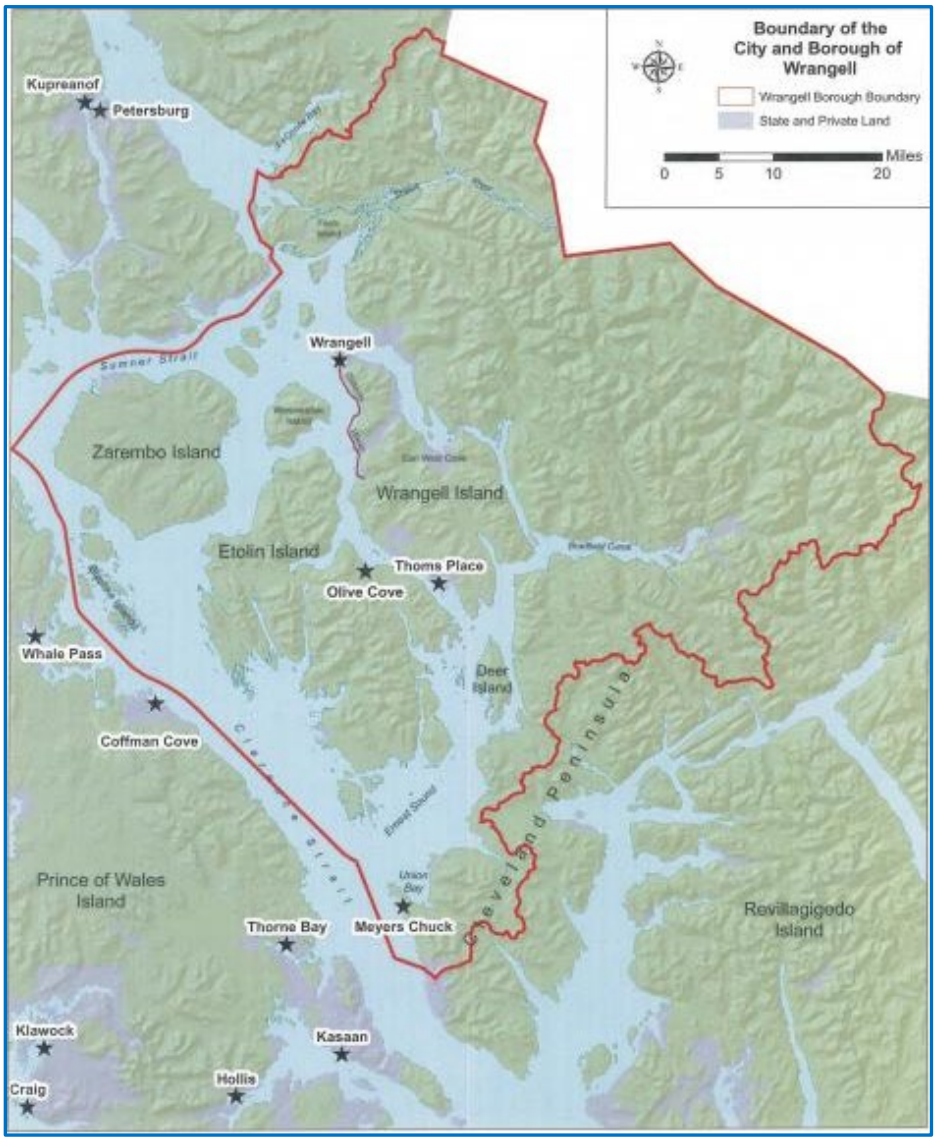


Figure 2-5 City and Borough of Wrangell Boundary

Source: Wrangell 2018

This page intentionally left blank

3.0 PLANNING PROCESS

This section 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 MJHMP. Outreach support documents and meeting information regarding the planning team and public outreach efforts are provided in Appendix F.

DMA 2000 requirements and implementing local and multi-jurisdictional governance regulations for describing the planning process include:

DMA 2000 Requirements
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))
Source: FEMA, March 2015.

DMA 2000 requirements and implementing Tribal governance regulations for describing the planning process include:

DMA 2000 Requirements
ELEMENTS. Planning Process
A1. Does the plan document the planning process, including how it was prepared and who was involved in the process? [44 CFR § 201.7(c)(1)] A2. Does the plan document an opportunity for public comment during the drafting stage and prior to plan approval, including a description of how the tribal government defined "public"? [44 CFR § 201.7(c)(1)(i)] A3. Does the plan document, as appropriate, an opportunity for neighboring communities, tribal 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? [44 CFR § 201.7(c)(1)(ii)] A4. Does the plan describe the review and incorporation of existing plans, studies, and reports? [44 CFR § 201.7(c)(1)(iii)] A5. Does the plan include a discussion on how the planning process was integrated to the extent possible with other ongoing tribal planning efforts as well as other FEMA programs and initiatives? [44 CFR § 201.7(c)(1)(iv)] A6. Does the plan include a description of the method and schedule for keeping the plan current (monitoring, evaluating and updating the mitigation plan within the plan update cycle)? [44 CFR § 201.7(c)(4)(i)] A7. Does the plan include a discussion of how the tribal government will continue public participation in the plan maintenance process? [44 CFR § 201.7(c)(4)(iv)]
Source: FEMA, October 2017

3.1 OVERVIEW

The State of Alaska, Division of Homeland Security and Emergency Management (DHS&EM) provided funding and project oversight to AECOM to facilitate and guide planning team development and MJHMP development.

The planning process began on January 31, 2018 with a teleconference with Ms. Lisa Von Bargen, Borough Manager to explain how their community was selected by the Division of Homeland Security and Emergency Management 2016 Pre-Disaster Mitigation Grant award. AECOM staff described the MJHMP development requirement to enable the community to qualify for Hazard Mitigation Grant Program grants and the overall MJHMP development process.

Ms. Von Bargen explained she desired a major update to their legacy HMP stating she was contacting prospective community planning team members to assist the community's efforts to identify available resources and capabilities for the 2018 MJHMP development. The planning team will assist AECOM by acting as an advocate for the planning process, assist with gathering information, and provide support during public participation opportunities. AECOM briefly discussed existing hazards that affect the community such as erosion, sediment deposition, and permafrost impacts, which are increasing in intensity due to climate changes.

No additional contact was made between AECOM until the Borough contacted them again in October of 2018 to get started on the project. The first community meeting and planning team work sessions occurred on November 27 to 29, 2018. The Assembly identified applicable resources and capabilities during the November 27 meeting. The planning team met on November 29 to discuss their hazards that create the most concern for the community such as earthquake, erosion, sediment deposition, tsunami, severe weather, and wildland fire which are increasing in intensity.

The planning team then discussed their hazard impacts to their residential, critical facilities, and infrastructure various mitigation actions for potential future mitigation project funding.

In summary, the following five-step process took place from November, 2018 through July, 2019.

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 the Wrangell area and with AECOM's assistance (DHS&EM's contract consultant), developed the risk assessment for their identified hazards. The planning team reviewed the risk assessment,

including the vulnerability analysis, prior to and during developing their 2018 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.

Due to holidays, limited resources, and conflicting responsibilities, the local Planning Team was unable to provide some comments but continued to gather more detailed information for HMP inclusion.

3.2 PLANNING TEAM

The local planning team members are listed in Table 3-1.

Table 3-1 Hazard Mitigation Planning Team

Name	Title	Organization	Key Input
Lisa Von Bargen	Borough Manager	City and Borough of Wrangell (CBW)	Planning team lead, data input and MJHMP review.
Steve Prysunka	Mayor	CBW	Planning team member, data input and MJHMP review.
Patty Gilbert	Vice Mayor	CBW	Planning team member, data input and MJHMP review.
Carol Rushmore	Economic Development Director	CBW	Planning team member, data input and MJHMP review.
Rolland Howell	Public Works Director	CBW	Planning team member, data input and MJHMP review.
Amber Al-Haddad	Capital Facilities Director	CBW	Planning team member, data input and MJHMP review.
Tim Buness	Fire Chief	CBW	Planning team member, data input and MJHMP review.
Doug McCloskey	Police Chief	CBW	Planning team member, data input and MJHMP review.
Greg Meissner	Harbor Master	CBW	Planning team member, data input and MJHMP review.
Borough Assembly	Entire Membership	CBW	Planning team members, data input and MJHMP review.
Austin O'Brien	Acting Forest Service District Ranger	US Forest Service District (USFS)	Planning team members, data input and MJHMP review.
Esther Ashton	Tribal Administrator	WCA	Planning team member, Tribal data input and MJHMP review.
Richard Peterson	President	Central Council of the Tlingit and Haida Indian Tribes of Alaska	Planning team member, Tribal data input and MJHMP review.

Table 3-1 Hazard Mitigation Planning Team

Name	Title	Organization	Key Input
Raymond Paddock	Environmental Manager/ MJHMP Contact	CCTHIT of Alaska	Planning team member, Tribal data input and MJHMP review.
Michael Sanders	Safety Officer	Southeast Alaska Regional Health Consortium (SEARCH)	Agency Planning Participant
Kelly Isham	Emergency Management Planner	AECOM, Alaska	Contract planning team member, data acquisition, MJHMP development
Scott Simmons	Emergency Management Professional	AECOM, Alaska	Contract planning team lead. Responsible for MJHMP development, lead writer, project coordination.

3.3 PUBLIC INVOLVEMENT AND OPPORTUNITIES FOR INTERESTED PARTIES TO PARTICIPATE

AECOM 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 February 12, 2018. The following agencies were invited to participate and review the MJHMP:

- 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)
  - Division of Spill Prevention and Response (DSPR)
  - Village Safe Water (VSW)
- Alaska Department of Transportation and Public Facilities (DOT/PF)
  - Central Region
  - North Region
  - Southcoast Region
- 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)

3.3.1 Wrangell Cooperative Association and the Central Council of the Tlingit and Haida Indian Tribes of Alaska's "Public" Determination

The Wrangell Cooperative Association and the Central Council of the Tlingit and Haida Indian Tribes of Alaska recognize any tribal member, Alaska Native, community resident, or employee as a "Public" member of the community. This assures that anyone within the community is eligible to attend and participate in tribal public meetings concerning hazard mitigation plan development and implementation activities.

3.4 LEGACY 2009 HMP REVIEW AND ANALYSIS

44 CFR requires communities to schedule MJHMP, LHMP, and THMP planning team meetings and teleconferences to review, discuss, and determine mitigation implementation accomplishments, track data relevance for future HMP update inclusion, and document recommendations for future HMP updates.

Wrangell's Legacy 2009 HMP document was revised to reflect the following 2018 format bring meet newly identified regulatory requirements. These areas are further also encapsulated within Table 3-2.

Section 1 Introduction

Added entire new section explaining Wrangell's 2018 plan review and update planning processes.

Section 2 Community Description

Updated and expanded community information, including new census and state data.

Section 3 Planning Process

Updated this section to reflect 2009 to 2018 changes to the public process including newsletters, public meetings and planning team composition.

Section 4 Plan Adoption

Provided new 2018 borough and tribal adoption resolutions.

Section 5 Hazard Profile Analysis

Reviewed hazard identification and risk assessment for earthquake, flooding, severe weather and wildland fire adding 2009 to 2018 descriptions and data and new hazard impact data. The weather profile now addresses climate change as it pertains to changing patterns and impacts. However, other profiled natural hazards also include noted climate change impacts as appropriate, these modifications better meet Wrangell's needs.

Section 6 Vulnerability Analysis

Added a new section to analyze vulnerability with current critical facility and infrastructure table data.

Section 7 Mitigation Strategy

Reviewed 2009 mitigation goals and actions and added new goals and actions for the 2018 MJHMP Mitigation Strategies' Mitigation Action Plan.

Section 8 References

Revised to reflect 2018 update resources.

Maintenance Requirement Completion Review

The planning team did not complete their designated annual HMP integration into other planning mechanisms, annual reviews, or other plan maintenance activities. Therefore it became a primary consideration to update the legacy 2009 HMP to analyze borough and tribal changes as well as all hazards that have, or could potentially have, impacted the Wrangell area during the legacy HMP's five-year lifecycle.

All sections of the MJHMP were updated throughout the 2018 update's year-long planning activity due to intermittent contractor and community staff availability. Therefore, Table 3-2 was developed to categorize planning team identified HMP components that necessitated information update were not lost. The team discussed how community changes, construction and infrastructure conditions, climate change impacts, and population increases or decreases have influenced hazard risks and/or facility vulnerabilities.

The 2018 MJHMP update process included inviting new and existing stakeholders to review the legacy 2009 HMP to determine what was accomplished versus what was intended to accomplish.

Pertinent section data are identified within Table 3-2, which provided the foundation for completing the 2018 MJHMP update.

Table 3-2 Legacy HMP Review and Update Needs Determination

2009 HMP Section	2009 HMP Items to be Updated	Status*	2009 HMP Identified items for Deletion	Newly Identified Items to be Added for HMP Compliance	New Action Commitment
Planning Process	• Planning process obligations successes • Planning team membership • Mitigation resource list • Continue public outreach initiatives • HMP integration initiatives into other planning mechanisms • Plan Maintenance Activities	NF: Complete annual HMP review NF: Integrate any legacy HMP components into other planning mechanisms or initiatives NF: Continue public involvement during five-year life cycle	• None	• Refine plan maintenance processes and responsibilities	• Planning team will begin to hold annual review meetings • Strive to integrate HMP initiatives into other planning mechanisms
Hazard Profile Update	• Update hazard profile and new event history • Profile newly identified hazard risks	NF: Update hazard profile and new event history	• Mitigation projects that were deleted or combined due to similarity	• Identify new hazards • Update hazards' impacts • Determine mitigation project status as: deleted, deferred, or combined • Develop new MAP	• Define new actions within the MAP
Risk Analysis and Vulnerability Assessment	• Asset inventory • Vulnerability analysis & summaries	NF: Identify development and land use changes	• None	• Develop asset inventory • Determine infrastructure vulnerabilities • Determine residential structure vulnerabilities • Identify repetitive loss properties as appropriate	• Fill data gaps • Locate scientific information to augment these data. • Delineate climate change impacts to infrastructure

Table 3-2 Legacy HMP Review and Update Needs Determination

2009 HMP Section	2009 HMP Items to be Updated	Status*	2009 HMP Identified items for Deletion	Newly Identified Items to be Added for HMP Compliance	New Action Commitment
Mitigation Strategy	• Determine existing mitigation actions progress and current status • Define mitigation action implementation successes or barriers	NF: Did not track project implementation processes or progress	• Delete completed, combined, or deleted actions • Implemented & non-relevant mitigation actions	• Legacy (2009) HMP MAP initiatives' status • Identify new mitigation actions for newly identified hazard implementation • Develop community specific capability assessment(s)	• Annually review action's progress, status, and feasibility

* F:Fulfilled NF: Not Fulfilled

3.5 2018 UPDATE HMP PLANNING ACTIVITIES

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

Table 3-3 Public Involvement Mechanisms

Mechanism	Description
Newsletter #1 Distribution (Oct. 16, 2018)	The jurisdiction distributed their 1st newsletter introducing the upcoming planning activity. The newsletter encouraged the whole community to provide hazard and critical facility information. It was posted through Wrangell's offices, stores, and bulletin boards to enable the widest dissemination.
Agency Involvement Email (November 12, 2016)	Invited agencies to participate in mitigation planning effort and to review applicable newsletters located on the DHS&EM Local/Tribal All Hazard Mitigation Plan Development website at: http://ready.alaska.gov/plans/localhazmitplans
Newsletter #2 Distribution (Date 2019)	The jurisdiction distributed their second newsletter describing the draft MJHMP's availability and presented potential projects for review. The newsletter encouraged the whole community to provide comments or input. It was posted at Wrangell area offices, stores, and bulletin boards, stores to enable the widest dissemination.
HMP Reviews Opportunities	The planning team reviewed each section during MJHMP development and final HMP review.
Public HMP Progress Notifications	Team members engaged their "public" during borough and tribal council meetings to encourage discussion concerning the 2019 MJHMP update's progress and about HMP review opportunities throughout the project.
Public Comments	CBW planning team reviewed the initial draft MJHMP and posted comments received as of 01/13/19 on the Planning and Zoning

Table 3-3 Public Involvement Mechanisms

Mechanism	Description
	Commission's website for public review. Comments were available at: http://www.wrangell.com/planning/multi-jurisdictional-hazard-mitigation-plan
	Public comments were received during development and during the final draft HMP review period. Comments were reviewed and vetted by the Planning and Zoning Commission. Valid comments were included within the MJHMP before finalizing the plan.

AECOM initially reached out through email with City Manager Lisa Von Bargen, the Wrangell Cooperative Association (WCA), and the Central Council of the Tlingit and Haida Indian Tribes of Alaska on January 16, 2018. The not explained the HMP update project and sought participation with the recipients.

On July 20, 2018 Ms. Von Bargen was very excited that Wrangell was included within DHS&EM's Pre-Disaster Mitigation grant and the prospects of completing the hazard mitigation plan. She stated the original 2009 HMP was insufficient as it did not address any of their critical infrastructure. AECOM provided a hazard mitigation plan update overview and a draft newsletter and updating with future distribution. Unfortunately, there was not further contact between AECOM and the Borough until Borough staff reached out in October 2018 to understand more as to what the process should be and how to start.

WCA President worked with the City and Borough of Wrangell and WCA Tribal Council to review the legacy HMP and provide information throughout the 2018 MJHMP update planning process.

Public meeting notices were posted throughout the community (Offices, businesses, post office, public bulletin boards, etc.) announcing the November 27th Assembly Meeting's agenda; encouraging attendance and participate in the plan update process and the introductory newsletter was disseminated.

The planning team identified seven natural hazards: earthquake, flood/erosion, ground failure (landslide), severe weather, tsunami, volcanic ash, and wildland fire concerns for their community.

AECOM described the specific information needed from the planning team to assess critical facility, infrastructure, and residential vulnerability and population risk by their location, facility value, and population risk.

The risk assessment was completed after the community asset data was collected by the planning team during 2018 and early 2019, which identified the assets that are exposed and vulnerable to specific hazards.

The planning team evaluated these facilities and their associated risks to facilitate creating a viable or realistic risk analysis and subsequent vulnerability assessment for the Wrangell area.

A planning team meeting was held in February, 2019 to review legacy 2009 mitigation actions, determine their current status, and identify new mitigation actions identified based on the results of the risk assessment. A second newsletter was prepared and delivered on Date, 2019 describing

the process to date, presenting the newly identified and prioritized mitigation actions, and announcing the availability of the draft MJHMP for public review and comment.

The planning team held a special meeting on Date, 2019 to review the draft MJHMP for accuracy – ensuring it meets borough and tribal needs.

Note: Neither the borough nor the tribe received public comments either during HMP development or during the draft review period.

3.6 PLAN MAINTENANCE

This section describes a formal plan maintenance process to ensure that the MJHMP remains an active and applicable document. It includes an explanation of how the community's planning team intends to organize their efforts to ensure that improvements and revisions to the MJHMP occur in a well-managed, efficient, and coordinated manner. The planning team will:

- Incorporate and integrate MJHMP components into existing planning mechanisms
- Continue public involvement
- Monitor, review, evaluate, and update the MJHMP annually

3.6.1 Incorporating Existing Plans and Other Relevant Information

During the 2018 MJHMP update planning process, the planning team reviewed and incorporated pertinent information from resources that became available since the legacy 2009 HMP received FEMA final approval. Data collected included newly available plans, studies, reports, and technical research listed in Table 3-4. These data were reviewed and referenced where applicable for the MJHMP's jurisdictional information, hazard profiles, risk analysis, and vulnerability assessment.

Table 3-4 Documents Reviewed

Existing plans, studies, reports, ordinances, etc.	Contents Summary (How will this information improve mitigation planning?)
Wrangell Household Opinion Survey, 2009	Identified issues relevant to residents concerning quality of life, economic sustainability, waste accumulation and disposal recycling options, electric power intertie, and deep water access location to boost industrial development and employment
Wrangell Water Front Economic Overview, 2014	Provided employment and other economic related data for plan inclusion
Waterfront Master Plan (WMP), 2015	Provided insight into future and planned development
Wrangell Community Profile, 2016	Provided community specific infrastructure and economic, information
Water Treatment Plant (WTP) Upgrade Project Environmental Report, 2016 – 2017	Reviewed for pertinent geological information
Wrangell Borough Comprehensive Plan, (CP) 2010	
Wrangell Capitol Improvement Project (CIP) List, 2016 - 2017	Provided critical facility funding information for risk assessment
Wrangell's History, (Wrangell website 2018)	Provided Wrangell area background information

Table 3-4 Documents Reviewed

Existing plans, studies, reports, ordinances, etc.	Contents Summary (How will this information improve mitigation planning?)
FEMA Map Service Center (MSC)	Provided historic flood hazard area documents and maps
Wrangell Erosion Sediment Control Plan (ESCP)	Describes Wrangell area erosion concern areas
US Army Corps of Engineers, Alaska Baseline Erosion Assessment, 2009	Defined the area'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), 2013	Defined statewide hazards and their potential locational impacts

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

3.6.2 Integrating THMP Precepts into Existing Planning Mechanisms

Each planning team member ensures that the MJHMP, in particular each Mitigation Action Plan's (MAP's) project or initiative, is incorporated into existing city or tribal planning mechanisms whenever possible. Once the MJHMP is community adopted and receives FEMA's final approval, each member of the planning team will undertake the following activities.

This section describes how the City and Borough of Wrangell's (CBW) Planning and Zoning Commission, the Wrangell Coop Association (WCA), and the Central Council of the Tlingit and Haida Indian Tribes of Alaska CCTHITA (planning team) intends to implement, coordinate or integrate existing planning mechanisms into the MJHMP, as stipulated in the DMA 2000 and its support regulations.

The CBW planning team did not integrate any legacy 2009 HMP components into other planning mechanisms; or initiatives during the legacy 2009 HMP's five-year lifecycle.

Like most Alaska communities there is continuous staff turnover. New leadership is in the process of working with Wrangell department leads to integrate MJHMP components into existing planning documents and procedural mechanisms.

Wrangell hosts various annual outreach activities every summer which gives the CBW planning team opportunities to present MJHMP initiatives and philosophies to the public during these meetings. These activities provide platforms to facilitate public discussion and to explain the need to integrate MJHMP precepts into city and tribal planning initiatives. The most effective events include annual *Please provide sample outreach events the CBW can use as a platform to present mitigation opportunities such as a Permitting workshop, Health Fair, Ports and Harbors events, etc. where department leads can share the MJHMP's Annual Review Questionnaire and the Annual Mitigation Action Progress Report to encourage the community to become aware and engaged with selecting and prioritizing the most appropriate mitigation initiatives and other planning components*

Once the MJHMP is city and tribally adopted and receives FEMA's final approval, each planning team member commits to integrating MJHMP components within future plans, processes, and studies. They additionally commit to seeking additional opportunities to integrate the MJHMP's Mitigation Action Plan's (MAP's) projects or initiatives, whenever possible. The planning team members will individually strive to undertake the following activities that fall under their areas of responsibility.

- Review community-specific regulatory tools to assess integrating MJHMP components. These regulatory tools are identified in Section 7, Capability Assessment section.
- Work with pertinent community departments to increase MJHMP awareness and provide assistance with integrating the mitigation strategy (including the MAP) into relevant planning mechanisms.
- Responsible authorities will track their respective project or action's status and annually report their progress as well as their mitigation success, or failure. (See Section 7.7 and 7.8)

Note: *Implementing these requirements may require updating or amending specific planning mechanisms.*

3.6.3 Continued Public Involvement

The Wrangell planning teams did not conduct their HMP maintenance commitments, therefore neither was their "public" engaged during the legacy HMP's five-year life cycle.

The entire community is recommitted to involving the public directly in the continual reshaping and updating the MJHMP. A paper copy of the MJHMP and any proposed changes will be available at the City and Tribal offices; along with an address and phone number of the planning team leader to whom people can direct their comments or concerns.

The CBW, WCA, and the Central Council of the Tlingit and Haida Indian Tribes of Alaska (CCTHITA) will strive to continue identifying opportunities to raise community awareness about the MJHMP and the hazards that affect the area. This effort could include attendance and provision of materials at City- and Tribal-sponsored events, and outreach projects (such as – see the outreach ideas listed above) to share identified activities. Also list in Section 3 public mailings, and website development and Section 7, Mitigation Strategy. Any public comments received regarding the MJHMP will be collected by the planning team leader who will include the information within the annual report for consideration during future MJHMP updates.

3.6.4 Monitoring, Reviewing, Evaluating, and Updating the MJHMP

The MJHMP was prepared as a collaborative effort with CBW, WCA, and the CCTHITA. The planning team will build upon previous hazard mitigation planning efforts and successes. CBW, WCA, and the CCTHITA will continue to use their respective planning teams to monitor, review, and evaluate the MJHMP annually and update the plan as required .

3.6.4.1 Planning Team MJHMP Maintenance Recommitment

The CBW, WCA, and the CCTHITA commits to organizing their efforts to ensure that future HMP improvements and revisions occur in a well-managed, efficient, and coordinated manner. The planning team will follow these three process steps:

Legacy 2009 HMP maintenance activities were not conducted during plan's five-year lifecycle. Subsequently, each section of the 2009 HMP was reviewed and edited to reflect changes since it was implemented. (See Section 3.4 and Table 3-2)

The CBW planning team intends to organize their efforts to ensure that 2019 MJHMP's improvements and revisions occur in a well-managed, efficient, and coordinated manner. The planning team will follow these three process steps:

1. Review and revise the 2019 MJHMP to reflect how development changes could be affected by identified natural hazards, planning process improvements, project implementation progress, project priority changes, and mitigation strategy progress.
2. Submit MJHMP update at the end of its five-year life cycle for State and FEMA review and approval.
3. Continually strive to implement and integrate mitigation initiatives within community documents.

3.6.4.2 Monitoring the MJHMP

The planning team did not monitor any legacy 2009 HMP components. Therefore, no projects or initiatives were accomplished that needed closure.

The city and tribal councils will monitor the plan continually, evaluate the plan annually and update the plan every five years, or within 90 days of a presidentially declared disaster (if required), or as necessary to reflect changes in state or federal law.

The HMP Annual Progress Report and Annual Evaluation Forms are plan review tools (Appendix F). The city and tribal councils, with advisement from the SHMO and FEMA, determines when significant changes warrant an update prior to the scheduled date.

Each authority identified in the Mitigation Action Plan (MAP) matrix (Table 7-10) will be responsible for implementing the MAP and determining whether their respective actions were effectively implemented.

The city and tribal councils will work together to appoint the most appropriate planning team leader, who will serve as the primary point-of-contact and will coordinate local efforts to monitor, evaluate, revise, and update MJHMP mitigation strategy actions' progress, status, and closure status (Section 7-7 and 7.8).

3.6.4.3 Reviewing the MJHMP

The planning team recommits to reviewing their successes and challenges for integrating MJHMP's components into existing and newly developed planning mechanisms. This information will be placed in the newly developed Section 7.8, Integrating Mitigation Strategy into Existing Planning Mechanisms.

The planning team will complete other MJHMP maintenance components as described. Projects or initiatives tracking will be completed to assure they are properly managed and closed. The joint Planning Team will strive to integrate MJHMP components into other planning mechanisms or initiatives as their respective councils determine.

Additionally, during each annual review, each authority or agency administering a mitigation project will submit a Progress Report (Appendix F) to the planning team leader. The report will include the mitigation project's current status, including any project changes, a list of identified implementation problems (with appropriate strategies to overcome them), and a statement of whether or not the project has helped achieve the appropriate goals identified in the plan. (See also Section 7.6 and 7.7).

3.6.4.4 Evaluating the MJHMP

The Annual Review Questionnaire (Appendix F) provides the basis for future MJHMP 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 MJHMP 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 authorities, outside agencies', stakeholders', and residents' participation with MJHMP implementation successes
- Identify notable risk changes for each identified and newly considered natural-caused hazards
- Consider land development activities and related programs' impacts on hazard mitigation
- MAP implementation progress and integration (identify problems and suggest improvements as necessary)
- Evaluate MJHMP local resource implementation for identified activities

3.6.4.5 Updating the MJHMP

The CBW planning team recommits to annually reviewing and integrating MJHMP components as described in Section 3.6.4.3; and update the MJHMP every five years (or when significant events such as a disaster declaration or other changes occur). The planning team leader will review their Annual Review Questionnaires (Appendix F) to determine their success with integrating MJHMP components and MAP within other community planning actions.

Completing annual reviews and editing the current plan with this information will reduce the planning team's efforts to update the MJHMP every five years.

Completed Annual Review Questionnaires will enable the team to identify possible changes to, or increases in, development, resource allocations, and garnering additional support for MJHMP integration and implementation (successes, failures, and roadblock experiences) in the MJHMP Mitigation Action Plan by refocusing on new or more threatening hazards, resource availability, and acquiring stakeholder support for the MJHMP project implementation.

No later than the beginning of the fourth year following MJHMP adoption, the planning team leader will undertake the following activities:

- Request grant assistance from DHS&EM to update the MJHMP (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 MJHMP sections that need improvement, the section and page number of their location within the MJHMP, 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 MJHMP 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 community still desires to implement.
  - Prepare a "new" Wrangell MJHMP MAP matrix.
- Prepare a new Draft Updated MJHMP.
- Submit the updated draft MJHMP to the Division of Emergency Management (DHS&EM) and FEMA for review and approval.

3.6.5 Formal State and FEMA MJHMP Review

Completed Hazard Mitigation Plans do not qualify the CBW, WCA, or the CCTHITA mitigation grant program eligibility until their respective city and tribal councils have reviewed and independently adopted the HMP, and the plan has received State and FEMA final approval.

Upon MJHMP completion, the City and participating tribes or their contractor) will submit the completed draft MJHMP to DHS&EM for initial review and preliminary approval. When all corrections are made, DHS&EM will forward the MJHMP to FEMA for their review and conditional approval.

Once the plan has fulfilled all FEMA criteria, the city and tribes will pass their respective formal MJHMP Adoption Resolutions. A copy will be sent to FEMA through DHS&EM for final MJHMP approval. The city and tribes (or their contractor[s]) will include a final copy of their respective FEMA approved documents within the MJHMP.

FEMA's final approval assures the city and tribal eligibility for applying for appropriate mitigation grant program funding.

3.6.6 Tribal or Native Village Mitigation Grant Application Process Considerations

The Indian Reorganization Act (IRA) Tribes can potentially qualify to either apply for applicable grant funding as state sub-applicants; or apply directly to FEMA as eligible federally IRA tribal governments with sovereign authority working directly with government agencies.

Therefore, each eligible Tribe can determine which of the two following options will best fit their needs. These options are:

Option 1:

Each Tribe can submit grant applications through the State with no loss in Tribal governance authorities.

Each Tribe submits their mitigation grant applications to the State Hazard Mitigation Officer (SHMO) for initial State review. This option could potentially enable each Tribe to avoid paying future mitigation project grant funding match.

The SHMO will then coordinate tribal applications within their grant review and prioritization process for potential approval and award. DHS&EM will review, prioritize, and award grants assigning their most current grant recipient cost share requirements to successful grant awardees.

Option 2:

Each eligible Tribe can submit mitigation grant applications directly to FEMA or other granting agencies as sovereign IRA tribal governments who maintain sovereign authority working directly with government agencies.

As an IRA tribe, the Tribal Councils submits their respective mitigation grant applications directly to FEMA with full knowledge that each Tribe will be responsible for providing any applicable programmatic project matching funds.

FEMA will review, prioritize, and award grants assigning their most current grant recipient cost share requirements to each successful grant awardee.

4.0 JURISDICTIONAL ADOPTION

This section is included to fulfill the City and Borough of Wrangell's MJHMP adoption requirements.

The City and Borough of Wrangell, the Wrangell Cooperative Association, and the Central Council of the Tlingit and Haida Indian Tribes of Alaska, two federally recognized (IRA) tribes, are represented in this MJHMP and meet the requirements of Section 409 of the Stafford Act and Section 322 of DMA 2000, and 44 CFR §201.6(c)(5), and §201.7(c)(5) & (6) respectively.

4.1 JURISDICTIONAL ADOPTION

DMA 2000 requirements and implementing city governance regulations for the MJHMP adoption include:

DMA 2000 Requirements
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))
E2. For multi-jurisdictional plans, has each jurisdiction requesting approval of the plan documented formal plan adoption? (Requirement §201.6(c)(5))
Source: FEMA, March 2015.

The City and Borough of Wrangell Assembly adopted the MJHMP on Date, 2019 and submitted the final draft MJHMP to FEMA for formal approval.

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

4.2 TRIBAL GOVERNMENT MJHMP ADOPTION

DMA 2000 requirements and implementing tribal governance regulations for TMP adoption include:

DMA 2000 Requirements
ELEMENT. Tribal HMP Adoption and Assurances
E1. Does the plan include assurances that the tribal government will comply with all applicable Federal statutes and regulations in effect with respect to the periods for which it receives grant funding, including 2 CFR Parts 200 and 3002, and will amend its plan whenever necessary to reflect changes in tribal or Federal laws and statutes? [44 CFR § 201.7(c)(6)]
E2. Does the plan include documentation that it has been formally adopted by the governing body of the tribal government requesting approval? [44 CFR § 201.7(c)(5)]
Source: FEMA, October 2017

The Wrangell Cooperative Association and the Central Council of the Tlingit and Haida Indian Tribes of Alaska are represented in this THMP and meets the requirements of Section 409 of the Stafford Act and Section 322 of DMA 2000, and 44 CFR §201.7(c)(5) & (6).

Tribal Assurance: Evidenced by Section Four of this MJHMP update; by formal Tribal adoption, each Tribe formally adopted the jurisdictional MJHMP. Their respective tribal governments therefore assures they will monitor the plan to evaluate progress and work with the city and borough to update the plan every five years to comply with all applicable federal statutes and regulations in effect with respect to the periods for which it receives grant funding, including 2 CFR parts 200 and 3002. The Wrangell Cooperative Association and the Central Council of the Tlingit and Haida Indian Tribes of Alaska will amend their respective information within the

MJHMP whenever necessary to reflect changes in tribal or federal laws and statutes as required in 2 CFR parts 200 and 3002, and 44 CFR 13.11(c), and 44 CFR 13.11(d).

The Wrangell Cooperative Association Tribal Council formally adopted their Hazard Mitigation Plan on Date, 2019 and submitted the final draft for State and FEMA regulatory review and approval.

The Central Council of the Tlingit and Haida Indian Tribes of Alaska formally adopted their Hazard Mitigation Plan on Date, 2019 and submitted the final draft for State and FEMA regulatory review and approval.

A scanned copy of their respective formal tribal adoptions are included in Appendix C.

5.0 HAZARD ANALYSIS

This section identifies and profiles the hazards that could affect the Wrangell, Alaska area.

5.1 OVERVIEW

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, 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.

5.2 HAZARD IDENTIFICATION AND SCREENING

This is the first step of the hazard analysis. In November, 2018 the planning team reviewed seven possible hazards that could affect the City and Borough of Wrangell. 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 six hazards pose a great threat to the Borough: earthquake, flood/scour, ground failure, severe weather, and wildland/tundra fire; some of which are influenced by increasing changing climate conditions such as late ice formation, early thaw conditions, increased, lack, or inconsistent rain.

Table 5-1 Identification and Screening of Hazards

Hazard Type	Should It Be Profiled?	Explanation
Natural Hazards		
Earthquake	Yes	Periodic, unpredictable occurrences. The Wrangell area experienced minor shaking from the 1964 Good Friday Earthquake and aftershocks along with earthquakes occurring off the coast of Prince of Wales Island. The Wrangell area has experienced 48 earthquakes M4.2 and below since the legacy 2009 HMP was implemented.
Flood (Coastal floods and resultant erosive scour damages)	Yes	There is potential for coastal storm surge flooding exacerbated by high wind, high tides, and rising sea level. Wrangell does not have an entire community storm drainage system. Existing location drainage capacity could be insufficient or culverts could clog and back-up. Many drains go directly into sewer systems. Heavy rain could cause pump failure due to stress and too much water cause great concern.

Table 5-1 Identification and Screening of Hazards

Hazard Type	Should It Be Profiled?	Explanation
Ground Failure (Landslide/Debris Flow, Subsidence, Sink Holes)	Yes	Ground Failure occurs throughout Alaska from avalanches, landslides, melting permafrost, ground subsidence and sink holes. However there is a potential for landslides and small avalanches, and subsidence impacts.
Weather (Severe cold, heat, drought, rain, snow, wind, etc.)	Yes	Severe weather impacts the community with climate change/global warming and changing El Niño/La Niña Southern Oscillation (ENSO) patterns generating increasingly severe weather events such as winter storms, heavy or freezing rain, thunderstorms and with subsequent secondary hazards such as riverine or coastal storm surge floods, landslides, snow, and wind; and more recently from lack of precipitation.
Tsunami (Seiche)	Yes	Wrangell is located at the confluence of three straits, the Stikine, Zimovia, and the Eastern Passage. There has been minor historical tsunami events that caused minor increased (1-foot) tidal run-up.
Volcanic Ash	Yes	Distant volcano generated ash has historically extended to beyond the Wrangell area from very distant volcanoes. Such an event could prevent essential goods delivery to Wrangell's remote island location for an extended period.
Wildland Fire	Yes	The community and the surrounding forest area become very dry in summer months when extreme heat, cause very dry drought conditions. These conditions have historically fueled lightening and human carelessness as fire ignition sources throughout the Wrangell area.

5.3 PLANNING AREA AND HAZARD PROFILES

DMA 2000 requirements and implementing City governance regulations for hazard profile development include:

DMA 2000 Multi-Jurisdictional Requirements
ELEMENTS. Planning Area and Natural Hazard Profiles
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))
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)) 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))
Source: FEMA, March 2015

DMA 2000 requirements and implementing Tribal governance regulations for hazard profile development include:

DMA 2000 Tribal Requirements
ELEMENTS. Planning Area and Natural Hazard Profiles
B1. Does the plan include a description of the type, location, and extent of all natural hazards that can affect the tribal planning area? [44 CFR § 201.7(c)(2)(i)]
B2. Does the plan include information on previous occurrences of hazard events and on the probability of future hazard events for the tribal planning area? [44 CFR § 201.7(c)(2)(i)] B3. Does the plan include a description of each identified hazard's impact as well as an overall summary of the vulnerability of the tribal planning area? [44 CFR § 201.7(c)(2)(ii)]
Source: FEMA, October 2017

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

- Nature (Type)
  - Potential climate change impacts are primarily discussed in the Severe Weather hazard profile but are also identified where deemed appropriate within each hazard profile.
- History (Previous Occurrences)
- Location
- Extent (breadth, magnitude, and severity)
- Impact (Section 5 provides general impacts associated with each hazard. Section 6 provides detailed impacts to Wrangell's residents and critical facilities)
- Recurrence Probability

NFIP insured Repetitive Loss Structures (RL) 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 future recurrence probability (Table 5-3).

Estimating magnitude and severity are determined based on historic events using Table 5-2 identified criteria from narrative descriptions in 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% 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%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% of property is severely damaged.

Similar to estimating magnitude and severity, Probability is determined based on historic events, using Table 5-3 identified criteria, to provide estimated future event recurrence likelihood.

Table 5-3 Hazard Recurrence 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% likely per year. • Event is "Highly Likely" to occur.

Table 5-3 Hazard Recurrence Probability Criteria

Probability	Criteria
3 - Likely	• Event is probable within the next three years. • Event has up to 1 in 3 years chance of occurring (1/3=3%). • History of events is greater than 20% but less than or equal to 33% 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%). • History of events is greater than 10% but less than or equal to 20% 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%). • History of events is less than or equal to 10% likely per year. • Event is "Unlikely" but is possible to occur.

The hazards profiled for the Wrangell area 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.
- **Local and Distant Tsunami** are discussed in Section 5.3.4

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. The following is an excerpt from the 2018 SHMP explaining the intensity and magnitude relationship:

> *The point at the earth's surface directly above earthquake rupture begins is known as its "epicenter." While the epicenter usually experiences the most intense earthquake effects (e.g., shaking), the total area affected can cover hundreds of thousands of square miles, depending on the earthquake's magnitude. Scientists cannot predict earthquakes, and because damage can occur only seconds after rupture initiation, it is important for every Alaskan to know what to do to minimize risk posed by damaging earthquakes.*
>
> *The moment magnitude scale (M_w) is used to describe the size of moderate to large earthquakes, and is objectively based on the amount of physical energy released in an event. The seismic moment of an earthquake (used to calculate the moment magnitude) is based on the area of fault that ruptures in the brittle crust, the average amount of slip (movement) that occurs between the two pieces of crust, and the force that was required to overcome the friction that was holding the pieces of crust together. The moment magnitude scale is logarithmic, meaning that each step up the scale corresponds to an increase of roughly 32 times the amount of energy released. For example, a M8 earthquake releases approximately 32 times more energy than a M7, and approximately 1,000 times more energy than a M_w 6. Conversely, larger earthquakes are less common than smaller earthquakes, such that the smallest earthquakes are extremely frequent, while the largest earthquakes are relatively infrequent. The moment magnitude scale succeeds the Richter and Local magnitude scales, which were based on the amplitude of shaking recorded on paper seismographs.*
>
> *Earthquakes are also classified by their felt effects (e.g., the perceived shaking intensity). However, the effects of an earthquake are directly related to the distance from the earthquake rupture, among other parameters (such as the type of crust where the earthquake occurs). In general, the closer one is to an earthquake epicenter, the more severe the felt effects and damage will be. An earthquake's intensity is described by the Modified Mercalli Intensity (MMI) Scale. As shown in Figure 6-24, the MMI Scale consists of 10 subjective intensity levels ranging from "not felt" to "extreme," with varying amounts of damage associated with each.*

Figure 6-24 also depicts the relation of Modified Mercalli Intensity and ground acceleration, percent (%) g), which is a measure of shaking strength.

INTENSITY	I	II-III	IV	V	VI	VII	VIII	IX	X+
Shaking	Not felt	Weak	Light	Moderate	Strong	Very Strong	Severe	Violent	Extreme
Damage	None	None	None	Very slight	Light	Moderate	Moderate/ heavy	Heavy	Very heavy
Peak Acc	<0.17	0.17-1.4	1.4-3.9	3.9-9.2	9.2-18	18-34	34-65	65-124	>124
Peak Vel	<0.1	0.1-1.1	1.1-3.4	3.4-8.1	8.1-16	16-31	31-60	60-116	>116

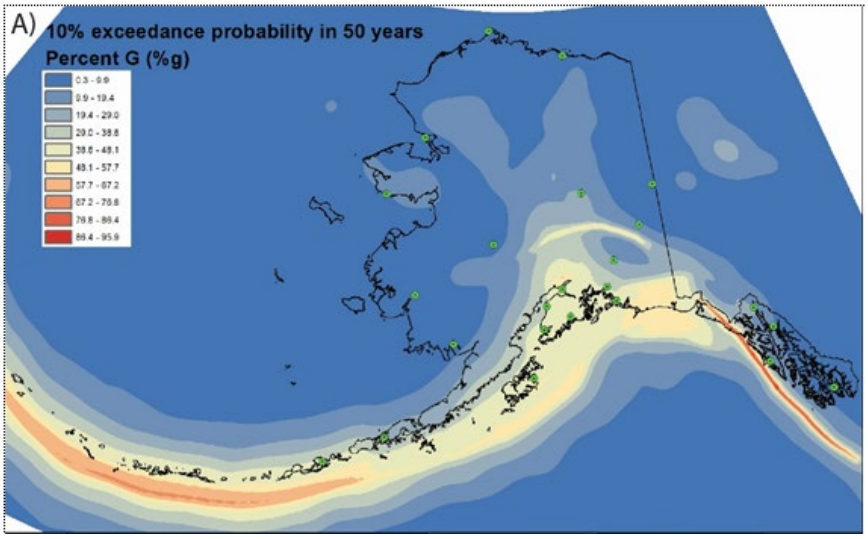
Peak Acc = Peak ground acceleration (g), Peak Vel = Peak ground velocity (cm/s)

Figure 6-24 Perceived Shaking, Potential Damage, and Peak Ground Acceleration
Source: Modified Mercalli scale of ground shaking. http://www.sanandreasfault.org/feelit.html

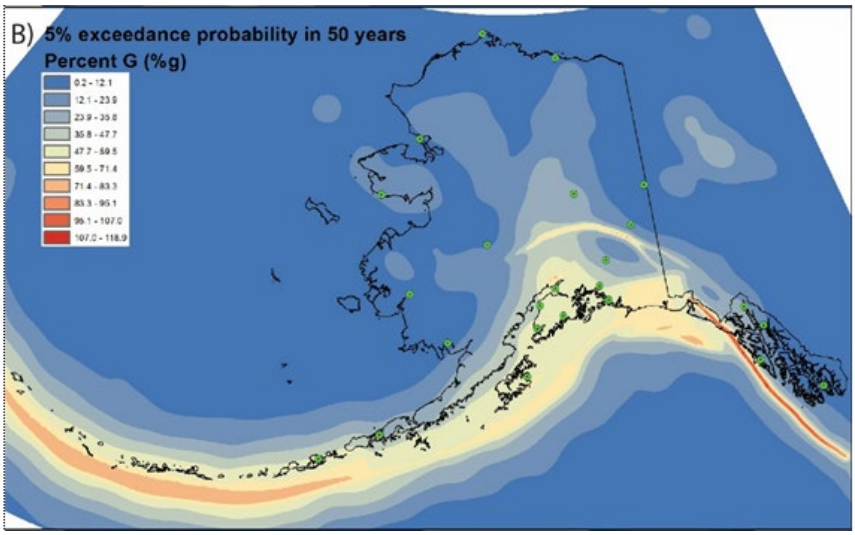
The varying degrees of damage associated with earthquakes are a direct result of the strong ground motions from seismic shaking. The objective classification of earthquake shaking at a point is based on ground accelerations. Ground accelerations (described as a percent of the acceleration of gravity, %g) are measured instrumentally and can be extrapolated between seismic stations after an earthquake occurs. Additionally, ground accelerations are described at different "spectral wavelengths" to describe the types of shaking that affect different building styles; for example, spectral wavelengths of 0.2 seconds affect short, rigid buildings whereas 1 second wavelengths affect multi-story structures. The most universal metric used is the Peak Ground Acceleration (PGA) at a point.

Because earthquakes are impossible to predict, scientists must use a unique approach to describing the hazards posed by earthquakes. Probabilistic Seismic Hazard Analyses (PSHAs) describe earthquake shaking levels and the likelihood that they will occur in Alaska. PSHAs are based on known, mapped geologic faults throughout Alaska and all background seismicity from unknown faults. The result is a visual representation of the peak ground acceleration that has a certain percent chance of being exceeded in a given amount of time (usually 50 years). Figure 6.25 (includes three images) shows three peak ground acceleration maps, the 10, 5, and 2 percent probabilities that certain PGAs will be exceeded in the next 50 years in Alaska. The reason for three maps has to do with earthquake hazard characteristics and their magnitudes. Small earthquakes are frequent, and there is a higher percent chance that they will happen in any given year (a 10 % chance in 50 years means a 0.21% annual exceedance probability—there is a 0.21% chance that the earthquake will happen in a given year). Large earthquakes are infrequent, so there is lower percent chance that they will happen in a given year (a 2% chance in 50 years means a 0.04% annual exceedance probability—there is a 0.04% chance that the earthquake will happen in a given year). However, when the infrequent, large earthquakes occur, there are stronger ground accelerations.

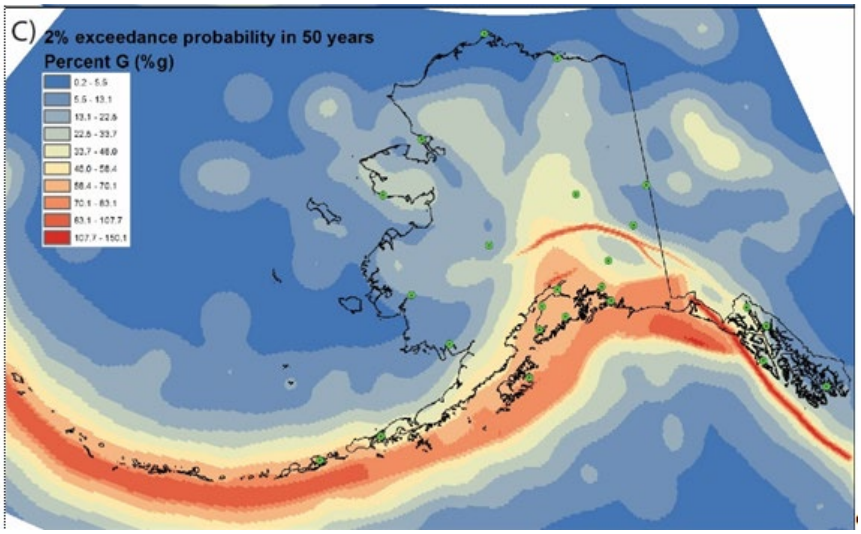
To use these maps, first pick the type of earthquake in which you are interested. For infrequent, large, and destructive earthquakes you would use the 2% in 50 years exceedance probability (Figure 6-25 C). Next, choose your location, and note the color of the map there. For this example, choose Fairbanks, and see that the city is in the yellow zone. Look at the explanation on the map to see the range of ground accelerations that the color represents, in this case 34-53 %g for Fairbanks in Figure 6-25 C. That means that in Fairbanks, the peak ground acceleration that has a 2% chance of being exceeded in 50 years (or 0.04% chance in any given year) is 34-53 % g, which corresponds to shaking that is perceived as very-strong to severe, and may cause moderate to moderate/heavy damage (Figure 6-24).


A)
10% exceedance probability in 50 years
Percent G (%g)
0.3 - 9.9
9.9 - 19.4
19.4 - 29.0
29.0 - 38.6
38.6 - 48.1
48.1 - 57.7
57.7 - 67.2
67.2 - 76.8
76.8 - 86.4
86.4 - 95.9

6-25 A


B)
5% exceedance probability in 50 years
Percent G (%g)
0.2 - 12.1
12.1 - 23.9
23.9 - 35.8
35.8 - 47.7
47.7 - 59.5
59.5 - 71.4
71.4 - 83.3
83.3 - 95.1
95.1 - 107.0
107.0 - 118.9

6-25 B


C)
2% exceedance probability in 50 years
Percent G (%g)
0.2 - 5.5
5.5 - 13.1
13.1 - 22.6
22.6 - 33.7
33.7 - 46.0
46.0 - 58.4
58.4 - 70.1
70.1 - 83.1
83.1 - 107.7
107.7 - 150.1

6-25 C

Figures 6-25 PGAs – 10%, 5%, and 2% Exceedance Probabilities in 50 Years.
Green dots show locations of significant population centers. Earthquakes with a high exceedance probability (e.g., 10% in 50 years) are common, and therefore are smaller earthquakes with less severe ground shaking. Earthquakes with a low exceedance probability (e.g., 2% in 50 years) are uncommon, but when they do occur, the earthquakes are large and have more severe shaking. Source: USGS 2018

5.3.1.2 History

Accurate seismology for Alaska is relatively young with historic data beginning in 1973 for most locations. Therefore, data is limited for acquiring long-term earthquake event data. The MJHMP's Alaska earthquake information is based on best available data; obtained from the U.S. Geological Survey (USGS) and the State of Alaska, UAF Geophysical Institute's archives. Research included searching the USGS earthquake database for events since the legacy 2009 HMP was implemented to present; none of which exceeded M4.2 located within 100 miles of CBW.

The 1995 "Overview of Environmental and Hydrogeologic Conditions at Wrangell, Alaska," USGS, Open File Report 95-344 prepared for the Federal Aviation Administration describes the Wrangell area seismically relevant location:

> ***Geology***
>
> *The geology of Wrangell Island has been described by Berg (1980), Karl and Koch (1985, 1990), Hunt and Brew (1986), Brew and others (1989), and Berg and Gehrels (1992). The bedrock on Wrangell Island consists of sedimentary and intrusive rocks of Cretaceous age. The sedimentary rocks consist of marine gray wacke, mudstone, and minor amounts of limestone (Berg and Gehrels, 1992). Other rock types on the island include andesitic to basaltic volcanic rocks.*
>
> *Wrangell Island lies within the circum-Pacific seismic belt that rims the north Pacific Ocean. The area is traversed by the Chatham Strait Fault, the Fairweather Fault, and numerous smaller faults. In recent years, several earthquakes with Richter scale magnitudes greater than 7 have been recorded along these fault systems.*
>
> *Sources: Brower and others, 1977; Stephens and others, 1986, and USGS 1995*

Current Wrangell area earthquake information is based on best available data; obtained from the U.S. Geological Survey (USGS) and the State of Alaska, UAF Geophysical Institute's archives. Research included searching the USGS earthquake database for events spanning from 1973 to present. Of the 48 events that have occurred since the legacy 2009 HMP was implemented, none exceeded M4.2 located within 109 miles (175 km) of Wrangell.

The planning team determined that based on available recorded data, Wrangell has a minor to moderate concern for earthquake damages as they have not experienced damaging impacts from their historical earthquake events and only need to be concerned with earthquakes with a magnitude >M5.0. Table 5-4 highlights the largest two events (M4.2) occurring on April 29, 2013 and November 8, 2009.

