City of Seward and Qutekcak Native Tribe Alaska Multi-Jurisdictional Hazard Mitigation Plan

January 2020

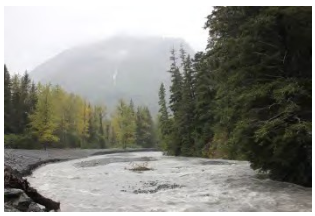
Prepared by:
AECOM
Alaska

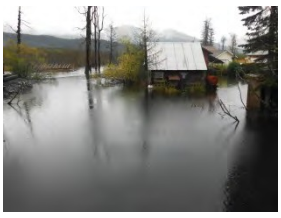
2012 Flood Disaster Images


Lowell Creek Tunnel: Entrance


Outlet


Debris Accumulation


Box Canyon


Clear/Salmon Creek Area


Grouse Creek


Old Mill Creek


Sawmill Creek


RR at Nash Rd-Acts as Levee

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Front Cover Photos: AECOM, Scott Simmons, 2012 Flood Disaster

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

Acronyms and Abbreviations

°F	Degrees Fahrenheit
AECOM	AECOM, Consultant, or Contractor
AICC	Alaska Interagency Coordination Center
AK	Alaska
AVTEC	Alaska Vocational Technical Center
AVO	Alaska Volcano Observatory
B/C	Benefit vs. Cost or Benefit/Cost
BCA	Benefit Cost Analysis
BIA	US Bureau of Indian Affairs
CDBG	Community Development Block Grant
CFR	US Code of Federal Regulations
City	City of Seward
CIP	Capital Improvement Plan, City of Seward
CP	Comprehensive Plan, City of Seward
CRS	Community Rating System
DCCED	Department of Commerce, Community, and Economic Development
DCRA	Division of Community and Regional Affairs
DEC	Alaska Department of Environmental Conservation
DHS&EM	Alaska Division of Homeland Security and Emergency Management
DHSS	Alaska Department of Health and Social Services
DGGS	Alaska Division of Geological and Geophysical Survey
DMA 2000	Disaster Mitigation Act Of 2000
DMVA	Alaska Department of Military and Veterans Affairs
DNR	Alaska Department of Natural Resources
DOL	Alaska Department of Labor
DOT/PF	Alaska Department of Transportation and Public Facilities
EHS	Extremely Hazardous Substance
EMWIN	Emergency Managers Weather Information Network
ENSO	El Niño/La Niña Southern Oscillation
EOC	Emergency Operations Center
EPA	US Environmental Protection Agency
ERP	Emergency Response Plan
EQ	Earthquake
FEMA	Federal Emergency Management Agency
FIRM	Flood Insurance Rate Map
FL	Flood
FMA	Flood Mitigation Assistance
ft	Feet
g	Gravity
GF	Ground Failure
GI	Geophysical Institute

Acronyms and Abbreviations

GIS	Geospatial Information System
Hazus	Hazards US – Multi-Hazard Software
HMA	Hazard Mitigation Assistance
HMGP	Hazard Mitigation Grant Program
HMP	Hazard Mitigation Plan
HUD	Housing and Urban Development
IGAP	Indian General Assistance Program
IRA	Indian Reorganization Act
KPB	Kenai Peninsula Borough
M	Magnitude
MAP	Mitigation Action Plan
MMI	Modified Mercalli Intensity
mph	Miles Per Hour
MJHMP	Multi-Jurisdictional Hazard Mitigation Plan
NFIP	National Flood Insurance Program
NOAA	National Oceanic and Atmospheric Administration
NRCS	Natural Resources Conservation Service
NTWC	National Tsunami Warning Center
NWS	National Weather Service
P&Z	Planning and Zoning
PDM	Pre-Disaster Mitigation
PGA	Peak Ground Acceleration
RL	Repetitive Loss
SBA	US Small Business Administration
SBCFSA	Seward Bear Creek Flood Service Area
SMIC	Seward Marine Industrial Center
SNAP	Scenarios Network for Alaska and Arctic Planning
SHMP	State of Alaska Hazard Mitigation Plan
Stafford Act	Robert T. Stafford Disaster Relief and Emergency Assistance Act
T/F	Technical / Feasibility
Tribe	Qutekcak Native Tribe
UAF	University of Alaska Fairbanks
US or U.S.	United States
USACE	US Army Corps of Engineers
USDA	US Department of Agriculture
USFS	US Forest Service
USFWS	US Fish and Wildlife Service
USGS	US Geological Survey
VSW	Village Safe Water

1.0 INTRODUCTION

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

1.1 OVERVIEW

The City of Seward, and the Qutekcak Native Tribe's (QNT) was planned and executed as a Multi-Jurisdictional Hazard Mitigation Plan (MJHMP). After careful review by FEMA Region X, it was discovered the QNT is not currently a federally recognized tribe by the Bureau of Indian Affairs (BIA).[1] As such, FEMA and the State could not move the plan forward in the approval processes as a Tribal Hazard Mitigation Plan.

The Qutekcak Native Tribe, while not currently recognized by the Federal Register as an Alaskan Native Tribe, is operating as an Alaskan Private non-Profit (PnP), organization (501.3)[2]. FEMA and the State understand the QNT is currently in good standing and further, is recognized by the Alaskan Federation of Natives (AFN)[3] while continuing legislative and litigation efforts to gain Federal recognition. It remains the intent and is the request of the city of Seward and the QNT that this Hazard Mitigation Plan be championed, and ultimately approved, as a Local Hazard Mitigation Plan (LHMP) in its current title outlined as a "MJHMP", in the eventuality that Federal recognition of the QNT through the BIA comes to fruition. This "recognition" could occur during the life of this LHMP, and because community efforts in both time and resources have been actioned to complete the Seward Hazard Mitigation Plan requirements, this request seems reasonable.

Although this documents current title and format could be interpreted as misleading, there is an understanding that a careful review and editing of the plan in its current form must occur annually, per Sec. 3.6.5. of this non-regulatory but critical document. Note: While the Seward Hazard Mitigation Plan was developed to meet FEMA's tribal planning requirements under Part 201.7, it can only be approved as a Local Mitigation Plan at this time. However, should the tribe attain federal recognition over the 5-year approval period, the plan can be approved as a Tribal Hazard Mitigation Plan under 44 CFR Part 201.7.

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

To implement these planning requirements, FEMA published an Interim Final Rule in the

[1] https://www.federalregister.gov/documents/2020/01/30/2020-01707/indian-entities-recognized-by-and-eligible-to-receive-services-from-the-united-states-bureau-of
[2] https://www.commerce.alaska.gov/cbp/main/search/entities, (#14398D)

[3] https://www.nativefederation.org/2020/02/aktribes/

Federal Register on February 26, 2002, 44 CFR Part 201 with subsequent updates. The planning requirements for local entities are described in detail in Section 3 and are identified in their appropriate sections throughout this MJHMP.

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

This MJHMP complies with Title 44 CFR current as of March 11, 2015 and applicable guidance documents (FEMA 2015a)

1.2 TRIBAL AUTHORITIES AND REQUIREMENTS

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

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

In recognition of tribal sovereignty and the government-to-government relationship that FEMA has with Indian Tribal governments, FEMA amended 44 CFR Part 201 at 72 Fed. Reg. 61720, on

October 31, 2007, and again at 74 Fed. Reg. 47471, on September 16, 2009, to consolidate and clarify the requirements for Indian Tribal governments, to establish tribal mitigation plans separately from state and local mitigation plans, and finalize the mitigation planning rule.

Indian Tribal governments with an approved Tribal Mitigation Plan in accordance with 44 CFR 201.7 may apply for assistance from FEMA as a grantee. If the Indian Tribal government coordinates with the State for review of their Tribal Mitigation Plan, then the Indian Tribal government also has the option to apply as a subgrantee through a state or another tribe. A grantee is an entity such as a state, territory, or Indian Tribal government to which a grant is awarded and that is accountable for the funds provided. A subgrantee is an entity, such as a community, local, or Indian Tribal government; state-recognized tribe; or a private non-profit 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, Indian Tribal governments must have an approved, adopted Tribal Mitigation Plan to meet the eligibility requirements for certain types of assistance, which may differ depending on whether the Indian Tribal government intends to apply as a grantee or subgrantee, as outlined in the following table.

Table 1-1 Tribal HMP Authorities and Requirements

Program	Enabling Legislation	Funding Authorization	Tribal Mitigation Plan Required (✓)	
			Grantee Status	Subgrantee Status
Public Assistance (Categories A, B: e.g., debris removal, emergency protective measures)	Stafford Act	Presidential Disaster Declaration	No Plan Required	No Plan Required
Public Assistance (Categories C-G: e.g., repairs to damaged infrastructure, publicly owned buildings)	Stafford Act	Presidential Disaster Declaration	✓	No Plan Required
Individual Assistance	Stafford Act	Presidential Disaster Declaration	No Plan Required	No Plan Required
Fire Management Assistance Grants	Stafford Act	Fire Management Assistance Declaration	✓	No Plan Required
HMGP Planning Grant	Stafford Act	Presidential Disaster Declaration	✓	No Plan required
HMGP Project Grant	Stafford Act	Presidential Disaster Declaration	✓	✓
Pre-Disaster Mitigation Planning Grant	Stafford Act	Annual Appropriation	No Plan required	No Plan required
PDM Project Grant	Stafford Act	Annual Appropriation	✓	✓

Table 1-1 Tribal HMP Authorities and Requirements

Program	Enabling Legislation	Funding Authorization	Tribal Mitigation Plan Required (✓)	
			Grantee Status	Subgrantee Status
Flood Mitigation Assistance	National Flood Insurance Act (NFIP)	Annual Appropriation	✓	✓
Severe Repetitive Loss	NFIP	Annual Appropriation	✓	✓
Repetitive Flood Claims	NFIP	Annual Appropriation	✓	No Plan Required
Fire Management Assistance Grants	Stafford Act	Fire Management Assistance Declaration	✓	No Plan Required

Source: FEMA 2010a

1.3 GRANT PROGRAMS WITH MITIGATION PLAN REQUIREMENTS

FEMA HMA grant programs provide funding to states, tribes, and local entities that have a FEMA-approved state, tribal, or local mitigation plan. Two of the grants are authorized under the Stafford Act and DMA 2000, while the remaining three are authorized under the National Flood Insurance Act and the Bunning-Bereuter-Blumenauer Flood Insurance Reform Act. Excerpts from FEMA's 2015 HMA Guidance, Part I, is as follows:

> *The U.S. Department of Homeland Security FEMA HMA programs present a critical opportunity to reduce the risk to individuals and property from natural hazards, while simultaneously reducing reliance on Federal disaster funds. On March 30, 2011, the President signed Presidential Policy Directive 8 (PPD-8): National Preparedness, and the National Mitigation Framework was finalized in May 2013. The National Mitigation Framework comprises seven core capabilities, including:*
>
> - *Threats and Hazard Identification*
> - *Risk and Disaster Resilience Assessment*
> - *Planning*
> - *Community Resilience*
> - *Public Information and Warning*
> - *Long-Term Vulnerability Reduction*
> - *Operational Coordination*
>
> *HMA programs provide funding for eligible activities that are consistent with the National Mitigation Framework's Long-Term Vulnerability Reduction capability. HMA programs reduce community vulnerability to disasters and their effects, promote individual and community safety and resilience, and promote community vitality after an incident. Furthermore, HMA programs reduce response and recovery resource requirements in the wake of a disaster or incident, which results in a safer community that is less reliant on external financial assistance.*
>
> *Hazard mitigation is defined as any sustained action taken to reduce or eliminate long-term risk to people and property from natural hazards and their effects. This definition distinguishes actions that have a long-term impact from those that are more closely associated with immediate preparedness, response, and recovery activities. Hazard mitigation is the only phase of emergency management specifically dedicated to breaking*

the cycle of damage, reconstruction, and repeated damage. Accordingly, States, territories, federally-recognized tribes, and local communities are encouraged to take advantage of funding that HMA programs provide in both the pre- and post-disaster timelines.

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

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

WHOLE COMMUNITY

A. HMA Commitment to Resilience and Climate Change Adaptation

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

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

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

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

FEMA Strategic Plan, steps are being taken by communities through engagement of individuals, households, local leaders, representatives of local organizations, and private sector employers and through existing community networks to protect themselves and the environment by updating building codes, encouraging the conservation of natural and beneficial functions of the floodplain, investing in more resilient infrastructure, and

engaging in mitigation planning. FEMA plays an important role in supporting community-based resilience efforts, establishing policies, and providing guidance to promote mitigation options that protect critical infrastructure and public resources.

FEMA encourages better integration of Sections 404 and 406 of the Robert T. Stafford Disaster Relief and Emergency Assistance Act, as amended (Stafford Act), Title 42 of the United States Code (USC) 5121 et seq., to promote more resilience during the recovery and mitigation process. FEMA regulations that implement Sections 404 and 406 of the Stafford Act allow funding to incorporate mitigation measures during recovery activities. Program guidance and practice limits Section 406 mitigation to the damaged elements of a structure. This limitation to Section 406 mitigation may not allow for a comprehensive mitigation solution for the damaged facility; however, Section 404 funds may be used to mitigate the undamaged portions of a facility.

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

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

For additional information, see http://www.fema.gov/climate-change (FEMA 2015b).

1.3.1 Hazard Mitigation Assistance (HMA) Grant Programs

Table 1-2 lists HMA eligible grant program activities:

Table 1-2 HMA Eligible Activities

Activities	HMGP	PDM	FMA
1. Mitigation Projects	✓	✓	✓
Property Acquisition and Structure Demolition	✓	✓	✓
Property Acquisition and Structure Relocation	✓	✓	✓
Structure Elevation	✓	✓	✓
Mitigation Reconstruction	✓	✓	✓
Dry Floodproofing of Historic Residential Structures	✓	✓	✓
Dry Floodproofing of Non-residential Structures	✓	✓	✓
Generators	✓	✓	
Localized Flood Risk Reduction Projects	✓	✓	✓
Non-localized Flood Risk Reduction Projects	✓	✓	

Table 1-2 HMA Eligible Activities

Activities	HMGP	PDM	FMA
Structural Retrofitting of Existing Buildings	✓	✓	✓
Non-structural Retrofitting of Existing Buildings and Facilities	✓	✓	✓
Safe Room Construction	✓	✓	
Wind Retrofit for One- and Two-Family Residences	✓	✓	
Infrastructure Retrofit	✓	✓	✓
Soil Stabilization	✓	✓	✓
Wildfire Mitigation	✓	✓	
Post-Disaster Code Enforcement	✓		
Advance Assistance	✓		
5 Percent Initiative Projects	✓		
Miscellaneous/Other[(1)]	✓	✓	✓
2. Hazard Mitigation Planning	✓	✓	✓
Planning Related Activities	✓		
3. Technical Assistance			✓
4. Management Cost	✓	✓	✓

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

Source: FEMA 2015b

The HMGP is a competitive, disaster funded, grant program. Whereas the other Unified Mitigation Assistance Programs: Pre-Disaster Mitigation (PDM) and Flood Mitigation Assistance (FMA) programs although competitive, rely on specific pre-disaster grant funding sources, sharing several common elements. The 2015 HMA Guidance provides the following programmatic information:

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

the population and structures from future hazard events, while also reducing reliance on Federal funding in future disasters. Congressional appropriations provide the funding for PDM.

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

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

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

The City Seward actively participates in FEMA's National Flood Insurance Program (NFIP) and is therefore eligible to participate in Flood Mitigation Assistance (FMA) associated grant funding opportunities.

Active Community Rating System (CRS) participation allows reduced price NFIP flood insurance premiums.

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

As the State Hazard Mitigation Plan states:

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

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

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

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

1.3.2 MJHMP Layout Description

The MJHMP consists of the following sections and appendices:

Section 1 Introduction

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

Section 2 Community Description

Provides a general description of the City of Seward and Qutekcak Native Tribe area history and background, including historical trends for population and the demographic and economic conditions that have shaped the area.

Section 3 Planning Process

Describes the MJHMP update's planning process, identifies the planning team members, the meetings held as part of the planning process, and the key stakeholders within the Seward area. This section documents public outreach activities (support documents are located in Appendix E); including document reviews and relevant plans, reports, and other appropriate information data utilized for MJHMP development; actions the plans to implement to assure continued public participation; and their methods and schedule for keeping the plan current.

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

Section 4 Jurisdictional Adoption

Describes the community's MJHMP adoption process (support documents are located in Appendix D).

Section 5 Hazard Analysis

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

Section 6 Vulnerability Assessment

Identifies the City and Tribal area's vulnerable assets—people, residential and non-residential buildings (where available), critical facilities, and critical infrastructure. The resulting information identifies land use and development trends, the full range of hazards the Seward area could face, and potential social impacts, damages, and economic losses.

Section 7 Mitigation Strategy

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

The planning team reviewed legacy 2010 HMP mitigation goals and actions to address current applicability to the risks facing the Seward area. The planning team reviewed their legacy mitigation strategies to determine whether they adequately addressed NFIP insured property needs and updated them to improve their flood damage reduction efforts.

Section 8 References

Lists reference materials and resources used to prepare this MJHMP.

Appendices

Appendix A: Critical Facilities Located in Natural Hazard Threat Areas

Appendix B: Lists federal, state, and other potential mitigation funding sources. This section will aid the community with researching and applying for funds to implement their mitigation strategy.

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

Appendix D: Provides the City of Seward and Qutekcak Native Village's adoption resolutions.

Appendix E: Provides public outreach information, including newsletters and meeting minutes.

Appendix F: Discusses Benefit-Cost Analysis (BCA) process used to prioritize mitigation actions.

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

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2.0 COMMUNITY DESCRIPTION

This section provides the City of Seward (City) and Qutekcak Native Tribe's (Tribe or Tribal) location, geography, history, and demographic information.

2.1 PLANNING AREA LOCATION, GEOGRAPHY, AND HISTORY

The City and Tribe are co-located and intermingled within the same geographic area with no separation between communities. Seward is primarily a non-Alaska Native community. For the purposes of this Plan, the Seward area encompasses nearly the entire community footprint (Figure 2-8).

Seward is situated on Resurrection Bay on the east coast of the Kenai Peninsula, 125 highway miles south of Anchorage. It lies at the foot of Mount Marathon and is the gateway to the Kenai Fjords National Park. The communities of Bear Creek and Lowell Point are adjacent to Seward. The City lies at approximately 60.10417° North Latitude and 149.44222° West Longitude (Sec. 10, T001S. R001W, Seward Meridian). The City of Seward is located in the Seward Recording District. The incorporated area encompasses 14.4 square miles of land and 7.1 square miles of water.

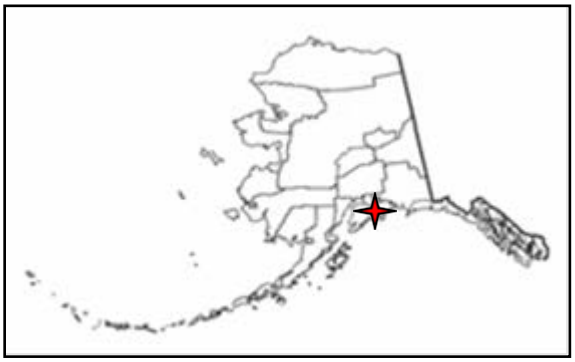

Figure 2-1 Seward's Location Map

The Department of Commerce, Community, and Economic Development (DCCED) online community database provides a general community description:

> *Resurrection Bay was named in 1792 by Russian fur trader and explorer Alexander Baranof. While sailing from Kodiak to Yakutat, he found unexpected shelter from a storm in this bay. He named the Bay Resurrection because it was the Russian Sunday of the Resurrection. Seward was named for U.S. Secretary of State William Seward, 1861-1869, who negotiated the purchase of Alaska from Russia in 1867. In the 1890s, Capt. Frank Lowell arrived with his family. In 1903, John and Frank Ballaine and a group of settlers arrived to begin construction of a railroad. Seward became an incorporated city in 1912. The Alaska Railroad was constructed between 1915 and 1923, and Seward developed as the ocean terminus and supply center. By 1960, Seward was the largest community on the peninsula. Tsunami generated after the 1964 earthquake destroyed the railroad terminal and killed several residents. As an ice-free harbor, Seward has become an important supply center for Interior Alaska." Source: DCCED 2018*

The Qutekcak Native Tribe's website provides a brief history of their present-day location:

> *Qutekcak Native Tribe is a collection of Alaska Native people of different heritages instead of just one cultural group as is traditional. Historically, Seward was a large, active trading post for the Alaska Natives within the Prince William Sound area and on the Kenai Peninsula. Alaska Natives living in these areas are called Aleut or Alutiiq people.*
>
> *The earliest people in the area were known as Unegkurmuit. These were the ancestors of Alaska Native people now living in Port Graham, Nanwalek and English Bay. Russian explorers first discovered the bay in the 1800s as well as the number of Alaska Natives who could be used for labor to help them harvest the timber from Montague Island. The*

area was abandoned by the Russians in the mid-1800s although the Native population remained.

In the early 1900s more and more Westerners discovered the area known as Seward because of its all-weather port and timber industry. Resurrection Bay provided access to other parts of Alaska for these early explorers. During this time, Alaska Natives were expected to assimilate into western society and culture so their Native traditions were crushed.

The Jesse Lee Home for Alaska Native orphans moved to Seward in 1925 bringing a large number of Native children to Seward. In addition, the government opened the Tuberculosis Sanatorium in 1946 where many Native peoples were sent for treatment. These two events resulted in more growth in the Native population and became cornerstones for the area's Native population today. Many of those who moved to the area and decided to adopt it as their home.

Although our beginnings aren't auspicious, we are a proud people. Our elders gathered in the mid-1960s to begin the formal process of organizing and planning for our future. We were first called the Chugach Native Association in the 1960s and later the Mount Marathon Native Association in 1972. Unfortunately, we did not obtain a listing in the Alaska Native Claims Settlement Act as other Alaska Native communities did. This has resulted in a decades long struggle to gain federal recognition as an American Indian tribe.

In 1993, we changed our name to Qutekcak Native Tribe to help our people regain a connection to "the big beach" from the Alutiiq language. Over time, we hope to provide services to our ancestors in the area to help our people regain their ties to history and culture as well to thrive in today's world."

Source: Qutekcak 2018

DCRA describes the Seward area's geography and climate:

Seward is situated on Resurrection Bay on the east coast of the Kenai Peninsula, 125 highway miles south of Anchorage. It lies at the foot of Mount Marathon and is the gateway to the Kenai Fjords National Park. Bear Creek and Lowell Point are adjacent to Seward. The area includes approximately 14.40 square miles of land and approximately 7.10 square miles of water.

Seward falls within the gulf coast maritime climate zone, characterized by a rainy atmosphere, long, cold winters, and mild summers. This zone lacks prolonged periods of freezing weather at low altitudes and is characterized by cloudiness and frequent fog. The combination of heavy precipitation and low temperatures at high altitudes in the coastal mountains of southern Alaska accounts for the numerous mountain glaciers.
Source: DCCED 2018

2.2 DEMOGRAPHICS

The 2017 U.S. Census estimated 2,831 residents, of which the median age was 38.3 indicating a relatively young population. Seward's population is expected to remain steady because over half of the population is below 36 years of age. Approximately 261 or 9.7 percent of the population is principally Alaska Native. The male and female composition is approximately 62 and 38 percent respectively. The 2017 Census estimates that there are 928 households with the average household having approximately 2.14 individuals. The most recent 2017 DCCED certified population is 2,518. Figure 2-2 illustrates Seward's historic population.

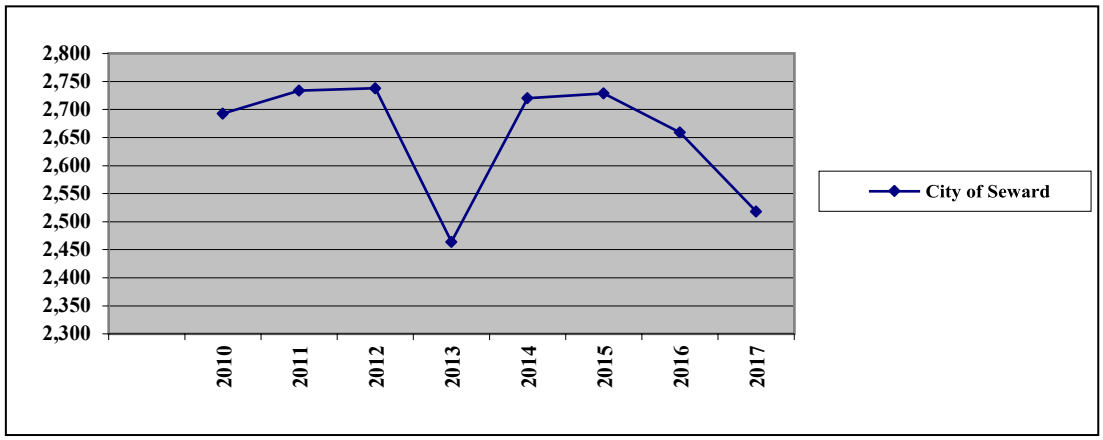

Figure 2-2 Seward Area's Historic Population

2.3 TAX REVENUES

The 2016 tax revenues include:

Table 2-1 Tax Revenue

Tax Levied	Tax Revenue
Bed Tax	$458,605
Real and Personal Property Tax, excluding Oil and Gas	$1,007,672
Sales Tax	$4,883,996
Total Property Tax, including Oil and Gas	$1,007,672

Source: DLWD 2017

2.4 ECONOMY

The Alaska Department of Labor and Workforce Development, Research and Analysis Section provides the following City of Seward's Workforce data up to 2016.

Table 2-2 Worker Characteristics

Categories	2016
Residents age 16 and over	1,583
Residents employed	941
Female workers	455
Male workers	486
Workers age 45 and over	404
Workers age 50 and over	309
Total wages	$34,304,626
Sector employed in:	
Private	722
Local government	116
State government	103
Peak quarterly employment	844
Workers employed all 4 quarters	591
New hires	303
Unemployment insurance claimants	157

Source: DLWD 2017

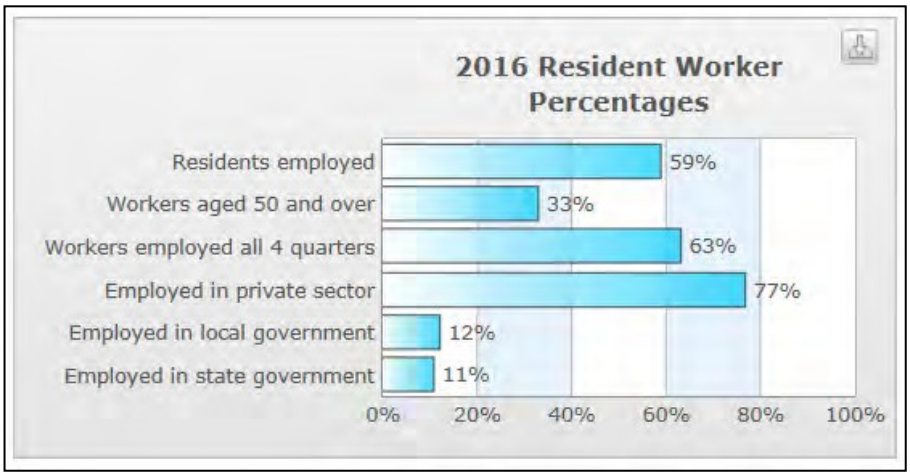

Figure 2-3 Resident Worker Percentages

Source: DLWD 2017

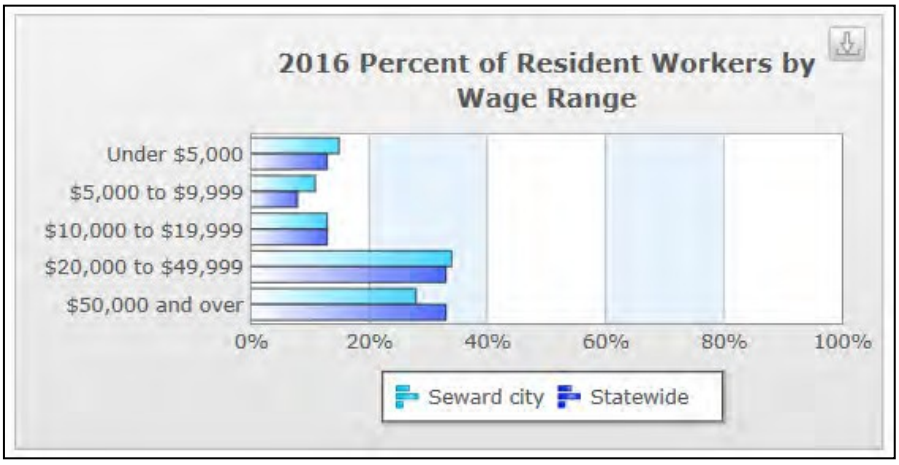

Figure 2-4 Resident Workers by Wage Range

Source: DLWD 2017

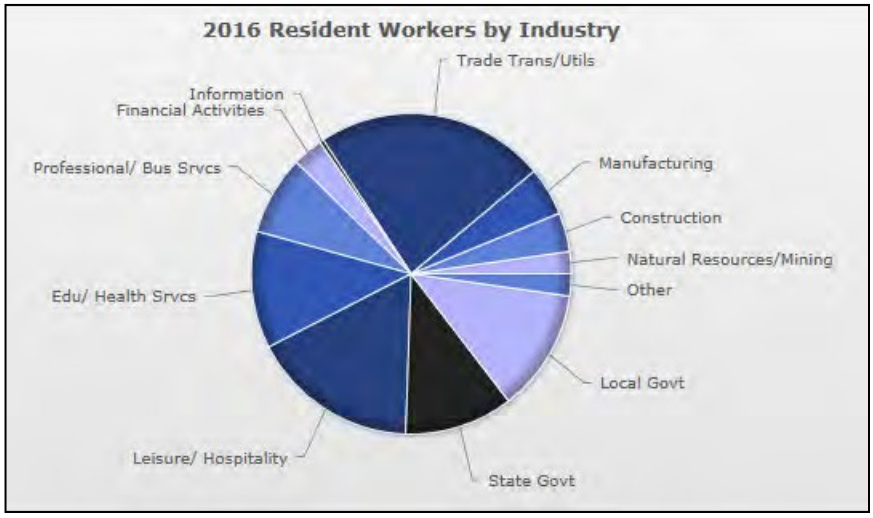

Figure 2-5 2016 Resident Workers by Industry Chart

Source: DLWD 2017

2016 Top Occupations (go to expanded occupations page)

Note: Values in this table represent resident workers only.

