Aleutians East Borough Multi-Jurisdictional Hazard Mitigation Plan

2020

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LIST OF ACRONYMS AND ABBREVIATIONS

AEB	Aleutians East Borough
AECOM	AECOM, Consultant, or Contractor
AVO	Alaska Volcano Observatory
CFR	U.S. Code of Federal Regulations
DCCED	Alaska Department of Commerce, Community, and Economic Development
DCRA	Division of Community and Regional Affairs
DHS&EM	Division of Homeland Security and Emergency Management
DGGS	Alaska Division of Geological and Geophysical Survey
DMA 2000	Disaster Mitigation Act Of 2000
DOT/PF	Alaska Department of Transportation and Public Facilities
ENSO	El Niño/La Niña Southern Oscillation
EPA	U.S. Environmental Protection Agency
FEMA	Federal Emergency Management Agency
ft	Feet
GI	Geophysical Institute
HMGP	Hazard Mitigation Grant Program
HMP	Hazard Mitigation Plan
HUD	Housing and Urban Development
IRA	Indian Reorganization Act
M	Magnitude
MAP	Mitigation Action Plan
MJHMP	Multi-Jurisdictional Hazard Mitigation Plan
mph	miles per hour
NFIP	National Flood Insurance Program
NOAA	National Oceanic and Atmospheric Administration
NRCS	Natural Resources Conservation Service
NWS	National Weather Service
SNAP	Scenarios Network for Alaska and Arctic Planning
Stafford Act	Robert T. Stafford Disaster Relief and Emergency Assistance Act
UAF	University of Alaska Fairbanks
USACE	U.S. Army Corps of Engineers
USGS	U.S. Geologic Survey
WC/ATWC	West Coast/Alaska Tsunami Warning Center

1 INTRODUCTION

This section provides a brief introduction to hazard mitigation planning and a description of this Multi-Jurisdictional Hazard Mitigation Plan (MJHMP). This plan is built for use by the Aleutians East Borough and it's included communities. The MJHMP for the Aleutians East Borough (AEB) is comprised of five separate communities with 12 separate local and tribal jurisdictions (in addition to the Borough) located and intermingled in the same geographic area in southwestern Alaska. These jurisdictions that participated in this plan include; the City of Akutan, the City of False Pass, City of King Cove, City of Sand Point, the Native Village of Akutan, Native Village of False Pass, the Agnaagux Tribe of King Cove, the Native Village of Nelson Lagoon, the Native Village of Pauloff Harbor, the Native Village of Unga, and the Qagan Tayagungin Tribe of Sand Point Village. The City of Cold Bay is also in the AEB; however, they are developing a separate HMP and will not be included in this one.

1.1 HAZARD MITIGATION PLANNING

As defined in Title 44 of the Code of Federal Regulations (CFR), Subpart M, Section 206.401, hazard mitigation is "any action taken to reduce or eliminate the long-term risk to human life and property from natural hazards." As such, hazard mitigation is any work to minimize the impacts of any type of hazard event before it occurs. Hazard mitigation aims to reduce losses from future disasters. It is a process that identifies and profiles hazards, analyzes the people and facilities at risk, and develops mitigation actions to reduce or eliminate hazard risk. The implementation of the mitigation actions, which include short- and long-term strategies that may involve planning, policy changes, programs, projects, and other activities, is the end result of this process.

In recent years, local hazard mitigation planning has been driven by a federal law, known as the Disaster Mitigation Act of 2000 (DMA 2000). On October 30, 2000, Congress passed the DMA 2000 (Public Law 106-390), which amended the Robert T. Stafford Disaster Relief and Emergency Assistance Act of 1988 (Stafford Act) (Title 42 of the United States Code Section 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. This new section also provided the legal basis for the Federal Emergency Management Agency's (FEMA's) mitigation plan requirements for the Hazard Mitigation Assistance grant programs.

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 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, 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.

1.2 2020 MULTI-JURISDICTIONAL HAZARD MITIGATION PLAN SYNOPSIS

To meet the requirements of the DMA 2000, the Aleutians East Borough (AEB) and its associated cities and Tribes have prepared a Multi-Jurisdictional Mitigation Plan (MJHMP) (hereinafter referred to as the 2020 MJHMP) to assess risks posed by natural hazards and to develop a mitigation action plan for reducing the risks in the Borough. This is an updated plan from the legacy 2010 hazard mitigation plan for the community.

The 2020 MJHMP is organized to follow FEMA's Local Mitigation Plan Review Tool, which demonstrates how local Hazard Mitigation Plans (HMPs) meet the DMA 2000 regulations. As such, specific planning elements of this review tool are in their appropriate plan sections.

The 2020 MJHMP structure has been updated to including the following sections:

- **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 Planning Process** provides an overview of the planning process, starting with the plan completion timeline. It identifies planning/advisory committee members and describes their involvement with the plan update process. It provides an overview of the existing plans and reports and how they were incorporated into the 2020 MJHMP, how the legacy plan was reviewed for the update, and lastly lays out a plan update method and schedule. Supporting planning process documentation is listed in Appendix A.
- **Section 3 Community Profile** provides a general history and background of the AEB including historical trends for population and the demographic and economic conditions that have shaped the area. Finally, this section lists the critical facilities identified by the community that are included in this plan.
- **Section 4 Hazard Identification and Risk Assessment** describes each of the six hazards addressed in this plan. Profiles include the nature, location, history, extent/impact, and recurrence probability of each hazard.
- **Section 5 Vulnerability Assessment** provides the impact (i.e., risk assessment) tables for the planning area, vulnerable populations and critical facilities in each hazard area. An overall summary description is also provided for each hazard.
- **Section 6 Mitigation Strategy** details the AEB's capabilities (authorities, policies, programs and resources) available for hazard mitigation. Finally, it describes the mitigation strategy, which is the blueprint for how the AEB will reduce its risks to hazards. The mitigation strategy is made up of three main components: mitigation goal(s); potential mitigation actions and projects; and a mitigation action plan.
- **Section 7 Plan Adoption** contains a scanned copy of the adoption resolutions.
- **Section 8 References** contains the sources cited in the document.

2 PLANNING PROCESS

Section 2 – Planning Process addresses Element A of the Local Mitigation Plan Regulation Checklist.

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

Regulation Checklist – 44 CFR 201.6 Local Mitigation Plans
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))

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

Regulation Checklist – 44 CFR 201.7 Tribal Mitigation Plans
Element A: 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)]

2.1 OVERVIEW

The State of Alaska, DHS&EM provided funding and project oversight to AECOM to facilitate and guide planning team development and MJHMP development.

The planning process began in January 2018 with an in-person and teleconference with various community leaders to explain how their Borough 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.

Community leaders were encouraged to develop a community planning team to assist the community's efforts to identify available resources and capabilities for MJHMP development. AECOM explained how the MJHMP differed from current emergency plans. 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.

In summary, the following five-step process took place from January 2018 through February 2020.

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 plan's five-year update.
3. Assess risks: The planning team identified the hazards specific to the Borough and with AECOM's assistance, developed the risk assessment for their identified hazards. The planning team reviewed the risk assessment, including the vulnerability analysis, prior to and during the development of their 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.

Table 1 provides the planning team for the 2020 MJHMP.

Table 1. Hazard Mitigation Advisory Committee

Name	Department / Agency, Title	Contribution
Anne Bailey	Borough Administrator, Aleutians East Borough	Planning team lead, data input and MJHMP review.
Mary Tesche	Assistant Administrator, Aleutians East Borough	Planning team member, Tribal data input and MJHMP review.
Joe Bereskin	Mayor, City of Akutan; Tribal President, Native Village of Akutan	Planning team member, City and Tribal data input and MJHMP review.
Chris Babcock	Fire and Police Chief, City of King Cove	Planning team member, Tribal data input and MJHMP review.

Table 1. Hazard Mitigation Advisory Committee

Name	Department / Agency, Title	Contribution
Etta Kuzakin	Tribal President, Agdaagux Tribe of King Cove	Planning team member, Tribal data input and MJHMP review.
Jordan Keeler	Administrator, City of Sand Point	Planning team member, Tribal data input and MJHMP review.
Kelly D.S. Isham	MJHMP Planner, AECOM	Contract planning team member, data acquisition, MJHMP development
Scott Simmons	Emergency Management, Hazard Mitigation, and Climate Change Planner, AECOM	Contract planning team member, Responsible for MJHMP development, lead writer, project coordination.
Jessica Evans	MJHMP Planner, AECOM	Contract planning team member, data acquisition, MJHMP development

2.2 OPPORTUNITIES FOR STAKEHOLDERS

On February 12, 2018, AECOM reached out to stakeholders about the 2020 MJHMP to invite them to participate in the planning process. Stakeholders included:

- US Bureau of Indian Affairs
- US Bureau of Land Management
- US Department of Housing and Urban Development (HUD)
- US Fish & Wildlife Service
- University of Alaska Fairbanks (UAF), Geophysical Institute (GI), Alaska Earthquake Information Center
- Alaska Native Tribal Health Consortium-Community Development
- Alaska Volcano Observatory (AVO)
- Association of Village Council Presidents
- Denali Commission
- Alaska Department of Environmental Conservation
    - Division of Spill Prevention and Response
    - Village Safe Water
- Alaska Department of Transportation and Public Facilities (DOT/PF)
    - Central Region
    - North Region
    - Southcoast Region
- Alaska Department of Community, Commerce, and Economic Development (DCCED)
    - Division of Community Advocacy (DCRA)
- Alaska Department of Military and Veterans Affairs
    - Division of Homeland Security and Emergency Management (DHS&EM)
- U.S. Environmental Protection Agency (EPA)
- National Weather Service (NWS)
    - Northern Region

  - Southeast Region
  - Southcentral Region
- Natural Resources Conservation Service (NRCS)
- U.S. Department of Agriculture
- U.S. Department of Agriculture Division of Rural Development
- U.S. Army Corps of Engineers (USACE)

All stakeholder documentation is included in Appendix A.

2.3 PUBLIC INVOLVEMENT

The AEB engaged the public in the plan update process through discussions at Borough Assembly and Tribal Council meetings and through distribution of newsletters (Appendix A). The newsletters and draft plan were posted on the community electronic bulletin board (Facebook) for review and comment.

Note: The various tribal governments throughout the Aleutians East Borough 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.

Table 2 provides the community's public involvement initiative.

Table 2. Public Involvement Mechanisms

Plans and Reports	Information to be Incorporated into the 2020 MJHMP
Newsletter #1 Distribution (September 2018)	The first newsletter introducing the upcoming planning activity was distributed to all jurisdictions, and posed on the AEB Facebook page. The newsletter encouraged the whole community to provide hazard and critical facility information.
Newsletter #2 Distribution (February 2020)	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.
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
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 2020 MJHMP update's progress and about HMP review opportunities throughout the project.
Public Comments	The planning team reviewed the draft MJHMP in February 2020. [Insert note about comments on the draft]

AECOM worked with the AEB Assembly to review the legacy HMP and provide information throughout the 2020 MJHMP update planning process.

The planning team identified 6 natural hazards: earthquake, flood, tsunami and seiche, volcanic ash, severe weather, and wildland fire which periodically impact the community. The risk assessment was completed

after the community asset data was collected by the planning team during 2018 and 2020, 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 Aleutians East Borough.

Public meeting notices were posted throughout the community (offices, businesses, post office, public bulletin boards, etc.) announcing the August 14h, 2018 Borough Assembly Meeting's agenda; encouraging attendance and participate in the plan update process and the introductory newsletter was disseminated.

A planning team meeting was held in August 2018 to review legacy 2010 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 to the Borough and communities in February 2020 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 meetings in February 2020 to review the draft MJHMP for accuracy – ensuring it meets borough and tribal needs. Public comments included…..

2.4 LEGACY 2010 HMP REVIEW AND ANALYSIS

44 CFR requires communities to schedule multi-jurisdictional, local, and tribal HMP 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.

AEB's Legacy 2010 HMP document was revised to reflect the following format to meet newly identified regulatory requirements.

Section 1: Introduction

- Added entire new section explaining AEB's 2020 plan review and update planning processes.

Section 2: Planning Process

- Updated this section to reflect 2010 to 2020 changes to the public process including newsletters, public meetings and planning team composition.

Section 3: Community Profile

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

Section 4: Hazard Identification and Risk Assessment

- Reviewed hazard identification and risk assessment for earthquake, flooding, tsunami, volcanos, and severe weather and added wildland fire and other hazards. Added 2010 to 2020 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 the AEB's needs.

Section 5: Vulnerability Assessment

- Updated the vulnerability assessment based on updated information in Section 4.

Section 6: Mitigation Strategy

- Reviewed 2010 mitigation goals and actions and added new goals and actions for the 2020 MJHMP Mitigation Strategies' Mitigation Action Plan.

Section 7: Plan Adoption

- Provided new 2020 borough and tribal adoption resolutions.

Section 8: References

- Revised to reflect 2020 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 2010 HMP to analyze borough and tribal changes as well as all hazards that have, or could potentially have, impacted the AEAB area during the legacy HMP's five-year lifecycle.

All sections of the MJHMP were updated throughout the 2020 update's planning activity due to intermittent contractor and community staff availability. Table 3 categorizes planning team-identified HMP components that necessitated information update were not lost.

The 2020 MJHMP update process included inviting new and existing stakeholders to review the legacy 2010 HMP to determine what was accomplished versus what was intended to accomplish.

Table 3. Legacy HMP Review and Update Needs Determinations

2010 HMP Section	2010 HMP Items to be Updated	Status*	2010 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

Table 3. Legacy HMP Review and Update Needs Determinations

2010 HMP Section	2010 HMP Items to be Updated	Status*	2010 HMP Identified items for Deletion	Newly Identified Items to be Added for HMP Compliance	New Action Commitment
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
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 (2010) 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

2.5 REVIEW AND INCORPORATION OF EXISTING PLANS AND REPORTS

The consultant reviewed existing relevant information to include in the 2020 MJHMP. Table 4 lists the plans and reports reviewed as well as information to be incorporated into the 2020 MJHMP.

Table 4. Existing Plans and Reports

Plans and Reports	Information to be Incorporated into the 2020 MJHMP
2010 Aleutians East Borough Mitigation Plan	Identify past needs and goals.
Akutan 2005 Community Plan	Identifying cultural resources, land use patterns, and community needs and goals.
Sand Point draft 2018 Comprehensive Plan	Identifying cultural resources, land use patterns, and community needs and goals.

Table 4. Existing Plans and Reports

Plans and Reports	Information to be Incorporated into the 2020 MJHMP
US Army Corps of Engineers, Erosion Information Paper, - Aleutians East Borough, Alaska, 2008	Defined the community's erosion impacts
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

2.6 INTEGRATING HMP PRECEPTS INTO EXISTING PLANNING MECHANISMS

The AEB planning team did not integrate any legacy 2010 HMP components into other planning mechanisms; or initiatives during the legacy 2010 HMP's five-year lifecycle.

Each planning team member ensures that the MJHMP, and 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:

- Review community-specific regulatory tools to assess integrating MJHMP components. These regulatory tools are identified in Section 5.
- Work with pertinent community departments to increase MJHMP awareness and provides 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.

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

The AEB hosts various annual outreach activities annually which gives the AEB 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 Borough also regularly uses social media to keep residents informed.

2.7 CONTINUED PUBLIC PARTICIPATION

The Aleutians East Borough's planning teams did not conduct their HMP maintenance commitments, therefore neither was their "public" engaged during the legacy HMP's 5-year life cycle.

The entire community is committed 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

office; along with an address and phone number of the planning team leader to whom people can direct their comments or concerns.

The cities and tribes 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, outreach projects, and public mailings. 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.

2.8 PLAN UPDATE AND MONITORING METHOD AND SCHEDULE

The AEB, cities, and tribes commit to organizing their efforts to ensure that future MJHMP improvements and revisions occur in a well-managed, efficient, and coordinated manner. The planning team will follow these three process steps:

- **Annual Review Worksheets**: Every 12 months from plan adoption, the HMP planning lead will email each member of the planning team an Annual Review Worksheet to complete. As shown in Appendix C, the Annual Review Worksheet reflects the Local Mitigation Plan Review Tool and includes the following: planning process, hazard profile, risk assessment, and mitigation strategy. Each member of the advisory committee will email completed worksheets back to the HMP planning lead to review. The HMP planning lead will summarize these findings and email them out to the committee. If the HMP planning lead believes that the 2020 MJHMP needs to be updated based on the findings, then an invitation will be sent to planning team members to attend a formal HMP update meeting.
- **Mitigation Progress Project Reports**: Mitigation actions will be monitored and updated using the Mitigation Project Progress Report. During each annual review, each department or agency currently administering a mitigation project will submit a progress report to the HMP planning lead. For projects that are being funded by a FEMA mitigation grant, FEMA quarterly reports may be used as the preferred reporting tool. As shown in Appendix C, the progress report will discuss the current status of the mitigation project, including any changes made to the project, identify implementation problems, and describe appropriate strategies to overcome them.
- **Planning Team Roundtable**: On the fourth year of the update, the HMP planning lead will lead a tabletop exercise with the advisory committee to: collect the Annual Review Worksheet and any Mitigation Project Progress Reports and FEMA quarterly reports; determine hazards to be included in the 2025 MJHMP; develop a new work plan; and begin the plan update process.