Table 5-4 Wrangell's Historical Earthquakes Since 2009

Date	Latitude	Longitude	Depth	Magnitude	Distance (Miles)
5/22/2017	57.7093	-132.5577	5	2.7	102km NNE of Petersburg, AK
3/24/2017	57.7328	-132.4347	1	2.5	107km NNE of Petersburg, AK
1/26/2017	57.6921	-132.3284	10	2.8	105km NNE of Petersburg, AK
1/26/2017	57.7187	-132.4169	1	3.1	106km NNE of Petersburg, AK
11/14/2016	57.8586	-133.0732	1	2.5	93km ESE of Juneau, AK
10/26/2016	57.4371	-132.936	1	2.5	69km N of Petersburg, AK
9/5/2016	57.882	-133.124	7.98	2.8	89km ESE of Juneau, AK
6/10/2016	57.7006	-132.4483	5	2.9	103km NNE of Petersburg, AK
5/12/2016	56.0847	-130.2367	1	3.1	22km NW of Hyder, AK
11/18/2015	57.2359	-132.908	1	2.8	47km N of Petersburg, AK
9/11/2015	55.8863	-129.9554	10.52	2.8	5km SE of Hyder, AK
7/9/2015	57.8727	-133.0582	1	2.7	93km ESE of Juneau, AK
3/29/2015	57.436	-132.592	1	2.5	72km NNE of Petersburg, AK
3/14/2015	57.479	-132.525	1	2.8	78km NNE of Petersburg, AK
10/20/2014	57.369	-132.7648	1	3.4	63km N of Petersburg, AK
9/13/2014	55.842	-130.0933	1	2.9	9km SSW of Hyder, AK
3/2/2014	57.878	-132.035	1	3.3	130km NNE of Petersburg, AK
11/6/2013	55.715	-134.837	14.9	3.3	109km WNW of Craig, AK
5/27/2013	55.571	-134.486	5	3.2	Southeastern AK
4/29/2013	56.324	-131.232	5	4.2	70km E of Wrangell, AK
4/14/2013	57.333	-132.862	5	2.7	Southeastern AK
1/5/2013	55.775	-134.79	10	2.9	Southeastern AK
1/5/2013	56.169	-134.84	0.1	2.5	Southeastern AK
1/5/2013	55.83	-134.671	10	2.7	Southeastern AK
1/5/2013	55.5	-134.546	10	2.8	Southeastern AK
1/5/2013	56.115	-135.131	4.4	3.8	Southeastern AK
1/5/2013	55.583	-134.677	10	2.7	Southeastern AK
1/5/2013	55.945	-135.047	10	4	Off the Coast of Southeastern AK
1/6/2012	57.19	-131.94	1	3.5	British Columbia, Canada
12/25/2011	57.693	-132.132	20.5	3.1	Southeastern AK
4/27/2011	56.508	-134.999	1	2.9	Southeastern AK
4/6/2011	58.0041	-133.0047	0	2.8	Southeastern AK
12/8/2010	56.5504	-134.4532	8.4	2.8	Southeastern AK
11/9/2010	57.7858	-133.2808	0	2.7	Southeastern AK
9/20/2010	56.8598	-134.6434	16.6	3.4	Southeastern AK
6/16/2010	56.7291	-132.345	13.5	2.6	Southeastern AK
4/9/2010	57.413	-132.823	10	2.6	Southeastern AK
4/6/2010	55.2797	-133.5611	17.8	3.3	Southeastern AK
11/9/2009	57.699	-132.497	1	3.5	Southeastern AK
11/9/2009	54.979	-132.744	15	2.8	Dixon Entrance Region, USA-Canada

Table 5-4 Wrangell's Historical Earthquakes Since 2009

Date	Latitude	Longitude	Depth	Magnitude	Distance (Miles)
11/8/2009	54.93	-132.655	10	2.6	Dixon Entrance Region, USA -Canada
11/8/2009	54.94	-132.662	25	2.6	Dixon Entrance Region, USA -Canada
11/8/2009	54.929	-132.785	10	2.8	Dixon Entrance Region, USA -Canada
11/8/2009	54.97	-132.891	19.2	2.8	Dixon Entrance Region, USA -Canada
11/8/2009	54.95	-132.508	10	2.5	Dixon Entrance Region, USA -Canada
11/8/2009	54.945	-132.789	14.9	4.2	Dixon Entrance Region, USA -Canada
11/8/2009	54.91	-132.651	10	3.2	Dixon Entrance Region, USA -Canada
1/8/2009	56.539	-134.637	18.7	3.1	Southeastern AK

(Source: USGS 2018)

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. However, Wrangell residents experienced minimal ground motion from this historic event.

5.3.1.3 Location, Extent, Impact, and Recurrence Probability

Location

The entire geographic area of Alaska is prone to earthquake effects. The USGS earthquake catalog indicates the CBW earthquakes magnitude averaged M2.9 since 1973. These data should be fairly accurate since state installed a seismometer (equipment that measures the direction, intensity, and duration of earthquakes by measuring actual ground movement in close proximity to Wrangell Shoemaker Bay.

Figure 5-1 provides the following earthquake fault and magnitude image that depicts events spanning a 1-year timeline.

> *…a visual representation of one year of earthquakes in Alaska. Note that the majority of the earthquakes shown in 6-21 are small-magnitude events, as small earthquakes are exponentially more common than large, destructive earthquakes. For comparison, Figure 6-26 shows all[moment magnitude] Mw 5+ earthquakes from 1990 to mid-2018. There are significantly fewer Mw 5+ events.*

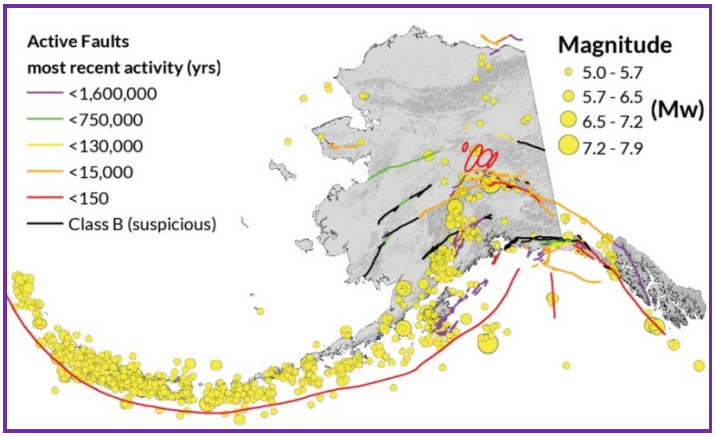


Figure 5-1 Alaska's Known Active Faults

Colored by activity recency. The North American plate and the Pacific plate are converging at the Alaska-Aleutian subduction zone at a rate of several inches per year. Source: DGGS 2018

Extent

Based on historic earthquake events and the criteria identified in Table 5-2, the magnitude and severity of earthquake impacts in the Wrangell area are considered "Limited" with potential injuries and/or illnesses that do not result in permanent disability; critical facilities could expect to be shut-down for more than two weeks; and more than 10 percent of property is severely damaged with limited long-term damage to transportation, infrastructure, or the economy.

Figure 5-2 shows a extracted portion of the Neotectonic Map of Alaska depicting Wrangell's relatively close proximity (red star) to known earthquake faults.

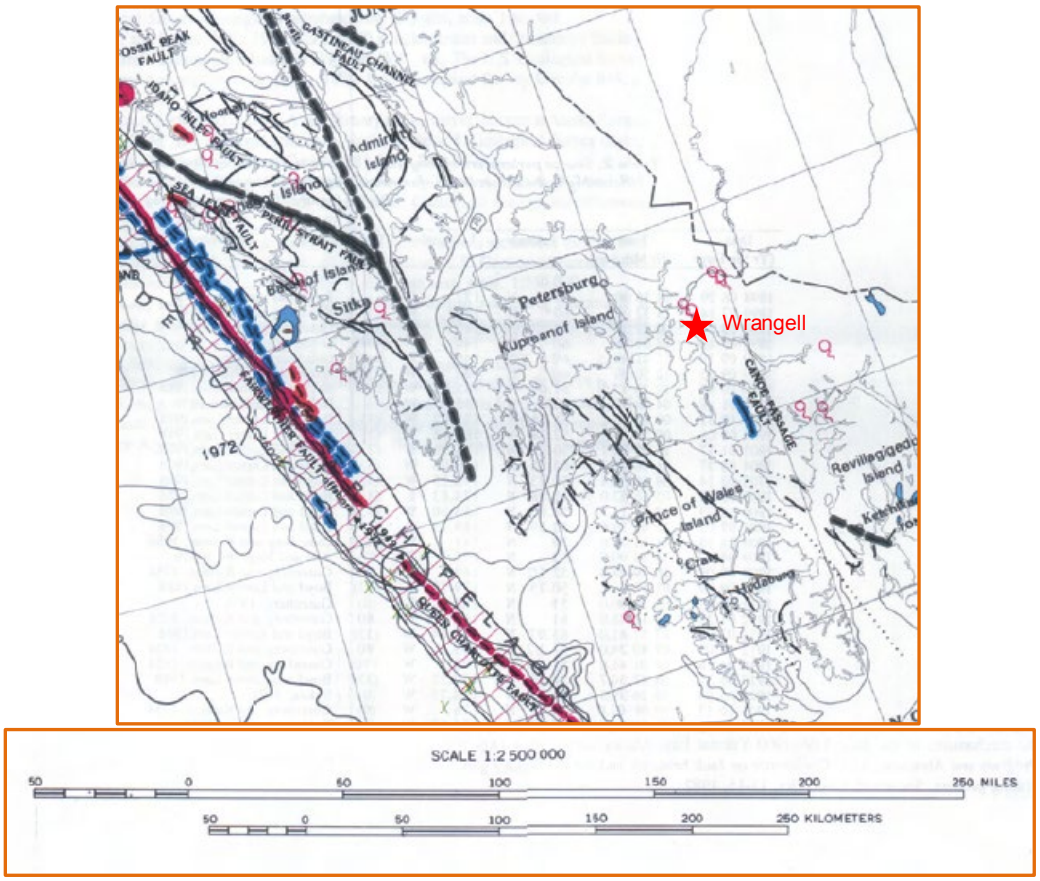


Figure 5-2 Neotectonic Map of Alaska, Wrangell-Petersburg Area
(Source: DGGS 1994)

Impact

Impacts to the community such as significant ground movement that may result in infrastructure damage could occur based on the magnitude or intensity. The Borough's water supply is supplied by two surface reservoirs behind aging earthen dams. Minor shaking has been felt based during past events. Impacts to future populations, residences, critical facilities, and infrastructure could be severe if a high magnitude earthquake were to occur.

Section 6.8, Tables 6-5, 6-6, and 6-7, and Section 6.8.1 lists potential people, property, and infrastructure damage and loss from a worst-case scenario if Seward's entire infrastructure experienced a damaging earthquake event.

Recurrence Probability

Wrangell's historic earthquake history indicates the community could experience a M5.0 or greater earthquake. However an event of that magnitude could be 250 miles distant from the Wrangell area. While it is not possible to predict when an earthquake will occur, the USGS has conducted Probabilistic Seismic Hazard Analyses for the state (Section 5.4.1.1, Figures 6-25a, b, and c). This modeling effort incorporates what is known about Alaska's active faults and current and past seismicity to depict community usable recurrence probability maps.

> *The hazard maps depict the peak ground accelerations expected at a point with 10%, 5%, and 2% exceedance probabilities in 50 years. A useful way to think about these exceedance probabilities is that a 10% chance in 50 years means that statistically this earthquake happens on average every 500 years (Figure 6-25a). A 5% chance in 50 years means that statistically this kind of earthquake happens every 1000 years (Figure 6-25b). A 2% chance in 50 years, is the rare, large earthquake, and statistically it happens on average every 2,500 years (Figure 6-25c). For each of these exceedance probabilities, the color on the map at your location corresponds to a shaking intensity in percent of gravitational acceleration. Source, DGGS, 2018 SHMP*

Wrangell has a low recurrence earthquake probability for an M5.0 event. It is "Unlikely" but possible an event could occur within the next 10 years with a (1/10=10 percent) chance of occurring; due to an event history that is less than or equal to10 percent likely per year.

5.3.2 Flood

5.3.2.1 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.

Two primary flooding types occur in Wrangell: sheet flow (include rainfall and snowmelt runoff) and storm surge floods.

FEMA defines sheet flooding as:

> *Water flows across the surface as either confined or unconfined flow. Unconfined flow moves in broad sheets of water often causing sheet erosion. It can also pick up and adsorb or carry contaminants from the surface. Water that flows along the surface may become trapped in depressions. Here water may either evaporate back into the air, infiltrate into the ground, or spill out of the depression as it fills. If local drainage conditions are inadequate to accommodate rainfall through a combination of evaporation, infiltration into the ground, and surface runoff, accumulation of water in certain areas may cause localized flooding problems.*
>
> *(Source: FEMA* https://training.fema.gov/hiedu/docs/fmc/chapter%202%20-%20types%20of%20floods%20and%20floodplains.pdf

Sheet Flow

- **Rainfall-Runoff Flooding** occurs in is spring 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.
- Dam breach floods are unpredictable. Their longevity is conditional, based on their age, condition, and recurring maintenance consistency, and periodic safety inspection results. These factors combine to determine dam facility current and future stability probabilities.

Storm Surge

Also known as 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 throughout Southeast Alaska's 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, however, winter brings changing wind patterns and directional impacts not normally experienced during other times of the year.

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

Coastal Scour rarely causes death or injury. However, erosive forces 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 and other ground failure events. Erosion is a natural process, but its effects can be easily exacerbated by human activity.

Land scour, no matter the source results from either natural activity or human influences. Coastal damage occurs throughout the area roughly from the top of the bluff 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 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.

Scour damages 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 and dams. Attempts to control erosion using shoreline protective measures such as groins, jetties, seawalls, or revetments can lead to increased erosion.

High water flow forces are embodied in waves, currents, and winds; surface and ground water flow; freeze-thaw cycles may also play a role. Not all of these forces may be present at any particular location. Coastal scour can occur from rapid, short-term daily, seasonal, or annual natural events such as waves, storm surge, wind, coastal storms, and 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.

Many flood damages are predictable based on rainfall and seasonal thaw patterns. Most of the annual precipitation is received from April through October with October being the wettest. This rainfall leads to flooding in late spring/early summer and/or fall. Spring snowmelt increases runoff, which can cause excessive surface flooding. It also breaks riverine winter ice cover, exacerbating localized ice-jam flood or coastal ice override damage impacts.

5.3.2.2 History

The December 15, 1981 City of Wrangell, Alaska, Wrangell-Petersburg Division, FEMA Flood Insurance Study described Wrangell's flood challenges:

> ***2.3 Principal Flood Problems***
>
> *Wrangell has no history of significant waterfront flooding. The Thanksgiving Day storm of 1968, considered to be the major storm of the last decade, produced no unusual flooding hazards, although instances of wind damage were reported. Winds were generally from the southeast, resulting in negligible effects from high waves and storm surge.*
>
> *The storm of October 26, 1976, caused some waterfront damage. The storm was considered less severe by residents than the 1968 Thanksgiving Day storm. However, winds were predominantly from the southwest, and the storm was of unusual duration. The south-westerly winds acting over a relatively long fetch of open water resulted in a combination of high tide and large waves that eroded fill and exposed residences built over the water to wave and log damage. The placed fill, upon which the city dock and barge ramp facilities are built, was severely affected by this storm. From 5 to 6 horizontal feet of fill were lost during the storm. The lost fill has subsequently been replaced; however, armoring was not attempted. The small boat harbor located approximately 5 miles south of the city, in Shoemaker Bay, was also damaged. Fill was lost from the end of the L-shaped levee forming the harbor.*
>
> *Although waterfront flooding has not proved to be a problem in Wrangell, damage from wave action combined with high water can be expected. (Source: FEMA FIS 1981)*

The 1981 FIS included data delineating the following flood recurrence intervals:

> ***3.0 Engineering Methods***
>
> *…Flood events of a magnitude which are expected to be equaled or exceeded once on the average during any 10-, 50-, 100-, or 500-year period (recurrence interval) have been selected as having special significance for flood plain management and for flood insurance premium rates. These events, commonly termed the 10-, 50-, 100-, and 500-year floods, have a 10, 2, 1, and 0.2 percent chance, respectively, of being equalled or exceeded during any year…*
>
> ***[Riverine Analysis]***
>
> *Riverine analyses were limited to approximate studies of Cemetery Creek, Rainbow Falls Creek, and Mill Creek…*
>
> ***[Coastal Analysis]***
>
> *The frequency of occurrence of high water due to coastal flooding consists of three major components: astronomical tide, storm surge, and wave runup…*
>
> *Elevations for floods of the selected recurrence intervals on Zimovia Strait are shown in Table 1.*

Table 1. Summary of Elevations

Flooding Source and Location	Elevation (Feet) 10-Year	50-Year	100-Year	500-Year
Zimovia Strait				
At Point Highfield	22.8	23.3	24.2	24.7
In Wrangell Harbor	18.4	19.8	20.4	22.3
At Point Shekesti	20.5	22.0	22.7	25.0
At Cemetery Point	20.7	21.2	21.3	23.4
At Shoemaker Bay	20.7	21.2	21.3	21.7

The 1995 "Overview of Environmental and Hydrogeologic Conditions at Wrangell, Alaska," USGS, Open File Report 95-344 prepared for the Federal Aviation Administration describes the Wrangell area flood threat as:

Floods

The city of Wrangell has a low flood hazard rating and has no history of significant waterfront flooding (Federal Emergency Management Agency, 1981; U.S. Army Corps of Engineers, 1993). Although there is a small risk of flooding by storm-surge or tsunami waves, the Thanksgiving Day Storm of 1968, considered to be the largest storm in recent times, produced no unusual flooding in Wrangell. (Federal Emergency Management Agency, 1981; U.S. Army Corps of Engineers, 1993). Winds at that time were generally from the southeast and the effects from high waves and storm surges were negligible. A storm on October 26, 1976, considered to be less severe than the Thanksgiving Day storm, did cause some waterfront damage near Wrangell (Federal Emergency Management Agency, 1981). The winds were predominately from the southwest, an unusual direction. These winds acting over a large area of water resulted in a combination of high tide and large waves that eroded fill and exposed some homes to minor wave and log damage. Brower and others (1977) describe return periods for maximum wave heights for coastal areas in Alaska. A 100-year-wave more than 20-m high is estimated for coastal areas near Wrangell Island (table 3). A flood of this magnitude may affect the FAA facility which is about 10 m above sea level.

Table 3. *Annual maximum waves for selected return periods near Wrangell, Alaska*
[Modified from Brower and others, 1977]

Return period (years)	*Maximum significant wave (meters)*
5	*12.0*
10	*14.0*
25	*16.0*
50	*18.5*
100	*20.5*

Riprapping of exposed land formations has provided flood protection along Zimovia Strait and the Eastern Passage (Federal Emergency Management Agency, 1981). Protection for the small boat harbor is provided by a rubble mound breakwater constructed in 1926. The structure is well armored and shows no signs of damage (Federal Emergency Management Agency, 1981).

Over-bank flooding of stream channels in southeast Alaska usually occurs during heavy rainfall; snowmelt rarely causes flooding. Rood crests are typically of short duration, often less than one day, and are characterized by a very sharp rise and decline of flow. On September 11,1981 rainfall runoff caused a maximum discharge of about 8,500 m3/s

at U.S. Geological Survey streamgaging station 15024800, on the Stikine River near Wrangell, Alaska (U.S. Geological Survey, 1994). However, no flooding was reported near the city of Wrangell at this time.

Summary

…Flooding by tsunami and storm-surge waves is a low-rated hazard…

(Source: USGS 1995)

There is potential for coastal flooding in some areas due to storm related wave surge, exacerbated by high winds, high tides, and rising sea levels.

The Wrangell planning team further explained they have insufficient drainage infrastructure in many locations throughout the borough. Some locations have connected storm drains other areas do not. Some of the storm drains direct run-off directly into their sewer system. This creates a potentially very serious sanitation threat to the area; if the sewer pumps quit due to water capacity overload, fatigue, or stress the drains will back up and spread their contents throughout the area. The 2010 Wrangell Comprehensive Plan describes the borough's storm water and wastewater discharge concerns as they could potentially increase sheet flow flooding impacts:

7.3.2 Concerns and Opportunities

When there are heavy rains, high volumes of stormwater enter the wastewater system and overwhelm the pumps causing effluent discharge volumes that come close to, and occasionally exceed, permit limits and the treatment capacity of the system. Stormwater enters the wastewater treatment system either through ground water filtration into pipes or through the many commercial and residential storm drains that are directly connected to the wastewater system.

Property owners whose downspouts connect to the wastewater system need to be identified and disconnected. Commercial businesses on Front Street will disconnect their buildings downspouts and drainage from the wastewater system and connect to the storm drainage system as part of the 2010 street reconstruction work. Once the Borough's stormwater management system is improved, the wastewater treatment capacity should be sufficient to meet the community's needs for the next 10 to 20 years.

(Source: Wrangell 2010 CP)

The 2018 DHS&EM Disaster Cost Index (DCI) delineates historical flood events that could have directly or indirectly affected the Wrangell area. The index lists the following events:

3. Wrangell/Craig, November 6, 1978: *During this period an intense storm occurred in the Wrangell/Craig area in Southeastern Alaska generating high winds, torrential rains and heavy sea waves. The storm caused considerable damage to both private and public property in the two communities. Subsequent to the Governor's Proclamation of Disaster Emergency, DHS&EM provided both public assistance and assistance to individuals and families to assist the communities in recovering from the disaster. SBA made disaster loans available to affected businesses and homeowners.*

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

06-216 2005 Southeast Storm (AK-06-216) declared December 23, 2005 by Governor Murkowski: *Beginning on November 18, 2005 and continuing through November 26, 2005, a strong winter storm with high winds and record rainfall occurred in the City/Borough of Juneau, the City/Borough of Haines, the City/Borough of Sitka, the City of Pelican, the City of Hoonah, and the City of Skagway, which resulted in widespread coastal flooding, landslides, and severs damage and threat to life and property, with the potential for further damage. The following conditions exist as a result of this disaster: severe damage to personal residences requiring evacuation and relocation of residents; to individuals personal and real property; to businesses; and to a marine highway system dock, the road systems eroded and blocked by heavy debris that prohibited access to communities and residents, and other public infrastructures, necessitating emergency protective measures and temporary and permanent repairs. The total estimated amount of assistance is approximately $1.87 million. This includes the following: Individual Assistance totaling $500K for 52 applicants and Public Assistance totaling $1.1 million for 14 applicants and 31 PW's. There was no hazard mitigation. Nov 21,08 update—Closeout later to DAS total cost of $1,684,311 (included $183,088 for IA, plus IA Admin of $35,748, PA Grantee admin of $133,779, and subgrantee admin allowance of $30,290.) Lapse to DRF was $183,586. RBS-11/28/08.*

AK-15-254 2015 August Southeast Raines declared by Governor Walker on August 27, 2015: *Commencing on August 14, 2015, the City and Borough of Sitka received almost three inches of rain in six hours. This intense rainfall was accompanied by heavy wind and came on the heels of an unusually wet summer. Due to ground saturation and the wind, the hillsides within the borough failed resulting in* ***three deaths****, seven landslides and a sinkhole. The landslides and heavy rain, damaged homes, roads, and other infrastructure. The City and Borough of Sitka, along with state staff and contracted engineers, are monitoring slope stability to ensure safety of search and rescue and assessment efforts. On August 18, the City and Borough of Sitka declared a local disaster and requested state assistance. They have been fully engaged in debris removal operations since August 19th. After the failure of the slope on August 18, the Borough activated and staffed an emergency operations center to coordinate the response efforts and provide guidance to first responders, with utility and engineering specialists conducting body recovery as well as evaluating the slopes and affected residential areas.*

(Source: DHS&EM DCI 2018)

5.3.2.3 Location, Extent, Impact, and Future Events Probability

Location

The planning team indicated that Wrangell has a minor flooding impact threat; most of which occur from rainfall and snowmelt run-off sheet flow flooding and wind driven wave storm surge. The USGS Hydrogeologic Conditions at Wrangell, Alaska describes their typical minor flood susceptibility:

> *The Skitine River lies north and east of Wrangell Island, the Eastern Passage lies along Wrangell's east side and Zimovia Strait is due west (fig. 1).*

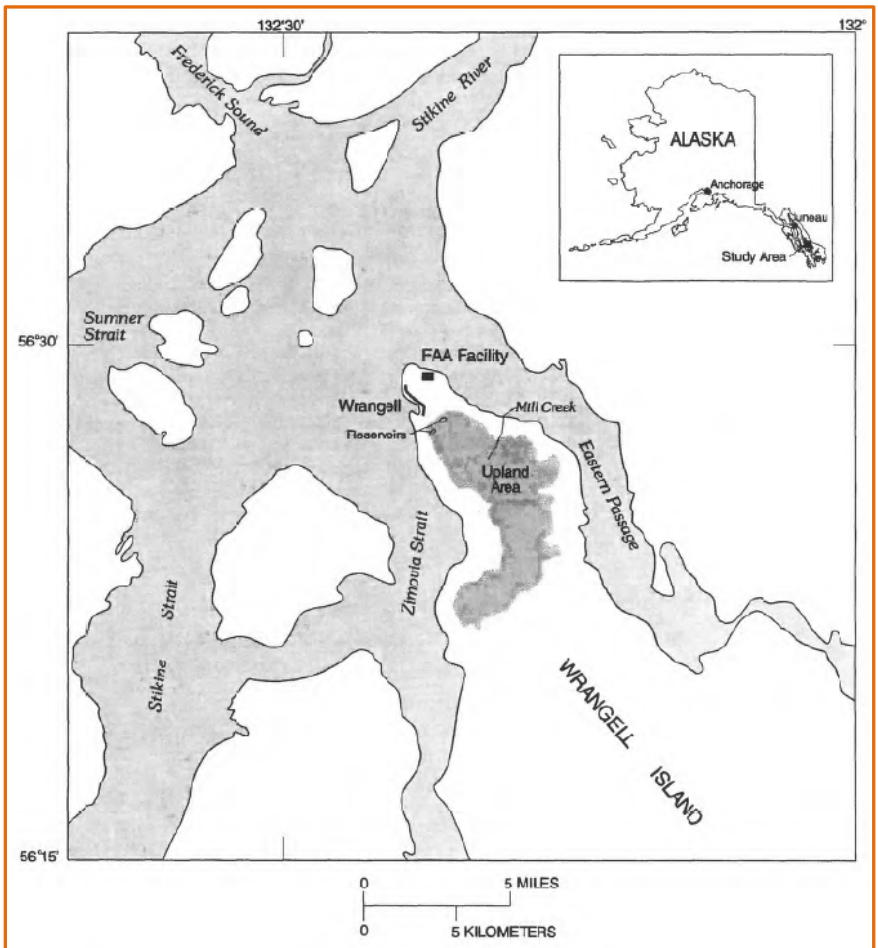


Figure 1. Location of Wrangell, Alaska and the Federal Aviation Administration facility.

The city of Wrangell has a low flood hazard rating and has no history of significant waterfront flooding (Federal Emergency Management Agency, 1981; U.S. Army Corps of Engineers, 1993). Although there is a small risk of flooding by storm-surge or tsunami waves, the Thanksgiving Day Storm of 1968, considered to be the largest storm in recent times, produced no unusual flooding in Wrangell. (Federal Emergency Management Agency, 1981; U.S. Army Corps of Engineers, 1993). Winds at that time were generally from the southeast and the effects from high waves and storm surges were negligible. A storm on October 26, 1976, considered to be less severe than the Thanksgiving Day storm, did cause some waterfront damage near Wrangell (Federal Emergency Management Agency, 1981). The winds were predominately from the southwest, an unusual direction. These winds acting over a large area of water resulted in a combination of high tide and large waves that eroded fill and exposed some homes to minor wave and log damage. Brower and others (1977) describe return periods for maximum wave heights for coastal areas in Alaska. A 100-year-wave more than 20-m high is estimated for coastal areas near Wrangell Island... A flood of this magnitude may affect the FAA facility which is about 10 m above sea level. (Source: USGS Open File Report 95-344)

Wrangell's dams are located on about 0.5 miles east and above the city of Wrangell, on Wrangell Island, in Alaska. The surrounding land is either owned by the Borough, Alaska Mental Health Trust, or part of the Tongass National Forest. CBW's dams are owned and maintained by the City of Wrangell, which uses the water stored in the Lower Reservoir for City water, with the water in the Upper Reservoir replenishing the level of the Lower Reservoir as needed. The two dams are approximately 28 feet high, 315 and 320 feet long, and constructed of earth over log crib dam structures. The dams are about 1,500 feet apart, with an elevation difference of about 64 feet. Figure 5-3, 5-4, and 5-5 provide an aerial view and a topographic view of each reservoir as they pertain to City of Wrangell proximity (2015 Dam Periodic Safety Inspection [PSI]).

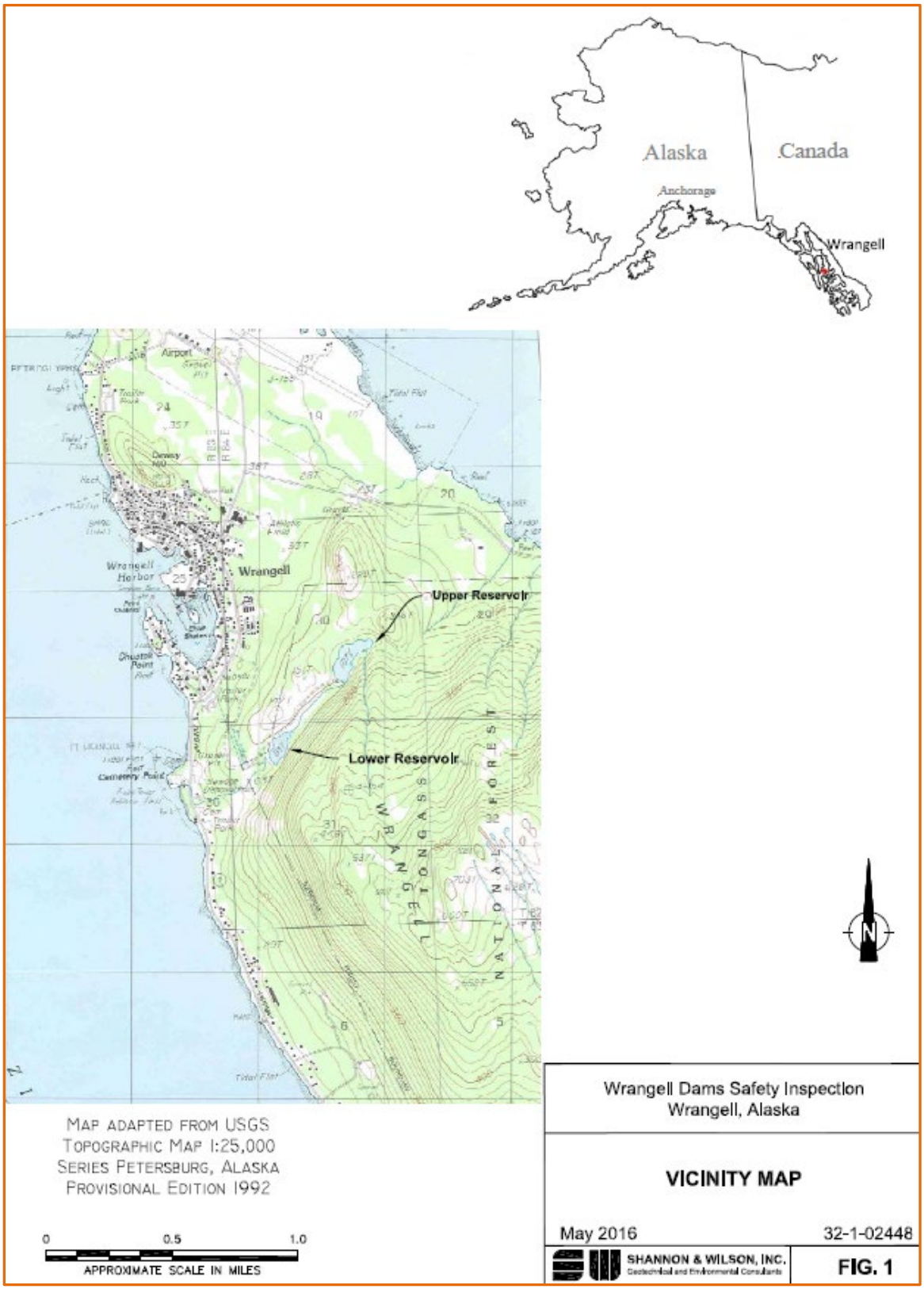


Figure 5-3 Wrangell Reservoir Locations

Source: (2015 Dam PSI)

Figure 5-4 Aerial Image of Wrangell's Reservoirs

Source: (2015 Dam PSI)

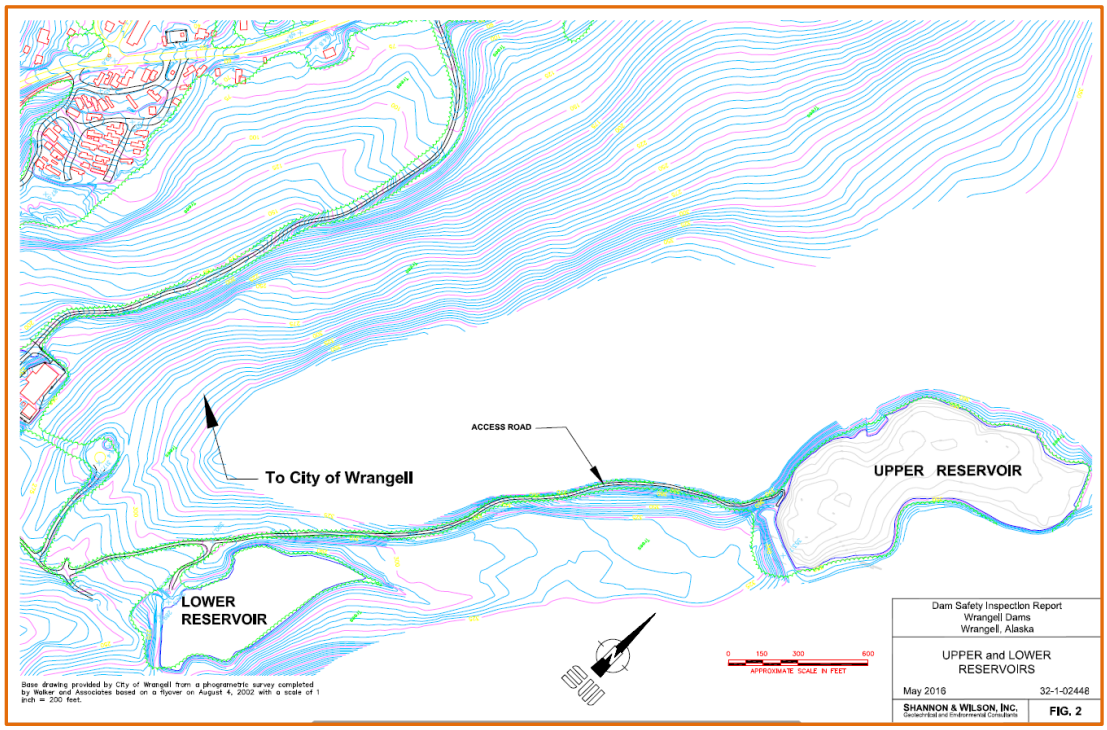


Figure 5-5 Topographic Image of Wrangell's Reservoirs

Source: (2015 Dam PSI)

The May 2016 Periodic Dam Safety Inspection (PSI) report stated that: *"Both dams are marginally stable under static conditions, but are likely not stable under operating basis earthquake (OBE) or maximum design earthquake (MDE). Outlet works for both dams require remediation."*

Therefore based on the 2016 PSI report, if a breach were to occur, the Upper Dam, would likely overtop the Lower Dam and potentially wash out and drain the Lower Reservoir… then flow downstream to impact Wrangell facilities.

Wrangell's 1992 Emergency Action Plan displays potential dam failure flood inundation areas:

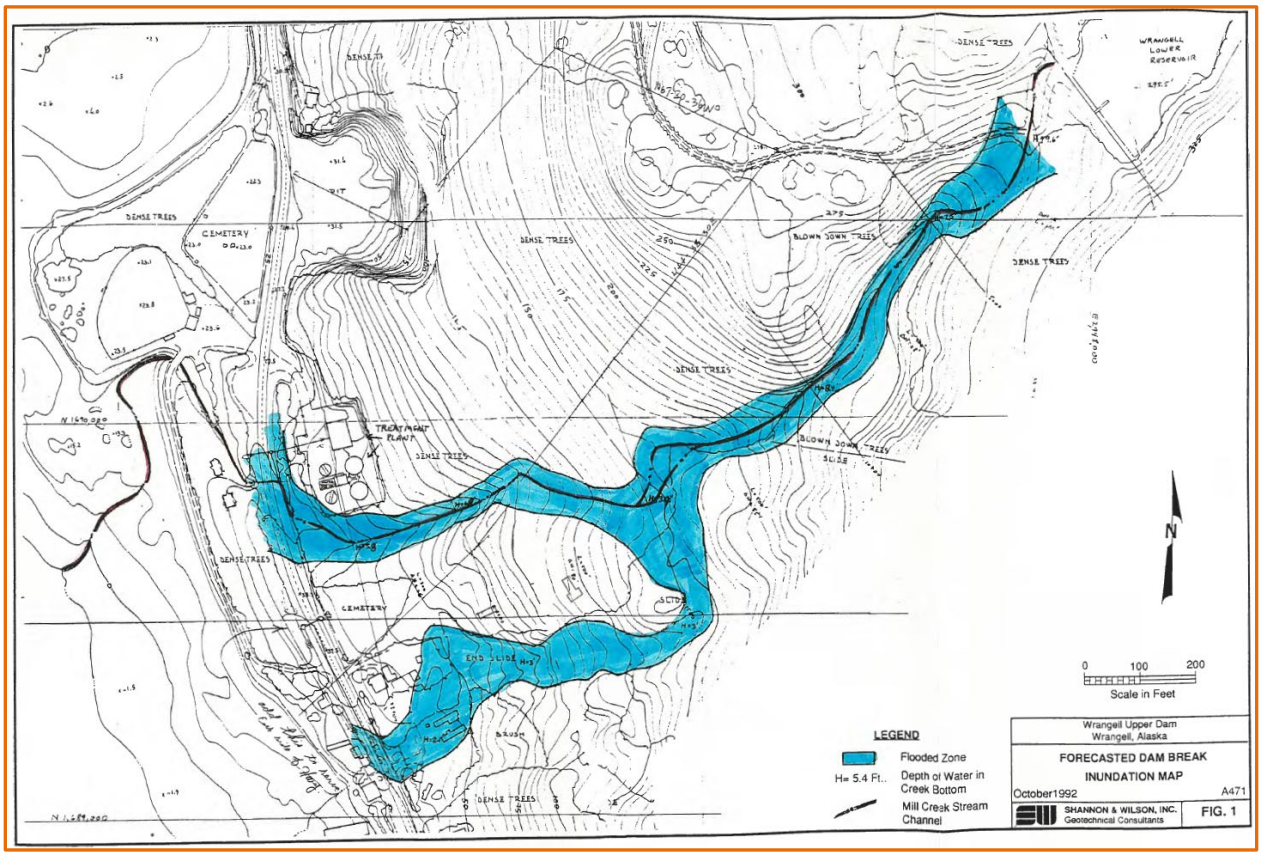


Figure 5-6 Wrangell's Potential Failure Dam Inundation Areas

(Source: Wrangell EAP, 1992)

The planning team stated they experience minor erosion along the island from various seasonal storm sources and directions. High water flow threatens the island's shoreline. Rain and snow melt run-off removes the road topping material, creates severe pot holes, and contributes to increasing landslide potential.

Extent

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

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 attenuating feature existence in the watershed, 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
- Availability of sediment for transport, and the bed and embankment watercourse erodibility
- location related to identified-historical flood elevation

Based on limited historical flood damage history and the criteria identified in Table 5-2, the extent of flooding and resultant damages to infrastructure and their protective embankments in Wrangell are considered "Negligible" where critical facilities would shut-down for 24 hours or less with less 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
- High water flow storm surge floods scour (erode) coastal embankments, coastal protection barriers, and result in infrastructure and residential property losses. Additional impacts can include roadway embankment collapse, foundations exposure, and damaging impacts
- 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, decreasing water conveyance and increasing loads which may cause feature overtopping or backwater damages
- Sewage, hazardous or toxic materials release, materials transport from wastewater treatment plant or sewage lagoon inundation, storage tank damages, and/or severed pipeline damages can be catastrophic to rural remote communities

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 as well as embankment, coastal, and/or wind erosion. 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. Embankment erosion involves material removal from the stream or river banks, coastal bluffs, and dune areas.

When bank erosion is excessive, it becomes a concern because it results in loss of embankment vegetation, fish habitat, and land, property, and essential infrastructure (BKP 1988).

Section 6.8, Tables 6-5, 6-6, and 6-7, and Section 6.8.1 lists potential people, property, and infrastructure damage and loss from a worst-case scenario if Seward's entire infrastructure experienced a damaging flood event.

Recurrence Probability

Based on previous occurrences, USACE Floodplain Manager's report, and criteria in Table 5-3, Wrangell has a low 100-year (1 percent chance of occurring in a given year) flood recurrence probability for an M5.0 event. It is "Unlikely" but possible an event could occur within the next 10 years with a (1/10=10 percent) chance of occurring; due to an event history that is less than or equal to10 percent likely per year.

There is no data identifying a 500-year (0.2 percent chance of occurring in a given year) event for this area.

5.3.3 Ground Failure

5.3.3.1 Nature

Ground failure describes avalanche, landslide, subsidence, and unstable soils gravitational or other soil movement mechanisms. Soil movement influences can include rain, snow, and/or water saturation induced avalanches or landslides; as well as from seismic activity, melting permafrost, river or coastal embankment undercutting, or in combination with 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, avalanches and landslides often occur secondary to other natural hazard events, thereby exacerbating conditions, such as:

- Earthquake ground movement can trigger events ranging from rock falls and topples to massive slides
- Intense or prolonged precipitation can cause slope over-saturation and subsequent destabilization failures such as avalanches and landslides.
- Climate change related drought conditions may increase wildfire conditions where a wildland fire consumes essential stabilizing vegetation from hillsides significantly increasing runoff and ground failure 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.

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 2013 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 the Wrangell area.

5.3.3.2 History

There are few written records defining ground failure impacts to the Wrangell area. However, the planning team states they have potential landslide and other ground failure threats in a couple residential areas.

5.3.3.3 Location, Extent, Impact, and Recurrence Probability

Location

There are various ground failure locations throughout the CBW area. Sources include USACE, NRCS, USGS, as well as other agencies' developed plans and studies. Land subsidence such as floodwater soil saturation cause the most common ground failure impacts in the Wrangell area.

The June 2018 Assembly meeting minutes provides a little in-sight into Wrangell's precipitation, ground water, and soil composition challenges:

> *Wrangell averages over 80 inches of precipitation per year and the former Byford Junkyard site has slopes up to 17%, which together creates the potential for erosion during site operations from run-on and precipitation. In addition, groundwater in this area is usually shallow with variable depths due to the presence of silt/glacial till that controls groundwater flow. There are small drainage channels, and an existing drainage ditch parallel transmitting drainage water to three existing culverts under the Zimovia Highway and into Zimovia Strait approximately 150 feet west of the site.*
>
> *A Storm Water Pollution Prevention Plan (SWPPP) has been prepared for this project and has been previously submitted. Shane O'Neill, Project Site Superintendent for NRC Alaska is CESCL certified and will perform the weekly SWPPP inspections and event inspections. Additional details pertaining to this issue are available within the Plan.*
>
> *Source: 06/18 Meeting Minutes (http://www.wrangell.com/assembly/regular-assembly-meeting)*

According to Permafrost Characteristics Map of Alaska (Figure 5-7) developed for the National Snow and Ice Data Center/World Data Center for Glaciology (Jorgenson et al 2008), shows that Wrangell no permafrost.

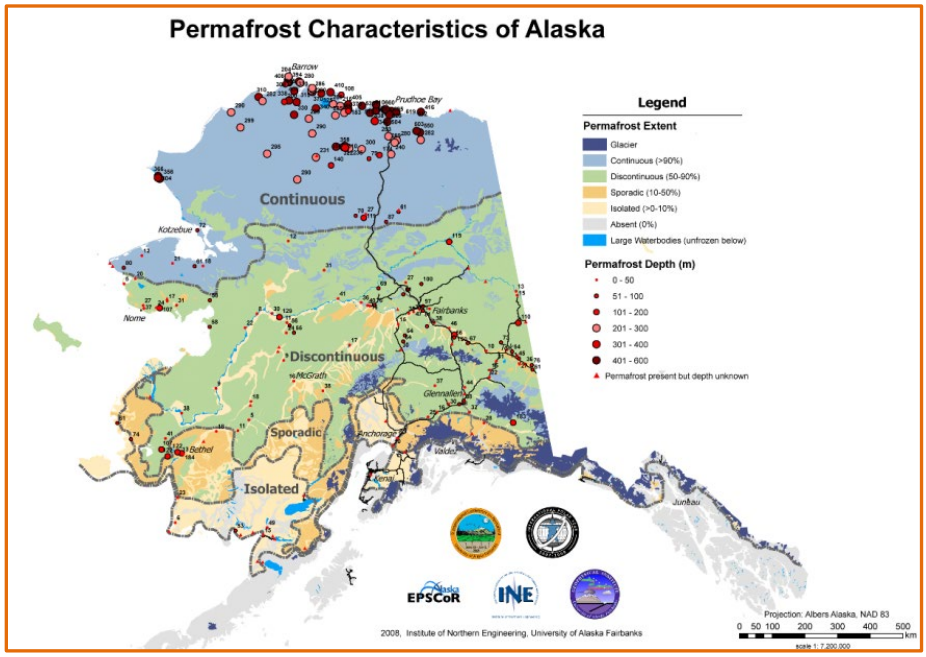


Figure 5-7 Permafrost Characteristics of Alaska

Source: Jorgenson et al 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 or water supply dams) were damaged and transportation or drinking water 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 Wrangell are considered "Negligible". Impacts would not occur quickly but over time with warning signs. The Planning team described ground failure as<

> *...slide impacts usually occur unexpectedly... you think the ground is fine and then it is not there. The [slide events occurred in] areas [that] I am aware of in the community were completely unexpected and happened quickly.*

Therefore Wrangell's landslides would occur quickly with little to no warning. This hazard may not likely cause injuries or death, neither would it likely shutdown critical facilities and services for extensive time periods. However, less than 10 percent of property could potentially receive severe damage.

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.

Section 6.8, Tables 6-5, 6-6, and 6-7, and Section 6.8.1 lists potential people, property, and infrastructure damage and loss from a worst-case scenario if Seward's entire infrastructure experienced a damaging ground failure event.

Recurrence Probability

Even though there are few written records defining ground failure impacts for the Wrangell area, the planning team notes there are recurring landslide, avalanche, and ground failure damages within the community that could threaten structures, roads, and the airport. The planning team stated the probability for ground failure follows the criteria in Table 5-3, future damage probability resulting from ground failure is "Possible" in the few known locations in the next five years, with a (1/5=20%) percent chance of occurring with a history of events greater than 20 percent but less than 33 percent likely per year.

5.3.4 Tsunami and Seiche

5.3.4.1 Nature

A tsunami is a series of waves generated in a body of water by an impulsive disturbance along the seafloor that vertically displaces the water. A seiche is an oscillating wave occurring within a partially or totally enclosed water body.

Subduction zone earthquakes at plate boundaries often cause tsunamis. However, submarine landslides, submarine volcanic eruptions, and the collapses of volcanic edifices can also generate tsunamis. A single tsunami may involve a series of waves, known as a train, of varying heights. In open water, tsunamis exhibit long wave periods (up to several hours) and wavelengths that can extend up to several hundred miles, unlike typical wind-generated swells on the ocean, which might have a period of about 10 seconds and a wavelength of 300 feet.

The actual height of a tsunami wave in open water is generally only 1 to 3 feet and is often practically unnoticeable to people on ships. The energy of a tsunami passes through the entire water column to the seabed. Tsunami waves may travel across the ocean at speeds up to 700 miles per hour (mph). As the wave approaches land, the sea shallows and the wave no longer travels as quickly, so the wave begins to "pile up" as the wave-front becomes steeper and taller, and less distance occurs between crests. Therefore, the wave can increase to a height of 90 feet or more as it approaches the coastline and compresses.

Tsunamis not only affect beaches that are open to the ocean, but also bay mouths, tidal flats, and the shores of large coastal rivers. Tsunami waves can also diffract around land masses and islands. Since tsunamis are not symmetrical, the waves may be much stronger in one direction than another, depending on the nature of the source and the surrounding geography. However, tsunamis do propagate outward from their source, so coasts in the shadow of affected land masses are usually fairly safe.

Local tsunami and seiche events may be generated from earthquakes, underwater landslides, atmospheric disturbances, or avalanches and last from a few minutes to a few hours. Initial waves typically occur quite soon after onslaught, with very little advance warning. They occur more in Alaska than any other part of the US.

A seiche occurs within an enclosed water body such as a lake, harbor, cove or bay. They are localized event-generated waves characterized as a "bathtub effect" where successive water waves move back and forth within the enclosed area until the energy is fully spent causing repeated impacts and damages.

5.3.4.2 History

The City and Borough of Wrangell has minimal tsunamigenic event history. However, Greg Knight Wrangell Sentinel, Wrangell, Alaska reported that on January 10, 2013:

> *A 7.5 magnitude earthquake, with an epicenter located 110 kilometers* [Figure 5-4] *west of Craig and approximately 6 miles under the earth's surface, struck just minutes before midnight on Friday, shaking houses across the region.*

A tsunami warning was initially lodged for almost all of Southeast, including Wrangell and Petersburg, though it was cancelled within hours of the initial quake. No substantial elevation in the tide level at Wrangell or Petersburg was reported….

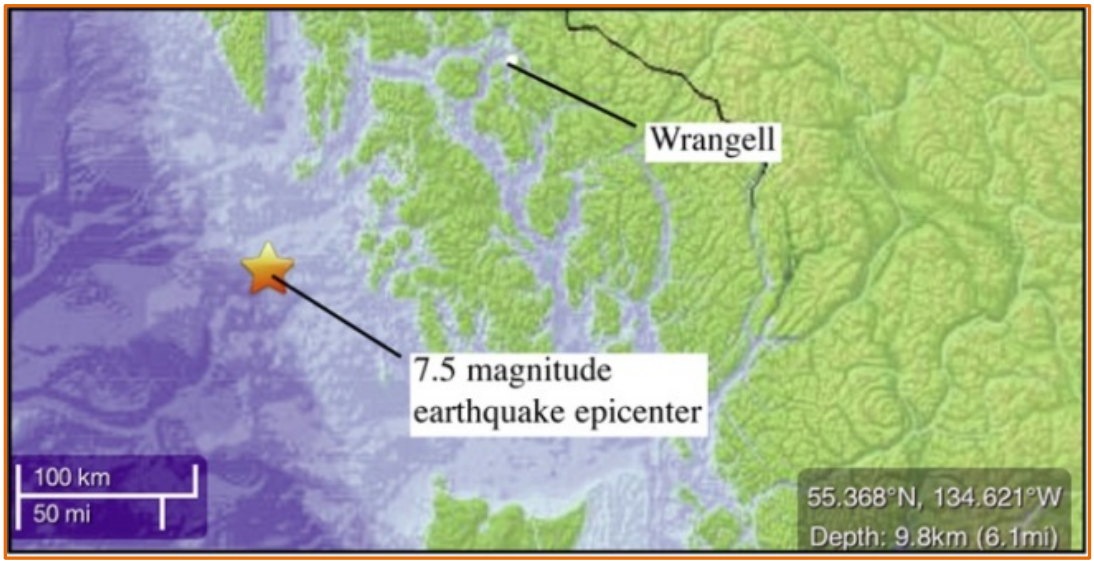


Figure 5-8 7.5 Earthquake – No Tsunami Event

(Source: Wrangell Sentinel: https://www.wrangellsentinel.com/story/2013/01/10/news/major-quake-rattles-wrangell-southeast-alaska/810.html

The West Coast/Alaska Tsunami Warning Center (WC/ATWC) lists the following Alaska earthquake generated tsunamis with observed or measured tsunami waves (Table 5-5) throughout Alaska.

Table 5-5 Alaska's Historic Aleutian Tsunamis Waves

Date	Location	Earthquake Moment Magnitude (MW)	Wave Height	Source	
			Ft./Meters	Latitude	Longitude
November 10, 1938	Alaska Peninsula	8.2 Mw	/0.1	54.48	-158.37
April 1, 1946	Near Unimak Island, Eastern Aleutian Islands, AK	8.6	Unknown	25.8	-163.5
March 9, 1957	South of Andreanof Islands, Central Aleutian Islands, AK	8.3	Unknown	51.5	-175.7
March 27, 1964	Prince William Sound	9.2	/0.35	61.05	-147.48
February 4, 1965	Rat Islands, Western Aleutian Islands, AK	8.7	<0.1	51.29	-178.49
May 7, 1986	Central Aleutian Islands, AK	8.0Mw	0.15	51.52	-166.54
February 21, 1991	Bering Sea	6.7 Mw	0.15	58.43	-175.45
June 10, 1996	Central Aleutian Islands, AK	7.9 Mw	0.6	51.56	-177.63

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

Location

The City of Wrangell indicated by the red stars is located inland from the open Pacific Ocean. Figure 5-9

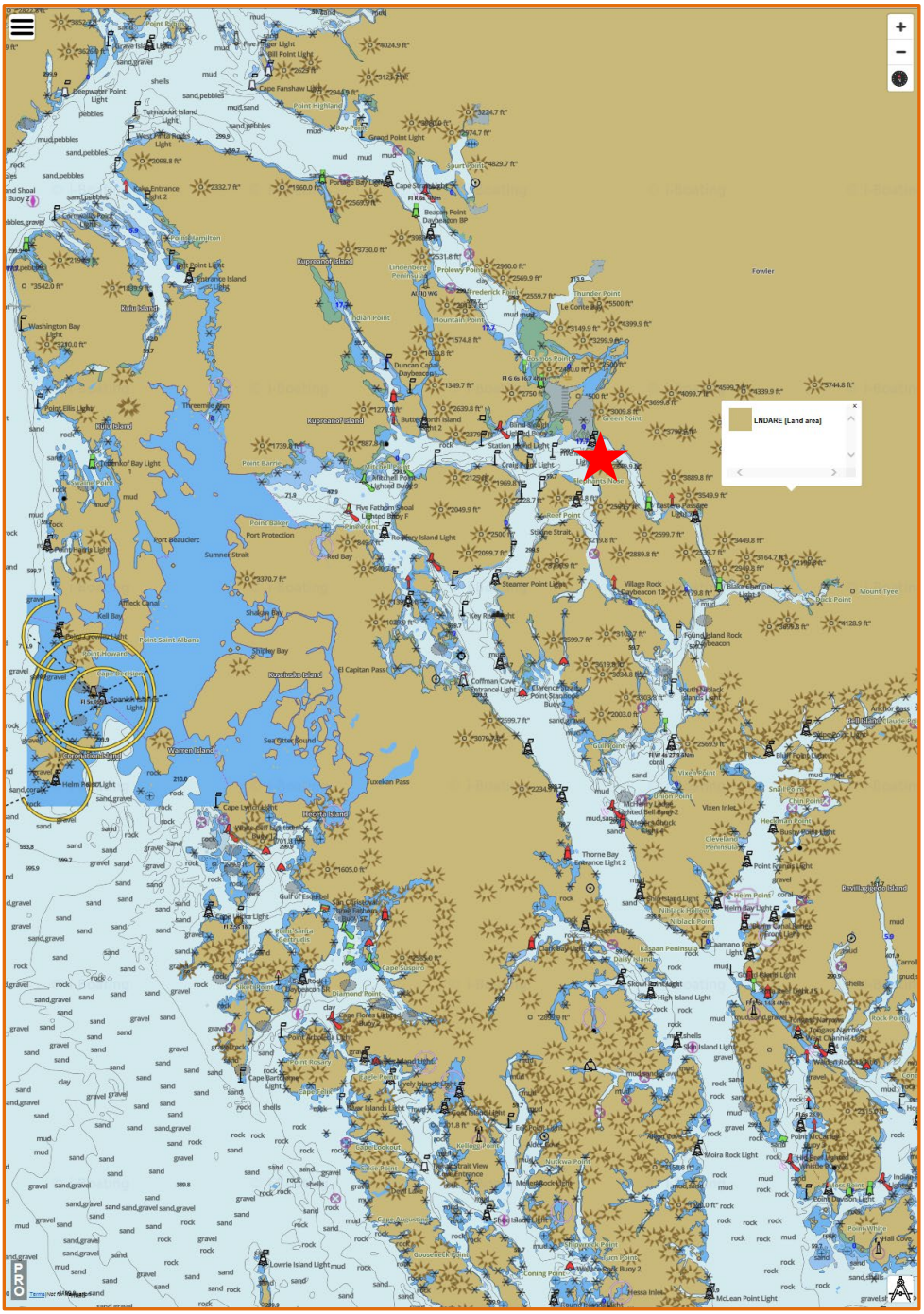


Figure 5-9 Wrangell Island Location

(Source: iFishing Nautical Charts (http://fishing-app.gpsnauticalcharts.com/i-boating-fishing-web-app/fishing-marine-charts-navigation.html?title=WRANGELL+NARROWS+boating+app#8.44/56.0769/-132.8346)

The 1995 "Overview of Environmental and Hydrogeologic Conditions at Wrangell, Alaska," USGS, Open File Report 95-344 prepared for the Federal Aviation Administration describes the Wrangell tsunami threat as: "*...Flooding by tsunami and storm-surge waves is a low-rated hazard...*" due to their fairly protected location away from the open ocean (Figure 5-10).