	Number of workers	Female	Male	Age 45 and over	Age 50 and over
Teachers and Instructors, All Other	32	20	12	18	17
Correctional Officers and Jailers TOP JOB	30	7	23	15	13
Cashiers	25	18	7	9	8
Bookkeeping, Accounting, and Auditing Clerks	24	20	4	17	15
Meat, Poultry, and Fish Cutters and Trimmers	24	6	18	8	6
Captains, Mates, and Pilots of Water Vessels TOP JOB	22	1	21	12	10
Food Preparation Workers	21	8	13	8	7
Counter and Rental Clerks	20	13	7	8	4
Material Moving Workers, All Other	20	4	16	10	6
Nursing Assistants	19	17	2	9	5
Waiters and Waitresses	19	10	9	1	1
Cooks, Restaurant	16	2	14	2	0
Maids and Housekeeping Cleaners	16	12	4	8	6
Hotel, Motel, and Resort Desk Clerks	16	11	5	7	6
Janitors and Cleaners, Except Maids and Housekeeping Cleaners	15	6	9	9	8
Personal Care Aides	15	11	4	8	4
Construction Laborers	15	0	15	5	3
Executive Secretaries and Executive Administrative Assistants TOP JOB	14	14	0	5	4
Sailors and Marine Oilers	14	3	11	7	6
Recreation Workers	14	8	6	0	0
Vocational Education Teachers, Postsecondary	12	6	6	11	8
General and Operations Managers TOP JOB	12	6	6	6	6
Registered Nurses TOP JOB	11	9	2	7	5
First-Line Supervisors of Retail Sales Workers	11	5	6	8	7
Heavy and Tractor-Trailer Truck Drivers	11	0	11	7	5

means the occupation has been identified as an important occupation involved in the oil and gas industry. Read more.

means the occupation has been identified as an important occupation involved in the maritime industry. Read more.

TOP JOB means the occupation is projected to have a high growth rate and numerous openings, and has an above average wage. Read more.

Figure 2-6 2016 Top Occupations

Source: DLWD 2017

2016 Workers by Industry						
	Number of workers	Percent of total employed	Female	Male	Age 45 and over	Age 50 and over
Natural Resources and Mining	21	2.2	4	17	9	8
Construction	37	3.9	7	30	13	10
Manufacturing	46	4.9	11	35	20	13
Trade, Transportation and Utilities	218	23.2	88	130	105	84
Information	4	0.4	0	4	2	1
Financial Activities	29	3.1	13	16	11	8
Professional and Business Services	75	8.0	41	34	26	18
Educational and Health Services	111	11.8	83	28	63	46
Leisure and Hospitality	159	16.9	83	76	34	23
State Government	103	10.9	42	61	57	48
Local Government	116	12.3	70	46	57	43
Other	21	2.2	12	9	7	7
Unknown	1	0.1	1	0	0	0

Figure 2-7 Resident Workers by Industry Table

Source: DLWD 2017

According to the 2017 U.S. Census estimates, the median household income in Seward was $70,000 with a per capita income of $27,810. Approximately 7.2 percent were reported to be living below the poverty level. The potential work force (those aged 16 years or older) in Seward was estimated to be 2,382, of which 1,203 were actively employed. In 2017 the unemployment rate was approximately 8 percent; however, this rate included part-time and seasonal jobs. Practical unemployment or underemployment is likely to be significantly higher.

Figure 2-8 displays a 1998 aerial photo of the Seward area.

Figure 2-8 Aerial Photo Seward, Alaska

Source: USACE 2018

Figure 2-9 depicts the City of Seward's community map. The Qutekcak Native Tribe does not have a village location; tribal members live intermingled within the City of Seward and adjacent areas.

Figure 2-9 City of Seward Map

Source: City of Seward 2018

2.5 FACILITIES

Water is supplied by nine wells. The water is treated and distributed throughout Seward. Wastewater is collected via pipes to a secondary treatment lagoon. Almost all homes are connected to the city systems. Refuse collection is provided by the city under contract; the Borough provides solid waste disposal. The Kenai Peninsula Borough refuse transfer facility is located on 3200 Dimond Boulevard 3 miles north of downtown Seward.

Seward Public Utility purchases power from Chugach Electric Association for day to day operations and owns six emergency standby diesel generators.

Harbor facilities include approximately 4,000 linear feet of moorage and space for up to 650 vessels.

Seward Providence Medical Care Center is licensed to admit and care for up to six in-patients. The Long Term Care Facility, Seward Mountain Haven is licensed to admit and care for up to forty patients.

Fire and rescue resources include Seward's primary facility, the Seward Fire Department located at 316 4th Avenue in downtown Seward, and one satellite station located at mile 6.5 Nash Road in the Seward Marine Industrial Center basin area.

2.6 TRANSPORTATION

Seward is connected to the Alaska Highway system by the Seward Highway.

- Bus and commercial trucking services to and from Anchorage are available daily.
- Air services and charters are available at the State-owned airport. Two paved runways are utilized, at 4,240 and 2,300 feet.
- The port serves cruise ships, cargo barges, and ocean freighters from Seattle and overseas.
- The small boat harbor has two launch ramps, slips for 650 vessels and approximately 4,000 linear feet of moorage for transient vessels.
- The Alaska Railroad provides over 1.4 billion pounds of cargo transit each year, importing cargo for the Alaskan Interior and exporting coal to the Pacific Rim. Seasonal passenger transportation is available by rail and highway.

3.0 PLANNING PROCESS

This section provides an overview of the planning process; identifies the planning team members and key stakeholders; documents public outreach efforts; and summarizes the review and incorporation of existing plans, studies, and reports used to develop this MJHMP. Outreach support documents and meeting information regarding the planning team and public outreach efforts are provided in Appendix E.

This 2020 MJHMP displays DMA 2000 and 44 CFR 201.6 (city jurisdictional) and 44 CFR 201.7 (tribal jurisdictional) requirements to guide HMP development throughout the MJHMP. Pertinent support data follows each regulatory criteria text boxes, striving to fulfill designated criteria.

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

DMA 2000 Requirements
ELEMENT A. Planning Process
A1. Does the Plan document the planning process, including how it was prepared and who was involved in the process for each jurisdiction? (Requirement §201.6(c)(1)) A2. Does the Plan document an opportunity for neighboring communities, local and regional agencies involved in hazard mitigation activities, agencies that have the authority to regulate development as well as other interests to be involved in the planning process? (Requirement §201.6(b)(2)) A3. Does the Plan document how the public was involved in the planning process during the drafting stage? (Requirement §201.6(b)(1)) A4. Does the Plan describe the review and incorporation of existing plans, studies, reports, and technical information? (Requirement §201.6(b)(3)) A5. Is there discussion of how the community(ies) will continue public participation in the plan maintenance process? (Requirement §201.6(c)(4)(iii)) A6. Is there a description of the method and schedule for keeping the plan current (monitoring, evaluating and updating the mitigation plan within a 5-year cycle)? (Requirement §201.6(c)(4)(i))
Source: FEMA, March 2015.

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

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

3.1 OVERVIEW

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

The planning process began on, January 18, 2018 with an introductory email followed by personal telephonic conversations on 2/13/2018 with City Manager Jim Hunt selecting Fire Chief Eddie Athey, as the team leader. On 2/15/2018 AECOM contacted Scott Allen, Tribal Administrator to solicit the Qutekcak Native Tribe's participation, on 2/22/2018 Chief Athey, the Planning Team Lead and 2/28/2018 with Stephanie Presley, Seward Bear Creek Flood Service Area (SBCFSA) Program Lead to discuss MJHMP update information needs.

AECOM explained how the City of Seward was selected as a DHS&EM's 2016 PDM grant awarded planning project. AECOM staff described the MJHMP development requirement to enable the community to qualify for HMGP grants and the overall MJHMP development process as well as including neighboring community participation opportunities. MJHMP participants include the SBCFSA and the Qutekcak Native Tribe.

Chief Athey was encouraged to develop a community planning team to assist the community's efforts to identify available resources and capabilities for MJHMP development. The planning team will assist AECOM by acting as an advocate for the planning process, assist with gathering information, provide support during public participation opportunities, and review pertinent MJHMP information to assure it accurately describes participant needs and responsibilities.

AECOM provided a copy of the legacy 2010 HMP's planning team member list and asked Chief Athey to review and update the list. The city determined they would present the MJHMP update effort during their March 20, 2018 joint City Planning and Zoning (P&Z) Commission, SBCFSA, and the Qutekcak Native Tribe's work session.

The joint Seward P&Z Commission, SBCFSA, and Qutekcak Native Tribe workgroup members agreed to act as the Seward MJHMP planning team. They jointly identified applicable resources and capabilities during their 3/20/2018 joint meeting. The planning team then discussed their respective rolls, the hazard mitigation planning process, along with determining legacy HMP mitigation action status and their need to prioritize all mitigation actions for potential future mitigation project funding.

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.

Planning team discussed how their hazards have affected the area since the legacy 2010 HMP was implemented such as riverine and coastal erosion, sediment and heavy debris deposition within their 15 watersheds, and ground failure (most commonly landslides and small avalanche) impacts which are increasing in intensity and recurrence.

In summary, the following five-step process took place from date January 2018 through May 2019.

1. Organize resources: Members of the planning team identified resources, including staff, agencies, and local community members, who could provide technical expertise and historical information needed in the development of the hazard mitigation plan.

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

3.2 PLANNING TEAM

Seward's planning team members include Seward's P&Z Commission, SBCFSA, and the Qutekcak Tribe. Fire Chief Eddie Athey was selected as the MJHMP update lead by the former City Manager Jim Hunt. City Planner Jackie Wilde, Public Works Director Doug Schoessler, SBCFSA Coordinator Stephanie Presley, Qutekcak Tribal Administrator Pam Jarosz, (Tribal HMP Lead) and IGAP Coordinator Katherine Brown.

Interim City Manager Jeff Bridges and Assistant City Manager Brennen Hickok joined the planning team in late 2018. Table 3-1 lists Seward's MJHMP planning team.

Table 3-1 Seward Hazard Mitigation Planning Team

Name	Title	Organization	Phone
Eddie Athey	Fire Chief	City of Seward	**City HMP Lead**, Data gathering and MJHMP review
Jeff Bridges	Interim City Manager	City of Seward	MJHMP review
Brennen Hickok	Asst. City Manager	City of Seward	MJHMP review
Jackie Wilde	City Planner	City of Seward	Data gathering and MJHMP review
Doug Schoessler	Public Works Director	City of Seward	Data gathering and MJHMP review
Norm Regis	Harbormaster	City of Seward	Data input and MJHMP review
Tom Clemens	Police Chief	City of Seward	Data input and MJHMP review
Pam Jarosz	Tribal Administrator	Qutekcak Native Tribe	**Tribal HMP Lead**, data gathering and MJHMP review
Katherine Brown	IGAP Coordinator	Qutekcak Native Tribe	Tribal data gathering and MJHMP review

Table 3-1 Seward Hazard Mitigation Planning Team

Name	Title	Organization	Phone
Stephanie Presley	SBCFSA Coordinator	SBCFSA	SBCFSA data gathering and MJHMP review
Erik Slater	Planning and Zoning (P&Z) Commission Members	City of Seward	Review and approve MJHMP for submittal and implementation
Jeremy Norn			
Marianna Keil			
Ristine Casagranda			
Sue McClure			
Suzi Towsley			
Cindy Ecklund			
Craig Amrosiani			
Gary Seese			
Margaret Anderson			
Martha Fleming			
Nathaniel Carbonneau			
Tom Swan			
Scott Simmons	Emergency Management Planner/ Consultant	AECOM	Project Manager, lead writer, technical assistance

3.3 PUBLIC INVOLVEMENT AND OPPORTUNITIES FOR INTERESTED PARTIES TO PARTICIPATE

AECOM extended an invitation to all individuals and entities identified on the project mailing list describing the planning process and announcing the upcoming communities' planning activities. The announcement was emailed to relevant academia, nonprofits, and local, state, and federal agencies on February 2, 2018. The following agencies were invited to participate and review the MJHMP during and after draft completion:

- 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 (DEC)
    - Division of Spill Prevention and Response
    - Village Safe Water (VSW)
- Alaska Department of Transportation and Public Facilities (DOT/PF)

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

3.3.1 Qutekcak Native Village "Public" Determination

Due to the Qutekcak Native Tribe's relatively small population within the Seward area they recognize all actual tribal members, as well as Alaska Native, community residents, or employees as their "Public." This assures that anyone within the community is eligible to attend and participate in tribal public meetings concerning hazard mitigation plan development and implementation activities.

3.4 LEGACY 2010 HMP REVIEW AND ANALYSIS

Legacy 2010 HMP Lifecycle Planning Team Meeting Recommendations

44 CFR requires communities to schedule MJHMP 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.

The legacy 2010 HMP document was revised as described below.

Section 1 Introduction
Added entire new section explaining the City of Seward's plan development authorities and requirements.

Section 2 Community Description
Updated and expanded community information, including new census and state data.

Section 3 Planning Process
Updated this section to update the public process including newsletters, public meetings and planning team membership.

Section 4 Plan Adoption
Provided 2020 jurisdictional adoption resolutions.

Section 5 Hazard Profile Analysis
Reviewed hazard identification and risk assessment for earthquake, flooding, tsunami, volcanic, weather and wildland fire adding 2010 to 2018 descriptions and data. The weather profile addresses potential climate change conditions as it pertains to changing weather patterns and impacts. Other profiled natural hazards include climate change impacts as appropriate; these modifications better meet Seward's needs.

Section 6 Vulnerability Analysis
Added a new section to analyze climate change vulnerability with current critical facility and infrastructure table data.

Section 7 Mitigation Strategy
Reviewed, defined, and explained the status of Seward's 2010 HMP and SBCFSA's 2013 HMP listed mitigation goals and actions as they pertain to the City of Seward's 2020 Mitigation Action Plan update.

Section 8 References
Revised to reflect updated applicable resources assessed for plan development.

3.4.1 Planning Process Considerations

The legacy planning team did not complete their designated annual HMP integration into other planning mechanism, annual reviews, or other plan maintenance activities. Therefore, it became a primary consideration to update the legacy 2010 HMP to analyze Seward area changes as well as all hazards that have, or could potentially have, impacted the community during the legacy HMP's five-year lifecycle.

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

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

Pertinent section data are listed within Table 3-2 that formed the foundation for completing the 2020 MJHMP update. The overall priorities for this plan did not change.

Table 3-2 Legacy HMP Review and Update Needs Determination

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 to include the Qutekcak Tribe • Continue public outreach initiatives • HMP integration 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	• Legacy Planning Team membership list	• Add hazard data from newly available research, reports, and plans • Refine plan maintenance processes and responsibilities • Recommit to completing HMP maintenance requirements	• Planning team will begin to hold annual review meetings • Strive to integrate MJHMP initiatives into other planning mechanisms • Include the Qutekcak Tribe as an active HMP participant
Hazard Profile Update	• Update hazard profiles and refine hazard event history • Profile newly identified hazards	NF: Update hazard profile and new event history	• Deleted mitigation projects that were completed or combined those that were similar or redundant	• Identify new hazards if identified • Update hazards' impacts •	• Define new actions within the MAP
Risk Analysis and Vulnerability Assessment	• Asset inventory • Risk analysis and Vulnerability assessment & summaries	NF: Identify development and land use changes	• None	• Review and refine asset inventory • Determine infrastructure vulnerabilities • Determine residential structure vulnerabilities • Identify repetitive loss properties as appropriate	• Fill data gaps • Locate scientific information to augment these data. • Delineate climate change impacts to infrastructure

Table 3-2 Legacy HMP Review and Update Needs Determination

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
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	• Develop community specific capability assessment(s) • Determine legacy (2010) HMP MAP initiatives' status • Identify new mitigation actions for newly identified hazard implementation	• Annually review action's progress, status, and feasibility

* F: Fulfilled NF: Not Fulfilled

3.5 UPDATE HMP PLANNING ACTIVITIES

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

Table 3-3 Public Involvement Mechanisms

Mechanism	Description
Agency Involvement Email (February 2, 2018)	Invited agencies to participate in mitigation planning effort and to review applicable newsletters located on the DHS&EM Local/Tribal All Hazard Mitigation Plan Development website at: http://ready.alaska.gov/plans/localhazmitplans
Newsletter #1 Distribution (March 20, 2018)	The jurisdiction distributed their 1st newsletter introducing the upcoming planning activity. The newsletter encouraged the whole community to provide hazard and critical facility information. It was posted at city and tribal offices, as well as on bulletin boards in stores and community gathering locations to enable community wide dissemination.
Newsletter #2 Distribution (April 2019)	The jurisdiction distributed their second newsletter presenting potential projects for review and encouraging draft MJHMP's preliminary review. The newsletter encouraged the whole community to provide comments or input. It was posted at city and tribal offices, as well as on bulletin boards in stores and community gathering locations to enable the widest participation.
HMP Reviews Opportunities	The City of Seward identified their Planning and Zoning Commission as their formal planning team. They meet quarterly to review and discuss HMP data needs, component inclusion, and update essential information to fulfill FEMA HMP review

	requirements during development and prior to finalizing the plan.
June 5, 2018	P&Z Commission & SBCFSA Board reviewed mitigation goals, legacy project status, and new project selection work session #1
June 19, 2018	P&Z Commission mitigation continued reviewing mitigation goals, legacy project status, and new project selection work session #2. They combined and/or edited actions, identified those that were closed, and selected new actions for HMP inclusion.
Public HMP Progress Notifications (August 2, 2016, March 20,2018, April 21, 2018, April 22, 2019)	Team members engaged the public during city council meetings and health fairs to provide HMP update progress and HMP review opportunities throughout the project.
Planning and Zoning Commission Workshops	The Planning & Zoning Commission provided editorial direction during their quarterly HMP development workshop meetings during HMP draft development.
Public HMP Review Sources	Seward planning team provided public awareness notifying residents and other interested parties where they could access the draft HMP. No public comments were received during development or during the draft HMP review period.

AECOM made initial contact with Mayor Squires, City Manager Jim Hunt, and Fire Chief Eddie Athey and Tribal Administrator Scott Allen on January 18, 2018; they appreciated that Seward was included within DHS&EM's Pre-Disaster Mitigation grant and the prospects of completing the hazard mitigation plan. City Manager Jim Hunt quickly selected Eddie Athey as the HMP project lead who began coordinating MJHMP data acquisition efforts with Ms. Jackie Wilde, City Planner. Ms. Wilde introduced the hazard mitigation planning project and introductory newsletter during the March 20, 2018 City of Seward P&Z Commission, SBCFSA's, and Qutekcak tribe's joint work session.

Tribal Finance Officer Pam Jarosz assumed Tribal Administrator responsibilities upon Scott Allen's retirement. She worked with the Qutekcak Native Tribal Council to review and provide pertinent tribal information throughout the planning process.

The project introductory newsletter was posted throughout the community (city and tribal offices, and public bulletin boards, etc.) announcing Seward's MJHMP planning team's joint work session encouraging public participation.

AECOM described the legacy 2010 Seward HMP sections that needed to be updated. The HMP update activity will seek to update each plan section as well as determine how development changes may have hindered, threatened, or benefited the area:

- Did historic as well as newly realized hazards threaten the area?
- Did Seward experienced damages from new hazards?
- Has population risks or infrastructure vulnerability increase or decrease?
- How did proposed hazard mitigation projects or initiatives work as planned?

The risk analysis was completed after the community asset data was collected by the planning team during spring and summer 2018. The planning team further evaluated facilities and their associated risks to facilitate creating a viable or realistic risk analysis and subsequent vulnerability assessment for the Seward area.

Based on the results of the risk and vulnerability analysis, the planning team identified 10 legacy HMP listed natural hazards include: earthquake, flood, ground failure (includes landslide and avalanche), tsunami (includes seiche), volcano, weather, and wildland fire; and two manmade hazards: economic and hazardous materials which periodically threatens the Seward area.

The planning team decided to omit the legacy 2010 HMP's economic hazard profile as the city has no mitigation alternatives for this hazard type. However, the hazardous substances hazard profile is located in the new Technological Hazard section.

The planning team further determined it would be beneficial to combine certain hazards to consolidate related information within fewer categories:

- The flood hazard now includes riverine and coastal erosion, storm surge, and associated impacts.
- Ground failure will include landslide, avalanche, and other ground failure events.
- Tsunami includes local seiche.
- Weather now includes climate change influences, drought, and other severe weather impacts.

A planning team reviewed mitigation actions contained in their legacy 2010 HMP as well as city shared actions within the 2013 SBCFSA HMP, and 2018 KPB HMP to determine which ones to include within their 2020 City of Seward MJHMP update.

Those selected mitigation actions were presented to the planning team to determine whether to include them in the new 2020 mitigation strategy. The planning team then determined each action's priority during March 2020.

A second newsletter was prepared (April 2019) to describe the project selection process and presented the sample of the prioritized mitigation actions list for public review and comment. The public was advised to review the draft MJHMP to review the complete Mitigation Action Plan (MAP).

The planning team held a special meeting, in April 2019 to review the draft MJHMP for accuracy – ensuring it meets city P&Z Commission, SBCFSA, and Qutekcak tribal needs.

Note: *planning team and public comments were addressed where appropriate during MJHMP development and prior to finalizing the MJHMP for state and FEMA review.*

3.6 PLAN MAINTENANCE

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

- Incorporate and integrate MJHMP components into existing planning mechanisms
- Continue public involvement throughout the 2020 MJHMP's 5-year lifecycle

- Monitor, review, evaluate, and update the MJHMP annually

3.6.1 Incorporating Existing Plans and Other Relevant Information

During the new MJHMP development and subsequent annual update planning process, the planning team reviewed and incorporated pertinent information from resources that became available since the legacy 2010 HMP received FEMA final approval. Some historical documents were also reviewed and considered for inclusion due to their historical context.

Data collected included newly available plans, studies, reports, and technical research listed in Table 3-4 and Section 8, References. The data were reviewed and referenced where applicable for the MJHMP's jurisdictional information, hazard profiles, risk analysis, and vulnerability assessment. Additional MJHMP reference materials are presented in Section 8, References.

Table 3-4 Documents Reviewed

Existing plans, studies, reports, ordinances, etc.	Contents Summary (How will this information improve mitigation planning?)
Seward Hazard Mitigation Plan, 2010	Provides essential historical HMP data for the Seward area
Seward Bear Creek Flood Service Area Hazard Mitigation Plan, 2013	Defines historical hazard data to 2013
City of Seward 2030 Comprehensive Plan, 2017, Volume I and Volume II	Provides city governance, economic, land use, housing, road, water, and air transportation, etc. Volume I identified goals, objectives, and implementation action items, updated and developed for each comprehensive plan element. Volume II, presents background information and planning issues for each of these elements.
Seward Municipal Lands Inventory and Management Plan, 2014	Defines community land assets and needs that direct land use, management, public use, and potential future needs
Seward Zoning Map, 2016	Depicts Seward's land use locations
Lowell Point Beach Sediment Study, Lowell Point, Alaska. CE A676 Coastal Engineering, University of Alaska Anchorage 2007	Describes overall beach morphology at Lowell Point, Alaska
Tsunami Inundation Maps of Seward and Northern Resurrection Bay, Alaska, 2010	Tsunami impact study depicting historical and future impact locations
US Army Corps of Engineers, Erosion Information Paper, -Seward, Alaska, date, July 17, 2008	Defined the community's historical erosion impacts
USACE, Alaska Baseline Erosion Assessment, 2009	Defined the area's erosion threats
USACE, Floodplain Manager's Reports, Community Specific 2011	Defined the area's historical flood impacts
USACE Lowell Tunnel Renovation, 2018	Provided images and described potential damage locations and impacts

Table 3-4 Documents Reviewed

Existing plans, studies, reports, ordinances, etc.	Contents Summary (How will this information improve mitigation planning?)
State of Alaska, Department of Commerce, Community and Economic Development Community Profile	Provided historical and demographic information
State of Alaska Hazard Mitigation Plan (SHMP), 2013	Defined statewide hazards and their potential locational impacts

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

3.6.2 Integrating MJHMP Precepts into Existing Planning Mechanisms

This section describes how the Seward Planning and Zoning Commission and the Qutekcak Native Tribe (planning team) intends to implement, coordinate or integrate existing planning mechanisms into the MJHMP, as stipulated in the DMA 2000 and its support regulations.

The Seward 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 due to conflicting requirements such as flood hazard response and recovery and seasonal road, Lowell Creek diversion tunnel reconstruction, and infrastructure repair and maintenance activities. Vulnerability from natural hazards did not change.

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

Seward hosts various annual outreach activities every summer which gives the Seward 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 two most effective events include annual Permitting workshops and the Health Fair where department leads can share the MJHMP's Annual Review Questionnaire and the Annual Mitigation Action Progress Report to encourage the community is aware and engaged with selecting and prioritizing the most appropriate mitigation initiatives.

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

- Review community-specific regulatory tools to assess integrating MJHMP components. These regulatory tools are identified in Section 7, Capability Assessment section.
- Work with pertinent community departments to increase MJHMP awareness and provide assistance with integrating the mitigation strategy (including the MAP) into relevant planning mechanisms.

- Responsible authorities will track their respective project or action's status and annually report their progress as well as their mitigation success, or failure. (See Section 7.7 and 7.8)

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

3.6.3 Continued Public Involvement

The Seward planning teams did not conduct their legacy 2010 HMP maintenance commitments, therefore neither was their "public" engaged during its five-year life cycle.

The entire joint Planning Team recommitted to involving the public directly to review, reshape and update their implemented 2019 MJHMP. A paper copy of the MJHMP and any proposed changes will be available at the city and tribal offices; along with an address and phone number of the planning team leader or members to whom people can direct their comments or concerns.

The city, SBCFSA, and Qutekcak Tribe will strive to continue identifying opportunities to raise community awareness about the MJHMP and the hazards that affect the area. This effort will include opportunities during open public meetings, providing hazard related outreach and other available materials at city, SBCFSA, and tribal-sponsored events such as their annual Health Fair and Permitting Process workshop, within future newspaper articles, and other public mailings and activities.

Any public comments received regarding the MJHMP during its 5-year lifecycle will be collected by the planning team leader and team members who, as they occur from public comments, will include the information within the annual report for inclusion consideration during future MJHMP updates.

3.6.4 Monitoring, Reviewing, Evaluating, and Updating the MJHMP

The MJHMP was prepared as a collaborative effort with the city, SBCFSA, and the Qutekcak Tribe, and the P&Z Commission (planning team). The planning team will build upon previous hazard mitigation planning efforts and successes. The City of Seward will strive to continue using the planning team to monitor, review, and evaluate the MJHMP annually and update the plan as required.

3.6.4.1 Planning Team MJHMP Maintenance Recommitment

Legacy HMP maintenance activities were not conducted during the legacy HMPs five-year lifecycle. Subsequently, each section of the 2010 HMP was reviewed and edited to reflect changes since it was implemented.

Seward's planning team intends to organize their efforts to ensure that this 2020 MJHMP improvements and revisions occur in a well-managed, efficient, and coordinated manner. The planning team will follow these three process steps:

1. Review and revise the 2018 MJHMP to reflect development changes, planning process improvements, project implementation progress, project priority changes, and mitigation strategy progress.
2. Submit a MJHMP update at the end of its five-year life cycle for State and FEMA review and approval.

3. Continually strive to implement and integrate MJHMP identified mitigation initiatives within community planning, emergency management, and other essential documents.

3.6.4.2 Monitoring the MJHMP

The planning team did not monitor any legacy 2010 HMP components. Therefore, no projects or initiatives were accomplished that needed closure.

The planning team recommits to monitoring the 2020 MJHMP, 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 local, state, or federal law.

The HMP's Annual Progress Report and Annual Evaluation Forms are plan review tools located within Appendix G. The city and tribal councils, with advisement from the city leadership, the State Hazard Mitigation Officer and FEMA, determines when significant changes warrant a MJHMP update prior to its five-year anniversary date.

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

The City Fire Chief as the planning team leader, (or designee), will serve as the primary point-of-contact and will coordinate local efforts to monitor, evaluate, revise, and update MJHMP mitigation strategy actions' progress, status, and closure status (Section 7-7 and 7.8).

3.6.4.3 Reviewing the MJHMP

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

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

Additionally, during each annual review, each authority or agency administering a mitigation project will submit a Progress Report (Appendix G) to the joint planning team leader (or designee). The report will include the mitigation project's current status, including any project changes, a list of identified implementation problems (with appropriate strategies to overcome them), and a statement of whether or not the project has helped achieve the appropriate goals identified in the plan. (See also Section 7.6, 7.7, and 7.8).

3.6.4.4 Evaluating the MJHMP

The Annual Review Questionnaire provides the basis for future MJHMP evaluations by guiding the planning team with identifying new or more threatening hazards, adjusting to changes to, or increases in, resource allocations, and garnering additional support for MJHMP implementation.

The planning team leader will initiate the annual review two months prior to the scheduled planning meeting date to ensure that all data is assembled for discussion with the planning team.