The borough, 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.

Each authority identified in the MAP matrix 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.

2.9 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 for initial State review. This option could potentially enable each Tribe to avoid paying future mitigation project grant funding match.

The State Hazard Mitigation Officer 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.

3 COMMUNITY PROFILE

3.1 PLANNING AREA

The Aleutians East Borough is co-located and intermingled in the same geographic area with no separation between communities. For the purposes of this plan, the area included in the Aleutians East Borough encompasses the entire community footprint (Figure 1).

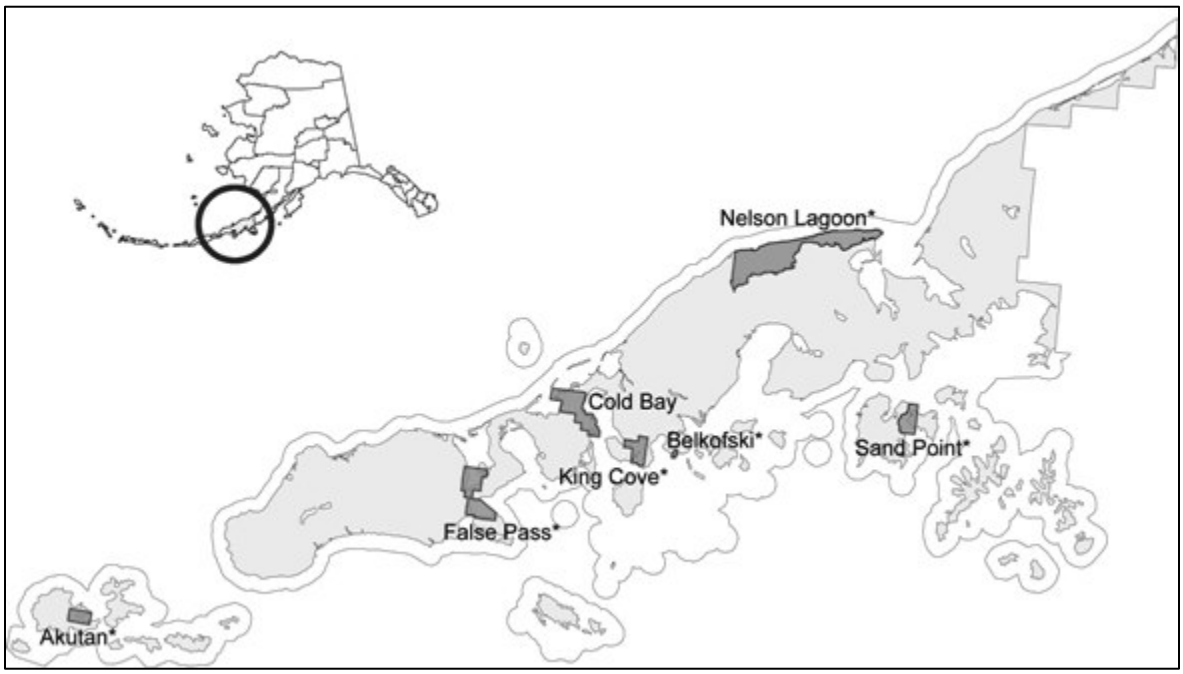

Figure 1. Aleutians East Borough Overview Map

The Aleutians East Borough is comprised of 6 separate communities located and intermingled within the same geographic area in southwestern Alaska. Most of these communities include both cities and tribes in the same geographic area.

According to archaeological evidence, the area has been inhabited by the Unanga since the last ice age. Early contact was with Russian fur traders who sought sea otters in these islands. Whaling, fishing, and cannery operations brought an influx of Scandinavian and European fishermen in the early 1900s. During World War II, the area was a strategic military site for the Aleutian Campaign, and many locals were evacuated to Ketchikan (DCRA 2020).

The area's rich resources have cultivated an extremely diverse population of non-Natives, Natives, and Asians. The Unanga were called 'Aleut' by Russian traders. Unangas speak the western dialect, and Unangans speak the eastern dialect (DCRA 2020).

Based in Sand Point, the borough comprises the westernmost portion of the Alaska Peninsula and a number of Aleutian islands. There are five incorporated cities and two unincorporated villages within the boundaries of the borough (DCRA 2020).

The Aleutians East Borough covers approximately 6,988 square miles of land and approximately 8,023.5 square miles of water. Moderate maritime temperature changes occur along Alaska's Aleutian Chain. Aleutians East Borough falls within the southwest maritime climate zone, characterized by persistently overcast skies, high winds, and frequent cyclonic storms.

The following is a brief sketch of the Aleutians East Borough's history (DCRA 2020):

1867 Alaska is purchased from Russia.

1883 First Public School is opened in Unalaska.

1933 Bureau of Indian Affairs built the first area hospital in Unalaska.

1980 Boroughs were established and recorded by the U.S. Census Bureau. AEB population at 1,643 persons.

The Aleutians East Borough's economy is primarily based on fisheries, subsistence, and other general employment opportunities that exist throughout the community.

According to the 2010 Census estimates, the median household income throughout the Aleutians East Borough was $66,607 with a per capita income of $31,254. Approximately 14.6 percent were reported to be living below the poverty level. The potential work force (those aged 16 years or older) throughout the Aleutians East Borough's was estimated to be 2,917, of which 2,265 were actively employed. The unemployment rate includes part-time and seasonal jobs, and practical unemployment or underemployment is likely to be significantly higher.

A brief description of the communities included in this plan is below (DCRA 2020).

Akutan

Current population: 94

Native Community Name: Achan-ingiiga

Language: Unangan Aleut

History: Akutan began in 1878 as a fur storage and trading port for the Western Fur & Trading Company. The company's agent established a commercial cod fishing and processing business that quickly attracted nearby Unangan to the community. A Russian Orthodox church and a school were built in 1878. Alexander Nevsky Chapel was built in 1918 to replace the original structure. The Pacific Whaling Company built a whale processing station across the bay from Akutan in 1912. It was the only whaling station in the Aleutians and operated until 1939. After the Japanese attacked Unalaska in June 1942, the U.S. government evacuated Akutan residents to the Ketchikan area. The village was re-established in 1944, although many villagers chose not to return. This exposure to the outside world brought many changes to the traditional lifestyle and attitudes of the community. The city was incorporated in 1979.

Akutan is a fishing community and is the site of a traditional Unangan village. Approximately 75 persons are year-round residents; the majority of the population are transient fish processing workers who live in bunkhouses (group quarters).

Transportation: Akutan is only accessible by boat and amphibious aircraft. The land-based Akutan Airport was opened in September 2012 on Akun Island, and services Akutan by a helicopter. Daily scheduled air service is provided by Grant Aviation from nearby Dutch Harbor/Unalaska and is subsidized by the Essential Air Service. The state ferry M/V Tustumena serves Akutan on its westbound route to Dutch Harbor and its eastbound route to Homer between the months of May and October. Akutan is the second largest seafood port in north America. Akutan has a 100-foot public dock and a 58-vessel mooring basin and breakwater was completed by the USACE in September 2013. Trident Seafoods owns several commercial docks.

False Pass

Current population: 39

Native Community Name: IsanaX

Language: Unangan Aleut

History: The name False Pass is derived from the fact that the Bering Sea side of the strait is extremely shallow and cannot accommodate large vessels. The area was originally settled by a homesteader in the early 1900s and grew with the establishment of a cannery in 1917. Natives immigrated from Morzhovoi, Sanak Island, and Ikatan when the cannery was built. A post office was established in 1921. The cannery operated continuously, except from 1973 to 1976, when two hard winters depleted the fish resources. It was destroyed by fire in March 1981 and was not rebuilt. The city was incorporated in 1990.

False Pass community is primarily Unangan. Fishing, fish processing, and subsistence activities are mainstays of the lifestyle.

Transportation: Boats and aircraft provide the only means of transportation into False Pass. A seaplane base and a state-owned gravel airstrip are available. Mail and passenger flights arrive three times weekly. There is a boat harbor with electricity and water at the floats, and a dock and boat ramp are available. Cargo barges are available from Seattle. No local taxi or delivery services exist in False Pass. The state ferry operates once a month between May and October from Kodiak.

King Cove

Current population: 920

Native Community Name: Agdaaĝux^

Language: Unangan Aleut

History: King Cove was founded in 1911 when Pacific American Fisheries built a salmon cannery. Early settlers were Unangan, Scandinavian, and other European fishermen. Of the first ten founding families, five consisted of a European father and an Alaskan Native mother. The city was incorporated in 1949. The cannery operated continuously between 1911 and 1976, when it was partially destroyed by fire. The adoption of the 200-mile fisheries limit spurred rebuilding. King Cove remains tied to fishing and fish processing.

Scandinavians have historically influenced the cultural, economic, and social structures of King Cove. King Cove has a mixture of non-native and Unangan residents.

Transportation: King Cove is accessible by air and sea only. A state-owned gravel runway is available. Gale force crosswinds are common, as the airport lies in a valley between two volcanic peaks. Currently a hovercraft provides regular service to nearby Cold Bay, which enjoys more stable flying conditions. Cold Bay Airport also has a longer runway allowing the airport to handle larger planes. A high priority for local transportation has long been construction of an access road between King Cove and Cold Bay to provide a more reliable link to the outside world during emergencies. As of the Fall of 2012, the City of King Cove awaited a final decision on a proposed land transfer that would allow the access road to be extended directly to Cold Bay. In addition to air travel and limited road access, the state ferry provides bi-monthly service to King Cove between May and October. In addition, one public deep-water dock is available in King Cove. The dock can be used by fuel and cargo barges, the state ferry, and large fishing vessels. In addition, a new harbor is operated by the City and provides additional moorage for larger vessels ranging between 60 and 150 feet in length.

Nelson Lagoon

Current population: 32

Native Community Name: Niilsanam Alĝuudaa

Language: Unangan Aleut

History: Nelson Lagoon has been used historically as an Unangan summer fish camp. The resources of the lagoon and nearby Bear River are excellent. The lagoon was named in 1882 for Edward William Nelson of the U.S. Signal Corps, an explorer in the Yukon Delta region between 1877 and 1920. A salmon saltery operated from 1906 to 1917, which attracted Scandinavian fishermen, but there has been no cannery since. In 1965 a school was built, and the community began to be occupied year-round.

The culture of Nelson Lagoon is focused on commercial fishing and subsistence activities. There is strong community pride and loyalty among the residents, with a desire to maintain their lifestyle with slow, monitored growth and development that can be managed by the residents.

Transportation: Nelson Lagoon is accessible only by air and sea. A state-owned gravel runway serves regularly-scheduled flights. It has a dock, boat ramp, harbormaster's office, and warehouse. Some freight is landed at the Peter Pan Seafoods dock, 30 miles away at Port Moller.

Sand Point

Current population: 911

Native Community Name: None

Language: Unangan Aleut

History: Sand Point was founded in 1898 by a San Francisco fishing company as a trading post and cod-fishing station. Aleuts from surrounding villages and Scandinavian fishermen were the first residents of the community. Sand Point served as a repair and supply center for gold mining during the early 1900s, but fish processing became the dominant activity in the 1930s. The Saint Nicholas Chapel, a Russian Orthodox church, was built in 1933 and is now on the National Register of Historical Places. Aleutian Cold Storage built a halibut plant in 1946. Today, it is home to the largest fishing fleet in the Aleutian Chain. The city government was incorporated in 1966.

Sand Point is characterized as self-sufficient and progressive, with commercial fishing activities at the heart of the local culture. There is a large transient population for fishing and cannery work. Many of the shareholders of Pauloff Harbor and Unga now live in Sand Point.

Transportation: Sand Point has a state-owned airport with an asphalt runway. Direct flights to Anchorage are available. Marine facilities include a 25-acre boat harbor with four docks, 134 boat slips, a harbormaster office, barge off-loading area, and a 150-ton lift. Regular barge services supply the community. The state ferry serves Sand point between May and October.

3.2 POPULATION AND LAND USE

3.2.1 Population

The 2010 US Census estimated 3,141 residents, of which the median age was 46-55 indicating a relatively older population. The population of the Aleutians East Borough is expected to remain steady. The male and female composition is approximately 67 and 33 percent respectively. The 2010 Census revealed that there are 812 households with the average household having approximately 2.53 individuals. The most recent 2020 DCCED certified population is 3,008.

Figure 2 portrays population has been steadily rising since 1980, the first year of census data, although the DCCED estimates a slight decline in the recent year.

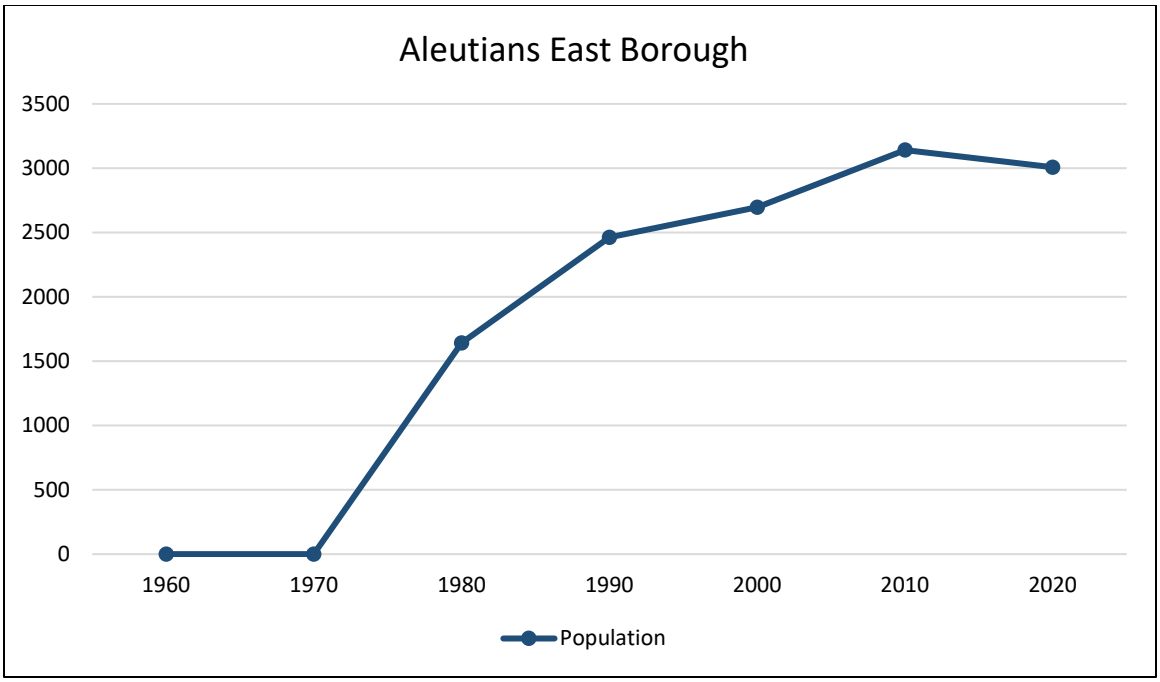

Figure 2. Aleutians East Borough Historic Population

Population data for the Aleutians East Borough were obtained from the 2010 US Census and the State of Alaska DCCED's 2018 estimates. The US Census reports the Aleutians East Borough total population for 2010 as 3,141 and the 2020 State of Alaska estimates are 3,008 (Table 5).

Table 5. Estimated Population and Building Inventory

Population[1]		Residential Buildings	
2010 Census	**DCCED 2020 Data**	**Total Building Count**	**Total Value of Buildings**
3,141	3,008	752	[1]US Census $8,978,400 [2]Adjusted: $19,800,000

[1]U.S. Census 2018 estimated AEB population data. US Census listed median housing value at $124,700
[2]The project team determined that the average single-family residential structural replacement cost is $275,000

The planning team stated that residential replacement values are generally understated because replacement costs exceed Census structure estimates due to material purchasing, barge or airplane delivery, and construction in rural Alaska. The planning team estimates an average 30 feet by 40 feet (1,200 square feet) residential structure costs $275,000. A total of 752 single-family residential buildings were considered in this analysis.

3.2.2 Land Use

Land use in the Aleutians East Borough is predominately residential with limited area for commercial services and community (or institutional) facilities. Suitable developable vacant land is in short supply within the Aleutians East Borough boundaries, and various hydrological bodies surround the community. Several areas within the Borough are classified as airport land use. (See Section 6 for Aleutians East Borough future development goals.)

4 HAZARD IDENTIFICATION

Section 4 – Hazard Identification and Risk Assessment addresses Element B of the Local and Tribal Mitigation Plan Regulation Checklist.