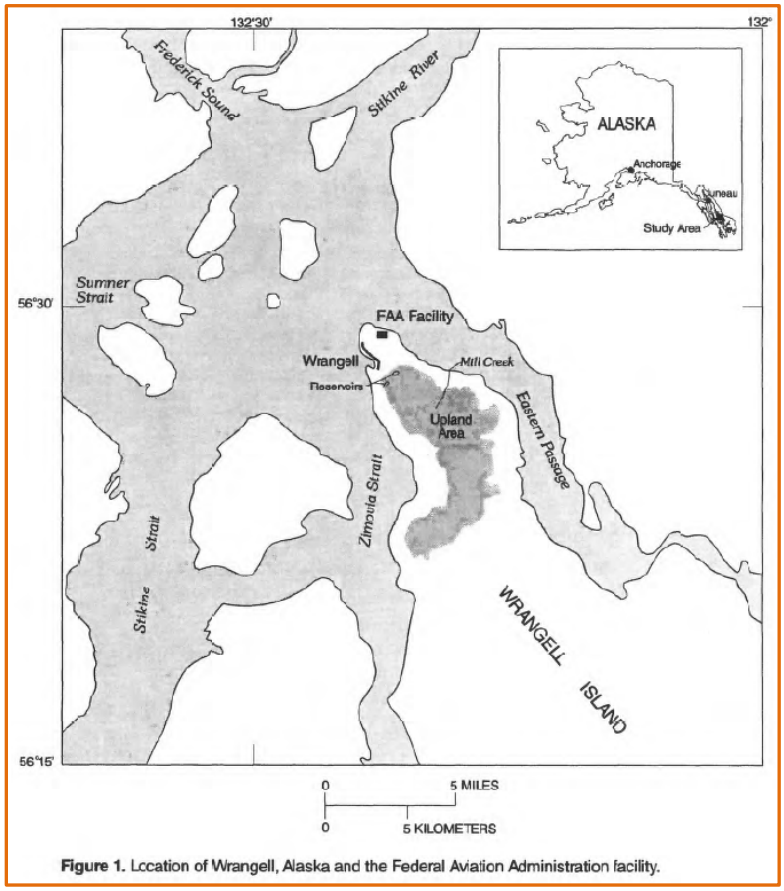
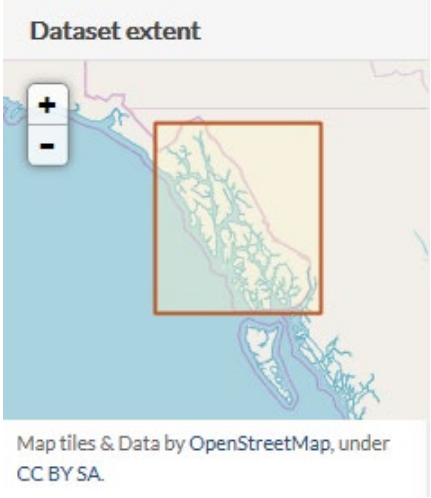


Figure 5-10 Wrangell Location at Confluence of Three Major Straits

(Source: USGS 1995)

The National Oceanic and Atmospheric Administration's (NOAA) Pacific Marine Environmental Laboratory (PMEL) indicates:

> *NOAA is striving to develop Digital Elevation Model for Southeast Alaska, Integrating Bathymetric and Topographic Datasets (Metadata Updated: February 8, 2018).*
>
> *NOAA's National Centers for Environmental Information (NCEI) is building high-resolution digital elevation models (DEMs) to support individual coastal States as part of the National Tsunami Hazard Mitigation Program's (NTHMP) efforts to improve community preparedness and hazard mitigation. These integrated bathymetric-topographic DEMs are used to support tsunami and coastal inundation mapping. Bathymetric, topographic, and shoreline data used in DEM compilation are obtained from various sources, including NCEI, the U.S. National Ocean Service*



> *(NOS), the U.S. Geological Survey (USGS), the U.S. Army Corps of Engineers (USACE), the Federal Emergency Management Agency (FEMA), and other federal, state, and local government agencies, academic institutions, and private companies. DEMs are referenced to various vertical and horizontal datums depending on the specific modeling requirements of each State. For specific datum information on each DEM, refer to the appropriate DEM documentation. Cell sizes also vary depending on the specification required by modelers in each State, but typically range from 8/15 arc-second (~15 meters or 50 feet) to 8 arc-seconds (~240 meters or 800 feet). (Source: https://catalog.data.gov/dataset/digital-elevation-model-of-southeast-alaska-integrating-bathymetric-and-topographic-datasets#sec-dates)*

The University of Alaska Fairbanks', Dmitry Nicolski, Geophysical Institute (UAF/GI), Research Assistant Professor stated:

> *Wrangell is at the top of their "to-be-modeled" list. Research indicates there is a recognition of the submarine landslide potential at the Stikine River. A geologist presumably traced remnants of the previous submarine landslide in the Eastern Channel based on currently available bathymetry.*
>
> *UAF/GI anticipates they will be working with NCEI to develop Digital Elevation Models (DEMs) for Wrangell and other southeast Alaska regions.*

Many believe that Wrangell's relatively protected location on the northern side of the island – away from the open Pacific tsunami sources would protect them from severe impacts. The planning team described their tsunami threat potential as:

> *Yes, we have potential [for future tsunami event impacts]. Even though [we are] behind other islands that could [provide] protect[ion]... depending on where [the] center is, if wave action comes from certain directions... We are [located near a] confluence of two straights ... [we] could [potentially experience] impacts. There was a Tsunami threat years ago, but I think water levels only rose about 1 foot. (Source: 2018 Wrangell planning team comment)*

Extent

There is limited anecdotal tsunami impact data available at this time. Based on limited data and the criteria identified in Table 5-2, the magnitude and severity of tsunami impacts to the Wrangell area are considered "Limited" with injuries and/or illnesses that do not result in permanent disability; critical facility could shutdown for more than one week, and more than 10 percent of property could be severely damaged.

Impact

Dmitry Nicolski further postulates:

> *Some local landslide-generated tsunamis might produce higher run-up values, but there is little known about them in this region.*

Section 6.8, Tables 6-5, 6-6, and 6-7, and Section 6.8.1 lists potential people, property, and infrastructure damage and loss from a worst-case scenario if Seward's entire infrastructure experienced damaging tsunami or seiche events.

Recurrence Probability

The City's 1977 Community Development Plan states:

> *Tsunamis, seismic sea waves, are sometimes generated by earthquake activity and crustal movements. These are often generated along the Aleutian Chain and can have disastrous effects throughout the Pacific Basin. Earthquakes occurring elsewhere in the Pacific [R]im can cause tsunami waves to reach Unalaska Island also. However, since the community is located on the north, or Bering Sea, side of the chain there is very little, if any, probability that a substantial tsunami wave of rapid and destructive force could affect Unalaska. The major consideration in Unalaska with respect to the tsunami problem is the rapid rising of ocean waters sometimes associated with tsunami activity rather than the destructive tidal wave of rapid movement and great height as occurred in 1964 in Valdez and Kodiak. In low lying areas at or adjacent to sea level elevation even a two or three foot increase in sea level could cause flooding. The tsunami watch station at Unalaska is part of the Alaska Regional Warning System, which monitors tsunamic activity throughout the state. (UCDP 1977).*

The DGGS Makushin Volcano Assessment, Report of Investigation, 2000-4 states that it is unlikely the volcano will generate a tsunami:

> *No tsunamis have been produced at Makushin Volcano during the relatively small eruptions of the last few hundred years, and tsunamis are very unlikely to be produced by typical eruptions of Makushin Volcano in the future. However, if an unusually large eruption, similar to the caldera-forming eruptions of about 8,000 years ago, were to occur again, tsunami waves might be produced. During the prehistoric eruptions, pyroclastic flows and surges traveled from the volcano to the sea, especially on the north flank, where the sea is closest (McConnell and others, 1997). Slightly older debris avalanches also reached the sea on the north flank of Makushin Volcano (Bean, 1999). No geologic deposits of tsunamis produced by eruptions of Makushin were identified during field studies (Bean, 1999) (DGGS 2000).*

The Wrangell has a minor tsunami impact history with no fully documented tsunami impact data. However, NOAA and UAF/GI state that southeast Alaska is near the top of their tsunami mapping list. Following the criteria delineated in Table 5-2, a distant source tsunami is "Possible" however, the recurrence interval is unknown. Too many factors determine when an impact event will occur, and there is limited data for the area to determine bathymetric conditions adjacent to Wrangell Island area and the surrounding area.

5.3.5 Volcanic Ash Hazards

5.3.5.1 Nature

Alaska is home to 40 historically active volcanoes stretching across the entire southern portion of the state from the Wrangell Mountains to the far western Aleutian Islands. "Historically active" refers to actual eruptions that have occurred during Alaskan historic time, in general the time-period in which written records have been kept; from about 1760. Alaska averages 1-2 eruptions per year. In 1912, the largest eruption of the 20th century occurred at Novarupta and Mount Katmai, located in what is now Katmai National Park and Preserve on the Alaska Peninsula (AVO 2011, USGS 2002).

A volcano is a vent or opening in the earth's crust from which molten lava (magma), pyroclastic materials, and volcanic gases are expelled onto the surface. Volcanoes and other volcanic phenomena can unleash cataclysmic destructive power greater than nuclear bombs, and can pose serious hazards if they occur in populated and/or cultivated regions.

There are four general volcano types:

- Lava domes are formed when lava erupts and accumulates near the vent
- Cinder cones are shaped and formed by cinders, ash, and other fragmented material accumulations that originate from an eruption
- Shield volcanoes are broad, gently sloping volcanic cones with a flat dome shape that usually encompass several tens or hundreds of square miles, built from overlapping and inter-fingering basaltic lava flows
- Composite or stratovolcanoes are typically steep-sided, large dimensional symmetrical cones built from alternating lava, volcanic ash, cinder, and block layers. Most composite volcanoes have a crater at the summit containing a central vent or a clustered group of vents.

Along with the different volcano types there are different eruption classifications. Eruption types are a major determinant of the physical impacts an event will create, and the particular hazards it poses. Six main types of volcano hazards exist including:

- Volcanic gases are made up of water vapor (steam), carbon dioxide, ammonia, as well as sulfur, chlorine, fluorine, and boron compounds, and several other compounds. Wind is the primary source of dispersion for volcanic gases. Life, health, and property can be endangered from volcanic gases within about 6 miles of a volcano. Acids, ammonia, and other compounds present in volcanic gases can damage eyes and respiratory systems of people and animals, and heavier-than-air gases, such as carbon dioxide, can accumulate in closed depressions and suffocate people or animals.
- Lahars are usually created by shield volcanoes and stratovolcanoes and can easily grow to more than 10 times their initial size. They are formed when loose masses of unconsolidated, wet debris become mobilized. Eruptions may trigger one or more lahars directly by quickly melting snow and ice on a volcano or ejecting water from a crater lake. More often, lahars are formed by intense rainfall during or after an eruption since rainwater can easily erode loose volcanic rock and soil on hillsides and in river valleys.

As a lahar moves farther away from a volcano, it will eventually begin to lose its heavy load of sediment and decrease in size.

- Landslides are common on stratovolcanoes because their massive cones typically rise thousands of feet above the surrounding terrain, and are often weakened by the very process that created the mountain – the rise and eruption of molten rock (magma). If the moving rock debris is large enough and contains a large content of water and soil material, the landslide may transform into a lahar and flow down valley more than 50 miles from the volcano.
- Lava flows are streams of molten rock that erupt from a vent and move downslope. Lava flows destroy everything in their path; however, deaths caused directly by lava flows are uncommon because most move slowly enough that people can move out of way easily, and flows usually do not travel far from the source vent. Lava flows can bury homes and agricultural land under tens of feet of hardened rock, obscuring landmarks and property lines in a vast, new, hummocky landscape.
- Pyroclastic flows are dense mixtures of hot, dry rock fragments and gases that can reach 50 mph. Most pyroclastic flows include a ground flow composed of coarse fragments and an ash cloud that can travel by wind. Escape from a pyroclastic flow is unlikely because of the speed at which they can move.
- Tephra is a term describing any size of volcanic rock or lava that is expelled from a volcano during an eruption. Large fragments generally fall back close to the erupting vent, while smaller fragment particles (ash) can be carried hundreds to thousands of miles away from the source by wind. Ash clouds are common adaptations of tephra.

Ash fall poses the most significant volcanic threat to CBW because, unlike other secondary eruption effects such as lahars and lava flows, ash fall can travel thousands of miles from the eruption site.

Volcanic ash consists of tiny jagged particles of rock and natural glass blasted into the air by a volcano. Ash can threaten the health of people, livestock, and wildlife. Ash imparts catastrophic damage to flying jet aircraft, operating electronics and machinery, and interrupts power generation and telecommunications. Wind can carry ash thousands of miles, affecting far greater areas and many more people than other volcano hazards. Even after a series of ash-producing eruptions has ended, wind and human activity can stir up fallen ash for months or years, presenting a long-term health and economic risk. Special concern is extended to aircraft because volcanic ash completely destroys aircraft engines.

Ash clouds have caused catastrophic aircraft engine failure, most notably in 1989 when KLM Flight 867, a 747 jetliner, flew into an ash cloud from Mt. Redoubt's eruption and subsequently experienced flameout of all four engines. The jetliner fell 13,000 feet before the flight crew was able to restart the engines and land the plane safely in Anchorage. The significant trans-Pacific and intrastate air traffic traveling directly over or near Alaska's volcanoes, has necessitated developing strong communication and warning links between the Alaska Volcano Observatory (AVO), other government agencies with responsibility for aviation management, and the airline and air cargo industry (AVO 2012a, USGS 2002). The AVO's identified volcanos in Alaska. Table 5-6 lists those located along the Aleutian Chain.

Table 5-6 Volcanoes in Alaska's Aleutian Chain

Volcano Names			
Akutan Volcano	Davidof Volcano	Kiska Volcano	Semisopochnoi Volcano
Amak Volcano	Dutton Volcano	Koniuji Volcano	Shishaldin Volcano
Amukta Volcano	Fisher Volcano	Korovin Volcano	Tanaga Volcano
Aniakchak Volcano	Gareloi Volcano	Little Sitkin Volcano	Ugashik-Peulik Volcano
Bobrof Volcano	Great Sitkin Volcano	Makushin Volcano	Ukinrek-Maars Volcano
Bogoslof Volcano	Herbert Volcano	Okmok Volcano	Uliaga Volcano
Buldir Volcano	Isanotski Volcano	Pavlov Volcano	Veniaminof Volcano
Carlisle Volcano	Kagamil Volcano	Pogromni Volcano	Vsevidof Volcano
Chagulak Volcano	Kanaga Volcano	Seguam Volcano	Westdahl Volcano
Cleveland Volcano	Kasatochi Volcano	Segula Volcano	Yunaska Volcano

(Source: AVO 2012)

5.3.5.2 History

The AVO, and its constituent organizations (USGS, DNR, and UAF), have volcano hazard identification and assessment responsibility for Alaska's active volcanic centers. The AVO monitors active volcanoes several times each day using Advanced Very High Resolution Radiometers (AVHRR) and satellite imagery.

DHS&EM's Disaster Cost Index records the following volcanic eruption disaster events:

> ***103. Mt. Redoubt Volcano, December 20, 1989*** *When Mt. Redoubt erupted in December 1989, posing a threat to the Kenai Peninsula Borough, Mat-Su Borough, and the Municipality of Anchorage, and interrupting air travel, the Governor declared a Disaster Emergency. The Declaration provided funding to upgrade and operate a 24-hr. monitoring and warning capability.*
>
> ***104. KPB-Mt. Redoubt, January 11, 1990*** *The Kenai Peninsula Borough, most directly affected by Mt. Redoubt, experienced extraordinary costs in upgrading air quality in schools and other public facilities throughout successive volcanic eruptions. The Borough also sustained costs of maintaining 24-hr. operations during critical periods. The Governor's declaration of Disaster Emergency supported these activities.*
>
> ***161. Mt. Spurr, September 21, 1992*** *Frequent eruptions and the possibility of further eruptions has caused health hazards and property damage within the local governments of the Municipality of Anchorage, Kenai Peninsula Borough and Mat-Su Borough. These eruptions caused physical damage to observation and warning equipment. Funds to replace equipment for AVO. (Source: DHS&EM)*

The AVO's Service Review, Mount Redoubt Volcanic Eruptions, March – April 2009 (Figure 5-11) states,

Mount Redoubt volcano in continuous eruption on March 31, 2009. Plume height is no more than 15,000 feet above sea level. The small amount of ash in the plume is creating a haze layer downwind of the volcano and dustings of fine ash are falling out of the plume…

> *On March 22, 2009, Mount Redoubt volcano, 106 miles southwest of Anchorage, Alaska, began a series of eruptions after persisting in Orange or "Watch" status since late January 2009. Plume heights were observed at or above 60,000 feet during two of the six significant eruptions. Ashfall*

occurred over south central Alaska, including in Anchorage, with amounts ranging from a trace to one-half inch in depth.

The Redoubt eruptions also disrupted air traffic in the region. Hundreds of commercial flights were cancelled and cargo companies were significantly impacted. This resulted in employees being placed on unpaid leave during periods when airport operations were shut down. Anchorage is Alaska's major population center; its airport serves as a critical strategic transportation hub as the third busiest cargo airport in the world.

The impacts of the unrest at Mount Redoubt volcano continued through spring and into the summer. The threat of continuing eruptions and lahars (volcanic mud flows composed of water, ash, mud, and debris) necessitated the removal of millions of gallons of oil from Chevron's nearby Drift River Terminal. Residents, emergency management, and health officials remained on alert until Mount Redoubt volcano was downgraded to Yellow or "Advisory" status on June 30, 2009, and finally to Green or "Normal" status on September 29, 2009 (AVO 2009b).

Recent volcano eruption impacts demonstrate modern community vulnerability to volcanic ash dispersal and travel distance statewide.

Alaska's volcanoes have very diverse eruption histories spanning thousands of years. Activity spanning such an extensive timeline is nearly impossible to define. However modern science has enabled the AVO with determining fairly recent historical eruption dates.

Table 5-7 lists the AVO's identified Aleutian Chain volcano's historical eruption dates with explanatory symbols to designate the data's accuracy.

Table 5-7 Aleutian Volcano Eruption Events

Aleutian Volcanoes and Their Respective Eruption Dates				
Akutan	**Gareloi**	**Korovin**	**Semisopochnoi**	**Westdahl**
10: ✱ 1765-1953	6: ✱ 1760-1996	8: ✱ 1829-2005	4: ✱ 1772-1830	3: ✱ 1820-1979
30: ! 1848-1992	10: ! 1791-1989	3: ! 1973-1998	2: ! 1873-1987	7: ! 1795-1991
Amak	**Great Sitkin**	**Little Sitkin**	**Shishaldin**	**Wrangell**
2: ✱ 1700-1796	7: ✱ 1760 -1987	3: ✱ 1776-1900	28: ✱ 1775-2008	3: ✱ 1820-1979
Amukta	8: ! 1767-1974	Makushin	23: ! 1824 2004	2: ! 1795-1991
1: ✱ 1770	**Kagamil**	14: ✱ 1790-1993	**Tanaga**	**Yunaska**
Aniachak	1: ✱ 1929	10: ! 1769-1995	3: ✱ 1763-1829	3: ✱ 1817-1929
1: ! 1931	Kanaga	**Okmok**	1: ! 1914	2: ! 1824-1937
Bogoslof	5: ✱ 1763-1996	3: ✱ 1878-1936	**Ugashik-Peulik**	
4: ✱ 1908-1951	6: ! 1786-2012	14: ! 1817-2008	2: ✱ 1814-1852	
8: ! 1796-1992	**Kasatochi**	**Pavlof**	**Ukinrek-Maars**	
Carlisle	4: ✱ 1760-1899	7: ✱ 1762-1903	1: ! 1977	
1: ✱ 1987	1: ! 2008	31: ! 1817-2007	**Veniaminof**	
Cleveland	**Kiska**	**Pavlof Sister**	4: ✱ 18572-1987	
7: ✱ 1774-2010	3: ✱ 1907-1987	1: ✱ 1762	2: ! 1830-2008	
19: ! 1828-2011	4: ! 1962-1990	**Seguam**	**Vsevidof**	
Fisher		3: ✱ 1827-1927	5: ✱ 1784-1957	
3: ✱ 1795-1830		6: ! 1786-1993		
Key: ! Eruption ✱ Questionable eruption ⓘ Non-eruptive activity Numbers that precede volcanic activity symbols indicate the number of events for that timeline				

(AVO 2016)

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

Location

The AVO publishes individual hazard assessments for each active volcano in Alaska.

Table 5-8 provides a representative sample of their preliminary reports and hazard assessments.

Table 5-8 AVO Published Aleutian Volcano Hazard Assessments

Volcano Names			
Akutan Volcano	Great Sitkin Volcano	Makushin Volcano	Shishaldin Volcano
Aniakcahak Volcano	Hayes Volcano	Okmok Volcano	Tanaga Island Volcanic Cluster
Gareloi Volcano	Kanaga Volcano	Pavlof Volcano	

The legacy 2009 HMP states:

> *The Alaska Volcano Observatory identifies the closest active volcano to Wrangell at being over 400 miles away…*
>
> *The Alaska Volcano Observatory (AVO), which is a cooperative program of the U.S. Geological Survey (USGS), Alaska Division of Geological & Geophysical Surveys (DGGS), and the University of Alaska Fairbanks Geophysical Institute (UAF/GI), monitors the seismic activity at 23 of Alaska's 41 active volcanoes in real time. In addition, satellite images of all Alaskan and Russian volcanoes are analyzed daily for evidence of ash plumes and elevated surface temperatures. Russian volcanoes are also a concern to Alaska as prevailing winds could carry large ash plumes from Kamchatka into Alaskan air space. AVO also researches the individual history of Alaska's active volcanoes and produces hazard assessment maps for each center.*
>
> *The AVO identifies the closest active volcano to Wrangell as being over 400 miles away. (Source: AVO (http://www.avo.alaska.edu/)*

Each report contains a description of the eruptive history of the volcano, the hazards they pose, and the likely effects of future eruptions to populations, facilities, and ecosystems. Figure 5-11 lists Wrangell's closest volcanoes. However, there is very little known eruption data for these volcanoes and are not seismically monitored. The AVO provides the following reference sources for these data:

> *Hauksdottir, S., Enegren, E.G., Russell, J.K., 1994, Recent basaltic volcanism in the Iskut-Unuk Rivers area, northwestern British Columbia: Gological Survey of Canada Current Research no. 1994-A, P. 57-67."*

Volcanos Nearby

A total of 6 volcanoes are found in or near Wrangell, AK.

Distance (miles)	Name	Region	Latitude	Longitude	Elevation (foot)	Type	Status	Last Eruption
43.3	Duncan Canal	Alaska-SE, United States	56.5	-133.1	15	Unknown	Holocene	Undated, but probable Holocene eruption
45.1	Hoodoo Mountain	Canada, Canada	56.78	-131.28	1820	Subglacial volcano	Holocene	Undated, but probable Holocene eruption
60.6	Iskut-Unuk River Cones	Canada, Canada	56.58	-130.55	1880	Cinder cone	Radiocarbon	Last known eruption 1800-1899
76.6	Behm Canal-Rudyerd Bay	Alaska-SE, United States	55.32	-131.05	500	Cinder cone	Holocene	Unknown
86.3	Tlevak Strait-Suemez Is.	Alaska-SE, United States	55.25	-133.3	50	Volcanic field	Holocene	Undated, but probable Holocene eruption
94.6	Spectrum Range	Canada, Canada	57.43	-130.68	2430	Shield volcano	Holocene	Undated, but probable Holocene eruption

Figure 5-11 Wrangell Area Inactive Volcanoes

(Source: USA.com: http://www.usa.com/wrangell-ak-natural-disasters-extremes.htm)

Alaska contains 80+ volcanic centers and is at continual risk for volcanic eruptions. Most of Alaska's volcanoes are far from settlements that could be affected by lahars, pyroclastic flows and clouds, and lava flows; however ash clouds and ash fall have historically caused significant impact to human populations.

> *When volcanoes erupt explosively, high-speed flows of hot ash (pyroclastic flows) and landslides can devastate areas 10 or more miles away, and huge mudflows of volcanic ash and debris (lahars) can inundate valleys more than 50 miles downstream... Explosive eruptions can also produce large earthquakes... the greatest hazard posed by eruptions of most Alaskan volcanoes is airborne dust and ash; even minor amounts of ash can cause the engines of jet aircraft to suddenly fail in flight (USGS 1998)*

Many of the volcanoes in Alaska are capable of producing eruptions that can affect far distant communities such as those in the Wrangell area. A large ash plume has the capability of shutting down air, and potentially, ferry and barge operations because ash is damaging to all engine types.

USGS Bulletin 1028-N explains that Mount Katmai's eruption on June 5, 1912 was up to that point "the greatest volcanic catastrophe in the recorded history of Alaska. More than six cubic miles of ash and pumice were blown into the air from Mount Katmai and the adjacent vents in the Valley of Ten Thousand Smokes." The eruption lasted for three days. The USGS Fact Sheet 075-98, Version 1.0 states,

> *The ash cloud, now thousands of miles across, shrouded southern Alaska and western Canada, and sulfurous ash was falling on Vancouver, British Columbia; and Seattle, Washington. The next day the cloud passed over Virginia, and by June 17th it reached Algeria in Africa.*

Figure 5-12 shows the extent of four ash cloud impact areas. The 1912 Katmai ash cloud is gray; the Augustine (blue plume), Redoubt (orange plume), and Spurr (yellow plume) were each dwarfed by the Katmai event. "Volcanologists discovered that [this] 1912 [Katmai] eruption was actually from Novarupta, not Mount Katmai" (USGS 1998).

Figure 5-12 1912 Katmai Volcano Impact

(Source: USGS 1998)

- Archaeological evidence suggests that an eruption of Aniakchak volcano 3,500 years ago spread ash over much of Bristol Bay and generated a tsunami which washed up onto the tundra around Nushagak Bay. Within the past 10,000 years, Aniakchak volcano has significantly erupted on at least 40 occasions.
- The 1989-90 eruption of Mt. Redoubt seriously affected the population commerce, and oil production and transportation throughout the Cook Inlet region.

  Redoubt Volcano is a strato-volcano located within a few hundred kilometers of more than half of the population of Alaska. This volcano has erupted explosively at least six times since historical observations began in 1778. The most recent eruption occurred in 1989-90 and similar eruptions can be expected in the future. The early part of the 1989-90 eruption was characterized by explosive emission of substantial volumes of volcanic ash to altitudes greater than 12 kilometers above sea level and widespread flooding of the Drift River valley. Later, the eruption became less violent, as developing lava domes collapsed, forming short-lived pyroclastic flows associated with low-level ash emission. Clouds of volcanic ash had significant effects on air travel as they drifted across Alaska, over Canada, and over parts of the conterminous United States causing damage to jet aircraft, as far away as Texas. Total estimated economic costs are $160 million, making the eruption of Redoubt the second most costly in U.S. history (Source: USGS 1998).

- Mt. Spurr's 1992 eruption brought business to a halt and forced a 20 hour Anchorage International Airport closure. Communities 400 miles away reported light ash dustings.

> *Eruptions from Crater Peak on June 27, August 18, and September 16–17, 1992, produced ash clouds (fig. 11) that reached altitudes of 13 to 15 kilometers [8-9 miles] above sea level. These ash clouds drifted in a variety of directions and were tracked in satellite images for thousands of kilometers beyond the volcano (Schneider and others, 1995). One ash cloud that drifted southeastward over western Canada and over parts of the conterminous United States and eventually out across the Atlantic Ocean (fig. 12) significantly disrupted air travel over these regions but caused no direct damage to flying aircraft (USGS 2002)*

In 1992, another eruption series occurred, resulting in three separate eruption events. The first, in June, dusted Denali National Park and Manley Hot Springs with 2 mm of ash – a relatively minor event. In August, the mountain again erupted, covering Anchorage with ash, bringing business to a halt and forcing officials to close Anchorage International Airport for 20 hours. St. Augustine's 1986 eruption caused similar air traffic disruption.

Small ash clouds from the 2001 eruption of Mt. Cleveland were noted by USGS to have reached Fairbanks. These clouds dissipated somewhere along the line between Cleveland and Fairbanks. A full plume, visible on satellite imagery, was noted in a line from Cleveland to Nunivak Island. Volcanoes in Alaska and Russia have the potential to permanently displace entire communities and disrupt all travel modes.

Figure 5-13 displays a simplified illustration of approximate flight paths traveling over Alaska's historically active volcanoes. Aircraft flying along these routes, some of the busiest in the world carry more than 50,000 passengers and millions of dollars of cargo each day to and from Asia, North America, and Europe.

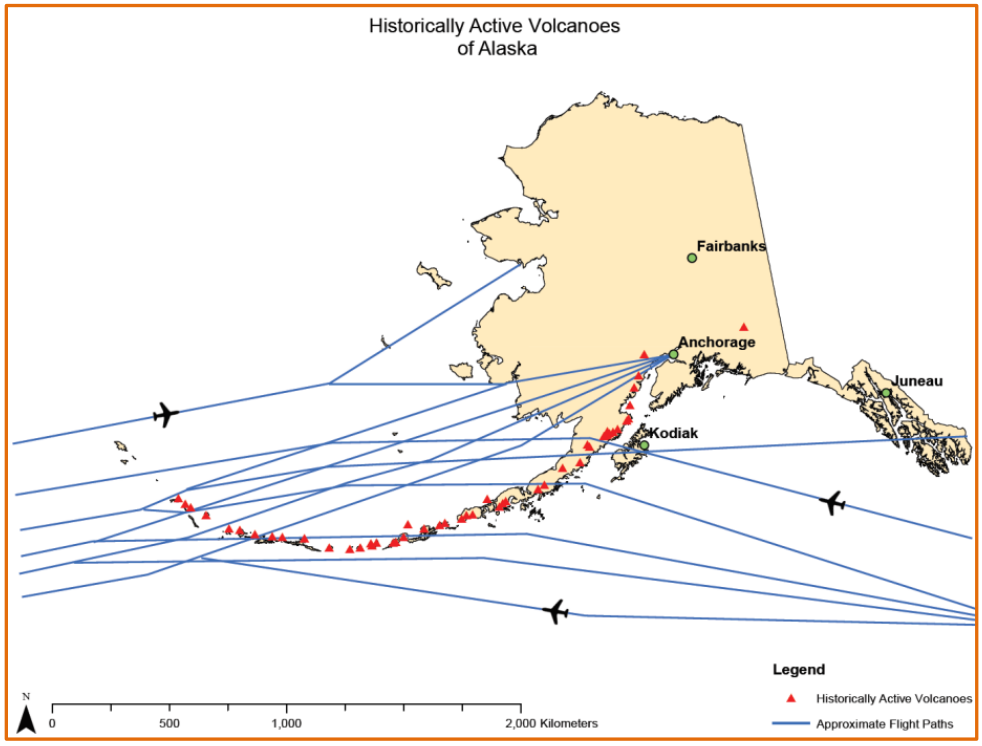


Figure 5-13 North Pacific Air Travel Routes

(Source: AVO/USGS 2018, https://www.avo.alaska.edu/volcanoes/hazards.php)

Extent

Volcanic effects include severe blast, turbulent ash and gas clouds, lightning discharge, volcanic mudflows, pyroclastic flows, corrosive rain, flash flood, outburst floods, earthquakes, and tsunamis. Some of these activities include ash fallout in various communities, air traffic, road transportation, and maritime activity disruptions.

Southeast Alaska could receive some ash fall during a massive volcanic eruption from Russian as and Alaska volcanoes. Prolonged traffic disruptions (air, land, or rail) would potentially prevent essential community resupply e.g. food and medicine delivery, and medical evacuation service capabilities to full service hospitals.

A massive eruption anywhere on earth, as depicted in Figure 5-14, could severely affect the global climate; radically changing Wrangell's (and everyone else's) long-term weather event risks for weeks, months, or years.

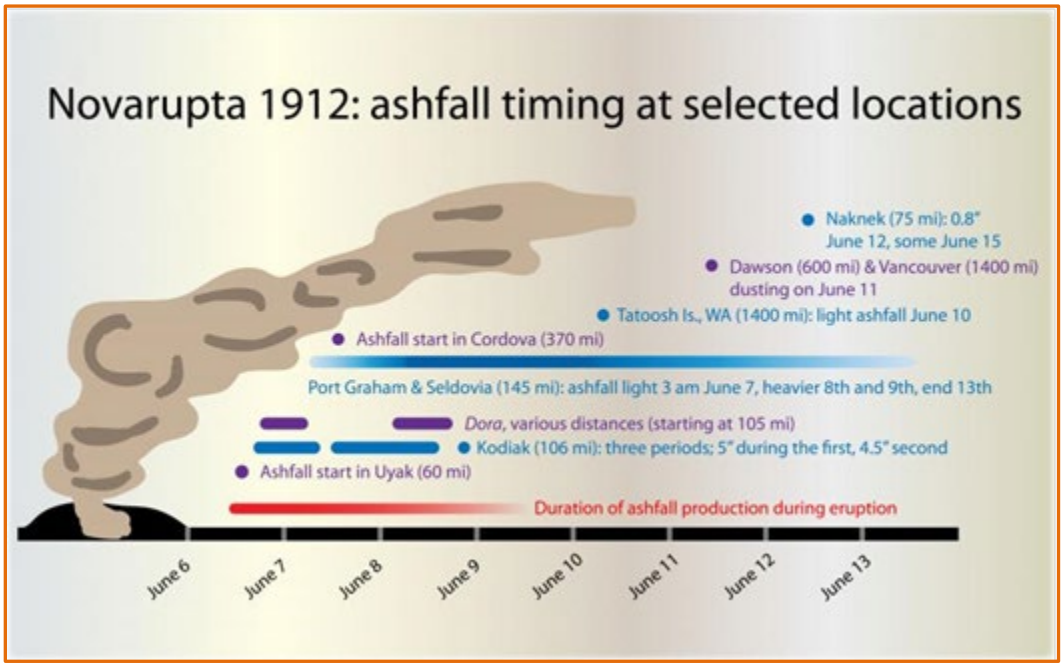


Figure 5-14 Novarupta's Historic Ashfall Timeline

(Source: AVO 2012)

Based on historic volcanic activity impacts and the criteria identified in Table 5-3, the magnitude and severity of impacts in Wrangell are considered "Negligible" with minor injuries, minor quality of life lost, the potential for critical facilities to shut down for 24 hours or less, and less than 10% of property or critical infrastructure being severely damaged.

Impact

As the Preliminary Volcano-Hazard Assessment for Makushin Volcano, Alaska, Summary of Hazards states,

> *If eruptions as large as those of 8,000 years ago were to occur, volcanic ash falls would be much thicker and more extensive than any seen in the area in historic time, and highly mobile pyroclastic flows, surges, or lateral blasts might affect areas tens of kilometers from the volcano... Such huge eruptions could also significantly disrupt air travel over the north Pacific area for days*

> *and perhaps weeks. However, based on the volcano's pattern of past behavior, eruptions of this magnitude are very rare, and therefore unlikely to recur in the near future (DGGS 2000).*

Such an ash fall event would undoubtedly be devastating to the entire state by straining its resources as well as transportation (air, ocean, land, and rail routes); especially if other hub communities are also significantly affected by a volcanic eruption. Wrangell residents could experience respiratory problems from airborne ash, general property damage (electronics and unprotected machinery), state or regional transportation interruptions, loss of commerce, as well potential as water supply contamination.

These impacts can range from inconvenience – a few days with no transportation capability; to disastrous – heavy, debilitating ash fall throughout the state, forcing Wrangell residents to be completely self-sufficient.

Section 6.8, Tables 6-5, 6-6, and 6-7, and Section 6.8.1 lists potential people, property, and infrastructure damage and loss from a worst-case scenario if Seward's entire infrastructure experienced a damaging volcanic ashfall event.

Recurrence Probability

Geologists can make long-term general forecasts associated with individual volcanoes by carefully analyzing past activity, but they would be based trends and likelihood, rather than specific events or timelines. Short-range forecasts are often possible with greater accuracy. Several signs of increasing activity can indicate that an eruption will follow within weeks or months. Magma moving upward into a volcano often causes a significant increase in small, localized earthquakes, and measurable carbon dioxide, sulfur, and chlorine compound emission increases. Shifts in magma depth and location can cause ground level elevation changes that can be detected through ground instrumentation or remote sensing.

Based on the criteria identified in Table 5-3 and information presented in the SHMP, it is "Possible" a volcanic eruption will occur within the next ten years. Event has up to 1 in 10 years (1/10=10%) chance of occurring. History of events is less than or equal to 10% likely per year. Vulnerability depends on the type of activity and current weather, especially wind patterns.

5.3.1 Weather

5.3.1.1 Nature

Severe weather events occur throughout Alaska and vary by location. The Wrangell area continually experience rain, thunderstorms, lightning, hail, high winds, moderate snow, freezing rain/ice storm, and extreme cold.

Climate Change influences the environment, particularly historical weather patterns. Climate change and El Niño/La Niña Southern Oscillation (ENSO) determines create increased weather volatility such as hotter summers (drought) and colder winters, intense thunderstorms, lightning, hail, snow storms, freezing rain/ice storms, high winds and even a few tornadoes within and around Alaska.

ENSO is comprised of two weather phenomena known as El Niño and La Niña. While ENSO activities are not a hazard, they can lead to severe weather changes and large-scale damage throughout Alaska's varied jurisdictions. Direct correlations were found linking ENSO events to severe weather across the Pacific Northwest, particularly increased flooding (coastal storm surge) and severe winter storms. Therefore it is essential that rural community increase their awareness and understanding of how ENSO events potentially impact Alaska's vastly differing regional weather.

Greenhouse gassing is described as a phenomenon of water vapor, carbon dioxide, and other gases in the earth's atmosphere acting like a blanket over the earth, absorbing some of the heat of the sunlight-warmed surfaces instead of allowing it to escape into space. The more gasses, the thicker the blanket, and the warmer the earth. Trees and other plants cannot absorb carbon dioxide through photosynthesis if foliage growth is inhibited. Therefor carbon dioxide builds up and changes precipitation patterns, increases storms, wildfires, and flooding frequency and intensity; and substantially changes flora, fauna, fish, and wildlife habitats.

The governor's Alaska's Climate, Ecosystems & Human Health Work Group is tasked with determining how the changing ecosystems may impact human health and to identify, prioritize, and educate Alaskan's about the connection between their health and changing environmental patterns.

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 the Wrangell area.

Heavy Snow generally means snowfall accumulating to 6 inches or more in depth in 12 hours or less or eight inches or more in depth in 24 hours.

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 -50°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 50 mph) occur rather frequently over Wrangell's coastal areas. High winds are a severe threat to Wrangell.

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 5.3.2.

Figure 5-15 displays Alaska's annual rainfall map based on Parameter-elevation Regressions on Independent Slopes Model (PRISM) that combines climate data from 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.

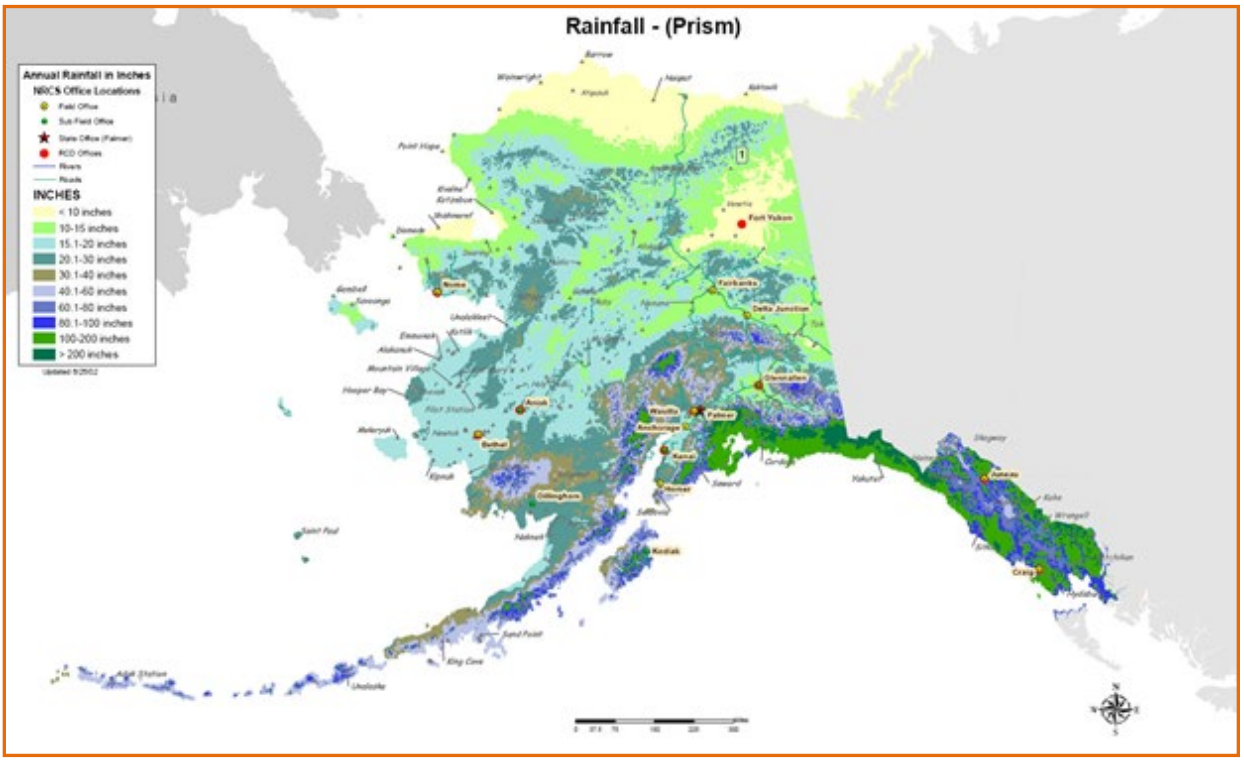


Figure 5-15 Statewide Rainfall Map

Source: PRISM 2012

5.3.1.2 History

The Wrangell area is continually impacted by severe weather events. Hurricane force wind, storm surge, and cold typically have disastrous results.

Climate Change. The University of Alaska Fairbanks (UAF) Arctic Climate Impact Assessment (ACIA) describes recent weather changes and how they impact Alaska:

> *18.3.3.1. Changes in climate*
>
> *Alaska experienced an increase in mean annual temperature of about 2 to 3 ºC between 1954 and 2003…Winter temperatures over the same period increased by up to 3 to 4 ºC in Alaska and the western Canadian Arctic, but Chukotka experienced winter cooling of between 1 and 2 ºC…*
>
> *The entire region, but particularly Alaska and the western Canadian Arctic, has undergone a marked change over the last three decades, including a sharp reduction in snow-cover extent and duration, shorter river- and lake ice seasons, melting of mountain glaciers, sea-ice retreat and thinning, permafrost retreat, and increased active layer depth. These changes have caused major ecological and socio-economic impacts, which are likely to continue or worsen under projected future climate change. Thawing permafrost and northward movement of the permafrost boundary are likely to increase slope instabilities, which will lead to costly road replacement and increased maintenance costs for pipelines and other infrastructure. The projected shift in climate is likely to convert some forested areas into bogs when ice-rich permafrost thaws. Other areas of Alaska, such as the North Slope, are expected to continue drying. Reduced sea-ice extent and thickness, rising sea level, and increases in the length of the open-water season in the region will increase the frequency and intensity of storm surges and wave development, which in turn will increase coastal erosion and flooding…*

18.3.3.4. Impacts on people's lives

Traditional lifestyles are already being threatened by multiple climate-related factors, including reduced or displaced populations of marine mammals, seabirds, and other wildlife, and reductions in the extent and thickness of sea ice, making hunting more difficult and dangerous. Indigenous communities depend on fish, marine mammals, and other wildlife, through hunting, trapping, fishing, and caribou/reindeer herding. These activities play social and cultural roles that may be far greater than their contribution to monetary incomes. Also, these foods from the land and sea make significant contributions to the daily diet and nutritional status of many indigenous populations and represent important opportunities for physical activity among populations that are increasingly sedentary… (ACIA 2018)

Figure 5-16 delineates the Weather Service Office's (WSO) weather data. Actual community temperatures and depths may vary due to their relative proximity to the WSO.

WRANGELL AP, ALASKA (509919)

Period of Record Monthly Climate Summary

Period of Record : 11/01/1917 to 02/19/2013

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Average Max. Temperature (F)	33.9	37.7	42.0	49.1	56.3	61.7	64.0	63.5	57.7	49.4	41.1	36.4	49.4
Average Min. Temperature (F)	24.7	27.7	30.8	35.3	41.1	46.5	49.8	49.7	45.9	39.2	32.1	27.6	37.5
Average Total Precipitation (in.)	6.71	5.72	5.49	4.65	4.21	3.93	4.88	5.98	9.62	13.32	9.08	7.92	81.51
Average Total SnowFall (in.)	18.4	12.4	7.9	0.8	0.0	0.0	0.0	0.0	0.0	0.1	5.8	12.6	58.0
Average Snow Depth (in.)	4	5	1	0	0	0	0	0	0	0	1	3	1

Percent of possible observations for period of record.
Max. Temp.: 95.6% Min. Temp.: 95.5% Precipitation: 90.1% Snowfall: 86.9% Snow Depth: 86.9%
Check Station Metadata or Metadata graphics for more detail about data completeness.

Western Regional Climate Center, wrcc@dri.edu

Figure 5-16 Wrangell Airport WSO Climate Summary

(Source: WRCC 2018: http://www.wrcc.dri.edu/summary/Climsmak.html)

DHS&EM's DCI records the following severe weather disaster events which may have affected the Wrangell area due to their close proximity to declared disaster events:

3. Wrangell/Craig, November 6, 1978: *During this period an intense storm occurred in the Wrangell/Craig area in Southeastern Alaska generating high winds, torrential rains and heavy sea waves. The storm caused considerable damage to both private and public property in the two communities. Subsequent to the Governor's Proclamation of Disaster Emergency, DHS&EM provided both public assistance and assistance to individuals and families to assist the communities in recovering from the disaster. SBA made disaster loans available to affected businesses and homeowners.*

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.*

32. Southeast Alaska, November 26, 1984: *A hurricane force windstorm and wind driven tides caused extensive damage to public and private property in five Southeast Alaskan communities. The State provided public and individual assistance grants and*

temporary housing in Juneau, Sitka, Kake, Angoon and Tenakee Springs. SBA provided disaster loan assistance and the American Red Cross made grants to meet immediate needs of victims. The Governor's request for a Presidential declaration was denied.

111. '89 Spring Floods Hazard Mitigation, April 14, 1990: *The Major Disaster Declaration by the President in response to statewide flooding in the Spring of 1989 authorized the commitment of federal funds to projects designed to mitigate flood damage in future years. Since the federal funding required a State matching share, the Governor declared a disaster to provide these funds and authorize their expenditure.*

97-182 '96 Southeast Storm (Pelican/Elfin Cove): *On Wednesday, September 25,1996 a severe storm struck Southeast Alaska causing severe damage to some of the communities in the area. The community of Pelican sustained erosion damage to temporary construction (sandbags) placed to curtail erosion on Pelican Creek. The storm also caused additional erosion around the bridge that crosses the creek. In Elfin Cove the landslide damaged electrical distribution lines to homes, disrupted telephone service to 12 homes and caused remaining telephones to operate off battery power. Two homes sustained damage. Also the trail which provided the only means of access between the two sides of town was damaged causing residents to commute from one side of town to the other by boat. The Governor declared the area a disaster on November 1, 1996 due to the threat to life and property. Public Assistance totaled $486K for 1 applicant with 1 DSR. The total for this disaster is $528K.*

06-216 2005 Southeast Storm (AK-06-216) declared December 23, 2005 by Governor Murkowski: *Beginning on November 18, 2005 and continuing through November 26, 2005, a strong winter storm with high winds and record rainfall occurred in the City/Borough of Juneau, the City/Borough of Haines, the City/Borough of Sitka, the City of Pelican, the City of Hoonah, and the City of Skagway, which resulted in widespread coastal flooding, landslides, and severs damage and threat to life and property, with the potential for further damage. The following conditions exist as a result of this disaster: severe damage to personal residences requiring evacuation and relocation of residents; to individuals personal and real property; to businesses; and to a marine highway system dock, the road systems eroded and blocked by heavy debris that prohibited access to communities and residents, and other public infrastructures, necessitating emergency protective measures and temporary and permanent repairs. The total estimated amount of assistance is approximately $1.87 million. This includes the following: Individual Assistance totaling $500K for 52 applicants and Public Assistance totaling $1.1 million for 14 applicants and 31 PW's. There was no hazard mitigation. Nov 21,08 update—Closeout later to DAS total cost of $1,684,311 (included $183,088 for IA, plus IA Admin of $35,748, PA Grantee admin of $133,779, and subgrantee admin allowance of $30,290.) Lapse to DRF was $183,586. RBS-11/28/08.*

Severe weather events have historically impacted the entire Wrangell Borough area. Rural communities generally lack capacity to track changing climate conditions. It is fortunate the University of Alaska Fairbanks Scenarios Network for Alaska and Arctic Planning (SNAP) is part of the International Arctic Research Center provides this data for planning purposes. The following provides a guideline for using SNAP data:

Due to variability among climate models and among years in a natural climate system, these graphs are useful for examining trends over time, rather than for precisely predicting monthly or yearly values.

How to interpret climate outlooks for your community

You can examine SNAP community outlooks for certain key changes and threshold values—for example, higher mean monthly temperatures in the spring and fall may be of particular interest. This could signify any or all of these conditions:

- *a longer growing season*
- *a loss of ice and/or frozen ground needed for travel or food storage*
- *a shift in precipitation from snow to rain, which impacts water storage capacity and surface water availability*

Note: *Precipitation may occur as either rain or snow, but is reported for all months in terms of rainwater equivalent.*

Warmer, drier spring weather may also be an indicator for increased fire risk. In many locations, winter temperatures are projected to increase dramatically. Warmer winters may favor growth of species that are less cold-hardy (including desirable crops and invasive species), or it may decrease snowpack and increase the frequency of rain-on-snow events that impact wildlife. Higher temperatures across all seasons will likely impact permafrost and land-fast ice (SNAP 2016)

SNAP data tools depict Wrangell's historic and future predicted precipitation and temperatures. (Figures 5-17 and 5-18) The long bars that look like a capital "I" displays the colored bar's estimated temperature or precipitation range.

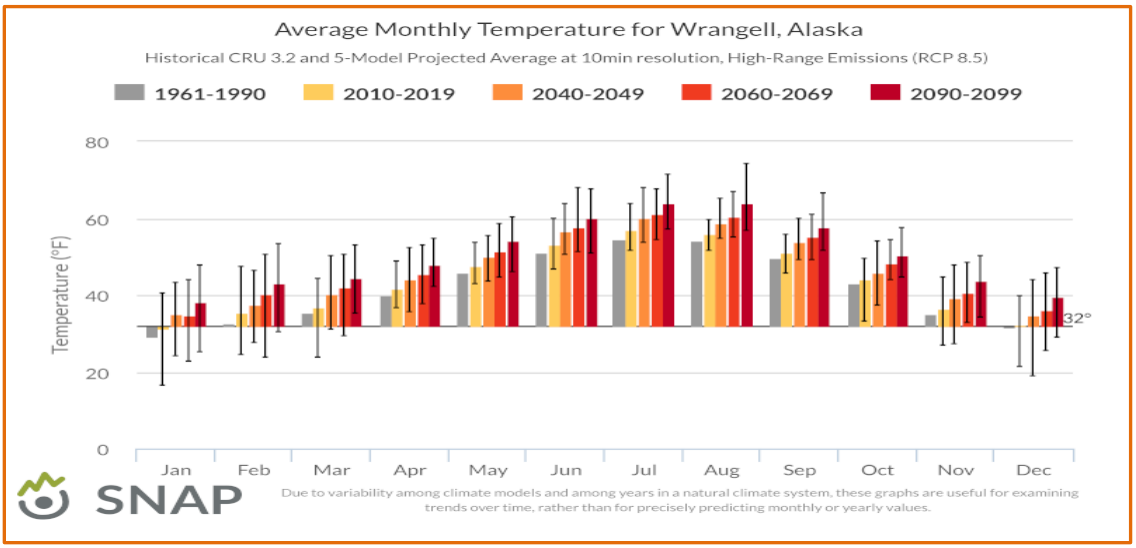


Figure 5-17 Wrangell's Historic and Predicted Temperature Ranges

Source: SNAP 2018

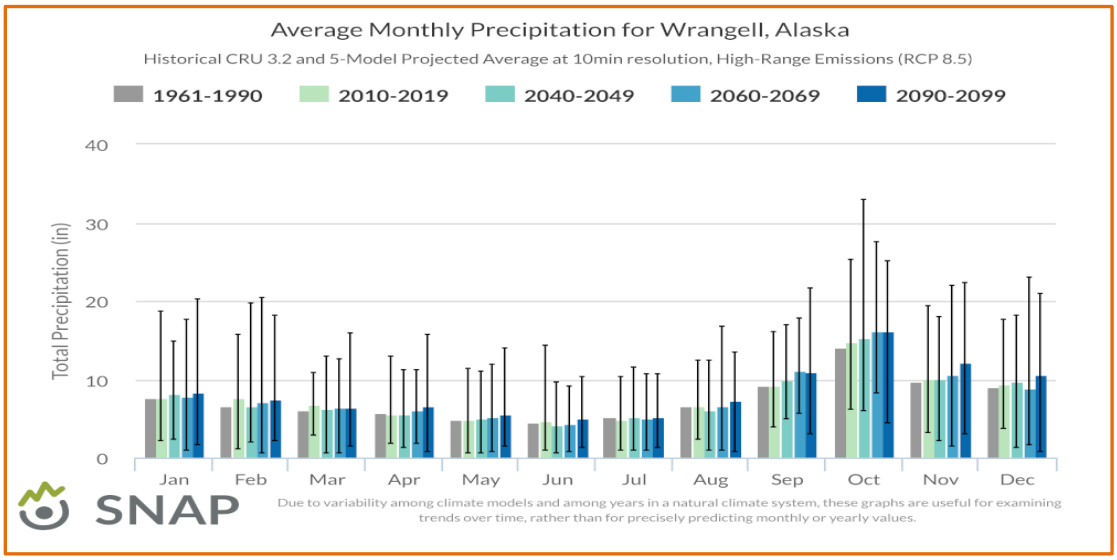


Figure 5-18 Wrangell's Historic and Predicted Temperatures

Source: SNAP 2018

The Western Regional Climate Center's (WRCC) provides monthly climate data summary for the Wrangell area. (Figure 5-19) This data indicates future potential trends.