The findings from these reviews will be presented at the annual planning team meeting. Each review, as shown on the Annual Review Worksheet, will include an evaluation of the following:

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

3.6.4.5 Updating the MJHMP

The planning team recommits to reviewing and integrating MJHMP components within their respective planning documents during MJHMP implementation throughout its five-year life cycle as described in Section 3.6 and update the MJHMP every five years (or when significant events such as a disaster declaration or other changes occur). The planning team leader (or designee) will review their Annual Review Questionnaires and Project Progress Reports to determine their success with integrating MJHMP components and MAP within other community planning actions.

Completing annual reviews and editing the current plan with this information will reduce the planning team's MJHMP update efforts within its five-year lifecycle.

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

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

- Request grant assistance and potential funding from DHS&EM to update the MJHMP (this can take up to one year to obtain and a minimum of two years to update the plan).
- Ensure that each authority administering a mitigation project will submit a progress report to the planning team.
- Develop a chart to identify those MJHMP sections that need improvement, the section and page number of their location within the MJHMP, and describing the proposed changes.
- Thoroughly analyze and update the natural hazard risks.
    - Determine the current status of the mitigation projects.
    - Identify the proposed MAP (projects) that were completed, deleted, or delayed. Each action should include a description of whether the project should remain on

the list, be deleted because the action is no longer feasible, or reasons for the delay.

- Describe how each action's priority status has changed since the MJHMP was originally developed and subsequently approved by FEMA.
- Determine whether or not the project has helped achieve the appropriate goals identified in the plan.
- Describe whether the community has experienced any barriers preventing them from implementing their mitigation actions (projects) such as financial, legal, and/or political restrictions and stating appropriate strategies to overcome them.
- Update ongoing processes, and to change the proposed implementation date/duration timeline for delayed actions the community still desires to implement.
- Prepare a "new" MJHMP MAP matrix.

- Prepare a new Draft Seward MJHMP update.
- Submit the updated draft MJHMP to DHS&EM and FEMA for review and approval.

3.6.5 Formal State and FEMA MJHMP Review

Completed MJHMPs do not qualify either the City of Seward or the Qutekcak Native Tribe for mitigation grant program eligibility until they have been reviewed and adopted independently by their city and tribal councils and received State and FEMA final approval.

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

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

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

3.6.6 Qutekcak Native Tribal Mitigation Grant Application Process Considerations

Qutekcak Native Tribe, as an Indian Reorganization Act (IRA) tribe, can potentially qualify to either apply for applicable grant funding as a state sub-applicant or apply directly to FEMA as an eligible federally recognized IRA tribal government with sovereign authority working directly with government agencies.

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

Option 1:

The Qutekcak Native Tribe can submit grant applications through the State with no loss in tribal governance authorities.

The tribe submits their mitigation grant applications to the State Hazard Mitigation Officer for initial State review. This option could potentially enable the tribe to avoid paying the future mitigation project's programmatic matching funds.

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 assuming payment of their grant recipient cost share.

Option 2:

The Qutekcak Native Tribe can submit mitigation grant applications directly to FEMA or other granting agencies as a sovereign, IRA tribal government maintaining sovereign authority working directly with government agencies.

The tribe will be responsible for providing any applicable programmatic project matching funds.

FEMA will review, prioritize, and award grants assigning grant recipient cost match to successful grant awardees.

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4.0 JURISDICTIONAL ADOPTION

This section is included to fulfill FEMA regulatory criteria for the City of Seward and the Qutekcak Native Tribe's formal MJHMP adoption requirements.

The City of Seward and Qutekcak Native Tribe are represented in this MJHMP and meet the requirements of Section 409 of the Stafford Act and Section 322 of DMA 2000, and 44 CFR §201.6(c)(5), and §201.7(c)(5) & (6) respectively.

4.1 JURISDICTIONAL ADOPTION

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

DMA 2000 Requirements
ELEMENT E. Plan Adoption
E1. Does the Plan include documentation that the plan has been formally adopted by the governing body of the jurisdiction requesting approval? (Requirement §201.6(c)(5))
E2. For multi-jurisdictional plans, has each jurisdiction requesting approval of the plan documented formal plan adoption? (Requirement §201.6(c)(5))
Source: FEMA, March 2015.

The Seward's City Council adopted the MJHMP on [date], 2020 and submitted the final draft MJHMP to FEMA for formal approval.

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

4.2 TRIBAL GOVERNMENT MJHMP ADOPTION

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

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

The Qutekcak Native Tribe is represented in this Tribal HMP and meets the requirements of Section 409 of the Stafford Act and Section 322 of DMA 2000, and 44 CFR §201.7(c)(5) & (6).

Tribal Assurance: Evidenced by Section Four of this MJHMP update; by formal Tribal adoption, the Tribe formally adopted the jurisdictional MJHMP. The Tribal government therefore assures they will monitor the plan to evaluate progress and work with the City to update the plan every five years to comply with all applicable federal statutes and regulations in effect with respect to the periods for which it receives grant funding, including 2 CFR parts 200 and 3002. The Qutekcak Native Tribe will amend its plan whenever necessary to reflect changes in tribal or federal laws and statutes as required in 2 CFR parts 200 and 3002, and 44 CFR 13.11(c), and 44 CFR 13.11(d).

The Qutekcak Native Tribal Council formally adopted the City of Seward Hazard Mitigation Plan on [date], 2020. A scanned copy of the Tribal formal adoption is included in Appendix D.

5.0 HAZARD ANALYSIS

This section identifies and profiles the hazards that could affect the Seward area.

5.1 OVERVIEW

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

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

5.2 HAZARD IDENTIFICATION AND SCREENING

This is the first step of the hazard analysis. On January 18, 2018 the planning team reviewed and evaluated their legacy 2010 HMP's identified hazards based on a range of factors, including prior current threat perception, the current relative risk presented by each hazard, the city and tribe's ability to mitigate the hazard, and the known or expected hazard threat information availability (Table 5-1).

The planning team determined that seven natural hazards and one technological hazard pose a great threat to Seward: earthquake, flood/erosion, ground failure, volcanic ash, tsunami, weather, and wildland; some of which are influenced by increasing changing climate conditions such as late ice formation, early thaw conditions, increased, lack, or inconsistent rain. Seward lists a hazardous material, namely Anhydrous Ammonias as their only technological hazard.

Table 5-1 Identification and Screening of Hazards

Hazard Type	Should It Be Profiled?	Explanation
Natural Hazards		
Earthquake (EQ)	Yes	The Seward area experienced severe structural damage from the 1964 Good Friday Earthquake. Nearly the entire community was destroyed from the earthquake (EQ) and its aftershocks. The EQ propagated a devastating tsunami from the Pacific Ocean EQ epicenter devastation. Subsequent seiche waves continued to oscillate from each side of Resurrection Bay that continued to threaten the population and delay disaster response activities.
Flood (FL) (Riverine and/or coastal related floods and resultant erosive	Yes	Snowmelt run-off and rainfall flooding occur during spring thaw and the fall rainy season. Events occur from soil saturation, coastal storm surge and wind scour, and riverine high water flow scour along the area's rivers, streams, and creek embankments.

Table 5-1 Identification and Screening of Hazards

Hazard Type	Should It Be Profiled?	Explanation
scour damages)		
Ground Failure (GF) (Avalanche, Landslide/Debris Flow, Subsidence)	Yes	Ground Failure occurs throughout Alaska from avalanches, landslides, melting permafrost, and ground subsidence. However, subsidence and permafrost are the primary hazards causing houses to shift due to ground sinking and upheaval, and high ground water melting the permafrost.
Tsunami (Seiche)	Yes	The 1964 9.2M Earthquake generated a tsunami in the Pacific Ocean impacting many coastal Communities along with the City of Seward. The same event caused a Resurrection Bay seiche that devastated Seward's waterfront with recurring waves, infrastructure destruction with fires burning out of control.
Volcanic Ash	Yes	Volcano generated ash periodically impacts the community from volcanos located along the Aleutian Chain. The closest of five volcanoes is Mt. Redoubt located approximately 116 miles, and the furthest is Mt. Novarupta, approximately 239 miles, from the Seward area.
Weather (WX) (Cold, Drought, Rain, Snow, Wind, etc.)	Yes	Severe weather impacts the community with climate change influences such as 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 and avalanches, heavy snow, and high wind, and extreme cold temperatures.
Wildland Fire (WF)	Yes	The community and the surrounding forest area become very dry in summer months with weather (such as drought and lightening), human caused incidents igniting dry vegetation in the adjacent area (burning trash outside their landfill's burn box, camp fires, etc.), and increasing pine bark beetle infestations killing black spruce exacerbating the area's fire fuels threat.
Technological Hazard		
Hazardous Materials (HM)	Yes	The Seward area has fish processing plants that handle hazardous materials that is tracked through by the Alaska Department of Environmental Conservation and the EPA.

5.3 PLANNING AREA AND HAZARD PROFILES

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

DMA 2000 Multi-Jurisdictional Requirements
ELEMENTS. Planning Area and Natural Hazard Profiles
B1. Does the Plan include a description of the type, location, and extent of all natural hazards that can affect each jurisdiction(s)? (Requirement §201.6(c)(2)(i))
B2. Does the Plan include information on previous occurrences of hazard events and on the probability of future hazard events for each jurisdiction? (Requirement §201.6(c)(2)(i)) B3. Is there a description of each identified hazard's impact on the community as well as an overall summary of the community's vulnerability for each jurisdiction? (Requirement §201.6(c)(2)(ii))
Source: FEMA, March 2015

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

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

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

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

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

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

Estimating magnitude and severity are determined based on historic events using Table 5-2 identified criteria from narrative descriptions in Section 5.3.

Table 5-2 Hazard Magnitude/Severity Criteria

Magnitude / Severity	Criteria
4 - Catastrophic	• Multiple deaths. • Complete shutdown of facilities for 30 or more days. • More than 50 percent (%) of property is severely damaged.
3 - Critical	• Injuries and/or illnesses result in permanent disability. • Complete shutdown of critical facilities for at least two weeks. • More than 25% of property is severely damaged.
2 - Limited	• Injuries and/or illnesses do not result in permanent disability. • Complete shutdown of critical facilities for more than one week. • More than 10%of property is severely damaged.

Table 5-2 Hazard Magnitude/Severity Criteria

Magnitude / Severity	Criteria
1 - Negligible	• Injuries and/or illnesses are treatable with first aid. • Minor quality of life lost. • Shutdown of critical facilities and services for 24 hours or less. • Less than 10% of property is severely damaged.

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

Table 5-3 Hazard Recurrence Probability Criteria

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

The hazards profiled for the Seward area are presented throughout Section 5.4 Natural Hazards and 5.5 Technological Hazards. The presentation order does not signify their importance or risk level.

5.4 NATURAL HAZARD PROFILES

5.4.1 Earthquake

5.4.1.1 Nature

An earthquake is a sudden motion or trembling caused by a release of strain accumulated within or along the edge of the earth's tectonic plates. The effects of an earthquake can be felt far beyond the site of its occurrence. Earthquakes usually occur without warning and after only a few seconds can cause massive damage and extensive casualties. The most common effect of earthquakes is ground motion, or the vibration or shaking of the ground during an earthquake.

Ground motion generally increases with the amount of energy released and decreases with distance from the fault or epicenter of the earthquake. An earthquake causes waves in the earth's

interior (i.e., seismic waves) and along the earth's surface (i.e., surface waves). Two kinds of seismic waves occur: 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. Intensity is based on the damage and observed effects on people and the natural and built environment. The following is an excerpt from the 2018 SHMP explaining the intensity and magnitude relationship:

> *The point at the earth's surface directly above earthquake rupture begins is known as its "epicenter." While the epicenter usually experiences the most intense earthquake effects (e.g., shaking), the total area affected can cover hundreds of thousands of square miles, depending on the earthquake's magnitude. Scientists cannot predict earthquakes, and because damage can occur only seconds after rupture initiation, it is important for every Alaskan to know what to do to minimize risk posed by damaging earthquakes.*
>
> *The moment magnitude scale (M_w) is used to describe the size of moderate to large earthquakes, and is objectively based on the amount of physical energy released in an event. The seismic moment of an earthquake (used to calculate the moment magnitude) is based on the area of fault that ruptures in the brittle crust, the average amount of slip (movement) that occurs between the two pieces of crust, and the force that was required to overcome the friction that was holding the pieces of crust together. The moment*

magnitude scale is logarithmic, meaning that each step up the scale corresponds to an increase of roughly 32 times the amount of energy released. For example, a M8 earthquake releases approximately 32 times more energy than a M7, and approximately 1,000 times more energy than a M_w 6. Conversely, larger earthquakes are less common than smaller earthquakes, such that the smallest earthquakes are extremely frequent, while the largest earthquakes are relatively infrequent. The moment magnitude scale succeeds the Richter and Local magnitude scales, which were based on the amplitude of shaking recorded on paper seismographs.

Earthquakes are also classified by their felt effects (e.g., the perceived shaking intensity). However, the effects of an earthquake are directly related to the distance from the earthquake rupture, among other parameters (such as the type of crust where the earthquake occurs). In general, the closer one is to an earthquake epicenter, the more severe the felt effects and damage will be. An earthquake's intensity is described by the Modified Mercalli Intensity (MMI) Scale. As shown in Figure 6-24, the MMI Scale consists of 10 subjective intensity levels ranging from "not felt" to "extreme," with varying amounts of damage associated with each.

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

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

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

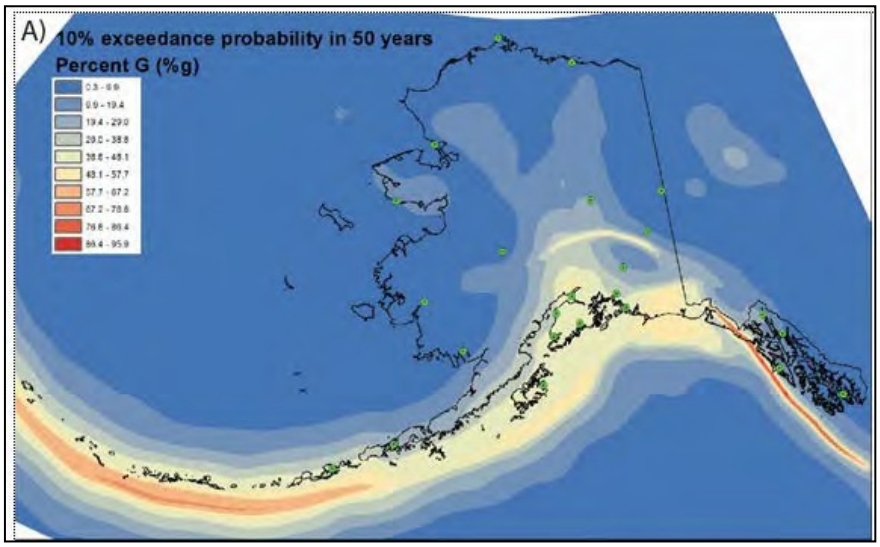
Figure 6-24 Perceived Shaking, Potential Damage, and Peak Ground Acceleration
Source: Modified Mercalli scale of ground shaking. http://www.sanandreasfault.org/feelit.html

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

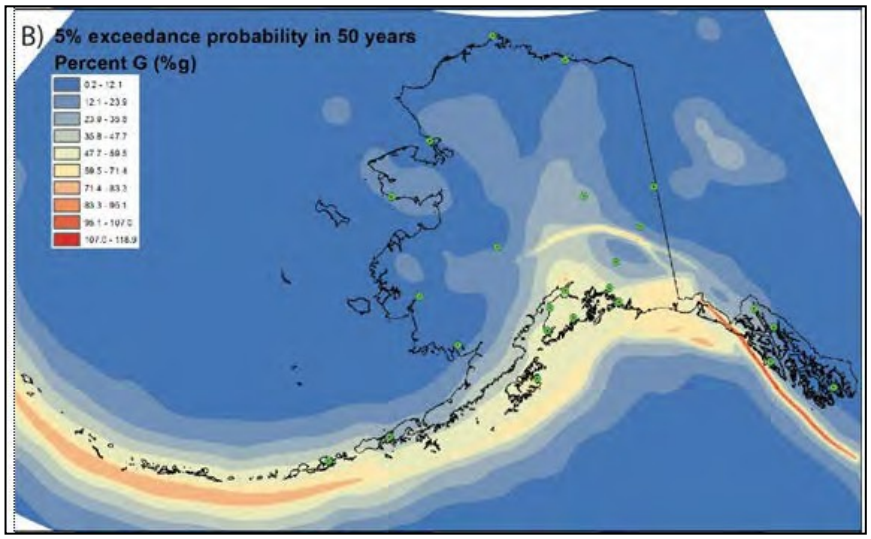
Because earthquakes are impossible to predict, scientists must use a unique approach to describing the hazards posed by earthquakes. Probabilistic Seismic Hazard Analyses (PSHAs) describe earthquake shaking levels and the likelihood that they will occur in Alaska. PSHAs are based on known, mapped geologic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

means a 0.04% annual exceedance probability—there is a 0.04% chance that the earthquake will happen in a given year). However, when the infrequent, large earthquakes occur, there are stronger ground accelerations.

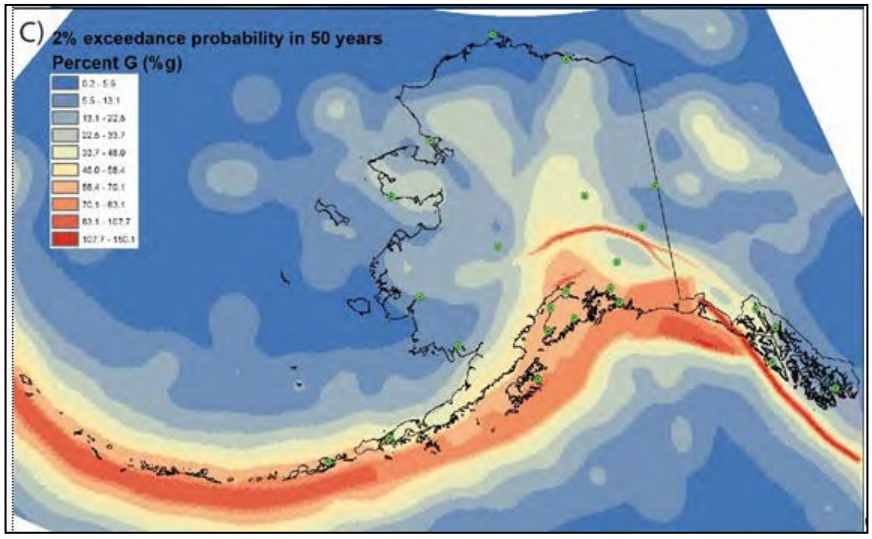
To use these maps, first pick the type of earthquake in which you are interested. For infrequent, large, and destructive earthquakes you would use the 2% in 50 years exceedance probability (Figure 6-25 C). Next, choose your location, and note the color of the map there. For this example, choose Fairbanks,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



6-25 A



6-25 B



6-25 C

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

5.4.1.2 History

Accurate seismology for Alaska is relatively young with historic data beginning in 1973 for most locations. Therefore, data is limited for acquiring long-term earthquake event data. The MJHMP's Alaska earthquake information is based on best available data; obtained from the US Geological Survey (USGS) and the State of Alaska, UAF/GI archives. Research included searching the USGS earthquake database for events since the legacy 2010 HMP was implemented to present; none of which exceeded magnitude (M) 5.8 located within 100 miles of Seward.

The planning team determined that based on available recorded data, Seward has a strong concern for large damaging earthquake because they have experienced numerous historical earthquake events. As of December 19, 2018, there have been 70 earthquakes with greater than (>) M4.0 since the 2010 legacy HMP was implemented; 25 (nearly 1/3rd) of those events occurred between November 30 and December 9, 2018.

Most of Alaska has become anesthetized to lower magnitude earthquakes. However, Seward area residents start to pay attention when earthquakes with higher magnitude M>4.0 occur as they may potentially indicate the beginning of my more severe earthquake activity. Table 5-4 lists:

- 57 earthquake events spanning M4.0 to 4.9,
- 10 events spanning M5.0 to 5.8, and
- 1 M7.0 occurring on November 30, 2018 that caused significant damage to the Municipality of Anchorage and Matanuska-Susitna (Mat-Su) Borough communities located in close proximity to those events.

Table 5-4 Seward Area's Historical Earthquakes >4.0 Since 2010

Date/Time	Latitude	Longitude	Depth	Magnitude	Magnitude Type	Alaska (AK) Epicenter Location
12/9/2018	61.4406	-149.887	28	4.8	ml	9km SSE of Big Lake
12/6/2018	61.3458	-149.999	40.3	4.8	ml	15km NNW of Anchorage
12/6/2018	61.3993	-150.065	36.1	4	ml	14km SSW of Big Lake
12/5/2018	61.3277	-150.053	38.1	4.5	ml	13km NW of Anchorage
12/4/2018	61.3903	-150.077	36	4.6	ml	17km SSW of Big Lake
12/2/2018	61.3417	-149.996	44.5	4.6	ml	12km NNW of Anchorage
12/1/2018	61.3582	-149.994	39	5.2	ml	17km NNW of Anchorage
12/1/2018	61.4039	-150.005	42.4	4.8	ml	14km SSW of Big Lake
12/1/2018	61.4027	-150.056	22.8	4.5	ml	14km SSW of Big Lake
12/1/2018	61.4566	-149.89	27.7	4.1	ml	6km SSE of Big Lake
12/1/2018	61.3558	-150.003	39.3	4.1	ml	16km NNW of Anchorage
12/1/2018	61.3415	-150.048	31.4	4	ml	15km NNW of Anchorage
11/30/2018	61.3464	-149.955	46.7	7	mww	12km N of Anchorage
11/30/2018	61.2822	-149.957	40.8	5.7	ml	4km NNW of Anchorage
11/30/2018	61.384	-150.08	37.7	5	ml	17km SSW of Big Lake
11/30/2018	61.2833	-149.908	45.8	4.9	ml	7km N of Anchorage
11/30/2018	61.3707	-150.004	39.8	4.8	ml	17km NNW of Anchorage
11/30/2018	61.3978	-149.998	47	4.5	ml	13km S of Big Lake
11/30/2018	61.3885	-150.098	37.4	4.5	ml	16km SSW of Big Lake
11/30/2018	61.3713	-149.71	35.2	4.4	ml	16km SSW of Knik-Fairview
11/30/2018	61.336	-149.91	39.3	4.3	ml	16km N of Anchorage
11/30/2018	61.4315	-150.006	41.1	4	ml	10km SSW of Big Lake
11/30/2018	61.4209	-149.961	43.4	4	ml	12km S of Big Lake
11/30/2018	61.4283	-149.942	36.6	4	ml	8km SSW of Big Lake
11/30/2018	61.4166	-150.072	42.7	4	ml	10km SW of Big Lake
10/15/2018	61.2868	-150.522	72.1	4.5	ml	34km WNW of Anchorage
7/13/2018	59.3125	-151.242	45.4	4.3	ml	40km SSE of Homer
6/24/2018	60.0326	-151.434	75.4	4	ml	33km NNW of Fritz Creek
4/11/2018	60.579	-147.613	6.6	4.1	ml	62km ESE of Whittier
11/27/2017	60.5552	-147.43	16.6	5.3	ml	72km ESE of Whittier
11/17/2017	60.6195	-150.711	49.1	4.4	ml	9km NNE of Sterling
9/4/2017	60.678	-151.22	67.6	4.1	ml	3km ESE of Nikiski
8/27/2017	60.4166	-151.904	77.7	4.4	ml	33km W of Kalifornsky
7/11/2017	60.4234	-147.335	20	4.4	ml	83km ESE of Whittier
7/7/2017	60.4755	-151.76	70.6	4.3	ml	25km WNW of Kalifornsky
5/7/2017	60.1828	-151.68	66.6	5.2	ml	29km SW of Cohoe
11/21/2016	60.7706	-150.198	50.4	4	ml	40km NE of Sterling
10/14/2016	59.8029	-151.777	62.9	4	ml	4km NE of Anchor Point
4/8/2016	61.4564	-149.924	40.1	4	ml	7km SSE of Big Lake
2/15/2016	60.8913	-150.017	49.4	4.1	ml	36km S of Anchorage

Table 5-4 Seward Area's Historical Earthquakes >4.0 Since 2010

Date/Time	Latitude	Longitude	Depth	Magnitude	Magnitude Type	Alaska (AK) Epicenter Location
11/23/2014	60.449	-151.038	67.9	4.1	ml	4km SSE of Soldotna
10/18/2014	60.1363	-150.983	65.3	4.3	ml	31km SE of Cohoe
5/10/2014	60.0035	-152.132	91.1	5.6	ml	30km NNW of Anchor Point
5/5/2014	60.6511	-149.558	38	4.6	ml	49km WSW of Whittier
9/11/2013	61.343	-149.522	36.9	4	Ml	19km SSE of Knik-Fairview
7/14/2013	60.358	-151.384	57.4	4.5	Ml	3km WSW of Cohoe
6/27/2013	61.328	-150.019	55.3	4.3	Ml	11km NW of Anchorage
6/19/2013	61.4331	-149.834	48.7	4	Ml	12km S of Big Lake
1/9/2013	60.744	-150.173	49.7	4.3	mwr	Kenai Peninsula
12/24/2012	61.243	-150.764	64.4	4.4	mb	Southern AK
12/4/2012	61.24	-150.768	63.7	5.8	mw	Southern AK
8/29/2012	60.3345	-150.735	65.8	4.4	mw	Kenai Peninsula
8/9/2012	60.352	-147.541	0.7	4.8	mw	Southern AK
7/28/2012	60.9785	-150.964	68	4.2	mb	Kenai Peninsula
5/16/2012	61.1175	-149.926	61.7	4.9	mw	Southern AK
3/8/2012	61.0071	-150.914	10	4	mw	Southern AK
12/23/2011	61.1207	-150.198	47.2	4.4	mb	Southern AK
11/12/2011	60.2239	-151.826	72.7	4	ml	Kenai Peninsula
9/15/2011	59.8977	-151.827	55.9	4	ml	Kenai Peninsula
6/16/2011	60.7649	-151.076	58.9	5.1	mw	Kenai Peninsula
2/4/2011	60.7248	-150.276	40.9	4.5	mw	Kenai Peninsula
11/27/2010	60.0358	-151.934	64.6	4.6	mb	Kenai Peninsula
11/15/2010	60.528	-149.358	28.2	4.9	mw	Kenai Peninsula
10/27/2010	60.9795	-150.99	66	4.4	mw	Kenai Peninsula
9/20/2010	61.1147	-150.219	45.4	4.9	mw	Southern AK
9/17/2010	59.0971	-149.719	27.8	4.2	mb	Kenai Peninsula
8/19/2009	61.228	-150.858	66.4	5.1	mwc	Southern AK
7/30/2009	59.93	-151.091	44.1	4.6	mb	Kenai Peninsula
4/7/2009	61.454	-149.743	33	4.6	mwr	Southern AK

(Source: USGS 2018a)

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. This is the largest earthquake that Seward experienced. The event was catastrophic destroying much of Seward's infrastructure. Seward did not experience significant ground motion from the FEMA disaster declared November 3, 2002 M7.9 Denali earthquake that occurred in the Alaska Interior along the Denali Fault. But they did experience damaging impacts from the November 30, Cook Inlet M7.0 event.

The 2018 DHS&EM Disaster Cost Index lists two of Alaska's historic earthquake events, the November 3, 2002 M7.9 Denali Fault earthquake and the November 30, 2018 M7.0 event that

may not have affected the Seward Area but was experienced through most of the Kenai Peninsula.

03-203 Denali Fault Earthquake (AK-DR-1440) Declared November 6, 2002 by Governor Knowles then FEMA Declared November 8, 2002: *A major earthquake with a preliminary magnitude of 7.9 occurred on the Denali Fault in Interior Alaska on November 3, 2002, with strong aftershocks. The earthquake caused severe & widespread damage and loss of property, and threat to life & property in the Fairbanks North Star Borough, the Denali Borough, the Matanuska-Susitna Borough, and numerous communities within the Delta Greely, Alaska Gateway, Copper River, and Yukon-Koyukuk Regional Education Attendance Areas including the cities of Tetlin, Mentasta Lake, Northway, Dot Lake, Chistochina and Tanacross, and the unincorporated communities of Slana and Tok. The areas experienced severe damage to numerous personal residences requiring evacuations and sheltering of residences; extensive damage to primary highways including the Richardson Highway, the Tok Cutoff, the Parks Highway and road links to communities including the road to Mentasta and Northway. Damage to supports for the Trans-Alaska Pipeline necessitated the shutdown of the pipeline. Additionally; fuel spills from residential storage tanks, significant damage to water, septic, sewer and electrical systems also occurred. Not all of the areas listed in the State disaster were included in the Federal Individual Assistance Program. Assistance to those areas was thought the State Individual Assistance Program. Additionally, not all of the areas listed in the State declaration were eligible for all categories of assistance under the federal Public Assistance Program. Those areas were only eligible for Debris Removal & Emergency Protective Measures under the Federal Public Assistance Program but were eligible for all Permanent Work categories under the State public Assistance Program. FEMA also authorized 404 Mitigation funding. DOT submitted an appeal letter after funding was denied by FEMA for permanent repair of the runways at Northway and Gulkana Airports. On August 10, 2004, FEMA granted the second appeal, which awarded DOT an extra $13.5 million to conduct the repairs. Individual Assistance totaled $67K for 12 applicants. Public Assistance totaled $24.8 million for 17 applicants with 53 PW's.*

AK-18-265 2018 November Cook Inlet Earthquake declared by Governor Walker on December 2, 2018 then FEMA declared an Emergency Declaration on December 2, 2018.
On November 30, 2018, a major earthquake measured at magnitude 7.0 produced strong seismic shaking that caused widespread and severe damage primarily within the Municipality of Anchorage, Matanuska-Susitna Borough, and Kenai Peninsula Borough. The Municipality of Anchorage and Matanuska-Susitna Borough have each issued local declarations of disaster emergency in response to this event

The disaster resulted in widespread and severe seismic shaking damage to: major highways and critical community roads, bridges, and other transportation infrastructure; undermining of road embankments and railroad tracks, and loss of track base; widespread power, water, and communication disruption; structural collapse and resulting fires to several community buildings; and severe damage to private homes and personal property.