Regulation Checklist – 44 CFR 201.6 Local Mitigation Plans
Element B: Hazard Identification and Risk Assessment
B1. Does the Plan include a description of the type, location, and extent of all natural hazards that can affect each jurisdiction(s)? (Requirement § 201.6(c)(2)(ii))
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))
B4. Does the Plan address NFIP insured structures within the jurisdiction that have been repetitively damaged by floods? (Requirement §201.6(c)(2)(ii))
Regulation Checklist – 44 CFR 201.7 Tribal Mitigation Plans
Element B: Hazard Identification and Risk Assessment
B1. Does the plan include a description of the type, location, and extent of all natural hazards that can affect 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)]

For the 2020 MJHMP, the planning lead worked with the local planning team to review the State of Alaska identified hazards for the geography. The team evaluated and screened these potential hazards based on a range of factors, including prior knowledge or perception of their threat, the relative risk presented by each hazard, the ability to mitigate the hazard, and the known or expected information availability for each hazard. The planning team determined that the following five hazards: earthquake, flood and bank destabilization, tsunami and seiche, volcanic hazards, and severe weather posed the greatest threat to the AEB; some of which are influenced by increasing changing climate conditions such as late ice formation, early thaw conditions, increased, lack, or inconsistent rain.

Table 6. Identification and Screening of Hazards

Hazard Type	Should It Be Profiled?	Explanation
Earthquake	Yes	The AEB has experienced more than 900 earthquakes above M5 with epicenters located less than 150 miles from the area since 1973.
Flooding and Bank Destabilization (Riverine and/or coastal related floods and resultant erosive scour damages)	Yes	The AEB experiences storm surge, coastal ice run-up, and coastal wind scour along the shoreline and damages from coastal ice flows, wind, surface runoff, and boat traffic wakes.

Table 6. Identification and Screening of Hazards

Hazard Type	Should It Be Profiled?	Explanation
Ground Failure (Landslide/Debris Flow, Permafrost, Subsidence)	No	This hazard does not threaten the AEB.
Tsunami (Seiche)	Yes	This hazard has historically impacted infrastructure in the AEB.
Volcano	Yes	Volcano generated ash periodically impacts the communities in the AEB.
Severe Weather (Cold, Drought, Rain, Snow, Wind, etc.)	Yes	Severe weather impacts the community with climate change 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.
Wildland Fire	Yes	The AEB does not have a history of wildland fire; however; a changing climate as made some areas drier and potentially prone to future wildland fires. The AEB Planning team wanted to include an analysis in this MJHMP.

Hazard identification consists of describing the nature of the hazard, disaster history, location, extent/severity, and probability of future events. Hazard identification profiles have been developed for each of the six hazards addressed in the MJHMP. Additionally, impact (i.e., risk assessment) tables have been created for each hazard. Overall summary descriptions have been developed as well.

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

- Nature (type)
- Location
- History (previous occurrences)
- Extent (to include magnitude, severity and impact)
- Recurrence probability

Each hazard is assigned a rating based on the following criteria for magnitude/severity (Table 7) and future recurrence probability (Table 8). Potential climate change impacts are primarily discussed in the Severe Weather hazard profile but are also identified where deemed appropriate within each hazard profile.

In addition to the six profiled hazards, communities in the AEB expressed concern over the potential for dam failure, and the potential for effects to public health, from the movement of people and seasonal workers. A brief profile is provided of these hazards

Estimating magnitude and severity are determined based on historic events using the criteria identified in the following tables.

Table 7. 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 7 identified criteria, to provide estimated future event recurrence likelihood.

Table 8. 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.
3 - Likely	• Event is probable within the next three years. • Event has up to 1 in 3 years chance of occurring (1/3=33%). • 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 AEB are presented throughout the remainder of this section. The presentation order does not signify their importance or risk level.

4.1 EARTHQUAKE

4.1.1 Nature

An earthquake is a sudden motion or trembling caused by a release of strain accumulated in 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: 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 secondary waves, also known as shear waves, are slower than primary waves and cause structures to vibrate from side to side (horizontal motion). There are also two types of surface waves: Raleigh waves and Love waves. These waves travel more slowly and typically are significantly less damaging than seismic waves.

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

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

The severity of an earthquake can be expressed in terms of intensity and magnitude (M). Intensity is based on the damage and observed effects on people and the natural and built environment. It varies from place to place depending on the location with respect to the earthquake epicenter, which is the point on the earth's surface that is directly above where the earthquake occurred. The severity of intensity generally increases with the amount of energy released and decreases with distance from the fault or epicenter of the earthquake. The scale most often used in the U.S. to measure intensity is the Modified Mercalli Intensity Scale. The Modified Mercalli Intensity Scale consists of 10 increasing levels of shaking intensity that range from "Not Felt" (imperceptible) to "Extreme" (catastrophic) destruction. Peak ground acceleration is also used to measure earthquake intensity by quantifying how hard the earth shakes in a given location. Peak ground acceleration can be measured as acceleration due to gravity.

4.1.2 Location

The entire geographic area of Alaska is prone to earthquake effects. As such the Aleutians East Borough has experienced 1,087 earthquakes greater than M2.5 within 50 miles since 1973 with an average of approximately 0.06 earthquakes per day.

Figure 3 shows an extracted portion of the Neotectonic Map of Alaska depicting the AEB's proximity to known earthquake faults (DGGS 1994).

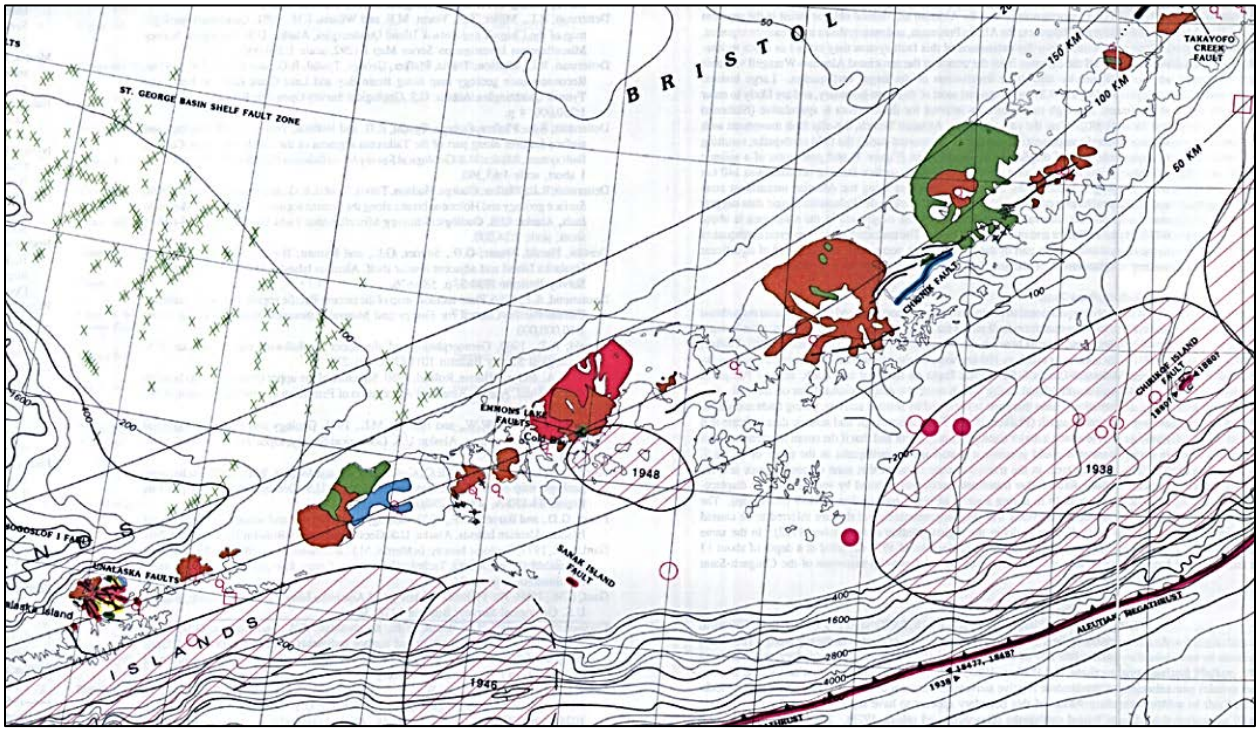

Figure 3. Neotectonic Map of Alaska, Aleutian Islands

4.1.3 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 United States 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; none of which exceeded 7.0 located within 100 miles of Sand Point.

Therefore, the planning team determined that, based on available recorded data, the Aleutians East Borough communities have minor concerns 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 greater than M5.0.

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. The Aleutians East Borough experienced minimal ground motion from this historic event. planning team members further stated that Aleutians East Borough communities had experienced no ground shaking from the November 3, 2002 M7.9 Denali earthquake or the November 30, 2018 M7.1 Cook Inlet earthquake.

Table 9 summarizes the history of nearby earthquakes to the AEB communities.

Table 9. AEB Historic Earthquakes Since 2010

Community	Number	Date Range	Magnitude	Geographic Range
Akutan	171	1922 to 2018	>M5	200 km
False Pass	208	1922 to 2018	>M5	250 km
King Cove	191	1917 to 2018	>M5	250 km
Nelson Lagoon	188	1917 to 2018	>M5	250 km
Sand Point	146	1917 to 2018	>M5	250 km

4.1.4 Extent and Impact

Extent

Based on historic earthquake events and the criteria identified in Table 7, the magnitude and severity of earthquake impacts in the Aleutians East Borough 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 less than two weeks; and approximately 10 percent of property is severely damaged with limited long-term damage to transportation, infrastructure, or the economy.

The Aleutians East Borough and associated communities are located approximately 118 miles from the Aleutian Trench earthquake fault.

Impact

Impacts to the community such as significant ground movement that may result in infrastructure damage are/are not expected. Minor shaking may be seen or felt based on past events. Impacts to future populations, residences, critical facilities, and infrastructure are anticipated to remain the same.

4.1.5 Recurrence Probability

As indicated, while it is not possible to predict when an earthquake will occur, the Shake Map was generated using the USGS Earthquake Mapping Model to generate the 2014 Shake Map. This modelling effort incorporates current seismicity in its development and is the most current map available for this area. Peter Haeussler, USGS, Alaska Region states, it is a viable representation to support probability inquiries.

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

Shake maps indicate a M5.0 or greater earthquake occurring within 50 years and 50 miles of the borough is "Unlikely" within the next 10 years (1/10=10 percent chance of occurring); due to an event history that is less than or equal to 10 percent likely per year.

4.2 FLOOD AND BANK DESTABILIZATION

4.2.1 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.

Three primary types of flooding occur throughout the Aleutians East Borough: rainfall-runoff, ice jam, storm surge, and ice override floods.

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

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

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

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

Ice Override is a phenomenon that occurs when motion of the sheet ice is initiated by wind stress acting on the surface of ice that is not confined. Onshore wind coupled with conditions such as a smooth gradual sloping beach and high tides can cause ice sheets to slide up or "override" the beach and move inland as much as several hundreds of feet. Ice override typically occurs in fall and early winter (though events have been reported at other times) and is usually associated with coastal storms and storm surge but may also happen in calm weather.

Override advances are slow enough to allow people to move out of its path, and therefore poses little immediate safety hazard. Intact sheets of ice up to several feet thick moving into buildings or across roads and airports can however cause structural damage and impede travel. Shoreline protection in the form of bulkheads or other structures to break-up the ice can limit the movement of ice. In at least one occasion, a bulldozer was able to break-up the ice and prevent damage.

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

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

Coastal scour threatens the Aleutians East Borough's area infrastructure, built environment, and utilities adjacent embankments and shorelines.

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 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.

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.

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.

Riverine Scour results from the force of flowing water and ice formations in and adjacent to river channels. This scouring affects the river the channel, river bed and banks and can alter or preclude any channel navigation or riverbank development. In less stable braided channel reaches, scour, and material deposition are constant issues. In more stable meandering channels, scour episodes may only occasionally occur from human activities including boat wakes and dredging.

Attempts to control scour using shoreline protective measures such as groins, jetties, levees, or revetments can lead to increased embankment loss or damage.

Land surface loss results from high flowing surface water across roads due to poor or improper drainage. These events typically occur from rain and snowmelt run-off.

Event Recurrence Intervals

Many flood damages are predictable based on rainfall and seasonal thaw patterns. Most of the annual precipitation is received from April through October with August being the wettest. This rainfall leads to flooding in early/late 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.

4.2.2 Location

The planning team indicated that the City of Sand Point has minor flooding impacts; most of which occur from rainfall, snowmelt run-off, and bad storms. Water collects in low terrain depressions and may rise to just below a structure's first step with no water intrusion on the first floor.

Nelson Lagoon indicated that fall storms have washed out the numerous waterlines buried along the coast. They also experience flooding from silt filling in the delta which has affected water flow, height, and increased flooding.

False Pass experiences flooding by the airport and residential areas. Past events have required the use of heavy equipment to divert flooding from the creek to an adjacent stream.

King Cove indicated bank destabilization affects West Lagoon Road, located across King Cove, and increases with flooding and rain. Rams Creek and roads along the lagoon experience flooding when strong winds combine with high tide.

Akutan noted that all of their utilities are near the shoreline and could be impacted by bank destabilization.

4.2.3 History

The Aleutians East Borough experiences severe road surface damages and erosion from heavy rainfall, snowmelt, and spring run-off flooding. Spring run-off causes the most damages to the community's road surfaces.

The Army Corps of Engineers (USACE) completed their Alaska Baseline Erosion Assessment in 2009. The report listed the communities of False Pass and Nelson Lagoon as "Monitor Conditions Communities." The report further listed King Cove and Sand Point as "Minimal Erosion Communities." Port Heiden, in the Lake and Peninsula Borough was the closest community listed as a "Priority Action Community."

4.2.4 Extent and Impact

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

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 erosion, and/or wind. 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 destabilization 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).

4.2.5 Recurrence Probability

Based on previous occurrences, USACE Floodplain Manager's report, and criteria in Table 8, there is a likely but limited chance of recurrence 1 in 5 year (1/5=20 percent) chance of occurring. History of events is greater than 10 percent but less than or equal to 20 percent likely per year. There is no data identifying a 500-year (0.2 percent chance of occurring in a given year) flood threat in the Aleutians East Borough.

4.3 TSUNAMI AND SEICHE

4.3.1 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 in 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 tsunamis and seiches 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 U.S.

Seiches occur in 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 in the enclosed area until the energy is fully spent causing repeated impacts and damages.

4.3.2 Location

The State of Alaska, the UAF/GI, and the National Oceanic and Atmospheric Administration's (NOAA) Pacific Marine Environmental Laboratory indicate that the Aleutians East Borough has a moderate tsunami

impact threat. Many believe their relatively protected location on the northern side of the island – away from Aleutian Trench created tsunami sources would protect them from severe impacts. However, the UAF/GI conducted tsunami models that demonstrates the Harbor and airport areas may receive significant water current impacts with whirlpools, the UAF/GI's "specific scenario" model sequence - 65 minutes to 105 minutes series.

The planning team in King Cove indicated they experienced tsunami watches and warnings within the past year but had not experience an event. The City of Sand Point have facilities such as the airport located at sea level and adjacent to the waterfront, that may be impacted in the case of a tsunami. Nelson Lagoon experiences tidal waves and high surf that affect infrastructure along their coast. Akutan noted that because of their location, they are not sure a tsunami would be a threat.

4.3.3 History

The Aleutians East Borough is in close proximity to historic tsunamigenic events that have occurred along the Aleutian Trench. The West Coast/Alaska Tsunami Warning Center (WC/ATWC) lists the following earthquake generated tsunamis with observed or measured tsunami waves throughout the Aleutians East Borough (Table 10).

Table 10. Aleutians East Borough's Historic Aleutian Tsunamis Waves

Date	Location	Earthquake Moment Magnitude (MW)	Wave Height Ft./Meters	Source	
				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

4.3.4 Extent and Impact

Extent

Based on historic earthquake events, UAF GI, University of Washington, and the Pacific Marine Environmental Laboratory information, and the criteria identified in Table 7, the magnitude and severity of tsunami impacts to Aleutians East Borough are considered limited with injuries and/or illnesses that do not result in permanent disability; complete critical facility shutdown for more than one week, and more than 10 percent of property could be severely damaged.

Impact

UAF GI's Dr. Elena Sulemani and Dmitry Nicolski indicate there is a high potential of the Aleutians East Borough receiving future tsunami impacts.