Climate data for Wrangell [hide]

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Record high °F (°C)	62 (17)	65 (18)	58 (14)	77 (25)	81 (27)	84 (29)	84 (29)	83 (28)	75 (24)	70 (21)	66 (19)	57 (14)	84 (29)
Average high °F (°C)	33.9 (1.1)	37.7 (3.2)	42 (6)	49.1 (9.5)	56.3 (13.5)	61.7 (16.5)	64 (18)	63.5 (17.5)	57.7 (14.3)	49.4 (9.7)	41.1 (5.1)	36.4 (2.4)	49.4 (9.7)
Average low °F (°C)	24.7 (−4.1)	27.7 (−2.4)	30.8 (−0.7)	35.3 (1.8)	41.1 (5.1)	46.5 (8.1)	49.8 (9.9)	49.7 (9.8)	45.9 (7.7)	39.2 (4)	32.1 (0.1)	27.6 (−2.4)	37.5 (3.1)
Record low °F (°C)	−10 (−23)	−5 (−21)	0 (−18)	17 (−8)	22 (−6)	30 (−1)	32 (0)	33 (1)	11 (−12)	18 (−8)	1 (−17)	−7 (−22)	−10 (−23)
Average precipitation inches (mm)	6.71 (170.4)	5.72 (145.3)	5.49 (139.4)	4.65 (118.1)	4.21 (106.9)	3.93 (99.8)	4.88 (124)	5.98 (151.9)	9.62 (244.3)	13.32 (338.3)	9.08 (230.6)	7.92 (201.2)	81.51 (2,070.4)
Average snowfall inches (cm)	18.4 (46.7)	12.4 (31.5)	7.9 (20.1)	0.8 (2)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0.1 (0.3)	5.8 (14.7)	12.6 (32)	58 (147)
Average precipitation days	19	17	19	18	18	17	17	17	20	25	21	21	229

Source: [21] "WRANGELL (509919)". Western Regional Climate Center.

Figure 5-19 Wrangell's Monthly Climate Data Summary

Source: WRCC 2018

Table 5-9 displays Annette Island's wind speeds for their highest wind events for each indicated year for the most windy time periods; fall/winter. Wind speeds in the Ketchikan area have reached 100 mph in many southeast Alaska areas (Table 5-10). Therefore, similar wind speeds are expected in Wrangell as their surrounding areas.

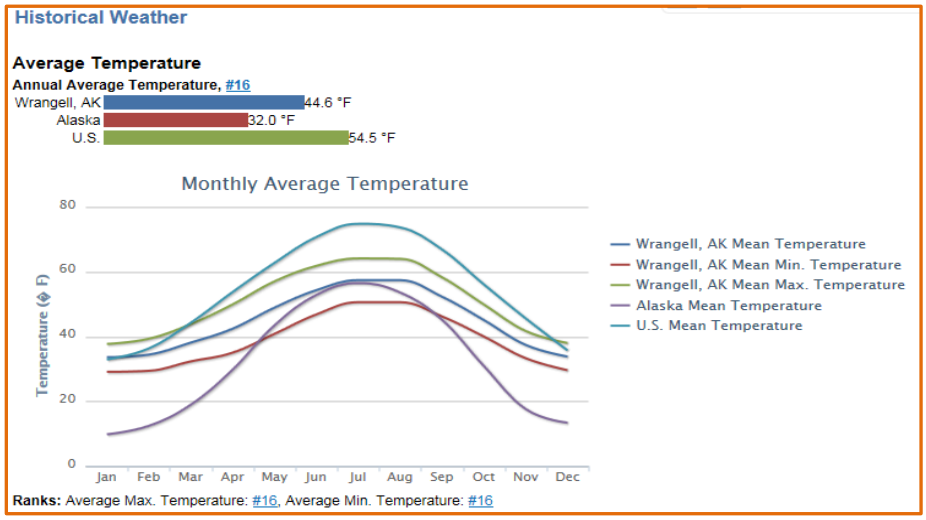
Table 5-9 Wrangell's Winter Wind Speeds

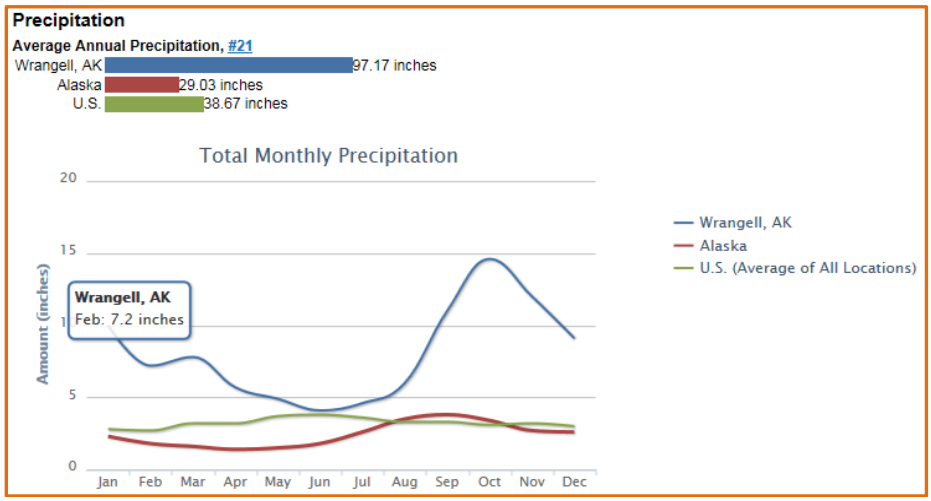
(Highest speeds in red text)

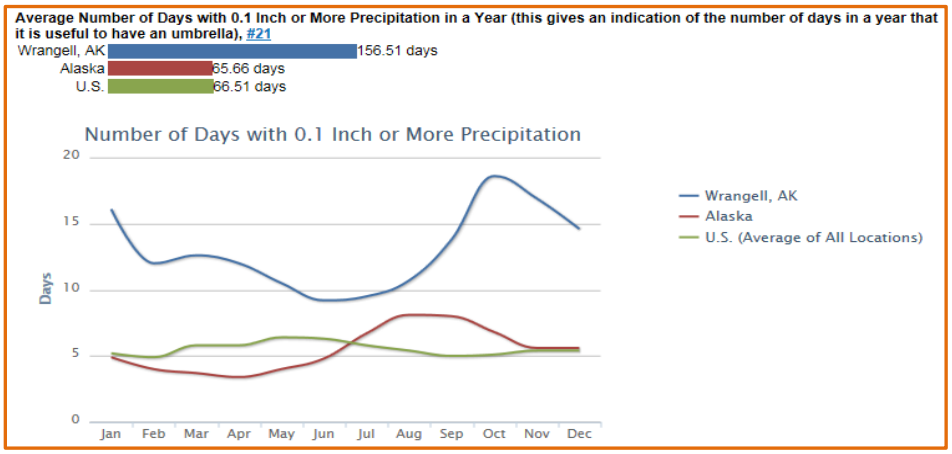
	Jan	Feb	Mar	Oct	Nov	Dec
2017	59	54	46	50	44	46
2016	65	63	45	42	61	58
2015	56	43	47	59	57	48
2014	49	40	51	49	67	63
2013	45	45	40	53	47	52
2012	55	54	61	41	64	56
2011	43	46	39	60	52	67
2010	48	59	64	63	68	36

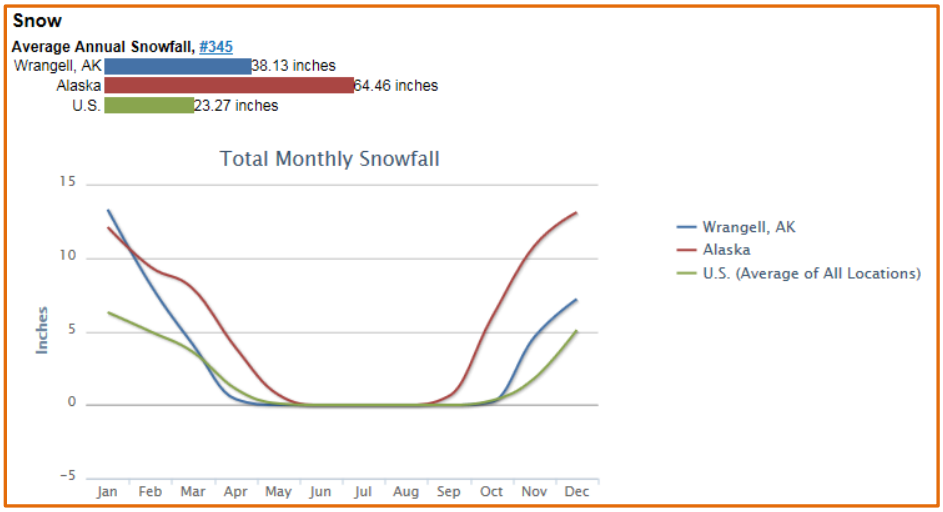
Source: https://www.ncdc.noaa.gov/IPS/lcd/lcd.html?_page=1&state=AK&stationID=25308&_target2=Next+%3E

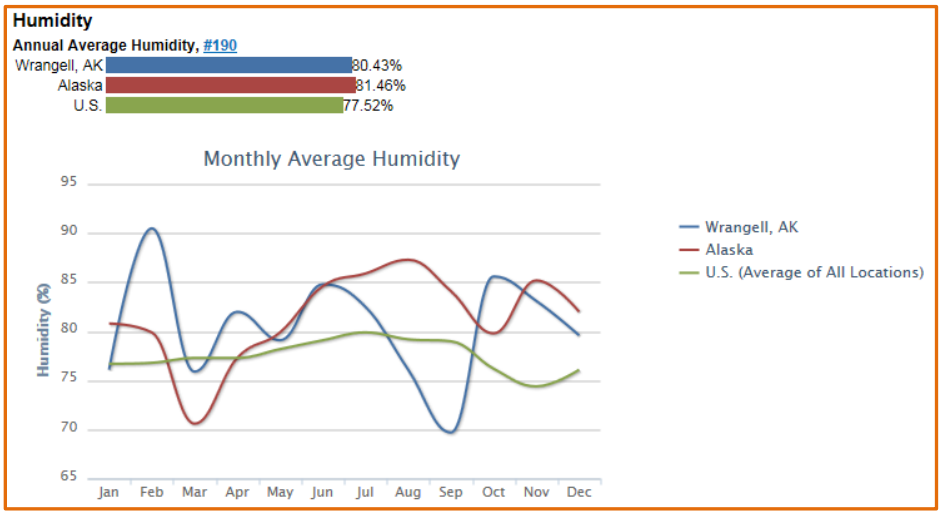
USA.com provides comprehensive climate data and other community information in a usable yet comprehensive format for the Wrangell area. The following figures enable the reader to better understand the area's climate (Figures 5-20).

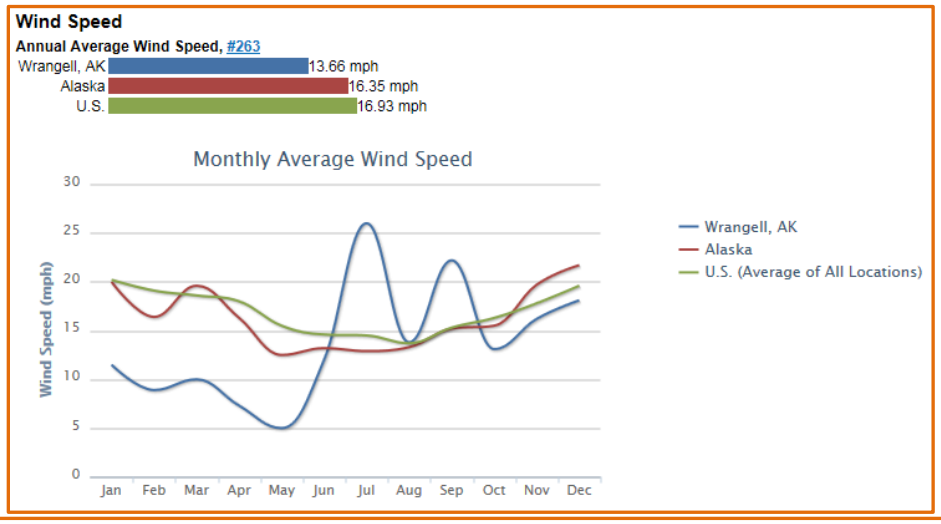





Average Number of Days with 0.1 Inch or More Precipitation in a Year (this gives an indication of the number of days in a year that it is useful to have an umbrella), #21
Wrangell, AK 156.51 days
Alaska 65.66 days
U.S. 66.51 days
Number of Days with 0.1 Inch or More Precipitation
Days
20
15
10
5
0
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
Wrangell, AK
Alaska
U.S. (Average of All Locations)


Snow
Average Annual Snowfall, #345
Wrangell, AK 38.13 inches
Alaska 64.46 inches
U.S. 23.27 inches
Total Monthly Snowfall
Inches
15
10
5
0
-5
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
Wrangell, AK
Alaska
U.S. (Average of All Locations)


Humidity
Annual Average Humidity, #190
Wrangell, AK 80.43%
Alaska 81.46%
U.S. 77.52%
Monthly Average Humidity
Humidity (%)
95
90
85
80
75
70
65
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
Wrangell, AK
Alaska
U.S. (Average of All Locations)



* The temperature, snow fall, and precipitation information on this page were calculated from the historical data of 18,000+ U.S weather stations for the period of time from 1980 to 2010. The humidity and wind speed information were calculated from data from 15,000 worldwide stations for the period of time from 1980 to 2010.

Figures 5-20 USA.com Weather Data

Source: USA.com, http://www.usa.com/wrangell-ak-weather.htm#HistoricalTemperature

Table 5-10 lists a representative sample of Wrangell's major storm events the National Weather Service (NWS) identified for their Weather Zone (. Each weather event may not have specifically impacted the area.

These storm events are listed due to their close proximity to Wrangell or by location within the Inner Channels from Kupreanof Island to Etolin Island's Weather zone 026. Listed impacts may not have affected the Wrangell area.

Table 5-10 Wrangell's Severe Weather Event Sample

Location	Date	Event Type	Magnitude
Inner Channels from Kupreanof Island to Etolin Island. (AK Zone 026)	2/23/2018	Winter Storm	The weather front swept over the central panhandle on 24 February, spreading snow over the… easterly slopes increasing the snowfall. Temperatures began warming in the afternoon leading to a wetter snowfall in the afternoon and snowpack compaction.
AK Zone 026	2/1/2018	Winter Storm	N-NE-E wind… kept temperatures cold enough on the north side of the front to allow snow to get up to southern Admiralty Island. Increasing temps above freezing late Thursday night into Friday morning made the rain/snow line critical and difficult to forecast. Significant snowfall occurred for Port Alexander, Petersburg, Wrangell, Point Baker and Coffman Cove. Ketchikan had wintry mix. No damage was reported and the impact was snow removal. Some places could have had blizzard conditions... Port Alexander had gusts of around **46 mph** (40kts)... Highest snow falls extended a little farther south than expected. Petersburg, to Whale Pass to Thorne Bay, and Coffman Cove got buried. Lighter amounts elsewhere. Snow changed to rain early in

Table 5-10 Wrangell's Severe Weather Event Sample

Location	Date	Event Type	Magnitude
			Ketchikan and overnight at Kasaan limited snow amounts to 1 to 2 inches there…
AK Zone 026	2/12/2018	Heavy Snow	… Juneau and Petersburg got hit with a heavy snow storm that was not well forecasted. By Tuesday morning Juneau got 6 to 15 inches of new snow plus some freezing drizzle, and Petersburg got 7 to 8 inches. This was due to deep WSW flow aloft that was expected to rain, but cold air never changed over.
AK Zone 026	2/22/2018	Winter Storm	… heavy snow for the Central Panhandle. Cold air in place closer to the coast mountains resulted in heavy snow with a high water content. Most snow was 10 to 1 or less which made heavy snow removal the main impact… Petersburg and Wrangell temperatures warmed overnight but more snow was observed before the changeover especially at Petersburg. Wildly varying snow amounts with less than 1 inch at Kake and Wrangell while 5 to 6 inches were observed at 9 mile on the Mitkof highway.
AK Zone 026	4/10/2018	High Wind	A very strong wave developed south of Haida Gwaii and skirted the coast of SE Alaska causing storm force wind and hurricane force gusts. There was some damage reported, and the peak wind was **100 MPH**. The strong wave moved off the coast and into the western Gulf on the morning of 4/11.
AK Zone 026	3/12/2017	Winter Storm	An arctic front was over the central Panhandle as another in a series of storms moved northward from off the Pacific Northwest. The storm center had deepened… off Dixon Entrance forcing warm moist air over the arctic air in place resulting in heavy snow for most of the Panhandle... The impact was intense snow removal for storm totals up to 20 inches on top of an already deep snowpack. This was a setup for avalanches later that week.
AK Zone 026	2/11/2017	High Wind, Snow, Blizzard	Strong SSW flow… brought snow, high winds, and even blizzard conditions to the Panhandle. Warm air overrunning very cold air at the surface caused the snow to accumulate rapidly. White Pass was closed, and snow combined with wind gusts over **60 mph** (52kts) caused road and marine problems throughout SE Alaska. Some locations measured over a foot of new snowfall.
AK Zone 026	2/27/2017	Winter Storm	Gale force wind just off Ocean Cape. A strong front moved on to the coast dumping snow. The impact was snow removal but no damage was reported.
AK Zone 026	1/25/2016	High Wind	A Hurricane Force wind over the western Gulf... A series of gale force to storm force winds. One of these systems caused extensive damage in the Edna Bay harbor… wrecking boats in the harbor. Max gusts in these systems were **75 to 80 mph** (65-69 kts).
AK Zone 026	12/25/2016	Winter Storm	A very strong Bering Sea low… spawned a strong frontal system that raced across the Gulf to slam SE with another heavy snow event. This was a typical case of warm moist air overrunning cold air at the surface. Snowfall ranged from 1 to 2 ft. The only impact was intense snow removal.

Table 5-10 Wrangell's Severe Weather Event Sample

Location	Date	Event Type	Magnitude
AK Zone 026	11/29/2016	High Wind	…a radical pattern shift with a storm off the coast… brought warm moist air over the arctic front while… causing high wind. Trees came down and snow was hard to remove, but no significant damage was reported.
AK Zone 026	2/5/2015	Winter Storm	A second major wind storm hit Southeast Alaska beginning on the evening of Wednesday February 4th… extreme surface pressure gradients in the channels over the entire Panhandle and an arctic front from Cape Spencer to Petersburg. Classical Taku wind conditions persisted for Downtown Juneau and Douglas through Thursday night into Friday. There were many wind speed observations in excess of **100 mph**, and damage was reported. Also, heavy snow developed over the arctic front and winter storm watches and warnings were issued well in advance. Brief blizzard conditions occurred over the Klondike Highway, and a number of high wind warnings were issued well in advance of this storm. Extensive decision support services were conducted by the Juneau Forecast Office. All concerned emergency managers across the region were directly contacted either in person or by phone for briefings. The Alaska Department of Transportation was directly contacted about the hazardous white-out conditions at White Pass and the potential for snow removal in the central Panhandle. The Alaska Marine Highway (ferries) were briefed two days in advance of this event and some routes were cancelled due to the hurricane force winds, giant wind waves - one report to 20 ft. on Inside waters - and heavy freezing spray. There was significant damage to windows and windshields and power outages during this storm. As previously stated, ferry service was canceled and also airline schedules were disrupted. Freezing spray iced over some marine observations which were out of service for a few days until there was a thaw. Snow removal was easier than usual due to the snow being fluff.
AK Zone 026	4/28/2015	High Wind	An unseasonable storm hit the Southern Panhandle… SSW of the Queen Charlotte Islands... The center moved over Sitka… then rapidly weakened over the Eastern gulf of Alaska... Numerous reports of downed trees, power outages, and wind damage were reported particularly in Ketchikan. Gusts over **100 mph** (86 kts) were measured.
AK Zone 026	10/9/2015	High Wind	[High wind] caused minor damage for several coastal areas. Power outages were common and there was significant damage to a dock.
AK Zone 026	11/30/2014	Winter Storm	Cold air was trapped over the inner channels… due to blocking high pressure. Heavy snow began as warm moist air moved over the area as the block broke down… A second snow event occurred on Dec 1, but the amounts were not as heavy... No damage or power outages were reported, but snow removal was a challenge due to this being the first measurable snowfall of the 2014-2015 season.
AK Zone 026	11/5/2014	High Wind	…The storm center…, just off Dixon Entrance… weakened

Table 5-10 Wrangell's Severe Weather Event Sample

Location	Date	Event Type	Magnitude
			over land… near Cape Spencer... Marine storm force winds were common with this system with hurricane force gusts. Land winds gusted as high as **92 mph** (80 kts) and caused damage particularly in Ketchikan with one roof blown away with trees down and power outages.
AK Zone 026	4/28/2014	High Wind	A weak low… caused high wind along the coast of Cape Decision measured **50 mph** (43 kts) sustained wind… with gusts as high as **85 mph** (74 kts)... some areas along Baranof, Kuiu, and Prince of Wales islands were hit.
AK Zone 026	10/19/2014	High Wind	… a strong associated front approached the Panhandle from the SSW. A secondary low developed... This second center made landfall near Cape Decision... Gale force winds with storm force gusts were observed over much of the Southern Panhandle including Kuiu Island ... Winds rapidly diminished... with no damage reported.
AK Zone 026	12/19/2013	Winter Storm	…gale force triple point low moved into the central Gulf of Alaska… forcing warm moist air over cold air at the surface in the Panhandle. This system brought heavy snow to much of SE Alaska including the northern Panhandle, Yakutat, and Hyder.
AK Zone 026	1/29/2013	Winter Storm	…cold northerly flow [occurred] through mountain passes and Lynn Canal… [carrying] moisture-laden frontal system… into the eastern Gulf. This… brought heavy snow to some parts of SE Alaska...
AK Zone 026	11/21/2013	Winter Storm	Arctic air… over SE Alaska [that] changed to SW and warm moist air… over the Panhandle... snow changed to rain, precipitation became freezing rain in a few locations. Strong winds… with a switch over to rain. Temperatures warmed rapidly causing the snow pack to become very difficult to manage. This storm … [caused widespread] snowfall, freezing rain, and wind problems.
AK Zone 026	2/2/2012	High Wind	… hurricane force low deepened… off Sand Point… This storm brought hurricane force winds to all of SE Alaska and a few areas of heavy snow.
AK Zone 026	12/1/2012	Winter Storm	Arctic high pressure… Petersburg got around 11.2 inches of snow...
AK Zone 026	12/8/2012	Winter Storm	... [combined moist]… air masses [brought] heavy snowfall to the northern Panhandle. The heavier snowfall amounts were from 5 to 9 inches... Most areas had rain later that day making snow management difficult.
AK Zone 026	1/20/2012	Winter Storm	… Strong north wind developed for Downtown Juneau, but no damage was reported ... The storm deepened…, cold air, and heavy snow [occurred along] most of the Panhandle… [lasting for 2 days].
AK Zone 026	11/22/2012	High Wind	…hurricane force low… slowed down but deepened... over Prince of Wales Island that evening. The high winds were brief but intense for much of SE Alaska... Strong winds lasted for another day afterward.

Source: NOAA 2018

5.3.1.3 Location, Extent, Impact, and Recurrence Probability

Location

The entire Wrangell area experiences periodic severe weather impacts. The most common to the area are high winds and severe winter storms. Table 5-6 depicts weather events that have impacted the area since 2012 and are provided as a representative sample.

Extent

The entire Wrangell area is equally vulnerable to the severe weather effects. The area experiences severe storm conditions with moderate snow depths; wind speeds exceeding 90 mph.

Based on past severe weather events and the criteria identified in Table 5-2, the extent of severe weather in the Wrangell area are considered "Limited" where injuries do not result in permanent disability, complete shutdown of critical facilities could 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 area.

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 supply flows 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 sheet flow flooding throughout Wrangell. 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.

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

Section 6.8, Tables 6-5, 6-6, and 6-7, and Section 6.8.1 lists potential people, property, and infrastructure damage and loss from a worst-case scenario if Seward's entire infrastructure experienced a damaging weather event.

Recurrence Probability

Based on previous occurrences and the criteria identified in Table 5-3, it is "Likely" a severe storm event will occur in the next three years with a (1/3=33 percent) years chance of occurring as the history of events is greater than 20 percent but less than or equal to 33 percent likely per year.

5.3.2 Wildland Fire

5.3.2.1 Nature

A wildland fire is a wildfire type that spreads by consuming vegetation. It often begins unnoticed, spreads quickly, and is usually signaled by dense smoke that may be visible from miles around. The vast majority of Wrangell's wildland fires have been caused by human activities (such as unattended burns and camp or cooking fires) and by natural events such as lightning. In addition to wildland fires, wildfires can be classified as tundra fires, urban fires, interface or intermix fires, and prescribed burns.

The following three factors contribute significantly to wildland fire behavior and can be used to identify wildland fire hazard areas.

Topography describes slope increases, which influences wildland fire burn and spread rates. South-facing slopes are subject to more solar radiation, making them drier and thereby intensifying wildland fire behavior. However, ridge tops may mark the end of wildland fire spread since fire spreads more slowly or may even be unable to spread downhill.

Fuel is the type and condition of vegetation that determines how often a fire occurs and its spread rate. Certain plant and vegetation types are more susceptible to burning or will burn with greater intensity. Dense or overgrown vegetation increases the amount of combustible material available to fuel a fire (referred to as the "fuel load"). The ratio of living to dead plant matter is also important. Climate change is deemed to increase wildfire risk significantly during periods of prolonged drought as the moisture content of both living and dead plant matter decreases. The fuel load continuity, both horizontally and vertically, is also an important factor.

Weather is the most variable factor affecting wildland fire behavior. Wrangell's drought conditions are cause by higher temperatures, lower humidity and precipitation, wind, and lightning. All of which can increase fire ignition probability and spread rates. Wrangell has been experiencing extremely hot and dry weather compared to their historical norms… increasing in recent time and can potentially lead to more frequent wildland fire activity.

Wildland fire frequency and severity also depends on other hazards, such as damage caused by spruce-bark beetle infestations. If not promptly controlled, wildland fires may grow into an emergency or disaster. Even small fires can threaten lives, resources, and improved properties. In addition to affecting people, wildland fires may severely affect livestock and pets. Such events may require emergency water/food, evacuation, and shelter.

Wildland fire's indirect effects can be catastrophic. It strips the land of vegetation and destroys forest resources; large, intense fires can harm the soil, waterways, and the land itself. Soil exposed to intense heat may lose its capability to absorb moisture and support life. Exposed soils erode quickly and increase river and stream siltation, thereby increasing flood potential, harming aquatic life, and degrading water quality. Vegetation stripped lands are also subject to increased ground failure events such as debris and mud flows.

5.3.2.2 History

The Alaska Interagency Coordination Center (AICC) identified 114 historical wildland fires that occurred within 50 miles of Wrangell. The majority of these fires ranged in size from 0.1 to 0.9

acres burned and were human caused from trash burning, camp fires, and children. Table 5-10 lists 18 of those fires that exceeded 1 acre with the largest one burning 588 acres in 1980, and another burning 26 acres in 1958.

Table 5-10 Wrangell's Historical Wildfires Since 1939 within 50 Miles

Fire Name	Fire Year	Estimated Acres	Total Cost	Latitude	Longitude	Cause
Highbush Fire	2009	1		56.3166656	-132.1166687	Campfire
Sweetwater	2005	1.3		55.94972	-132.9489	Human
Rainbow Falls	2004	6	$6,310	56.40667	-132.2786	Lightning
Whiskey Cove	2004	1	$4,000	56.32611	-132.1769	Human
Kosciusko Bay	2004	3.5	$9,500	56.01445	-133.3114	Human
Petersburg Creek	2003	1		56.86666	-133	Children
Union Bay	2002	4		55.7666664	-132.2666626	Human
Ketili	1999	2		56.68333	-131.9833	Recurrent
Farragut Bay	1998	1		57.16667	-133.15	Trash Burning
Snake Ridge	1996	2		56.5833321	-133.7833405	Campfire
Sarkar Route	1995	4		55.9666672	-133.1166687	Campfire
Clamdigger 2	1994	1		56.2000008	-132.1999969	Campfire
Clamdigger	1994	1		56.2000008	-132.1999969	Campfire
Canoe	1993	1		56.8333321	-132.1666718	Lightning
Unnamed	1990	6		56.1833344	-133.1166687	Camping
N Hamilton	1980	588		56.8666667	-133.65	Undefined
Bay Log	1958	26		55.7999992	-131.4666595	Debris Burning
Blind River	1958	5.6		56.6666679	-132.5	Campfire

Source: AICC 2018

Location

Under certain conditions wildland fires may occur near residential areas and other infrastructure when weather, fuel availability, topography, and ignition sources combine. Wrangell area does not have official fuels data. However, the planning team stated that persistent and recurring unseasonably hotter temperatures create drought conditions that are perfect for increasing wildland fire susceptibility. Wrangell's historical wildland fire locations are displayed in Figure 5-21.

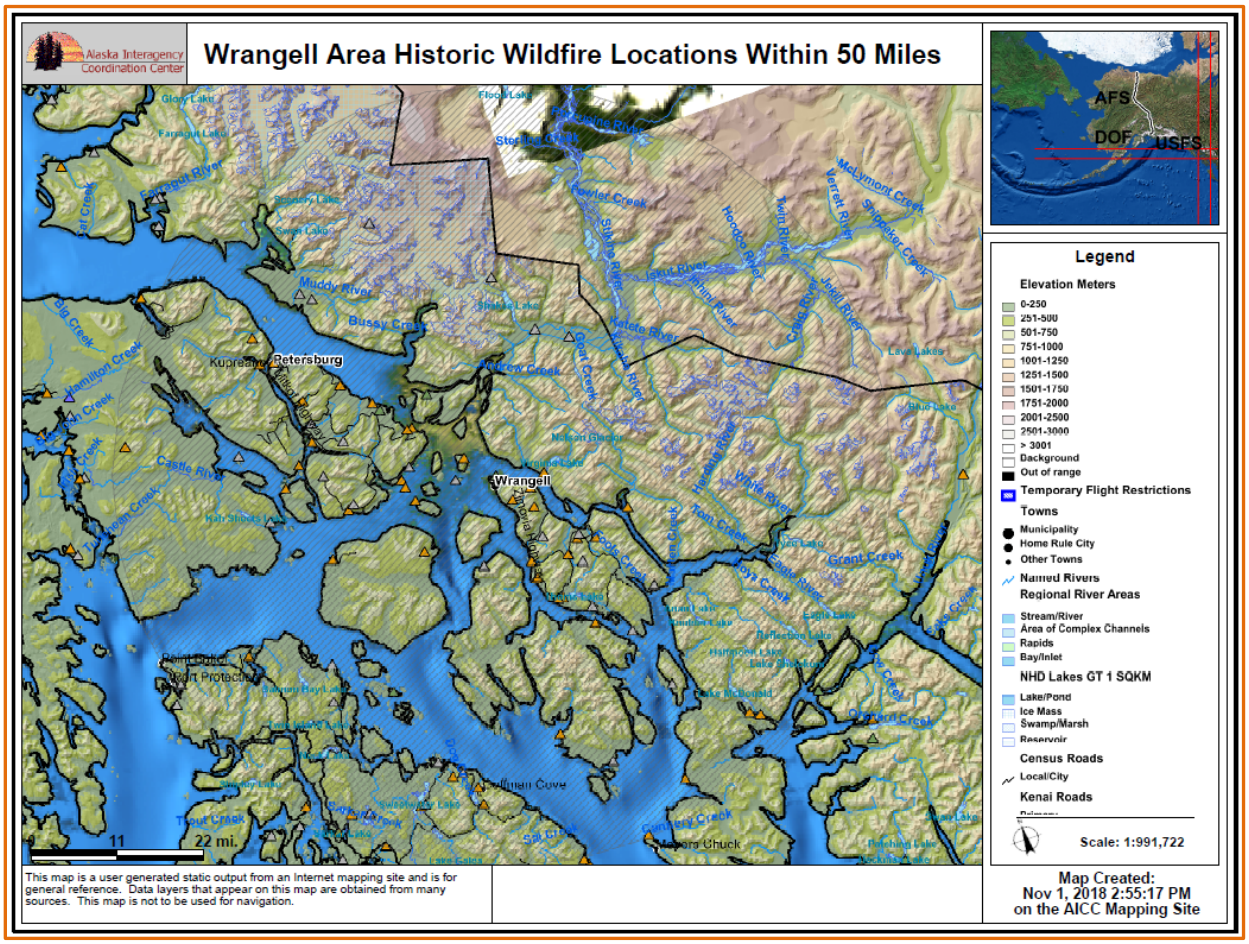


Figure 5-21 Wrangell's Historical Wildfire Locations

Source: AICC 2018: https://afsmaps.blm.gov/imf_firehistory/imf.jsp?site=firehistory

Extent

Wrangell is experiencing greater fire vulnerability because their spring, summer, and early fall temperatures have been increasing. Vegetation dries out from decreasing plant moisture content and increases the ratio of dead fuel to living fuel. The area's humidity, wind speed and direction, fuel load and fuel type, and topography can contribute to the fire intensity and spread rates. Wrangell's most common wildland fire cause is human negligence, followed by increased lightning strikes from changing climate patterns.

The 1980 fire burned approximately 588 acres. Due to poor records, the location is approximate. The cause of the fire was unknown. The AICC historical fire report indicates an average number of acres burned amounted to 5.9 acres burned. Subtract the (large, undefined but atypical) 588 acre fire and the average falls to 0.75 acres burned from human carelessness.

Based on the limited number of large historical wildland fire events and the criteria identified in Table 5-2, the magnitude and severity from wildland fire in Wrangell are considered "Negligible" where minor injuries or illnesses would be treatable with first aid, minor quality of life lost, with potential for critical facilities to be shut down for 24 hours or less with less than 10 percent of property or critical infrastructure being severely damaged.

Impact

Wildland fire impacts with the population center of Wrangell could grow into an emergency or disaster if not properly controlled. A small fire can threaten lives and resources and destroy property.

Fire is recognized as a critical feature of the natural history of many ecosystems. It is essential to maintain the biodiversity and long-term ecological health of the land. The role of wildland fire as an essential ecological process and natural change agent has been incorporated into Alaska's fire management planning process its full range of fire management activities to help achieve ecosystem sustainability. This includes interrelated ecological, economic, and social consequences on firefighters, public safety and welfare; natural and cultural resources threatened.

Section 6.8, Tables 6-5, 6-6, and 6-7, and Section 6.8.1 lists potential people, property, and infrastructure damage and loss from a worst-case scenario if Seward's entire infrastructure experienced a damaging wildland/urban interface fire event.

Recurrence Probability

An important issue related to the wildland fire probability is the urban interface fire. Increased development along the community's perimeter, accumulation of hazardous wildfire fuels, and the uncertainty of weather patterns that may accompany climate change increases wildland urban-interface fire recurrence probability. These three combined elements are reason for concern and require heightened mitigation management of each community's wildland interface areas, natural areas, and open spaces.

Climate change and flammable vegetation species are prolific throughout Wrangell's forests locations especially since extreme heat days have been increasing and drought conditions are a year recurrence. Fire frequency will likely increase in the future.

Based on the history of wildland fires in the Wrangell area and applying the criteria identified in Table 5-3, it is "Unlikely" but possible a wildland fire event will occur within Wrangell in the next ten years. The event has 1 in 10 years (1 in 10= 10 percent) chance of occurring and the history of events is less than or equal to 10 percent likely each year.

6.0 VULNERABILITY ASSESSMENT

This section outlines the vulnerability process for determining potential losses for the community from various hazard impacts.

6.1 OVERVIEW

A vulnerability analysis predicts the exposure extent that may result from a hazard event, with a given intensity, within a given area. This 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. National Flood Insurance Program Participation
4. Land Use and Development Trends
5. Vulnerability Analysis Methodology
6. Data Limitations
7. Vulnerability Exposure Analysis
8. Future Development

DMA 2000 requirements and implementing city and borough governance regulations for current assets, and area future development initiatives:

DMA 2000 Multi-Jurisdictional Requirements
ELEMENTS. Planning Area and Natural Hazard Profiles
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 the jurisdiction that have been repetitively damaged by floods? (Requirement §201.6(c)(2)(ii))
Source: FEMA, March 2015

DMA 2000 requirements and implementing tribal governance regulations for current assets, and area future development initiatives:

DMA 2000 Tribal Requirements
ELEMENTS B: Risk and Vulnerability Assessment
B3. Does the plan include a description of each identified hazard's impact as well as an overall summary of the vulnerability of the tribal planning area? [44 CFR § 201.7(c)(2)(ii)]
Source: FEMA, October 2017

Vulnerability assessment requirements include:

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

Table 6-1 lists CBW, WCA, and the CCTHITA's infrastructures' hazard vulnerability synopsis.

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
Flood				
Ground Failure	100	100	100	100
Weather	100	100	100	100
Wildland Fire	100	100	100	100

6.2 CULTURAL AND HISTORIC RESOURCE

The 2010 Wrangell Comprehensive Plan describes the areas historic location:

> *People have lived in the Wrangell area for a long, long time (Figure 6-1). According to clan history, the Tlingit people migrated down the Stikine River during a time when the river still flowed underneath glaciers. The population slowly moved down the river with later settlements on the coast including Anita Bay, Mill Creek, the site of the Wrangell Institute at Shoemaker Bay, Anan and many others. The petroglyphs found at Petroglyph Beach near Wrangell and throughout the Borough and the shell middens found on Etolin Island are evidence of the long settlement in the area. (Source 2010 WCP)*

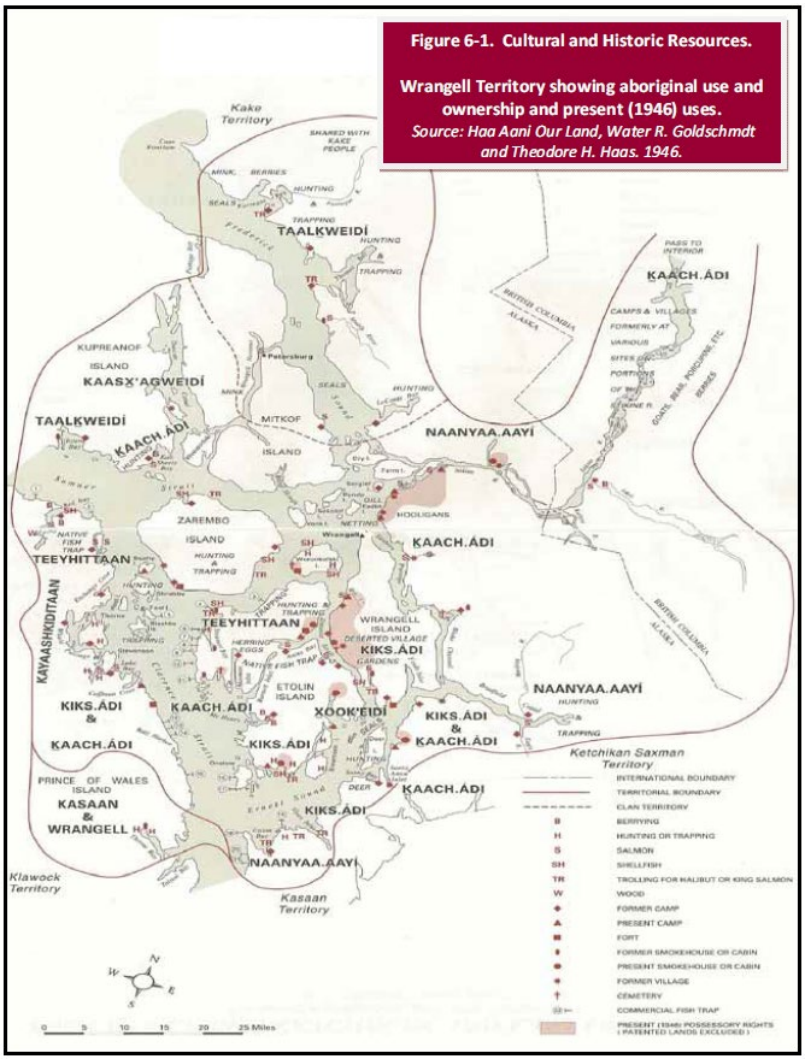


Figure 6-1. Cultural and Historic Resources.

Wrangell Territory showing aboriginal use and ownership and present (1946) uses.
Source: Haa Aani Our Land, Water R. Goldschmdt and Theodore H. Haas. 1946.

6.2.1 Cultural and Sacred Site Sensitivity

The 2010, Wrangell Comprehensive Plan describes the Wrangell Cooperative Associations bond to the land.

> *The community has always been a major home to the Tlingit Kiks.ádi and Naanyaa.aayí clans, as well as the only home of the Kayaashkiditaan, S'iknax.ádi, Xook'eidí, Kaasx'agweidí, and Taalkweidí clans. Today the Wrangell Cooperative Association, a Tlingit IRA council and the federally recognized tribe for the area, maintains Shakes Island in Wrangell's Inner Harbor, Chief Shakes House and the totem park. Chief Shakes House is a replica of traditional Tlingit houses and was constructed in the 1930's using traditional knowledge and methods. (Source 2010 WCP)*

Neither the WCA nor the CCTHITA identified sacred or culturally sensitive locations within the Wrangell area.

NOTE: Anyone desiring information concerning their respective culturally sensitive information must contact the appropriate WCA or CCTHITA tribal office for assistance.

6.3 LAND USE AND DEVELOPMENT TRENDS

6.3.1 City and Borough Land Use

The 2010 Wrangell Comprehensive Plan (WCP) defines their land ownership and current land use designations. The below description and maps are representative of 2010. Since then, the Borough has completed its municipal entitlement selection and acquired an additional 9006 acres from the State of Alaska

> ***6.2 Land_Ownership***
>
> *The City and Borough of Wrangell encompasses 2,582 square miles of land and 883 square miles of water. The federal government is by far the largest landowner in the borough, followed by the State of Alaska (including Alaska Mental Health Trust), the City and Borough of Wrangell and a variety of individual and corporate private sector land owners (Table 6-1). See Figure 6-2.*

[WCP's] Table 6-1. City and Borough of Wrangell Land Status

Land Owner	Square Miles	Percent of Total
Federal (all)	1,597,021	97.28%
State	40,713	2.48%
Alaska Mental Health Trust	2,590	1.06%
City and Borough of Wrangell	1,296	0.08%
Private	2,709	0.17%
	1,641,740	100%

> *There are just under 41,000 acres of State uplands in the Borough. Table 6-2 lists the approximately 25,000 acres of State land that are designated in a manner that make it VUU land and thus available to select as part of the Borough's municipal entitlement. Lands eligible for municipal selection (VUU land) are shown in black on Figure 6-3.*

[WCP's] Table 6-2. State Land within the City and Borough of Wrangell
Eligible for Municipal Entitlement Selection (only uplands listed)

State Parcel #	Parcel Name	Designation	Acres
W-01	Crittenden Creek area	Gu	3,410
W-02	St John Harbor (Zarembo Island)	Gu, S	1,679
W-08	Western bank of Eastern Passage (Wrangell Island	Gu	1,679
W-10	Pats Creek Drainage	Gu	3,061
W-12	Earl Cove West**	Gu	3,564
W-14	Thoms Place (west half)	Gu, S	2,360
W-15	Olive Cove Drainage (Etolin Island)	Gu, Ru	450
W-19	North bank of Bradfield Canal	Gu	880
W-20	South bank of Bradfield Canal	Gu	574
W-21	Bradfield River floodplain	Gu	2,778
W-23	McHenry Anchorage frontage including Kelp Point and Avon Island (Etoline Island)	Gu, Ru	752
W-27	Uplands above coastal plain south of Pat Creek Campground (Wrangell Island)	Gu	694
W-28	West of Thoms Place	Ru	408
C-01	Sunny Bay and Watkins Point frontage and uplands (Cleveland Peninsula)**	Gu	2,514
C-04	Union Park and Vixen Harbor area	Ru, Pr	421
C-05	Small parcel in Meyers Chuck	Sc	1

Sources: Alaska DNR Central/Southern Southeast Area Plan, November 2000
The data on this table is from the DNR Area Plan and does not reflect andy changes since 2000
***Parcels that will go to University if not selected by Borough.*

6.3 Wrangell Municipal Entitlements (Land Use and Future Growth)

On May 6, 2008, a local election was held to decide whether to dissolve the City of Wrangell and incorporate as the unified City and Borough of Wrangell, that would include the communities of Meyers Chuck, Union Bay, Thoms Place, Olive Cove and Farm Island and stretch from Cleveland Peninsula on the south end to the Stikine River on the north, and Zarembo and Etolin Islands on the west. Two third (64 percent) of the area's residents voted in favor of this proposal and on May 30, 2008, the City and Borough of Wrangell was incorporated. The area and extent of the new borough reflects the long standing connection between Wrangell, its Tlingit territory, and the surrounding land and water; minerals and gravel are extracted from the Stikine and brought into Wrangell, fish caught in surrounding waters are processed in local plants, logs harvested from Etolin, Zarembo and Shrubby Islands and other areas supported the Wrangell mills, residents of the remote areas use Wrangell as a transportation and supply hub, and visitors to Wrangell often travel to the rest of Wrangell Island, the Stikine River and Anan Wildlife Observatory…

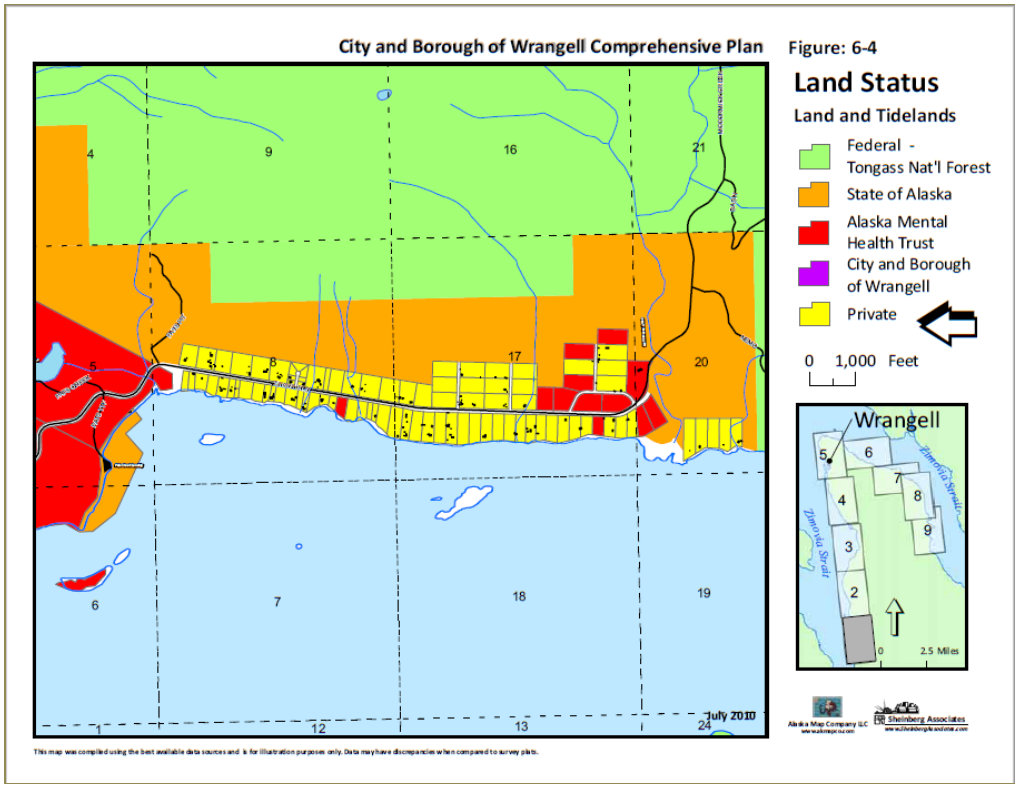
A series of maps now follows that shows Land Status:

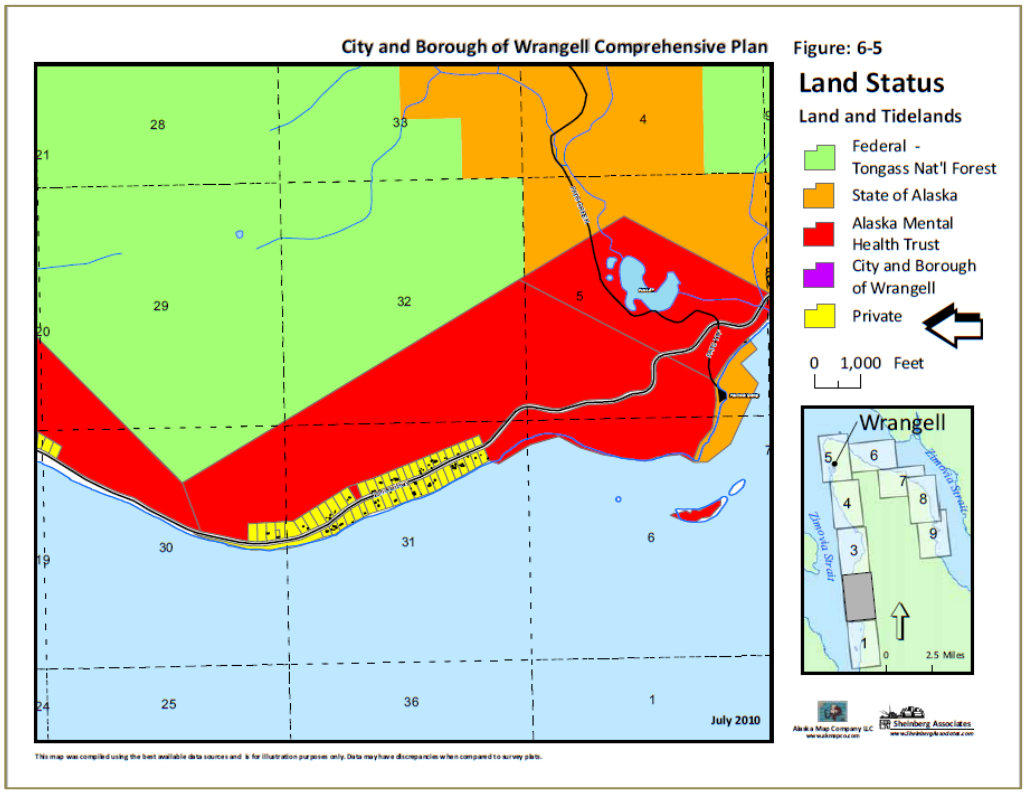
- *General land ownership in the City and Borough of Wrangell (Figure 6-2)*
- *State land in the City and Borough of Wrangell that is available to select for Wrangell's municipal entitlement (Figure 6-3)*
- *a 9 map series detailing ownership in the former city where most residents live today (Figures 6-4 to 6-12)*

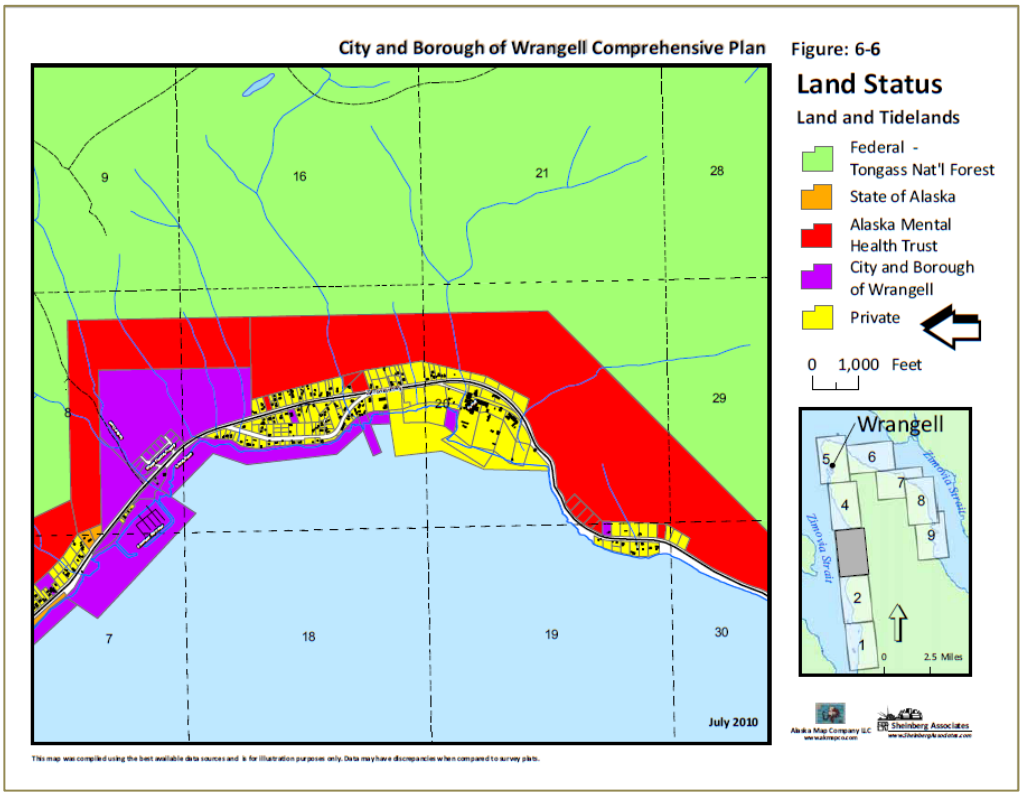
Maps showing land ownership forMeyers Chuck, Union Bay, Thoms Place, Olive Cove, Wrangell East and the Farm Island area are found in the Chapter 10.