These conditions have required local emergency protective measures to protect life and property, including activation and staffing of emergency operations centers; emergency debris clearance of roads and railroad tracks to protect critical infrastructure and maintain access; placement of road barricades to protect roads and bridges; operation of mass shelters for affected residents; school, business, and government office closures (Source: DHS&EM 2018)

5.4.1.3 Location, Extent, Impact, and Recurrence Probability

Location

The entire geographic area of Alaska is prone to earthquake effects. As such Seward has experienced 993 earthquakes since 2010 with an average M2.9 seismicity.

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

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

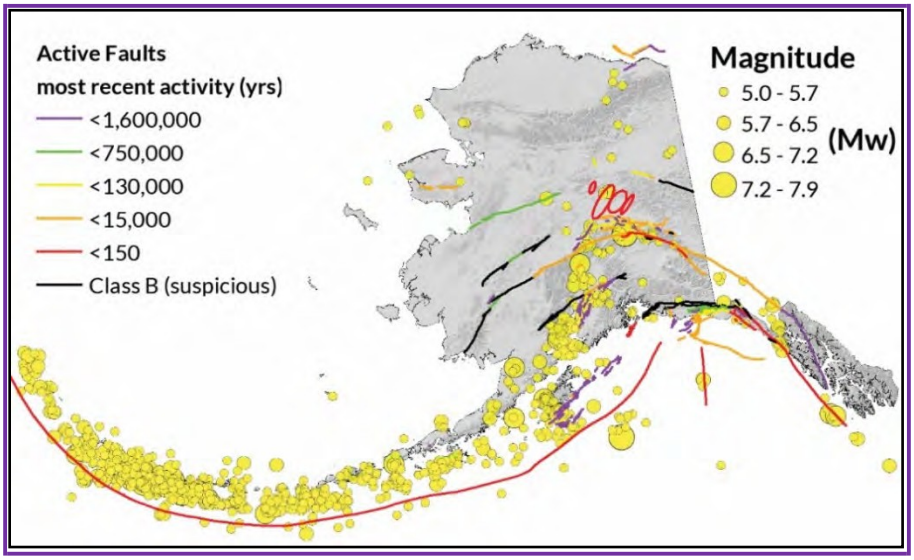


Figure 5-1 Alaska's Known Active Faults

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

Extent

Based on historic earthquake events and the criteria identified in Table 5-2, the magnitude and severity of earthquake impacts in the Seward area are considered "Critical" with injuries and/or illnesses result in permanent disability, complete critical facilities shutdown for at least two weeks; and more than 25 percent of property is severely damaged with limited long-term damage to transportation, infrastructure, or the economy.

Figure 5-2 depicts a portion of the 1994 USGS generated Neotectonic Map of Alaska with Seward at the center point. Numerous earthquake faults lay within 100 miles of the City center (red star) including the November 30, 2018 M7.0 epicenter's approximate location (red dot).

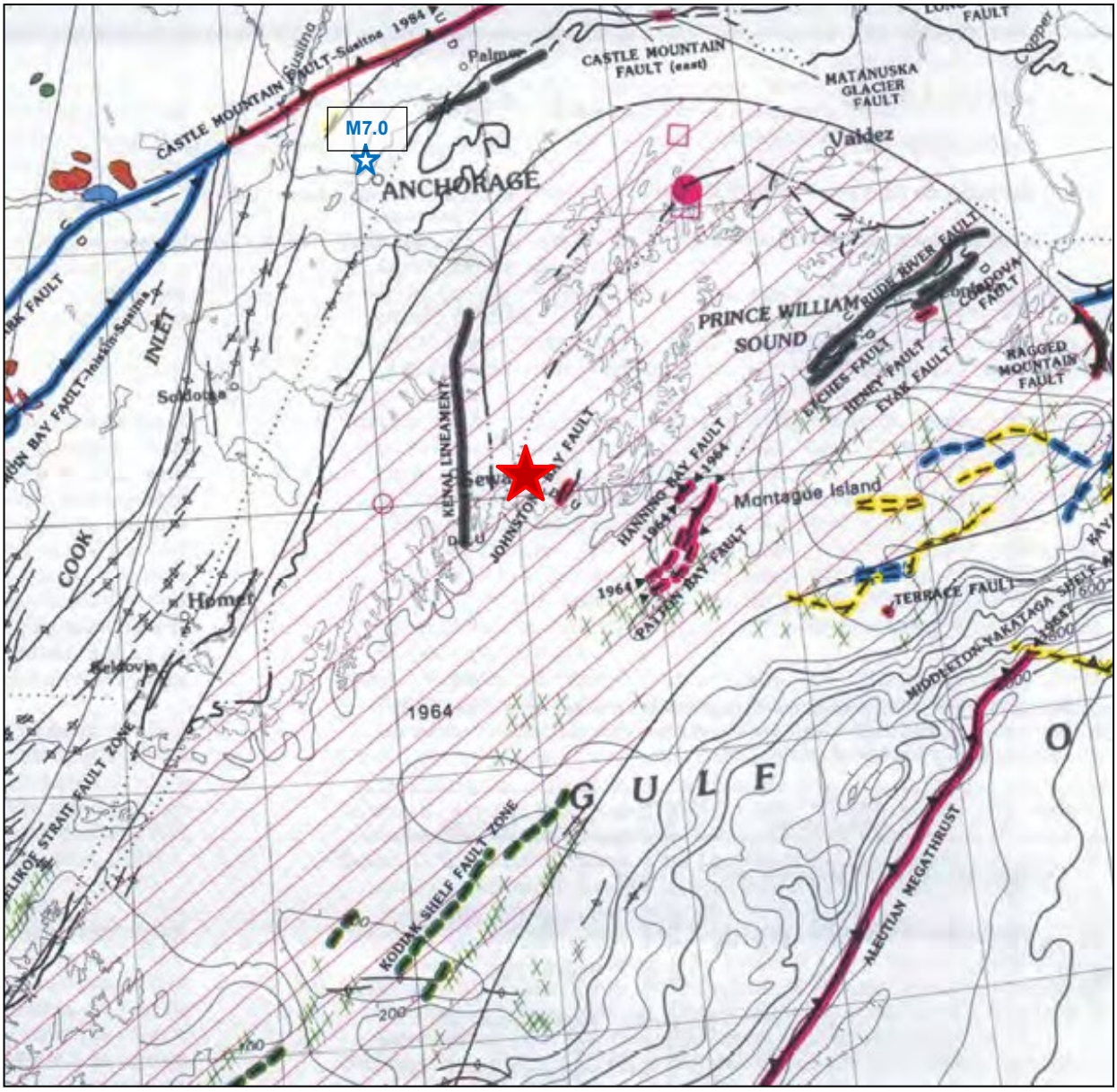


Figure 5-2 Neotectonic Map of Alaska, "Seward" Area

Source: DGGS 1994

Impact

The Seward area can expect to experience significant ground movement that may result in infrastructure damage due to their location among numerous earthquake faults as well as their earthquake history.

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

Recurrence Probability

The City has significant historical earthquake activity resulting in damage or injuries. While it is not possible to predict when an earthquake will occur, the USGS has conducted Probabilistic Seismic Hazard Analyses for the state (Section 5.4.1.1, Figures 6-25a, b, and c). This modeling effort incorporates what is known about Alaska's active faults and current and past seismicity to depict community usable recurrence probability maps.

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

Earthquake probability maps indicate a M5.0 or greater earthquake has a recurrence likelihood within 50 years and 30 miles of the Seward area. Table 5-3 indicated their recurrence is categorized as "Highly Likely" that a M5.0 or greater earthquake could potentially recur within the next year with a (1/1= 100 percent) chance of occurring; due to an event history that is greater than 33 percent likely per year.

5.4.2 Flood

5.4.2.1 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 in the Seward area: rainfall, snowmelt, and storm surge floods. Ice override floods do not generally threaten Seward because it is an open water port.

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.

Flash floods typically originate from slow-moving storms that can generate immense rainfall and snow melt volumes which rapidly raise water levels bursting levees and seeking new routes to lower ground. Flash floods quickly reach high velocities; often carrying debris. They can strike Seward area populated areas with little to no warning and may bring several feet of water. These events have moved small car-sized boulders, uprooted trees, destroyed structures and facilities, eroded roadways, swept away vehicles and created new water channels. The intensity of flash flooding is a function of rainfall intensity and duration, watershed steepness, stream gradients, watershed vegetation resistance, natural and artificial flood storage area capacities, and streambed and floodplain configuration. Urban areas are more vulnerable to flash flooding

because of development, land clearing, drainage system construction, and open areas that allow water to move unobstructed; such as parking lots and ditches. Wildfires exacerbate flood and land slide conditions because wildfires alter soil conditions and remove essential landslide resistant vegetation.

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

Storm Surge, 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 coastal wave run-up 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 Resurrection Bay coast, the Pacific Ocean, and other Alaska coastal areas 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 (used interchangeably with erosion) rarely causes death or injury. However, both coastal and riverine scour causes property destruction, prohibits development, and impacts community infrastructure. Erosive scour can occur rapidly as the result of floods, storms or other event' or slowly as the result of long-term environmental and other climate changes occur. Erosion is a natural process, but its effects can be easily exacerbated by human activity.

Coastal and riverine erosive scour threatens the Seward area's infrastructure, built environment, and utilities adjacent embankments and shorelines.

Land scour, no matter the source results in lost beach, shoreline, or dune material from natural activity or human influences. Coastal damage occurs throughout the area roughly from the top of the bluff out into the near-shore region to about the 30 feet water depth. It is measured as the rate

of change in the position or horizontal displacement of a shoreline over a period of time. Bluff recession is the most visible aspect of coastal erosion because of the dramatic change it causes to the landscape. As a result, this aspect of coastal erosion usually receives the most attention.

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 downstream affects from shore protection structures such as groins, jetties, seawalls, or revetments can lead to increased erosion.

Riverine Scour results from extreme flowing water forces river channels damages. This scouring affects the river 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.

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.

Flood Risk Defined

Interpret the following data using this example:

> A 100-year flood is a one-percent annual chance flood (also known as the base flood) that has a one-percent (1/100=0.01 percent) chance of occurring in any given year. FEMA uses the 100-year flood as a community's base flood as it relates to the floodplain.
>
> Flood category terminology is sometimes confusing as an area could experience a 100-year flood two times in the same year, two years in a row, or four times over the course of 100 years. One could also not experience a 100-year flood over the course of 200 or more years.

Table 5-5 Annual Flood Chance of Occurring

Category	Defined as
1-Year Flood:	A 100% chance an annual flood will occur (also described as having a 100% probability in any year)
2-Year Flood:	There is a 50% chance a flood event will occur (5.0 Probability)
5-Year Flood:	There is a 20% chance a flood event will occur (or 2.0 probability)
10-Year Flood:	There is a 10% chance a flood event will occur (or 0.1 probability)
50-Year Flood:	There is a 2% chance a flood event will occur (or 0.02 probability)
100-year Flood:	There is a 1% chance a flood event will occur (or 0.01 probability)

500-Year Flood:	There is a 0.2% chance a flood event will occur (or 0.002 probability)

Related Hazards

Hazards related to flooding include erosion, ground failure, and coastal storm surge. Flooding and erosion commonly occur together because of increased water currents that get raised above the normal tide line or riverbank.

5.4.2.2 History

Figure 5-3 depicts a portion of the Kenai Peninsula Borough's Review Draft 2018 MJHMP's, Section 2, page 18; Map 2.3, Seward Area Chronic Flood Problem areas:

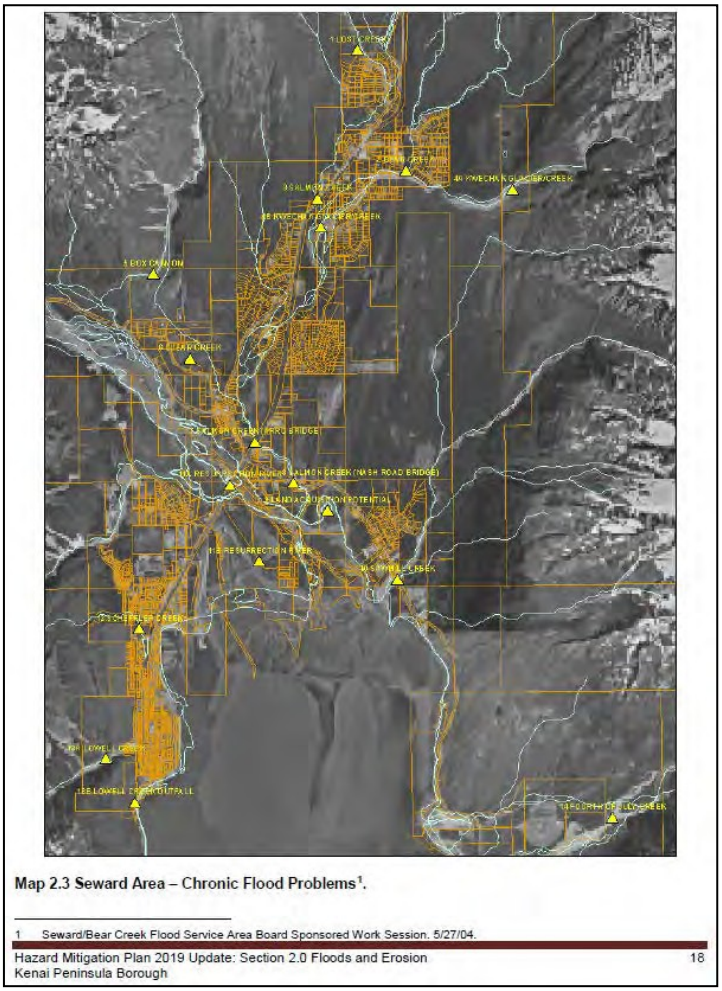


Figure 5-3 Seward Area Flood and Erosion Locations

Source: KPB 2018

The SBCFSA flood history provides a sampling of the Seward area's repeated high water flow experiences and impacts from their 15 separate area watersheds. Many of which intersect with each other causing massive downstream damages during high water flow events. These conditions subject the Seward area to severe flood and erosion impact damages from heavy rainfall, snowmelt, and spring run-off flooding (Figure 5-3 above).

The following Historic Flood Event information was extracted from the SBCFSA 2013 MJHMP as it provides context to the City of Seward's continuing flood threats:

> *The Seward Bear Creek Flood Service Area, Flood Hazard Mitigation Plan, A Service Area of the Kenai Peninsula Borough, May 2010 provides the concise flood history. URS performed a field floodplain analysis during the September 2012 flood event. This information is included within Table 5-6*

Table 5-6 Representative Sampling of Historic Flood Events

Date	*Watershed*	*Description*
1903-1966	*Lowell Creek*	*Lowell Creek flooding began to be recorded almost as soon as settlers arrived to begin building the railroad.*
		1903 and 1917 photographs it is evident that Lowell Creek regularly demolished the center of town with floodwaters.
		1918 Another flood occurred before this project could be started.
		1930's Lowell Creek was diverted through an elevated flume.
		1935 flood was estimated that 10,000 cubic yards was deposited in the flume in 11 hours.
		1937 it was determined that the cost of maintaining the deteriorating flume was prohibitive.
		1939 Congress allocated funds to the Army Corps of Engineers to build the Lowell Creek Diversion Tunnel and Dam: original cost of $143, 929.00.
		1966 Flooding and landslides partially blocked the Lowell Creek Diversion Tunnel and water levels behind the diversion tunnel dam came within 2 feet of overtopping the dam.
	Resurrection River	*Flooding is recorded on the Resurrection River in 1946 when the first recorded flooding of the airport occurred, as well as in 1961 and 1962.*
1986	*Entire SBCFSA*	*Rainstorm dropped ~18 inches of rain on the Kenai Peninsula from October 9 – 11.* *Landslides, landslide-dam failure, and resultant floods, debris flows, alluvial fan aggradations and flooding in and around Seward.* *Damages: ~ $20 million.*
1989	*Entire SBCFSA*	*Heavy rains from August 25 – 27* *Damages: over $1,000,000 to homes, roads, bridges, and infrastructure.*
1993	*Entire SBCFSA*	*Heavy rains on August 26 caused Salmon Creek, Clear Creek and the Resurrection River to flood.* *Damage: Three homes, one business, and the Alaska Rail Road tracks.*
1995	*Entire SBCFSA*	*Typhoon Oscar generated rain from September 19 with about 9 inches of rain within a 24 hour period.* *Damages:* • *State authorities closed the Seward Highway from flood near Milepost 3.* • *The Alaska Railroad removed debris accumulated at their Seward Highway Milepost 4.8 bridge and replaced damaged bridge infrastructure.* • *Additional damages: the airport, sewage treatment facility, roads, trails, railroad facilities, power transmission lines and damage to dikes and levees and the Lowell Creek diversion tunnel.* • *Estimated flood damage was 9.8 million dollars.* • *A South Central Fall Flood Hazard Mitigation Grant Program (HMGP) was $1,185,588, for bridge repair mitigation and $731,658 for a comprehensive flood mitigation project on the lower Resurrection River.*

Table 5-6 Representative Sampling of Historic Flood Events

Date	Watershed	Description
2002	*Entire SBCFSA*	*Heaviest rainfall and most severe flooding occurred October 22 – 24.* *Damages:* • *Salmon Creek flooding severely affected Marathon View II subdivision, Whites, Sawmill and Camelot.* • *Infrastructure damaged included roads, Lowell Creek diversion tunnel, and the small boat harbor.*
2006	*Entire SBCFSA*	*High tides, warm temperatures, and typhoon remnants caused 9 – 15 inches of rain to fall on the Seward area.* *Damages:* • *Heavy rain contributed to the Seward Highway overtopping at Mile 4.* • *The Lowell Creek diversion tunnel outflow dumped a 15 foot high pile of debris and gravel on the bridge, damaging the bridge and backing water up into surrounding businesses and streets.* • *Alaska Sea-Life Center and Institute of Marine Science (IMS) received extensive damage: pump house was completely destroyed,* • *Shell Fish factory was flooded with water and gravel.* • *Power and water lines in the area were damaged.* • *Timber Lane Bridge damaged in Old Mill Subdivision* • *Forest Lane Bridge over Sometimes Creek was destroyed and replaced with two large culverts.* • *The loss of the bridge caused residents of Lowell Point to be cut off by road.* • *Water taxis had to be pressed into service to help Lowell Point residents get to jobs and stores.* • *Families were evacuated from their homes in the Exit Glacier Road area, Old Mill Subdivision and around the Resurrection River highway bridges.* • *Japanese Creek levee, Box Canyon levee and Kwechak Creek levee were all damaged in the flooding as was the airport.* • *The Seward Highway was blocked by flooding at milepost 3.5* • *Nash Road was blocked by flood waters. Portions of the airport runways were flooded.* • *A federal disaster was declared for this flood event.*
2007	*Entire SBCFSA*	*Flood occurred after steady rain and high ground water conditions.* *Damages:* • *Water to rise in Salmon Creek, Clear Creek, Sometimes Creek, and Lost Creek.* • *Flooding threatened property and infrastructure in these areas including Salmon Creek Road, Nash Road, the Timber Lane Bridge, and the new bridge that had replaced the temporary culverts under Forest Road across Sometimes Creek.* • *The KPB Office of Emergency Management (OEM) instituted Emergency dredging and bank restoration on Salmon Creek.* • *SBCFSA obtaining permits and private property owner waivers.* • *KPB appealed directly to Governor Palin, for DNR to allow a short-term limited area exemption from the material sale fee.* • *KPB contracted for emergency dredging and bank repair above*

Table 5-6 Representative Sampling of Historic Flood Events

Date	*Watershed*	*Description*
		and below Timber Lane Bridge. • *SBCFSA contracted dredging and bank repair project extending further north on Lost Creek.*
2009	*Entire SBCFSA*	*Flooding on July 29 – heavy rains, 3.3 inches in 24 hours.* *Damages:* ***City of Seward:*** • *Lowell Point Road – closed at the bridge due to debris piled up on the roadway.* • *Several landslides on Lowell Point Road. Storm surge damaged Lowell Point Road and the small board harbor, waterfront adjacent to the Alaska Sea-life Center, IMS, and the Shell Fish factory.* • *Seward Airport runway 13/31 closed – water on the runway.* • *Dimond Boulevard closed – water across the road.* ***Outside City Limits*** • *Exit Glacier Road closed – water across the road and up to the bottom of Exit Glacier Bridge.* • *Box Canyon Creek landslides caused Surge release flooding threatened homes in the Old Exit Glacier Subdivision; levee needed emergency restoration.* • *Bear Creek Fire Department went door-to-door warning residents of flood threat.* • *Old Mill Subdivision reported – water across the road and the bridge at Sometimes Creek threatening to wash out.* • *Flooding was reported on low lying properties on Clear Creek.* • *Kwechak Creek Levee emergency repairs – damaged from surge release flooding.* • *Local and borough emergency declarations were made. Emergency crews worked during and after the flooding on Lowell Creek Bridge, Box Canyon Levee and Upper Kwechak Levee.*
2012	*Entire SBCFSA*	*Flooding on September 19 – 30, heavy rains, 9 inches in one 24 hour period.*

Source: SBCFSA 2013

The News agencies report diverse flood events within the Seward area. Glacier dam burst events are called Jökulhlaup are included within this section. The following provides flood related article contents:

> ***September 19, 2017:*** *Anchorage Daily News: "A glacier dam bursts and creates minor flooding on the Kenai," by Lisa Demer*
>
> *A glacier dam… gave way around Sept. 19 at Snow River on the Kenai Peninsula is causing minor flooding...*
>
> *The National Weather Service… issued a flood warning that it extended on Monday for Kenai Lake and the Kenai River from Cooper Landing to Skilak Lake. It is in effect until 12:30 a.m. Wednesday.*
>
> *The phenomenon is called a jökulhlaups, an Icelandic term for a flood that suddenly bursts from a glacier.*
>
> *…water builds up behind Snow Glacier at the headwaters of the Snow River until finally it breaks through, usually every two years, according to the National Weather Service.*

Melt water flows in tunnels through the glacier until ice plugs give way. The lake drains like a bathtub through the conduits into Snow River and eventually the Kenai [Lake]…

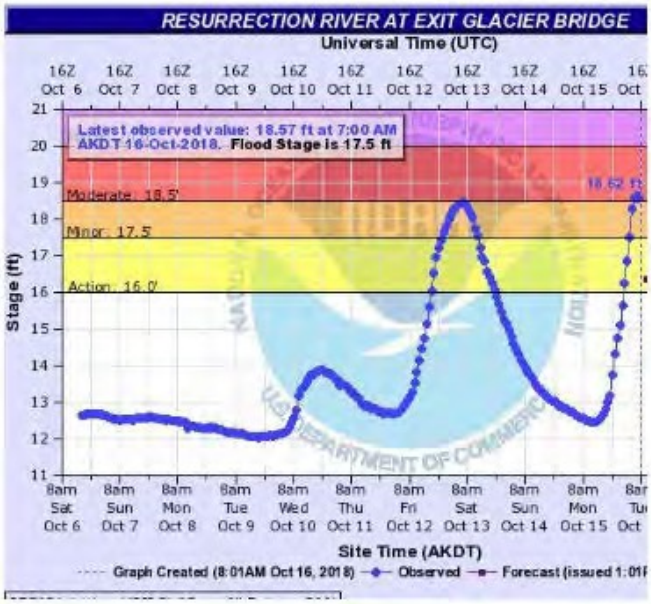
The flooding is minor, covering boat ramps and some roads. Some driveways, outbuildings and a crawlspace have flooded, National Weather Service hydrologist Crane Johnson said. But the agency doesn't have reports of flooded main houses. Two weather service employees went to the Kenai to assess the situation.

***December 4, 2017,** Seward City News: "Lowell Point Road Damaged by 13.7 High Tide and Surf," by Carol Griswold*

Waves pummeled Lowell Point Road today, flinging rocks and woody debris clear across the road. Motorists navigated cautiously between the ocean spray, road rubble, deep puddles, and falling rocks. At particularly narrow spots, timing was essential to dart past before the waves returned to slam into the roadside. Several sections were severely undercut by the pounding surf. It was a very dramatic and exciting drive!

Despite the challenging conditions, a Seward Public Works loader managed to scrape the damaged road into a more drivable condition.

***October 16, 2018,** KTVA: "Seward flooding prompts emergency declaration, school closure." by Melissa Fey*



Seward's city manager issued an emergency declaration Tuesday, due to heavy rains that have left high water throughout town…

The flooding in Seward is a "significant event," according to Brenda Ahlberg with Kenai Peninsula Borough. There are at least two subdivisions cut off from the Seward Highway just north of town. Ahlberg says bridges and the solid waste treatment center are closed. The Seward Airport and parts of the Dieckgraeff Road are also closed due to high water…

Impacted areas from flooding are:

- *Lowell Creek Bridge & Waterfall – Closed to pedestrian traffic; limit vehicle traffic as crews from the Public Works Department work with local contractors to clear debris and remove gravel using heavy equipment and machinery.*
- *Dieckgraeff Road – Gravel portion of road closed to vehicle traffic; water over the road; borough crews are working with local contractors using heavy equipment and machinery.*
- *Mile 3.5 Seward Highway & Bikepath – Highway is open; use caution and limit speed; water over road.*
- *Mile 5 Seward Highway at Bear Creek Fire Station – Highway is open; use extreme caution and limit speed; deep water over road.*
- *Seward Airport – North runway is closed; deep standing water over most of the runway…*

Crews are working around the clock to keep roads and bridges open like Lowell Creek Bridge, the only way in and out for people living in that area of town.

The Resurrection River was seeing moderate flooding Tuesday morning as the water reached more than a foot above flood stage for the second time in three days.

Source: https://www.ktva.com/story/39296410/seward-flooding-prompts-declaration-of-emergency

The 2018 DHS&EM Disaster Cost Index lists historical flood events affecting the Seward Area since the legacy 2009 HMP was implemented. Older disaster declaration details were not included in this HMP update.

09-230 2009 Seward Storm Surge declared by Governor Parnell on December 31, 2009: *On December 1, 2009 the City of Seward experienced a winter storm event that caused damage to the shoreline and an important roadway within the community. High winds, 3 plus inches of rainfall, and a 12.6 foot tide, caused extensive damage to the wave barrier along Lowell Point Road, the Seward Greenbelt area and the seawall at the Alaska Sea Life Center.*

12-240 2012 September Storm declared by Governor Parnell on October 17, 2012 then FEMA declared November 27, 2012 (DR-4094): *Beginning on September 4, 2012, and continuing, a strong weather system produced high winds and heavy rains, resulting in severe and widespread wind damage and flooding throughout much of South-central and Interior Alaska. The series of storms created a threat to life and property in the Matanuska- Susitna Borough, Kenai Peninsula Borough, Alaska Gateway Regional Educational Attendance Area (REAA), and the Chugach area. The magnitude of the storm resulted in wind damages and flooding which necessitated debris clearance, emergency protective measures, damage to public facilities including roads, bridges, railroad, electrical distribution and water systems; and damage to private residences to include losses of personal property.*

13-F-243 2013 October KPB Flood Disaster declared by Governor Parnell on November 18, 2013 then FEMA declared January 16, 2014 (DR-4161): *Beginning October 27, 2013, the Kenai Peninsula received substantial amounts of rain following several weather systems that had previously inundated low-lying areas. On October 26, the National Weather Service issued a flood watch for areas around Western Prince William Sound due to a slow moving system which brought widespread rainfall to the mainland. The forecast was calling for local amounts in excess of 5 inches of rain. Seward, Homer, and other areas of the Kenai Peninsula received heavy rain and flooding which caused landslides, bridge, and airport and road closures. Damages were reported in Seward, Homer, Kenai, Anchor Point, and the Tyonek area along Beluga Road. Flood damages affecting many individual homes were reported and several businesses were also impacted. Disaster Declarations were received from the Kenai Peninsula Borough and the City of Seward on October 29, 2013.*

AK-17-262 2017 December KPB Storm declared by Governor Walker on January 19, 2018 then FEMA declared on June 8, 2018 (DR-4369)*: On December 4, 2017 a fast moving storm system moving northward out of the Gulf of Alaska brought widespread high winds to coastal areas on both the east and west sides of the Kenai Peninsula. These high winds, gusting 30-40 mph, produced 3-4 foot waves that lasted for 4-8 hours in Seward, coinciding almost perfectly with the highest astronomical tide of the year, causing significant wave action damage to occur. Resurrection Bay in Seward experienced a 13.4 foot-high tide in conjunction with high southerly winds on December 4. This combination of events caused serious erosion to the Lowell Point Road that connects South Seward with the community of Lowell Point and the Lowell Point State Recreation Area (SRA). In the summer, this is the second highest travelled road in the area. Much of the armor rock on Lowell Point Road has been washed free of the roadside. In some areas, 10 feet or more of road has been washed away by wave action. The road, through an easement, has critical city sewer and electric infrastructure buried under the surface. The city's waterfront*

RV/camping areas also experienced erosion.

In the Lower Cook Inlet area, this storm system created high winds gusting 30-40 mph, reaching a maximum wind speed of 58 mph, producing 7-10 foot waves that impacted the Cook Inlet coastline from Homer to Kenai. Two SRAs, the Anchor River SRA and the Deep Creek SRA, each sustained extensive damages to campgrounds, parking areas, boat launches, and beach areas.