Dr. Elena Sulemani states:

> *I think that the NOAA's SIFT [Short-Term Inundation Forecast for Tsunami] modeling summary gives a [sound] estimate of the tsunami threat to Unalaska. Based on our recent modeling results, there could be a wave of about 2 meter high coming into the Unalaska [B]ay from a tsunami source located along the Aleutian trench.*

Dmitry Nicolski further postulates:

> *Some local landslide-generated tsunamis might produce higher runup values, but there is little known about them in this region.*
>
> *The tsunami currents could be extremely dangerous especially in passages between Amaknak and Unalaska Islands. Here is a small very preliminary visualization of the tsunami currents around Amaknak Island: http://atom.giseis.alaska.edu/misc/DutchHarbor.wmv*
>
> *Please notice lots of whirlpools forming in and around the passages. The blue arrows show the water velocity. The water level changes between -2 and +2 meters, but this is only for this particular scenario and this is not the so-called worst case scenario.*

Yong Wei, (Joint Institute for the Study of Atmosphere and Ocean, University of Washington and NOAA Center for Tsunami Research, NOAA Pacific Marine Environmental Laboratory presentation at the American Society of Civil Engineers "Solutions to Coastal Disasters 2008: Tsunamis" conference. Yong postulated that Unalaska, near the Aleutians East Borough, could have a substantial tsunami impact.

> *Being the most populous area in the Aleutians, Unalaska is considered as one of Alaskan coastal communities with high potential for tsunamis. As part of NOAA's Short-term Inundation Forecast for Tsunami (SIFT), a Stand-by Inundation Model (SIM) based on the MOST model is applied in this study to assess the tsunami impact for Unalaska. The model validation using historical tsunami events show excellent agreement between the model computation and observations, which gives rise to the accuracy of the inundation model. This study provides inclusive tsunami impact assessment for Unalaska, AK subject to a total of 2681 distant and local tsunamis scenarios in the Pacific at different level of earthquake magnitude Mw 7.5, 7.8, 8.2, 8.7 and 9.3. This study also investigates the impact caused by the hypothetical scenarios initiated in Unalaska gap and Shumagin gap at different level of earthquake magnitude Mw 7.5, 8.0, 8.5, and 9.0. The computational maximum tsunami runup suggests the current definition of Tsunami Safe Zone in Unalaska, areas above 50ft (~15m), is conservative.*

4.3.5 Recurrence Probability

The Alaska Division of Geological & Geophysical Surveys (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 Aleutians East Borough has a minor tsunami impact history. While it is not possible to predict when a tsunami will occur, NOAA's Short-Term Inundation Forecast for Tsunami model. Therefore, following the criteria delineated in Table 8, a distant source tsunami is likely to occur, but the recurrence interval is unknown. Too many factors determine when the next event will occur, as supported by known bathymetric conditions adjacent to the Aleutians East Borough area.

4.4 VOLCANIC ASH

4.4.1 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.

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 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 a significant volcanic hazard to the Aleutians East Borough 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.

4.4.2 Location

Table 11 lists the AVO's identified volcanos located along the Aleutian Chain. The AVO publishes individual hazard assessments for each active volcano in Alaska. 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 4 indicates the most likely volcanoes to impact Southwest Alaska and the Aleutian chain.

Table 11. 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

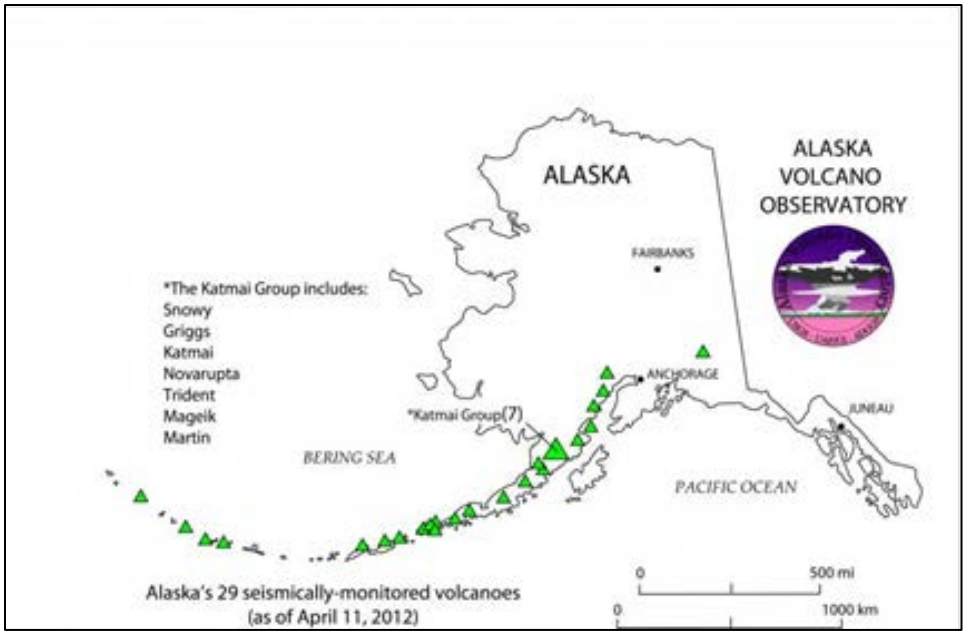

Figure 4. Alaska's Seismically Monitored Volcanoes

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.

Many of the volcanoes in Alaska are capable of producing eruptions that can affect far distant communities. A large ash plume has the capability of shutting down air, and potentially, ferry and barge operations because tephra is damaging to all engine types. Large tephra could cause further damage from direct impact damages.

Figure 5 displays air travel routes identified by the USGS and the active volcanoes which could easily disrupt air travel during significant volcanic eruptions with ash fall events. Figure 6, (DGGS Makushin Hazard Assessment Report of Investigation 200-4, Figure 8), explains how an explosive Makushin Volcano eruption's plumes could impact airline flight routes.

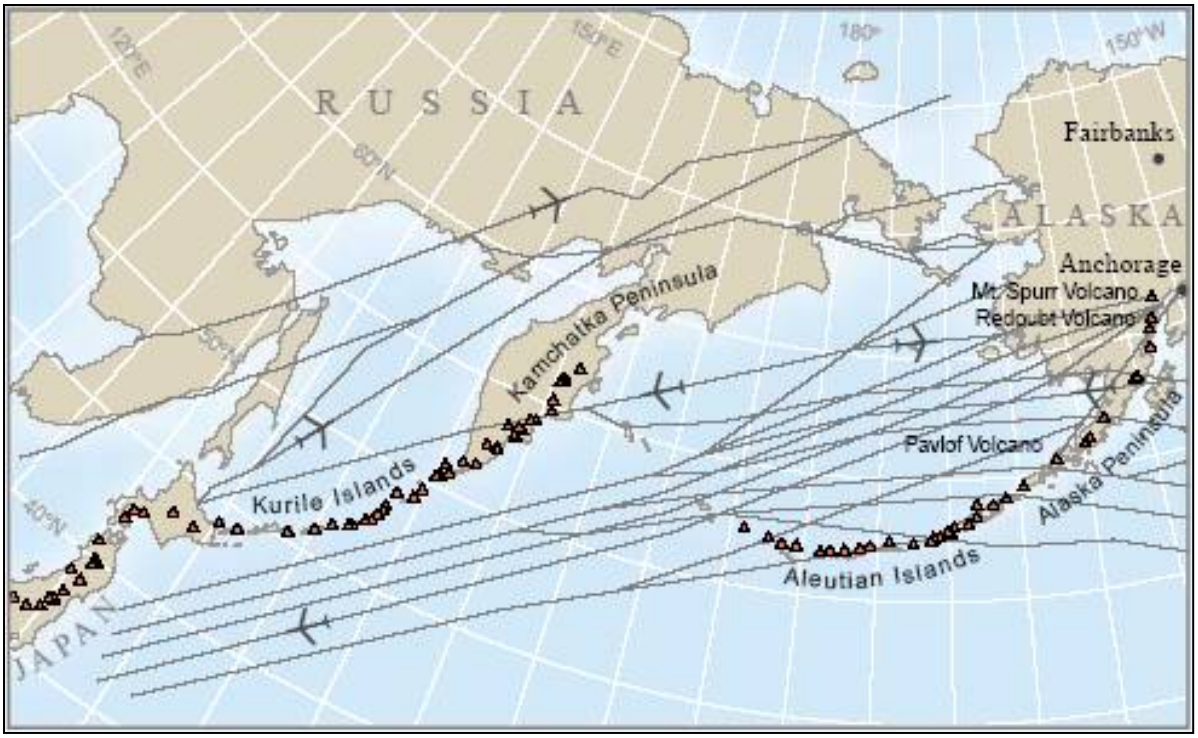

Figure 5. North Pacific Air Travel Routes

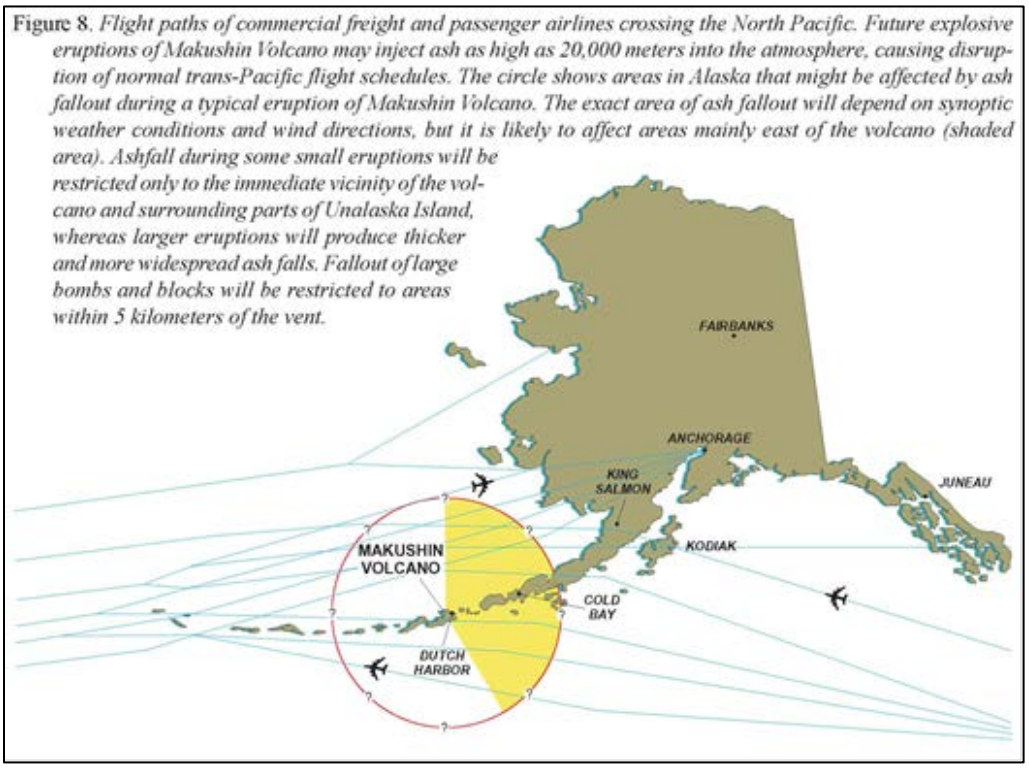

Figure 6. Makushin Volcano Flight Proximity

4.4.3 History

The AVO and its constituent organizations has 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 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.*

Recent volcano eruption impacts demonstrate modern community vulnerability to volcanic ash dispersal and travel distance statewide. On January 19, 2020, the Alaska Volcano Observatory increased the Aviation Color Code to "Red" and Alert Level to "Warning" for activity regard Shishaldin Volcano, located in the eastern Aleutian Islands. The Volcano Activity Notification for the event states,

> *Starting at about 09:30 UTC (12:30 AM AKST), the eruption at Shishaldin intensified, and about two hours ago began generating a more ash-rich volcanic plume. The plume now extends from the summit 150 km east and is as high as about 20,000 ft asl, as seen in satellite data. Seismicity is elevated and the eruption is detected on regional infrasound arrays. The aviation color code is being raised to* ***RED*** *and the volcano alert level to WARNING.*
>
> *Shishaldin is one of the most active volcanoes in the Aleutian volcanic arc, with at least 54 episodes of unrest including over 24 confirmed eruptions since 1775. (AVO 2020)*

The planning team in the City of King Cove and False Pass reported ash from the 2020 Shishaldin eruption in their community prompting False Pass to take precautions such as recommending the use of N95 particle masks and eye protection (McKenney 2020). The Agdaagux tribe of King Cove noted their location between Pavlov and Shishaldin to highlight their experiences with and susceptibility to ash fall. Members of the planning team in Sand Point acknowledged the direct and indirect affects that volcanic eruptions and ash fall have on flight patterns going to and from their community.

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

Table 12. Aleutian Volcano Eruption Events

Aleutian Volcanoes and Their Respective Eruption Dates				
Akutan 10: ✱ 1765-1953 30: ! 1848-1992 4: i 1996-2007	**Fisher** 3: ✱ 1795-1830	**Kiska** 3: ✱ 1907-1987 4: ! 1962-1990 1: i 1943	**Pavlof Sister** 1: ✱ 1762	**Ukinrek-Maars** 1: ! 1977
Amak 2: ✱ 1700-1796	**Gareloi** 6: ✱ 1760-1996 10: ! 1791-1989	**Korovin** 8: ✱ 1829-2005 3: ! 1973-1998 3: i 1996-2006	**Seguam** 3: ✱ 1827-1927 6: ! 1786-1993	**Veniaminof** 4: ✱ 18572-1987 18: ! 1830-2013 1: i 1999
Amukta 5: ✱ 1770-1997 4: ! 1786-1996	**Great Sitkin** 7: ✱ 1760-1987 8: ! 1767-1974 3: i 1974-2002	**Little Sitkin** 3: ✱ 1776-1900 1: i 2012	**Semisopochnoi** 4: ✱ 1772-1830 2: ! 1873-1987 1: i 2014	**Vsevidof** 5: ✱ 1784-1957 2: i 1790-1999
Aniachak 1: ! 1931 7: i 1942-2010	**Kagamil** 1: ✱ 1929	**Makushin** 14: ✱ 1790-1993 10: ! 1769-1995 10: i 1871-2010	**Shishaldin** 30: ✱ 1775-2009 26: ! 1824 2014 5: i 1913-2005	**Westdahl** 3: ✱ 1820-1979 7: ! 1795-1991
Bogoslof 4: ✱ 1908-1951 8: ! 1796-1992	**Kanaga** 5: ✱ 1763-1996 6: ! 1786-2012 3: i 1790-1933	**Okmok** 3: ✱ 1878-1936 14: ! 1817-2008 4: i 1805-2009	**Tanaga** 3: ✱ 1763-1829 1: ! 1914 1: i 2005	**Wrangell** 3: ✱ 1820-1979 2: ! 1795-1991 3: i 1996-2010
Carlisle 1: ✱ 1987 3: i 1774-1838	**Kasatochi** 4: ✱ 1760-1899 1: ! 2008 2: i 2005-2006	**Pavlof** 10: ✱ 1762-1903 36: ! 1817-2007 4: i 1999-2005	**Ugashik-Peulik** 2: ✱ 1814-1852	**Yunaska** 3: ✱ 1817-1929 3: ! 1824-1937
Cleveland 8: ✱ 1774-2010 26: ! 1828-2014	**Key:** ! Eruption ✱ Questionable eruption i Non-eruptive activity			

4.4.4 Extent and Impact

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.

The Aleutians East Borough and each included community will receive some ash fall during a massive volcanic eruption. A tsunami is possible if the eruption included a massive, high speed pyroclastic flow into the Bering Sea. A much more likely affect would be prolonged traffic disruptions (air, land, or rail) preventing essential community resupply e.g. food and medicine delivery, and medical evacuation service capabilities to full service hospitals.

A massive eruption anywhere on earth could severely affect the global climate; radically changing the Aleutians East Borough's long-term weather event risks for weeks, months, or years.

Based on historic volcanic activity impacts and the criteria identified in Table 7, the magnitude and severity of impacts in the Aleutians East Borough are considered negligible; with injuries treated with first aid, minor quality of life lost, the potential for critical facilities to shut down for 24 hours or less, and less than 10 percent 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 Aleutians East Borough 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. Residents would likely experience respiratory problems from airborne ash, personal injury, and potential residential displacement or lack of shelter with general property damage (electronics and unprotected machinery), structural damage from ash loading, state/regional transportation interruptions, loss of commerce, as well 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 Aleutians East Borough residents to be completely self-sufficient.

4.4.5 Recurrence Probability

Geologists can make general forecasts of long-term activity associated with individual volcanoes by carefully analyzing past activity, but these are on the order of 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 and compounds of sulfur and chlorine emissions 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 presented in Table 8, it is likely a volcanic eruption will occur within the next ten years. Event has up to 1 in 10 years (1/10=10 percent) chance of occurring. History of events is less than or equal to 10 percent likely per year. Vulnerability depends on the type of activity and current weather, especially wind patterns

4.5 SEVERE WEATHER

4.5.1 Nature

Severe weather occurs throughout Alaska with extremes experienced by the Aleutians East Borough including thunderstorms, lightning, hail, heavy and drifting snow, freezing rain/ice storm, extreme cold, and high winds. The Aleutians East Borough experiences periodic severe weather events such as the following:

Climate Change influences the environment, particularly historical weather patterns. Climate change and 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 in 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 events 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 (riverine and storm surge) and severe winter storms. Therefore, increased awareness and understanding how ENSO events potentially impact Alaska's vastly differing regional weather.