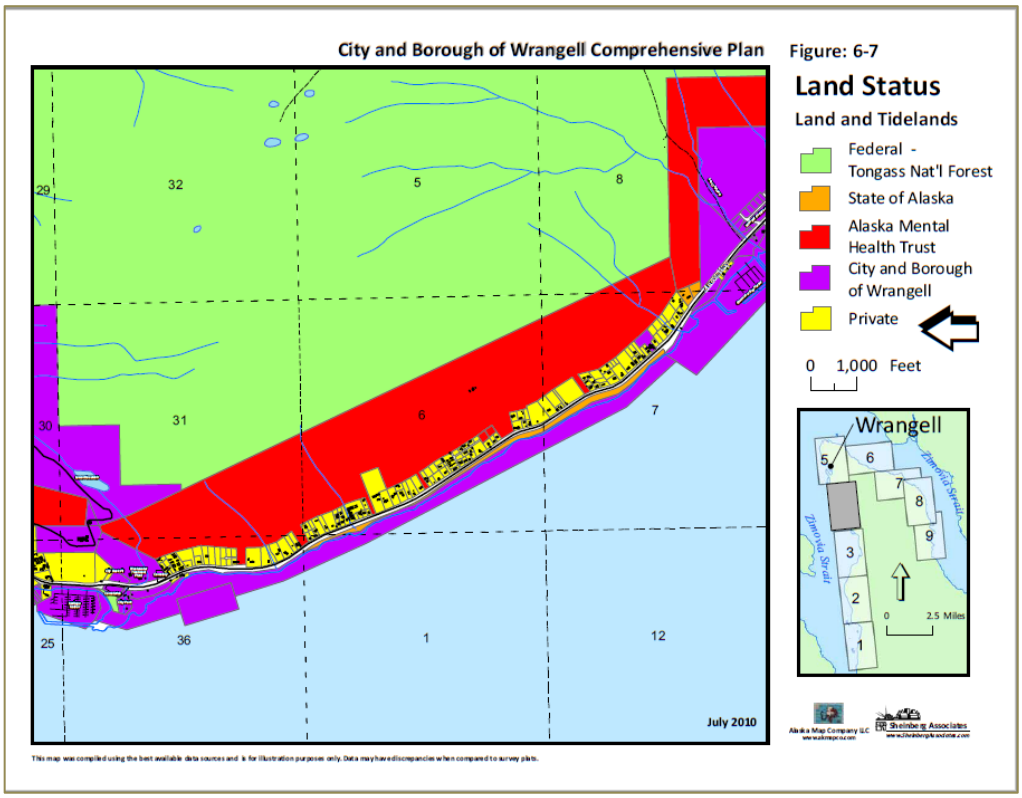
(Source: Wrangell CP, 2010)

Note: *Not all maps were available from this source due to document size (6-2, 6-3, & 6-8)*

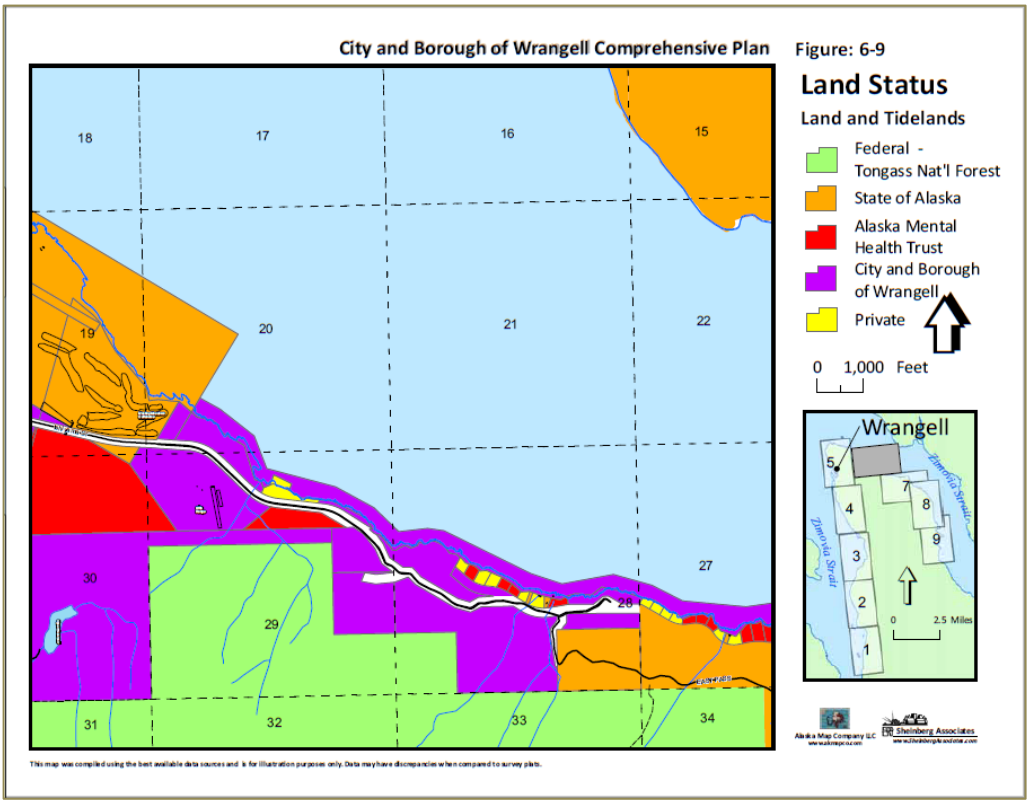

City and Borough of Wrangell Comprehensive Plan
Figure: 6-4
Land Status
Land and Tidelands
Federal - Tongass Nat'l Forest
State of Alaska
Alaska Mental Health Trust
City and Borough of Wrangell
Private
0 1,000 Feet
Wrangell
Zimovia Strait
2.5 Miles
July 2010
This map was compiled using the best available data sources and is for illustration purposes only. Data may have discrepancies when compared to survey plats.

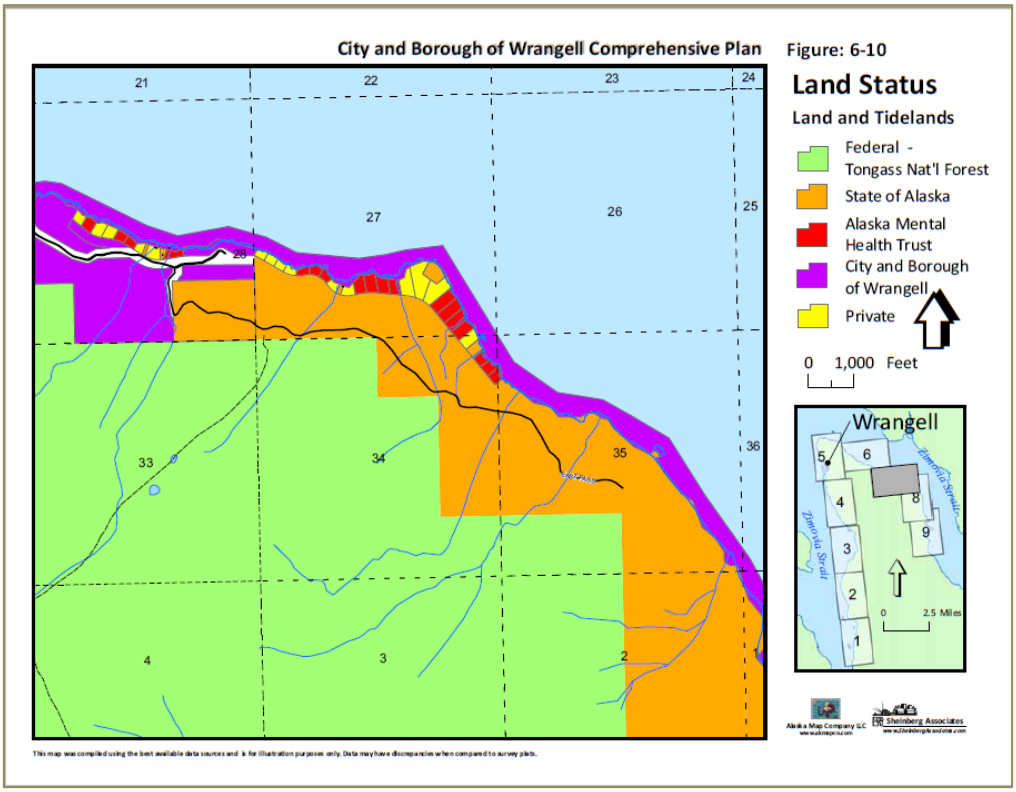

City and Borough of Wrangell Comprehensive Plan
Figure: 6-5
Land Status
Land and Tidelands
Federal - Tongass Nat'l Forest
State of Alaska
Alaska Mental Health Trust
City and Borough of Wrangell
Private
0 1,000 Feet
Wrangell
Zimovia Strait
2.5 Miles
July 2010
This map was compiled using the best available data sources and is for illustration purposes only. Data may have discrepancies when compared to survey plats.

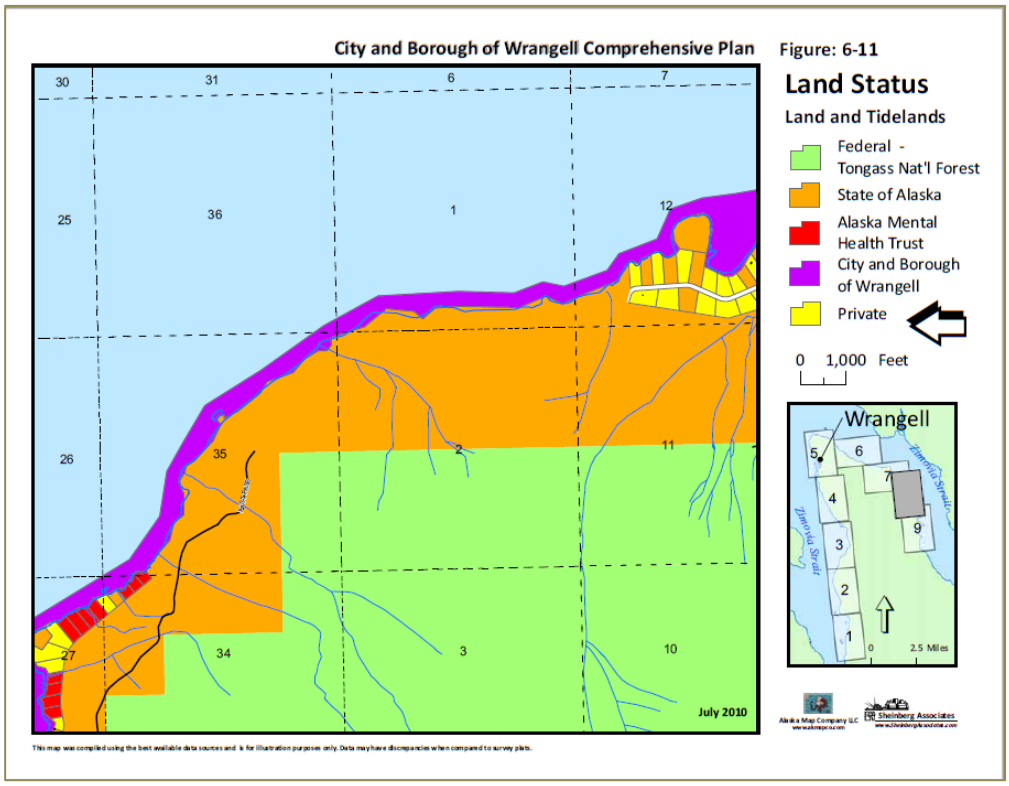




Note: Figure 6-8, land status map not available


City and Borough of Wrangell Comprehensive Plan
Figure: 6-9
Land Status
Land and Tidelands
Federal - Tongass Nat'l Forest
State of Alaska
Alaska Mental Health Trust
City and Borough of Wrangell
Private
0 1,000 Feet
Wrangell
Zimovia Strait
0 2.5 Miles
18
17
16
15
19
20
21
22
30
29
28
27
31
32
33
34


City and Borough of Wrangell Comprehensive Plan
Figure: 6-10
Land Status
Land and Tidelands
Federal - Tongass Nat'l Forest
State of Alaska
Alaska Mental Health Trust
City and Borough of Wrangell
Private
0 1,000 Feet
Wrangell
Zimovia Strait
0 2.5 Miles
21
22
23
24
27
26
25
28
33
34
35
36
4
3
2


City and Borough of Wrangell Comprehensive Plan
Figure: 6-11
Land Status
Land and Tidelands
Federal - Tongass Nat'l Forest
State of Alaska
Alaska Mental Health Trust
City and Borough of Wrangell
Private
0 1,000 Feet
Wrangell
Zimovia Strait
2.5 Miles
July 2010
This map was compiled using the best available data sources and is for illustration purposes only. Data may have discrepancies when compared to survey plats.

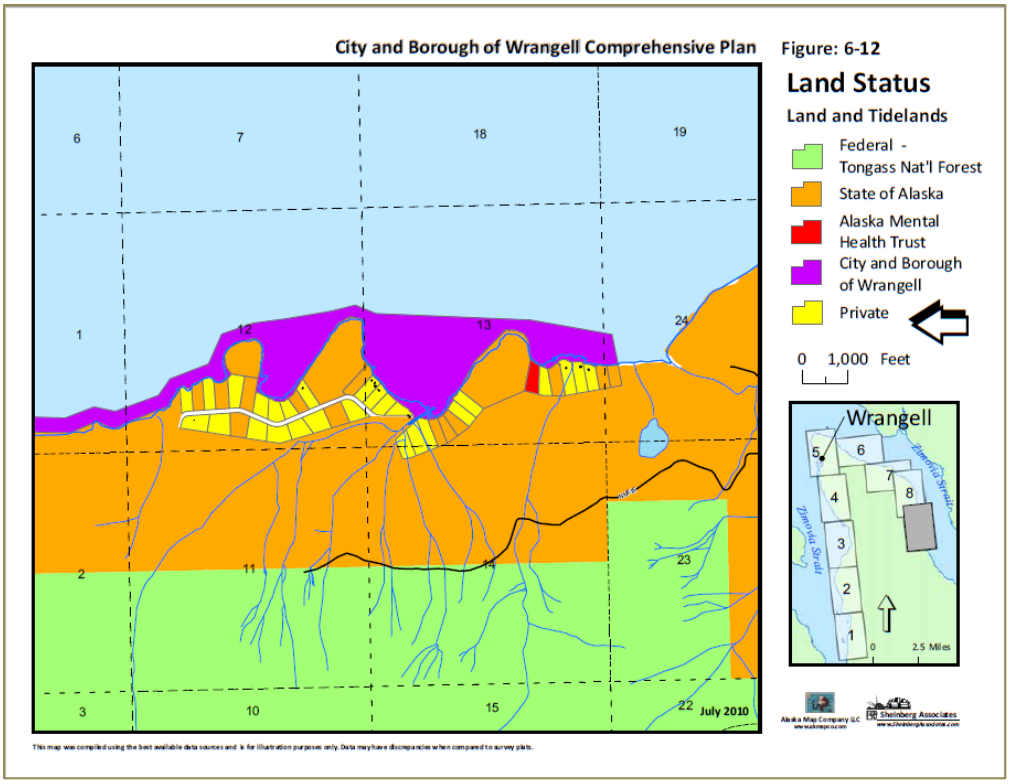
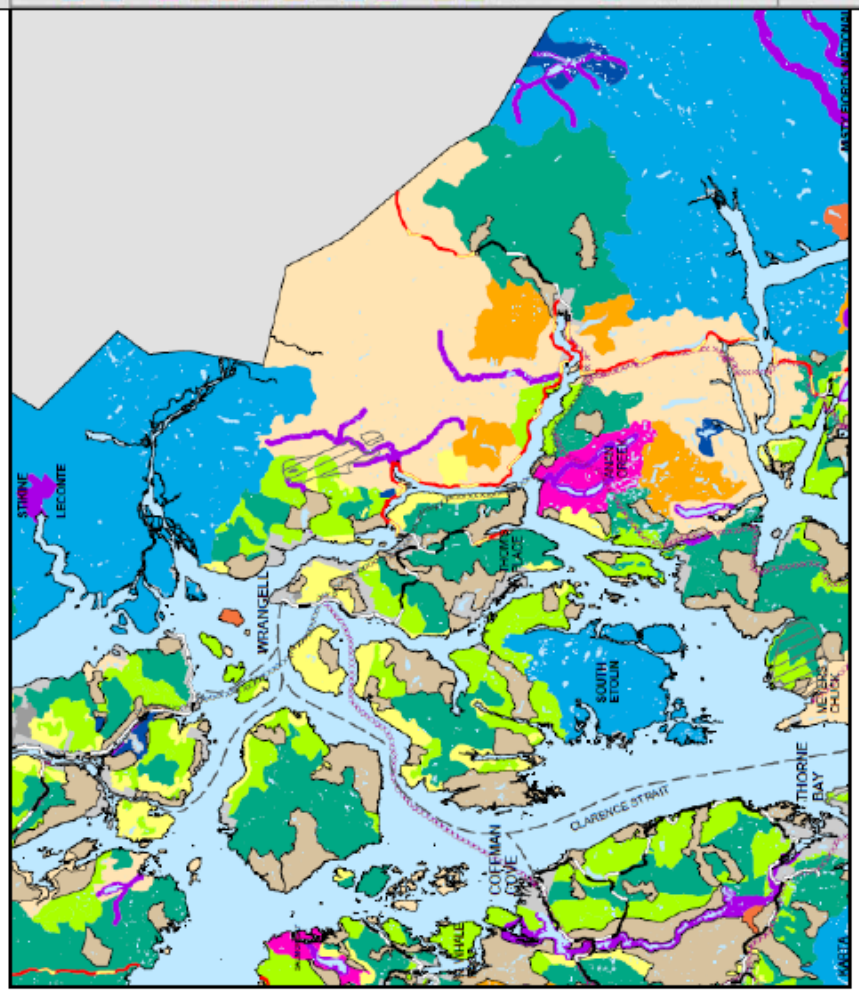

City and Borough of Wrangell Comprehensive Plan
Figure: 6-12
Land Status
Land and Tidelands
Federal - Tongass Nat'l Forest
State of Alaska
Alaska Mental Health Trust
City and Borough of Wrangell
Private
0 1,000 Feet
Wrangell
Zimovia Strait
2.5 Miles
July 2010
This map was compiled using the best available data sources and is for illustration purposes only. Data may have discrepancies when compared to survey plats.

Figure 6-13. Tongass National Forest Land and Resource Management Plan



112 Land Use and Future Growth

6.3.2 Tribal Traditional Land Use

Alaska tribal land ownership differs from that which is found in other parts of the country. Alaska land law, the 1884 Organic Act stated that "… the Indians or other persons in said district shall not be disturbed…" This act established the difference between native land policy in Alaska and the tribal land policy in the lower 48 states. The United States did not move Alaskan Natives to reservations; instead Congress recognized native claims to the land. This law led to the Alaska Native Claims Settlement Act (ANCSA) enacted December 18, 1971. This act provided a means to settle outstanding land claims and established clear title to Alaska's land and resources. These land titles were conveyed to 12 Regional Alaska Native Corporations created around corresponding tribal villages. Villages created their own corporations to expedite land conveyance. Neither the Village nor the Village corporation owns the land, but simply reconveys to qualified individuals and organizations.

Often the co-located tribe and city share the same land boundaries and infrastructure. However, the regional corporations typically manage the sub-surface rights and sometimes the surface use rights. The regional corporations provide lands to their tribal members for home sites, tribal offices, and other needs. Villages may have historically used lands outside their joint community as seasonal-use land for subsistence hunting/fishing/gathering purposes. These subsistence lands are often traditional use areas, and many times are on public lands. Traditional use lands do not have definitive or set boundaries and are seldom improved. Therefore undeveloped lands are not eligible for programmatic mitigation funding except what is essential for protecting critically threatened facilities.

6.4 CURRENT ASSET EXPOSURE ANALYSIS

6.4.1 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.

6.4.1.1 Population and Building Stock

Population data for City and Borough of Wrangell were obtained from the 2017 U.S. Census and the DCCED certified Population. The U.S. Census estimated the City and Borough of Wrangell total population for 2017 as 2,521 and the 2017 DCCED certified population data of 2,387 (Table 6-2).

Table 6-2 Estimated Population and Building Inventory

Population		Residential Buildings	
2017 Census Estimate	DCCED 2017 Data	Total Building Count	Total Value of Buildings[1]
2,521	2,387	1,408	[1]U.S. Census: $258,086,400 [2]City and Borough of Wrangell: $387,200,000

[1] Sources: U.S. Census 2017 estimated City and Borough of Wrangell population data. US Census listed median housing value at $138,300

[2] Source: The project team determined that the average single-family residential structural replacement cost is $275,000

The 2017 U.S. Census estimates the City and Borough of Wrangell's current residential structure value as $183,300, as shown in Table 6-2.

However, the planning team stated that residential replacement values are generally understated because replacement costs exceed U.S. Census structure value estimates due to material purchasing, barge or airplane delivery, construction, and labor costs in rural Alaska. The planning team estimates an average 30ft by 40 ft (1,200 sq ft) residential structure costs $275,000. A total of 1,408 single-family residential buildings were considered in this analysis.

6.4.1.2 Current and Future Infrastructure Project List

The City and Borough of Wrangell's Capital Improvement Projects list (Table 6-3) contains data for Fiscal Year 2017 – 2018 data.

Table 6-3 Proposed Wrangell Capital Budget Requests

State and Federal FY 2017-18

	Town/Org	Project Description	State Request Amount	Total Project Amount	State or Federal	Status
1	Wrangell	Shoemaker Bay Float - Construction	5,000,000	10,000,000	State	Priority #1 in Governor's capital budget for State Harbor funding for FY 2018
2	Wrangell	Water Treatment Plant Improvements	13,000,000	13,000,000	State/ Federal	Undefined
3	Wrangell	Water Main Distribution System Replacement, Phase 1 - updated costs based on ext'g funding in place vs. shortfall	500,000	1,000,000	State/ Federal	DEC Loan paperwork underway; DEC MMG received.
4	Wrangell	Fire Engine/Pumper	275,000	275,000	--	Undefined
5	Wrangell	Pool Facility Improvements (Pool Roof, Mechanical, Remodel) Phase I	--	2,000,000	State/ Federal	Assessment completed
6	Wrangell	Wrangell Medical Center Design and Construction	--	35,000,000	State	Undefined
7	Wrangell	Wrangell Boat Yard Improvements - Final Improvements	4,200,000	4,200,000	State/ Fed	Undefined
8	Wrangell	Public Safety Building Renovations	950,000	950,000	State/ Federal	Undefined
9	Wrangell	Ozone Generator Replacement - DELETE Pursuing purchase now	300,000	300,000	State/ Federal	DEC Loan paperwork underway
10	Wrangell	Water Main Distribution System Replacement, Phase 2 (Zimovia Highway)	1,583,560	2,262,229	State	Undefined
11	Wrangell	Back-up Diesel Generation	2,700, 000	2,700, 000	--	Undefined
12	Wrangell	Ash Street/Lemiux Watermain Replacement	1,000,000	1,000,000	--	AK Rural Water Utilities completed assessment; DEC loan application 1/17
13	Wrangell	Community Center Life & Safety Improvements (phase II) Fire System upgrades	250,000	2,715,000	State/ Federal	Phase I design is complete. Condition Assessment is complete.
14	Wrangell	SCBA's for personal Protective Equipment	60,000	83,700	--	Undefined
15	Wrangell	Industrial Park Expansion - Road and	400,000	2,500,000	Federal	Undefined

Table 6-3 Proposed Wrangell Capital Budget Requests

State and Federal FY 2017-18

	Town/Org	Project Description	State Request Amount	Total Project Amount	State or Federal	Status
		Utilities Expansion				
16	KSTK	KSTK Radio Group Inc. Flood Cessation	19,000	19,000	--	Undefined
17	Wrangell	Wrangell Road Resurfacing Phase I	2,250,000	2,500,000	State	Undefined
18	Wrangell	Storm Drain Plan	175,000	175,000	--	Undefined
19	Wrangell	Elementary School Parking Lots	500,000	500,000	--	WCA Tribal Roads Priority
20	Wrangell	Two Police Vehicles	70,000	70,000	State/Federal	Rural Development application to be resubmitted.
	Wrangell	Pneumatic Control Systems Phase I (Pool Facililty) - DELETE, will be completed in 2017 with FY17 budget for Pool.	55,000	55,000	--	Undefined
	Wrangell	School Fire Alarm System (rounded the number from $490K to $500K)	500,000	500,000	--	Undefined
	Wrangell	Library Recarpeting	55,000	55,000	--	Undefined
	Wrangell	Shoemaker Bay Breakwater Feasibility Study	--	4,000,000	Federal	DEC Clean Water Fund; Received 750k FY2015
	Wrangell	Power Plant Roof Replacement	200,000	--	--	Undefined
	WRG/PRG	South Mitkof Island Improvements - Banana Point Improvements	1,250,000	1,250,000	State	Undefined
	Wrangell	Dam Replacement	--	50,000,000	Federal	Undefined
	Wrangell	Pool Facility Improvements (Pool Roof, Mechanical, Remodel) Phase II	--	--	--	Undefined
	Wrangell	Mt. Dewey Trail Extension (to Petroglyph Beach State Park)	200,000	200,000		Undefined
	Wrangell	Reliance Harbor - Design and Construction	2,500,000	2,500,000	State/ Federal	Undefined
	Wrangell	Inner Harbor - Design and Construction	2,500,000	2,500,000	State/ Federal	Undefined
	Wrangell	Standard Oil Float - Design and Construction	2,000,000	2,000,000	State	Undefined
	WCA	Wrangell Totem Pole Carving	--	1,000,000	--	Undefined
	Wrangell	Volunteer Park Trail Extension to Etolin Ave.	100,000	100,000		Undefined
	Wrangell	Pool Locker Replacements	55,000	55,000	State	Undefined
	Wrangell	Power Infrastructure Improvements - Mission and First Avenue	150,000	--	--	Undefined
	Wrangell	Volunteer Park Ball Fields' Improvements	250,000	250,000	--	Undefined
	Wrangell	Meridian Street Extension (North End of Cassiar)	--	--	--	Undefined
	Wrangell	Shoemaker Bay Park and Rainbow Falls Trailhead Improvements - requesting 10% of cost for possible federal grant match	1,250,000	1,250,000	State	Undefined
	Wrangell	First and Second Avenue Improvements (Elementary School)	2,000,000	--	--	Undefined
	Wrangell	Public Works Storage Building, Phase II - DELETE (no plan to pursue at this time)	50,000	--	--	Phase I pad to be completed 2016 by City

Table 6-3 Proposed Wrangell Capital Budget Requests

State and Federal FY 2017-18

	Town/Org	Project Description	State Request Amount	Total Project Amount	State or Federal	Status
	Wrangell	Airplane Float Redecking	--	--	--	Undefined
	Wrangell	Fire Hose Replacement	25,000	25,000	--	Undefined
	Wrangell	Volunteer Park Plan	25,000	25,000	--	Undefined
	Wrangell	Multipurpose Field Improvements	100,000	100,000	--	Undefined
	Wrangell	Mariners Memorial	--	--	--	Undefined
	Wrangell	Biomass Heating District	--	--	State/ Federal	Undefined
	Wrangell	Stikine Avenue Safety Issues	--	--	--	Undefined
	Wrangell	Mitigation/Restoration Plan for Public/Private Development	75,000	150,000	--	Undefined
	Wrangell	Sewer Pumping Truck - DELETE (there is one in town now)	100,000	100,000	--	Undefined
	Wrangell	Capacitor Bank for Water Treatment Plant	60,000	60,000	--	Undefined
	Wrangell	Sunrise Lake - Alternative Water Source (Monitoring, Design, NEPA, etc.)	3,000,000	BG	State/ Federal	Undefined

CBW 2018

6.4.1.3 Community Name's 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 Wrangell and fulfilling important public safety, emergency response, and disaster recovery functions. Due to many of Alaska's remote rural location – a long distance from their nearest neighboring community, most all facilities are deemed "critical" to their survival. 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.
- Structures and businesses that could play a key role in providing facilities or services in an emergency response scenario.

Table 6-3 lists CBW and tribal critical facilities and infrastructure because they are collocated; not geographically separate.

Table 6-3 The City and Borough of Wrangell's Critical Facilities and Infrastructure

Facilities	Number of Occupants	Facilities	Address	Latitude	Longitude	Estimated Value	Building Type	Earthquake	Flood	Ground Failure	Tsunami	Volcanic Ash	Weather	Wildland Fire
Government	8	City Hall	205 Brueger Street	56.470783	-132.384259	$1,697,840	GOV1	X	X		X	X	X	X
	3	U.S. Post Office	112 Federal Way	56.472538	-132.387132	Undefined	GOV1	X	X		X	X	X	X
	5	Alaska Fish & Game	Front Street	56.470505	-132.380631	Undefined	GOV1	X				X	X	X
	20	US Forest Service	525 Benett Street	56.478047	-132.376058	$6,000,000	GOV1	X				X	X	X
	3	Public Works Office	Case Avenue	56.469635	-132.377721	$5,000,000	COM4	X	X			X	X	X
	3	Wrangell Municipal Light & Power Office	1064 Case Avenue	56.461768	-132.378815	$4,664,450	EPPL	X				X	X	X
	3	Capital Facilities Office	Bennett Street	56.473652	-132.37529	$125,000	GOV1	X				X	X	X
	3	Harbor Office	Shakes Street	56.466554	-132.382074	$125,000	GOV1	X				X	X	X
	8	Public Safety Building: Offices for Police, Court System, DMV	Zimovia Highway	56.469635	-132.377721	$10,674,080	GOV1	X				X	X	X
	2	Alaska Legislative Information Office	Front Street	56.470505	-132.380631	Undefined	GOV1	X				X	X	X
	7	WCA Tribal and Transportation offices	Zimovia Highway	56.462685	-132.375328	$6,000,000	GOV1	X				X	X	X
	1	US Custom's office	Airport Loop Road	56.485684	-132.3812	$75,000	GOV1	X				X	X	X
Emergency Response	5	Public Safety Building: Fire and Search&Rescue	Zimovia Hwy and Bennett Street	56.469635	-132.377721	$5,000,000	EFEO	X				X	X	X
	6	5.5 Mile Substation	Zimovia Hwy	56.362936	-132.356211	$936,750	GOV2	X				X	X	X
	0	12 Mile Emergency Van	12 Mile Zimovia Hwy	56.324971	-132.3812	$35,000	GOV2	X				X	X	X
	0	Alaska DEC Oil Spill Response Van/Supplies	City Barge Ramp	Undefined	Undefined	Undefined	N/A	X				X	X	X
	0	Alaska DOT Airport Fire Pumper Truck 3,000 gal	ARRF Bldg. / Airport Loop Road	56.48452	-132.37778	Undefined	EFEO	X				X	X	X
	0	US Forest Service Fire	Bennett Street	56.474975	-132.374848	Undefined	GOV2	X				X	X	X

Table 6-3 The City and Borough of Wrangell's Critical Facilities and Infrastructure

Facilities	Number of Occupants	Facilities	Address	Latitude	Longitude	Estimated Value	Building Type	Earthquake	Flood	Ground Failure	Tsunami	Volcanic Ash	Weather	Wildland Fire
		Pumper Truck												
	0	SEARHC 10-person remote medical facility / Decon for HazCom (in Vans)	Bennett Street	Undefined	Undefined	Undefined	N/A	X				X	X	X
	0	CBW/Fire Dept. MMRS (medical response system)	ARRF Bldg. / Airport Loop Road	Undefined	Undefined	Undefined	GOV2	X				X	X	X
Educational	4	Wrangell School District Office	350 Bennett Street	56.472497	-132.37463	Undefined	EDU1	X				X	X	X
	182	Wrangell High School (167 students, 15 teachers)	310 Reid Street	56.472159	-132.381524	$10,000,000	EDU1	X				X	X	X
	70	Skitine Middle School (60 students, 10 teachers)	321 Church Street	56.472015	-132.378168	$10,000,000	EDU1	X				X	X	X
	92	Evergreen Elementary School (82 students, 10 teachers)	350 Bennett Street	56.472497	-132.37463	$10,000,000	EDU1	X				X	X	X
	30	T&H Head Start	First Ave	56.4715	-132.374131	$150,000	EDU1	X				X	X	X
Medical	30	Alaska Island Community Services (AICS) Tideline Health Clinic	232 Wood Street	56.412.952	-132.371778	$12,000,000	EFMC	X				X	X	X
	6	AICS Pharmacy	333 Church Street	56.471185	-132.380348	$800,000	COM1	X				X	X	X
	3	Stikine Drug	202 Front Street	56.471778	-132.383977	$350,000	COM1	X	X		X	X	X	X
	2	State Public Health Nurse	Front Street	56.471329	-132.383619	Undefined	COM7	X				X	X	X
	80	Wrangell Medical Center	310 Bennett Street	56.471783	-132.375702	$35,000,000	COM6	X				X	X	X
	2	Coniffs Critters Vet	Front Street	56.470933	-132.381628	$100,000	COM1	X				X	X	X
	15	AICS Dental Clinic	Front Street	56.471935	-132.385813	$450,000	COM1	X	X		X	X	X	X
Community	2	Bible Baptist Church	535 Church Street	56.467667	-132.377252	$350,000	REL1	X				X	X	X
	2	First Prebyterian Church	220 Church Street	56.471223	-132.379016	$350,000	REL1	X				X	X	X
	2	Harbor Light Assembly of God	.5 Mile Zimovia Hwy	56.466379	-132.375998	$350,000	REL1	X				X	X	X
	2	Hope	212 Bennett	56.47082	-132.376445	$350,000	REL1	X				X	X	X

Table 6-3 The City and Borough of Wrangell's Critical Facilities and Infrastructure

Facilities	Number of Occupants	Facilities	Address	Latitude	Longitude	Estimated Value	Building Type	Earthquake	Flood	Ground Failure	Tsunami	Volcanic Ash	Weather	Wildland Fire
		Community Church of God	Street	9										
	2	Island of Faith Lutheran Church	211 Second Street	56.473544	-132.387981	$350,000	REL1	X				X	X	X
	2	Seventh Day Adventist Church	432 Zimovia Hwy	56.470862	-132.37902	$350,000	REL1	X				X	X	X
	2	St. Phillip's Episcopal Church	Church Street	56.469777	-132.378456	$350,000	REL1	X				X	X	X
	2	St. Rose of Lima Catholic Church	202 Church Street	56.471174	-132.379918	$350,000	REL1	X				X	X	X
	5	Salvation Army	Zimovia Hwy	56.467899	-132.375391	$350,000	REL1	X		X		X	X	X
	5	First Bank	224 Brueger Street	56.470823	-132.383292	$400,000	COM5	X	X		X	X	X	X
	5	Tongass Federal Credit Union	215 Front Street	56.47134	-132.383635	$400,000	COM5	X	X		X	X	X	X
	5	Wells Fargo	115 Front Street	56.471.549	-132.384807	$400,000	COM5	X	X		X	X	X	X
	12	Nolan Center Convention Center, Museum & Wrangell Visitor Ctr	296 Campbell Drive	56.469838	-132.382941	$9,625,140	GOV1	X	X			X	X	X
	15	Irene Ingle Public Library	124 2nd Street	56.473242	-132.386377	$2,198,480	GOV1	X		X		X	X	X
	25	Wrangell Community Center	Church Street	56.472138	-132.381927	$5,378,340	COM8			X		X	X	X
	25	Wrangell Parks and Recreation Pool	321 Church Street	56.47195	-132.381386	$20,000,000	COM8	X		X		X	X	X
	1	Harbor Dept. Warehouses	Front Street	Various Locations		$200,000	PWH		X				X	X
	4	Ava's Bed & Breakfast	15 Crest Drive	56.475081	-132.380892	$325,000	RES4	X				X	X	X
	15	Armstrong Rents	522 Front Street	56.46887	-132.380038	$325,000	RES4	X				X	X	X
	5	Airport Hangers	Airport Way	56.484333	-132.3698333	$600,000	AMF	X				X	X	X
	3	Little Bitty Getaway	Church Street	56.47202	-132.383444	$300,000	RES4	X				X	X	X
	4	Be Still Bed and Breakfast	318 McKinnon Street	56.473676	-132.38473	$325,000	RES4	X		X		X	X	X
	7	Grand View B&B	1.5 Mile Zimovia Hwy	56.451198	-132.381104	$325,000	RES4	X				X	X	X
	2	Heritage Harbor Boathouse	Berger Street	56.459975	-132.381711	$50,000	RES4	X	X		X	X	X	X
	4	Mt. Dewey Garden Guest House	120 Third Street	56.474283	-132.385587	$325,000	RES4	X		X		X	X	X

Table 6-3 The City and Borough of Wrangell's Critical Facilities and Infrastructure

Facilities	Number of Occupants	Facilities	Address	Latitude	Longitude	Estimated Value	Building Type	Earthquake	Flood	Ground Failure	Tsunami	Volcanic Ash	Weather	Wildland Fire
	4	Mt. Dewey Sunset Bed & View	111 Mt. Dewey Lane	56.474521	-132.386822	$325,000	RES4	X		X		X	X	X
	2	Northstar Reflections Guest Suite	Zimovia Avenue	Undefined	Undefined	$325,000	RES4	X				X	X	X
	3	Off the Hook Extended Stay	Evergreen Ave	56.483019	-132.390410	$325,000	RES4	X				X	X	X
	5	Reliance Harbor View	Peninsula Street	56.461973	-132.38247	$325,000	RES4	X	X		X	X	X	X
	6	Rooney's Roost B&B	206 McKinnon Street	56.472575	-132.384068	$300,000	RES4	X				X	X	X
	4	That Place	928 Zimovia Highway	56.463323	-132.374396	$325,000	RES4	X				X	X	X
	75	Stikine Inn, Restaurant Café	105 Skitine Avemue	56.471886	-132.38773	$800,000	RES4	X	X		X	X	X	X
	8	Wrangell Extended Stay	312 Stikine Avenue	56.474777	-132.38942	$400,000	RES3	X				X	X	X
	4	Wrangell Seawatch House B&B	506 Evergreen Avenue	56.476894	-132.390616	$325,000	RES4	X	X		X	X	X	X
	6	Zimovia B&B	319 Webber Street	56.472273	-132.372453	$400,000	RES4	X				X	X	X
	30	Senior Apartments	351 Bennett Street	56.473022	-132.376046	$500,000	RES3	X				X	X	X
	35	Wrangell IGA (Grocery)	223 Brueger Street	56.470428	-132.383706	$400,000	COM1	X	X		X	X	X	X
	35	City Market (Grocery)	423 Front Street	56.47004	-132.381145	$400,000	COM1	X	X		X	X	X	X
	5	Twisted Root Market	628 Shakes Street	56.467478	-132.384004	Undefined	COM1	X	X		X	X	X	X
	25	Elks Lodge	Front Street	56.471499	-132.385295	$400,000	COM1	X	X		X	X	X	X
	5	J&W's Fast Food	120 Front Street	56.471824	-132.384411	$350,000	COM1	X	X		X	X	X	X
	8	Michelle's Taste of Asia	216 Front Street	56.470907	-132.381573	$350,000	COM1	X	X		X	X	X	X
	15	Marine Bar and Pizza	640 Shakes Street	56.466746	-132.381181	$450,000	COM1	X	X		X	X	X	X
	4	Notsofamous Pizza	325 Front Street	56.470769	-132.381921	Undefined	COM1	X	X		X	X	X	X
	2	The Pit Stop	Front Street	56.468585	-132.380078	$50,000	COM1	X	X		X	X	X	X
	8	The Cabin Cafe	305 Front Street	56.471368	-132.382645	$350,000	COM1	X	X		X	X	X	X
	15	Zak's Café	Front Street	56.4700029	-132.3814458	$350,000	COM1	X	X		X	X	X	X
	12	Churchills Apartments and Laundry	Shakes Street	56.467539	-132.380934	$500,000	COM1	X	X		X	X	X	X
	75	Sea Level	2204	56.45872	-132.381508	$10,000,000	COM2	X	X		X	X	X	X

Table 6-3 The City and Borough of Wrangell's Critical Facilities and Infrastructure

Facilities	Number of Occupants	Facilities	Address	Latitude	Longitude	Estimated Value	Building Type	Earthquake	Flood	Ground Failure	Tsunami	Volcanic Ash	Weather	Wildland Fire
		Seafoods	Zimovia Hwy	3										
	75	Trident Seafoods, Inc.	641 Shakes Street	56.467211	-132.381705	$12,000,000	COM2	X	X		X	X	X	X
	1	Cold Storage	Shakes Street	56.468088	-132.38115	$2,633,450	COM2	X	X		X	X	X	X
	2	Wrangell Sentinel	205 Front Street	56.471375	-132.38403	$100,000	COM2	X	X		X	X	X	X
	10	Senior Center	Church Street	56.472284	-132.385521	$200,000	COM7	X	X		X	X	X	X
	20	Harbor House Assisted Living	Berger Street	56.461192	-132.384531	$400,000	COM7	X	X		X	X	X	X
	2	Wrangell Chamber of Commerce	105 Stikine Avenue	56.471385	-132.382618	Undefined	COM4	X	X		X	X	X	X
	20	Southeast AK Regional Health Consortium (SEARHC) Offices	Church Street	56.47118	-132.380365	$500,000	COM4	X	X		X	X	X	X
	0	Chief Shakes Tribal House	Shakes Street	56.472284	-132.385521	Undefined	COM8	X	X		X	X	X	X
	0	Totem Park	Front Street	56.469779	-132.379601	Undefined	COM8	X	X		X	X	X	X
	2	Tribal Community House and Carving Shed	Front Street	56.470807	-132.382318	$5,000,000	COM8	X	X		X	X	X	X
Roads	--	Total City Owned Paved Roads Miles: 9.9	Cost per Paved Miles: $5M (ADOT Estimate)			$50,000,000	HRD2							
	--	Total City Owned Gravel Roads Miles: 7.65	Cost per Gravel Miles: $1.5M (ADOT Estimate)			$11,500,000	HRD2							
	0	6263 Road (Federal)	N/A	N/A	N/A	N/A	HRD2	X		X		X	X	X
		6265 Road (Federal)						X		X		X	X	X
		50024 Road (Federal)						X		X		X	X	X
		Airport Loop Road (State)						X				X	X	X
		Alaska Avenue						X				X	X	X
		Ash Street						X				X	X	X
		Berger Street						X				X	X	X
		Bennett Street (State)						X				X	X	X
		Bevier Street						X				X	X	X
		Brueger Street						X	X		X	X	X	X

Table 6-3 The City and Borough of Wrangell's Critical Facilities and Infrastructure

Facilities	Number of Occupants	Facilities	Address	Latitude	Longitude	Estimated Value	Building Type	Earthquake	Flood	Ground Failure	Tsunami	Volcanic Ash	Weather	Wildland Fire
		Campbell Drive						X	X		X	X	X	X
		Case Avenue						X				X	X	X
		Cassiar Street						X				X	X	X
		Cedar Circle						X				X	X	X
		Church Street						X				X	X	X
		Lower Church Street						X				X	X	X
		City Dock						X	X		X	X	X	X
		City Park Road						X	X		X	X	X	X
		Crest Drive						X				X	X	X
		Crest Lane						X				X	X	X
		Crittenden Street						X				X	X	X
		Council Drive						X				X	X	X
		Cow Alley						X				X	X	X
		Dog Pound Road						X				X	X	X
		Episcopal Street						X				X	X	X
		Etolin Avenue						X				X	X	X
		Evergreen Avenue						X				X	X	X
		Evergreen Way						X				X	X	X
		Federal Way						X				X	X	X
		Fifth Avenue - Industrial Park						X				X	X	X
		Fifth Avenue - North End						X				X	X	X
		First Avenue - St Michael St						X				X	X	X
		First Avenue -at Elementary School						X				X	X	X
		Fool's Inlet Road (Federal)						X		X		X	X	X
		Fort Street						X				X	X	X
		Fourth Avenue - Industrial Park						X				X	X	X
		Fourth Avenue - North End						X				X	X	X
		Front Street						X				X	X	X
		Garnet Road (Federal)						X		X		X	X	X
		Grave Street						X	X		X	X	X	X
		Graves Street						X	X		X	X	X	X
		Grief Street						X				X	X	X
		Green Valley Road						X				X	X	X
		Hemlock Street						X				X	X	X
		Highfield Street						X				X	X	X

Table 6-3 The City and Borough of Wrangell's Critical Facilities and Infrastructure

Facilities	Number of Occupants	Facilities	Address	Latitude	Longitude	Estimated Value	Building Type	Earthquake	Flood	Ground Failure	Tsunami	Volcanic Ash	Weather	Wildland Fire
		Howell Avenue						X				X	X	X
		Ishiyama Drive (State)						X				X	X	X
		Lemieux Street						X				X	X	X
		Lynch Street						X				X	X	X
		McCormack Street						X	X		X	X	X	X
		McKinnon Street						X				X	X	X
		Middle Ridge Road (Federal)						X				X	X	X
		Mission Street						X				X	X	X
		Mt. Dewey Lane						X				X	X	X
		Marantz Drive						X				X	X	X
		Neimeyer Road						X				X	X	X
		Nemo-Skip Loop Road (Federal)						X				X	X	X
		Pat Creek Road (State/Federal)						X				X	X	X
		Ocean View Drive						X	X		X	X	X	X
		Park Avenue						X				X	X	X
		Penninsula Street						X	X		X	X	X	X
		Phillips Street						X				X	X	X
		Pine Street						X				X	X	X
		Reid Steet						X				X	X	X
		Rilatos Road						X				X	X	X
		Sales Street - Wrangell Ave to Pine Street section						X				X	X	X
		Sales Street - Volunteer Park / Running Track section-						X				X	X	X
		Second Avenue - Mission to Sales						X				X	X	X
		Second Street - McCormack to McKinnon						X				X	X	X
		Shooting Range Road						X				X	X	X
		Saint Michaels Street						X				X	X	X
		Shakes Street						X				X	X	X
		Shtax-heen Circle						X				X	X	X
		Shoemaker Loop Road -S. Wrangell Highway						X	X		X	X	X	X

Table 6-3 The City and Borough of Wrangell's Critical Facilities and Infrastructure

Facilities	Number of Occupants	Facilities	Address	Latitude	Longitude	Estimated Value	Building Type	Earthquake	Flood	Ground Failure	Tsunami	Volcanic Ash	Weather	Wildland Fire
		Shoemaker Bay Park Road						X				X	X	X
		Shustak Street						X	X		X	X	X	X
		Silvernail Work Road						X				X	X	X
		Spur Road - beyond Ishiyama Drive Pavement						X		X		X	X	X
		Spring Street						X				X	X	X
		Spruce Street						X				X	X	X
		Stikine Avenue						X	X		X	X	X	X
		Sunset Boulevard						X				X	X	X
		Third Avenu - Industrial Park						X				X	X	X
		Third Avenue - North End						X		X		X	X	X
		Third Street						X				X	X	X
		Webber Street						X				X	X	X
		Wood Street						X		X		X	X	X
		Wrangell Avenue (two separate sections)						X				X	X	X
		Zimovia Avenue						X				X	X	X
		Zimovia Highway (State)						X				X	X	X
Bridges	0	Pats Creek Bridge (State)	Pat's Creek Road	56.342059	-132.338188	Undefined	HWB1	X			X	X	X	X
		McCormacks Bridge (State)	Zimovia Highway	56.310421	-132.335998	Undefined	HWB1	X			X	X	X	X
		City Park Bridge	Zimovia Highway	56.453522	-132.382264	Undefined	HWB1	X	X		X	X	X	X
		SMB Park Bridge/Institute Creek	Zimovia Highway	56.41632	-132.345399	Undefined	HWB1	X	X		X	X	X	X
		SMB near pullout/Zimovia Highway culvert	Zimovia Highway	56.413328	-132.340684	Undefined	HWB1	X	X		X	X	X	X
		Wood St/Zimovia Hwy culvert	Zimovia Highway	56.463008	-132.37541	Undefined	HWB1	X	X	X	X	X	X	X
		Pine St/Zimovia Hwy Culvert	Zimovia Highway	56.468916	-132.3764	Undefined	HWB1	X	X		X	X	X	X
		Evergreen/Trailer Park Culvert	Evergreen	56.48118	-132.391572	Undefined	HWB1	X	X		X	X	X	X
		Nugget Trailer Park Culvert	Zimovia Highway	56.450933	-132.380612	Undefined	HWB1	X	X		X	X	X	X
		Spur Road Culvert (State)	Spur Road	56.46889	-132.333389	Undefined	HWB1	X				X	X	X

Table 6-3 The City and Borough of Wrangell's Critical Facilities and Infrastructure

Facilities		Number of Occupants	Facilities	Address	Latitude	Longitude	Estimated Value	Building Type	Earthquake	Flood	Ground Failure	Tsunami	Volcanic Ash	Weather	Wildland Fire
			USFS Bridges on Wrangell Island (Fed)	Various Locations			Undefined	HWB1			X		X	X	X
Transportation	City/State/Federal	2	Wrangell Airport (PAWG)	1 Airport Loop Road	56.4843333	-132.3698333	Undefined	ATB	X				X	X	X
		0	Wrangell Airport Runway				Undefined	ARW	X				X	X	X
		0	Wrangell Seaplane Base	Shakes Street	56.466325	-132.3800181	Undefined	AFO	X				X	X	X
		15	Alaska Airlines Terminal and Hangar	1 Airport Loop Road	56.485	-132.3796	Undefined	AMF	X				X	X	X
		4	State DOT Highway Maintenance	Airport Loop Road	56.482373	-132.375447	Undefined	IND2	X				X	X	X
		0	City Bulk Fuel Tanks	Zimovia Highway	56.469635	-132.377721	Undefined	OTF	X				X	X	X
		8	U.S. Transporation Security Administration offices	Front Street	56.485104	-132.37954	Undefined	ATB	X				X	X	X
	Marine	0	Wrangell Ports and Harbors	Various Locations	Undefined	Undefined	Undefined	PWS	X	X		X	X	X	X
		5	Wrangell Ferry Terminal	Stikine Avenue at Evergreen	56.474024	-132.390154	Undefined	FPT	X	X		X	X	X	X
		4	Samson Tug & Barge	102 Outer Drive	56.471417	-132.386619	Undefined	FMF	X	X		X	X	X	X
		1	6-mile Industrial Yard / Dock	Zimovia Highway	56.396045	-132.340178	Undefined	PEQ/FMF	X	X		X	X	X	X
		5	"Alaska Marine Lines	Undefined	Undefined	Undefined	Undefined	FMF	X			X	X	X	X
	Surface	2	Etolin Bus Company Inc.	Howell Avenue	56.470846	-132.37662	Undefined	BMFW	X				X	X	X
	Fuel	4	Arrowhead Transfer and Arrohead L.P. Gas	520 Front Street	56.469249	-132.379751	Undefined	N/A	X		X		X	X	X
		3	Apline Fuel Expediting	930 Zimovia Highway	56.463081	-132.374911	Undefined	N/A	X		X		X	X	X
		3	LN'M Services and Gas Station	Front Street	56.471661	-132.385831	Undefined	N/A	X	X	X	X	X	X	X
		4	Petro Marine Services	1427 Penninsula Street	56.462595	-132.383143	Undefined	N/A	X		X	X	X	X	X

Table 6-3 The City and Borough of Wrangell's Critical Facilities and Infrastructure

Facilities		Number of Occupants	Facilities	Address	Latitude	Longitude	Estimated Value	Building Type	Earthquake	Flood	Ground Failure	Tsunami	Volcanic Ash	Weather	Wildland Fire
	Business	4	Alaska Charters and Adventures	5 Front Street	56.471477	-132.386964	Undefined	COM4	X	X		X	X	X	X
		4	Alaska Vistas	103 Front Street	56.471431	-132.387147	Undefined	COM4	X	X		X	X	X	X
		4	Alaska Waters	107 Skitine Avenue	56.471688	-132.387512	Undefined	COM4	X	X		X	X	X	X
		3	Breakaway Adventures	104 Front Street	56.471688	-132.384136	Undefined	COM4	X	X		X	X	X	X
		0	Muddy Water Adventures	Undefined	Undefined	Undefined	Undefined	COM4	X				X	X	X
		3	Practical Car Rental	Airport Way	56.485341	-132.380063	Undefined	COM4	X				X	X	X
		2	Summit Charters	318 McKinnon Street	56.473676	-132.38473	$325,000	COM4	X				X	X	X
Utilities		12	Public Works Maintenance Barn	Case Avenue	56.469635	-132.377721	$0	GOV1	X				X	X	X
		5	Wrangell Municipal Light & Power Generator Warehouse(Large)	1064 Case Avenue	56.461768	-132.378815	$7,392,770	EPPL	X	X		X	X	X	X
		2	SE Alaska Power Agency Substation	4.5 Zimovia Highway	56.419769	-132.351185	Undefined	ESSM	X				X	X	X
		0	SE Alaska Power Agency / Tyee Intertie Distribution Lines	Various Locations			Undefined	EDC	X		X		X	X	X
		2	Potable Water Plant	Wood Street	56.456512	-132.376483	$1,199,610	PWTM	X		X		X	X	X
		0	Potable Water Distribution Lines	Community-wide	N/A	N/A	Undefined	PWP	X	X		X	X	X	X
		0	Potable Water Storage Tanks	Wood Street	56.456512	-132.376483	Undefined	N/A	X		X		X	X	X
		2	Wastewater Plant (medium)	Zimovia Hwy	56.453653	-132.380397	Undefined	WWTM	X	X	X	X	X	X	X
		0	Sewer Collection Lines	Community-wide	N/A	N/A	Undefined	PWP	X	X	X	X	X	X	X
		2	Solid Waste Transfer Facility	3 Evergreen Avenue	56.485591	-132.388848	$1,799,510	N/A	X			X	X	X	X
		3	AP&T Power & Telephone	20 Front Street	56.471933	-132.386013	Undefined	DBO	X	X		X	X	X	X
		3	GCI Communication	325 Front Street	56.470777	-132.38195	Undefined	CBO	X	X		X	X	X	X
		4	KSTK Public Radio - 101.7, 94.7 FM	202 St. Michael Street	56.471174	-132.379918	Undefined	DBR	X				X	X	X

Table 6-3 The City and Borough of Wrangell's Critical Facilities and Infrastructure

Facilities	Number of Occupants	Facilities	Address	Latitude	Longitude	Estimated Value	Building Type	Earthquake	Flood	Ground Failure	Tsunami	Volcanic Ash	Weather	Wildland Fire
	0	Cell Tower Repeater System	Various Locations			Undefined	CBO	X		X		X	X	X
Total Potential Occupants			**1,391**	**Total Potential Damages**		**$339,710,420**								

Source: CBW 2018a, WCA, CCTHITA, and DHS&EM 2009

6.5 NATIONAL FLOOD INSURANCE PROGRAM PARTICIPATION

The City and Borough of Wrangell no longer participates in the NFIP.

DMA 2000 requirements and implementing city and borough governance regulations for estimating the number and type of structures at risk to repetitive flooding include:

DMA 2000 Requirements
ELEMENT B. NFIP Insured Structures
B4. Does the Plan address NFIP insured structures within the jurisdiction that have been repetitively damaged by floods? (Requirement §201.6(c)(2)(ii))
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, March 2015.

6.5.1 Repetitive Loss Properties

The City and Borough of Wrangell does not have a repetitive flood property inventory that meets NFIP criteria as the loss thresholds are substantially below FEMA values.

6.5.2 Wrangell's Legacy Flood Hazard Mapping

This section provides Wrangell's historic NFIP membership and flood hazard map information. Table 6-4 provides FEMA's august 2018 Community Status Book Report data the City and Borough of Wrangell that lists them as suspended since 1982.

Table 6-4 FEMA Community Status Book Report

CID	Community Name	Initial FHBM Identified	Initial FIRM Identified	Current Effective Map Date	Sanction Date	Tribal
020098	City and Borough of Wrangell	06/28/74	06/15/82	06/15/82	06/15/82 (S)	No
Legend N/A Not Applicable At This Time (S) Suspended from Regular Program (W) Withdrawn Community – Not in Program						

Source: NFIP 2018

The CBW's outdated 1982 Flood Insurance Rate Maps (FIRMs) indicate Wrangell Island's flood hazard areas:

- A 1-A30: Areas of 100 year; flood elevations and flood hazard factors determined.
- B: Areas between limits of the 10-year flood and 500-yearf flood; or certain areas subject to 100-year flooding with average depths less than one (1) food or where the contributing drainage area is less than one square mile; or areas protected b levees from the base flood. (Medium shading)
- C: Areas with minimal flooding. (No shading).
- D: Areas with undetermined, but possible, flood hazard
- V: Areas with 10-year coastal flood with velocity (wave action); base flood elevations and flood hazard factors not determined.
- V1-V30: Areas with 10-year coastal flood with velocity (wave action); base flood elevations and flood hazard factors determined.