AK-18-264 2018 October KPB Flooding declared by Governor Walker on October 16, 2018. *On October 12, 2018, and continuing, numerous areas of the Kenai Peninsula Borough and the City of Seward have suffered widespread flooding and related damages as a result of an unusually heavy and persistent rainfall event; and the City of Seward and the Kenai Peninsula Borough are political subdivisions of the State of Alaska; and, both the City of Seward and the Kenai Peninsula Borough have issued local declarations of disaster emergency in response to this event. The following conditions exist as a result of this disaster: widespread flooding of community roads, the Seward airport, and other facilities; and severe threat to life and property; and, these conditions have required local emergency protective measures to protect life and property, including activation and staffing of emergency operations centers; emergency debris clearance of roads and stream channels to protect critical infrastructure and maintain access; placement of road barricades and sandbagging to protect roads and bridges; school closures. The flooding in this area has the potential to cause substantial damage to the highway, community infrastructure, the Seward airport, and homes; and, the severity and magnitude of the emergency is beyond the timely and effective response and recovery capability of local resources, and repairs and emergency assistance are required. (Source: DHS&EM 2018).*

The USACE completed an erosion survey for Seward during their 2009 Alaska Baseline Erosion Assessment. The report listed the community as having "continuous erosion." The USACE Erosion Information Paper – Seward, Alaska, July 17, 2008 reported the following erosion problems or issues that will likely recur due to their location within known flood hazard-producing watersheds.

Seward has continuous erosion associated with the glacially fed, swift-moving drainages from the mountains surrounding Resurrection Bay. The drainages carry glacial debris that is deposited in the streams and added to the alluvial fans at outlets (2005 Seward/Bear Creek Flood Service Area (SBCFSA) Flood Hazard Mitigation Plan). Glacial streams such as Lowell Creek, Spruce Creek, Fourth of July Creek, and Japanese (local: Japp) Creek erode avalanche and other debris in their courses. Channel migrations in alluvial fan areas, channel migrations in the wider floodplain drainages such as Resurrection River, and periodically heavy rainfall associated with storm events are other contributing factors to erosion. Resurrection River overtopped the Seward Airport runway and erosion cut through a taxiway during storm-induced flood events in 1986, 1995, and 2006.

Residents in Lowell Point were isolated from Seward when an approximate 18-inch rainfall in 3 days during August 1986 eroded debris in Spruce Creek, washing out the bridge and a large portion of Lowell Point Road A torrent of debris was sent down Spruce Creek when a 15-inch rainfall, combined with one of the highest tides of the year, resulted eroded Lowell Point Road and brought Spruce Creek closer to the sewage lagoon in October 2006. The Lowell Creek diversion tunnel outflow dumped a 25-foot high pile of debris and gravel on the Lowell Creek Bridge at Lowell Point Road, damaging the bridge and backing water into surrounding businesses and streets.

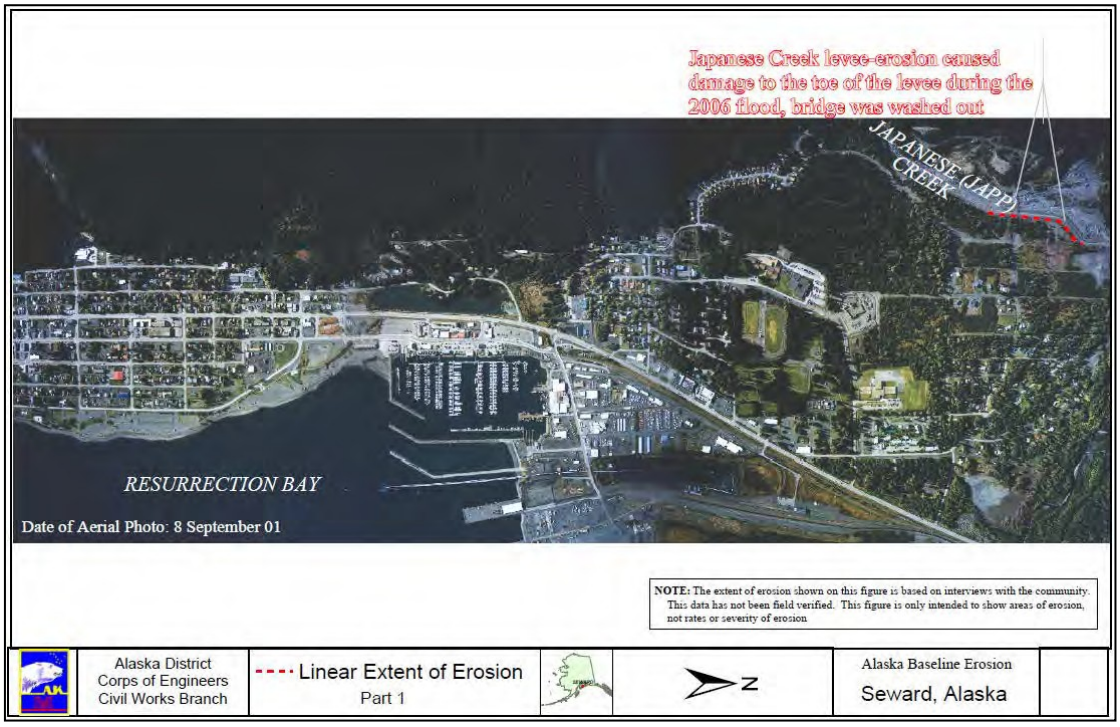
The alluvial fan area of Japanese Creek has seen increasing development in recent years and supports a number of schools, a military recreation center, several businesses, many

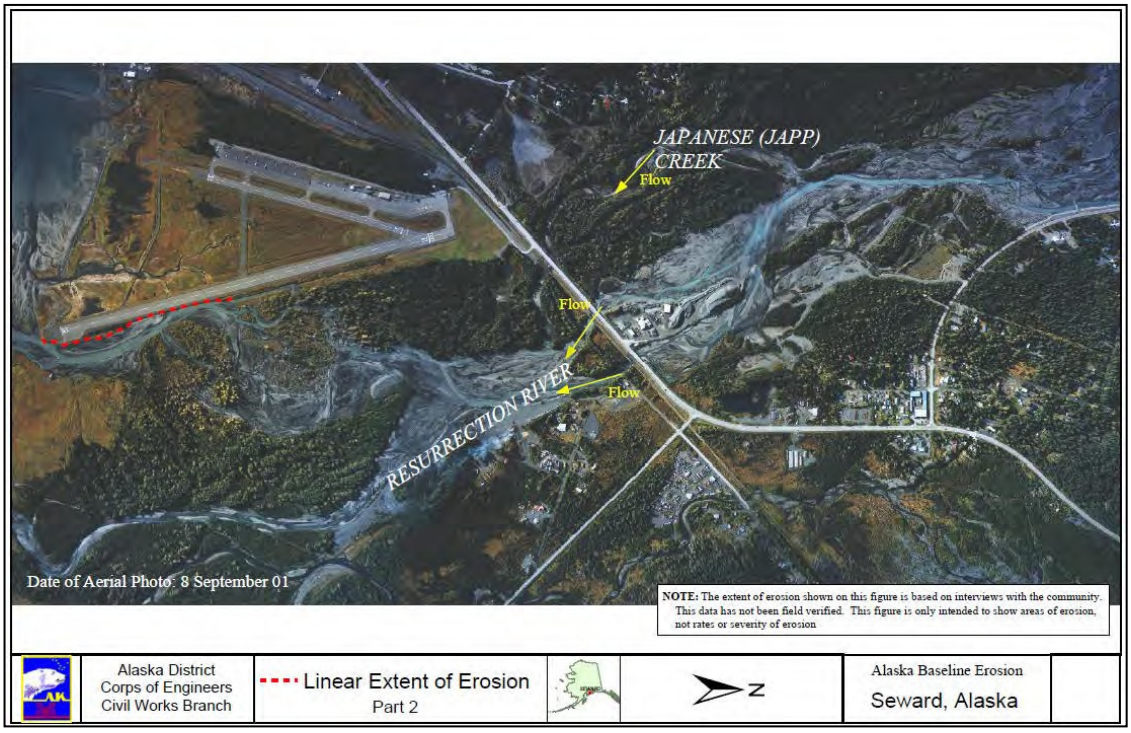
private residences… and a future long term care center for the elderly. The city has diverted the river and constructed a levee along each side of the creek channel to protect these facilities. An interim Corps Flood Damage Reduction Reconnaissance Report stated the levees had reduced the active surface of the fan by 70 percent. The 2006 flood eroded the toe of a levee that had been constructed by the city along part of the channel to protect development; however, damages have since been repaired" (Source: USACE 2008)

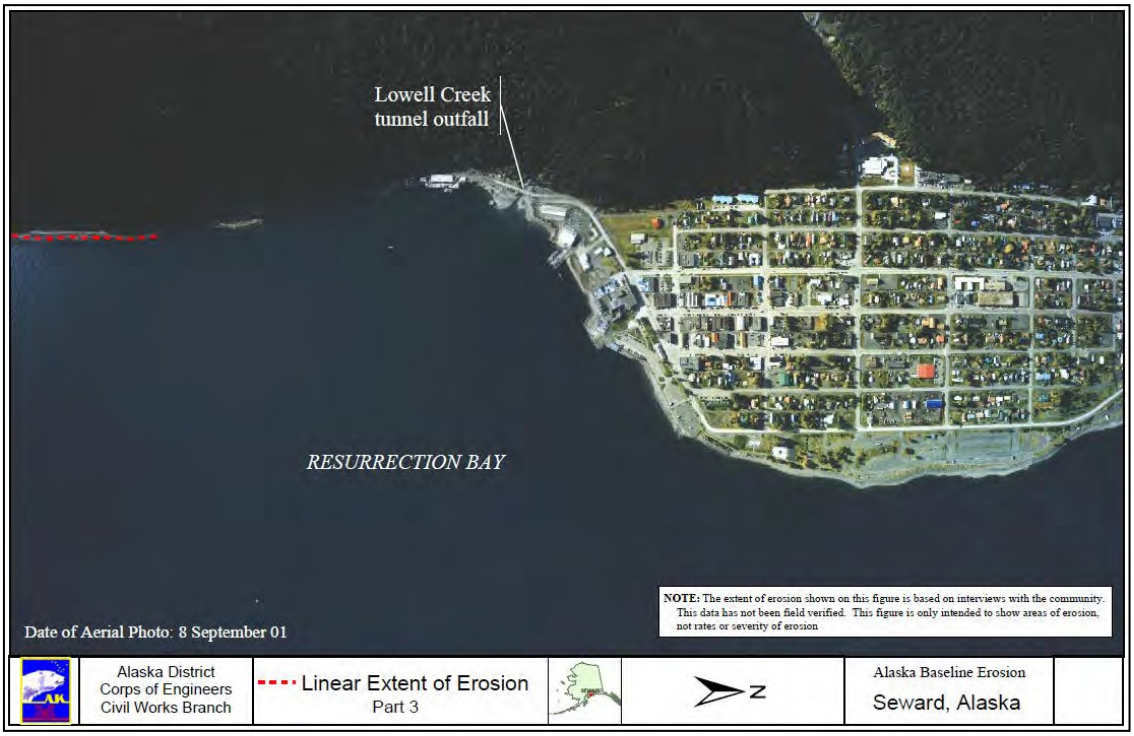
5.4.2.3 Location, Extent, Impact, and Future Events Probability

Seward' major flood and impact threats are well documented. Water flows within the SBCFSA's 15 watershed drainages (5 directly impact Seward) carrying debris and glacial till which increase river and stream bed loads; decreasing channel water capacity before embankments overflow.

USACE's 2008 Erosion Information Paper, Seward Alaska generated aerial photographs identify (with red dotted lines) Seward's "Linear Extent of Erosion" Part 1, Part 2, & Part 3. (Figures 5-4)







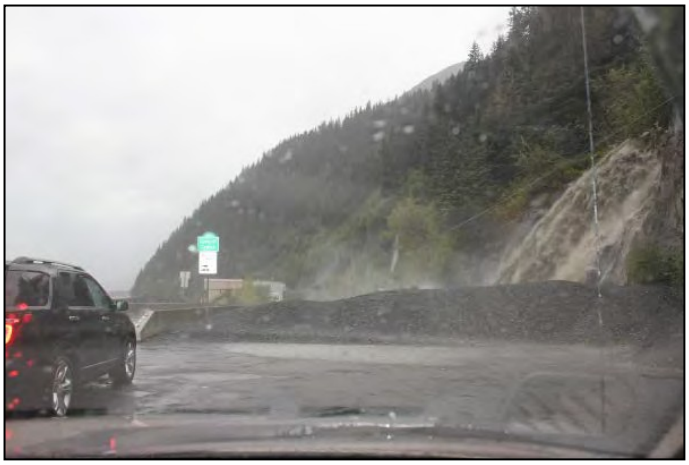
Figures 5-4 Seward Area Erosion Locations

Source: USACE 2008

The September 21, 2012 September Storm disaster (DR-4094) caused severe flooding throughout the SBCFSA and heavily impacted the City of Seward's residential areas and infrastructure. The following 2012 images were taken by AECOM staff during the 2012 flood disaster to depict how the Lowell Tunnel outflow carries and ultimately deposits debris-laden

material creating a choke point at the Lowell Creek Bridge. These recurring events present Lowell Point access and hampers debris removal, and floodwater flow diversion challenges as depicted in the Figures 5-5.

Lowell Diversion Tunnel-Upper Entrance



Lowell Creek Tunnel Debris Laden Outfall

Lowell Outflow during High Water Flow Debris Deposition onto Lowell Point Access Bridge

Lowell Creek Bridge Covered

Figures 5-5 Lowell Diversion Tunnel Outflow – Debris Threat

Source: AECOM 2012

Undersized railroad culverts (Figure 5-6) adjacent to Nash Road caused floodwaters to reverse their normal downstream flow pattern and back flow that in-turn flooded Seward Highway during the 2012 Flood Disaster. This required the City to consider closing their only egress highway until flood waters receded.

Two undersized culverts under the RR is insufficient to redirect flood water flow.

Figure 5-6 Undersized Culverts, Nash and Salmon Creek Roads

Source: AECOM 2012

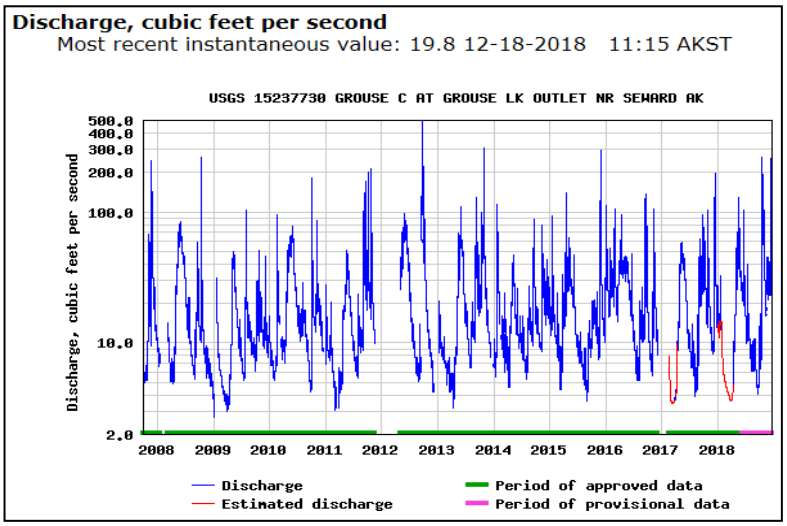
The 2013 SBCFSA HMP explains that the entire area experienced heavy rains with an accumulation of 9 inches within one 24 hour period during September 2012. Multiple watersheds were overwhelmed, overbanked, and exceeded adjacent creek water flow controls.

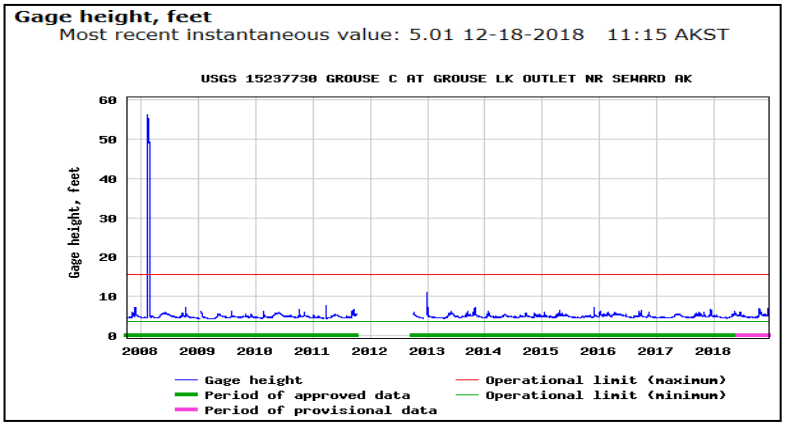
The 2013 SBCFSA HMP further explained,

> *...the [Seward] area's coastline is [also] prone to severe storm surge and high winds that exacerbate rainfall flooding and erosion. The worst flooding events occur from complex storm events. The area has received extensive damaging flood impacts throughout its history.* ***Source: SBCFSA 2013***

The 2017 USACE Floodplain Manager's report provided the following flood gage readings for the Seward area:

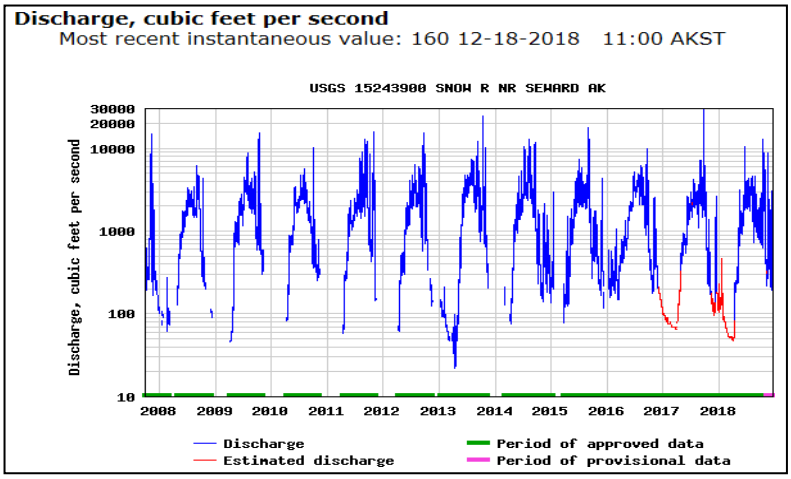
USGS Gage 1:

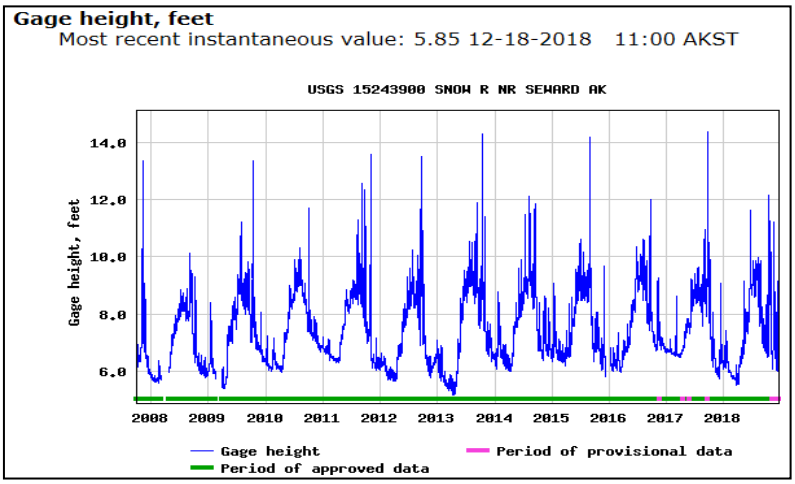




USGS Gage 1 #15237730

For Gage 2:





USGS Gage 2 #15243900

Floodplain Notes: *NFIP status is through the Kenai Peninsula Borough. Published Flood Insurance Rate Maps (FIRM) show detailed flood information.*

Source: USACE 2011

Extent

Floods are described in terms of their extent which includes the horizontal area affected, the vertical floodwater depth, 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

The following factors contribute to coastal flooding frequency and severity:

- Astronomical tides
- Storm surge - the rise in water from wind stress and low atmospheric pressure
- Waves
- Peak still-water elevation

The Seward area experiences severe riverine and coastal flooding and erosion from five of the SBCFSA's 15 watersheds (Table 5-7). Seward's watersheds are marked with an asterisk (*).

Table 5-7 Seward Bear Creek Flood Service Area Watersheds

Bear Creek	* Japanese Creek	Salmon Creek
Box Canyon Creek	Kwechak Creek	Sawmill Creek
Clear Creek	Lost Creek	* Scheffler Creek
Fourth of July Creek	* Lowell Creek	Sometimes Creek
Grouse Creek	* Resurrection River	* Spruce Creek

The SBCFSA population and infrastructure receives repetitive and destructive flood impacts from several watersheds. Figure 5-7 depicts the SBCFSA watersheds. The City, the surrounding area, and their critical road system is threatened by severe-uncontrollable flood events.

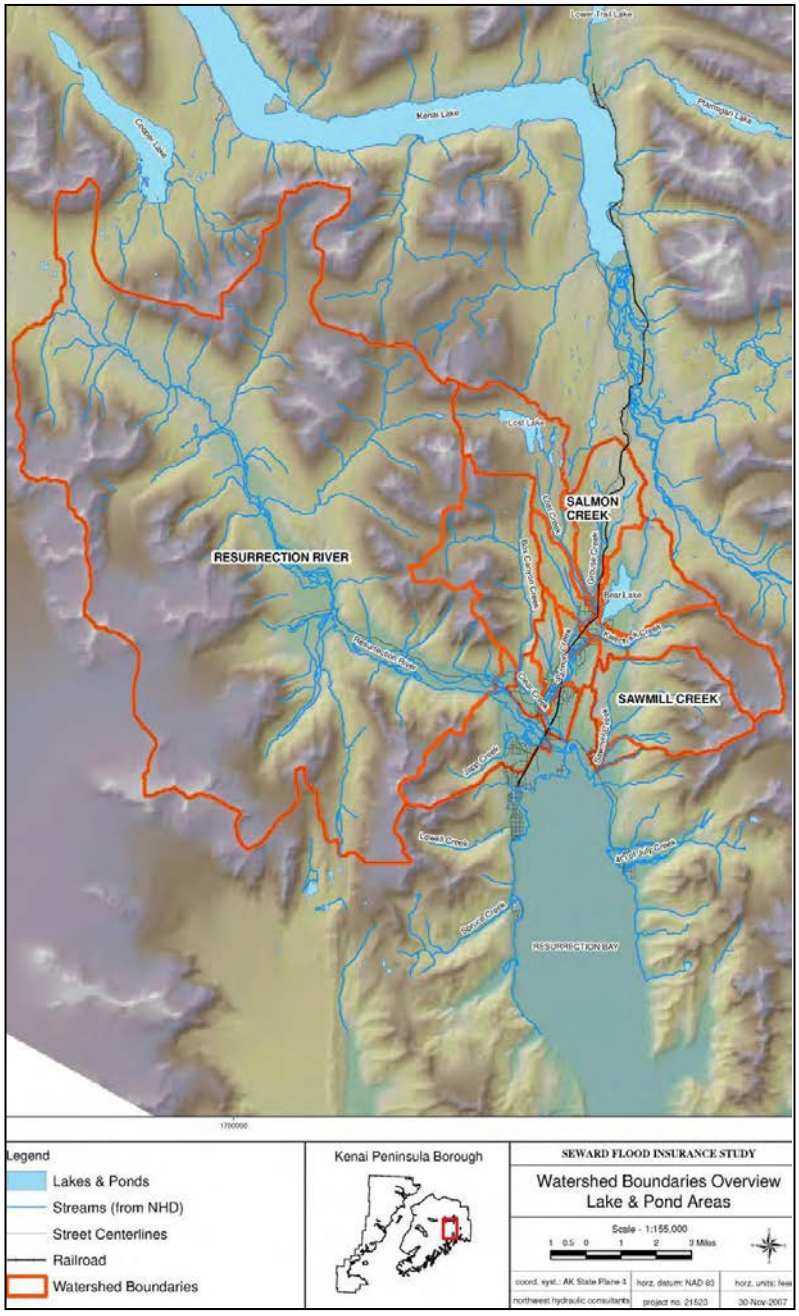


Figure 5-7 SBCFSA Watershed Boundaries

Source: FEMA 2007

Therefore, based on past high water flow event history and the criteria identified in Table 5-2, the extent of flooding and resultant damages to infrastructure and their protective embankments in the Seward area are considered "Critical" where injuries and/or illnesses result in permanent disability, critical facilities would shut down for at least two weeks, and more than 25 percent of property is severely damaged.

Impact

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

- Structure flood inundation, causing water damage to structural elements and contents
- High water flow storm surge floods scour (erode) coastal embankments, coastal protection barriers, and result in infrastructure and residential property losses. Additional impacts can include roadway embankment collapse, foundations exposure, and damaging impacts
- Damage to structures, roads, bridges, culverts, and other features from high-velocity flow and debris carried by floodwaters. Such debris may also accumulate on bridge piers and in culverts, decreasing water conveyance and increasing loads which may cause feature overtopping or backwater damages
- Sewage, hazardous or toxic materials release, materials transport from wastewater treatment plant or sewage lagoon inundation, storage tank damages, and/or severed pipeline damages can be catastrophic to rural remote communities

Floods also result in economic losses through business and government facility closure, communications, utility (such as water and sewer), and transportation services disruptions. Floods result in excessive expenditures for emergency response, and generally disrupt the normal function of a community.

Impacts and problems also related to flooding are deposition as well as embankment, coastal 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 erosion involves material removal from the stream or river banks, coastal bluffs, and dune areas. When bank erosion is excessive, it becomes a concern because it results in loss of embankment vegetation, fish habitat, and land, property, and essential infrastructure (BKP 1988).

The SBCFSA Appendix J provides detailed impact analysis for all areas within the flood service area. The following are extracted from that study to highlight Seward specific impacts from specified watersheds:

Japanese Creek

Japanese Creek is a right bank tributary to Resurrection River. The Japanese Creek watershed is approximately 4.3 square miles and contains a mixture of rock outcrop and forested terrain. The majority of the Japanese Creek watershed is undeveloped; however, there is a developed area located southeast of Japanese Creek near its confluence with Resurrection River. The Japanese Creek study reach extends approximately 0.4 mile upstream from the Dimond Boulevard crossing, located just upstream from the Resurrection River floodplain.

Table J-5 FEMA Peak Flow Rates for Current Conditions

Watershed	Hydrology Method	Current Peak Flow (cfs)			
		10-Year	50-Year	100-Year	500-Year
Japanese Creek	Regional Regression Equations	897	1,220	1,360	1,700

Note: cfs = cubic feet per second

Lowell Creek

Lowell Creek discharges directly into the west side of Resurrection Bay. The current Lowell Creek watershed, which terminates just below the diversion dam for the Lowell Creek Flood Control Project, is approximately 4.2 square miles of predominantly undeveloped land, with a mix of forested and glacial terrain.

Lowell Creek conveyed flows directly through the City of Seward along what is now Jefferson Street until 1940, when construction of the Lowell Creek Flood Control Project was completed and successfully diverted flows to an outfall into Resurrection Bay just south of the City. The project included construction of the Lowell Creek Dam, a concrete diversion tunnel through Bear Mountain known as the Lowell Creek Tunnel, and a new concrete outfall to Resurrection Bay. A map of the Lowell Creek Flood Control Project area is shown on Figure J-2. Hydraulic modeling results were obtained from the U.S. Army Corps of Engineers for use in this assessment. See Section J.2.2.3 for a description of the Lowell Creek analysis.

Note: No hydrologic or hydraulic modeling for Lowell Creek was performed for this project. Hydraulic analyses for Lowell Creek were performed by the U.S. Army Corps of Engineers (USACE) as part of the "Lowell Creek Inundation Study, Seward, Alaska", dated January 2012 (USACE, 2012).

Resurrection River

The Resurrection River flows predominantly northwest to southeast and discharges directly into the north end of Resurrection Bay. The Resurrection River watershed is approximately 221 square miles of glacial terrain which includes the watersheds for Salmon Creek, and Japanese Creek, which are tributary to the river. There are developed areas on both sides of the river, with the largest area to the west, including the Seward Airport, which is located on the west bank of the river adjacent to Resurrection Bay. The Resurrection River study reach extends approximately 3.1 miles upstream from the outfall at Resurrection Bay. NHC developed a HEC-RAS hydraulic model for Resurrection River for the KPB FIS update in 2008 (NHC, 2008). URS obtained that model for use in this assessment.

Table J-5 FEMA Peak Flow Rates for Current Conditions

Watershed	Hydrology Method	Current Peak Flow (cfs)			
		10-Year	50-Year	100-Year	500-Year
Resurrection River	FEMA	19,230	26,190	29,160	36,570

Note: cfs = cubic feet per second

Scheffler Creek

Scheffler Creek discharges directly into the west side of Resurrection Bay. The Scheffler Creek watershed is bounded by the Japanese Creek and Lowell Creek watersheds and is approximately 1.8 square miles. The upstream portion of the watershed is predominantly glacial and the downstream portion is a mixture of forested and developed land near the Resurrection Bay. The developed land includes residential and commercial developments, including a marina near the outfall. The Scheffler Creek study reach is approximately 0.9 miles long and flow through the Lagoon and Fish Ditch before terminating at the outfall to Resurrection Bay.

Table J-5 FEMA Peak Flow Rates for Current Conditions

Watershed	Hydrology Method	Current Peak Flow (cfs)			
		10-Year	50-Year	100-Year	500-Year
Scheffler Creek	*Regional Regression Equations*	*418*	*572*	*673*	*799*

Note: cfs = cubic feet per second

Spruce Creek

Spruce Creek discharges directly into the west side of Resurrection Bay near the Lowell Point Water Treatment Plant. The Spruce Creek watershed is approximately 9.7 square miles of forested, mountainous terrain, including the south face of Bear Mountain. There are several structures at the downstream end of the watershed, including a fire department and the municipal water treatment plant. The Spruce Creek study reach extends approximately 0.4 miles upstream from the outlet at Resurrection Bay.