Climate change is described as a phenomena 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, 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 threat to Aleutians East Borough. 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. 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 occur rather frequently over the Aleutians East Borough coastal areas. High winds can be a severe threat and have been recorded at greater than 100 mph on several occasions.

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.

Figure 7 displays Alaska's annual rainfall map based on Parameter-elevation Regressions on Independent Slopes Model that combines climate data from NOAA and NRCS climate stations with a digital elevation model to generate annual, monthly, and event-based climatic element estimates such as precipitation and temperature.

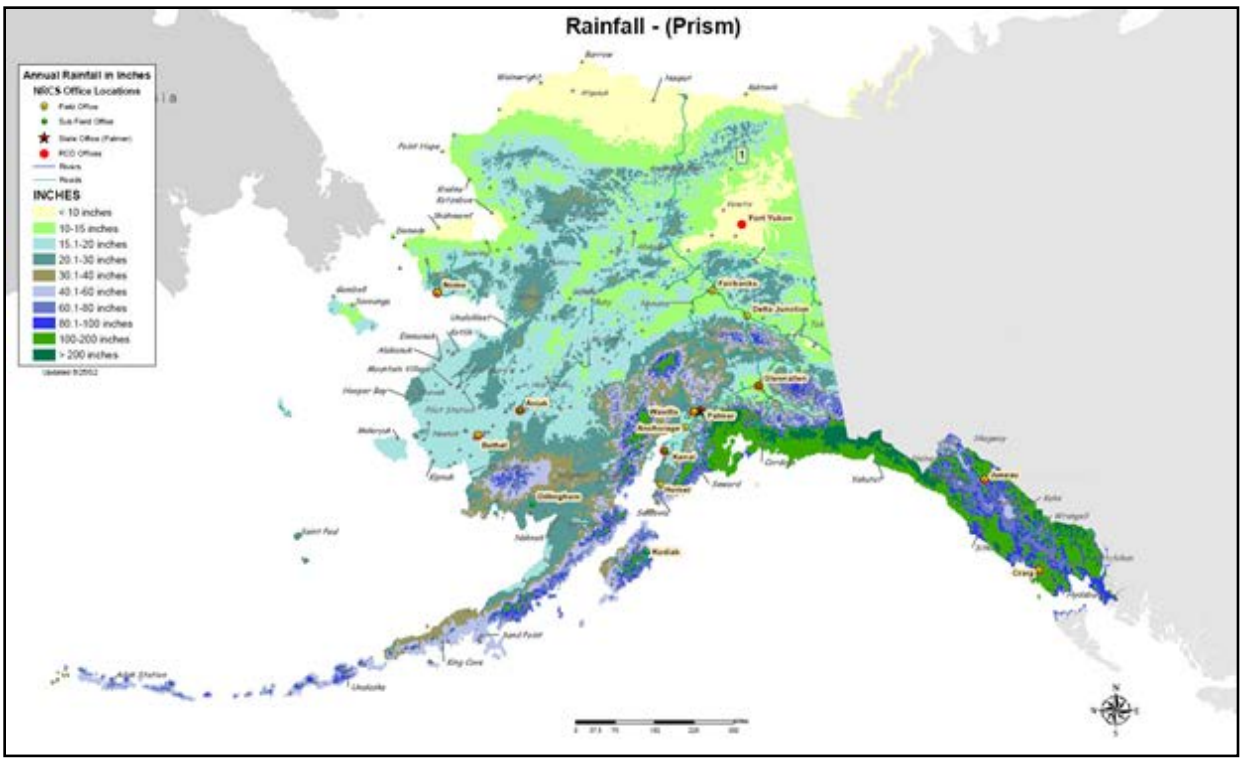

Figure 7. Statewide Rainfall Map

4.5.2 Location

The entire area experiences periodic severe weather impacts. The most common to the area are high winds and severe winter storms. Table 13 depicts weather events that have impacted the area since 2000 and are provided as a representative sample.

4.5.3 History

The Aleutians East Borough is continually impacted by severe weather events. Hurricane force wind, storm surge, and cold typically have disastrous results. DHS&EM's Disaster Cost Index records the following severe weather disaster events which may have affected the area:

> ***83. Omega Block Disaster, January 28, 1989 & FEMA declared (DR-00826) on May 10, 1989****: The Governor declared a statewide disaster to provide emergency relief to communities suffering adverse effects of a record breaking cold spell, with temperatures as low as -85 degrees. The State conducted a wide variety of emergency actions, which included: emergency repairs to maintain & prevent damage to water, sewer & electrical systems, emergency resupply of essential fuels & food, & DOT/PF support in maintaining access to isolated communities.*
>
> ***86. Sand Point, February 27, 1989:*** *After the Omega Block cold spell caused permanent damage to the water main serving the Sand Point boat harbor, the Governor declared a disaster to provide assistance in repairing the line & restoring services.*
>
> ***00-191 Central Gulf Coast Storm declared February 4, 2000 by Governor Murkowski Murkowski then FEMA declared (DR-1316) on February 17, 2000:*** *On Feb 4 2000, the Governor declared a disaster due to high impact weather events throughout an extensive area of the state. The State began responding to the incident since the beginning of December 21, 1999. The declaration was expanded on February 8 to include City of Whittier, City of Valdez, Kenai Peninsula Borough, Matanuska-Susitna Borough and the Municipality of Anchorage. On February 17, 2000, President Bill Clinton determined the event disaster warranted a major disaster declaration under the Robert T. Stafford Disaster Relief and Emergency Assistance Act, P.L. 93-288*

as amended ("the Stafford Act). On March 17, 2000, the Governor again expanded the disaster area and declared that a condition of disaster exists in ***Aleutians East****, Bristol Bay, Denali, Fairbanks North Star, Kodiak Island, and Lake and Peninsula Boroughs and the census areas of Dillingham, Bethel, Wade Hampton, and Southeast Fairbanks, which is of sufficient severity and magnitude to warrant a disaster declaration. Effective on April 4, 2000, Amendment No. 2 to the Notice of a Major Disaster Declaration, the Director of FEMA included the expanded area in the presidential declaration. Public Assistance, for 64 applicants with 251 PW's, totaled $12.8 million. Hazard Mitigation totaled $2 million. The total for this disaster is $15.66 million.*

AK-15-256 2015 December Bering Sea Storm declared by Governor Walker on January 29, 2016 then FEMA declared on February 17, 2016 (DR-4257): *Beginning December 12, 2015 and continuing for several days, the low pressure system reached 933 mbars moving northeast from the Central and Western Aleutian Islands past the Pribilof Islands, and into the Yukon-Kuskokwim Delta region. These communities were impacted by hurricane force winds exceeding 100 miles per hour (mph) and gusts of up to 122 mph, high tidal ranges, and strong sea surges up to 10 feet above mean sea level (msl). Island communities also experienced extreme wave heights of 40–50 feet. This combined weather system began on December 15, 2015 and extended the incident period to December 19, 2015.*

Severe weather events have historically impacted the entire Aleutians East Borough. Rural communities generally lack capacity to track changing climate conditions. 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. SNAP data tools depict the Aleutians East Borough's historic and future predicted precipitation and temperatures. (Figures 8 and 9).

How to Interpret 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 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: Both precipitation and temperature are projected to remain consistent throughout the various seasons. However, the warm weather months (July through October) may experience slightly higher temperatures and precipitation due to anticipated climatic changes. Rain and snow variations could dramatically determine wildland fire potential as well as adversely impact future

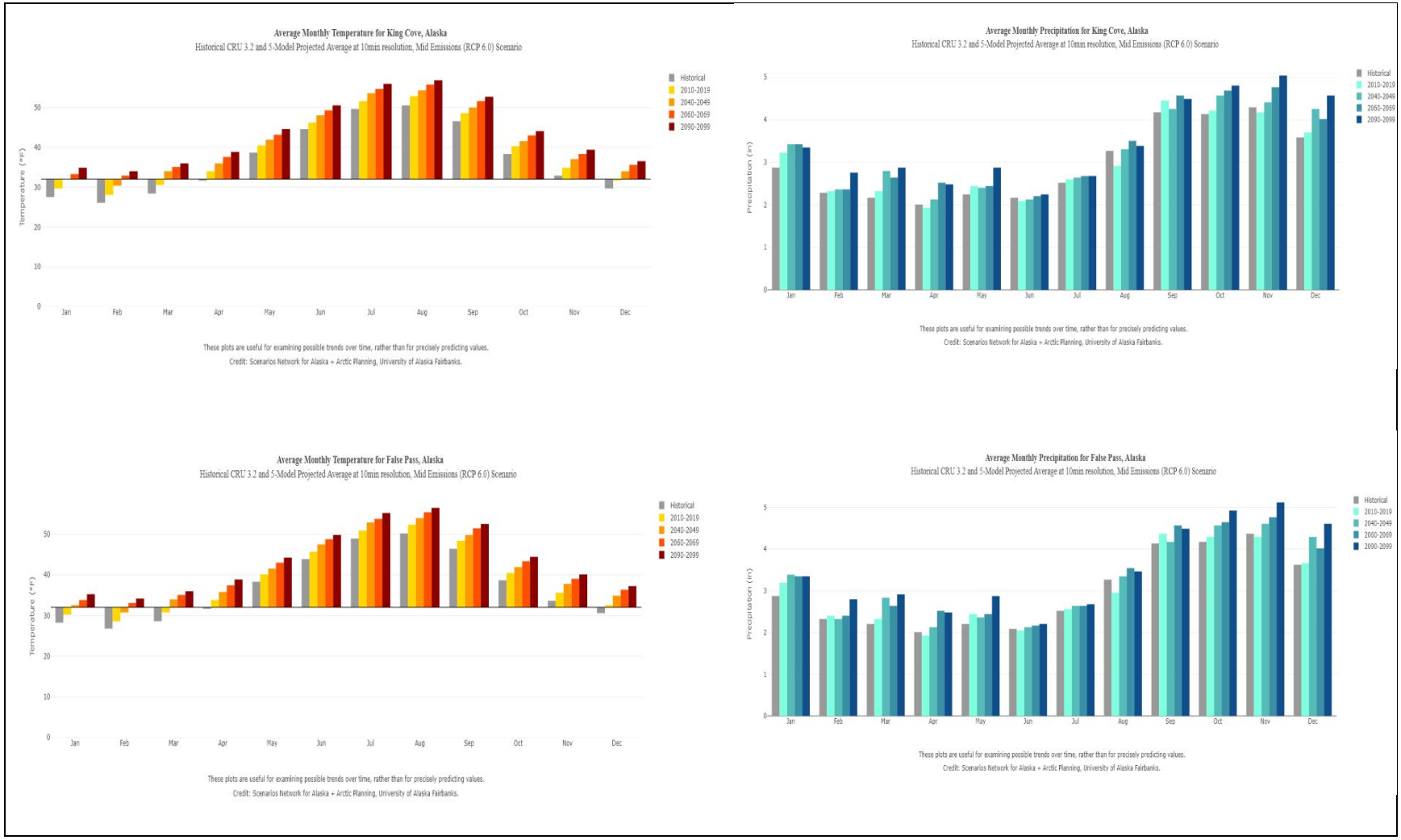

Figure 8. SNAP data for King Cove and False Pass

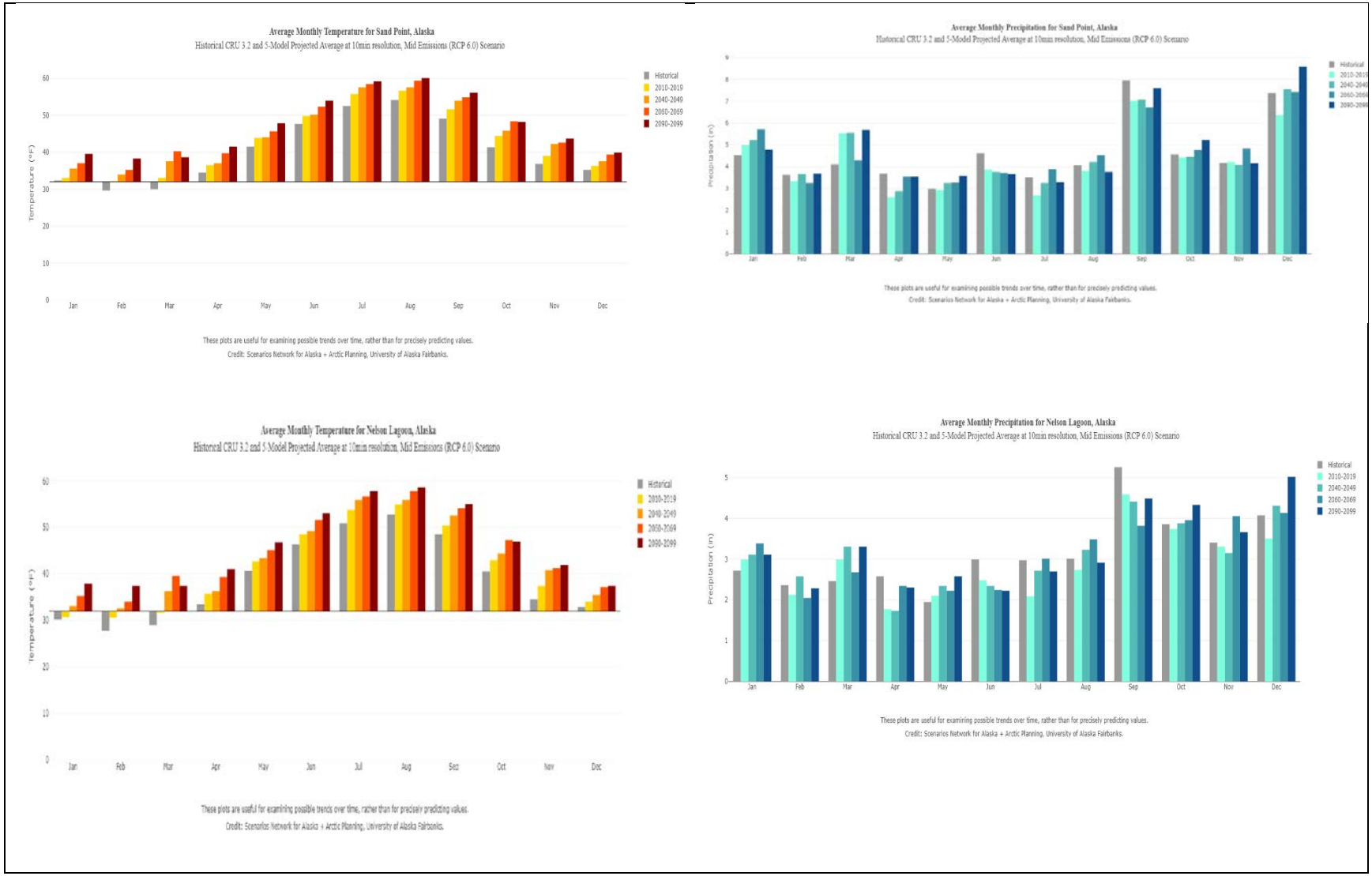

Figure 9. SNAP Data for Sand Point and Nelson Lagoon

The events listed below were identified by the NWS as severe weather events for the Aleutians East Borough. These events are listed due to their proximity to listed communities or by location within the identified zone. Each weather event may not have specifically impacted each community within AEB (NOAA 2020).