Table 6-5 lists Wrangell's outdated Flood Insurance Rate Maps (FIRMS). These historical FIRMs are used to assist developers or facility owners with obtaining or maintaining flood insurance. They do not necessarily show all areas subject to flooding in the community or a feature's horizontal footprint or position outside special flood hazard areas (SFHAs).

Table 6-5 Flood Insurance Rate Maps (FIRMs) for Wrangell

Flood Source	Mapped Reach	FIRM1 Number and Identified Panel and Flood Zones
Zimovia Strait and Eastern Passage	Around northern extent of Wrangell Island	020098 0008 B: C: Map areas 13, 19, & 24 V: High Field Anchorage V3: (EL 24) in west side of 13 and west of Point Highfield V4: (EL 26) west side of area 24
Zimovia Strait	Along West Side of Wrangell Island	020098 0016 B: A4: (EL 20)Wrangell Harbor A1 and B: Cemetery Point C: Map area19, 20, 24, 25, & 36 D: Map areas 29, 30, 31, & 32Majority of Mapped land surface V1: (EL 21)Around Cemetery Point V3: (EL 24) West side of Zimovia Highway north of Cemetery Point V4: (EL 23) West side of Stikine Ave, Front Street, Outer Drive, and Point Shekesti V4: (EL 21) West side of Peninsula Street
Eastern Passage	South side of Eastern Passage	020098 00017 B: C: Wrangell East Hwy, area 20 D: Areas 27, 28, 29, 32, 33, & 34 V: Entire Eastern Passage
Zimovia Strait	Along West Side of Wrangell Island	020098 00018 B C: Areas Portion of 6, 7, 31, & 36 D: Areas Portion of Areas 6 & 7, and areas 5, 8 & 31, & 32 V1: (EL 21) East side of Zimovia Hwy areas 6, 7, & 36
Mill Creek	Along Northern side Zone "C" Along, Southern side Zone "A"	020098 00030 B
Zimovia Strait	East of Shoemaker Bay west	020098 00030 B,

Table 6-5 Flood Insurance Rate Maps (FIRMs) for Wrangell

Flood Source	Mapped Reach	FIRM1 Number and Identified Panel and Flood Zones
	of Rainbow Falls Creek and Institute Creek confluence	Zone A: South side of Mill Creek and Rainbow Falls Creek confluence with Institute Creek area C: North side of Mill Creek and Areas 7, 8, 17, 19, 20, 30, & 31 D: 9, 10, 15, 16, 21, 22, 27, 28, 29, 32, 33, & 34 V: Zimovia Strait V1: (EL 21) Coastal side of 7, 8, 17, 19, 20, 30, & 31
Zimovia Strait	East of Zimovia Strait	020098 00020 B C: 7, 8, 17, 20, 30, & 31 D: 9, 10, 15, 16, 21, 22, 28, 29, 32,& 33
Zimovia Strait	East of Zimovia Strait	020098 00040B C: 5, 6, & 31, small portion of 8 C: 3, 4, 9, 10, 33, & 34, portion of 5, 8, 32, & 33, 34 V: Entire Zimovia Strait
[1]FEMA Flood Map Service Center Portal: http://msc.fema.gov/portal/advanceSearch		

The December 15, 1981 City of Wrangell, Alaska, Wrangell-Petersburg Division's FEMA Flood Insurance Study described Wrangell's legacy flood mitigation initiatives:

2.4 Principal Protective Measures

Flood protection along Zimovia Strait and Eastern Passage has been achieved by riprapping fill areas or exposed land formations and by providing for adequate freeboard of residential and commercial structures. Major structures such as the Wrangell Lumber Dock and Wrangell dock and wharf have been constructed at an elevation of 24.0 feet.

Protection for the small boat harbor is provided by a rubble mound breakwater constructed by the U.S. Army Corps of Engineers in 1926. The approximate low point elevation of this structure is 27.0 feet. The breakwater is well armored and shows no signs of damage over its 50-year life. From the small boat harbor south-ward, residences are intermittently spaced and generally built above the high-water mark.

A seawall protects Stikine Street. Age has deteriorated this structure, and cracks and spalling concrete are evident. Residences north of the seawall are built over the water on timber piling and take the full force of storms.

Farther north, below Airport Road, are scattered old and new single-family residences. In several cases, the residences are very near the highest estimated tide elevation of 19.5 feet (Reference 2). The new airport is located on the north end of the island. It is well constructed with substantial armoring and is over 34.0 feet...

The effect of the aforementioned coastal protection measures on the 100- and 500-year floods is not known.

There are no regulations, codes, or inspection policies restricting construction on the Wrangell waterfront…

5.3 Flood Insurance Zones

After the determination of reaches and their respective [Flood Hazard Factors] FHFs, all the areas of Wrangell were divided into zones, each having a specific flood potential or hazard. Each zone was assigned [a] flood insurance zone designation…

FLOODING SOURCE	PANEL[1]	ELEVATION DIFFERENCE[2] BETWEEN 1% (100-YEAR) FLOOD AND			FLOOD HAZARD FACTOR	ZONE	BASE FLOOD ELEVATION (FEET MLLW)[3]
		10% (10-YEAR)	2% (50-YEAR)	0.2% (500-YEAR)			
Zimovia Strait							
Reach 1	0008	-1.4	-0.9	0.5	015	V3	24
Reach 2	0008,0016	-1.8	-1.3	0.8	020	V4	26
Reach 3	0016	-2.5	-0.7	2.4	025	V5	25
Reach 4	0016	-2.1	-0.7	2.3	020	V4	23
Reach 5	0016	-2.0	-0.6	1.9	020	A4	20
Reach 6	0016	-2.2	-0.7	2.3	020	V4	23
Reach 7	0016	-1.9	-0.7	1.9	020	V4	21
Reach 8	0016	-1.3	-0.5	0.9	015	V3	24
Reach 9	0016,0018, 0030	-0.6	-0.1	2.1	005	V1,A1	21

[1]Flood Insurance Rate Map Panel [2]Weighted Average [3]Rounded to Nearest Foot

TABLE 2

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF WRANGELL, AK
(WRANGELL-PETERSBURG DIV.)

FLOOD INSURANCE ZONE DATA

ZIMOVIA STRAIT

...The flood elevation differences, FHFs, flood insurance zones, and base flood elevations for each flooding source studied in detail in the community are summarized in Table 2. Source: FEMA FIS 1981

6.6 VULNERABILITY ASSESSMENT METHODOLOGY

Although not completed at this time, the community planning team determined their facility locations within identified hazard impact zones. This data was used to develop a vulnerability assessment for those hazards.

Combined structure and contents replacement 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 and contents 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.

The planning team then used locally obtained GPS coordinate data to identify critical facility locations in relation to potential hazard threat exposure and vulnerability. Second this data was used to develop a vulnerability assessment for those hazards where GIS based hazard mapping information was available.

6.7 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 MJHMP 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 MJHMP updates.

6.8 VULNERABILITY EXPOSURE ANALYSIS

There is insufficient GIS data available for the City and Borough of Wrangell. The following discussion contains data obtained from the project team and their subsequent analysis. The results of their exposure analysis and loss estimations are summarized in Tables 6-6 and 6-7 and Section 6.8.1 Narrative Summaries.

Table 6-6 Potential Hazard Exposure Analysis – Critical Facilities

		Government		Emergency Response		Educational		Medical		Community	
Hazard Type	Methodology/ Severity	# Occ/ #Bldgs	Value ($)	# Occ/ #Bldgs	Value ($)	# Occ/ #Bldgs	Value ($)	# Occ/ #Bldgs	Value ($)	# Occ/ #Bldgs	Value ($)
Earthquake	Descriptive	66/12	34,361,370	11/8	5,971,750	378/5	30,150,000	318/ 7	48,700,000	679/59	132,760,410
Flood	Descriptive	14/3	6,697,840	0	0	0	0	18/2	800,000	384/31	37,133,450
Ground Failure	Descriptive	0	0	0	0	0	0	0	0	82/7	28,901,820
Tsunami (Seiche)	Descriptive	11/2	1,697,840	0	0	0	0	18/2	800,000	472/30	37,133,450
Weather	Descriptive	66/12	34,361,370	11/8	5,971,750	378/5	30,150,000	318/ 7	48,700,000	679/59	132,760,410
Volcanic Ash	Descriptive	66/12	34,361,370	11/8	5,971,750	378/5	30,150,000	318/ 7	48,700,000	679/59	132,760,410
Wildland Fire	Descriptive	66/12	34,361,370	11/8	5,971,750	378/5	30,150,000	318/ 7	48,700,000	679/59	132,760,410

Table 6-7 Potential Hazard Exposure Analysis – Critical Infrastructure

		Roads				Bridges/Culverts		Earthen Dams		Transportation Facilities		Utilities	
Hazard Type	Methodology / Severity	Paved Road Miles	Value ($)	Gravel Road Miles	Value ($)	No.	Value ($)	No.	Value ($)	# Occ/ #Bldgs	Value ($)	# Occ/ #Bldgs	Value ($)
Earthquake	Descriptive	9.9	50,000,000	7.65	11,500,000	11	Undefined	2	65,000,000	82/25	>475,000	35/14	10,391,890
Flood	Descriptive	Undefined		Undefined		7	Undefined	2	65,000,000	28/9	Undefined	6/13	8,592,380
Ground Failure	Descriptive	Undefined		Undefined		2	Undefined	2	65,000,000	14/4	Undefined	4/5	2,999,380
Tsunami (Seiche)	Descriptive	Undefined		Undefined		9	Undefined	0	0	32/10	Undefined	13/7	9,192,280
Volcanic Ash	Descriptive	9.9	50,000,000	7.65	11,500,000	11	Undefined	2	65,000,000	82/25	>475,000	35/14	10,391,890
Weather	Descriptive	9.9	50,000,000	7.65	11,500,000	11	Undefined	2	65,000,000	82/25	>475,000	35/14	10,391,890
Wildland Fire	Descriptive	9.9	50,000,000	7.65	11,500,000	11	Undefined	2	65,000,000	82/25	>475,000	35/14	10,391,890

6.8.1 Exposure Analysis – Narrative Summaries

Earthquake

Although all structures are exposed to earthquakes, buildings within the Wrangell area constructed with wood have less vulnerability to the effects of earthquakes than those constructed with other materials.

The Wrangell area has a "Low" recurrence probability (see Section 5.3.1.3) for a significant event that will generate "severe" ground movement resulting in infrastructure damage and personal injury. The following summaries potential impacts from a worst case scenario event:

- 1,408 people in 2,387 residences (approximate value $457,600,000)
- 66 people in 12 government facilities (approximate value $34,361,370)
- 11 people in 8 emergency response facilities (approximate value $5,971,750)
- 378 people in 5 educational facilities (approximate value $30,150,000)
- 318 people in 7 medical facilities (approximate value $48,700,000)
- 679 people in 59 community facilities (approximate value $132,760,410)
- 9.9 paved road system miles (approximate value $49,500,000)
- 7.65 gravel road system miles (approximate value $11,475,000)
- 11 bridges/culverts (approximate value is undefined)
- 2 earthen dams (approximate value $65,000,000)
- 82 people in 25 transportation facilities (approximate value >$475,000)
- 35 people in 14 utility facilities (approximate value $10,391,890)

Flood

Typical flood impacts associated include structures and contents water damage, roadbed, embankment, and coastal erosion, boat stranding, standing water in roadways and other areas. Flood events may also damage or displace 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 pass-through an open area under the main floor of a building) are more vulnerable to flood impacts.

Section 5.3.2.3 explains that the Wrangell has a minor flooding impact threats; most of which occur from rainfall and snowmelt run-off sheet flow flooding and wind driven wave storm surge.

Wrangell has grown since their initial flood insurance rate maps (FIRMS) were created in 1998. They can only be used to estimate where they can potentially expand or create new developments away from their historical floodplain. Therefore the CBW planning team estimated potential impacts from a worst case scenario event could include:

- 525 people in 175 residences (approximate value $56,875,000)
- 14 people in 3 government facilities (approximate value $6,697,840)
- 18 people in 2 medical facility (approximate value $800,000)
- 384 people in 31 community facilities (approximate value $37,133,450)
- Undefined paved road system miles (approximate value is undefined)

- Undefined gravel road system miles (approximate value is undefined)
- 7 bridges/culverts (approximate value is undefined)
- 2 earthen dams (approximate value $65,000,000)
- 28 people in 9 transportation facilities (approximate value is undefined)
- 6 people in 13 utility facilities (approximate value $8,592,380)

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.

Wrangell's ground failure events periodically cause structure and infrastructure displacement due to ground shifting, sliding, sinking, and/or upheaval. There have been periodic landslides and other ground failure incidents on the island. The following summaries potential impacts from a worst case scenario event:

- 375 people in 125 residences (approximate value $40,325,000)
- 82 people in 7 community facilities (approximate value $38,901,820)
- Undefined paved road system miles (approximate value is undefined)
- Undefined gravel road system miles (approximate value is undefined)
- 2 bridge/culvert (approximate value is undefined)
- 2 earthen dams (approximate value is undefined)
- 14 people in 4 transportation facilities (approximate value is undefined)
- 4 people in 5 utility facilities (approximate value $2,999,380)

Tsunami and Seiche

The UAF/GI, DGGS, and NTWC indicate that Wrangell has experienced minimal distant and local source tsunami threats for population and infrastructure located within the identified tsunami impact area. (See Section 5.3.5.3)

Wrangell's residential, commercial, and public structures and infrastructure located adjacent to the identified tsunami impact area have a "Possible" risk from tsunamigenic impacts. Potentially threatened population and infrastructure includes:

- 1,050 people in 350 residences (approximate value $113,750,000)
- 11 people in 2 government facilities (approximate value $1,697,840)
- 18 people in 2 medical facility (approximate value $800,000)
- 472 people in 30 community facilities (approximate value $37,133,450)
- Undefined paved road system miles (approximate value is undefined)
- Undefined gravel road system miles (approximate value is undefined)
- 9 bridges/culverts (approximate value is undefined)
- 32 people in 10 transportation facilities (approximate value is undefined)
- 13 people in 7 utility facilities (approximate value $9,192,280)

Volcano

Impacts associated with a volcanic eruption include strain on resources should other hub communities be significantly affected by volcanic eruption. An eruption of significant size in southcentral Alaska will certainly affect air routes, which in turn affects the entire state. Other impacts include respiratory problems from airborne ash, displaced persons, lack of shelter, and personal injury. Other potential impacts include general property damage (electronics and unprotected machinery), structural damage from ash loading, state/regional transportation interruption, loss of commerce, and contamination of water supply. (See Section 5.3.6.3)

Using information provided by the planning team, the USGS, and the Alaska Volcano Observatory, Wrangell's have a "Possible" risk from volcanic eruptions dispersing volcanic ash into the atmosphere. This could hamper air, land, and ocean resupply capability to Wrangell's isolated island location. The following summaries potential impacts from a worst case scenario event:

- 1,408 people in 2,387 residences (approximate value $457,600,000)
- 66 people in 12 government facilities (approximate value $34,361,370)
- 11 people in 8 emergency response facilities (approximate value $5,971,750)
- 378 people in 5 educational facilities (approximate value $30,150,000)
- 318 people in 7 medical facilities (approximate value $48,700,000)
- 679 people in 59 community facilities (approximate value $132,760,410)
- 9.9 paved road system miles (approximate value $49,500,000)
- 7.65 gravel road system miles (approximate value $11,475,000)
- 11 bridges/culverts (approximate value is undefined)
- 2 earthen dams (approximate value $65,000,000)
- 82 people in 25 transportation facilities (approximate value >$475,000)
- 35 people in 14 utility facilities (approximate value $10,391,890)

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 5.3.4.3 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 planning team and the National Weather Service; the entire area experiences severe storm conditions with moderate snow depths; and wind speeds exceeding 90 mph. The following summaries potential impacts from a worst case scenario event:

- 1,408 people in 2,387 residences (approximate value $457,600,000)
- 66 people in 12 government facilities (approximate value $34,361,370)
- 11 people in 8 emergency response facilities (approximate value $5,971,750)
- 378 people in 5 educational facilities (approximate value $30,150,000)
- 318 people in 7 medical facilities (approximate value $48,700,000)
- 679 people in 59 community facilities (approximate value $132,760,410)
- 9.9 paved road system miles (approximate value $49,500,000)
- 7.65 gravel road system miles (approximate value $11,475,000)
- 11 bridges/culverts (approximate value is undefined)
- 2 earthen dams (approximate value $65,000,000)
- 82 people in 25 transportation facilities (approximate value >$475,000)
- 35 people in 14 utility facilities (approximate value $10,391,890)

Wildland Fire

Section 5.3.5.3 provides additional detail regarding wildland/tundra fire impacts

The planning team stated that persistent and recurring unseasonably hotter temperatures create drought conditions that are perfect for increasing wildland fire susceptibility. Climate change and flammable vegetation species are prolific throughout Wrangell's forests locations; especially since extreme heat days have been increasing and drought conditions are a year recurrence. Fire frequency will likely increase in the future. The following summaries potential impacts from a worst case scenario event:

- 1,408 people in 2,387 residences (approximate value $457,600,000)
- 66 people in 12 government facilities (approximate value $34,361,370)
- 11 people in 8 emergency response facilities (approximate value $5,971,750)
- 378 people in 5 educational facilities (approximate value $30,150,000)
- 318 people in 7 medical facilities (approximate value $48,700,000)
- 679 people in 59 community facilities (approximate value $132,760,410)
- 9.9 paved road system miles (approximate value $49,500,000)
- 7.65 gravel road system miles (approximate value $11,475,000)
- 11 bridges/culverts (approximate value is undefined)
- 2 earthen dams (approximate value $65,000,000)
- 82 people in 25 transportation facilities (approximate value >$475,000)
- 35 people in 14 utility facilities (approximate value $10,391,890)

6.9 FUTURE DEVELOPMENT

The City and Borough of Wrangell continually seeks to maintain and upgrade their aging infrastructure.

The CBW, WCA, and the CCTHITA have few known hazard areas because there is no actual hard data about such areas. The community has become aware of a few ground failure - principally landslide sites, and flood hazard areas. Wrangell learned of their potential landslide locations after development occurred in area.

Wrangell has FEMA Flood Insurance Rate Maps (FIRMs) developed in 1982. However, Wrangell no longer participated in the NFIP. These maps (Section 6.5.1 and Table 6-8) define Wrangell's flood zoned areas. Most of their flood hazard areas are in flood velocity (V) zones near the coastline.

The borough provides developers or those desiring to develop in the floodway flood construction guidance documents, such as flood insurance construction requirements, and construction guidelines before any development occurs. If they are seeking to fill, they are provided all the flood insurance documentation and development guidelines to assure they know what is required. There are only a few homes that were built on fill or in the V zone.

The 10-year Wrangell Comprehensive Plan, June 2010, Section 6.7 Future Growth Plan and Maps, explains the borough's growth initiatives to guide development away from known hazard impact areas such as requiring building permits:

> *"The Borough Public Works Department requires and issues building permits for new construction or renovation projects." (Source: WCP, 2010)*

Note: Understanding Wrangell's future land use and growth initiatives is best left to read from their comprehensive plan to maintain context and facilitate understanding.

Hazard Mitigation Strategy for Future Growth

The MJHMP 's Section 7, Hazard Mitigation Strategy, identifies potential projects participants can accomplish to demonstrate how their respective communities' intends to continue improving development within or away from known hazard areas. These initiatives will culminate in their Mitigation Action Plan (MAP), Table 7-10.

Table 6-8 lists the City and Borough of Wrangell's current and planned projects and their respective funding sources.

Table 6-8 Proposed Wrangell Capital Budget Requests FY 2017-18

	Town/Org	Project Description	State Request Amount	Total Project Amount	State or Federal	Status
1	Wrangell	Shoemaker Bay Float - Construction	5,000,000	10,000,000	State	Priority #1 in Governor's capital budget for State Harbor funding for FY 2018
2	Wrangell	Water Treatment Plant Improvements	13,000,000	13,000,000	State/Federal	--
3	Wrangell	Water Main Distribution System Replacement, Phase 1 - updated costs based on ext'g funding in place vs. shortfall	500,000	1,000,000	State/Federal	DEC Loan paperwork underway; DEC MMG received.
4	Wrangell	Fire Engine/Pumper	275,000	275,000	--	--
5	Wrangell	Pool Facility Improvements (Pool Roof, Mechanical, Remodel) Phase I	--	2,000,000	State/Federal	Assessment completed
6	Wrangell	Wrangell Medical Center Design and Construction	--	35,000,000	State	--
7	Wrangell	Wrangell Boat Yard Improvements - Final Improvements	4,200,000	4,200,000	State/Fed	--
8	Wrangell	Public Safety Building Renovations	950,000	950,000	State/Federal	--
9	Wrangell	Ozone Generator Replacement - DELETE Pursuing purchase now	300,000	300,000	State/Federal	DEC Loan paperwork underway
10	Wrangell	Water Main Distribution System Replacement, Phase 2 (Zimovia Highway)	1,583,560	2,262,229	State	--
11	Wrangell	Back-up Diesel Generation	2,700, 000	2,700, 000	--	--
12	Wrangell	Ash Street/Lemiux Watermain Replacement	1,000,000	1,000,000	--	AK Rural Water Utilities completed assessment; DEC loan application 1/17
13	Wrangell	Community Center Life & Safety Improvements (phase II) Fire System upgrades	250,000	2,715,000	State/Federal	Phase I design is complete. Condition Assessment is complete.
14	Wrangell	SCBA's for personal Protective Equipment	60,000	83,700	--	--
15	Wrangell	Industrial Park Expansion - Road and Utilities Expansion	400,000	2,500,000	Federal	--
16	KSTK	KSTK Radio Group Inc. Flood Cessation	19,000	19,000		--
17	Wrangell	Wrangell Road Resurfacing Phase I	2,250,000	2,500,000	State	--
18	Wrangell	Storm Drain Plan	175,000	175,000	--	--
19	Wrangell	Elementary School Parking Lots	500,000	500,000	--	WCA Tribal Roads Priority
20	Wrangell	Two Police Vehicles	70,000	70,000	State/Federal	Rural Development application to be resubmitted.

Table 6-8 Proposed Wrangell Capital Budget Requests FY 2017-18

	Town/Org	Project Description	State Request Amount	Total Project Amount	State or Federal	Status
	Wrangell	Pneumatic Control Systems Phase I (Pool Facililty) - DELETE, will be completed in 2017 with FY17 budget for Pool.	55,000	55,000	--	--
	Wrangell	School Fire Alarm System (rounded the number from $490K to $500K)	500,000	500,000	--	--
	Wrangell	Library Recarpeting	55,000	55,000	--	--
	Wrangell	Shoemaker Bay Breakwater Feasibility Study	--	4,000,000	Federal	DEC Clean Water Fund; Received 750k FY2015
	Wrangell	Power Plant Roof Replacement	200,000	--	--	--
	WRG/PRG	South Mitkof Island Improvements - Banana Point Improvements	1,250,000	1,250,000	State	--
	Wrangell	Dam Replacement	--	50,000,000	Federal	--
	Wrangell	Pool Facility Improvements (Pool Roof, Mechanical, Remodel) Phase II	--	--	--	--
	Wrangell	Mt. Dewey Trail Extension (to Petroglyph Beach State Park)	200,000	200,000	--	--
	Wrangell	Reliance Harbor - Design and Construction	2,500,000	2,500,000	State/Federal	--
	Wrangell	Inner Harbor - Design and Construction	2,500,000	2,500,000	State/Federal	--
	Wrangell	Standard Oil Float - Design and Construction	2,000,000	2,000,000	State	--
	WCA	Wrangell Totem Pole Carving	--	1,000,000	--	--
	Wrangell	Volunteer Park Trail Extension to Etolin Ave.	100,000	100,000	--	--
	Wrangell	Pool Locker Replacements	55,000	55,000	State	--
	Wrangell	Power Infrastructure Improvements - Mission and First Avenue	150,000	--	--	--
	Wrangell	Volunteer Park Ball Fields' Improvements	250,000	250,000	--	--
	Wrangell	Meridian Street Extension (North End of Cassiar)	--	--	--	--
	Wrangell	Shoemaker Bay Park and Rainbow Falls Trailhead Improvements - requesting 10% of cost for possible federal grant match	1,250,000	1,250,000	State	--
	Wrangell	First and Second Avenue Improvements (Elementary School)	2,000,000	--	--	--
	Wrangell	Public Works Storage Building, Phase II - DELETE (no plan to pursue at this time)	50,000	--	--	Phase I pad to be completed 2016 by City
	Wrangell	Airplane Float Redecking	--	--	--	--
	Wrangell	Fire Hose Replacement	25,000	25,000	--	--
	Wrangell	Volunteer Park Plan	25,000	25,000	--	--
	Wrangell	Multipurpose Field Improvements	100,000	100,000	--	--
	Wrangell	Mariners Memorial	--	--	--	--
	Wrangell	Biomass Heating District	--	--	State/Federal	--
	Wrangell	Stikine Avenue Safety Issues	--	--	--	--
	Wrangell	Mitigation/Restoration Plan for Public/Private Development	75,000	150,000	--	--

Table 6-8 Proposed Wrangell Capital Budget Requests FY 2017-18

	Town/Org	Project Description	State Request Amount	Total Project Amount	State or Federal	Status
	Wrangell	Sewer Pumping Truck - DELETE (there is one in town now)	100,000	100,000	--	--
	Wrangell	Capacitor Bank for Water Treatment Plant	60,000	60,000	--	--
	Wrangell	Sunrise Lake - Alternative Water Source (Monitoring, Design, NEPA, etc.)	3,000,000	BG	State/Federal	--

Table 6-9 Proposed Wrangell Capital Budget Requests FY 2017-18

Listed as priority on main list	Town/Org	Project Description	State Request Amount	Total Project Amount	State or Federal	Status
14	Wrangell	Wrangell	Wrangell	Wrangell	--	--
16	Wrangell	KSTK Radio Group Inc. Flood Cessation	19,000	19,000	--	--
20	Wrangell	Two Police Vehicles	70,000	70,000	State/Federal	Rural Development application to be resubmitted.
	Wrangell	Pneumatic Control Systems Phase I (Pool Facililty) - Modify Cost, Ph 1 to be completed in 2017	35,000	35,000	--	--
	Wrangell	Library Recarpeting	55,000	55,000	--	--
	Wrangell	Pool Locker Replacements	55,000	55,000	State	--
	Wrangell	Public Works Storage Building, Phase II - DELETE (no plan to pursue at this time)	50,000	50,000	--	Phase I pad to be completed 2016 by City
	Wrangell	Fire Hose Replacement	25,000	25,000	--	--

This page intentionally left blank

7.0 MITIGATION STRATEGY

This section delineates the City and Borough of Wrangell (CBW), Wrangell Cooperative Association (WCA), and Central Council of the Tlingit and Haida Indian Tribes of Alaska's (CCTHITA) MJHMP mitigation strategy.

7.1 OVERVIEW

The mitigation strategy provides the blueprint for implementing desired activities that will enable the community to continue to save lives and preserve infrastructure by systematically reducing hazard impacts, damages, and community disruption. A vulnerability analysis is divided into six steps:

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)

7.2 COMMUNITY NAME'S CAPABILITY ASSESSMENT

The MJHMP displays DMA 2000 and 44 CFR 201.6 (city and borough jurisdictional) and 44 CFR 201.7 (Alaska Native Village) requirements to guide HMP development throughout the MJHMP. Pertinent support data follows each regulatory criteria text boxes, striving to fulfill regulatory criteria.

Note: Rural Alaska cities and villages have very limited funding, staff, and formal government resources. They "make do with what they have" looking at life with survival ever present in their minds and hearts. Many communities' leadership positions are extremely transitory with sometimes rapid or frequent turn-over.

The 2018 MJHMP planning team reviewed and edited their MJHMP and seeks to integrate the State and FEMA mitigation programs and initiatives within other borough and tribal planning mechanisms.

City and Borough of Wrangell's capability assessment reviews their pre- and post-disaster technical and fiscal resources available to the community.

DMA 2000 and its city and borough governance implementing regulations for comprehensive mitigation strategy development include:

DMA 2000 Requirements
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))
Source: FEMA, March 2015

DMA 2000 and its tribal governance implementing regulations for comprehensive mitigation strategy development include:

DMA 2000 Requirements
ELEMENT C. Mitigation Strategy
C1. Does the plan include a discussion of the tribal government's pre- and post-disaster hazard management policies, programs, and capabilities to mitigate the hazards in the area, including an evaluation of tribal laws and regulations related to hazard mitigation as well as to development in hazard-prone areas? [44 CFR §§ 201.7(c)(3) and 201.7(c)(3)(iv)]
Source: FEMA, October 2017

CBW and WCA, are collocated with their respective city and a tribal government. The CCTHITA has community members located in very diverse locations throughout Alaska and the lower 48 states. The tribal government has organizational specific planning and land management resources. The borough and tribes have assessed their available resources and are summarized in Tables 7-1 through 7-6 listing their regulatory tools, technical specialists, and financial, and training resource available for project management.

Table 7-1 City and Borough of Wrangell's Regulatory Tools

Regulatory Tools (ordinances, codes, plans)	Existing Yes/No?	Comments (Year of most recent update; problems administering it, etc.)
City and Borough of Wrangell's (CBW) Comprehensive Plan, 2010	Yes	Explains the CBW's land use initiatives and natural hazard impacts.
Land Use Plan	Yes/No?	Explains the CBW s land use goals and initiatives.
Wrangell Cooperative Association's (WCA's) Tribal Land Use Plan	Yes/No?	Describes the WCA's community development goals and initiatives.
Emergency Response Plan	No	
Wildland Fire Protection Plan	No	
Building code	Yes	The City has established Municipal Codes, Approved Ordinances, and Adopted Resolutions to facilitate enforce construction compliance
Zoning ordinances	Yes	The City has established Municipal Codes, Approved Ordinances, and Adopted Resolutions to facilitate enforce construction compliance
Subdivision ordinances or regulations	Yes	The City has established Municipal Codes, Approved Ordinances, and Adopted Resolutions to facilitate enforce construction compliance
Special purpose ordinances	Yes	The City has established Municipal Codes, Approved Ordinances, and Adopted Resolutions to facilitate enforce construction compliance

Local Resources

City and Borough of Wrangell has extensive planning and land management capacity and staff that will allow them to implement and integrate local hazard mitigation activities with FEMA mitigation actions and initiatives. However they work closely with State agencies such as the Division of Community and Regional Affairs and Division of Homeland Security and Emergency Management staff to guide them with funding and planning activities. The resources

available in these areas have been assessed by the hazard mitigation planning team, and are summarized below.

Table 7-2 City and Borough of Wrangell's (CBW) Technical Specialists

Staff/Personnel Resources	Yes / No	Department/Agency and Position
Planner or engineer with knowledge of land development and land management practices	Yes	The CBW has staff with this knowledge or works with planning and engineering consultants or contractors as needed
Engineer or professional trained in construction practices related to buildings and/or infrastructure	Yes	The CBW Director of Public Works and staff have this knowledge
Planner or engineer with an understanding of natural and/or human-caused hazards	Yes	The CBW Director of Public Works and staff have this knowledge
Floodplain Manager	No	The CBW does not have a Floodplain Manager
Surveyors	Yes	The CBW works with planning and engineering staff, consultants, or contractors as needed
Staff with education or expertise to assess the jurisdiction's vulnerability to hazards	Yes	The CBW h has staff with this knowledge or works with planning and engineering staff and consultants or contractors as needed
Personnel skilled in Geospatial Information System (GIS) and/or Hazards Us-Multi Hazard (Hazus-MH) software	Yes	The CBW has a GIS professional on staff with this knowledge
Scientists familiar with the hazards of the jurisdiction	Yes	The CBW works with consultants or contractors as needed
Emergency Manager	Yes	The CBW's Fire Chief Tim Buness and Police Chief Doug McCloskey and their staff have this knowledge
Finance (Grant writers)	Yes	CBW Finance Director Lee Buness fulfills this capacity
Public Information Officer	Yes	The Borough Manager

Table 7-3 WCA and CCTHITA's Technical Specialists

Staff/Personnel Resources	Yes / No	Department/Agency and Position
Planner or engineer with knowledge of land development and land management practices	Yes/No	The WCA has staff with this knowledge or works with planning and engineering consultants or contractors as needed The CCTHITA has staff with this knowledge or works with planning and engineering consultants or contractors as needed
Engineer or professional trained in construction practices related to buildings and/or infrastructure	Yes/No	The WCA has staff with this knowledge or works with planning and engineering consultants or contractors as needed The CCTHITA has staff with this knowledge or works with planning and engineering consultants or contractors as needed

Table 7-3 WCA and CCTHITA's Technical Specialists

Staff/Personnel Resources	Yes / No	Department/Agency and Position
Planner or engineer with an understanding of natural and/or human-caused hazards	Yes/No	The WCA has staff with this knowledge or works with planning and engineering consultants or contractors as needed The CCTHITA has staff with this knowledge or works with planning and engineering consultants or contractors as needed
Floodplain Manager	No	Neither tribe has this capability
Surveyors	Yes/No	The WCA has staff with this knowledge or works with planning and engineering consultants or contractors as needed The CCTHITA has staff with this knowledge or works with planning and engineering consultants or contractors as needed
Staff with education or expertise to assess the jurisdiction's vulnerability to hazards	Yes/No	The WCA has staff with this knowledge or works with planning and engineering consultants or contractors as needed The CCTHITA has staff with this knowledge or works with planning and engineering consultants or contractors as needed
Personnel skilled in Geospatial Information System (GIS) and/or Hazards Us-Multi Hazard (Hazus-MH) software	Yes/No	The WCA has staff with this knowledge or works with planning and engineering consultants or contractors as needed The CCTHITA has staff with this knowledge or works with planning and engineering consultants or contractors as needed
Scientists familiar with the hazards of the jurisdiction	Yes/No	The WCA has staff with this knowledge or works with planning and engineering consultants or contractors as needed The CCTHITA has staff with this knowledge or works with planning and engineering consultants or contractors as needed
Emergency Manager	Yes/No	The WCA President fulfills this position as needed The CCTHITAPresident fulfills this position as needed
Finance (Grant writers)	Yes	City or Tribal Bookkeeper as applicable
Public Information Officer	Yes	The City Manager and Tribal President as jurisdictionally applicable

Table 7-4, 7-5, and 7-6 lists a sample of the city and tribal jurisdictions' funding resources. Table 7-7 lists a few FEMA specific funding programs while Appendix A provides a detailed list of potential state and federal agency funding resources.

Table 7-4 City and Borough of Wrangell's Financial Resources

Financial Resource	Accessible or Eligible to Use for Mitigation Activities
General funds	CBW 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 (ICDBG)	CBW is eligible for this funding source
Capital Improvement Project Funding	CBW can exercise this authority with voter approval
Authority to levy taxes for specific purposes	CBW can exercise this authority with voter approval
Incur debt through general obligation bonds	CBW can exercise this authority with voter approval
Incur debt through special tax and revenue bonds	CBW can exercise this authority with voter approval
Incur debt through private activity bonds	CBW can exercise this authority with voter approval

DMA 2000 stipulated requirements and Tribal governance implementing regulations for grant financial management include:

DMA 2000 Requirements
ELEMENT
C2. Does the plan include a discussion of tribal funding sources for hazard mitigation projects and identify current and potential sources of Federal, tribal, or private funding to implement mitigation activities? [44 CFR §§ 201.7(c)(3)(iv) and 201.7(c)(3)(v)]
Source: FEMA, October 2017

Table 7-5 presents the Wrangell Cooperative Association's available financial resources

Table 7-5 Wrangell Cooperative Association's Tribal Financial Resources

Financial Resource	Accessible or Eligible to Use for Mitigation Activities
General funds	Available from various sources
Indian Community Development Block Grants (ICDBG)	Provides operational funds for tribal management activities
EPA, Indian Environmental General Assistance Program (IGAP)	Provides funding for tribal environmental improvement activities
HUD, Indian Housing Block Grant (IHBG)	Assists IRA Tribes with obtaining adequate housing
HUD, Native American Housing Assistance and Self Determination Act (NAHASDA)	Assists IRA Tribes with housing management resources
DOL, Employment and Training Administration, Disaster Unemployment Assistance	Provides disaster related unemployment by supporting employment and training activities

Table 7-6 presents the Central Council of the Tlingit and Haida Indian Tribes of Alaska (CCTHITA) available financial resources

Table 7-6 CCTHITA's Tribal Financial Resources

Financial Resource	Accessible or Eligible to Use for Mitigation Activities
General funds	Available from various sources
Indian Community Development Block Grants	Provides operational funds for tribal management

Table 7-6 CCTHITA's Tribal Financial Resources

Financial Resource	Accessible or Eligible to Use for Mitigation Activities
(ICDBG)	activities
EPA, Indian Environmental General Assistance Program (IGAP)	Provides funding for tribal environmental improvement activities
HUD, Indian Housing Block Grant (IHBG)	Assists IRA Tribes with obtaining adequate housing
HUD, Native American Housing Assistance and Self Determination Act (NAHASDA)	Assists IRA Tribes with housing management resources
DOL, Employment and Training Administration, Disaster Unemployment Assistance	Provides disaster related unemployment by supporting employment and training activities

FEMA and Other Mitigation Program and Initiative Eligibility

A FEMA approved and jurisdiction adopted MJHMP or THMP assures participant eligibility for FEMA mitigation grant programs and initiatives. The final MJHMP or THMP assures these jurisdictions can potentially fulfill grant management and integration with available grants listed in Table 7-7.

Table 7-7 Federal Agency Mitigation Programs

Financial Resources	Accessible or Eligible to Use for Mitigation Activities
Hazard Mitigation Grant Program (HMGP)	FEMA funding available to eligible local and tribal jurisdictions after a presidentially declared disaster. It can be used to fund both pre- and post-disaster mitigation plans and projects.
Pre-Disaster Mitigation (PDM) grant program	FEMA funding available to eligible local and tribal jurisdictions 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 available to eligible local and tribal jurisdictions on an annual basis. This grant can be used to mitigate repetitively flooded structures and infrastructure to protect repetitive flood structures. The City and Borough is no longer a NFIP participant and therefore is not eligible for NFIP funding.
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 their mitigation goals and potential mitigation actions to address identified potential hazard impacts (refer to Section 5.3) for the entire Wrangell area.

7.3 DEVELOPING MITIGATION GOALS

DMA 2000 stipulated and implementing city and borough governance regulations for developing hazard mitigation goals include:

DMA 2000 Requirements
ELEMENT C. Mitigation Goals
C3. Does the Plan include goals to reduce/avoid long-term vulnerabilities to the identified hazards? (Requirement §201.6(c)(3)(i))
Source: FEMA, March 2015.

DMA 2000 stipulated and implementing Tribal governance regulations for developing hazard mitigation goals include:

DMA 2000 Requirements
ELEMENT C. Mitigation Goals
C3. Does the Mitigation Strategy include goals to reduce or avoid long-term vulnerabilities to the identified hazards? [44 CFR § 201.7(c)(3)(i)]
Source: FEMA, October 2017

The planning team developed their mitigation goals and potential mitigation actions to address current and future potential hazard impacts for the city's and the native village's residents and infrastructure.

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. The planning team developed the mitigation goals and potential mitigation actions to address identified potential hazard impacts for the City and Borough of Wrangell.

The exposure analysis results were used as a basis for updating the mitigation goals and actions (Table 7-6). Additionally, the CBW, WCA, and the CCTHITA desired to have three new Mitigation Action or Initiative categorizes that could address combined hazard impacts. They are classified as Multi-Hazard along with their identified natural hazard categories. These three Multiple (Multi-Hazard or MH) Categories include:

- Multi-Hazard (MH) 1:Provide outreach activities to educate and promote recognizing and mitigating natural hazards that affect the City and Borough of Wrangell (CBW), Wrangell Cooperative Association (WCA), and CCTHITA within the Wrangell area.
- Multi-Hazard (MH) 2:Cross-reference mitigation goals and actions with other city and tribal planning mechanisms and projects.
- Multi-Hazard (MH) 3:Develop construction activities that reduce possibility of losses from natural hazards that affect the Wrangell area.

Table 7-8 lists the communities newly refined strategic mitigation goals which form the foundation for the following mitigation strategy processes and culminate within the Mitigation Action Plan (MAP) depicted in Table 7-12.

Table 7-8 Mitigation Goals

No.	Goal Description
Multi-Hazards (MH)	
MH 1	Provide outreach activities to educate and promote recognizing and mitigating all natural hazards that

	affect the City and Borough of Wrangell (CBW), Wrangell Cooperative Association (WCA), and Central Council of the Tlingit and Haida Indian Tribes of Alaska (CCTHITA) within the Wrangell area.
MH 2	Cross-reference mitigation goals and actions with other city and tribal planning mechanisms and projects
MH 3	Develop construction activities that reduce loss possibility from all natural hazards that affect the Wrangell area.
Natural Hazards	
EQ 4	Reduce earthquake (EQ) damage and loss possibilities.
FL 5	Reduce flood and erosive scour (FL) damage and loss possibility.
GF 6	Reduce ground failure (GF) damage and loss possibility.
TS 7	Reduce tsunami (TS) damage and loss possibilities.
VO 8	Reduce volcanic debris impacts (VO)
WX 9	Reduce severe weather (WX) damage and loss possibilities.
WF 10	Reduce tundra/wildland fire (WF) damage and loss possibilities.

7.4 IDENTIFYING MITIGATION ACTIONS

DMA 2000 requirements and implementing city and borough governance regulations for identifying and analyzing city governmental mitigation actions include:

DMA 2000 Requirements
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? (Requirement §201.6(c)(3)(ii))
Source: FEMA, March 2015

DMA 2000 requirements and implementing Tribal governance regulations for identifying and analyzing mitigation actions include:

DMA 2000 Requirements
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 2017

Mitigation actions are activities, initiatives, 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 construction projects.

FEMA Hazard Mitigation Assistance Guidance and Addendum (HMA) state the importance of considering, evaluating, and implementing the most effective mitigation actions, projects, activities, and potential alternatives:

> *Reviewing and incorporating information from the State, tribal, or local mitigation plan can help an Applicant or subapplicant facilitate the development of mitigation project alternatives. Linking the existing mitigation plan to project scoping can support the Applicant and subapplicant in selecting the most appropriate mitigation activity that best addresses the identified hazard(s), while taking into account community priorities, climate change, and resiliency. In particular, the mitigation strategy section of the plan identifies a range of specific mitigation activities that can reduce vulnerability and*

> *includes information on the process that was used to identify, prioritize, and implement the range of mitigation actions considered…*
>
> *It is important to reference the mitigation plan as potential project alternatives may have been considered during the planning process. If the project alternatives were not considered during the mitigation planning process, they should be considered in the next mitigation plan update (FEMA 2015b)*

The planning team assessed the legacy 2009 HMP's existing mitigation actions status and provided an explanation as to any changes that may have occurred. The planning team defined legacy MHMP mitigation project's status as: "Completed", "Deleted", "Deferred," "Ongoing", and "Re-Defined" to better meet participant's needs.

The planning team then considered, reviewed, and selected new projects (Table 7-9) from a comprehensive list of potential actions identified during this MJHMP development process for each hazard type. Newly identified projects indicate whether they were considered, or selected for implementation. Considered projects were not carried forward into the MAP. The planning team then carried forward "Ongoing" and "Deferred" actions into the 2018 mitigation strategy's MAP (Table 7-12).

Note: AECOM's potential projects list is seven pages long and subsequently deemed too large for MJHMP inclusion.

Note: The actions are applicable to CBW, WCA, and CCTHITA. Therefore the MAP, Table 7-10, identifies the "responsible office" for implementation as whether the CBW, WCA, and CCTHITA offices as responsible for grant management for each project grant received for their specific organization.

Table 7-9 Wrangell MJHMP Update – Existing and New Mitigation Actions

(Blue text items are the current MJHMP Identified Mitigation Action Items and their respective status determinations)

Goals		Status		Actions
No.	**Description**	**New** *Considered, Selected* **Brought Forward** *Complete, Deferred, Deleted, or Ongoing*	**Explain Status**	**Description**
Multi-Hazards (MH)				
MH 1	Provide outreach activities to educate and promote recognizing and mitigating all natural hazards that affect the city and village.	Selected	New	Identify and pursue funding opportunities to implement mitigation actions (erosion control, structure elevation or relocation, etc.)
				E-1. If funding is available, perform an engineering assessment of the earthquake vulnerability of each identified critical infrastructure owned by the Borough.
				E-2. Identify buildings and facilities that must be able to remain operable during and following an earthquake event.
				E-3. Contract a structural engineering firm to assess the identified buildings and facilities to determine their structural integrity and devise a strategy to improve their earthquake

Table 7-9 Wrangell MJHMP Update – Existing and New Mitigation Actions

(Blue text items are the current MJHMP Identified Mitigation Action Items and their respective status determinations)

Goals		Status		Actions
No.	**Description**	**New** *Considered, Selected* **Brought Forward** *Complete, Deferred, Deleted, or Ongoing*	**Explain Status**	**Description**
				resistance.
				SW-2. Conduct special awareness activities, such as Winter Weather Awareness Week, Flood Awareness Week, etc.
				SW-3. Expand public awareness about NOAA Weather Radio for continuous weather broadcasts and warning tone alert capability
MH 2	Cross-reference mitigation goals and actions with other Tribal planning mechanisms and projects.	Selected	New	Establish a formal role for the jurisdictional Hazard Mitigation Planning Committee to develop a sustainable process to implement, monitor, review, and evaluate community wide mitigation actions.
		Selected	New	The City will strive to coordinate and 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.
				SW-1. Research and consider instituting the National Weather Service's "Storm Ready" program.
			Reworded for an all-hazards approach	SW-4. Encourage weather resistant building construction materials and practices.
				New: Encourage using hazard resistant construction materials and building siting to avoid earthquake, high wind, snow load, flood, and tsunami damages.
				T-1: Use the Emergency Operations Plan in exercises regarding natural hazards including tsunami danger. Participate in the Tsunami Awareness programs and consider pursuing Tsunami Ready Community designation.
MH 3	Develop construction activities that reduce possibility of losses from all natural hazards that affect the city and village.			

Table 7-9 Wrangell MJHMP Update – Existing and New Mitigation Actions

(Blue text items are the current MJHMP Identified Mitigation Action Items and their respective status determinations)

Goals		Status		Actions
No.	**Description**	**New** *Considered, Selected* **Brought Forward** *Complete, Deferred, Deleted, or Ongoing*	**Explain Status**	**Description**
EQ4	Reduce vulnerability, damage, or loss of structures from earthquake damage			
FL 5	Reduce flood and erosive scour (FL) damage and loss possibility.			
GF 6	Reduce vulnerability, damage, or loss of structures from flooding.			GF-1. Continue to educate public about avalanche and landslide hazards. Information can be disseminated to the public through the City website, press releases, media ads, and other methods.
				GF-2: Conduct studies of unstable soils in landslide prone areas, specifically those areas that have not yet been studied and might present additional dangers in the form of underwater ground failure, or landslides that may cause a tsunami.
TS 7	Reduce structural vulnerability to tsunami (TS) damage.			T-1. Siren and lights at both ends of town for Tsunami and other hazardous warnings
				T-2: Obtain tsunami inundation maps for Wrangell. Without these maps, communities must rely on historical or estimated information for land use and evacuation route planning. Inundation maps will provide more accurate and precise information.
VO 8	Reduce vulnerability, damage, or loss of structures from volcanic ash or debris impacts			
SW 9	Reduce vulnerability,			SW-1: Research and consider instituting the National Weather Service program of "Storm Ready".

Table 7-9 Wrangell MJHMP Update – Existing and New Mitigation Actions

(Blue text items are the current MJHMP Identified Mitigation Action Items and their respective status determinations)

Goals		Status		Actions
No.	Description	New *Considered, Selected* Brought Forward *Complete, Deferred, Deleted, or Ongoing*	Explain Status	Description
	damage, or loss of structures from ground failure.			SW-2: Conduct special awareness activities, such as Winter Weather Awareness Week, Flood Awareness Week, etc.
				SW3: Expand public awareness about NOAA Weather Radio for continuous weather broadcasts and warning tone alert capability.
				SW4: Encourage weather resistant building construction materials and practices.
WF 10	Reduce vulnerability, damage, or loss of structures from wildland or tundra fires.			

7.5 EVALUATING AND PRIORITIZING MITIGATION ACTIONS

DMA 2000 requirements and city and borough governance regulations for implementing mitigation actions.

DMA 2000 Requirements: Mitigation Strategy - Implementation of Mitigation Actions
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, March 2015

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

DMA 2000 Requirements: Mitigation Strategy - Implementation of Mitigation Actions	
ELEMENTS. MITIGATION STRATEGY	
C5. Does the plan contain an action plan that describes how the actions identified will be prioritized, implemented, and administered by the tribal government? [44 CFR § 201.7(c)(3)(iii)]	
Source: FEMA, October 2017	

The Mitigation Action Plan (MAP) represents mitigation projects and programs the City and Village could implement to potentially reduce damaging hazard impacts to both current and future infrastructure and buildings.

The planning team evaluated and prioritized each of the mitigation actions on Date, 2019 to determine which actions would be included in the Mitigation Action Plan. The Mitigation Action Plan represents mitigation projects and programs to be implemented during this HMP's five-year life cycle. To complete this task, the planning team first prioritized the hazards that were regarded as the most significant within the community (earthquake, flood, ground failure, severe weather, volcano, wildland/tundra fire).

The planning team reviewed the simplified social, technical, administrative, political, legal, economic, and environmental (STAPLEE) evaluation criteria (Table 7-10) and the Benefit-Cost Analysis Fact Sheet (Appendix F) 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 CBW, WCA, and CCTHITA each choose to implement.

Table 7-10 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 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 Date, 2019, the hazard mitigation planning team prioritized # legacy 2009 HMP actions brought forward and # new natural hazard mitigation actions that were selected for Mitigation Action Plan (MAP) implementation.

The hazard mitigation planning team considered each hazard's history, extent, and recurrence probability to determine each potential actions priority. The planning team defined their project rating categories as high, medium, or low priority:

- 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 7-10) was completed to provide the Wrangell planning team with an implementation approach. The CBW, WCA, and CCTHITA will primarily focus their mitigation efforts on their high priority initiatives as funding becomes available. Unfortunately, DHS&EM has insufficient funding for large (high priority) projects but can fund smaller projects. Therefore due to limited available community funding sources, HMP participants will strive to acquire any funding amounts to fulfill their diverse mitigation needs.

7.6 MITIGATION ACTION PLAN

DMA 2000 requirements and city and borough governance regulations for implementing mitigation actions.

DMA 2000 Requirements: Mitigation Strategy - Implementation of Mitigation Actions
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, March 2015.

DMA 2000 requirements and tribal governance regulations for implementing mitigation actions.

DMA 2000 Requirements: Mitigation Strategy - Implementation of Mitigation Actions
ELEMENT C: Mitigation Action Implementation and Management
C5. Does the plan contain an action plan that describes how the actions identified will be prioritized, implemented, and administered by the tribal government? [44 CFR § 201.7(c)(3)(iii)]
Source: FEMA, October 2017

The CBW, WCA, and CCTHITA have flat management structures. Like most rural/remote Alaskan communities there is limited budget; therefore no funding is available for developing and maintaining departmental or other infrastructure responsibilities. The City and Village are managed by their mayoral led city or tribal president/chief led tribal councils respectively. This process enables each jurisdiction to maximize governance capacity, coordinate project prioritization, and closely monitor their limited budget.

Wrangell's mitigation project selection, although jointly accomplished, requires vastly different implementation and management processes due to their diverse government structures. City governments have specific authorities, laws, and regulations that qualify them to apply for federal agency grants intended only for organized city or borough governments. However, tribal governments may not be eligible for the same grants but they have Indian or IRA tribal government restricted grants provided by the Bureau of Indian Affairs (BIA) as well as many other agency grant programs designated only for Indian or IRA tribes.

Grant recipients are restricted to fulfilling grant specific and awarding agency implementation and management processes or requirements. To that end, the MJHMP MAP's (Table 7-12) Responsible Office will be CBW, WCA, and/or CCTHITA governments' office as applicable.

Their respective offices could conceivably receive funding to accomplish similar projects to improve their respective initiatives for owned infrastructure.

Table 7-11 defines the acronyms used in the Mitigation Action Plan (Table 7-10). See Appendix A for summarized funding agency resource descriptions.

Table 7-11 Potential Funding Source Acronym List

(See complete funding resource description in Appendix A)

City and Borough of Wrangell (CBW),

Wrangell Cooperative Association Tribal Council Office (WCA

Central Council of the Tlingit and Haida Indian Tribes of Alaska (CCTHITA)

U.S. Department of Homeland Security (DHS)
Citizen Corps Program (CCP)
Emergency Operations Center (EOC)
Homeland Security Grant Program (HSGP)
Emergency Management Performance Grant (EMPG)
State Homeland Security Program (SHSP)

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

U.S. Department of Commerce (DOC)/
Remote Community Alert Systems Program (RCASP)

National Oceanic and Atmospheric Administration (NOAA)
Economic Development Administration (EDP)
Public Works and Development Facilities Program (PWDFP)

U.S. Environmental Protection Agency (EPA)/
Indian Environmental General Assistance Program (IGAP)

U.S. Department of Agriculture (USDA)/
Farm Service Agency
Emergency Conservation Program (ECF)
Rural Development (RD)

.Natural Resources Conservation Service (NRCS)
Conservation Technical Assistance Program (DCT)
Conservation Innovation Grants (CIG)
Environmental Quality Incentives Program (EQIP)
Emergency Watershed Protection Program (EWP)
Watershed Planning (WSP)

U.S. Geological Survey (USGS)
Alaska Volcano Observatory (AVO)

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

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

Alaska Department of Military and Veterans Affairs (DMVA)
Division of Homeland Security and Emergency Management (DHS&EM)
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)/

Table 7-11 Potential Funding Source Acronym List

(See complete funding resource description in Appendix A)

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)/ Village Safe Water (VSW) DEC/Alaska Drinking Water Fund (ADWF) DEC/Alaska Clean Water Fund [ACWF] DEC/Clean Water State Revolving Fund (CWSRF)
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)
Denali Commission (Denali) Energy Program (EP Solid Waste Program (SWP)
Lindbergh Foundation Grant Programs (LFGP)
Rasmussen Foundation Grants (RFG)

The MAP lists the CBW, WCA, and CCTHITA's projects and initiatives to address their various hazard impact threats. Table 7-12 defines how each mitigation action will be implemented and administered by the individual city and tribal governments.

Additionally, the MAP lists each selected mitigation action, their priorities, the responsible office, potential funding resource(s), the anticipated implementation timeline, and provides a brief explanation as to how the overall benefit/costs and technical feasibility were taken into consideration.

Note: The actions are applicable to both the city and the tribe. Therefore the MAP, Table 7-12, identifies the "responsible office" for implementation as whether the city office or tribal office (or designated alternate) as responsible for grant management for each project grant received for their specific organization.