Table J-5 FEMA Peak Flow Rates for Current Conditions

Watershed	Hydrology Method	Current Peak Flow (cfs)			
		10-Year	50-Year	100-Year	500-Year
Spruce Creek	*Regional Regression Equations*	*1,050*	*2,020*	*2,240*	*2,790*

Note: cfs = cubic feet per second

***Note:** Peak flow rates for all stream can be found in SBCFSA HMP, Appendix J, Table J-5 and shown on Map K-8.*

***Note:** The peak flow rates for all streams' current conditions and future scenarios are shown in SBCFSA HMP, Appendix J, Tables J-6, J-7, and J-8.*

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

Appendix A provides a flood inundation figure that depict potential impact areas as well as critical facilities that may be affected within the City limits.

Recurrence Probability

Based on previous occurrences, the 2013 SBCFSA's HMP and associated flood study, and criteria in Table 5-3, it is "Highly Likely" that Seward will have a flood event within the next three years. An event has a 1 in 1 year (1/1=100) percent chance of occurring based on their flood history being greater 33 percent likely per year.

5.4.3 Ground Failure

5.4.3.1 Nature

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

Landslides are a dislodgment and fall of a mass of soil or rocks along a sloped surface, or for the dislodged mass itself. The term is used for varying phenomena, including mudflows, mudslides,

debris flows, rock falls, rockslides, debris avalanches, debris slides, and slump-earth flows. The susceptibility of hillside and mountainous areas to landslides depends on variations in geology, topography, vegetation, and weather. Landslides may also be triggered or exacerbated by indiscriminate development of sloping ground, or the creation of cut-and-fill slopes in areas of unstable or inadequately stable geologic conditions.

Additionally, avalanches and landslides often occur secondary to other natural hazard events, thereby exacerbating conditions, such as:

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

Development, construction, and other human activities can also provoke ground failure events. Increased runoff, excavation in hillsides, shocks and vibrations from construction, non-engineered fill places excess load to the top of slopes, and changes in vegetation from fire, timber harvesting, and land clearing have all led to landslide events. Broken underground water mains can also saturate soil and destabilize slopes, initiating slides. Something as simple as a blocked culvert can increase and alter water flow, thereby increasing the potential for a landslide event in an area with high natural risk. Weathering and decomposition of geologic material, and alterations in flow of surface or ground water can further increase the potential for landslides.

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

- **Complex** is any combination of landslide types.
- **Cornice Collapse** is an overhanging snow mass formed by wind blowing snow over a ridge crest or the sides of a gully. The cornice can break off and trigger bigger snow avalanches when it hits the wind-loaded snow pillow.
- **Debris Flows** arise from saturated material that generally moves rapidly down a slope. A debris flow usually mobilizes from other types of landslide on a steep slope, then flows through confined channels, liquefying and gaining speed. Debris flows can travel at speeds of more than 35 miles-per-hour (mph) for several miles. Other types of flows include debris avalanches, mudflows, creeps, earth flows, debris flows, and lahars.
- **Falls** are the free-fall movement of rocks and boulders detached from steep slopes or cliffs.
- **Ice Fall Avalanches** result from the sudden fall of broken glacier ice down a steep slope. They can be unpredictable as it is hard to know when ice falls are imminent. Despite common belief, they are unrelated to temperature, time of day or other typical avalanche factors.
- **Lateral Spreads** are a type of landslide generally occurs on gentle slope or flat terrain. Lateral spreads are characterized by liquefaction of fine-grained soils. The event is typically triggered by an earthquake or human-caused rapid ground motion.

- **Slab Avalanches** are the most dangerous types of avalanches. They happen when a mass of cohesive snow breaks away and travels down the mountainside. Slab avalanches occur as a result of the presence of structural weaknesses within interfacing layers of the snowpack.
- **Slides,** the more accurate and restrictive use of the term landslide, refers to a mass movement of material, originating from a discrete weakness area that slides from stable underlying material. A *rotational slide* occurs when there is movement along a concave surface; a *translational slide* originates from movement along a flat surface.
- **Topples** are rocks and boulders that rotate forward and may become falls.

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

Seasonal freezing can cause frost heaves and frost jacking that are most common along KPB's road system. Frost heaves occur when ice forms in the ground and separates sediment pores, causing ground displacement. Frost jacking causes unheated structures to move upwards. Permafrost is frozen ground in which a naturally occurring temperature below 32ºF has existed for two or more years (DHS&EM 2013).

Indicators of a possible ground failure include:

- Springs, seeps, or wet ground that is not typically wet
- New cracks or bulges in the ground or pavement
- Soil subsiding from a foundation
- Secondary structures (decks, patios) tilting or moving away from main structures
- Broken water line or other underground utility
- Leaning structures that were previously straight
- Offset fence lines
- Sunken or dropped-down road beds
- Rapid increase in stream levels, sometimes with increased turbidity
- Rapid decrease in stream levels even though it is raining or has recently stopped and
- Sticking doors and windows, visible spaces indicating frames out of plumb

The State of Alaska 2013 State Hazard Mitigation Plan provides additional ground failure information defining mass movement types, topographic and geologic factors which influence ground failure which may pertain to the Seward area.

Related Hazards

Ground failure is associated with many other hazards such as flooding, erosion, and ground failure. Each could directly initiate mass movement by destabilizing slopes; making them more failure-susceptible. For example,

- Water and sediment can add weight that overloads the surface making it unstable

- Removing material at the base of a steep slope or within the ground results in lateral support failure or structural subsidence
- Ground motion commonly initiates a variety of ground failure impacts

5.4.3.2 History

The City of Seward's 2030 Comprehensive Plan Update, Volume I Section 14 describes their historical ground failure (landslide and avalanche) impacts:

> ***Natural Hazards***
>
> *The City of Seward is particularly susceptible to earthquakes, tsunami, and stream flooding which may be aggravated by heavy rains, melt runoff, heightened tidal action, and severe winds. During winter, deep snow and avalanches occasionally hamper transportation and emergency response in the community, which is potentially a major factor during a disaster. Natural hazards are something the City of Seward is all too familiar, and the community has taken a variety of steps to mitigate their affects. In addition to controlled development, land use may be subject to requirements of other programs such as the Federal Emergency Management Agency (FEMA), and the US Army Corps of Engineers (USACE).*
>
> ***14.3 Avalanches and Landslides***
>
> *Steep slopes, which may be susceptible to avalanches and landslides, occur on the edge of town west of First Avenue, on the west side of Resurrection Bay along Lowell Point Road, and the eastern section of Nash Road as it goes up the hill toward the Fourth of July Creek area. The potential for avalanche/landslide hazards to develop in areas of steep slopes should be analyzed.*
>
> *There is also a potential for avalanches to close the Seward Highway. A 1982 avalanche study by the Alaska Division of Geological and Geophysical Surveys identified 60 avalanche paths along the Seward Highway.*

The Seward area experience repetitive landslides along the Lowell Point road and other areas along the Seward Highway; their only access road. Table 5-8 lists a few of those events:

Table 5-8 Seward Area Ground Failure Events

Date	Type	Description
10/12/18	Severe Flooding Debris/ Sedimentation	**AK-18-264 2018 October KPB Flooding declared by Governor Walker on October 16, 2018**. On October 12, 2018, and continuing, numerous areas of the Kenai Peninsula Borough and the City of Seward have suffered widespread flooding and related damages as a result of an unusually heavy and persistent rainfall event; … The following conditions exist as a result of this disaster: widespread flooding of community roads, the Seward airport, and other facilities;… local emergency protective measures… including… emergency **debris clearance of roads and stream channels** to protect critical infrastructure and maintain access; placement of road barricades and sandbagging to protect roads and bridges….
12/04/17	Erosion	**AK-17-262 2017 December KPB Storm declared by Governor Walker on January 19, 2018 then FEMA declared on June 8, 2018 (DR-4369)**: On December 4, 2017 … high winds, gusting 30-40 mph… coinciding almost perfectly with the highest astronomical tide of the year, causing significant wave action damage to occur. Resurrection Bay in Seward experienced a 13.4 foot-high tide in conjunction with high southerly winds on December 4. This combination of events caused serious erosion to the Lowell Point Road… Much of the armor rock on Lowell Point Road has been washed free of the roadside. In

Table 5-8 Seward Area Ground Failure Events

Date	Type	Description
		some areas, 10 feet or more of road has been washed away by wave action… has critical city sewer and electric infrastructure buried under the surface. The city's waterfront RV/camping areas also experienced erosion.
02/24/16	Mudslide	Shortly before 2:00 p.m. on Sunday, after two and a quarter inches of precipitation and above freezing temperatures in the previous 24 hours, a **mudslide** oozed mightily down a steep slope and slopped across Lowell Point Road, blocking it.
02/21/16	Mud/Landslide	After torrential rains, the supersaturated soil on the steep mountainside along Lowell Point Road gave way this afternoon at a new spot around 2 pm. The **huge slide**, about mile 1.5, included a massive spruce tree, snapped in half, mud, and rocks… Some Lowell Point residents climbed over the wreckage, while others are forced to wait, trapped on one side or the other. Fortunately, no one was caught by the slide. http://sewardcity.news/2016/02/huge-landslide-blocks-lowell-point-road/
10/02/13 to 10/29/13	Landslides	**13-F-2432013 October KPB Flood Disaster declared by Governor Parnell on November 18, 2013 then FEMA declared January 16, 2014 (DR-4161)**: …On October 26, the National Weather Service issued a flood watch… The forecast was calling for local amounts in excess of 5 inches of rain. Seward, Homer, and other areas of the Kenai Peninsula received heavy rain and flooding which caused **landslides**, bridge, and airport and road closures. Damages were reported in Seward, Homer, Kenai, Anchor Point, and the Tyonek area along Beluga Road. Flood damages affecting many individual homes were reported and several businesses were also impacted. Disaster Declarations were received from the Kenai Peninsula Borough and the City of Seward on October 29, 2013.
02/05/06 to 02/11/06	Avalanches	**06-217 2006 South Central Storm (AK-06-217) declared March 13, 2006 by Governor Murkowski:** Beginning on February 5, 2006 and continuing through February 11, 2006, a series of strong winter storms with high winds, heavy snow, and freezing rain occurred in the City of Seward and surrounding areas of the Kenai Peninsula Borough in South Central Alaska, causing **avalanches** that severely damaged power lines and other infrastructures, blocked roads, and threatened further damages.

Source: DHS&EM 2018

5.4.3.3 Location, Extent, Impact, and Recurrence Probability

Location

Seward experiences landslides, avalanches, and a few minor ground failure events because the community is located on a predominately alluvial fan created by Lowell Creek prior to the USACE constructing a tunnel to divert the creek flow away from Jefferson Street and the heart of downtown Seward.

According to Permafrost Characteristics Map of Alaska (Figure 5-8) developed for the National Snow and Ice Data Center/World Data Center for Glaciology (Jorgenson et al 2008), shows the immediate Seward area has no permafrost threat.

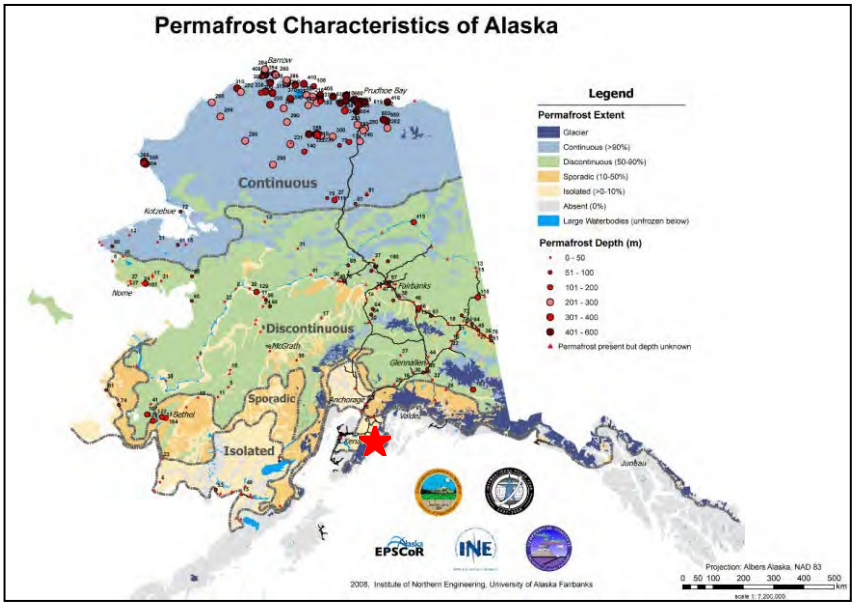


Figure 5-8 Permafrost Characteristics of Alaska

Source: Jorgenson et al 2008

However the City of Seward has numerous landslides and other ground failure threat locations outside the city limits along the Seward Highway and Lowell Point road.

The Lowell Point road was closed from massive landslides due to heavy rainfall on September 23, 2012. Figures 5-9 images were obtained from the Seward City News.

Figures 5-9 2012 Lowell Point Road Landslide

Source: Seward City News, http://sewardcitynews.com/2012/09/massive-landslide-closes-lowell-point-road/

The Lowell tunnel entrance is a critical structure diverts water away from the hospital, residential areas and other critical infrastructure. This facility needs to be protected from large volume woody hillside debris impacts.

Intense rain events severely saturate the soils throughout the Seward area. The Lowell Tunnel entrance has been blocked by small saturated soil landslides causing water to overtop the diversion structure at the tunnel entrance. The high water flow then travels downhill flooding the hospital, upper residential areas, and critical facilities as it continues to flow downhill towards the Resurrection Bay. Figures 5.5, 5-27 & 5-28 show the tunnel entrance at a moderate-high water flow, with subsequent images from the tunnel exit area. A large area landslide and heavy

flood volume could prevent emergency access to clear the tunnel. The City's only hospital will be inaccessible; many residential and critical facilities would be heavily damaged.

Extent

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

Based on research, the planning team's knowledge of past ground failure events, and the criteria identified in Table 5-2 Seward's ground failure impacts threats are considered "Limited." These locations typically include the Lowell Point Road, Seward Highway locations, and potentially at the mouth of the Lowell Creek diversion tunnel. These areas although known have historically quickly resulting from severe or heavy rain events weakening tree and vegetation root systems on steep terrain. Blockage of the Lowell Creek diversion tunnel could prove catastrophic because flood flow would heavily impact the middle area of the City damaging and preventing ingress or egress to their main hospital, businesses and residential areas.

Heavy rain, and warm weather rapid snow melt are typical warning signs for Seward's most threatened locations. This hazard could cause injuries or death but are limited to a few known locations. Impacts would result in road closures with unknown durations. Less than 10 percent of property or infrastructure could be severely damaged.

Impact

Impacts associated with ground failure include surface subsidence, infrastructure, building, and/or road damage. Ground failure does not typically pose a sudden and catastrophic hazard; however, landslides and avalanches may have no warning signs. Ground failure damage occurs from improperly designed and constructed buildings that settle as the ground subsides, resulting in structure loss or expensive repairs. Landslides and avalanches could cause death and injury because they occur with no advance warning.

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

Appendix A provides a ground failure figure that depict potential impact areas as well as critical facilities that may be affected within the City limits.

Recurrence Probability

A few locations in the Seward area experience recurring ground failure from landslide, avalanche, and heavy rain induced erosion. The Lowell Point road, a few isolated locations along the Seward highway, higher elevation residential areas, and community coastal areas are the most susceptible to landslide, avalanche, and other ground failure induced hazard impact areas.

Community hazard event history coupled with Table 5-3 Hazard Magnitude and Severity categories places Seward's landslide and avalanche threat as "Highly Likely" along the Lowell Point access road and a few locations along the Seward Highway. An event has a (1/1=100) percent chance of occurring in these areas within any given year as the history of events is greater than 33 percent likely per year.

5.4.4 Tsunami and Seiche

5.4.4.1 Nature

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

A seiche is a series of standing waves sloshing in a semi- or fully enclosed water body, typically caused when strong winds, rapid atmospheric pressure changes, earthquakes, tsunamis, or severe storm fronts "pile up" water on one end of the basin (Figure 6-60). When the driving force stops, the water rebounds to the other side of the enclosed area. The water then continues to oscillate back and forth for hours or even days. Because they are standing waves, they move vertically more than horizontally.

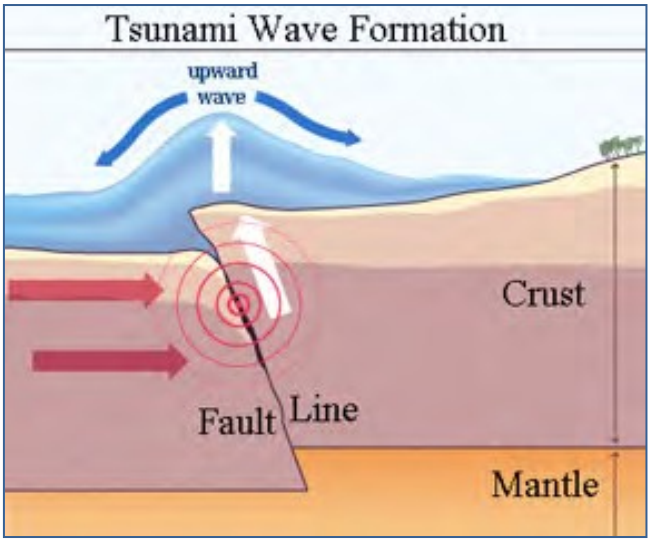


Figure 6-59 Most Tsunamis Occur from Underwater Earthquakes
Source: California Seismic Safety Commission

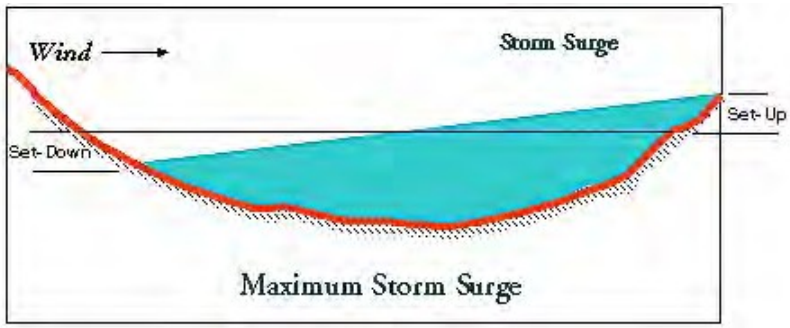


Figure 6-60 Storm Surges Can Cause Seiche in Large Lakes

Strong storm winds blow across the lakes and pile up water on the downwind shore of the lake, resulting in wind set-up. On the opposing upwind shore, the storm surge lowers the water the exact amount that has risen at the downwind shore, resulting in a wind set-down. When the wind stops, the water sloshes back and forth.
Source: Michigan State University Department of Geography

Tsunamis are far more destructive than seiches in Alaska. In the last 60 years, Pacific plate subduction under the North American plate has resulted in numerous great earthquakes, and is the source of locally generated tectonic tsunamis that have killed more than 100 people and destroyed entire towns. Some previously inhabited areas are now permanently abandoned because of this threat. Alaska has an enormous amount of coastline and, in addition to local and distant tectonic tsunamis, there are other tsunami triggers that may occur without warning.
Source: 2018 SHMP

Subduction zone earthquakes at plate boundaries often cause tsunami. However, submarine landslides, submarine volcanic eruptions, and near shore land-based volcanic edifice collapse can also generate tsunami. A single tsunami may involve a series of waves, known as a train, of varying heights. In open water, tsunami 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 compresses as it approaches the coastline.

Tsunami not only affect beaches that are open to the ocean, but also bay mouths, tidal flats, and the shores and deltas of large coastal rivers. Tsunami waves can also refract, reflect, and diffract around land masses and islands.

Since tsunami are not symmetrical, the waves may be much stronger in one direction than another, depending on the nature of the source, the surrounding geography and the tsunami wave length. However, tsunami do propagate outward from their source, so coasts in the shadow of affected land masses are usually fairly safe.

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

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

5.4.4.2 History

The City of Seward is located at the head of Resurrection Bay with a deep fjord and is a partially enclosed bay that easily transports open ocean tsunami and localized seiche energy throughout the Bay.

The National Tsunami Warning Center (NTWC) lists Alaska's historic earthquake generated tsunami (Table 5-9) with observed or measured tsunami wave heights.

Table 5-9 Alaska's Historic Aleutian Tsunami Waves

Date	Location	Earthquake Moment Magnitude (MW)	Wave Height	Source	
			Ft./Meters	Latitude	Longitude
January 23, 2018	Kodiak, Alaska	7.9	~10 Cm	56.046	-149.073
June 10, 1996	Andreanov, Central Aleutian Islands, AK	7.9 Mw	1.9/0.6	51.593	-51.593
February 21, 1991	Bering Sea	6.7 Mw	0..5/0.15	58.43	-175.45
May 7, 1986	Central Aleutian Islands, AK	8.0Mw	0.5/0.15	51.52	-166.54
February 4, 1965	Rat Islands, Western Aleutian Islands, AK	8.7	<0.33/<0.1	51.29	-178.49
March 27, 1964	Prince William Sound	9.2	1.1/0.35	61.05	-147.48
	Chenega, AK				
	Seward, AK		35/10.7		
	Tatitlek, AK				
	Whittier, AK				
	Valdez, AK				
March 9, 1957	South of Andreanof Islands, Central Aleutian Islands, AK	8.3	Unknown	51.5	-175.7
April 1, 1946	Near Unimak Island, Eastern Aleutian Islands, AK	8.6	Unknown	25.8	-163.5
November 10, 1938	Alaska Peninsula	8.2 Mw	0.33/0.1	54.48	-158.37

Resurrection Bay experienced devastation from the 1964 Good Friday M9.2 earthquake generated tsunami and subsequent seiche activities. The tsunami was generated in Prince William Sound and quickly traveled to many Alaska seaports.

1964 Great Alaska Earthquake Tsunamis

The 1964 Great Alaska Earthquake in Southcentral Alaska triggered several tsunamis, including one major tectonic tsunami and about 20 local submarine- and subaerial-landslide tsunamis. The tectonic tsunami hit 20–45 minutes after the earthquake, depending on location. The locally-generated tsunamis struck between two and five minutes post-earthquake and caused most of the deaths and damage. Tsunamis caused more than 90 percent of the deaths associated with this earthquake: 106 Alaskans and 16 California/Oregon residents were killed. Alaska's damages were most extensive in Kodiak Island, Seward, Whittier, and Valdez, with significant tsunami damage throughout areas adjacent to the Gulf of Alaska.

Seward: *The earthquake caused regional subsidence (~4 ft.) that exacerbated a local tsunami event. The local tsunami destroyed most of the facilities near the former shore, including a fuel tank farm that started the first of many fires. Additionally, the local tsunami spread floating, burning oil, which ultimately engulfed another large fuel tank farm further inland. The main dock collapsed with the waterfront and sank 30 fishing boats and 40 pleasure craft in the small boat harbor. The local tsunami also heavily damaged the railroad yards, moving a 120-ton locomotive 100 feet, and a 75-ton locomotive 300 feet [Figure 6-63]. About 25 minutes after the earthquake and local tsunami event, the tectonic tsunami event arrived in Seward. The waves carried flaming oil and debris into Seward and set fire to a large section of the town. Overall, Seward*

lost about 95 percent of its industrial base and 15 percent of its residential properties. There were 12 fatalities, 200 injuries, and approximately $14 million in damages.

Figure 6-63 1964 Tsunami Damage in Seward
A few months after the earthquake. Source: USGS 1964, 2018 SHMP

The University of Alaska Fairbanks, Geophysical Institute's "Tsunami inundation maps of Seward and norther Resurrection Bay, Alaska, Report of Investigation 2010-1," by E.N. Suleimani et al. describes the '64 tsunami damaging impacts to the Seward area:

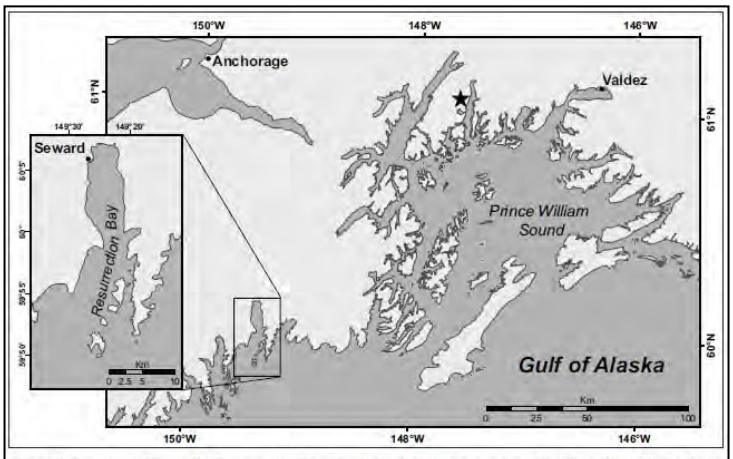


Figure 2. Location of Seward in Resurrection Bay. Star indicates initial epicenter of the 1964 Great Alaska Earthquake.

On March 27, 1964, the Prince William Sound area of Alaska was struck by the largest earthquake ever recorded in North America. This magnitude Mw9.2 megathrust earthquake generated the most destructive historic tsunami in Alaska and, farther south, impacted the west coast of the United States and Canada. Of the 131 fatalities associated with this earthquake, 122 were caused by tsunami waves (Lander, 1996) … In addition to the major tectonic tsunami that was generated by displacement of the ocean floor between the trench and the coastline, more than 20 local tsunamis were generated by submarine and subaerial landslides in coastal Alaska. Local tsunami caused most of the damage and accounted for 76 percent of tsunami fatalities. Also, they arrived almost immediately after the shaking was felt, leaving no time for warning or evacuation. The community of Seward in Resurrection Bay (fig. 2) suffered from the combined effects of local landslide-generated waves and the major tectonic

Figure 3. Imagery of downtown Seward: top – aerial photo taken before the earthquake of March 27, 1964 (photo by the U.S. Army Corps of Engineers, mosaic by the USGS); middle - aerial photo taken one day after the earthquake of March 27, 1964 (photo by the U.S. Army Corps of Engineers, mosaic by the USGS); bottom – a recent satellite image of Seward (Digital Globe, 2005). Red line indicates the maximum extent of inundation caused by the 1964 tsunami waves.

tsunami that propagated from the main earthquake rupture zone in the Gulf of Alaska. The earthquake triggered a series of slope failures offshore of Seward, which resulted in landsliding of part of the coastline into the water, along with the loss of the port facilities. The town sustained great damage, and 12 people perished due to the tsunami…

At the time of the 1964 earthquake, the economy of Seward was based on shipping, and was heavily dependent on the city's railroad, harbor, and port operations. Seward was severely impacted by the 1964 earthquake and tsunami waves. The loss of harbor facilities from the earthquake and resultant offshore slope failures near the Seward waterfront devastated the economic base of the town (Lemke, 1967) …

Figure 3 presents a sequence of Seward photos, taken before and after the 1964 tsunami, and then recently, in 2005. The red line indicates the maximum extent of inundation caused by the 1964 tsunami waves. The bottom image makes it clear that much of the economic and industrial base has been rebuilt in the area inundated by the 1964 tsunami.

...Seward is built mostly on the alluvial fan of Lowell Creek. Lowell Point, Tonsina Point, and the area at the mouth of Fourth of July Creek (fig. 4) are also alluvial fans that extend into the bay as fan deltas (Lemke, 1967). The entire head of Resurrection Bay is a fjord-head delta, formed by Resurrection River. Haeussler and others (2007) use the term 'bathtub' to describe a flat depression in the middle of the bay extending north to south (fig. 4). The deepest part of the bathtub is approximately 300 m below sea level. Prior to the 1964 earthquake, the average offshore slopes in the vicinity of Seward ranged from 10 to 20 degrees, decreasing to 5 degrees at the depth of about 200 m (Lemke, 1967). Today, that same area has an average slope of about 25 degrees (Lee and others, 2006). A natural barrier formed by Caines Head and a glacial sill divide the bay into two deep basins, separated by a narrow 'neck' with maximum depth above the sill at 195 m. This

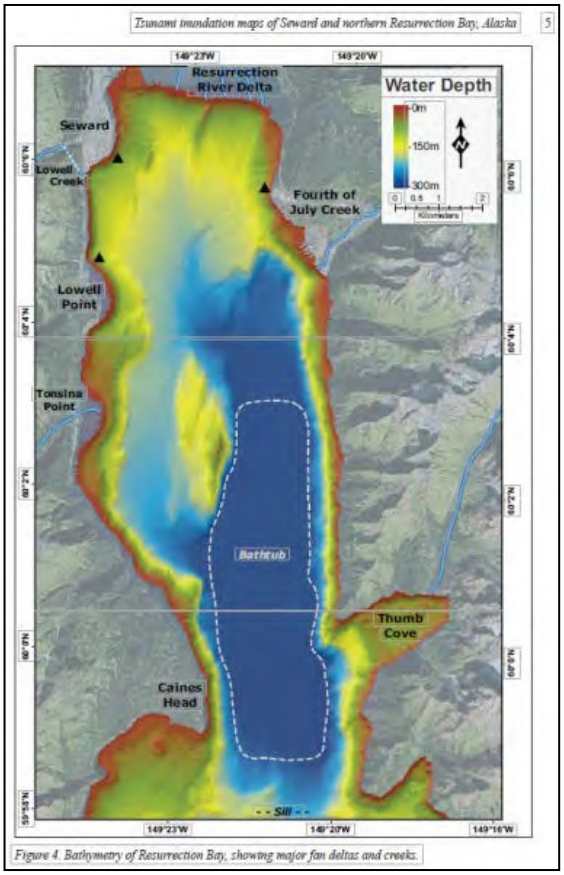


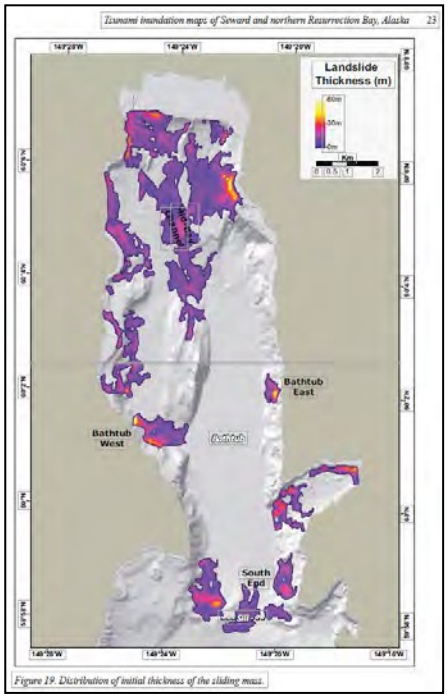
Figure 4. Bathymetry of Resurrection Bay, showing major fan deltas and creeks.

sill inhibits sediment transport by tidal currents to the southern part of the bay…

LANDSLIDE TSUNAMI SOURCES MULTIPLE SUBMARINE SLOPE FAILURES IN RESURRECTION BAY DURING THE 1964 EARTHQUAKE

A map of the slide thickness, derived from the bathymetric difference grid, is shown in figure 19. The first numerical modeling study of local tsunamis in Resurrection Bay (Suleimani and others, 2009) utilized these findings and concluded that the waves observed at the Seward waterfront and in several other locations in Resurrection Bay resulted from multiple submarine slope failures. Suleimani and others (2009) conducted a numerical experiment to investigate how individual underwater slides contributed to observed tsunami amplitudes in the bay. They showed that slides in the northern part of the bay were the major contributors to the tsunami amplitudes at Seward, and that the contribution from other slide complexes was negligible.