Table 13. Aleutians East Borough Area Severe Weather Events

Location	Date	Event Type	Magnitude
Eastern Aleutians	12/23/2016	High Wind	A triple point low moved through the Eastern Aleutians…A peak gust of 74 knots was measured on a secondary wind sensor on the Unalaska Airport runway.
Eastern Aleutians	11/11/2015	High Wind	Winds remained just below hurricane force in the Central Aleutians, but were significantly stronger in the Eastern Aleutians, causing significant damage…Damage at Akutan reported by local emergency manager: Construction materials at a new fourplex blown away.
Alaska Peninsula	12/25/2015	High Winds	This storm brought strong winds to the Aleutians and Pribilof Islands and caused blizzard conditions along the West Coast with snow ahead of the front. One death attributed to whiteout conditions occurred during this time. Prolonged periods of high winds and heavy waves caused damage along the West Coast…Port Heiden observed winds over 73 mph for 3 hours during this time.
Eastern Aleutians	2/7/2014	High Wind	Strong northwest wind blew across the Eastern Aleutians with a measured peak gust of 114 mph…Strong wind blew across the Alaska Peninsula with the peak gust reaching 79 mph in King Cove.
Western Aleutians	1/15/2013	High Winds	A very strong low with a central pressure of 936 mb developed off Japan and moved to the western Aleutian Islands. Winds reported 70 mph with a peak of 74 mph.
Alaska Peninsula	2/9/2013	Blizzard	False Pass (PAKF) began to experience blizzard conditions…the visibility was 1/4 mile in heavy snow and…Winds in this event were particularly strong with gusts over 60 mph…The strongest wind was a 72 mph gust southwest winds were gusting to 51 mph.
Alaska Peninsula	2/25/2013	Blizzard	King Cove (PAVC) developed blizzard conditions at 3:56 AM and blizzard criteria was reached at 6:56 AM…. Winds in King Cove were quite strong with peak gusts over 75 MPH from 6 AM through the end of the event. The strong peak wind gust was at 11:56 AM when it reached 90 MPH
Alaska Peninsula	10/24/2013	High Wind	Winds gusting 70 mph or higher were reported at False Pass, Cold Bay and King Cove. The highest gust was 72 MPH at False Pass.
Central Aleutians	12/08/2012	Blizzard	A large intense North Pacific storm moved across the Eastern Aleutians and Alaska Peninsula December 8th. This storm spread snow along with strong wind across the Central Aleutians to the Pribilof Islands and the Bristol Bay and Kuskokwim Delta areas resulting in blizzard conditions.
Central Aleutians	3/1/2010	High Wind	An intense North Pacific storm moved across the Bering Sea north of the Aleutian Islands. As it passed the central Aleutians, hurricane force gusts to 75 mph were observed at Adak**.**
Eastern Aleutians	12/3/2009	High Wind	Two powerful north Pacific storms moved across the eastern Aleutians beginning December 4th continuing through December 7th. The storms produced winds of 125 mph across the eastern Aleutians and Alaska Peninsula and to 70 to 85 mph across the Bristol Bay area and to around 75 mph in the Pribilof Islands…significant damage was reported in King Cove.
Eastern Aleutians	2/13/2006	Debris Flow	An intense storm rapidly moved from the north Pacific into the Bering Sea on February 13th….Reports received from the vessel Stimson in Akutan were of wind peaking at 123 knots that resulted in the vessel "tipping over" in the

Table 13. Aleutians East Borough Area Severe Weather Events

Location	Date	Event Type	Magnitude
			harbor. Along with the high wind, heavy rain occurred…. Several landslides occurred. One landslide completely destroyed a building and its contents and another pushed a building off its foundation.
Aleutian Islands	11/12/2000	High Wind	The front associated with the storm was preceded by very strong south and southeast winds across the Aleutians…leaving close to 4 inches around Cold Bay in a 24 hour period. Classic urban drainage and small stream flooding was reported in this tiny western Alaska Peninsula community of less than 100 people…Stronger winds, gusting around 100 mph, at King Cove produced considerable damage and several injuries due to flying debris

4.5.4 Extent and Impact,

Extent

The entire Aleutians East Borough area is equally vulnerable to the severe weather effects. The Aleutians East Borough experiences severe storm conditions with moderate snow depths; wind speeds exceeding 90 mph; and average low temperatures that only reach 27.6 ºF.

Based on past severe weather events and the criteria identified in Table 7, the magnitude of severe weather in the Aleutians East Borough is considered limited, where injuries do not result in permanent disability, complete shutdown of critical facilities does not occur for more than one week, and less 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 flooding. The cost of snow removal, repairing damages, and the loss of business can have severe economic impacts on cities and towns.

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

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

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

4.5.5 Recurrence Probability

Based on previous occurrences and the criteria identified in Table 8, it is likely a severe storm event will occur in the next three years (event has up to 1 in 3 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.

4.6 WILDLAND FIRE

4.6.1 Nature

A wildland fire is a wildfire type that spreads through vegetation consumption. It often begins unnoticed, spreads quickly, and is usually signaled by dense smoke that may be visible from miles around. Wildland fires can be caused by human activities (such as unattended burns or campfires) or by natural events such as lightning. Wildland fires often occur in forests or other areas with ample vegetation. In addition to wildland fires, wildfires can be classified as tundra fires, urban fires, interface or intermix fires, and prescribed burns.

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

Topography describes slope increases, which influences the rate of wildland fire spread increases. South-facing slopes are also 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 plays a significant role in the occurrence and spread of wildland fires. Certain types of plants are more susceptible to burning or will burn with greater intensity. Dense or overgrown vegetation increases the amount of combustible material available to fuel the 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 is weather. Temperature, humidity, wind, and lightning can affect chances for ignition and spread of fire. Extreme weather, such as high temperatures and low humidity, can lead to extreme wildland fire activity.

Climate change increases the susceptibility of vegetation to fire due to longer dry (drought) seasons. By contrast, cooling and higher humidity often signal reduced wildland fire occurrence and easier containment.

The frequency and severity of wildland fires is also dependent on other hazards, such as lightning and infestations (such as the 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 and resources and destroy 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.

The indirect effects of wildland fires can be catastrophic. In addition to stripping the land of vegetation and destroying 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 enhance rivers and stream siltation, thereby enhancing flood potential, harming aquatic life, and degrading water quality. Lands stripped of vegetation are also subject to increased debris flow hazards.

4.6.2 Location

Under certain conditions wildland fires may occur near residential areas and other infrastructure when weather, fuel availability, topography, and ignition sources combine. The Aleutians East Borough legacy MHMP provides a risk assessment that states,

> *Both the history and likelihood of wildfire within the Aleutians East Borough is negligible as a stand-alone threat. Within Alaska, lightning, especially "dry-lightning," is the leading cause of wildfire. The proper combination of fuel type, fuel moisture and natural ignition sources required for "natural" wildfire will rarely converge in the Aleutians East Borough.*
>
> *In Alaska, vegetation, the key element in wildfire, is documented to be changing in accordance with the current climate-warming trend. Maritime climate influences, however, have a tendency to attenuate changes in the environment, especially in insular or peninsular community locations. The relative humidity regime of the maritime influence generally prevents radical changes in fuel moisture content, which in turn affects combustibility.*
>
> *More likely, wildfire would be the result of other critical events such as earthquakes, tsunamis and hazardous material conflagration. (AEB MHMP 2010)*

The Aleutians East Borough area does not have official fuels data. The City of False Pass described wildland fire as a very low risk but acknowledged the presence of Alders as a fire fuel.

4.6.3 History

The legacy Aleutians East Borough HMP (AEB 2010) and State of Alaska AHMP designates wildland fire as a hazard that is not present in this jurisdiction and a low threat to the community. The Alaska Interagency Coordination Center identified 10 wildland fires that have occurred within 50 miles of the identified cities and villages in the Aleutians East Borough. The majority of the fires were of human origin. Table 14 lists those fires from 1965 to present (AICC 2020).

Table 14. Aleutians East Borough Historic Fires

Fire Name	Location	Fire Year	Estimated Acres	Cause
Unga Island 433	Unga Island	2019	.10	Human
Trident 004	Akutan	2018	.50	Open Trash Burning
Akutan 003	Akutan	2018	17.90	Open Trash Burning
Beaver Bay 202	38 miles from Nelson Lagoon	2010	3.00	Campfire
Sand Point 200	Sand Point	2010	3.50	Human
Popof	Sand Point	1996	30.0	Cooking Fire
Canoe Bay	30 miles from Nelson Lagoon	1992	30.0	Other
Unimak	20 miles from False Pass, 15 miles from False Pass ANVSA	1982	500.0	Human
Seal Cape	40 miles from Nelson Lagoon	1968	5.0	Debris Burning
Unga Island	Unga Island	1965	320.0	Human: Recreation

4.6.4 Extent and Impact

Extent

Although there has been a history of some wildland fires in the AEB, the threat is currently low. The planning team expressed concern that this could be a future risk. As summers become warmer and drier, there is a greater potential that fuel sources could increase. The extent of the hazard would likely occur in areas away from riparian habitats and uplands, where fuel sources are likely to accumulate.

Impact

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.

Based on the limited number of historical wildland fire events and the criteria identified in Table 7, the magnitude and severity from wildland fire in Aleutians East Borough 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.

4.6.5 Recurrence Probability

Based on the history of wildland fires in the AEB area and applying the criteria identified in Table 8, it is unlikely but possible a wildland fire event will occur within the AEB 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.

4.7 OTHER HAZARDS

Some communities in the AEB expressed concern over the potential for dam failure, and the potential for effects to public health, from the movement of people and seasonal workers. The State of Alaska Hazard Mitigation Plan addresses these hazards in an annex and note that they will no longer be included in future SHMP updates. A brief description of each is below.

4.7.1 Dam Failure

Nature:

Alaska Statute 46.17.900(3) defines a dam as, "an artificial barrier and its appurtenant works, which may impound or divert water." To be regulated as a dam under state jurisdiction, a barrier must meet at least one of the following three descriptions listed in the statute:

1. Have an impounding capacity at maximum water storage elevation of 50 acre-feet and be at least 10 feet tall measured from the lowest point at either the upstream or downstream toe of the dam to the crest of the dam

2. Be at least 20 feet tall measured from the lowest point at either upstream or downstream toe of the dam to the crest of the dam regardless of its storage capacity

3. Pose a threat to lives and property in the event of a failure or improper operation of the dam or barrier

Dams owned or operated by the federal government or regulated by the Federal Energy Regulatory Commission are exempt from state jurisdiction, in addition to artificial barriers that fail to meet the statutory

definition of a dam. At present, there are 180 dams listed on the Alaska Dam Inventory database at the Alaska Department of Natural Resources, including state, federal and non-jurisdictional dams. The Alaska Dam Safety Program is responsible for supervising the safety of the dams under its jurisdiction.

All dams are classified according to their potential impacts from catastrophic failure; referred to as their "hazard potential" classification. The hazard potential only describes dam failure consequences, but provides no information on the condition of a dam or its failure likelihood. Classifications range from Class I (high threat level) to Class III (low threat level). A Class I or Class II dam is considered to pose a threat to lives or property.

Location: The Aleutians East Borough has dams in Akutan, False Pass, Sand Point, and Squaw Harbor.

History: There have been several dam failures in Alaska's history, but no catastrophic failures since the 2007 structural failure in Kake.

Extent and Impact: Potential impact from a dam failure event can be a dramatic incident that results in a major catastrophe with substantial economic impacts and loss of life. There are varying degrees of failure that can contribute to uncontrolled water release from the reservoir, ranging from improper gated spillway operation to the partial or full breach of the dam's main structural components. Lesser degrees of failure often occur in advance of a catastrophic failure and are generally amenable to mitigation if detected and properly addressed. Based on the criteria in Table 7, the magnitude of a dam failure could be Limited; injuries would not result in permanent disability, critical facilities could be shut down for more than one week, and more than 10 percent of property could be severely damaged.

Recurrence Probability: Based on the criteria in Table 8, the estimated probability of recurrence of a dam failure in the AEB is Unlikely; the event has up to 1 in 10 years (1/10=10 percent) chance of occurring. History of events is less than or equal to 10 percent likely per year.

4.7.2 Public Health

Nature:

Infectious diseases are disorders caused by bacteria, viruses, fungi, and parasites entering the human body and multiplying. Infections range from mild to deadly depending on the organism and the host. Organisms enter the body through: skin contact; inhalation; ingestion; blood (intravenous contact, bites, or punctures); sexual contact; and transmission from mothers to unborn children.

While infectious diseases pose a threat to people of any age and health condition, they are often a greater hazard to very young children, older adults, or people with compromised health. Vaccines and other advances in medical technology have reduced risks of some infectious diseases; however, new diseases emerge, new strains of existing diseases appear, and diseases that have been previously eliminated may re-emerge.

Climate change is projected to adversely impact public health due to injuries and illnesses from severe weather events; increases in allergic, respiratory, vector-borne, and waterborne diseases; and threats to food and water supplies. While addressing these threats to public health is a challenge, developing adaptive public health capacities, integrating climate change impacts into current institutional learning, and improving resilience of local public health systems to climate change is essential to preventing injuries and illnesses, enhancing public health preparedness, and reducing risk.

Location: The Aleutians East Borough has many remote communities which potentially makes effective implementation of control measures challenging. The area is also a temporary home to large numbers of guest workers who may have increased risk for certain infectious diseases. Disease transmission is often greatest in high density situations such as airports, nursing homes, dormitories, schools, and restaurants.

History: The Alaska Department of Health and Human Services, Section of Epidemiology tracks annual disease outbreak trends. There have been no outbreaks in Alaska in recent history.

Extent and Impact: When a disease affects a greater portion of the population than would normally be expected, it is called either an outbreak (if limited in geography) or an epidemic. An epidemic that spreads across countries or continents is called a pandemic. Depending on the organism, outbreaks, epidemics, or pandemics may be considered public health emergencies, which require timely implementation of appropriate control measures. Such emergencies are commonly addressed through quarantine and immunization. Some populations are more vulnerable to outbreaks, made worse by limited access to healthcare. Based on the criteria in Table 7, the magnitude of an outbreak is Negligible; illnesses could be treated, critical facilities could be shut down for 24 hours or less, and less than 10 percent of property could be severely damaged.

Recurrence Probability: Outbreaks of infections diseases occur annually in the State of Alaska. Based on the criteria in Table 8, potential of an outbreak in the Aleutians East Borough is Likely; the event is probable in the next 3 years and has a 1 in 3 years chance of occurring (1/3 = 33 percent).

5 VULNERABILITY ASSESSMENT

This section describes and summarizes the overall vulnerability of the people and critical facilities to the hazards that occur in the AEB. 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.

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.

5.1 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.

A critical facility provides services and functions essential to a community, especially during and after a disaster. Common types of critical facilities include: fire stations, police stations, hospitals, schools, water and waste water systems, and utilities. Critical facilities may also include places that can be used for sheltering or staging purposes, such as community centers and libraries. Critical facilities may also include large public gathering spots.

Critical facility information was queried from the Alaska Critical Facilities database and reviewed and updated by the planning team. Due to many of the remote nature of the community – 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.

Since approximately 2010, the Division of Community and Regional Affairs (DCRA) is no longer able to collect diverse agency project data for Alaskan communities. Infrastructure improvement projects are still ongoing; however, there is no current information repository for this data.

5.2 VULNERABILITY

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

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 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.

Table 15. Vulnerability Overview

Hazard	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	45	65	65	65
Tsunami	45	65	65	65
Weather	100	100	100	100
Volcano	100	100	100	100

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.

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 Table 16 below.

Table 16. Overall Summary of Vulnerability

Hazard	Vulnerability
Earthquake	The Aleutians East Borough and surrounding area can expect to experience limited, moderate, significant earthquake ground movement that may result in infrastructure damage. Intense shaking may be seen or felt based on past events. Although all structures are exposed to earthquakes, buildings within The Aleutians East Borough constructed with wood have slightly less vulnerability to the effects of earthquakes than those with masonry. Based on earthquake probability maps produced by the USGS, the entire Aleutians East Borough area is at risk of experiencing moderate to significant earthquake impacts because of its proximity to known earthquake faults. The probability low or limited that impacts to the community such as severe ground movement may result in infrastructure damage and personal injury. The entire existing, transient, and future population, residential structures, and critical facilities are exposed to the effects of "severe" earthquake events. Impacts to future populations, residential structures, critical facilities, and infrastructure are anticipated at the same historical impact level.
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. No detailed 100 year flood analysis has been prepared for the Aleutians East Borough. The USACE The Aleutians East Borough anticipates that impacts to future populations, residential structures, critical facilities, and infrastructure will be at the same historical impact level.
Severe Weather	I 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 4 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 Aleutians East Borough and the National Weather Service; the entire Borough's existing, transient, and future population, residential structures, and critical facilities are exposed to future severe weather impacts. Impacts to future populations, residential structures, critical facilities, and infrastructure are anticipated at the same impact level.

Table 16. Overall Summary of Vulnerability

Hazard	Vulnerability
Tsunami and Seiche	The UAF/GI, DGGS, and NTWC indicate there are moderate distant and local source tsunami threats for the Aleutians East Borough population and infrastructure located within the identified tsunami impact area. Using information provided by the UAF/GI, DGGS, and WC/ATWC; the Borough's residential structures and infrastructure located adjacent to the identified tsunami impact area have a limited risk from tsunamigenic impacts. The Aleutians East Borough anticipates that impacts to future populations, residences, critical facilities, and infrastructure are at the same historical impact level.
Volcanic Ash	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. Using information provided by the Borough, the USGS, and the Alaska Volcano Observatory, AEB's entire existing and future population, residences, and critical facilities have a nearly equal risk from volcanic eruptions. The Aleutians East Borough anticipates that impacts to future populations, residences, critical facilities, and infrastructure are at the same historical impact level.
Wildland Fire	The planning team stated that persistent and recurring unseasonably hotter temperatures create conditions that are perfect for increasing wildland fire susceptibility. Although not a threat currently, fire frequency may increase in the future.

5.3 CULTURAL RESOURCES

Various community plans in the borough describe the area's rich historic and cultural heritage. Some specific cultural resources include:

- A library in Akutan that has a collection of Aleut and Alaskana items and artifacts, as well as a wide cross section of books for all ages. The museum displays local artifacts collected from the surrounding islands and the whaling station. In addition, a historical photo collection is displayed (City of Akutan 2005).
- Archaeological evidence indicates the area around Cold Bay was once inhabited by a large Native population, as long ago as the last ice age.
- In Sand Point, the St. Nicholas Chapel, a Russian Orthodox Church, was built in 1933 and is now on the National Register of Historical Places.