Table 7-12 Wrangell's Combined Mitigation Action Plan (MAP)

(Blue Italicized Initiatives were brought forward from existing MJHMP or other identified plans)
(See Table 7-10 Potential Funding Agency acronym list; Appendix 9-A for agency programmatic details)

Goal/ Action ID	Description	Priority (High, Medium, Low)	Responsible Office or Agency	Potential Funding Source(s)	Timeframe (1-3 Years 2-4 Years 3-5 Years)	Benefit-Costs (BC) / Technical Feasibility (T/F)
Multi-Hazard (MH)						
MH 1.1						
MH 1.						
MH 1.						
MH 2.1						
MH 2.						
MH 2.						
MH 3.1						
MH 3.						
MH 3.						
Natural Hazards						
EQ 4.1						
EQ 4.						
EQ 4.						
FL 5.1						
FL 5.						
FL 5.						
GF 6.1						
GF 6.						

Table 7-12 Wrangell's Combined Mitigation Action Plan (MAP)

(Blue Italicized Initiatives were brought forward from existing MJHMP or other identified plans)
(See Table 7-10 Potential Funding Agency acronym list; Appendix 9-A for agency programmatic details)

Goal/ Action ID	Description	Priority (High, Medium, Low)	Responsible Office or Agency	Potential Funding Source(s)	Timeframe (1-3 Years 2-4 Years 3-5 Years)	Benefit-Costs (BC) / Technical Feasibility (T/F)
GF 6.						
TS 8.1						
TS 8.						
VO 9.1						
VO 9.						
WX 7.1						
WX 7.						
WX 7.						
WF 10.1						
WF 10.						
WF 10.						

7.7 MONITORING MITIGATION STRATEGY PROGRESS

DMA 2000 requirements and city and borough governance regulations for determining mitigation action progress include:

DMA 2000 Requirements
ELEMENT E: Plan Updates
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 efforts? (Requirement §201.6(d)(3))
D3. Was the plan revised to reflect changes in priorities? (Requirement §201.6(d)(3))
Source: FEMA, March 2015

DMA 2000 requirements and Tribal governance regulations for monitoring mitigation action progress include:

DMA 2000 Requirements
ELEMENT C: Reviewing Progress
C7. Does the plan describe a system for reviewing progress on achieving goals as well as activities and projects identified in the mitigation strategy, including monitoring implementation of mitigation measures and project closeouts? [44 CFR §§ 201.7(c)(4)(ii) and 201.7(c)(4)(v)]
ELEMENT D: Plan Updates
D1. Was the plan revised to reflect changes in development? [44 CFR § 201.7(d)(3)]
D2. Was the plan revised to reflect progress in tribal mitigation efforts? [44 CFR §§ 201.7(d)(3) and 201.7(c)(4)(iii)]
D3. Was the plan revised to reflect changes in priorities? [44 CFR § 201.7(d)(3)]
Source: FEMA, October 2017

7.7.1 Reviewing HMP Successes

The borough and tribal planning team leaders (or designees) will monitor and review their mitigation strategy to determine potential successes or roadblocks to achieving the MJHMP's mitigation goals and whether implementing the Mitigation Action Plan's activities and projects were successful during the annual review process, throughout the MJHMP's five-year life cycle

The planning team will work together with each agency or authority administering a mitigation project to prepare an Annual Review Progress Report (Appendix F) to Wrangell's planning team leader. The report will include the current status of the mitigation project, including any project changes, a list of identified implementation problems (with appropriate strategies to overcome them), and a statement of whether or not the project has helped achieve their identified goals.

MJHMP participants will provide the status of each legacy HMP project of initiative's current status within Section 7-4, Table 7-9 to include defining MJHMP mitigation project's status as: "Completed", "Deleted", "Deferred," "Ongoing", and "Re-Defined" with an explanation as to how or why they may have changed.

7.7.2 Wrangell's Project Successes

Table 7-13 lists the Wrangell MJHMP participant's mitigation activities and initiatives progress. Many are ongoing annual activities due to their success or annual natural processes.

Table 7-13 Wrangell's Project Progress

Responsible Agency	Project or Activity Title	Status *(Completed, Closed, Ongoing, Stalled)*	Progress
CBW			
WCA			
CCTHITA			

7.8 IMPLEMENTING MITIGATION STRATEGY INTO EXISTING PLANNING MECHANISMS

DMA 2000 requirements and city and borough governance regulations for implementing the MJHMP into existing planning mechanisms include:

DMA 2000 Requirements
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? (Requirement §201.6(c)(4)(ii))
Source: FEMA, March 2015.

DMA 2000 requirements and Tribal governance regulations for implementing the MJHMP into existing planning mechanisms include:

DMA 2000 Requirements
ELEMENT
C6. Does the plan describe a process by which the tribal government will incorporate the requirements of the mitigation plan into other planning mechanisms, when appropriate? [44 CFR § 201.7(c)(4)(iii)]
Source: FEMA, October 2017

After MJHMP adoption, each planning team member will strive to that the MJHMP, in particular each mitigation action project, is incorporated into existing planning mechanisms such as their Comprehensive Plan, Economic Development or Business Plan, and BIA Indian Reservation Roads (IRR) Plan, as well as seeking other integration opportunities where appropriate. The MJHMP planning team will achieve this by undertaking the following activities.

- Review city and tribal regulatory tools to determine where to integrate the mitigation philosophy and implementable initiatives within current and future planning mechanisms. Current regulatory tools are identified in Section 7.2 capability assessment.
- Work with pertinent community entities to implement MJHMP philosophies and mitigation strategy initiatives (including the MAP) into relevant current and future planning mechanisms (i.e. Comprehensive Plan, Economic Development Plan, Capital Improvement Project List, Transportation Improvement Plan, etc.).

Note: Implementing this philosophy and activities may require updating or amending specific planning mechanisms.

This page intentionally left blank

8.0 REFERENCES

This section provides a comprehensive reference list used to develop the MJHMP.

ACIA 2013. University of Alaska Fairbanks (UAF), Arctic Climate Impact Assessment (ACIA), 2013. Available: http://www.amap.no/documents/doc/arctic-arctic-climate-impact-assessment/796. (September 2018)

https://www.google.com/search?tbm=bks&hl=en&q=arctic+climate+impact+assessment&=

AICC 2018. Alaska Interagency Coordination Center, Wildland Fire History. Available: http://fire.ak.blm.gov/aicc.php. (September 2018)

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. (July 2018)

2015 CBW. Wrangell Community Profile. Available: http://www.wrangell.com/visitorservices/history-wrangell. (November 2018)

2018 CBW. The City and Borough of Wrangell's website. "History of Wrangell." Available: http://www.wrangell.com/visitorservices/history-wrangell. (November 2018)

2018 CBWa, Wrangell Chamber of Commerce, Wrangell, Directory. Available: https://www.chamberorganizer.com/members/directory/search_2_column.php?org_id=WCOC&bci=56778687. (January 2018)

Census 2018. United States Census Bureau (Census), American Fact Finder, City and Borough of Wrangell Alaska. http://factfinder2.census.gov/faces/nav/jsf/pages/index.xhtml. (October 2018)

Data 2018. Data USA. City and Borough of Wrangell Data gathering. Available: https://datausa.io/profile/geo/wrangell-ak/. (October 2018)

DCRA 2018. DCCED/DCRA, Community Plans and Infrastructure Libraries 2018. Available http://commerce.state.ak.us/dnn/dcra/PlanningLandManagement/CommunityPlansAndInfrastructure.aspx. (October 2018).

DGGS 1994. (Division of Geological and Geophysical Survey [DGGS]). Neotectonic Map of Alaska. 1994. Available: http://www.dggs.alaska.gov/pubs/id/22331. (October 2018)

DHS&EM 2013. Alaska Division of Homeland Security and Emergency Management (DHS&EM) Alaska State Hazard Mitigation Plan (SHMP), 2013. Available: http://ready.alaska.gov/plans/documents/2013%20State%20Mitigation%20Plan%20Draft. pdf (June 2018)

DHS&EM 2013. Critical Facilities Inventory, 2013. Best available data. (July 2009)

DHS&EM 2016. Disaster Cost Index 2016. (July 2018)

DOF 2018. Alaska Division of Forestry (DOF). 2018. Role of Fire in the Alaskan Environment. http://forestry.alaska.gov/fire/fireplans.htm. (July 2018)

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. (July 2018)

FEMA 1981. Federal Emergency Management Agency (FEMA). FEMA Flood Map Service Center. City of Wrangell, Alaska, Wrangell-Petersburg Division's FEMA Flood Insurance Study. Available: https://msc.fema.gov/portal/search#searchresultsanchor. (November 2018)

FEMA 2011. FEMA Local Mitigation Plan Review Guide. October 2011. Available: https://www.fema.gov/media-library-data/20130726-1809-25045-7498/plan_review_guide_final_9_30_11.pdf, (June 2018)

FEMA 2013. FEMA, Local Mitigation Planning Handbook, March 29, 2013. Available: https://www.fema.gov/media-library/assets/documents/31598. (June 2018)

FEMA 2013b. FEMA, Mitigation Planning How-To Guides, July 26, 2013. Available: https://www.fema.gov/media-library/resources-documents/collections/6. (June 2018)

FEMA 2015. FEMA, Hazard Mitigation Assistance Guidance and Addendum, February 27, 2015. Available: https://www.fema.gov/media-library/assets/documents/103279. (June 2018)

FEMA 2016. FEMA, Mitigation Planning Fact Sheet. Available: https://www.fema.gov/media-library/assets/documents/5756. (June 2018)

FEMA 2017. Electronic (e) Code of Federal Regulations (CFR), Title 44 – Emergency Management and Assistance, Chapter 1, Subchapter D, Part 201Mitigation Planning. Available: https://www.ecfr.gov/cgi-bin/text-idx?SID=d8f49ce9ce19d78b6e2327f0cc0db05f&mc=true&tpl=/ecfrbrowse/Title44/44cfrv1_02.tpl#0. (July 2018)

FEMA 2017a. FEMA, Flooding and Flood Risks. Available: http://www.floodsmart.gov/floodsmart/pages/flooding_flood_risks/ffr_overview.jsp. (June 2018)

FEMA 2017b. FEMA, Flood Frequently Asked Questions Available: http://www.floodsmart.gov/floodsmart/pages/faqs/faqs_flood.jsp. (June 2018)

FEMA 2017c. FEMA, Flood Facts. Available: http://www.floodsmart.gov/floodsmart/pages/flood_facts.jsp. (June 2018)

FEMA 2017d. FEMA, Community Status Book Report. Available http://www.fema.gov/cis/AK.html. (July 2018)

FEMA 2017e. FEMA Flood Map Service Center Portal. Available: http://msc.fema.gov/portal/search. (June 2018)

FEMA 2017f. FEMA, Tribal Mitigation Plan Review Guide – December 5, 2017. Available: https://www.fema.gov/media-library/assets/documents/18355 . (July 2018)

FEMA 2018. Electronic (e) Code of Federal Regulations (CFR), Title 44 – Emergency Management and Assistance, Chapter 1, Subchapter D, Part 201Mitigation Planning. Available: https://www.ecfr.gov/cgi-bin/text-idx?SID=cd3fa3096ea0a6ae0cfea9e2b1c37aca&tpl=/ecfrbrowse/Title44/44tab_02.tpl. (June 2018)

FEMA 2018a. FEMA, Local Mitigation Planning Resources. Available: https://www.fema.gov/local-mitigation-planning-resources. (June 2018)

Jin 2011. Sridhar, Venkataramana and Jin, Xin. (2011). "Climate Change Impacts: An Assessment for Water Resources Planning and Management in the Pacific Northwest of the U.S". Climate Change / Book 1. Available: http://scholarworks.boisestate.edu/cgi/viewcontent.cgi?article=1016&context=civileng_facpubs. (September 2018).

Jorgenson 2008 et al. 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. (September 2018)

NOAA 2001. Winter Storms: The Deceptive Killers: A Preparedness Guide. National Weather Service. December 2001. Available: https://www.preventionweb.net/educational/view/3973. (June 2018)

NOAA 2018. National Weather Service (NWS) Definitions. Available: http://www.weather.gov/glossary/index.php?letter=F. (June 2018)

SNAP 2018. UAF, Scenarios Network for Alaska and Arctic Planning (SNAP), Community Temperature and Precipitation Charts, 2016. Historic, current, and predicted weather data. Available: https://www.snap.uaf.edu/sites/all/modules/snap_community_charts/charts.php. (November 2018)

USACE 2017 U.S. Army Corps of Engineers (USACE), Civil Works Branch, Interactive Map, Alaska Floodplain Manager's Flood Hazard Data, Wrangell, Alaska, July 2017. Available: http://corpsmapu.usace.army.mil/POA/Wrangell.pdf. (November 2018)

USACE. 2018. U.S. Army Corps of Engineers (USACE), Civil Works Branch, Interactive Map, Available: http://corpsmapu.usace.army.mil/cm_apex/cm2.cm2.map?map=POA. (November 2018)

USGS 2015. USGS North Pacific and Russian Far East Air Routes pass over volcanoes. U.S. Geological Survey Fact Sheet 030-97. Online Version 1.0. Available: http://pubs.usgs.gov/fs/fs030-97/. (October 2018)

USGS 2018. USGS, Modified Mercalli Intensity (MMI). Available: https://earthquake.usgs.gov/learn/topics/mercalli.php. (June 2018)

USGS 2018a. U.S. Geological Survey (USGS) NEIC Historic Earthquake Search Results. Available: http://earthquake.usgs.gov/earthquakes/search/. (September 2018)

WRCC 2018. Western Regional Climate Center, 2018. Available: http://www.wrcc.dri.edu/summary/Climsmak.html. (October 2018)

This page intentionally left blank

9.0 APPENDICES

This page intentionally left blank

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/hazard-mitigation-planning-resources#1).
  - Local Mitigation Planning Handbook, March 2013. This handbook explains the basic concepts of hazard mitigation and provides guidance to local governments on developing or updating hazard mitigation plans to meet the requirements of Title 44 Code of Federal Regulations (CFR) §201.6 for FEMA approval and eligibility to apply for FEMA Hazard Mitigation Assistance grant programs. (http://www.fema.gov/library/viewRecord.do?id=7209)
  - Earthquake Hazard Mitigation Handbook: This Handbook provides local jurisdictions with mitigation ideas, many of which have demonstrated success and timeliness. These mitigation measures should be used as a source of ideas for potential mitigation projects, regardless of whether it will receive FEMA funding. (http://www.starr-team.com/starr/RegionalWorkspaces/RegionX/Documents/Hazard%20Mitigation%20Handbooks/EQHazMitHandbook.pdf)
  - Flood Hazard Mitigation Handbook: his Handbook provides local jurisdictions with mitigation ideas that have demonstrated success and can be timely implemented. These mitigation measures relate to the most common damages sustained by severe flood events. This Handbook can be a useful mitigation tool regardless whether a specific project is proposed for FEMA funding under either the Public Assistance or Mitigation programs. (http://www.starr-team.com/starr/RegionalWorkspaces/RegionX/Documents/Hazard%20Mitigation%20Handbooks/FloodHazMitHandbook.pdf)
  - Hurricane Hazard Mitigation Handbook: This handbook provides local jurisdictions with mitigation ideas, many of which have demonstrated success in the past. These

mitigation measures should be used as a source of ideas for potential mitigation projects, regardless of whether they will receive FEMA funding. (http://www.starr-team.com/starr/RegionalWorkspaces/RegionX/Documents/Hazard%20Mitigation%20Handbooks/HurricaneMitHandbook.pdf)

- 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. (https://www.fema.gov/media-library/assets/documents/3412)
- The 2015 Hazard Mitigation Assistance (HMA) Guidance and Addendum, February 27 and March 3, 2015 respectively. Part I of the Hazard Mitigation Assistance (HMA) Guidance introduces the three HMA programs, identifies roles and responsibilities, and outlines the organization of the document. This guidance applies to Hazard Mitigation Grant Program (HMGP) disasters declared on or after the date of publication unless indicated otherwise. This guidance is also applicable to the Pre-Disaster Mitigation (PDM) and Flood Mitigation Assistance (FMA) Programs; the application cycles are announced via http://www.grants.gov/. The guidance in this document is subject to change based on new laws or regulations enacted after publication.

- FEMA, http://www.fema.gov - includes links to information, resources, and grants that communities can use in planning and implementing community resilience and sustainability measures.
- 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. (https://www.fema.gov/fiscal-year-2015-emergency-management-performance-grant-program)

- 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. (https://www.fema.gov/national-earthquake-hazards-reduction-program)

  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.

  NEHRPDHS 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/vfa.htm).

- Department of Homeland Security (DHS) provides the following grants:
  - Homeland Security Grant Programs (HSGP) and State Homeland Security Programs (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. (https://www.dhs.gov/homeland-security-grant-program-hsgp)
  - 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. (http://www.dhs.gov/citizen-corps)
  - Emergency Operations Center (EOC) Guidance. 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. (https://www.fema.gov/media-library/assets/documents/20622)

- Emergency Alert System (EAS). Resilient public alert and warning tools are essential to save lives and protect property during times of national, state, regional, and local emergencies. The Emergency Alert System (EAS) is used by alerting authorities to send warnings via broadcast, cable, satellite, and wireline communications pathways. Emergency Alert System participants, which consist of broadcast, cable, satellite, and wireline providers, are the stewards of this important public service in close partnership with alerting officials at all levels of government. The EAS is also used when all other means of alerting the public are unavailable, providing an added layer of resiliency to the suite of available emergency communication tools. The EAS is in a constant state of improvement to ensure seamless integration of CAP-based and emerging technologies. (https://www.fema.gov/emergency-alert-system)

- U.S. Department of Commerce's grant programs include:
  - 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. (http://www.tsunami.noaa.gov/warning_system_works.html)
  - 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. (http://www.federalgrants.com/Remote-Community-Alert-Systems-Program-11966.html) This program is a contributing element of the Warning, Alert, and Response Network (WARN) Act.
  - 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)

- 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)
    - Indian Environmental General Assistance Program (IGAP). 1992, Congress passed the Indian Environmental General Assistance Program Act (42 U.S.C. 4368b) which authorizes EPA to provide General Assistance Program (GAP) grants to federally recognized tribes and tribal consortia for planning, developing, and establishing environmental protection programs in Indian country, as well as for developing and implementing solid and hazardous waste programs on tribal lands.

      The goal of this program is to assist tribes in developing the capacity to manage their own environmental protection programs, and to develop and implement solid and hazardous waste programs in accordance with individual tribal needs and applicable federal laws and regulations.

      http://www.epa.gov/Indian/gap.htm

- Department of Agriculture (USDA). Provides diverse funding opportunities; providing a wide benefit range. Their grants and loans website provides a brief programmatic overview with links to specific programs and services. (http://www.rd.usda.gov/programs-services)
    - Farm Service Agency: 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/stateoffapp?mystate=ak&area=home&subject=landing&topic=landing)
    - Natural Resources Conservation Service (NRCS) has several funding sources to fulfill mitigation needs. (http://www.nrcs.usda.gov/wps/portal/nrcs/main/national/programs/alphabetical/)
        - Conservation Technical Assistance Program (CTA) is voluntary program available to any group or individual interested in conserving their natural resources and sustaining agricultural production. The program assists land users with addressing opportunities, concerns, and problems related to using their natural resources enabling them to make sound natural resource management decisions on private, tribal, and other non-federal lands. (http://www.nrcs.usda.gov/wps/portal/nrcs/main/national/programs/technical/)
        - Conservation Innovation Grants (CIG) is a voluntary program intended to stimulate developing and adopting innovative conservation approaches and technologies while leveraging federal investment in environmental

enhancement and protection, in conjunction with agricultural production. Under CIG, Environmental Quality Incentives Program funds are used to award competitive grants to non-federal governmental or nongovernmental organizations, Tribes, or individuals.

CIG enables NRCS to work with other public and private entities to accelerate technology transfer and adoption of promising technologies and approaches to address some of the Nation's most pressing natural resource concerns. CIG will benefit agricultural producers by providing more options for environmental enhancement and compliance with federal, state, and local regulations. (http://www.nrcs.usda.gov/wps/portal/nrcs/main/national/programs/financial/cig/)

- The Environmental Quality Incentives Program (EQIP) is a voluntary program that provides financial and technical assistance to agricultural producers through contracts up to a maximum term of ten years in length. These contracts provide financial assistance to help plan and implement conservation practices that address natural resource concerns and for opportunities to improve soil, water, plant, animal, air and related resources on agricultural land and non-industrial private forestland. In addition, a purpose of EQIP is to help producers meet federal, state, tribal and local environmental regulations. (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/programs/financial/eqip/?cid=stelprdb1242633)
- The Emergency Watershed Protection Program (EWP) 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. (http://www.nrcs.usda.gov/wps/portal/nrcs/main/national/programs/landscape/ewpp/)
- Watershed Surveys and Planning. NRCS watershed activities in Alaska are voluntary efforts requested through conservation districts and units of government and/or tribes. The purpose of the program is to assist federal, state, and local agencies and tribal governments to protect watersheds from damage caused by erosion, floodwater, and sediment and to conserve and develop water and land resources. Resource concerns addressed by the program include water quality, opportunities for water conservation, wetland and water storage capacity, agricultural drought problems, rural development, municipal and industrial water needs, upstream flood damages, and water needs for fish, wildlife, and forest-based industries. (http://www.nrcs.usda.gov/wps/portal/nrcs/main/national/programs/landscape/wsp/)

- Department of Energy (DOE), Office of Energy Efficiency and Renewable Energy, Weatherization Assistance Program. This program minimizes the adverse effects of high energy costs on low-income, elderly, and handicapped citizens through client education activities and weatherization services such as an all-around safety check of major energy systems, including heating system modifications and insulation checks. (http://www1.eere.energy.gov/wip/wap.html)
    - 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://energy.gov/eere/wipo/tribal-energy-program)
- 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 application information. (http://www.acf.hhs.gov/grants/open/foa/)
- 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/)
    - Indian Housing Block Grant / Native American Housing Assistance and Self Determination Act (IHBG/NAHASDA) administration, operating & construction funds. The act is separated into seven sections:

The Indian Housing Block Grant Program (IHBG) is a formula grant that provides a range of affordable housing activities on Indian reservations and Indian areas. The block grant approach to housing for Native Americans was enabled by the Native American Housing Assistance and Self Determination Act of 1996 (NAHASDA).

Eligible IHBG recipients are federally recognized Indian tribes or their tribally designated housing entity (TDHE), and a limited number of state recognized tribes who were funded under the Indian Housing Program authorized by the United States Housing Act of 1937 (USHA). With the enactment of NAHASDA, Indian tribes are no longer eligible for assistance under the USHA.

An eligible recipient must submit to HUD an Indian Housing Plan (IHP) each year to receive funding. At the end of each year, recipients must submit to HUD an Annual Performance Report (APR) reporting on their progress in meeting the goals and objectives included in their IHPs.

Eligible activities include housing development, assistance to housing developed under the Indian Housing Program, housing services to eligible families and individuals, crime prevention and safety, and model activities that provide creative approaches to solving affordable housing problems. (http://portal.hud.gov/hudportal/HUD?src=/program_offices/public_indian_housing/ih/grants/ihbg)

- Community Development Block Grants (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/)
- National Disaster Resilience (NDR) grant is a HUD/CDBG. The grant opportunity is called the Community Block Development Grant-National Disaster Resilience (CDBG-NDR). HUD sponsors the National Disaster Resilience Competition (NDRC) to help eligible communities impacted by federally declared disasters in 2011, 2012 and 2013 become more resilient. The NDRC is a two-phase process that will competitively award nearly $1 billion in HUD Disaster Recovery funds to the most impacted, distressed and needy eligible communities. The grant opportunity is called the Community Block Development Grant-National Disaster Resilience (CDBG-NDR). The State of Alaska is one of many applicants nationwide eligible to apply on behalf of its impacted communities. (https://www.hudexchange.info/course-content/ndrc-nofa-phase-1-factors/NDRC-NOFA-Phase-1-Factors-Slides-2014-11-03.pdf)
- HUD/Indian Community Development Block Grants (ICDBG) provide grant assistance and technical assistance to aid communities or Indian tribes 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://portal.hud.gov/hudportal/HUD?src=/program_offices/public_indian_housing/ih/grants/icdbg)

- Department of Labor (DOL), Employment and Training Administration, Disaster Unemployment Assistance (DUA). 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)
- Department of Transportation (DOT), Hazardous Materials Emergency Preparedness (HMEP) Grant. The Hazardous Materials Transportation Safety and Security Reauthorization Act of 2005 authorizes the U.S. DOT to provide assistance to public sector employees through training and planning grants to States, Territories, and Native American tribes for emergency response. The purpose of this grant program is to increase State, Territorial, Tribal, and local effectiveness in safely and efficiently handling hazardous materials accidents and incidents, enhance implementation of the Emergency Planning and Community Right-to-Know Act of 1986 (EPCRA), and encourage a comprehensive approach to emergency training and planning by incorporating the unique challenges of responses to transportation situations. (http://www.phmsa.dot.gov/hazmat/grants)
- 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/Businesses/Small-Businesses-%26-Self-Employed/Disaster-Assistance-and-Emergency-Relief-for-Individuals-and-Businesses-1).
- Small Business Administration (SBA) Disaster Assistance Loans and Grants program provides information concerning disaster assistance, preparedness, planning, cleanup, and recovery planning. (https://www.sba.gov/category/navigation-structure/loans-grants)
  - May provide low-interest disaster loans to individuals and businesses that have suffered a loss due to a disaster. (https://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. The USACE is a member and co-chair of the Alaska Climate Change Sub-Cabinet.

- Civil Works and Planning (http://www.poa.usace.army.mil/Missions/CivilWorksandPlanning.aspx)
- Environmental Resources Section (http://www.poa.usace.army.mil/About/Offices/Engineering/EnvironmentalResources.aspx)
- USACE Alaska District Grants (http://search.usa.gov/search?affiliate=alaska_district&query=grants)

- The Grants.gov program management office was established, in 2002, as a part of the President's Management Agenda. Managed by the Department of Health and Human Services, Grants.gov is an E-Government initiative operating under the governance of the Office of Management and Budget.

  Under the president's management agenda, the office was chartered to deliver a system that provides a centralized location for grant seekers to find and apply for federal funding opportunities. Today, the Grants.gov system houses information on over 1,000 grant programs and vets grant applications for 26 federal grant-making agencies.

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://ready.alaska.gov/grants.

- Division of Health and Social Services (DHSS): On this site you will find information intended to assist all who are interested in DHSS grants and services they support. (http://dhss.alaska.gov/fms/grants/Pages/grants.aspx and http://dhss.alaska.gov/fms/Documents/FY15GrantBook.pdf)
- Division of Health and Social Services (DSS): Provides special outreach services for seniors, including food, shelter and clothing. (http://dhss.alaska.gov/dsds/Pages/hcb/hcb.aspx)
- Division of Insurance (DOI): Provides assistance in obtaining copies of policies and provides information regarding filing claims. (http://commerce.state.ak.us/dnn/ins/Consumers/AlaskaConsumerGuide.aspx)
- 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. (http://commerce.state.ak.us/dnn/dcra/PlanningLandManagement/ACCIMP.aspx)

  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. (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 (VSW) 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 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 (ANTHC), 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. (http://dec.alaska.gov/water/MuniGrantsLoans/loanoverview.html
  - 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. (http://dggs.alaska.gov/pubs/advanced-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.

- The Alaska Interagency Coordination Center (AICC) is the Geographic Area Coordination Center for Alaska. AICC serves as the focal point for initial attack resource coordination, logistics support, and predictive services for all state and federal agencies involved in wildland fire management and suppression in Alaska.

  Fire management planning, preparedness, suppression operations, prescribed burning, and related activities are coordinated on an interagency basis. DOF has cooperative agreements with the Departments of Agriculture and Interior, and numerous local government and volunteer fire departments to respond to wildland fires, reduce duplication of efforts, and share resources.

  In 1984 the State of Alaska adopted the National Interagency Incident Management System Incident Command System concept for managing fire suppression. The Incident Command System (ICS) guiding principles are followed in all wildland fire management operations. All State of Alaska Departments adopted ICS in 1996 through the Governor's administrative order.

Other Funding Resources

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

- 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)
  - 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. (http://ruralcap.com/?page_id=794)
  - 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. (http://ruralcap.com/?page_id=198

- 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), an initiative of the insurance industry to reduce deaths, injuries, property damage, economic losses, and human suffering caused by natural disasters. (http://www.disastersafety.org/)
- 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. (http://www.redcross.org/find-help)
- Catalog of Federal Domestic Assistance (DFDA) Crisis Counseling Program (CCP). 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/grants)
    - 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.
- 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 Lindbergh's vision of a balance between the advance of technology and the preservation of the natural/human environment. (http://www.thelindberghfoundation.org/awards)
- Rasmussen Foundation Grants. The Rasmussen foundation invests both in individuals and well-managed 501(c)(3) organizations dedicated to improving the quality of life for Alaskans.

  Rasmussen 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 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)

This page intentionally left blank

APPENDIX B FEMA REVIEW TOOL, MULTI-JURISDICTIONAL HAZARD MITIGATION PLAN (MJHMP)

This page intentionally left blank

APPENDIX C COMMUNITY MJHMP ADOPTION RESOLUTIONS

This page intentionally left blank

APPENDIX D – PUBLIC OUTREACH ACTIVITIES

This page intentionally left blank

From:	Simmons, Scott
To:	"sally.cox@alaska.gov"; "jimmy.smith@alaska.gov"; "twolf@denali.gov"; "callard@denali.gov"; "rick.dembroski@alaska.gov"; "mike.johnson@alaska.gov"; "scott.nelsen@alaska.gov"; "eli.ward@alaska.gov"; "deanne.stevens@alaska.gov"; "kathryn.pyne@alaska.gov"; "sheri.gray@alaska.gov"; "paul.khera@alaska.gov"; "dan.monteleone@alaska.gov"; "john.clendenin@alaska.gov"; "michael.angove@noaa.gov"; "louise.fode@noaa.gov"; "aimee.fish@noaa.gov"; "amy.holman@noaa.gov"; "kyle.wright@tananachiefs.org"; "djnicolsky@alaska.edu"; "naruppert@alaska.edu"; "Kenneth.J.Eisses@usace.army.mil"; "scott.crockett@ak.usda.gov"; "brett.nelson@ak.usda.gov"; "ann.Y.gravier@hud.gov"; "jconaway@usgs.gov"; "adevaris@usgs.gov"; "janet.schaefer@alaska.gov"; "robin.bronen@akijp.org"; "denise.pollock@akijp.org"; "essmith@anthc.org"; "kwallace@usgs.gov"; "swhite@avcp.org"; "steve.heppner.bia.ak@gmail.com"; "terri.lomax@alaska.gov"; "Soderlund.Dianne@epamail.epa.gov"; "joel.curtis@noaa.gov"; "sam.albanese@noaa.gov"; "meg.mueller@ak.usda.gov"; "merlaine.kruse@ak.usda.gov"; "patty.burns@alaska.gov"; "margie.goatley1@alaska.gov"; "khoward@blm.gov"; "nicole.kinsman@noaa.gov"; "bruce.r.sexaur@usace.army.mil"; "mtavelton@usace.army.mil"; "steve.mcgroarty@alaska.gov"; "megan.kohler@alaska.gov"; "jade.gamble@alaska.gov"; "essmith@anthc.org"; "kwallace@usgs.gov"; "swhite@avcp.org"; "steve.heppner.bia.ak@gmail.com"; "jimmy.smith@alaska.gov"; "terri.lomax@alaska.gov"; "Soderlund.Dianne@epamail.epa.gov"; "joel.curtis@noaa.gov"; "sam.albanese@noaa.gov"; "meg.mueller@ak.usda.gov"; "merlaine.kruse@ak.usda.gov"; "ak_le@fws.gov"; "eddie.zingone@noaa.gov"; "patty.burns@alaska.gov"; "margie.goatley1@alaska.gov"; "khoward@blm.gov"; "nicole.kinsman@noaa.gov"; "bruce.r.sexaur@usace.army.mil"; "mtavelton@usace.army.mil"; "steve.mcgroarty@alaska.gov"; "megan.kohler@alaska.gov"; "jade.gamble@alaska.gov"
Cc:	Evans, Jessica (jessica.evans@aecom.com); Rabon, Angel; Cogger, Corinne; Volper, Kaley
Subject:	Hazard Mitigation Project Agency Involvement Participant Invitation Letter
Date:	Friday, February 02, 2018 11:38:00 AM
Attachments:	image003.png

Dear Potential HMP Development Participants,
AECOM (formerly URS) has received a 2014 contract from the State Division of Homeland Security and Emergency Management (DHS&EM) to develop Local/Tribal Multi-Jurisdictional Hazard Mitigation Plans (MJHMPs) for the following communities: Each group defines the HMP type and targeted communities.

The following communities' do not currently have an HMP. These communities will develop plans that meet FEMA's current MJHMP requirements:

New MJHMP and Tribal HMP Development

- ***Organized Cities with Co-Located Villages***
  - Gustavus (2nd Class City)
  - Manokotak (2nd Class City with Tribal Village)
  - Tenakee Springs (2nd Class City)

The following communities' currently have expired HMPs. These communities will have their plans updated from HMP to MJHMPs to meet current FEMA city and tribal requirements:

MJHMP/Tribal HMP Updates Required

- ***Organized Cities with Co-Located Native Villages***
  - Anvik (2nd Class City with Native Village)
  - Seward (2nd Class City with Native Village)

Borough HMPs converted to MJHMP Update Required

- The City and Borough of Wrangell's (CBW) legacy HMP includes two-collocated villages. CBW's HMP is currently expired. CBW's HMP will be

converted to meet FEMA's Multi-Jurisdictional Plan requirements with each Tribe receiving separate Tribal HMPs within CWB's MJHMP to meet current FEMA city and tribal requirements.

- The Aleutians East Borough's (AEB) legacy HMP includes six organized cities and their collocated villages. AEB's HMP is currently expired. AEB's HMP will be converted to meet FEMA's Multi-Jurisdictional Plan requirements with each constituent community and native village receiving separate HMPs within AEB's MJHMP to meet current FEMA requirements:

  - ***AEB Organized Cities with Co-Located Villages***

    - Akutan (2nd Class City with Tribal Village)
    - Cold Bay (2nd Class City only)
    - False Pass (2nd Class City with Tribal Village)
    - King Cove (2nd Class City with 2-Tribal Villages)
    - Nelson Lagoon (2nd Class City with Tribal Village)
    - Sand Point (2nd Class City with 2-Tribal Villages)

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: *https://ready.alaska.gov/plans/localhazmitplans* as the communities finalize them.

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

I encourage you to acknowledge receiving this invitation at your earliest convenience to allow me to include your participation (with appropriate acknowledgments) within the Draft and Final HMPs prior to State and FEMA review and subsequent approvals.

Kind Regards
-Scott-

AECOM
R. Scott Simmons, CFM, CPM
Senior Emergency Management Planner

700 G Street, Suite 500, Anchorage, AK 99501
eMail: scott.simmons@aecom.com
Phone: 907.261.9706 or 800.909.6787
Fax: 907.562.1297
Personal Cell: 907.841.1832

From:	Simmons, Scott
To:	"davidj@wrangell.com"; "lvonbargen@wrangell.com"; "ecodev@wrangell.com"; "aal-haddad@wrangell.com"
Cc:	"wcatribe@gmail.com"; "rpaddock@ccthita-nsn.gov"; "deptfob@ccthita.org"; Isham, Kelly
Subject:	RE: City & Borough of Wrangell with Tlingit-Haida Tribal Conference, Hazard Mitigation Plan Update-Project Introduction eMail
Date:	Tuesday, October 16, 2018 3:02:00 PM
Attachments:	image003.png Wrangell CritFacil-HzrdSprdst.xlsx Wrangell HMP UpdateNwsltr_1_101618.doc Wrangell HMP UpdateNwsltr_1_101618.pdf image004.png

---

Good Afternoon Mr. Jack, Ms. Von Bargen, Ms. Ashton, Ms. Al-Haddad, Ms. Rushmore, and Mr. Paddock,

Please accept my apologies and thank you for your patience with our slow hazard mitigation plan update process. I had been very engulfed in developing the new State Hazard Mitigation Plan because it expires October 25, 2018… just a few days away. It is now complete, state adopted, and will receive FEMA final approval this week…

I know Ms. Von Bargen has been disappointed with the previous contractor's version of your plan. I promise this one will be much better and pertinent to the Wrangell area. We write it with you, it is your plan, not ours.

It will likely sit unused on a shelf somewhere if it doesn't describe your community, your hazard damage experiences, "all" of your critical facilities, the hazards they are affected by, the structure type or category, and the number of potential occupants at any given time.

I have attached a draft critical facilities spreadsheet and a newsletter for your respective reviews and editing.

Please provide any changes to the newsletter so we can. You can either edit the newsletter yourself or send it to us to edit and return. You can post an accurate newsletter on city, tribal, post office, and other community bulletin board locations to notify your residents about your efforts to update your hazard mitigation plan.

I look forward to working with you throughout this month and longer as needed to produce YOUR new HMP. I will call tomorrow morning, October 17th to discuss our HMP development process and potentially work with anyone interested in updating the attached critical facilities spreadsheet.

Please let me know a good time if 9:00 a.m. does not work with you.

Again, thank you with your patience with updating the City and Borough of Wrangell's

HMP.
-Scott-

R. Scott Simmons, CFM, CPM
Senior Emergency Management Professional

700 G Street, Suite 500, Anchorage, AK 99501
eMail: scott.simmons@aecom.com
Phone: 907.261.9706 or 800.909.6787
Fax: 907.562.1297
Personal Cell: 907.841.1832

This e-mail and any attachments contain AECOM 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.

From: Simmons, Scott
Sent: Friday, January 19, 2018 11:54 AM
To: 'davidj@wrangell.com'; 'stevep@wrangell.com'; 'lvonbargen@wrangell.com'; 'aal-haddad@wrangell.com'; 'deptfob@ccthita.org'
Subject: City&Borough of Wrangell with Tlingit-Haida Tribal Conference, Hazard Mitigation Plan Update-Project Introduction eMail

Dear City&Borough Mayor Jack, Vice Mayor Prysunka, Manager Bargen, and Tribal President Pewterson, and Division Director Martin

I am writing to introduce myself, Scott Simmons at AECOM. This project will cost you nothing because we were contracted by the Division of Homeland Security and Emergency Management (DHS&EM) to assist the City&Borough of Wrangell and Tlingit-Haida Tribal Conference with updating your legacy 2009 Hazard Mitigation Plan (HMP).

FEMA now requires that collocated City&Borough and Tribal governments should work together with developing a multi-jurisdictional hazard mitigation plan (MJHMP). Both City&Borough and tribal government criteria will be included throughout the updated plan. Both the City&Borough and tribal Councils will adopt the plan once it has been state reviewed and received FEMA preliminary approval.

We will review and update all sections of your current plan; starting with the planning section. Your Planning Team membership needs to be manageable, with as few as four or five members or City&Borough and Tribal leadership can determine whether their City&Borough and Tribal council(s) would be best suited as their joint community Planning Team.
Your 2009 legacy HMP state:

> *"Wrangell Borough Planner Carol Rushmore was the contact person for*

the Borough… The Planning Commission was the lead public body that reviewed the plan."

Is this the same process you desire for this 2018 HMP update planning effort? If yes, please provide the current Planning Commission membership's names. You will also need to include Tlingit-Haida Tribal Conference members for this project within the table below.

Therefore our first goal is for you to review your legacy HMPs planning team list (below) and determine if those members are still available and willing to work on updating the plan. I have provided your legacy HMP's planning team chart below. We will also need to include Tlingit-Haida Tribal Conference Tribal Council members with the update effort. Please edit the list to update your planning team membership.

Table 4-1 Hazard Mitigation Planning Team

Name	Title	Organization	Phone
John Taylor	Wrangell Planning and Zoning Commission	City&Borough of Wrangell	Please identify the City&Borough Planning Team Leader, MJHMP review
Stanley Schnell			Data gathering and MJHMP review
Lisa Messmer			Data gathering and MJHMP review
August Schultz			Data gathering and MJHMP review
Terri Henson			Data gathering and MJHMP review
Pat McMurren			Data gathering and MJHMP review
Elizabeth Keegan			Data gathering and MJHMP review
		Tlingit-Haida Tribal Conference	Please identify the Tribal Planning Team Lead, data gathering and MJHMP review
	IGAP Coordinator?		Tribal data gathering and MJHMP review
Scott Simmons	New Planner, Consultant	AECOM (New Agency)	Project Manage, lead writer, technical assistance

Typically the City&Borough Mayor or Manager and Tlingit-Haida Tribal Conference President or Administrator desire to be their respective government's Planning Team Leads. Each of you can select alternates who can report to those who appointed them (your respective councils, or planning commission, etc.) as well as coordinate data review and approvals.

AECOM's role in this project is to ensure that the HMP update meets state and federal MJHMP requirements. We are at the beginning stages of this project, and we are seeking information about the community infrastructure, residents, and jurisdictional authorities.

This is the typical plan review process:

Section 1. Introduction: added entire new section explaining City&Borough and Tribal HMP regulatory requirements.

Section 2. Community Description: update your community information, including new census and State data.

Section 3. Planning Process: update this section to reflect 2018 public processes including newsletters, public meetings and 2018 Planning Team changes.

- Did your planning team do what they said they'd do? For example, did the planning team perform their annual maintenance commitment?
- Were mitigation efforts integrated with or into other City&Borough and Tribal planning documents"

Section 4 Plan Adoption: 2018 formal adoption resolutions and dates.

Section 5. Hazard Profile Analysis: review current and newly identified hazards such as 2010 t 2018 earthquake, flooding, ground failure, severe weather, and wildfire data.

Section 6 Vulnerability Analysis: analyze vulnerability with 2018 critical facilities and infrastructure tables as well as tribal culturally sensitive site and FEMA NFIP programmatic data as applicable.

Section 7 Mitigation Strategy: review and edit 2009 mitigation goals and actions.

- We will add short narrative descriptions as to their current status such as whether you have completed, deleted, or deferred those actions or projects;
- As well as provide a short explanation as to why they may have changed status.

Section 8. References: revised to reflect 2018 document searches and data used to support the update.

Our task is to write the plan while teaching you the hazard mitigation plan development and update process. We have been very successful accomplishing this by using a community Planning Teams. AECOM will write the plan. Your community Planning Team will work with us to provide essential information that only community residents will know or have

experienced.

There will be opportunities for the entire community to review the team's work and should be tracked as part of FEMA's public involvement process. This can include distributing or posting newsletters or providing information during City&Borough and Tribal Council Meetings or other public meetings, and working with us over the phone as we capture needed information. Please keep track of any public comments as FEMA pushes to see how this information benefited the plan development process.

Please provide the names of your respective planning team leaders to schedule an introductory meeting with the team leader and team members to introduce the project and coordinate information collection.

We look forward to working with you to complete your joint City&Borough and Tribal compliant Multi-Jurisdictional Hazard Mitigation Plan update. Please call me if you have questions.

Kind Regards
-Scott-

R. Scott Simmons, CFM, CPM
Senior Emergency Management Planner

700 G Street, Suite 500, Anchorage, AK 99501
eMail: scott.simmons@aecom.com
Phone: 907.261.9706 or 800.909.6787
Fax: 907.562.1297
Personal Cell: 907.841.1832

This e-mail and any attachments contain AECOM 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.

From:	Simmons, Scott
To:	"davidj@wrangell.com"; "stevep@wrangell.com"; "lvonbargen@wrangell.com"; "aal-haddad@wrangell.com"; "deptfob@ccthita.org"
Subject:	City&Borough of Wrangell with Tlingit-Haida Tribal Conference, Hazard Mitigation Plan Update-Project Introduction eMail
Date:	Friday, January 19, 2018 11:54:00 AM
Attachments:	image003.png

Dear City&Borough Mayor Jack, Vice Mayor Prysunka, Manager Bargen, and Tribal President Pewterson, and Division Director Martin

I am writing to introduce myself, Scott Simmons at AECOM. This project will cost you nothing because we were contracted by the Division of Homeland Security and Emergency Management (DHS&EM) to assist the City&Borough of Wrangell and Tlingit-Haida Tribal Conference with updating your legacy 2009 Hazard Mitigation Plan (HMP).

FEMA now requires that collocated City&Borough and Tribal governments should work together with developing a multi-jurisdictional hazard mitigation plan (MJHMP). Both City&Borough and tribal government criteria will be included throughout the updated plan. Both the City&Borough and tribal Councils will adopt the plan once it has been state reviewed and received FEMA preliminary approval.

We will review and update all sections of your current plan; starting with the planning section. Your Planning Team membership needs to be manageable, with as few as four or five members or City&Borough and Tribal leadership can determine whether their City&Borough and Tribal council(s) would be best suited as their joint community Planning Team.
Your 2009 legacy HMP state:

> *"Wrangell Borough Planner Carol Rushmore was the contact person for the Borough… The Planning Commission was the lead public body that reviewed the plan."*

Is this the same process you desire for this 2018 HMP update planning effort? If yes, please provide the current Planning Commission membership's names. You will also need to include Tlingit-Haida Tribal Conference members for this project within the table below.

Therefore our first goal is for you to review your legacy HMPs planning team list (below) and determine if those members are still available and willing to work on updating the plan. I have provided your legacy HMP's planning team chart below. We will also need to include Tlingit-Haida Tribal Conference Tribal Council members with the update effort. Please edit the list to update your planning team membership.

Table 4-1 Hazard Mitigation Planning Team

Name	Title	Organization	Phone

John Taylor	Wrangell Planning and Zoning Commission	City&Borough of Wrangell	Please identify the City&Borough Planning Team Leader, MJHMP review
Stanley Schnell			Data gathering and MJHMP review
Lisa Messmer			Data gathering and MJHMP review
August Schultz			Data gathering and MJHMP review
Terri Henson			Data gathering and MJHMP review
Pat McMurren			Data gathering and MJHMP review
Elizabeth Keegan			Data gathering and MJHMP review
		Tlingit-Haida Tribal Conference	Please identify the Tribal Planning Team Lead, data gathering and MJHMP review
	IGAP Coordinator?		Tribal data gathering and MJHMP review
Scott Simmons	New Planner, Consultant	AECOM (New Agency)	Project Manage, lead writer, technical assistance

Typically the City&Borough Mayor or Manager and Tlingit-Haida Tribal Conference President or Administrator desire to be their respective government's Planning Team Leads. Each of you can select alternates who can report to those who appointed them (your respective councils, or planning commission, etc.) as well as coordinate data review and approvals.

AECOM's role in this project is to ensure that the HMP update meets state and federal MJHMP requirements. We are at the beginning stages of this project, and we are seeking information about the community infrastructure, residents, and jurisdictional authorities.

This is the typical plan review process:

Section 1. Introduction: added entire new section explaining City&Borough and Tribal HMP regulatory requirements.

Section 2. Community Description: update your community information, including new census and State data.

Section 3. Planning Process: update this section to reflect 2018 public processes including newsletters, public meetings and 2018 Planning Team changes.

- Did your planning team do what they said they'd do? For example, did the planning team perform their annual maintenance commitment?
- Were mitigation efforts integrated with or into other City&Borough and Tribal planning documents"

Section 4 Plan Adoption: 2018 formal adoption resolutions and dates.

Section 5. Hazard Profile Analysis: review current and newly identified hazards such as 2010 t 2018 earthquake, flooding, ground failure, severe weather, and wildfire data.

Section 6 Vulnerability Analysis: analyze vulnerability with 2018 critical facilities and infrastructure tables as well as tribal culturally sensitive site and FEMA NFIP programmatic data as applicable.

Section 7 Mitigation Strategy: review and edit 2009 mitigation goals and actions.

- We will add short narrative descriptions as to their current status such as whether you have completed, deleted, or deferred those actions or projects;
- As well as provide a short explanation as to why they may have changed status.

Section 8. References: revised to reflect 2018 document searches and data used to support the update.

Our task is to write the plan while teaching you the hazard mitigation plan development and update process. We have been very successful accomplishing this by using a community Planning Teams. AECOM will write the plan. Your community Planning Team will work with us to provide essential information that only community residents will know or have experienced.

There will be opportunities for the entire community to review the team's work and should be tracked as part of FEMA's public involvement process. This can include distributing or posting newsletters or providing information during City&Borough and Tribal Council Meetings or other public meetings, and working with us over the phone as we capture needed information. Please keep track of any public comments as FEMA pushes to see how this information benefited the plan development process.

Please provide the names of your respective planning team leaders to schedule an introductory meeting with the team leader and team members to introduce the project and coordinate information collection.

We look forward to working with you to complete your joint City&Borough and Tribal compliant Multi-Jurisdictional Hazard Mitigation Plan update. Please call me if you have

questions.

Kind Regards
-Scott-

R. Scott Simmons, CFM, CPM
Senior Emergency Management Planner

700 G Street, Suite 500, Anchorage, AK 99501
eMail: scott.simmons@aecom.com
Phone: 907.261.9706 or 800.909.6787
Fax: 907.562.1297
Personal Cell: 907.841.1832

This e-mail and any attachments contain AECOM 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.

From:	Simmons, Scott
To:	"davidj@wrangell.com"; "lvonbargen@wrangell.com"; "ecodev@wrangell.com"; "aal-haddad@wrangell.com"
Cc:	"wcatribe@gmail.com"; "rpaddock@ccthita-nsn.gov"; "deptfob@ccthita.org"; Isham, Kelly
Subject:	RE: City & Borough of Wrangell with Tlingit-Haida Tribal Conference, Hazard Mitigation Plan Update-Project Introduction eMail
Date:	Wednesday, October 24, 2018 3:24:00 PM
Attachments:	image003.png Wrangell HMP UpdateNwsltr_1_101618.pdf image002.png

---

Hello Everyone,
Have you had a chance to review the Hazard Mitigation Plan update activity newsletter I sent out on October 16th?

I have added that AECOM will travel to Wrangell to attend the November 27 and 28th Assembly meetings and to work with the Wrangell planning team members and any other interested parties to gather essential MJHMP update information. My focus will be to determine what has changed since the 2009 HMP was implemented.

FEMA is specifically targeting:

- Did Wrangell's Planning Team "meet" annually to conduct their required annual review and plan maintenance activities meant to provide ideas for inclusion into the next HMP update?
- Did Wrangell "integrate" mitigation initiatives within other City, Borough, or Tribal documents and activities?
    - What were those initiatives and documents?
- How did new development design and siting work for the community?
- Did new development occur in identified hazard areas?
    - What mitigation initiatives were used to ensure the building or facility did not receive damage from new events?
- What is the current status of the legacy 2009 HMP's project?
- What portion(s) of the legacy 2009 HMP worked and did not work?

Please let me know if you desire any newsletter changes. I will implement them and send back the completed newsletter for community distribution through email, snail mail, or posting in relevant locations such as offices, stores, and bulletin boards to enable the widest dissemination.

Do you have any desired edits

Kind Regards
-Scott-

AECOM
R. Scott Simmons, CFM, CPM

Senior Emergency Management Professional

700 G Street, Suite 500, Anchorage, AK 99501
eMail: scott.simmons@aecom.com
Phone: 907.261.9706 or 800.909.6787
Fax: 907.562.1297
Personal Cell: 907.841.1832

This e-mail and any attachments contain AECOM 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.

From: Simmons, Scott
Sent: Tuesday, October 16, 2018 3:02 PM
To: 'davidj@wrangell.com'; 'lvonbargen@wrangell.com'; 'ecodev@wrangell.com'; 'aal-haddad@wrangell.com'
Cc: 'wcatribe@gmail.com'; 'rpaddock@ccthita-nsn.gov'; 'deptfob@ccthita.org'; Isham, Kelly
Subject: RE: City & Borough of Wrangell with Tlingit-Haida Tribal Conference, Hazard Mitigation Plan Update-Project Introduction eMail

Good Afternoon Mr. Jack, Ms. Von Bargen, Ms. Ashton, Ms. Al-Haddad, Ms. Rushmore, and Mr. Paddock,

Please accept my apologies and thank you for your patience with our slow hazard mitigation plan update process. I had been very engulfed in developing the new State Hazard Mitigation Plan because it expires October 25, 2018… just a few days away. It is now complete, state adopted, and will receive FEMA final approval this week…

I know Ms. Von Bargen has been disappointed with the previous contractor's version of your plan. I promise this one will be much better and pertinent to the Wrangell area. We write it with you, it is your plan, not ours.

It will likely sit unused on a shelf somewhere if it doesn't describe your community, your hazard damage experiences, "all" of your critical facilities, the hazards they are affected by, the structure type or category, and the number of potential occupants at any given time.

I have attached a draft critical facilities spreadsheet and a newsletter for your respective reviews and editing.

Please provide any changes to the newsletter so we can. You can either edit the newsletter yourself or send it to us to edit and return. You can post an accurate newsletter on city, tribal, post office, and other community bulletin board locations to notify your residents about your efforts to update your hazard mitigation plan.

I look forward to working with you throughout this month and longer as needed to

produce YOUR new HMP. I will call tomorrow morning, October 17th to discuss our HMP development process and potentially work with anyone interested in updating the attached critical facilities spreadsheet.

Please let me know a good time if 9:00 a.m. does not work with you.

Again, thank you with your patience with updating the City and Borough of Wrangell's HMP.
-Scott-

AECOM
R. Scott Simmons, CFM, CPM
Senior Emergency Management Professional

700 G Street, Suite 500, Anchorage, AK 99501
eMail: scott.simmons@aecom.com
Phone: 907.261.9706 or 800.909.6787
Fax: 907.562.1297
Personal Cell: 907.841.1832

This e-mail and any attachments contain AECOM 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.

From: Simmons, Scott
Sent: Friday, January 19, 2018 11:54 AM
To: 'davidj@wrangell.com'; 'stevep@wrangell.com'; 'lvonbargen@wrangell.com'; 'aal-haddad@wrangell.com'; 'deptfob@ccthita.org'
Subject: City&Borough of Wrangell with Tlingit-Haida Tribal Conference, Hazard Mitigation Plan Update-Project Introduction eMail

Dear City&Borough Mayor Jack, Vice Mayor Prysunka, Manager Bargen, and Tribal President Pewterson, and Division Director Martin

I am writing to introduce myself, Scott Simmons at AECOM. This project will cost you nothing because we were contracted by the Division of Homeland Security and Emergency Management (DHS&EM) to assist the City&Borough of Wrangell and Tlingit-Haida Tribal Conference with updating your legacy 2009 Hazard Mitigation Plan (HMP).

FEMA now requires that collocated City&Borough and Tribal governments should work together with developing a multi-jurisdictional hazard mitigation plan (MJHMP). Both City&Borough and tribal government criteria will be included throughout the updated plan. Both the City&Borough and tribal Councils will adopt the plan once it has been state reviewed and received FEMA preliminary approval.

We will review and update all sections of your current plan; starting with the planning section. Your Planning Team membership needs to be manageable, with as few as four or five members or City&Borough and Tribal leadership can determine whether their City&Borough and Tribal council(s) would be best suited as their joint community Planning Team.
Your 2009 legacy HMP state:

> *"Wrangell Borough Planner Carol Rushmore was the contact person for the Borough... The Planning Commission was the lead public body that reviewed the plan."*

Is this the same process you desire for this 2018 HMP update planning effort? If yes, please provide the current Planning Commission membership's names. You will also need to include Tlingit-Haida Tribal Conference members for this project within the table below.