Source, DGGS 2010:
http://www.dggs.alaska.gov/pubs/id/21001



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

Location

The State of Alaska, the UAF/GI, and the National Oceanic and Atmospheric Administration's (NOAA) Pacific Marine Environmental Laboratory indicate that the Seward area has a "severe" tsunami impact threat.

This area is at the terminus of Resurrection Bay, a deep water fjord located in close proximity to the Aleutian Trench where the active North American and Pacific tectonic plates overlap making the entire area susceptible to future tsunami impacts.

The City of Seward, Lowell Point, Fourth of July Creek areas comprise the Seward Bear Creek Flood Service Area (SBCFSA) located at the end of Resurrection Bay. The area has direct, nearly straight line access, to the Gulf of Alaska's open ocean. The bay possesses historical seiche generating terrain supported by accurate bathymetry.

The KPB Risk Report, FEMA Region X – Kenai Peninsula Borough, Alaska, December 2017 provides the following "Tsunami Exposure Assessment" that easily summarizes the Seward area's infrastructure hazard vulnerabilities.

Tsunami models are available for select areas in Kenai Peninsula Borough in the Cities of Homer, Seldovia, and Seward, via the Alaska Division of Geological and Geophysical Surveys. Hypothetical composite lines, also referred to as "maximum credible scenarios," generate a maximum extent of tsunami inundation based on all model simulations. The composite lines are generated by the following model…:

[**Note:** Only the City of Seward's information is included for the purposes of the HMP]

Table 20: Parcel Improvement Exposure Associated with Maximum Credible Scenario Tsunamis in Kenai Peninsula Borough

COMMUNITY NAME	TOTAL ESTIMATED VALUE OF IMPROVED PARCELS	IMPROVED PARCEL VALUE IN TSUNAMI ZONE	TOTAL NUMBER OF IMPROVED PARCELS	TOTAL NUMBER OF IMPROVED PARCELS IN TSUNAMI ZONE	PERCENTAGE OF IMPROVED PARCELS IN TSUNAMI ZONE
*Seward, City of***	*$472,711,500*	*$62,134,500*	*1,835*	*162*	*13.14%*

***Includes surrounding Seward Special, Seward/Bear Creek Flood Service Area, and Bear Creek Fire Area Parcels.*

- *Seward: Modeled repetition of the 1964 earthquake event (and accompanying modifications), ruptures of the Pamplona Zone, underwater slides, and underwater slope failures (and accompanying modifications)*

For this exposure assessment, the locations of improved parcels were compared to the geographic extent of the tsunami. The results of the exposure assessment are shown in Table 20.

Source: KPB Risk Report, 2017: https://www.commerce.alaska.gov/web/Portals/4/pub/Risk_Report_Kenai_Final.pdf

Alaska's UAF/GI developed three tsunami scenario based models to demonstrate the area's maximum estimated tsunami inundation flooding extent (Figure 5-10).

The Explanation of Map Symbols on the next page reads:

Although the location of inundation lines has an accuracy of approximately plus or minus 15 m horizontally relative to the model grid spacing, the true location accuracy is unknown because the lines are the result of a complex modeling process whose accuracy depends on many factors. These factors include suitability of the earthquake source model, accuracy of the bathymetric and topographic data, and the adequacy of the numerical model in representing the generation, propagation, and run-up of tsunami waves. Viewing the data at scales larger than 1:12,500 does not increase the accuracy of the line location.

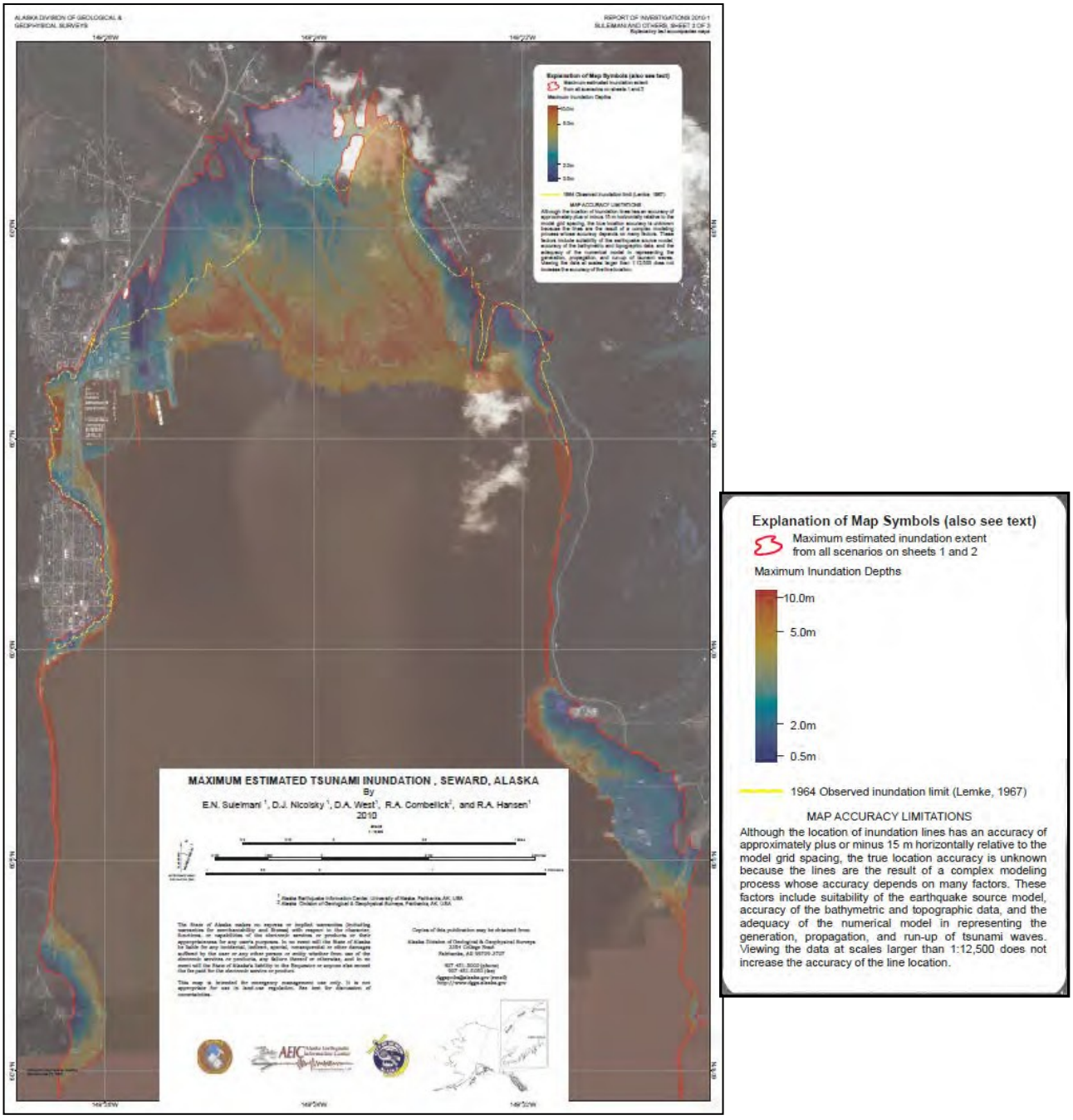


Figure 5-10 UAF/GI Maximum Tsunami Flooding and Subsidence

Source: UAF/GI, 2010

Extent

Based on historic earthquake events, UAF/GI, the NOAA Pacific Marine Environmental Laboratory information, Seward's historical tsunami, and the criteria identified in Table 5-3, the magnitude and severity of earthquake impacts to the Seward area are considered "Catastrophic" with potential for multiple deaths, complete critical facility shutdown for at least two weeks, and more than 50 percent of property and infrastructure severely damaged.

Impact

The NOAA's bathymetric studies of Resurrection Bay and UAF/GI's tsunami modeling indicate the Seward area could receive future devastating tsunami impacts. The most damaging impacts are anticipated from locally generated tsunami or seiche events occurring from accumulated glacial silt and debris situated throughout Resurrection Bay's numerous outflow and alluvial fan locations. The UAF/GI Report defines the 1964 tsunami impacts.

> *The Mw9.2 Alaska earthquake of March 27, 1964, at Seward was characterized by strong ground motion that lasted 3–4 minutes. During the shaking, a section of the waterfront slid into the bay, taking with it docks and other harbor facilities. At the same time, fuel tanks fractured and oil ignited. Both local, landslide-generated waves and distant, tectonically generated waves inundated the Seward shoreline and caused tremendous damage (Lemke, 1967). Damage from the strong ground motion alone was minor compared to tsunami-related destruction. As a result of regional tectonic deformation, the Resurrection Bay area subsided about 3.5 feet (1.1 m), which resulted in low-lying coastal areas being inundated at high tide. Thirteen people were killed and five injured in Seward as a combined result of the earthquake and tsunami waves. Eighty-six houses were totally destroyed and 269 were heavily damaged. According to Lemke (1967), the total cost to repair public and private facilities was estimated at $22 million ($153 million in 2009 dollars)*
> *Source: UAF/GI 2010, http://www.dggs.alaska.gov/pubs/id/21001*

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

Appendix A provides maximum tsunami inundation figure that depict potential impact areas as well as critical facilities that may be affected within the City limits.

Recurrence Probability

A distant source tsunami recurrence interval is unknown and it is therefore, unpredictable as too many factors determine when the next event will occur. However, the entire Resurrection Bay area, including Lowell Point, the City of Seward, and other SBCFSA locations surrounding the bay has a significant tsunami impact history. While it is not possible to predict when a tsunami will occur, future distant tsunami events are "Highly Likely" (Table 5-3) due to Seward's tsunami history.

5.4.5 Volcanic Hazards

5.4.5.1 Nature

Volcanoes are openings on the earth's surface where magma and gases escape from the subsurface. Lava flows and lava fragments (tephra) that are ejected from the openings, or vents, build the landforms we know as volcanoes. A volcano vent connects to one or more linked underground molten or partially molten rock (magma) storage areas through a series of cracks within and beneath the volcano. Magma originating many tens of miles beneath the ground forces its way upward by pressure from gas within it. Magma is lighter, less dense, and more buoyant than surrounding solid rock. It may ultimately break through weak areas to reach the surface; if so, an eruption begins. The connection to fresh magma allows a volcano to erupt over and over again in the same location.

The Alaska landscape has been profoundly shaped by volcanic processes. An average of one to two eruptions per year occurs in Alaska. During the last 2 million years, more than 130 volcanoes or volcanic fields have been active within the state (Figure 5-11). Of these volcanoes, about 90 have been active within the last 10,000 years (and might be expected to erupt again), and more than 50 have been active within historical time (since about 1760, for Alaska).

Figure 5-11 Alaska's Historically Active Volcanos
Source: AVO 2018

Alaska is home to 50 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 refers to written records that 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. The Bogoslof volcano was the most recent volcanic eruption occurring on August 7, 2017.

There are four general volcano types:

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

Along with the different volcano types there are different eruption classifications. Eruption types are a major determinant of the physical impacts an event will create, and the particular hazards it poses. The 2018 SHMP defines 12 major volcano hazards. This HMP update list four that are the most likely to affect Seward's quality of life:

- **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.
- A **Volcanic ash cloud** is created when volcanic ash is explosively blasted high into the atmosphere during an eruption and then drifts away from the volcano with the wind. This is Alaska's principal future volcanic hazard associated with explosive eruptions. Ash-rich clouds produced during large eruptions can reach heights of 30,000 to 65,000 feet or more above the volcano, although most Alaska eruptions are smaller (a few thousand feet to 20,000 feet). Prevailing North Pacific winds usually carry ash clouds eastward from the volcano, but dispersal in other directions is possible, depending on wind patterns at the time of the eruption.

  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.
- **Volcanic ashfall** is ash that falls to earth from an eruption cloud. The fragments in the ash cloud vary in size, and the heavier particles fall near the source while finer particles travel farther downwind. Transported ash will fall out of the cloud and accumulate on surfaces and structures, contaminate water sources, and infiltrate electronics and motors. Ash exposure may be a significant public health hazard to people, livestock, and wildlife. Essential items, including dust masks, clean water, non-perishable food, and eye protection, are key in preparation, as significant ashfall may keep people housebound for extended time periods. The weight of significant accumulations may collapse structures and cause other damage.

  Ash fall pose a significant volcanic hazard to the Seward area because, unlike other secondary eruption effects such as lahars and lava flows, ash fall can travel thousands of miles from the eruption site.
- **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 can be carried hundreds to thousands of miles away from the source by wind. Ash clouds are common adaptations of tephra.

The significant trans-Pacific and intrastate air traffic traveling directly over or near Alaska's volcanoes, has necessitated developing strong communication and warning links between the Alaska Volcano Observatory (AVO), other government agencies with responsibility for aviation management, and the airline and air cargo industry (AVO 2012a, USGS 2002). The AVO's identified volcanos in Alaska. Table 5-10 lists those located along the Aleutian Chain.

Table 5-10 Volcanoes in Alaska's Aleutian Chain

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

Source: AVO 2012

The AVO explains volcanic threats to airline flights in the Alaska area:

> *The volcanoes in Alaska make up well over three-quarters of U.S. volcanoes that have erupted in the last two hundred years.*
>
> *Alaska's volcanoes are potentially hazardous to passenger and freight aircraft as jet engines sometimes fail after ingesting volcanic ash. On December 15, 1989, a Boeing 747 flying 240 kilometers (150 miles) northeast of Anchorage encountered an ash cloud erupted from Redoubt Volcano and lost power in all four jet engines. The plane, with 231 passengers aboard, lost more than 3,000 meters (~9,800 feet) of elevation before the flight crew was able to restart the engines (Casadevall, 1994). After landing, it was determined the airplane had suffered about $80 million in damage (Brantley, 1990).*
>
> *We estimate, based on information provided by the Federal Aviation Administration, that more than 80,000 large aircraft per year, and 30,000 people per day, are in the skies over and potentially downwind of Aleutian volcanoes, mostly on the heavily traveled great-circle routes between Europe, North America, and Asia. Volcanic eruptions from Cook Inlet volcanoes (Spurr, Redoubt, Iliamna, and Augustine) can have severe impacts, as these volcanoes are nearest to Anchorage, Alaska's largest population center.*
>
> *The series of 1989-1990 eruptions from Mt. Redoubt were the second most costly in the history of the United States, and had significant impact on the aviation and oil industries, as well as the people of the Kenai Peninsula. On the Kenai Peninsula, during periods of continuous ash fallout, schools were closed and some individuals experienced respiratory problems. At the Drift River oil terminal, lahars and lahar run-out flows threatened the facility and partially inundated the terminal on January 2, 1990 (Waythomas and others, 1998). The Redoubt eruption also damaged five commercial jetliners, and caused several days' worth of airport closures and airline cancellations in Anchorage and on the Kenai Peninsula (Casadevall, 1994). Drifting ash clouds disrupted air traffic as far away as Texas. Source AVO 2018, https://avo.alaska.edu/volcanoes/about.php*

5.4.5.2 History

The AVO, and its constituent organizations (USGS, Alaska Department of Natural Resources [DNR], and UAF), 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.*

Approximate close proximity volcano distance to the Seward area:

- Mount Redoubt: 116 miles
- Iliamna Volcano: 126 miles
- Mount Spurr: 126 Miles
- Mount Augustine: 146 miles
- Mount Katmai: 232 miles
- Mount Novarupta: 239 miles

The AVO's Service Review, Mount Redoubt Volcanic Eruptions, March – April 2009 describes its impact to Alaska residents and air traffic:

> *Mount Redoubt volcano in continuous eruption on March 31, 2009. Plume height is no more than 15,000 feet above sea level. The small amount of ash in the plume is creating a haze layer downwind of the volcano and dustings of fine ash are falling out of the plume. View is from the northwest…*
>
> *On March 22, 2009, Mount Redoubt volcano, 106 miles southwest of Anchorage, Alaska, began a series of eruptions after persisting in Orange or "Watch" status since late January 2009. Plume heights were observed at or above 60,000 feet during two of the six significant eruptions. Ashfall occurred over south central Alaska, including in Anchorage, with amounts ranging from a trace to one-half inch in depth.*
>
> *The Redoubt eruptions also disrupted air traffic in the region. Hundreds of commercial flights were cancelled and cargo companies were significantly impacted. This resulted in employees being placed on unpaid leave during periods when airport operations were*

shut down. Anchorage is Alaska's major population center; its airport serves as a critical strategic transportation hub as the third busiest cargo airport in the world.

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

Recent volcano eruption impacts demonstrate modern community vulnerability to volcanic ash dispersal that could affect people, resupply, and travel statewide.

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

Table 5-11 lists the AVO's identified Aleutian Chain volcano's historical eruption dates with explanatory symbols to designate the data's accuracy.

Table 5-11 Aleutian Volcano Eruption Events

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

Key:
Eruption
Questionable eruption
Numbers on the left of the symbols designate how many events occurred during the designated timeline

Source: AVO 2016, https://avo.alaska.edu/volcanoes/eruptsearch.php

The following volcano eruptions occurred since the 2010 legacy HMP was implemented:

- **2013 Veniaminof Volcano:** *Beginning on 7 June 2013, a several-day period of increasing levels of seismic tremor indicated the start of a largely effusive eruption from the intracaldera cinder cone (figure 17). The first ash plume was observed on 13 June. Over the next four months, numerous emissions rose to altitudes generally below 4.6 km and coated the flanks of the cone with ash, Strombolian explosions were visually observed several times, and lava flowed down the N and S flanks of the active cone and advanced onto the surrounding ice-filled caldera creating ice cauldrons. The eruption constructed a new spatter cone within the summit crater of the main active cone. Activity had ceased by 17 October 2013. A brief period of elevated seismicity occurred during October and November 2015, but no eruptive activity was recorded. (Smithsonian, 13 June-17 October 2013, https://volcano.si.edu/showreport.cfm?doi=GVP.WVAR20181212-312070)*
- ***2014 Pavlov:*** *After a short and intense eruption between 12 and 15 November 2014 (BGVN 40:04), activity decreased quickly to background levels. The AVO had reduced the Aviation Color Code (ACC) from Red (highest) to Orange on 16 November, and from Orange to Yellow on 25 November. Seismicity remained slightly above background levels until early January. On 15 January 2015 the AVO reduced the ACC to the lowest level of Green where it remained for over a year until it was changed abruptly to Red on 28 March 2016 at the start of a new eruption. (Smithsonian, November 12-15, 2014 https://volcano.si.edu/volcano.cfm?vn=312030)*
- **2016 Pavlof Volcano:** *A sudden vigorous eruption that began on 27 March 2016 lasted for about 20 hours, sending ash to 11 km altitude, producing a plume dispersed NE for 1,200 km, and a similarly large SO2 plume. The volcano was then quiet until a short-lived, smaller ash emission occurred in mid-May for eight days. Intermittent low-level activity picked up again from late June through late July 2016, characterized by minor emissions of dark-colored ash and steam rising to 4.5 km altitude. Fallout of ash was limited to the flanks of the volcano and the immediate area around Pavlof. The last report of ash emissions was on 30 July, although low-amplitude tremors and steam plumes persisted through August, and intermittent thermal anomalies from the summit continued through the end of 2016. (Smithsonian, Mar 29, 2016, https://volcano.si.edu/volcano.cfm?vn=312030)*
- **2017 Bogoslof Volcano:** *Intermittent eruptions from Bogoslof, 40 km N of the main Aleutian arc (BGVN 42:09, figure 2), have created and destroyed several distinct islands at the summit of this submarine volcano. Previous eruptions in 1927 and 1992 created lava domes that were subsequently heavily eroded, before the most recent eruption began in December 2016 (figure 16). Numerous explosions with ash plumes significantly changed the morphology of the island between December 2016 and March 2017. Ash plumes rose to over 10 km altitude during May-July 2017 multiple times. A lava dome briefly emerged in early June before it was destroyed by subsequent explosions. This report continues with an account of activity between July and December 2017. Eruptive activity ended on 30 August. Information comes primarily from the Alaska Volcano Observatory (AVO) and the Anchorage Volcanic Ash Advisory Center (VAAC).* (Source: Smithsonian 2017, https://volcano.si.edu/showreport.cfm?doi=10.5479/si.GVP.BGVN201712-311300)
- ***2018 Cleveland Volcano:*** *A small explosion at Cleveland was recorded by the seismic network at 1155 on 8 December. A second small explosion with a higher peak amplitude was detected at 1153 on 12 December, prompting AVO to raise the Aviation Color Code to Orange and the Volcano Alert Level to Watch. No ash cloud was observed, though weather clouds obscured views of the volcano. Elevated surface temperatures were visible in satellite data on 15 December. A small explosion which occurred at 0737 on 16*

December generated a minor ash cloud that drifted NE. (Source: Smithsonian 2018a, https://volcano.si.edu/showreport.cfm?doi=GVP.WVAR20181212-311240)

- **2018 Veniaminof Volcano:** *AVO reported that seismic data indicated that the eruption of lava from the cone in Veniaminof's ice-filled summit caldera possibly paused on 6 December. Satellite data acquired on 10 December suggested lava effusion had stopped, though weak explosive activity from the vent possibly still occurred. No eruptive activity was evident in satellite and webcam images on the morning of 13 December. However, beginning in the afternoon intermittent tremor appeared and gradually became continuous. A plume, possibly containing ash, and elevated surface temperatures were identified in satellite and webcam images. A strong thermal anomaly was visible in satellite and webcam data during 14-15 December, and together with an eruption plume, was consistent with lava fountaining at the summit vent. By 16 December a lava flow was erupting from the vent. The Aviation Color Code remained at Orange (the second highest level on a four-color scale) and the Volcano Alert Level remained at Watch (the second highest level on a four-level scale)*. (Source: Smithsonian 2018b: *https://volcano.si.edu/showreport.cfm?doi=GVP.WVAR20181212-312070*)

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

Location

Figure 5-12 depicts the AVO monitoring program's active and inactive volcanoes.

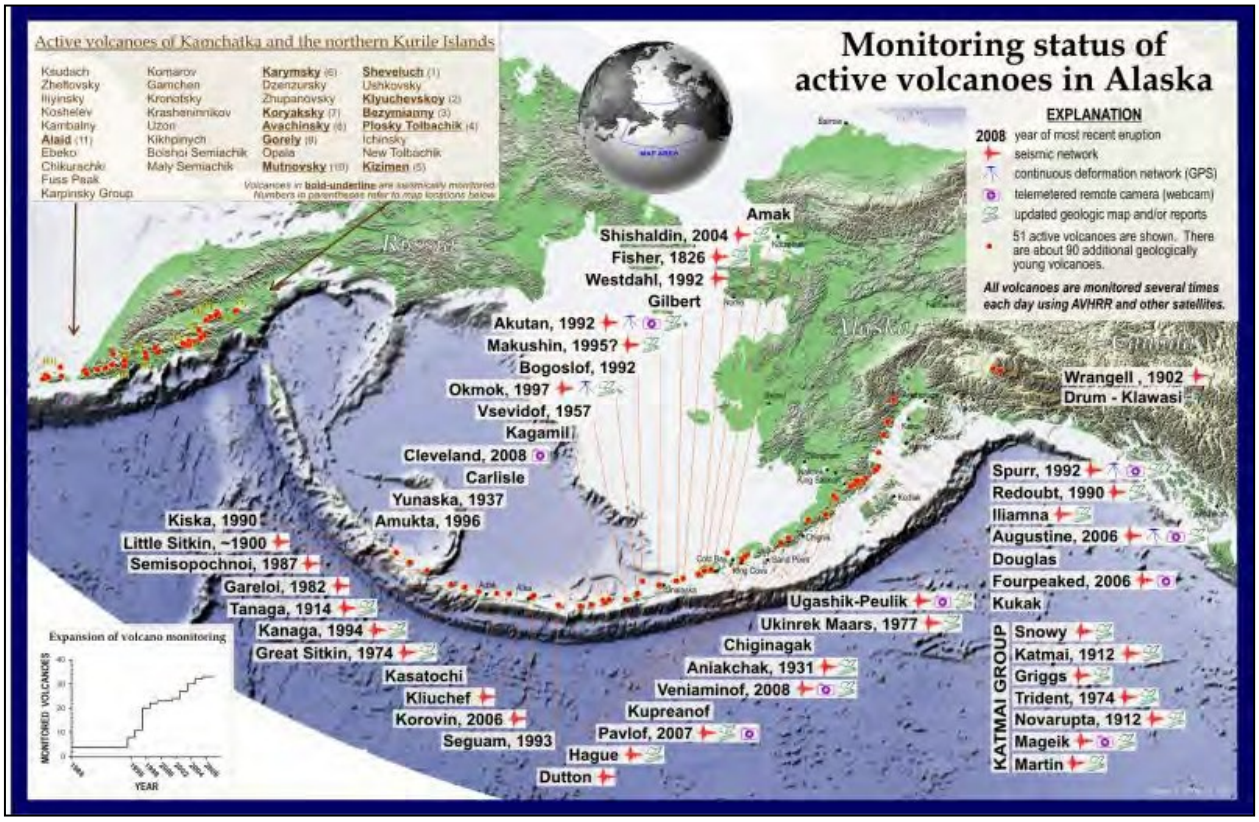


Figure 5-12 Alaska's Active Volcanoes
Source: AVO 2012

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

Table 5-12 provides a representative sample of their preliminary reports and hazard assessments.

Table 5-12 AVO Published Aleutian Volcano Hazard Assessments

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

Each report contains a description of the eruptive history of the volcano, the hazards they pose, and the likely effects of future eruptions to populations, facilities, and ecosystems.

Figure 5-13 portrays Alaska's seismically monitored volcanoes.

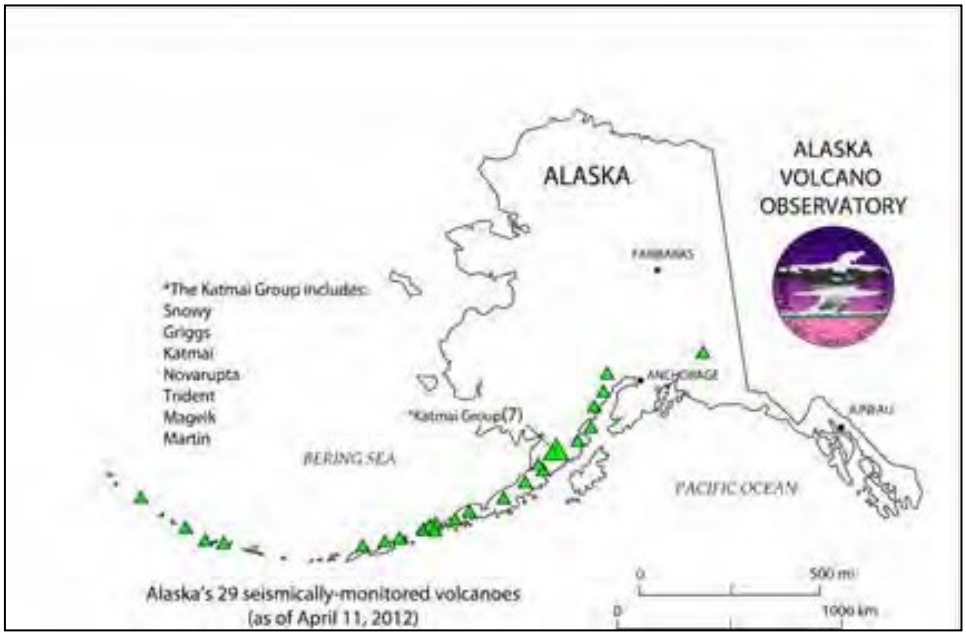


Figure 5-13 Alaska's Seismically Monitored Volcanoes
Source: AVO 2012

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

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

Many of the volcanoes in Alaska are capable of producing eruptions that can affect far distant communities such as the Seward. 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.