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

5.4 FUTURE DEVELOPMENT

The Aleutians East Borough and its planning team continually seeks to maintain and upgrade their aging infrastructure. Section 6, Mitigation Strategy, identifies potential projects they can accomplish to demonstrate how the community intends to continue improving their future development initiatives. These initiatives will culminate in their Mitigation Action Plan (MAP).

6 MITIGATION STRATEGY

Section 6 – Mitigation Strategy addresses Element C of the Local and Tribal Mitigation Plan Regulation Checklists.

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

Regulation Checklist – 44 CFR 201.6 Local Mitigation Plans
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))
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)(i))
C3. Does the Plan include goals to reduce/avoid long-term vulnerabilities to the identified hazards?
(Requirement §201.6(c)(3)(i))
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))
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))
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))

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

Regulation Checklist – 44 CFR 201.7 Tribal Mitigation Plans
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)]
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)]
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)
C4. Does the Plan identify and analyze a comprehensive range of specific mitigation actions and projects for each jurisdiction being considered to reduce the effects of hazards, with emphasis on new and existing buildings and infrastructure?
C5. Does the plan contain an action plan that describes how the actions identified will be prioritized, implemented, and administered by the tribal government? [44 CFR § 201.7(c)(3)(iii)]
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)]

6.1 AUTHORITIES, POLICIES, PROGRAMS, AND RESOURCES

The Aleutians East Borough is a collection of small communities collocated with cities and various tribal governments each with limited planning and land management tools. Their available resources have been assessed by the Cities and Villages as summarized in the tables below, indicating various regulatory tools, technical specialists, and financial and training resource available for project management.

Table 17. Aleutians East Borough's Regulatory Tools

Regulatory Tools (ordinances, codes, plans)	Existing Yes/No?	Comments (Year of most recent update; problems administering it, etc.)
Comprehensive Plan	Yes	Explains the AEB's land use initiatives and natural hazard impacts.
Land Use Plan	Yes/	Explains the AEB's land use goals and initiatives.
Tribal Land Use Plan	No	Describes the Village's community development goals and initiatives.
Emergency Response Plan	Yes	Not current
Wildland Fire Protection Plan	No	
Building code	No	
Zoning ordinances	No	
Subdivision ordinances or regulations	No	
Special purpose ordinances	No	

The Aleutians East Borough has limited "formal" planning and land management tools 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 18. Aleutians East Borough's Human and Technical Resources

Staff/Personnel Resources	Principal Activities Related to Hazard Mitigation
Planner or engineer with knowledge of land development and land management practices	The AEB or local jurisdictions hire planners and engineering consultants
Engineer or professional trained in construction practices related to buildings and/or infrastructure	The AEB or local jurisdictions hire engineers and engineering consultants
Planner or engineer with an understanding of natural and/or human-caused hazards	The AEB or local jurisdictions hire planners and engineering consultants
Floodplain Manager	The AEB does not have this capability
Surveyors	The AEB or local jurisdictions hire consultants when they need a surveyor.
Staff with education or expertise to assess the jurisdiction's vulnerability to hazards	The AEB or local jurisdictions hire consultants when they need a surveyor.
Personnel skilled in Geospatial Information System and/or Hazards Us-Multi Hazard software	The AEB has staff with this knowledge

Table 18. Aleutians East Borough's Human and Technical Resources

Staff/Personnel Resources	Principal Activities Related to Hazard Mitigation
Scientists familiar with the hazards of the jurisdiction	The AEB can work with U.S. Fish & Wildlife Service (USFWS) and Fish & Game (ADF&G), and the Alaska Department of Transportation and Public Facilities
Emergency Manager	The City Mayors and/or Administrators; Tribal President and/or Administrators as applicable
Finance (Grant writers)	The AEB or local jurisdictions hire consultants where not available in each jurisdiction
Public Information Officer	AEB personnel; The City Mayors and/or Administrators; Tribal President and/or Administrators as applicable

Table 19 introduces some financial resources that may be available to the Aleutian's East Borough, local jurisdictions, and/or tribes.

Table 19. Financial Resources for Hazard Mitigation

Type	Administrator	Purpose	Amount
General Fund	Borough Assembly, Local Jurisdictions, and Tribal Council	Program operations and specific projects.	Variable.
General Obligation Bonds	Borough Assembly, Local Jurisdictions, and Tribal Council	Used for the construction and/or acquisition of improvements to real property broadly available to residents and visitors. Such facilities include but are not limited to: libraries, hospitals, parks, public safety facilities, and cultural and educational facilities.	Variable.
Special Tax and Revenue Bonds	Borough Assembly, Local Jurisdictions, and Tribal Council	Used finance capital projects that: 1) have an identified budgetary stream for repayment (e.g., specified fees, tax receipts); 2) generate project revenue but rely on a broader pledge of general fund revenues to reduce borrowing costs; or 3) finance the acquisition and installation of equipment for the local jurisdiction's general governmental purposes.	Variable.
Indian Community Development Block Grants	HUD	Provides operational funds for tribal management activities	Project-specific.
Indian Environmental General Assistance Program	U.S. Environmental Protection Agency (EPA)	Provides funding for tribal environmental improvement activities	Project-specific.
Indian Housing Block Grant	HUD	Assists IRA Tribes with obtaining adequate housing	Variable.
Employment and Training Administration, Disaster Unemployment Assistance	Department of Labor	Provides disaster related unemployment by supporting employment and training activities	Variable.
Hazard Mitigation Grant Program (HMPG)	FEMA	Supports pre- and post-disaster mitigation plans and projects. Available to Alaska communities after a presidentially declared disaster has occurred in Alaska, administered by Alaska DHS&EM.	Project-specific.

Table 19. Financial Resources for Hazard Mitigation

Type	Administrator	Purpose	Amount
Homeland Security Preparedness Technical Assistance Program	FEMA/DHS	Supports preparedness technical assistance activities in support of the four homeland security mission areas (i.e., prevention, protection, response, recovery) and homeland security program management.	Project-specific.
Assistance to Firefighters Grant Program	FEMA/U.S. Fire Administration	Provides equipment, protective gear, emergency vehicles, training, and other resources needed to protect the public and emergency personnel from fire and related hazards. Available to fire departments and nonaffiliated emergency medical services providers.	Project-specific.
Land and Water Conservation Funds	U.S. Department of the Interior	Supports the protection of federal public lands and waters and voluntary conservation on private land.	Project-specific.
Community Action for a Renewed Environment	U.S. EPA	Offers financial and technical assistance offers an innovative way for a community to organize and take action to reduce toxic pollution (e.g., stormwater) in its local environment. Through this program, a community creates a partnership that implements solutions to reduce releases of toxic pollutants and minimize people's exposure to them.	Project-specific.
Clean Water State Revolving Fund	U.S. EPA	Provides low-cost financing to eligible entities on state and tribal lands for water quality projects, including all types of non-point source, watershed protection or restoration, estuary management projects, and more traditional municipal wastewater treatment projects.	Variable.
Flood Control and Coastal Emergencies	USACE	Authorizes the USACE under PL 84-99, Flood Control and Coastal Emergencies for emergency management activities. Under PL 84-99, the Chief of Engineers, acting for the Secretary of the Army, to undertake activities including disaster preparedness, advance measures, emergency operations (flood response and post flood response), rehabilitation of flood control works threatened or destroyed by flood, protection or repair of federally authorized shore protective works threatened or damaged by coastal storm, and provisions of emergency water due to drought or contaminated sources.	Project-specific.
The Cooperative Watershed Management Program	U.S. Department of the Interior Bureau of Reclamation	Supports WaterSMART strategy by providing funding to watershed groups to encourage diverse stakeholders to form local solutions to address their water management needs. Funding is provided on a competitive basis for watershed group development and watershed restoration planning and implementation of watershed management projects.	Project-specific.
Weatherization Assistance Program	U.S. Department of Energy (DOE)	Reduces energy costs for low-income households by increasing the energy efficiency of their homes. It is the nation's single largest residential whole-house energy efficiency program. The program works through local weatherization agency. Once DOE awards the grants, states contract with more than 700 local agencies nationwide to deliver services. All work is energy-related, and does not include new roofing, siding, or similar structural improvements. The average expenditure is $6,500 per home.	$6,500 per project

Table 19. Financial Resources for Hazard Mitigation

Type	Administrator	Purpose	Amount
Renewable Energy Fund (REF)	Alaska Energy Authority	Provides funding for the development of qualifying and competitively selected renewable energy projects in Alaska. The program is designed to produce cost-effective renewable energy for both heat and power For Fiscal Year (FY) 2019, $11 million has been allocated by the governor to fund the REF. This program runs through 2023.	Project-specific.
Wood Innovation Program	U.S. Department of Agriculture	Created to substantially expand and accelerate wood energy and wood products markets throughout the United States to support forest management needs. A minimum of a 50% of the total eligible costs must come from a non-federal source. In FY 2018, $8 million in federal funding was awarded to fund 34 projects.	Project-specific.

6.2 NATIONAL FLOOD INSURANCE PROGRAM PARTICIPATION

The Aleutians East Borough does not participate in the National Flood Insurance Program (NFIP), neither do they have the following repetitive flood property inventory that meets NFIP criteria. There are 0 repetitive flood property within the Aleutians East Borough that fulfills NFIP criteria.

6.3 MITIGATION GOALS

The planning team developed their mitigation goals and potential mitigation actions to address current and future potential hazard impacts for the Borough'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 Aleutians East Borough.

For the 2020 MJHMP, the overarching goal is for the communities in the Aleutians East Borough to be disaster resilient. A disaster resilient community is able to prepare for, respond to, and recover from adverse hazards and disasters. According to laresilience.org, "in the resilience framework, less emphasis is placed on traditional, individually focused preparedness efforts… building community resilience is really about making communities stronger."

Some specific goals include:

- Provide outreach activities to educate and promote recognizing and mitigating all natural-hazards that affect the Aleutians East Borough.
- Cross-reference mitigation goals and actions with other community planning mechanisms and projects.
- Develop construction activities that reduce loss possibility from all natural hazards that affect the Aleutians East Borough.
- Reduce damage and loss properties from the natural hazards profiled in this plan.

6.4 POTENTIAL MITIGATION ACTIONS AND PROJECTS

Mitigation actions and projects help achieve the goals of the Mitigation Plan. Potential mitigation actions to be considered are listed below in Table 20. This list addresses every hazard profiled in this plan and is based on the plan's risk assessment as well as lessons learned from recent disasters. It was developed using:

FEMA success stories and best management practices; FEMA job aids; local and regional plans and reports; and input from subject matter experts and guided by the AEB planning team.

The committee determined that high priority activities are essential to remedy or prevent a major health/safety hazard. They meet FEMA HMA grant criteria, including project eligibility, benefit-cost, and performance period. Medium activities are important in building a culture and practice of disaster resilience that will prevent new risks. They do not necessarily require and/or meet FEMA HMA grant criteria (but may qualify for other state and federal funds). Low priority projects still require further investigation toward developing a more comprehensive project idea.

Table 20. Potential Mitigation Actions and Projects

Hazard	Description	Pros	Cons	Priority
Multiple	Develop a public outreach and education programs regarding potential hazard impacts and personal planning preparations (annual health fair, educational fliers, school visits, high school senior project, hazard awareness week).	Life/Safety issue Risk reduction Benefit to entire community Inexpensive	Staff time	High
Multiple	Develop a list of internal and external suppliers of equipment, supplies (batteries, shovels etc.), medical supplies (i.e. voluntary registry of equipment such as earthmoving, generators, etc.).	Life/Safety issue Risk reduction Benefit to entire community Inexpensive	Staff time	Medium
Multiple	Develop or refine local emergency announcement procedures and back up plans.	Life/Safety issue Risk reduction Benefit to entire community Inexpensive	Staff time	Medium
Multiple	Obtain and install a Siren Warning system to alert for various emergencies or disasters	Life/Safety issue/Risk reduction Benefit to entire community Federal and State assistance available	Staff time, >$50,000	High
Multiple	Develop and install a signage program for hazards posted at key facilities or locations.	Life/Safety issue Risk reduction Benefit to entire community	Staff time, >$5,000	Medium
Multiple	Increase back up power generation: Purchase Generators to provide enough back up power to provide essential services and sustain community; Purchase portable generating units for needs for vulnerable populations (elders, medical); Purchase portable generating units for essential services; Explore alternative power sources such as wind and solar for emergency	Life/Safety Issue Benefit to entire community Federal funding may be available	Expensive, at least $100,000	Medium

Table 20. Potential Mitigation Actions and Projects

Hazard	Description	Pros	Cons	Priority
	services; Work with Alaska Dept. of Transportation to purchase back-up generator for the airport			
Earthquake	Complete Dam stabilization and replacement	Life/Safety Issue Benefit to entire community Federal funding may be available	Expensive, at least $500,000	Medium
Earthquake	Integrate hazard construction methodologies into newly constructed infrastructure and public buildings.	Benefit to entire community Risk reduction	Staff time	High
Earthquake	Identify buildings and facilities that must be able to remain operable during and following an earthquake event.	Life/Safety issue/Risk reduction Benefit to entire community Inexpensive State assistance available	Staff time	High
Earthquake	Contract a structural engineering firm to assess the identified buildings and facilities to determine their structural integrity and devise a strategy to improve their earthquake resistance.	Benefit to entire community Risk reduction	Feasibility and need analysis needed. 1 – 5 years	Medium
Flood and Bank Destabilization	Work with FEMA and the USACE to determine where flooding could be mitigated using dredging or gabian baskets.	Benefit to entire community Risk reduction	Staff time	High
Flood and Bank Destabilization	Provide public awareness and response education for residents within the potential flood impact zone and shoreline and bank destabilization.	Benefit to entire community Risk reduction	Staff time	Medium
Flood and Bank Destabilization	Develop a storm water management plan for flood prone areas of communities.	Life/Safety issue/Risk reduction Benefit to entire community Federal and State assistance available	Staff time, >$50,000	Low
Tsunami	Siren and lights for Tsunami and other hazardous warnings	Life/Safety Project	Staff time, >$50,000	High

Table 20. Potential Mitigation Actions and Projects

Hazard	Description	Pros	Cons	Priority
Tsunami	Inundation Mapping	Life/Safety Issue Benefit to entire community Federal funding may be available	Expensive, at least $100,000	Medium
Tsunami	Update Borough and community Emergency Operations Plan, as needed	Life/Safety issue/Risk reduction Benefit to entire community Inexpensive State assistance available 1 – 5 years, or as needed.	Staff time	Medium
Volcanic Ash	Provide adequate supplies of breathing apparatus for vulnerable populations, first responders, and critical facility crews.	Life/Safety issue/Risk reduction Inexpensive	Staff time, >$50,000	Medium
Volcanic Ash	Determine needs of equipment that may be needed during an event to assure its continued and safe operation	Life/Safety issue/Risk reduction Inexpensive	Staff time	Medium
Severe Weather	Research and consider instituting the National Weather Service program of *"Storm Ready"*.	Life/Safety issue Risk reduction Benefit to entire community Inexpensive State assistance available	Staff time	Low
Severe Weather	Encourage weather resistant building construction materials and practices.	Risk and damage reduction. Benefit to entire community.	May require ordinance change. Potential for increased staff time. Research into feasibility necessary. Political and public support not determined. 1 – 5 year implementation	Medium
Wildland Fire	Develop a local coordinated response and communication channel with the USFS.	Life/Safety issue/Risk reduction Inexpensive	Staff time	Low

Table 20. Potential Mitigation Actions and Projects

Hazard	Description	Pros	Cons	Priority
Wildland Fire	Coordinate with the USFWS to implement fire breaks and controlled burns in areas that may be vulnerable.	Life/Safety issue Risk reduction Benefit to entire community Inexpensive State and federal assistance available	Staff time, >$5,000	Low
Wildland Fire	Develop a local Smokey Bear awareness campaign with the USFS to educate against fires and mitigate fire threats	Life/Safety issue/Risk reduction Inexpensive Benefit to entire community	Staff time	Low
Wildland Fire	Develop, adopt, and enforce burn ordinances that control outdoor burning, require burn permits and restricts open campfires during identified weather periods (wind, dry etc.)	Life/Safety issue Risk reduction Benefit to entire community Inexpensive	Staff time	Low

6.5 MITIGATION ACTION PLAN

A mitigation action plan is a prioritized list of proposed mitigation projects and actions that a community hopes to implement to reduce its' risks and vulnerabilities. The 2020 mitigation action plan is shown in Table 21. Based on the prioritization criteria developed for Table 20, medium and high priority projects were selected for the mitigation action plan. These prioritized projects are to be pursued by the Aleutians East Borough and local and tribal entities over the next five years.