Therefore our first goal is for you to review your legacy HMPs planning team list (below) and determine if those members are still available and willing to work on updating the plan. I have provided your legacy HMP's planning team chart below. We will also need to include Tlingit-Haida Tribal Conference Tribal Council members with the update effort. Please edit the list to update your planning team membership.

Table 4-1 Hazard Mitigation Planning Team

Name	Title	Organization	Phone
John Taylor	Wrangell Planning and Zoning Commission	City&Borough of Wrangell	Please identify the City&Borough Planning Team Leader, MJHMP review
Stanley Schnell			Data gathering and MJHMP review
Lisa Messmer			Data gathering and MJHMP review
August Schultz			Data gathering and MJHMP review
Terri Henson			Data gathering and MJHMP review
Pat McMurren			Data gathering and MJHMP review
Elizabeth Keegan			Data gathering and MJHMP review
		Tlingit-Haida	Please identify the Tribal Planning Team Lead, data gathering and

		Tribal Conference	MJHMP review
	IGAP Coordinator?		Tribal data gathering and MJHMP review
Scott Simmons	New Planner, Consultant	AECOM (New Agency)	Project Manage, lead writer, technical assistance

Typically the City&Borough Mayor or Manager and Tlingit-Haida Tribal Conference President or Administrator desire to be their respective government's Planning Team Leads. Each of you can select alternates who can report to those who appointed them (your respective councils, or planning commission, etc.) as well as coordinate data review and approvals.

AECOM's role in this project is to ensure that the HMP update meets state and federal MJHMP requirements. We are at the beginning stages of this project, and we are seeking information about the community infrastructure, residents, and jurisdictional authorities.

This is the typical plan review process:

Section 1. Introduction: added entire new section explaining City&Borough and Tribal HMP regulatory requirements.

Section 2. Community Description: update your community information, including new census and State data.

Section 3. Planning Process: update this section to reflect 2018 public processes including newsletters, public meetings and 2018 Planning Team changes.

- Did your planning team do what they said they'd do? For example, did the planning team perform their annual maintenance commitment?
- Were mitigation efforts integrated with or into other City&Borough and Tribal planning documents"

Section 4 Plan Adoption: 2018 formal adoption resolutions and dates.

Section 5. Hazard Profile Analysis: review current and newly identified hazards such as 2010 t 2018 earthquake, flooding, ground failure, severe weather, and wildfire data.

Section 6 Vulnerability Analysis: analyze vulnerability with 2018 critical facilities and infrastructure tables as well as tribal culturally sensitive site and FEMA NFIP programmatic data as applicable.

Section 7 Mitigation Strategy: review and edit 2009 mitigation goals and actions.

- We will add short narrative descriptions as to their current status such as whether you have completed, deleted, or deferred those actions or projects;
- As well as provide a short explanation as to why they may have

changed status.

Section 8. References: revised to reflect 2018 document searches and data used to support the update.

Our task is to write the plan while teaching you the hazard mitigation plan development and update process. We have been very successful accomplishing this by using a community Planning Teams. AECOM will write the plan. Your community Planning Team will work with us to provide essential information that only community residents will know or have experienced.

There will be opportunities for the entire community to review the team's work and should be tracked as part of FEMA's public involvement process. This can include distributing or posting newsletters or providing information during City&Borough and Tribal Council Meetings or other public meetings, and working with us over the phone as we capture needed information. Please keep track of any public comments as FEMA pushes to see how this information benefited the plan development process.

Please provide the names of your respective planning team leaders to schedule an introductory meeting with the team leader and team members to introduce the project and coordinate information collection.

We look forward to working with you to complete your joint City&Borough and Tribal compliant Multi-Jurisdictional Hazard Mitigation Plan update. Please call me if you have questions.

Kind Regards
-Scott-

AECOM
R. Scott Simmons, CFM, CPM
Senior Emergency Management Planner

700 G Street, Suite 500, Anchorage, AK 99501
eMail: scott.simmons@aecom.com
Phone: 907.261.9706 or 800.909.6787
Fax: 907.562.1297
Personal Cell: 907.841.1832

This e-mail and any attachments contain AECOM 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.

From:	Carol Rushmore
To:	Simmons, Scott
Subject:	Draft news letter and spreadsheet
Date:	Wednesday, October 31, 2018 11:12:29 AM
Attachments:	Wrangell CritFacil-HzrdSprdst 10-25-18.xlsx Wrangell HMP UpdateNwsltr_1_103118 (002)cmr.doc

---

Scott,
Attached are some suggested changes I made to the news letter. I have also attached an updated spreadsheet where I added some things (in red), deleted some things or corrected spellings.
Amber, Lisa and I will be meeting this week or early next week sometime to discuss the spreadsheet further but since still in early phase, figured I would send you the update as this is what we will start with and meet over. I will give you a call as we develop some questions.

Also, can you please give me the name and email of the individual at THCC that you are in contact with that will be working with the Tribe on this? We have sent out some invitation notices for the stakeholder meeting morning of the 28th and I wanted to reach out and make contact with them as well.

Carol Rushmore
Economic Development Director
City and Borough of Wrangell
P.O. Box 531
Wrangell, AK 99929
907-874-2381
fx 907-874-3952
ecodev@wrangell.com

Please check out our website at www.wrangell.com
Follow us on Twitter: WrangellCVB
Like “WrangellCVB” or "City and Borough of Wrangell” on Facebook

From: Carol Rushmore
To: Simmons, Scott
Subject: RE: Draft newsletter and spreadsheet
Date: Friday, November 02, 2018 1:08:21 PM
Attachments: image002.png

Hi Scott,
Regarding Chart:
Earthquakes:We actually have a seismograph meter the state installed in Wrangell by Shoemaker Bay.
Flooding: Coastal flooding is a potential.. high winds, high tides with rising sea level could certainly create flooding in some areas. If some of our storm drain system backs up, yes we could see flooding… the entire town doesn't have storm drain systems but some areas do. Also, Some of our storm drains go directly into sewer system.. .. and in HEAVY rain periods, if sewer pumps quit working due to stress and too much water.. serious issue.
Yes for ground failure… have been slides behind a couple of different residential areas.
Tsunami – yes we have potential. Even though behind other islands that could protect.. depending on where center is, if wave action comes from certain direction.. we are confluence of two straights and could be impacts. There was a Tsunami threat years ago, but I think water levels only rose about 1 foot.
Volcanic ash – possibility, yes, from the map.. I remember reading a newspaper article from years ago talking about ash falling in town. Also , should Mt. Edgecumb blow on Baranof Island… we could be extremely impacted by ash.
Wildland Fires – air quality issue from outside sources from Interior due to smoke, but is also threat of local fires and have had some.
We also wanted to add two additional Hazards:
Drought – because of the serious impact to water sources which we faced last two years
And Extreme Heat… with climate change and rising temps, concern is more for senior population..

So we met this morning and I will be updating the spread sheet considerably. But I need to talk to you about the listings… Our concern is what exactly is this spreadsheet that says Critical Facilities identifying. Our main question centered around the list and is it supposed to be facilities that we need to mitigate for to minimize damage in a potential hazard, or facilities/businesses that can provide services during a hazard. Right now it seems to be mixed. Should it be one or the other… or in the notes column we have added, we just note this is a threat from a hazard because, or this place while isn't a critical facility, would have equipment or such to assist in an emergency.
We were going to remove most of the B&B's for example. They are not really critical facilities that need to be mitigated for, but they could provide housing accommodations during an emergency. Same thing with some of the other businesses.. why is this business listed and that one isn't?

Carol Rushmore
Economic Development Director
City and Borough of Wrangell
P.O. Box 531
Wrangell, AK 99929
907-874-2381
fx 907-874-3952
ecodev@wrangell.com

Please check out our website at www.wrangell.com
Follow us on Twitter: WrangellCVB
Like "WrangellCVB" or "City and Borough of Wrangell" on Facebook

---

From: Simmons, Scott [mailto:scott.simmons@aecom.com]
Sent: Thursday, November 01, 2018 2:46 PM
To: Carol Rushmore <ecodev@wrangell.com>
Subject: RE: Draft newsletter and spreadsheet

Good Afternoon Carol,
Would you please review this chart and confirm yes or no on what should be profiled.

Table 5-1 Identification and Screening of Hazards

Hazard Type	Should It Be Profiled?	Explanation
Natural Hazards		

Earthquake	Yes	Periodic, unpredictable occurrences. The Wrangell area experienced minor shaking from the 1964 Good Friday Earthquake earthquake and its aftershocks. The Wrangell area has experienced 48 earthquakes M4.2 and below since the legacy 2009 HMP was implemented.
Flood (Riverine and/or coastal related floods and resultant erosive scour damages)	Yes/No	This hazard does not exist for this location. The legacy HMP states Wrangell has no flood concerns-not even storm surge or erosion?. OR Snowmelt run-off and rainfall flooding occur 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. The City/ Village experiences storm surge, coastal ice run-up, and coastal wind scour along the shoreline and riverine high water flow scour along the area's rivers, streams, and creek embankments as well as damages from coastal or riverine ice flows, wind, surface runoff, and boat traffic wakes.
Ground Failure (Landslide/Debris Flow, Subsidence, Sink Holes)	Yes/No	Ground Failure occurs throughout Alaska from avalanches, landslides, melting permafrost, ground subsidence and sink holes. However there is a potential for landslides and small avalanches, and subsidence impacts.
Severe Weather (Cold, Drought, Rain, Snow, Wind, etc.)	Yes	Severe weather impacts the community with climate change/global warming and changing El Niño/La Niña Southern Oscillation (ENSO) patterns generating increasingly severe weather events such as winter storms, heavy or freezing rain, thunderstorms and with subsequent secondary hazards such as riverine or coastal storm surge floods, landslides, snow, and wind etc.
Tsunami (Seiche)	Yes/No	This hazard does not exist for this location. I find very limited tsunami data for Wrangell area that mainly looks at broken undersea cables… I have an inquiry to UAF tsunami staff now OR This hazard has historically impacted City and tribal infrastructure.
Volcanic Ash	Yes/No	This hazard does not exist for this location. The legacy HMP states Wrangell has not volcanic ash concerns. How about the attached volcanic ash wind plume map from historic events? OR Volcano generated ash periodically impacts the community from Name Volcano located approximately # miles from the community
Wildland Fire	Yes	The community and the surrounding forest area become very dry in summer months with weather (such as drought and lightening) and human caused incidents igniting dry vegetation in the adjacent area (burning trash outside their landfill's burn box, camp fires, etc.).

This figure shows the extent of four historic ash cloud impact areas. The 1912 Katmai ash cloud is gray; the Augustine (blue plume), Redoubt (orange plume), and Spurr (yellow plume) were each dwarfed by the Katmai event. "Volcanologists discovered that [this] 1912 [Katmai] eruption was actually from Novarupta, not Mount Katmai" (USGS 1998).

Please let me know your thoughts.

-Scott-

R. Scott Simmons, CFM, CPM
Senior Emergency Management Professional

700 G Street, Suite 500, Anchorage, AK 99501
eMail: scott.simmons@aecom.com
Phone: 907.261.9706 or 800.909.6787
Fax: 907.562.1297
Personal Cell: 907.841.1832

This e-mail and any attachments contain AECOM 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.

From: Simmons, Scott
Sent: Thursday, November 01, 2018 9:10 AM
To: 'Carol Rushmore'
Subject: RE: Draft newsletter and spreadsheet

Good Morning Carol,
Thank you for the suggested changes and updates. I have attached the final newsletter for distribution. Please cc me as you see fit (emails, news articles, public notices, etc.) so I can capture your processes for the public outreach documentation portion of the plan.

Wrangell Cooperative Association
Esther Ashton
874.4304
wcatribe@gmail.com

Central Council of the Tlingit and Haida Indian Tribes of Alaska
Raymond Paddock
Environmental Manger
463.7103
rfpaddock@ccthita-nsn.gov

-Scott-

R. Scott Simmons, CFM, CPM
Senior Emergency Management Professional

700 G Street, Suite 500, Anchorage, AK 99501
eMail: scott.simmons@aecom.com
Phone: 907.261.9706 or 800.909.6787
Fax: 907.562.1297
Personal Cell: 907.841.1832

This e-mail and any attachments contain AECOM 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.

From: Carol Rushmore [mailto:ecodev@wrangell.com]
Sent: Wednesday, October 31, 2018 11:12 AM
To: Simmons, Scott
Subject: Draft news letter and spreadsheet

Scott,
Attached are some suggested changes I made to the news letter. I have also attached an updated spreadsheet where I added some things (in red), deleted some things or corrected spellings. Amber, Lisa and I will be meeting this week or early next week sometime to discuss the spreadsheet further but since still in early phase, figured I would send you the update as this is what we will start with and meet over. I will give you a call as we develop some questions.

Also, can you please give me the name and email of the individual at THCC that you are in contact with that will be working with the Tribe on this? We have sent out some invitation notices for the stakeholder meeting morning of the 28th and I wanted to reach out and make contact with them as well.

Carol Rushmore
Economic Development Director
City and Borough of Wrangell
P.O. Box 531
Wrangell, AK 99929
907-874-2381
fx 907-874-3952
ecodev@wrangell.com

Please check out our website at www.wrangell.com
Follow us on Twitter: WrangellCVB
Like “WrangellCVB” or "City and Borough of Wrangell” on Facebook

From: Carol Rushmore
To: Simmons, Scott
Subject: RE: Draft newsletter and spreadsheet
Date: Friday, November 02, 2018 1:08:21 PM
Attachments: image002.png

Hi Scott,
Regarding Chart:
Earthquakes:We actually have a seismograph meter the state installed in Wrangell by Shoemaker Bay.
Flooding:Coastal flooding is a potential.. high winds, high tides with rising sea level could certainly create flooding in some areas. If some of our storm drain system backs up, yes we could see flooding… the entire town doesn't have storm drain systems but some areas do. Also, Some of our storm drains go directly into sewer system.. .. and in HEAVY rain periods, if sewer pumps quit working due to stress and too much water.. serious issue.
Yes for ground failure… have been slides behind a couple of different residential areas.
Tsunami – yes we have potential. Even though behind other islands that could protect.. depending on where center is, if wave action comes from certain direction.. we are confluence of two straights and could be impacts. There was a Tsunami threat years ago, but I think water levels only rose about 1 foot.
Volcanic ash – possibility, yes, from the map.. I remember reading a newspaper article from years ago talking about ash falling in town. Also , should Mt. Edgecumb blow on Baranof Island… we could be extremely impacted by ash.
Wildland Fires – air quality issue from outside sources from Interior due to smoke, but is also threat of local fires and have had some.
We also wanted to add two additional Hazards:
Drought – because of the serious impact to water sources which we faced last two years
And Extreme Heat… with climate change and rising temps, concern is more for senior population..

So we met this morning and I will be updating the spread sheet considerably. But I need to talk to you about the listings… Our concern is what exactly is this spreadsheet that says Critical Facilities identifying. Our main question centered around the list and is it supposed to be facilities that we need to mitigate for to minimize damage in a potential hazard, or facilities/businesses that can provide services during a hazard. Right now it seems to be mixed. Should it be one or the other… or in the notes column we have added, we just note this is a threat from a hazard because, or this place while isn't a critical facility, would have equipment or such to assist in an emergency.
We were going to remove most of the B&B's for example. They are not really critical facilities that need to be mitigated for, but they could provide housing accommodations during an emergency. Same thing with some of the other businesses.. why is this business listed and that one isn't?

Carol Rushmore
Economic Development Director
City and Borough of Wrangell
P.O. Box 531
Wrangell, AK 99929
907-874-2381
fx 907-874-3952
ecodev@wrangell.com

Please check out our website at www.wrangell.com
Follow us on Twitter: WrangellCVB
Like "WrangellCVB" or "City and Borough of Wrangell" on Facebook

---

From: Simmons, Scott [mailto:scott.simmons@aecom.com]
Sent: Thursday, November 01, 2018 2:46 PM
To: Carol Rushmore <ecodev@wrangell.com>
Subject: RE: Draft newsletter and spreadsheet

Good Afternoon Carol,
Would you please review this chart and confirm yes or no on what should be profiled.

Table 5-1 Identification and Screening of Hazards

Hazard Type	Should It Be Profiled?	Explanation
Natural Hazards		

Earthquake	Yes	Periodic, unpredictable occurrences. The Wrangell area experienced minor shaking from the 1964 Good Friday Earthquake earthquake and its aftershocks. The Wrangell area has experienced 48 earthquakes M4.2 and below since the legacy 2009 HMP was implemented.
Flood (Riverine and/or coastal related floods and resultant erosive scour damages)	Yes/No	This hazard does not exist for this location. The legacy HMP states Wrangell has no flood concerns-not even storm surge or erosion?. OR Snowmelt run-off and rainfall flooding occur 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. The City/ Village experiences storm surge, coastal ice run-up, and coastal wind scour along the shoreline and riverine high water flow scour along the area's rivers, streams, and creek embankments as well as damages from coastal or riverine ice flows, wind, surface runoff, and boat traffic wakes.
Ground Failure (Landslide/Debris Flow, Subsidence, Sink Holes)	Yes/No	Ground Failure occurs throughout Alaska from avalanches, landslides, melting permafrost, ground subsidence and sink holes. However there is a potential for landslides and small avalanches, and subsidence impacts.
Severe Weather (Cold, Drought, Rain, Snow, Wind, etc.)	Yes	Severe weather impacts the community with climate change/global warming and changing El Niño/La Niña Southern Oscillation (ENSO) patterns generating increasingly severe weather events such as winter storms, heavy or freezing rain, thunderstorms and with subsequent secondary hazards such as riverine or coastal storm surge floods, landslides, snow, and wind etc.
Tsunami (Seiche)	Yes/No	This hazard does not exist for this location. I find very limited tsunami data for Wrangell area that mainly looks at broken undersea cables… I have an inquiry to UAF tsunami staff now OR This hazard has historically impacted City and tribal infrastructure.
Volcanic Ash	Yes/No	This hazard does not exist for this location. The legacy HMP states Wrangell has not volcanic ash concerns. How about the attached volcanic ash wind plume map from historic events? OR Volcano generated ash periodically impacts the community from Name Volcano located approximately # miles from the community
Wildland Fire	Yes	The community and the surrounding forest area become very dry in summer months with weather (such as drought and lightening) and human caused incidents igniting dry vegetation in the adjacent area (burning trash outside their landfill's burn box, camp fires, etc.).

This figure shows the extent of four historic ash cloud impact areas. The 1912 Katmai ash cloud is gray; the Augustine (blue plume), Redoubt (orange plume), and Spurr (yellow plume) were each dwarfed by the Katmai event. "Volcanologists discovered that [this] 1912 [Katmai] eruption was actually from Novarupta, not Mount Katmai" (USGS 1998).

Please let me know your thoughts.

-Scott-

R. Scott Simmons, CFM, CPM
Senior Emergency Management Professional

700 G Street, Suite 500, Anchorage, AK 99501
eMail: scott.simmons@aecom.com
Phone: 907.261.9706 or 800.909.6787
Fax: 907.562.1297
Personal Cell: 907.841.1832

This e-mail and any attachments contain AECOM 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.

From: Simmons, Scott
Sent: Thursday, November 01, 2018 9:10 AM
To: 'Carol Rushmore'
Subject: RE: Draft newsletter and spreadsheet

Good Morning Carol,
Thank you for the suggested changes and updates. I have attached the final newsletter for distribution. Please cc me as you see fit (emails, news articles, public notices, etc.) so I can capture your processes for the public outreach documentation portion of the plan.

Wrangell Cooperative Association
Esther Ashton
874.4304
wcatribe@gmail.com

Central Council of the Tlingit and Haida Indian Tribes of Alaska
Raymond Paddock
Environmental Manger
463.7103
rfpaddock@ccthita-nsn.gov

-Scott-

R. Scott Simmons, CFM, CPM
Senior Emergency Management Professional

700 G Street, Suite 500, Anchorage, AK 99501
eMail: scott.simmons@aecom.com
Phone: 907.261.9706 or 800.909.6787
Fax: 907.562.1297
Personal Cell: 907.841.1832

This e-mail and any attachments contain AECOM 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.

From: Carol Rushmore [mailto:ecodev@wrangell.com]
Sent: Wednesday, October 31, 2018 11:12 AM
To: Simmons, Scott
Subject: Draft news letter and spreadsheet

Scott,
Attached are some suggested changes I made to the news letter. I have also attached an updated spreadsheet where I added some things (in red), deleted some things or corrected spellings. Amber, Lisa and I will be meeting this week or early next week sometime to discuss the spreadsheet further but since still in early phase, figured I would send you the update as this is what we will start with and meet over. I will give you a call as we develop some questions.

Also, can you please give me the name and email of the individual at THCC that you are in contact with that will be working with the Tribe on this? We have sent out some invitation notices for the stakeholder meeting morning of the 28th and I wanted to reach out and make contact with them as well.

Carol Rushmore
Economic Development Director
City and Borough of Wrangell
P.O. Box 531
Wrangell, AK 99929
907-874-2381
fx 907-874-3952
ecodev@wrangell.com

Please check out our website at www.wrangell.com
Follow us on Twitter: WrangellCVB
Like “WrangellCVB” or "City and Borough of Wrangell” on Facebook

Memorandum

700 G Street, Suite 500
Anchorage, AK 99501
Phone: 907.562.3366
Fax: 907.562.1297

SUBJECT: Division of Homeland Security and Emergency Management (DHS&EM) Multi-Jurisdictional Hazard Mitigation Plan (MJHMP) – Wrangell Assembly Workgroup Meeting – HMP Criteria Defined

Community: Wrangell, 907.874.2381

Date/Time: November 27, 2018. 6:00p.m. to 9:00p.m.

From: Scott Simmons

Attendees:

AECOM:

- Scott Simmons, Alaska Hazard Mitigation Planning Project Lead

City and Borough of Wrangell Assembly Members:

- Carol Rushmore, City and Borough of Wrangell (CBW), Economic Development Director
- Lisa Von Bargen, CBW Manager
- Amber Al-Haddad, CBW Capitol Facilities Director
- Roland Howell, Public Works Director
- Kim Lane, Borough Clerk
- David Powell, Assembly Member
- Mya DeLong, Assembly Member
- Patricia Gilbert, Assembly Member
- Anne Morrison, Assembly Member
- Julie Decker, Assembly Member

Guests:

- June Leffler, KSTK Radio
- Michael Sanders, Southeast Alaska Regional Health Consortium (SEARHC) Safety Officer

Subjects covered included:

- Discussion of Wrangell's 2009 HMP and requirement to update the plan during its 5-year lifecycle
- Explained new 2018 update layout to simplify access to pertinent Wrangell information. For example, many hazards were grouped in to the following single categories include:
    - **Flood**: erosion, coastal storm surge, and rising sea level
    - Ground Failure: landslide, subsidence, sink holes, etc.
    - **Weather:** climate change induced drought, extreme heat, extreme cold, wind, rain, sleet, etc.
- Discussed Critical Facilities
    - Explained options for determining what to include on Wrangell's Critical Facilities table.
    - Need to consider long-term isolation after a damaging hazard earthquake or other event:
        - Where will residents stay if their homes are destroyed?
        - What vendors are essential for repair materials like lumber, plumbing, or other construction supplies?
        - Where will ocean or air resupply deliveries occur if the airport and docks are not accessible?
        - How will patients be triaged and medical care be delivered if the hospital is not accessible or able to treat patients?
    - Critical facilities threatened by flood or ground failure type events need to be "x" to determine how those threats potentially impact emergency response and recovery efforts.
    - ***Estimated*** replacement value of each critical facility listed

- Hazard Mitigation Project Considerations and Selection:
    - AECOM presented a list from the legacy 2009 HMP's project comments. The planning team needs to decide whether to convert them into actual projects and provide a current status comment.
    - AECOM presented a list of potential projects the planning team can review, "Select" a few for HMP implementation (try to select one brick and mortar" projects per identified hazard). These will be "high" or "medium" priority projects to be implemented if funding becomes available either through grants or capital improvement project (CIP) funding
    - "Consider" a few Wrangell may desire to implement sometime in the future – these will have a low priority
- CBW Action Items:
    - Send any photos documenting hazard impacts (flood, erosion, landslides, storm surge, etc.)
    - Add essential facilities to the Critical Facilities table
    - Send any meeting minutes where the HMP process is discussed with the public. This is to show proof of public involvement
    - Provide the number of "residential" facilities that are located in flood and ground failure zones along with the total number of residents for each category, e.g.:
        - Flood: 38 residents for 68 homes
        - Ground Failure: 106 residents for 160 homes
        - Provide total value of all homes in CBW
    - Critical facilities threatened by flood or ground failure type events need to be "x" to determine how those threats potentially impact emergency response and recovery efforts.
    - ***Estimated*** replacement value of each critical facility listed
    - CBW is to "Select" a few for HMP implementation (try to select one brick and mortar" projects per identified hazard). These will be "high" or "medium" priority projects to be implemented if funding becomes available either through grants or capital improvement project (CIP) funding
    - "Consider" a few Wrangell may desire to implement sometime in the future – these will have a low priority
- AECOM's Action Items:
    - Update Critical Facilities spreadsheet once the Planning Team completes and send to CPC

City and Borough of Wrangell
Update Multi-Jurisdictional HMP Assembly Workshop/Public Meeting
November 27, 2018

	Name	Title	Phone #	Email Address
1	Amber Al-Haddad	CBW Capital fac. Dir.	(907) 874-3902	aal-haddad@wrangell.com
2	June Leffler	KSTK	874-2345	
3	MICHAEL SANDERS	SEARHC SAFETY OFFICER	907 738-2442	MSANDERS@SEARHC.ORG
4	Rolland Howell	Public Works Director	907 305-1041	rhowell@wrangell.com
5	David Powell	Assembly Member	305-0806	dnkpowell40@gmail.com
6	Mya DeLong	Assembly member	772-475-1608	MDeLong@wrangell.com
7	Patricia Gilbert	Assembly member	305-0777	bpgilbert@gci.net
8	Carol Rushmore	Eco. Dev Director	8742381	ecodev@wrangell.com
9	Lisa VonBargen	Borough Manager	907-874-2381	lvonbargen@wrangell.com
10	Anne Morrison	Assembly Member	907-874-4470	a47morrison@gmail.com
11	Julie Decker	Assembly Member	907-874-2381	julied@wrangell.com [redacted]
12	Kim Lane	Borough Clerk	907-874 2381	clerk@wrangell.com
13				
14				
15				
16				
17				
18				
19				
20				
21				
22				
23				

Memorandum

700 G Street, Suite 500
Anchorage, AK 99501
Phone: 907.562.3366
Fax: 907.562.1297

SUBJECT: Division of Homeland Security and Emergency Management (DHS&EM) Multi-Jurisdictional Hazard Mitigation Plan (MJHMP) – Wrangell Assembly Workgroup Meeting – HMP Criteria Defined

Community: Wrangell, 907.874.2381

Date/Time: November 28, 2018. 10:00 a.m. to 12:00 p.m.

From: Scott Simmons

Attendees:

AECOM:

- Scott Simmons, Alaska Hazard Mitigation Planning Project Lead

City and Borough of Wrangell Assembly Members:

- Carol Rushmore, City and Borough of Wrangell (CBW), Economic Development Director
- Lisa Von Bargen, CBW Manager
- Amber Al-Haddad, CBW Capitol Facilities Director
- Roland Howell, Public Works Director
- Gregg Meissner, Harbor Master
- Tim Buness, Fire Chief
- Mark Armstrong, Line Foreman
- Austin Obrien, Acting Forest Service District Ranger

Guests:

- Michael Sanders, Southeast Alaska Regional Health Consortium (SEARHC) Safety Officer

Subjects covered included:

- Discussion of Wrangell's 2009 HMP and requirement to update the plan during its 5-year lifecycle
- Explained new 2018 update layout to simplify access to pertinent Wrangell information. For example, many hazards were grouped in to the following single categories include:
    - **Flood**: erosion, coastal storm surge, and rising sea level
    - Ground Failure: landslide, subsidence, sink holes, etc.
    - **Weather:** climate change induced drought, extreme heat, extreme cold, wind, rain, sleet, etc.

- Ms. Rushmore Guided the Planning Team through determining reviewing the critical facilities list and adding any yet unidentified essential facilities.
    - Explained options for determining what to include on Wrangell's Critical Facilities table.
    - Need to consider long-term isolation after a damaging hazard earthquake or other event:
        - Where will residents stay if their homes are destroyed?
        - What vendors are essential for repair materials like lumber, plumbing, or other construction supplies?
        - Where will ocean or air resupply deliveries occur if the airport and docks are not accessible?
        - How will patients be triaged and medical care be delivered if the hospital is not accessible or able to treat patients?

- Hazard Mitigation Project Considerations and Selection:
    - AECOM presented a list from the legacy 2009 HMP's project comments. The planning team needs to decide whether to convert them into actual projects and provide a current status comment.
    - AECOM presented a list of potential projects the planning team can review. CBW is to "Select" a few for HMP implementation (try to select one brick and mortar" projects per identified hazard). These

will be “high” or “medium” priority projects to be implemented if funding becomes available either through grants or capital improvement project (CIP) funding
    - “Consider” a few Wrangell may desire to implement sometime in the future – these will have a low priority

- CBW Action Items:
    - Send any photos documenting hazard impacts (flood, erosion, landslides, storm surge, etc.)
    - Add essential facilities to the Critical Facilities table
    - Send any meeting minutes where the HMP process is discussed with the public. This is to show proof of public involvement
    - Provide the number of “residential” facilities that are located in flood and ground failure zones along with the total number of residents for each category, e.g.:
        - Flood: 38 residents for 68 homes
        - Ground Failure: 106 residents for 160 homes
        - Provide total value of all homes in CBW
    - Critical facilities threatened by flood or ground failure type events need to be “x” to determine how those threats potentially impact emergency response and recovery efforts.
    - ***Estimated*** replacement value of each critical facility listed
    - CBW is to “Select” a few for HMP implementation (try to select one brick and mortar” projects per identified hazard). These will be “high” or “medium” priority projects to be implemented if funding becomes available either through grants or capital improvement project (CIP) funding
    - “Consider” a few Wrangell may desire to implement sometime in the future – these will have a low priority

- AECOM’s Action Items:
    - Update Critical Facilities spreadsheet once the Planning Team completes and send to CBW for review
    - Define Planning Team selected projects for inclusion within Mitigation Strategy for implementation

City and Borough of Wrangell
Update Multi-Jurisdictional HMP Workshop/Public Meeting
November 28, 2018

	Name	Title	Phone #	Email Address
1	Mark Armstrong	Line Forman	907-420-0954	marmstrong@wrangell.com
2	Austin O'Brien	Acting District Ranger	907 874-7575	aobrien@fs.fed.us
3	TIM BUNESS	FIRE CHIEF	907 305 0556	FIRECHIEF@WRANGELL.COM
4	CAROL RUSTHOVEN	ECO. DEV.	874 2381	ecodev@wrangell.com
5	GREG MEISSNER	HARBORMASTER	907 305 0719	harborgreg@aptalaska.net
6	Koiland Howell	Public Works Director	907-305-1041	rhowell@wrangell.com
7	Lisa VonBargen	Borough Manager	907.874.2381	lvonbargen@wrangell.com
8	MICHAEL SANDERS	SEARHC SAFETY OFFICER	(907) 735-2441	MSANDERS@SEARHC.ORG
9	Amber Al-Haddad	CBW - Capital Facilities Director	(907) 874-3902	aal-haddad@wrangell.com
10				
11				
12				
13				
14				
15				
16				
17				
18				
19				
20				
21				
22				
23				

From:	Simmons, Scott
To:	"Carol Rushmore"
Subject:	RE: CBW Community Workgroup Meetings" Minutes
Date:	Wednesday, January 09, 2019 3:25:00 PM
Attachments:	image004.png image001.png

Thank you Carol,
I think is joint priority is the critical facility (GIS) data so we can begin the vulnerability assessment that you expressed as one your greatest needs.

Kind Regards
-Scott-

AECOM
R. Scott Simmons, CFM, CPM
Senior Emergency Management Professional

700 G Street, Suite 500, Anchorage, AK 99501
eMail: scott.simmons@aecom.com
Phone: 907.261.9706 or 800.909.6787
Fax: 907.562.1297
Personal Cell: 907.841.1832

This e-mail and any attachments contain AECOM 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.

From: Carol Rushmore [mailto:ecodev@wrangell.com]
Sent: Wednesday, January 09, 2019 3:19 PM
To: Simmons, Scott
Cc: 'Lisa Von Bargen'
Subject: RE: CBW Community Workgroup Meetings' Minutes

Hi Scott,
We are trying to get you some comments by early next week on at minimum chapter 7, but will look at whatever we can. Bulk of our comments will likely be on the public draft. Trying to get some of the reviews consolidated to send to you. If you have an updated version from what we last have from November.. could you please forward that to me? Thank you.

Carol Rushmore
Economic Development Director
City and Borough of Wrangell
P.O. Box 531
Wrangell, AK 99929
907-874-2381
fx 907-874-3952
ecodev@wrangell.com

Please check out our website at www.wrangell.com

Follow us on Twitter: WrangellCVB
Like “WrangellCVB” or "City and Borough of Wrangell” on Facebook

---

From: Simmons, Scott [mailto:scott.simmons@aecom.com]
Sent: Friday, December 07, 2018 1:06 PM
To: Carol Rushmore <ecodev@wrangell.com>
Subject: RE: CBW Community Workgroup Meetings' Minutes

Hi Carol,
Yes, I remember all that we discussed. We had discussed a few times the contract ends in March. We have accomplished a lot and I believe I have made the few changes we discussed during our meetings.

Please keep in mind I have provided a good working draft; mark it up and send it back to me via postal or fax on the pages with mark-ups.

I will edit until Mid-January. I think you and I discussed how to simplify the critical facilities spreadsheet:

- we will delete the GPS coordinates from the spreadsheet;
- the “X’s” will identify each facilities hazard threats;
- structure replacement costs can be estimated (most of your planning team could easily help estimate their facilities replacement costs)
- We will make narrative statements drafted in the Vulnerability Analysis section with the tables and the yellow highlighted text
-

There are only a few legacy 2009 HMP projects to determine their status (most would likely be deleted); we can make action statements from those you select as ongoing. CBW could select a few more realistic projects to implement that Wrangell has already identify within your CIP and community plans.

Is it accurate to state that CBW did not integrate any legacy 2009 HMP components within other community plans or processes?

The January plan will not be a final draft. Wrangell will have two to three weeks to review. I will then finalize the plan with your comments by Mid-February. It should take a short time to accept and approve the plan for FEMA submittal.

Please understand that State/FEMA reviews will also take time; e.g., State (30-day review) and FEMA (45-day review) minimum.

Kind Regards
-Scott-

R. Scott Simmons, CFM, CPM
Senior Emergency Management Professional

700 G Street, Suite 500, Anchorage, AK 99501
eMail: scott.simmons@aecom.com
Phone: 907.261.9706 or 800.909.6787
Fax: 907.562.1297
Personal Cell: 907.841.1832

This e-mail and any attachments contain AECOM 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.

From: Carol Rushmore [mailto:ecodev@wrangell.com]
Sent: Friday, December 07, 2018 11:41 AM
To: Simmons, Scott
Cc: 'Lisa Von Bargen'; rhowell@wrangell.com
Subject: RE: CBW Community Workgroup Meetings' Minutes

Hey Scott… you have in me in a panic as you never said anything before about needing to complete the draft by January. I had told you when you were here that the spreadsheet might not be completed until after the new year. Mid January is awfully soon based on the amount of work we need to do and the reviews required of not only the spreadsheet but also the draft plan itself. And is this the FINAL draft? Or just a draft update. With the holidays here and lots of folks traveling, myself included, I need to know to what extent/detail our review must be by then, because frankly, I can't guarantee we can give it the serious review it needs by end of month for you to have a final draft by mid January.

Carol Rushmore
Economic Development Director
City and Borough of Wrangell
P.O. Box 531
Wrangell, AK 99929
907-874-2381
fx 907-874-3952
ecodev@wrangell.com

Please check out our website at www.wrangell.com
Follow us on Twitter: WrangellCVB
Like "WrangellCVB" or "City and Borough of Wrangell" on Facebook

---

From: Simmons, Scott [mailto:scott.simmons@aecom.com]
Sent: Friday, December 07, 2018 11:06 AM
To: Carol Rushmore <ecodev@wrangell.com>; 'Lisa Von Bargen' <lvonbargen@wrangell.com>; Amber Al-Haddad, work <aal-haddad@wrangell.com>; rhowell@wrangell.com

Cc: wcatribe@gmail.com; rpaddock@ccthita-nsn.gov; deptfob@ccthita.org
Subject: CBW Community Workgroup Meetings' Minutes

Good Morning,
My return home was smooth until I was awakened in the morning with the M7.0 shaker… our home had no structural damage, just a lot of things out of a few cabinets. Thankfully nothing broken.

I have attached copies of our meeting minutes for your review and a new newsletter for community distribution. Have you posted any public notices or discussed the HMP update activity within Wrangell Public meetings. If yes, please provide PDF copies for inclusion within the HMP's Public Outreach activities appendix.

Thank you for orchestrating the meetings, I pray they were useful.

Please return the critical facilities spreadsheet when completed. We don't need a lot of detail. Although street address can be sufficient, GPS coordinates will improve hazard identification if there are available GIS data to run against facility locations during future mitigation plan updates.

Please review the Section 7 Mitigation Strategy. We need to determine how to address the legacy 2009 HMP's action items listed within Table 7-9. They didn't really seem like projects, just items that need to be addressed. Those you desire to improve will need to be converted to action statements. I can easily edit those you desire to bring forward into the 2018 Mitigation Action Plan, Table 7-12.

Please also coordinate with WCA and CCTHITA concerning HMP contents, planning processes, identified hazards, critical facilities, and project review striving to confirm any culturally significant sites and potential projects they may desire to include within the HMP.

I must complete the draft plan by mid-January to fulfill contract deadlines, budget, and deliverables. Those are the last two sections I need to complete before I can send you a draft plan for community review.

Kind Regards
-Scott-

AECOM
R. Scott Simmons, CFM, CPM
Senior Emergency Management Professional

700 G Street, Suite 500, Anchorage, AK 99501
eMail: scott.simmons@aecom.com
Phone: 907.261.9706 or 800.909.6787
Fax: 907.562.1297
Personal Cell: 907.841.1832

This e-mail and any attachments contain AECOM 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.

CITY AND BOROUGH OF WRANGELL
LEGACY 2009 HAZARD MITIGATION PLAN UPDATE

Newsletter #1 **December 2018**

This newsletter describes the City and Borough of Wrangell's Hazard Mitigation Plan Update project development processes to all interested agencies, stakeholders, and the public; and to solicit plan update comments.

The State of Alaska, Department of Military and Veterans Affairs, Division of Homeland Security and Emergency Management (DHS&EM) was awarded a Pre-Disaster Mitigation Program grant from the Federal Emergency Management Agency (FEMA) to update your legacy 2009 Hazard Mitigation Plan (HMP) and convert it into a Multi-Jurisdictional Hazard Mitigation Plan (MJHMP) that includes both collocated City and Tribal governments.

AECOM was contracted to assist the City and Borough of Wrangell with converting your 2009 HMP into a 2018 FEMA approvable Multi-Jurisdictional HMP (MJHMP).

The MJHMP will identify all natural hazards, such as earthquake, flood, ground failure, severe weather, drought, 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?

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 to Update the HMP?

Communities must have a current State, FEMA approved, and community adopted updated mitigation plan to receive a project grant from FEMA's pre- and post-disaster grants identified in their Hazard Mitigation Assistance Guides as well as for other agency's mitigation grant programs.

A FEMA approved and community adopted MJHMP enables the Local, collocated Tribal governments and other participating jurisdictions to apply for the Hazard Mitigation Grant Program (HMGP), a disaster related assistance program; the Pre-Disaster Mitigation (PDM), and the National Flood Insurance Program (NFIP) Flood Mitigation Assistance (FMA) grant programs.

The Planning Process

There are very specific federal requirements that must be met when preparing a FEMA approvable MJHMP. 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 updated HMP to include and document the following topics:

- New Planning Team membership and processes
- HMP update participation and plan reviewers,
- Identify new hazards not formerly addressed,
- Explain how your hazard impacted you since adoption and implementation,
- Identify new, existing, and future critical facilities were or may be impacted by known hazards,
- Determine their "estimated" replacement costs,
- Define the community's population risk and critical facility vulnerabilities,
- Review current, and update existing hazard mitigation goals as needed to better meet needs,
- Determine each project's current status within the Mitigation Strategy. Were they completed, deleted, delayed, combined/changed, or still viable and ongoing? Also provide a brief explanation for any changes.
- Update the MJHMP Maintenance section to reflect how the (City, Village, or Borough) completed legacy HMP annual review commitments, integrated HMP components into community planning mechanisms, and identify whether it was effective or not. Then update the process to make it more effective for future use.
- Provide a copy of the community's new MJHMP Adoption Resolution

FEMA has prepared Local and Tribal Planning Guidance (respectively available at: https://www.fema.gov/hazard-mitigation-planning-resources); that explains how the legacy MJHMP Update meets DMA2000 requirements.

We are currently in the very beginning stages of preparing the MJHMP update. We will be conducting a Planning

Team Meeting to introduce the project and planning team, to gather comments from community residents update hazards lists, and collect data to refine the vulnerability assessment.

We Need Your Help

Please use the following table to confirm the hazards AND identify new hazards not formerly addressed.

2018 CBW Hazard Identification Worksheet

Hazard	2009 HMP	Still Valid
Previously Identified and Profiled		
Earthquake (EQ)	Yes (L)	Yes
Flood (Erosion) (FL)	Yes (L)	Yes
Ground Failure (GF) Avalanche, Landslide, Melting Permafrost, and/or Subsidence	Yes (M)	Yes
Weather (WX), Severe Winter storms, rain, snow, drought, etc.	Yes (M)	Yes
Tsunami & Seiche (TS)	Yes (L)	Yes
Volcanic Ash (VO)	No	Yes
Wildland Fire (WF)	Yes (M)	Yes

Critical Facilities Hazard Location Determination

The legacy 2009 HMP identified critical facilities within the Wrangell area, but the list needs to be reviewed and 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 Wrangell. Please review and update the facilities list to assist us with better defining your vulnerabilities and potential losses. Please add additional facilities not included on the critical facilities spreadsheet we have included with this newsletter.

Please email or fax updated hazard and critical facility information directly to AECOM or provide it to Ms. Lisa Von Bargen, your community Planning Team Leader.

The Planning Team

The planning team is being led by Borough Manager Lisa Von Bargen with assistance from Borough Mayor Steve Prysunka , Vice Mayor Patty Gilbert, Economic Development Director Carol Rushmore, Facility Maintenance Director Amber Al-Haddad, the Wrangell Coop Association's Ester Ashton, and the Tlingit and Haida Indian Tribes President Richard Peterson, and AECOM (contracted by DHS&EM) providing 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 mitigation ideas and to guide the community.

We encourage you to take an active part in preparing the City and Borough of Wrangell 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 HMP Team Leader or Scott Simmons, AECOM directly if you have any questions, comments, or requests for more information:

City and Borough of Wrangell
Planning Team Leader
Lisa Von Bargen
PO Box 531
Wrangell, AK 99929
Phone: 874.2381
eMail: lvonbargen@wrangell.com

AECOM
Scott Simmons
Emergency Management Planner
700 G Street, Suite 500
Anchorage, Alaska 99501
907.261.9706 or 800.909.6787
eMail: scott.simmons@aecom.com

DHS&EM
Mike Johnson
State Hazard Mitigation Planner
PO Box 5750
Anchorage, AK 99505-5750
428.7055 or 800.478.2337
mike.johnson@alaska.gov

From:	ecodev@wrangell.com
To:	Simmons, Scott
Cc:	Lisa Von Bargen; Dorianne Sprehe; WORK; Amber Al-Haddad
Subject:	CBW Hazard Mitigation Plan initial plan comments.
Date:	Monday, January 14, 2019 8:04:13 PM
Attachments:	image004.png image003.png

Scott,
I am providing a link to the document with comments we have thus far on the Hazard Mitigation Plan. The last version you had emailed was frm (it was too large to email) Chapters 2, 3, 5 and 6 have been reviewed with comments, and Ch. 7 only minimally. It should be in Track Changes format. Until the planning team can meet together sometime in February to discuss some of these tables and how we want to prioritize and define issues, this is all I can provide right now. Also attached is the updated Spreadsheet, but pretty similar to the 12-8-18 version i had sent previously. There is some information that is being worked on and we are trying to get the valuation information but could not get it put together prior to mid January. Please let me know if you have any issues downloading. There are still some questions I have of some individuals, but to meet your deadline of mid January, here are our initial comments. I have also not been able to talk to the Esther at the Tribe regarding some of their resource capabilities as in Ch. 7 so will work with them in the near future as well.

http://www.wrangell.com/planning/multi-jurisdictional-hazard-mitigation-plan

Attached is also a locational map (figure 2.1) if you would like to use it.

Carol Rushmore

-----Original Message-----
From: "Simmons, Scott" <scott.simmons@aecom.com>
Sent: Monday, January 14, 2019 3:15pm
To: "ecodev@wrangell.com" <ecodev@wrangell.com>
Subject: RE: CBW Community Workgroup Meetings' Minutes

Thank you Carol

Kind Regards
-Scott-

AECOM
R. Scott Simmons, CFM, CPM
Senior Emergency Management Professional

700 G Street, Suite 500, Anchorage, AK 99501
eMail: scott.simmons@aecom.com
Phone: 907.261.9706 or 800.909.6787

Fax: 907.562.1297
Personal Cell: 907.841.1832

This e-mail and any attachments contain AECOM 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.

From: ecodev@wrangell.com [mailto:ecodev@wrangell.com]
Sent: Monday, January 14, 2019 3:14 PM
To: Simmons, Scott
Subject: RE: CBW Community Workgroup Meetings' Minutes

Scott,
I am trying to compile all the changes to get to you tomorrow, but as an FYI.. I was looking over the notes from our 11/27 and 11/28 meetings.

For 11/27 you say borough assembly members.. then list them as well as staff all underneath. the bold should be assembly members and staff

On the 11/28 notes... you have Borough Assembly members in bold then list the planning team, but there were no Assembly members present, so the bold should say City and Borough of Wrangell Planning Team members. and then the attached sign in sheet you attached for the 11/28 meeting was for 11/27 not the 11/28 meeting.

Carol

-----Original Message-----
From: "Simmons, Scott" <scott.simmons@aecom.com>
Sent: Wednesday, January 9, 2019 3:25pm
To: "Carol Rushmore" <ecodev@wrangell.com>
Subject: RE: CBW Community Workgroup Meetings' Minutes

Thank you Carol,
I think is joint priority is the critical facility (GIS) data so we can begin the vulnerability assessment that you expressed as one your greatest needs.

Kind Regards
-Scott-

R. Scott Simmons, CFM, CPM
Senior Emergency Management Professional

700 G Street, Suite 500, Anchorage, AK 99501
eMail: scott.simmons@aecom.com
Phone: 907.261.9706 or 800.909.6787

Fax: 907.562.1297
Personal Cell: 907.841.1832

This e-mail and any attachments contain AECOM 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.

From: Carol Rushmore [mailto:ecodev@wrangell.com]
Sent: Wednesday, January 09, 2019 3:19 PM
To: Simmons, Scott
Cc: 'Lisa Von Bargen'
Subject: RE: CBW Community Workgroup Meetings' Minutes

Hi Scott,
We are trying to get you some comments by early next week on at minimum chapter 7, but will look at whatever we can. Bulk of our comments will likely be on the public draft. Trying to get some of the reviews consolidated to send to you. If you have an updated version from what we last have from November.. could you please forward that to me? Thank you.

Carol Rushmore
Economic Development Director
City and Borough of Wrangell
P.O. Box 531
Wrangell, AK 99929
907-874-2381
fx 907-874-3952
ecodev@wrangell.com

Please check out our website at www.wrangell.com
Follow us on Twitter: WrangellCVB
Like “WrangellCVB” or "City and Borough of Wrangell” on Facebook

---

From: Simmons, Scott [mailto:scott.simmons@aecom.com]
Sent: Friday, December 07, 2018 1:06 PM
To: Carol Rushmore <ecodev@wrangell.com>
Subject: RE: CBW Community Workgroup Meetings' Minutes

Hi Carol,
Yes, I remember all that we discussed. We had discussed a few times the contract ends in March. We have accomplished a lot and I believe I have made the few changes we discussed during our meetings.

Please keep in mind I have provided a good working draft; mark it up and send it back to me via postal or fax on the pages with mark-ups.

I will edit until Mid-January. I think you and I discussed how to simplify the critical facilities spreadsheet:
we will delete the GPS coordinates from the spreadsheet;
the “X’s” will identify each facilities hazard threats;

structure replacement costs can be estimated (most of your planning team could easily help estimate their facilities replacement costs)
We will make narrative statements drafted in the Vulnerability Analysis section with the tables and the yellow highlighted text

There are only a few legacy 2009 HMP projects to determine their status (most would likely be deleted); we can make action statements from those you select as ongoing. CBW could select a few more realistic projects to implement that Wrangell has already identify within your CIP and community plans.

Is it accurate to state that CBW did not integrate any legacy 2009 HMP components within other community plans or processes?

The January plan will not be a final draft. Wrangell will have two to three weeks to review. I will then finalize the plan with your comments by Mid-February. It should take a short time to accept and approve the plan for FEMA submittal.

Please understand that State/FEMA reviews will also take time; e.g., State (30-day review) and FEMA (45-day review) minimum.

Kind Regards
-Scott-

AECOM
R. Scott Simmons, CFM, CPM
Senior Emergency Management Professional

700 G Street, Suite 500, Anchorage, AK 99501
eMail: scott.simmons@aecom.com
Phone: 907.261.9706 or 800.909.6787
Fax: 907.562.1297
Personal Cell: 907.841.1832

This e-mail and any attachments contain AECOM 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.

From: Carol Rushmore [mailto:ecodev@wrangell.com]
Sent: Friday, December 07, 2018 11:41 AM
To: Simmons, Scott
Cc: 'Lisa Von Bargen'; rhowell@wrangell.com
Subject: RE: CBW Community Workgroup Meetings' Minutes

Hey Scott… you have in me in a panic as you never said anything before about

needing to complete the draft by January. I had told you when you were here that the spreadsheet might not be completed until after the new year. Mid January is awfully soon based on the amount of work we need to do and the reviews required of not only the spreadsheet but also the draft plan itself. And is this the FINAL draft? Or just a draft update. With the holidays here and lots of folks traveling, myself included, I need to know to what extent/detail our review must be by then, because frankly, I can't guarantee we can give it the serious review it needs by end of month for you to have a final draft by mid January.

Carol Rushmore
Economic Development Director
City and Borough of Wrangell
P.O. Box 531
Wrangell, AK 99929
907-874-2381
fx 907-874-3952
ecodev@wrangell.com

Please check out our website at www.wrangell.com
Follow us on Twitter: WrangellCVB
Like "WrangellCVB" or "City and Borough of Wrangell" on Facebook

---

From: Simmons, Scott [mailto:scott.simmons@aecom.com]
Sent: Friday, December 07, 2018 11:06 AM
To: Carol Rushmore <ecodev@wrangell.com>; 'Lisa Von Bargen' <lvonbargen@wrangell.com>; Amber Al-Haddad, work <aal-haddad@wrangell.com>; rhowell@wrangell.com
Cc: wcatribe@gmail.com; rpaddock@ccthita-nsn.gov; deptfob@ccthita.org
Subject: CBW Community Workgroup Meetings' Minutes

Good Morning,
My return home was smooth until I was awakened in the morning with the M7.0 shaker… our home had no structural damage, just a lot of things out of a few cabinets. Thankfully nothing broken.

I have attached copies of our meeting minutes for your review and a new newsletter for community distribution. Have you posted any public notices or discussed the HMP update activity within Wrangell Public meetings. If yes, please provide PDF copies for inclusion within the HMP's Public Outreach activities appendix.

Thank you for orchestrating the meetings, I pray they were useful.

Please return the critical facilities spreadsheet when completed. We don't need a lot of detail. Although street address can be sufficient, GPS coordinates will improve hazard identification if there are available GIS data to run against facility locations during future mitigation plan updates.

Please review the Section 7 Mitigation Strategy. We need to determine how to address the legacy 2009 HMP's action items listed within Table 7-9. They didn't really seem like projects, just items that need to be addressed. Those you desire to improve will need to be converted to action statements. I can easily edit those you desire to bring forward into the 2018 Mitigation Action Plan, Table 7-12.

Please also coordinate with WCA and CCTHITA concerning HMP contents, planning processes, identified hazards, critical facilities, and project review striving to confirm any culturally significant sites and potential projects they may desire to include within the HMP.

I must complete the draft plan by mid-January to fulfill contract deadlines, budget, and deliverables. Those are the last two sections I need to complete before I can send you a draft plan for community review.

Kind Regards
-Scott-

AECOM
R. Scott Simmons, CFM, CPM
Senior Emergency Management Professional

700 G Street, Suite 500, Anchorage, AK 99501
eMail: scott.simmons@aecom.com
Phone: 907.261.9706 or 800.909.6787
Fax: 907.562.1297
Personal Cell: 907.841.1832

This e-mail and any attachments contain AECOM 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.

APPENDIX E – BENEFIT-COST ANALYSIS FACT SHEET

This page intentionally left blank

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 – PLAIN 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 planning team undertaken any public outreach activities regarding the HMP or implementation of mitigation actions?			
HAZARD PROFILES	Has a natural and/or manmade/ technologically caused disaster occurred during this reporting period?			
	Are there natural and/or manmade/ technologically 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 critical facilities or infrastructure need to be added to the asset lists?			
	Have there been development patterns changes 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 City or Village as applicable?			
	Are the goals still applicable?			
	Should new mitigation actions be added to the Mitigation Action Plan (MAP)?			
	Do existing mitigation actions listed in the Mitigation Strategies' MAP need to be reprioritized			
	Are the mitigation actions listed in the MAP appropriate for available resources?			

This page intentionally left blank

Mitigation Action Progress Report

Progress Report Period: _____ **To** _____
(Date) (Date)

Project Title: _____ **Project ID#:** _____

Responsible Agency: _____

Address: _____

: _____

Contact Person: **Title:**

Phone #(s): _____ **email Address(s):** _____

_____ _____

List Supporting Agencies and Contacts:

_____

_____

_____

Total Project Cost: _____

Anticipated Cost Overrun/Underrun: _____

Project Approval Date: _____ **Project Start Date:** _____

Anticipated Completion Date: _____

Description of project (describe each phase, if applicable, and the time frame for completing each phase:

_____

_____

_____

Milestones	Complete	Projected Completion Date

Mitigation Action Progress Report *(Continued)*

Plan Goal(s) Addressed: _____

Goal: _____

Success Indicators: _____

Project Status

- ☐ On Schedule
- ☐ Completed
- ☐ Delayed*

* Explain: _____

- ☐ 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 accomplish over the next reporting period?

Other Comments: _____