[NOTE: Table 21 will be finalized after Table 20 is completed. Shown below is an example of what it may look like.]

Table 20. Mitigation Action Plan

Description	Jurisdiction	Potential Funding	Timeframe	Priority
Develop a public outreach and education programs regarding potential hazard impacts and personal planning preparations (annual health fair, educational fliers, school visits, high school senior project, hazard awareness week).	Borough, Tribes DCRA DHS&EM	Borough DCRA DHS&EM	<1 year	High
Develop a list of internal and external suppliers of equipment, supplies (batteries, shovels etc.), medical supplies (i.e. voluntary registry of equipment such as earthmoving, generators, etc.).	Borough, Tribes	Borough and Tribal Budget	Ongoing	Medium

Table 20. Mitigation Action Plan

Description	Jurisdiction	Potential Funding	Timeframe	Priority
Develop or refine local emergency announcement procedures and back up plans.	Borough, Tribes DCRA DHS&EM	Borough and Tribal Budget	Ongoing	Medium
Obtain and install a Siren Warning system to alert for various emergencies or disasters	Borough DCRA DHS&EM	HMGP grant	2-3 years	High
Develop and install a signage program for hazards posted at key facilities or locations.	Borough	Borough and Tribal Budget	>1 year	Medium
Increase back up power generation: Purchase Generators to provide enough back up power to provide essential services and sustain community; Purchase portable generating units for needs for vulnerable populations (elders, medical); Purchase portable generating units for essential services; Explore alternative power sources such as wind and solar for emergency services; Work with Alaska Dept. of Transportation to purchase back-up generator for the airport	Borough DHS&EM	HMGP grant/Assistance to Firefighters Grant Program grants	2-3 years	Medium
Complete Dam stabilization and replacement	Borough	Flood Control and Coastal Emergencies funding	3-5 years	Medium
Integrate hazard construction methodologies into newly constructed infrastructure and public buildings.	Borough	Borough and Tribal Budget	>1 year	High
Identify buildings and facilities that must be able to remain operable during and following an earthquake event.	Borough DHS&EM FEMA	State Grants	>1 year	High
Contract a structural engineering firm to assess the identified buildings and facilities to determine their structural integrity and devise a strategy to improve their earthquake resistance.	Borough DHS&EM	State Grants PDM	1-2 years	Medium
Work with FEMA and the USACE to determine where flooding could be mitigated using dredging or gabian baskets.	Borough, FEMA, USACE	Federal Grants, PDM, Borough and Tribal Budget	1-2 years	High
Provide public awareness and response education for residents within the potential flood impact zone of the reservoir dams	Borough	Borough and Tribal Budget	>1 year	Medium
Siren and lights for Tsunami and other hazardous warnings	Borough DHS&EM	PDM or HMGP State DHS&EM/ NOAA (NTHMP), State DHS&EM /	>1 year	High

Table 20. Mitigation Action Plan

Description	Jurisdiction	Potential Funding	Timeframe	Priority
		Homeland Security Grants		
Inundation Mapping	State DHS&EM NOAA/NTHMP	NOAA/NTHMP	>5 years	Medium
Update Borough and community Emergency Operations Plan, as needed	Borough	DHS&EM/local funds	As needed	Medium
Provide adequate supplies of breathing apparatus for vulnerable populations, first responders, and critical facility crews.	Borough	Borough and Tribal Budget	>1 year	Medium
Determine needs of equipment that may be needed during an event to assure its continued and safe operation	Borough	Borough and Tribal Budget	>1 year	Medium
Encourage weather resistant building construction materials and practices.	Borough	Borough and Tribal Budget	<1 year	Medium

6.6 PLAN INTEGRATION

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 Bureau of Indian Affairs Indian Reservation Roads Plan, as well as seeking other integration opportunities where appropriate. The MJHMP planning team will achieve this by undertaking the following activities.

- Review borough, city, and tribal regulatory tools to determine where to integrate the mitigation philosophy and implementable initiatives within current and future planning mechanisms.
- 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.).

6.7 PROGRESS IN LOCAL MITIGATION EFFORTS

Table 22 lists the Aleutians East Borough area's mitigation activities' and initiatives' progress. Many are ongoing annual activities due to their success or annual natural processes.

Table 22. Proposed AEB Capital Budget Requests

Grant Recipient	Award year	Project Name	Grant Status	End Date
Aleutians East Borough	2014	Akutan Harbor	Active	6/30/2019
Aleutians East Borough	2014	Nelson Lagoon Erosion Project	Active	9/30/2017
Aleutians East Borough School District	2014	Nutritional Alaskan Foods in Schools	Closed	6/30/2015
Aleutians East Borough	2013	Cold Bay Airport - Apron and Taxiway Construction	Active	6/30/2018
Aleutians East Borough	2013	Completion of the King Cove to Cold Bay Access Project, Including Potential Litigation Support	Active	6/30/2018

Table 22. Proposed AEB Capital Budget Requests

Grant Recipient	Award year	Project Name	Grant Status	End Date
Aleutians East Borough School District	2013	Nutritional Alaskan Foods for Schools	Closed	11/8/2013
Aleutians East Borough School District	2013	Nutritional Alaskan Foods for Schools	Closed	6/30/2014
Aleutians East Borough	2012	Educational Pamphlet: Protecting the Coastline and Wildlife from Fuel Oil and Debris	Closed	2/22/2012
Aleutians East Borough	2011	SFY11 Section 306 Required Tasks	Closed	5/31/2011
Aleutians East Borough	2010	Coastal Impact Assistance Program	Deleted(deactivated)	
Aleutians East Borough	2010	FY10 Section 306 Required Tasks	Closed	6/30/2010
Aleutians East Borough	2010	Purchase Insurance Premiums	Closed	12/31/2009
Aleutians East Borough	2010	False Pass Boat Harbor Utility Project	Closed	8/31/2012
Aleutians East Borough	2010	Cold Bay Boat Ramp Rehabilitation Project	Closed	12/31/2012
Aleutians East Borough	2010	Create A Resource Development Land Use Permitting System to Protect Coastal Resources in the Aleutian East Borough Resource Development District	Closed	9/30/2015
Aleutians East Borough	2010	Nelson Lagoon Coastal Erosion Study Project	Closed	6/30/2016
Aleutians East Borough	2009	King Cove Access Project	Closed	6/30/2013
Aleutians East Borough	2009	FY09 Section 306 Required Tasks	Closed	6/30/2009
Aleutians East Borough	2008	FY08 Section 306 Required Tasks	Closed	6/30/2008
Aleutians East Borough	2007	07 - Required Tasks	Closed	6/30/2007
Aleutians East Borough	2007	07- Special Project/ Plan Finalization	Closed	6/30/2008
Aleutians East Borough	2006	Cold Bay Airport Terminal Project	Closed	3/31/2008
Aleutians East Borough	2006	06 - Special Project/Plan Amendment	Closed	3/31/2006
Aleutians East Borough	2006	Aleutians Regional Airport Terminal Construction Project	Closed	6/30/2007
Aleutians East Borough	2006	06 - Required Tasks	Closed	6/30/2006
Aleutians East Borough	2005	05 - Required Tasks	Closed	6/30/2005

Table 22. Proposed AEB Capital Budget Requests

Grant Recipient	Award year	Project Name	Grant Status	End Date
Aleutians East Borough	2005	FY05 - ACMP District Plan Amendment	Closed	6/30/2005
Aleutians East Borough	2005	Business Plan for Cold Bay Aviation Hub Project	Closed	6/30/2005
Aleutians East Borough	2005	Cold Bay Regional Airport Terminal	Closed	
Aleutians East Borough	2004	Temporary Fiscal Relief Grant	Closed	
Aleutians East Borough	2004	04 - Required Tasks	Closed	6/30/2004
Aleutians East Borough	2004	Direct Aid to Fisheries-Impacted Communities	Closed	
Aleutians East Borough	2003	Nelson Lagoon Water System	Closed	6/30/2007
Aleutians East Borough	2003	State Revenue Sharing	Closed	3/31/2004
Aleutians East Borough	2003	Safe Communities	Closed	3/31/2004
Aleutians East Borough	2003	Alaska Coastal Management Plan 306 Grant	Closed	6/30/2003
Aleutians East Borough	2003	Community Profile Maps	Closed	9/30/2004
Aleutians East Borough	2003	King Cove Fuel Tank Farm and Akutan Skiff Moorage	Closed	3/31/2004
Aleutians East Borough	2003	Nelson Lagoon Coastal Protection Project	Closed	3/1/2005
Aleut International Association	2002	Aleut International Association	Closed	12/31/2003
Aleutians East Borough	2002	Nelson Lagoon Community Center Building Construction	Closed	6/30/2003
Aleutians East Borough	2002	Shared Fisheries Business Tax	Closed	6/30/2002
Aleutians East Borough	2002	Fisheries Landing Tax	Closed	6/30/2002
Aleutians East Borough	2002	Shared Fisheries Business Tax	Closed	6/30/2002
Aleutians East Borough	2002	Fisheries Landing Tax	Closed	6/30/2002
Aleutians East Borough	2002	State Revenue Sharing	Closed	3/31/2003
Aleutians East Borough	2002	Safe Communities	Closed	3/31/2003
Aleutians East Borough	2002	Alaska Coastal Management Plan 306 Grant	Closed	6/30/2002
Aleutians East Borough	2001	Nelson Lagoon Water System Improvements	Closed	6/30/2005
Aleutians East Borough	2001	Akutan Wave Barrier (Aleutians East Borough)	Closed	2/28/2002

Table 22. Proposed AEB Capital Budget Requests

Grant Recipient	Award year	Project Name	Grant Status	End Date
Aleutians East Borough	2001	King Cove Float System (Aleutians East Borough)	Closed	2/28/2002
Aleutians East Borough	2001	King Cove/Cold Bay Isthmus Rd Baseline Studies/ Engineering (Aleut East Borough)	Closed	2/28/2002
Aleutians East Borough	2001	Water System Improvements	Closed	3/31/2006
Aleutians East Borough	2000	Nelson Lagoon Community Park Project	Closed	6/30/2004
Aleutians East Borough	1999	Nelson Lagoon Marine Facilities Improvements	Closed	6/30/2003
Aleutians East Borough	1999	Construct Community Hall	Closed	12/31/2001
Aleutians East Borough	1998	Nelson Lagoon Water Tank Project	Closed	6/30/2002
Aleutians East Borough	1997	Nelson Lagoon Dock and Boat Ramp Construction	Closed	6/30/2001
Aleutians East Borough	1996	Nelson Lagoon Dock and Boat Ramp Construction	Closed	6/30/2000
Aleutians East Borough	1995	Remodel and Upgrade of the Akutan School	Closed	
Aleutians East Borough	1995	Nelson Lagoon Public Dock/Boat Ramp Construction	Closed	6/30/1999
Aleutians East Borough	1994	Cold Bay Dock Expansion and Improvement Project	Closed	
Aleutians East Borough	1994	Nelson Lagoon Public Dock & Boat Ramp Const.	Closed	6/30/1998
Aleutians East Borough	1993	False Pass - Dock, Design and Construction	Closed	
Aleutians East Borough	1990	Road Improvements/Harbor Expansions	Closed	
Aleutians East Borough		Cold Bay Regional Airport Terminal	Closed	3/31/2008

7 PLAN ADOPTION

Section 7 – Plan Adoption addresses Element E of the Local and Tribal Mitigation Plan Regulation Checklist.

Regulation Checklist – 44 CFR 201.6 Local Mitigation Plans
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))
Regulation Checklist – 44 CFR 201.7 Tribal Mitigation Plans
Element E: Plan Adoption
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)]

7.1 JURISDICTIONAL ADOPTION

The 2020 Aleutians East Borough Multi-Jurisdictional Hazard Mitigation Plan was formally adopted by the Aleutians East Borough Assembly via resolution on [To be completed]. A scanned copy of the resolution follows this page. Various cities throughout the borough will also submit their individual adoption resolutions after FEMA's issuance of an APA decision.

7.2 TRIBAL GOVERNMENT ADOPTION

All tribal governments will comply with applicable federal statutes and regulations in effect, with regard to any grants or funding awarded to the Tribe for mitigation actions.

The 2020 Aleutians East Borough Multi-Jurisdictional Hazard Mitigation Plan was formally adopted by the TRIBE NAME via resolution on [To be completed]. A scanned copy of the resolution follows this page. It will also be kept on file with the Tribal Council and additional copy will be sent to DHS&EM and FEMA.

The 2020 Aleutians East Borough Multi-Jurisdictional Hazard Mitigation Plan was formally adopted by the TRIBE NAME via resolution on [To be completed]. A scanned copy of the resolution follows this page. It will also be kept on file with the Tribal Council and additional copy will be sent to DHS&EM and FEMA.

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Adoption Resolutions

8 REFERENCES

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

AEB 2010. Communities of the Aleutians East Borough Multi-Jurisdictional Multi-Hazards Mitigation Plan. Prepared by WH Pacific and Bechtol Planning and Development. Available: https://www.commerce.alaska.gov/dcra/DCRARepoExt/RepoPubs/Plans/AEB%202010.pdf

AICC 2020. Alaska Interagency Coordination Center, Wildland Fire History. Available: http://fire.ak.blm.gov/aicc.php. (February 2020)

AVO (Alaska Volcano Observatory) 2020. Volcano Search. Available: https://avo.alaska.edu/volcanoes/eruptsearch.php. (February 2020)

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.

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

City of Akutan 2005. Community Plan. June 2005. Prepared by Aurora Consulting.

City of Sand Point 2018. Draft Comprehensive Community Development Plan. Prepared by AECOM.

DCRA 2020. DCCED/DCRA, Community Information webpage. Available: https://dcra-cdo-dcced.opendata.arcgis.com/

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)

DGGS 2000. Makushin Volcano Assessment, Report of Investigation, 2000-4.

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)

FEMA no date (nd). Chapter 2: Types of Floods and Floodplains. Available at: https://training.fema.gov/hiedu/docs/fmc/chapter%202%20-%20types%20of%20floods%20and%20floodplains.pdf

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

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

FEMA 2018. Electronic (e) Code of Federal Regulations (CFR), Title 44 – Emergency Management and Assistance, Chapter 1, Subchapter D, Part 201Mitigation Planning. Available: http://www.ecfr.gov/cgi-bin/text-idx?SID=3e6e6ed90d4fe2483bb7b781f2e31362&node=pt44.1.201&rgn=div5#se44.1.201_17.

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

McKenney, H., 2020. Ash falls on False Pass after Shishaldin sends volcanic plume 30,000 feet. KUCB, Alaska Public Media. January 20, 2020.

NOAA 2020 (National Oceanic and Atmospheric Administration). National Climatic Data Center (NCDC). Storm Events Database. Available: http://www.ncdc.noaa.gov/stormevents/.

SNAP 2020. 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. (February 2020)

USGS 2009. United States Geologic Survey (USGS). Haeussler, P., E-mail correspondence concerning 2009 Shake Map application validity to support current HMP hazard profiling.

Wei, Y. (2008). Tsunami Impact Assessment for Unalaska, AK. In *Solutions to Coastal Disasters 2008: Tsunamis* (pp. 118-131).

APPENDIX A – PUBLIC PARTICIPATION AND PLANNING PROCESS DOCUMENTATION

APPENDIX B – FUNDING SOURCES

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.

APPENDIX C – PLAN MAINTENANCE TOOLS

2020 MJHMP - Annual Review Worksheet				
MJHMP Section	**Questions**	**Yes**	**No**	**Comments**
PLANNING PROCESS	Has the AEB done any public outreach activities regarding the MJHMP or a mitigation project? If yes, please describe.			
	Has the AEB integrated any of the MJHMP's elements into other plans or policies? If yes, please describe.			
HAZARD IDENTIFICATION	Has a disaster occurred in this reporting period that affected the AEB?			
	Do you know of new hazard studies, reports and/or mapping available for the AEB? If so, what are they?			
RISK ASSESSMENT	Does the AEB have any new critical assets that should be included in the 2025 MJHMP risk assessment?			
	Have there been changes in development trends that could create additional risks?			
MITIGATION STRATEGY	Are there different or additional resources (financial, technical, and human) that are now available for mitigation planning?			
	Should new mitigation actions be added?			

2020 MJHMP - Mitigation Project Progress Report			
Progress Report Period From (date):		**To (date):**	
Project Title:			
Project ID:			
Description of Project:			
Implementing Department/Agency:			
Supporting Department/Agencies:			
Contact Name:			
Contact E-mail:			
Contact Number:			
Grant/Finance Administrator:			
Total Project Cost:			
Anticipated Cost Overrun/Underrun:			
Date of Project Approval:			
Project Start Date:			
Anticipated Completion Date:			
Summary of Progress of Project for this Reporting Period			
1. What was accomplished during this reporting period?			
2. What obstacles, problems, or delays did the project encounter, if any?			
3. How were the problems resolved?			