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

> *The ash cloud, now thousands of miles across, shrouded southern Alaska and western Canada, and sulfurous ash was falling on Vancouver, British Columbia; and Seattle, Washington. The next day the cloud passed over Virginia, and by June 17th it reached Algeria in Africa. Source: USGS 1998*

Figure 5-14 shows the extent of four ash cloud impact areas. The 1912 Katmai ash cloud is gray; the Augustine (blue plume), Redoubt (orange plume), and Spurr (yellow plume) were each dwarfed by the Katmai event. "Volcanologists discovered that [this] 1912 [Katmai] eruption was actually from Novarupta, not Mount Katmai." *Source: USGS 1998*

Figure 5-14 1912 Katmai Volcano Impact
Source: USGS 1998

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

  Redoubt Volcano is a strato-volcano located within a few hundred kilometers of more than half of the population of Alaska. This volcano has erupted explosively at least six times since historical observations began in 1778. The most recent eruption occurred in 1989-90 and similar eruptions can be expected in the future. The early part of the 1989-

90 eruption was characterized by explosive emission of substantial volumes of volcanic ash to altitudes greater than 12 kilometers above sea level and widespread flooding of the Drift River valley. Later, the eruption became less violent, as developing lava domes collapsed, forming short-lived pyroclastic flows associated with low-level ash emission. Clouds of volcanic ash had significant effects on air travel as they drifted across Alaska, over Canada, and over parts of the conterminous United States causing damage to jet aircraft, as far away as Texas. Total estimated economic costs are $160 million, making the eruption of Redoubt the second most costly in U.S. history.
Source: USGS 1998

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

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

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

Small ash clouds from the 2001 eruption of Mt. Cleveland were noted by USGS to have reached Fairbanks. These clouds dissipated somewhere along the line between Cleveland and Fairbanks. A full plume, visible on satellite imagery, was noted in a line from Cleveland to Nunivak Island.

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. (Source: DHS&EM 2018b)

Figure 5-15 displays how Volcanoes in Alaska and Russia have the potential to permanently displace entire communities and disrupt all travel modes.

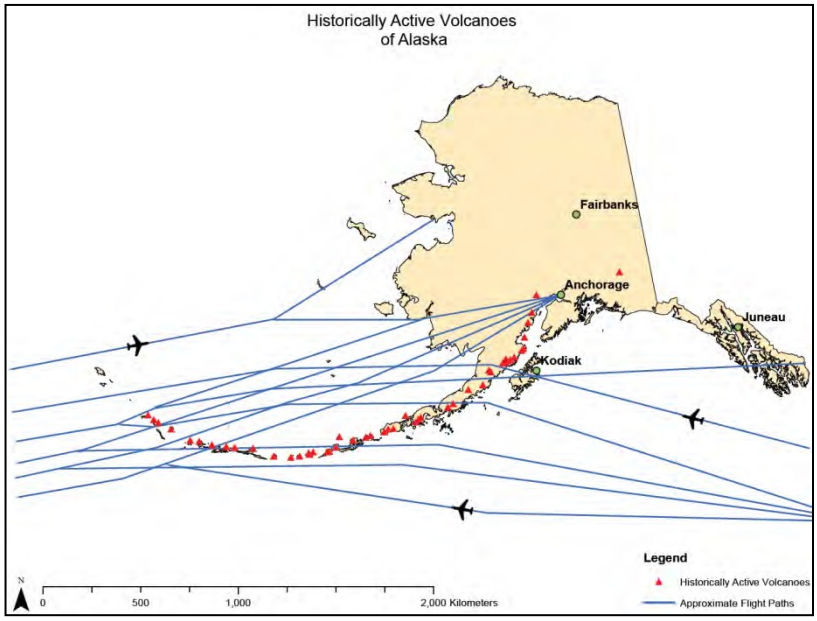


Figure 5-15 Simplified Flight Paths of the North Pacific

Source: AVO/USGS https://www.avo.alaska.edu/volcanoes/hazards.php

Extent

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

The Seward area might receive some ash fall during a massive volcanic eruption. A tsunami is not possible if the eruption included a massive, high speed pyroclastic flow from Mount Augustine in Cook Inlet because it would be contained within the Inlet. However, the area could potentially receive ash fall from any Alaska or Russian volcano due to high altitude wind currents. Ash fall could be cause 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, as depicted in Figure 5-16, could severely affect the global climate; radically changing Seward's (and everyone else's) long-term weather event risks for weeks, months, or years.

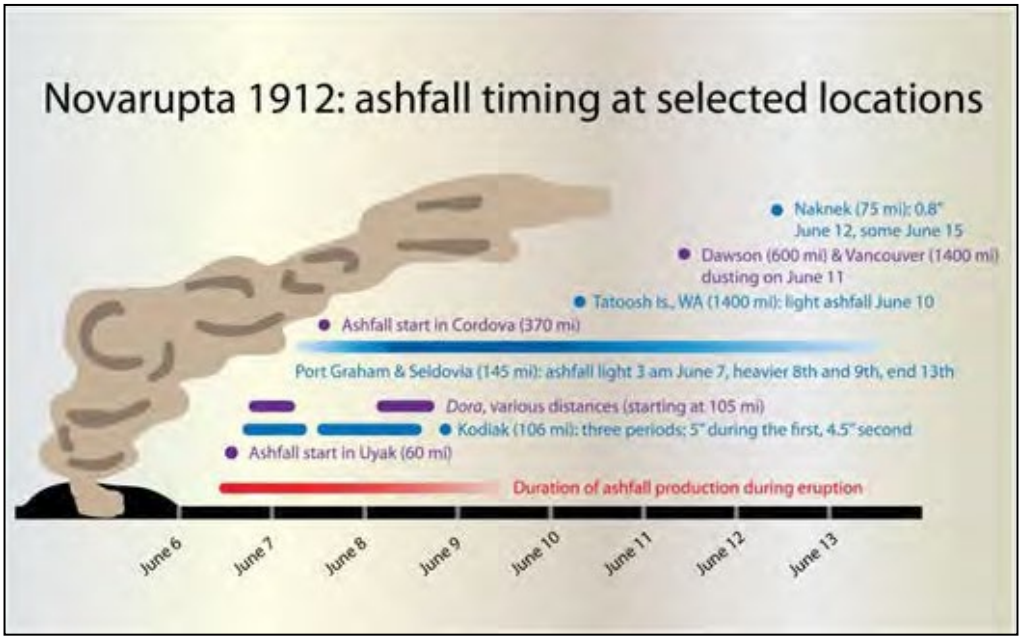


Figure 5-16 Novarupta's Historic Ashfall Timeline

Source: AVO 2012

Based on historic volcanic activity impacts and the criteria identified in Table 5-2, the magnitude and severity of impacts in the Seward are considered "Limited" with injuries and/or illnesses that would not likely result in permanent disability, critical facilities could shut down for more than one week, and more than 10% of property or critical infrastructure could be severely damaged.

Impact

Such an ash fall event would undoubtedly be devastating to the Seward area 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 Seward area residents to be completely self-sufficient.

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

Recurrence Probability

Geologists can make 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 in Table 5-3 and information presented in the SHMP, it is "Possible" a volcanic eruption will occur within the next five years. Event has up to 1 in 5 years (1/5=20) percent chance of occurring. Event history is less than or equal to 5 percent likely per year. Vulnerability depends on the type of volcanic activity and current weather; especially wind patterns.

5.4.6 Weather

5.4.6.1 Nature

Severe weather occurs throughout Alaska with extremes experienced by the entire Seward area that includes thunderstorms, lightning, hail, heavy and drifting snow, freezing rain/ice storm, extreme cold, and high winds.

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

ENSO is comprised of two weather phenomena known as El Niño and La Niña. While ENSO activities are not a hazard, they can lead to severe weather 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, coastal 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 and snow melt are severe threats to the Seward area.

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

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

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

Extreme Cold is the definition of extreme cold varies according to the normal climate of a region. In areas unaccustomed to winter weather, near freezing temperatures are considered "extreme." In Alaska, extreme cold usually involves temperatures between -20 to -50°F. Excessive cold may accompany winter storms, be left in their wake, or can occur without storm activity. Extreme cold accompanied by wind exacerbates exposure injuries such as frostbite and hypothermia.

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

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

Snowstorms happen when a mass of very cold air moves away from the polar region. As the mass collides with a warm air mass, the warm air rises quickly and the cold air cuts underneath it. This causes a huge cloud bank to form and as the ice crystals within the cloud collide, snow is formed. Snow will only fall from the cloud if the temperature of the air between the bottom of the cloud and the ground is below 40 degrees Fahrenheit. A higher temperature will cause the snowflakes to melt as they fall through the air, turning them into rain or sleet. Similar to ice storms, the effects from a snowstorm can disturb a community for weeks or even months. The combination of heavy snowfall, high winds and cold temperatures pose potential danger by causing prolonged power outages, automobile accidents and transportation delays, creating dangerous walkways, and through direct damage to buildings, pipes, livestock, crops and other vegetation. Buildings and trees can also collapse under the weight of heavy snow. Winter storm floods are discussed in Section 5.4.2.

Figure 5-17 displays Alaska's annual rainfall map based on Parameter-elevation Regressions on Independent Slopes Model (PRISM) that combines climate data from NOAA and Natural Resources Conservation Service (NRCS) climate stations with a digital elevation model to

generate annual, monthly, and event-based climatic element estimates such as precipitation and temperature.

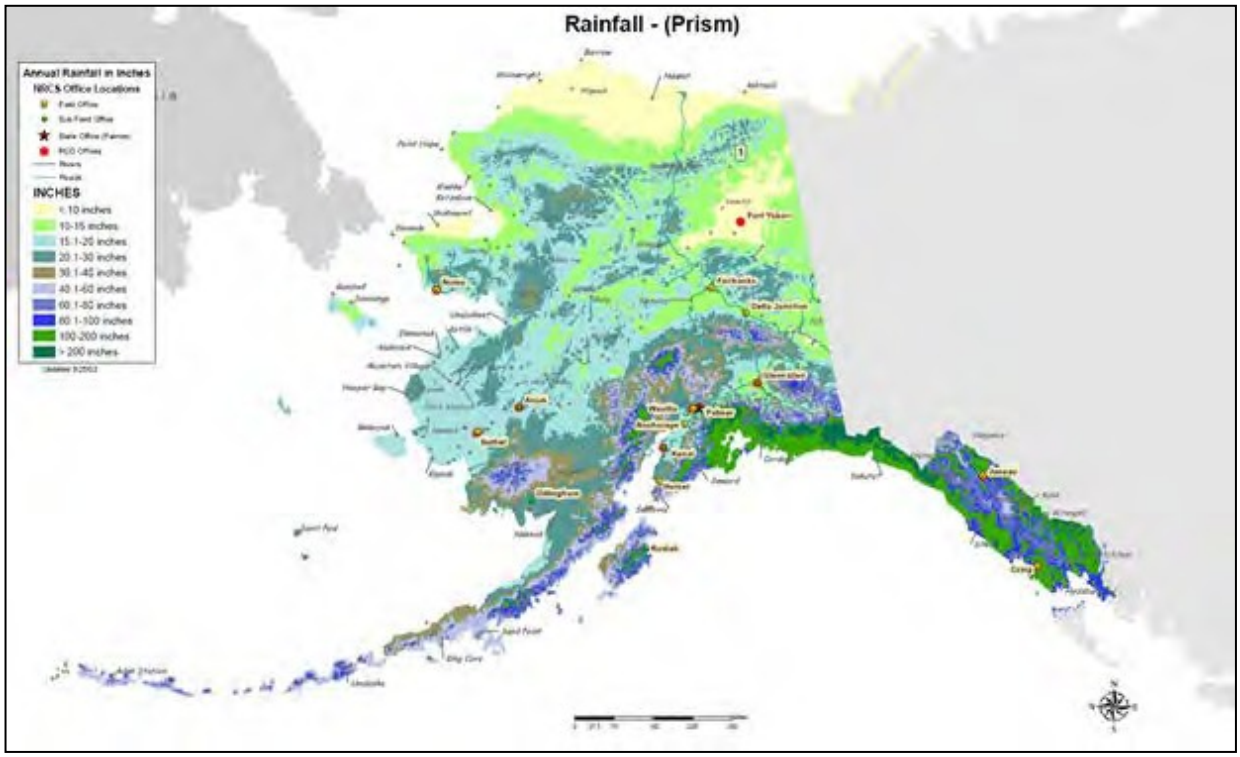


Figure 5-17 Statewide Rainfall Map

Source: PRISM 2012

5.4.6.2 History

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

Climate Change. UAF Arctic Climate Impact Assessment describes recent weather changes and how they impact Alaska:

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

Alaska, such as the North Slope, are expected to continue drying. Reduced sea-ice extent and thickness, rising sea level, and increases in the length of the open-water season in the region will increase the frequency and intensity of storm surges and wave development, which in turn will increase coastal erosion and flooding…

18.3.3.4. Impacts on people's lives

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

Figure 5-18 delineates the Seward Alaska Weather Service Office's (WSO) weather data summaries. Actual community temperatures and depth locations may vary due to their relative proximity to the WSO.

SEWARD, ALASKA (508371)

Period of Record Monthly Climate Summary

Period of Record : 02/01/1908 to 09/30/2008

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Average Max. Temperature (F)	30.0	32.8	36.9	44.4	52.1	58.3	62.2	61.9	55.2	44.6	35.6	31.5	45.5
Average Min. Temperature (F)	20.0	22.1	25.0	31.8	38.8	45.3	49.9	49.4	43.6	34.5	26.3	21.7	34.0
Average Total Precipitation (in.)	6.13	5.78	3.73	4.03	3.88	2.27	2.63	5.19	10.42	9.99	7.10	7.58	68.72
Average Total SnowFall (in.)	16.1	19.0	13.3	5.8	0.3	0.0	0.0	0.0	0.0	1.7	7.5	20.8	84.4
Average Snow Depth (in.)	6	8	7	2	0	0	0	0	0	0	1	4	2

Percent of possible observations for period of record.
Max. Temp.: 97.1% Min. Temp.: 97.1% Precipitation: 97.2% Snowfall: 96.4% Snow Depth: 96.1%
Check Station Metadata or Metadata graphics for more detail about data completeness.

Western Regional Climate Center, wrcc@dri.edu

Figure 5-18 Seward, Alaska WSO

Source: WRCC 2018 https://wrcc.dri.edu/cgi-bin/cliMAIN.pl?ak8371

DHS&EM's Disaster Cost Index records the following severe weather disaster events which may have affected the Seward area. This section shows historical events that demonstrates long-term severe weather affects:

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.*

100. Seward/Kenai Peninsula Borough, August 30, 1989: *This Declaration relates to the same storm and heavy flooding incident similar to that affecting Anchorage. Primary*

area of damage was in the city of Seward. As in Anchorage, State disaster assistance was limited to public property damage, with SBA loans available for individuals and businesses.

06-217 2006 South Central Storm (AK-06-217) declared March 13, 2006 by Governor Murkowski. *Beginning on February 5, 2006 and continuing through February 11, 2006, a series of strong winter storms with high winds, heavy snow, and freezing rain occurred in the City of Seward and surrounding areas of the Kenai Peninsula Borough in South Central Alaska, causing avalanches that severely damaged power lines and other infrastructures, blocked roads, and threatened further damages. As a result of the disaster, there was severe damage to power transmission and distribution lines supplying the City of Seward and surrounding areas; disruption of normal power supply requiring the prolonged use of emergency backup generators with extraordinary expensive operation costs; and damage and threat to public and private property as a result of power disruption. On March 13, 2006, a letter was submitted to request a federal time extension of 30 days. As of 3/20/06, the decision is pending. Decision made not to seek Federal assistance. Current estimated cost for repairs is $1,254,730; however, this does not include the ongoing cost of line repair. No federal declaration was sought; therefore, the State is limited to public assistance only (no HM or IA). As of 3/20/06, only the City of Seward and Sealife Center are applicants. Disaster administratively closed out and letter sent to applicants on 6/29/07. (7 Nov 08 update)--Formal closeout letter to DMVA/DAS was dated 6 Nov 08 (funds authorized = $1,465,321; funds expended =$1,306.509.72; funds lapsed to DFR = $158,811.28. (7Nov08, R.B. Stewart)*

07-221 2006 October Southern Alaska Storm (AK-07-221) declared October 14, 2006 by Governor Murkowski FEMA declared (DR-1669) on December 8, 2006: *Beginning on October 8, 2006 and continuing through October 13, 2006, a strong large area of low pressure that developed in the Northern Pacific and moved into the Southwest area of the state, produced hurricane force winds throughout much of the state and heavy rains in the Southcentral and Northern Gulf coast areas, which resulted in severe flooding and wind damage and threats to life in the Southern part of the state, to include the Kenai Peninsula Borough including the Cities of Seward and Seldovia, the Chugach Rural Education Area including the City of Cordova and the City of Valdez, and the Copper River Rural Education Area including the Richardson Highway to the Glennallen and highways and drainages in the McCarthy areas. Initial total damages are estimated at $557,415 with a public assistance estimate of $456,855. Federal declaration was made December 2006 including assistance for Public Assistance and Hazard Mitigation but not including Individual Assistance. Revised State of Alaska Cost estimates are $1,265,000 in Individual Assistance and $38,241,826 in Public Assistance for a total cost of $39,506,826. There is $26,825,918 available from the Federal Highway Administration leaving a requested amount of $13,948,999. A total of 10 individuals or households applied for assistance through the State's IA Temporary Housing program. Six eligible applicants received a total of $93,611.21 for home replacement, major repair and mitigation, and/or for temporary housing accommodations. Each TH applicant involved extensive case management. The temporary housing program closed 3/10/2008.*

09-230 2009 Seward Storm Surge declared by Governor Parnell on December 31, 2009: *On December 1, 2009 the City of Seward experienced a winter storm event that caused damage to the shoreline and an important roadway within the community. High winds, 3 plus inches of rainfall, and a 12.6 foot tide, caused extensive damage to the wave barrier along Lowell Point Road, the Seward Greenbelt area and the seawall at the Alaska Sea Life Center.*

12-237 2011 Kenai Peninsula Windstorm declared by Governor Parnell on

December 12, 2011 then FEMA declared February 2, 2012 (DR-4054): *On November 1, 12, and 15, 2011, a series of major windstorms caused widespread power outages threatening life and property. Power was disrupted to 17,300 homes and businesses. Local utilities, Homer Electric Association (HEA) and Chugach Electric employed several work crews to restore power to the area. Public Infrastructure, commercial property, and personal property damages were reported in the metropolitan areas and throughout the borough. DHS&EM received local declarations from the Kenai Peninsula Borough (KPB) requesting state disaster assistance to cover immediate response, public and individual costs and from the City of Seward through the KPB requesting State assistance.*

13-F-243 2013 October KPB Flood Disaster declared by Governor Parnell on November 18, 2013 then FEMA declared January 16, 2014 (DR-4161): *Beginning October 27, 2013, the Kenai Peninsula received substantial amounts of rain following several weather systems that had previously inundated low-lying areas. On October 26, the National Weather Service issued a flood watch for areas around Western Prince William Sound due to a slow moving system which brought widespread rainfall to the mainland. The forecast was calling for local amounts in excess of 5 inches of rain. Seward, Homer, and other areas of the Kenai Peninsula received heavy rain and flooding which caused landslides, bridge, and airport and road closures. Damages were reported in Seward, Homer, Kenai, Anchor Point, and the Tyonek area along Beluga Road. Flood damages affecting many individual homes were reported and several businesses were also impacted. Disaster Declarations were received from the Kenai Peninsula Borough and the City of Seward on October 29, 2013.*

AK-17-262 2017 December KPB Storm declared by Governor Walker on January 19, 2018 then FEMA declared on June 8, 2018 (DR-4369)*: On December 4, 2017 a fast moving storm system moving northward out of the Gulf of Alaska brought widespread high winds to coastal areas on both the east and west sides of the Kenai Peninsula. These high winds, gusting 30-40 mph, produced 3-4 foot waves that lasted for 4-8 hours in Seward, coinciding almost perfectly with the highest astronomical tide of the year, causing significant wave action damage to occur. Resurrection Bay in Seward experienced a 13.4 foot-high tide in conjunction with high southerly winds on December 4. This combination of events caused serious erosion to the Lowell Point Road that connects South Seward with the community of Lowell Point and the Lowell Point State Recreation Area (SRA). In the summer, this is the second highest travelled road in the area. Much of the armor rock on Lowell Point Road has been washed free of the roadside. In some areas, 10 feet or more of road has been washed away by wave action. The road, through an easement, has critical city sewer and electric infrastructure buried under the surface. The city's waterfront RV/camping areas also experienced erosion.*

In the Lower Cook Inlet area, this storm system created high winds gusting 30-40 mph, reaching a maximum wind speed of 58 mph, producing 7-10 foot waves that impacted the Cook Inlet coastline from Homer to Kenai. Two SRAs, the Anchor River SRA and the Deep Creek SRA, each sustained extensive damages to campgrounds, parking areas, boat launches, and beach areas.

AK-18-264 2018 October KPB Flooding declared by Governor Walker on October 16, 2018. *On October 12, 2018, and continuing, numerous areas of the Kenai Peninsula Borough and the City of Seward have suffered widespread flooding and related damages as a result of an unusually heavy and persistent rainfall event; and the City of Seward and the Kenai Peninsula Borough are political subdivisions of the State of Alaska; and, both the City of Seward and the Kenai Peninsula Borough have issued local declarations of disaster emergency in response to this event. The following conditions exist as a result of this disaster: widespread flooding of community roads, the Seward airport, and other facilities;*

and severe threat to life and property; and, these conditions have required local emergency protective measures to protect life and property, including activation and staffing of emergency operations centers; emergency debris clearance of roads and stream channels to protect critical infrastructure and maintain access; placement of road barricades and sandbagging to protect roads and bridges; school closures. The flooding in this area has the potential to cause substantial damage to the highway, community infrastructure, the Seward airport, and homes; and, the severity and magnitude of the emergency is beyond the timely and effective response and recovery capability of local resources, and repairs and emergency assistance are required.

(Source: DHS&EM 12/2018)

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

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

How to interpret climate outlooks for your community

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

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

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

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

SNAP data tools depict Seward's historic and future predicted precipitation and temperatures. (Figures 5-19 and 5-20)

***Note:** Both precipitation and temperature are projected to remain fairly 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 subsistence food source and wildlife habitat support capacity.*

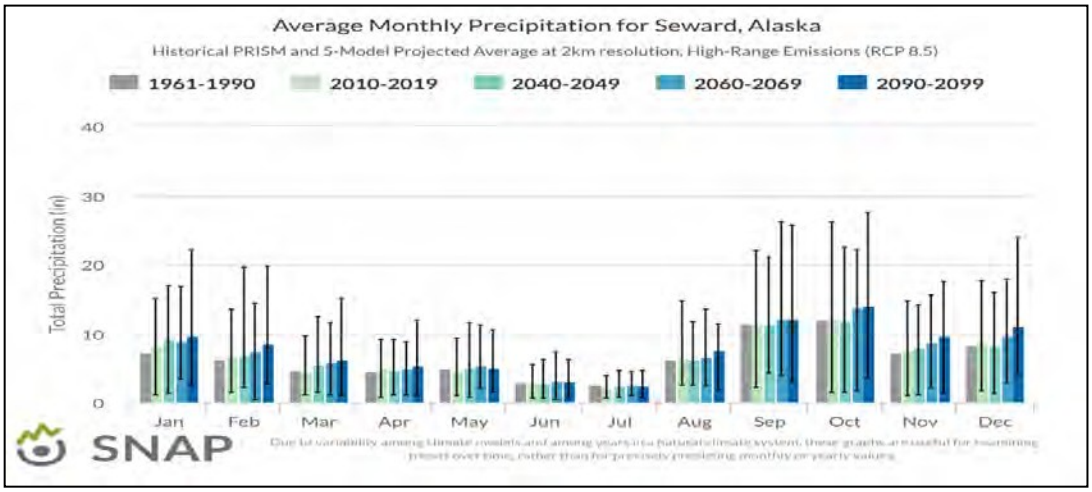


Figure 5-19 Seward's Historic and Predicted Precipitation Ranges

Source: SNAP 2018

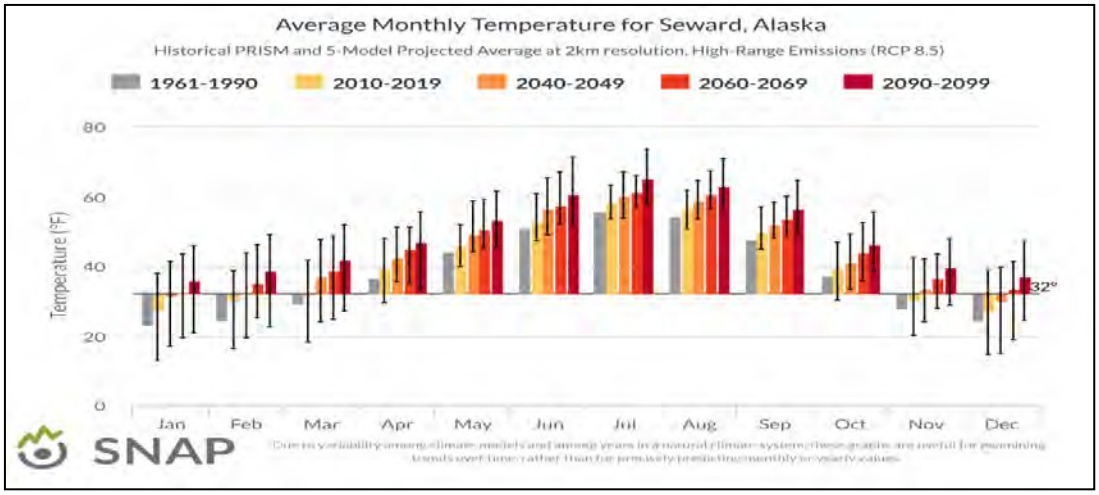


Figure 5-20 Seward's Historic and Predicted Temperature Ranges

Source: SNAP 2018,

5.4.6.3 Location, Extent, Impact, and Recurrence Probability

Location

The entire Seward area, experiences periodic severe weather impacts. The most common to the area are high winds, heavy rains, severe winter storms with extreme high tides.

Extent

Seward is equally vulnerable to all severe weather effects as well as Alaska's changing climate. Severe storm conditions bring heavy rain, moderate snow depths; wind speeds exceeding 90 mph.

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

Impact

The intensity, location, and the land's topography influence a severe weather event's impact within a community. Hurricane force winds, rain, snow, and storm surge can be expected to impact the entire 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 flow of supplies and disrupting emergency and medical services. Accumulations of snow can cause roofs to collapse and knock down trees and power lines. Heavy snow can also damage light aircraft and sink small boats. A quick thaw after a heavy snow can cause substantial flooding. The cost of snow removal, repairing damages, and the loss of business can have severe economic impacts on cities and towns.

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

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

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

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

Recurrence Probability

Based on previous occurrences and the criteria identified in Table 5-3, it is considered "Highly Likely" that a severe storm event will occur during the next year, an event has up to 1 in 1 years (1/1=100) percent chance of occurring as the history of events is greater than 33 percent likely per year.

5.4.7 Wildland Fire

5.4.7.1 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 three 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 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, drought, 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.

5.4.7.2 History

The Alaska Interagency Coordination Center (AICC) identified 665 historical wildland fire incidents within the Seward since 1939. The vast majority of those fires burned less than 8 acres, 19 burned between 8 and 30 acres, 13 burned between 31 and 80 acres, and 22 burned 100 acres or more.

Table 5-13 lists 19 fires that occurred within 25-miles of Seward city center since 2000. Only eight wildfires occurred since the legacy 2010 HMP was implemented. The largest fire was a "*Prescribed Burn"* that burned 43 acres in 2010. The remaining fires occurred since 2000 burned less than 3 acres.

Table 5-13 Seward's Wildfire Locations Since 2009

Fire Name	Fire Year	Estimated Acres	Total Cost ($)	Latitude	Longitude	Cause
Bear	2017	0	$0	60.1988333	-149.3458333	Campfire
Lawing	2017	0	$0	60.4098333	-149.3686667	Equipment
Greyling Lake	2016	0	- -	60.26667	-149.3835	Human
Range	2014	0	$0	60.15275	-149.452722	Human
F/A #6 Thumb Cove	2012	0	$1,500	59.9853889	-149.3191111	False Alarm
Lawing	2011	0	$199	60.4008331	-149.3616638	Debris Burning
VFD Bear Creek # 1	2011	0	$0	60.2463875	-149.3494415	Railroad
Hope RX	2010	43	- -	60.3933334	-149.6033325	Prescribed
Bear Lake	2009	0	- -	60.1833344	-149.3500061	Campfire
Chugach	2009	0	--	60.2999992	-149.3333282	Campfire
Meadow Creek	2009	0	--	60.3833351	-149.4166718	Campfire
Harbor View	2007	1	--	60.25	-149.4166718	Human
Tonsina Creek Fire	2005	3	--	60.06667	-149.45	Human
Chugach #6	2004	0	--	60.46667	-149.4667	Unknown)
Trestle Fire	2004	0	--	60.48333	-149.35	Human
Rookery Fire	2003	1	--	60.38334	-149.7167	Human
A-O	2001	0	--	60.35	-149.3667	Campfire
Fox Island	2000	1	--	59.91667	-149.35	Burning Building
Res. River	2000	0	--	60.26667	-149.6667	Miscellaneous
Note: *"--"are indicate undefined total costs*						

Source: AICC 2018

The AICC dataset categorizes historical fire events within AICC defined year groups. The wildfire locations listed in Table 5-13 and depicted in Figure 5-21 labeled with brown text occurred in the 2000 to 2017 year group. Those fires within a 25-mile radius (red circle) are those that could have potentially threatened Seward residents, visitors, and infrastructure since calendar year 2000.

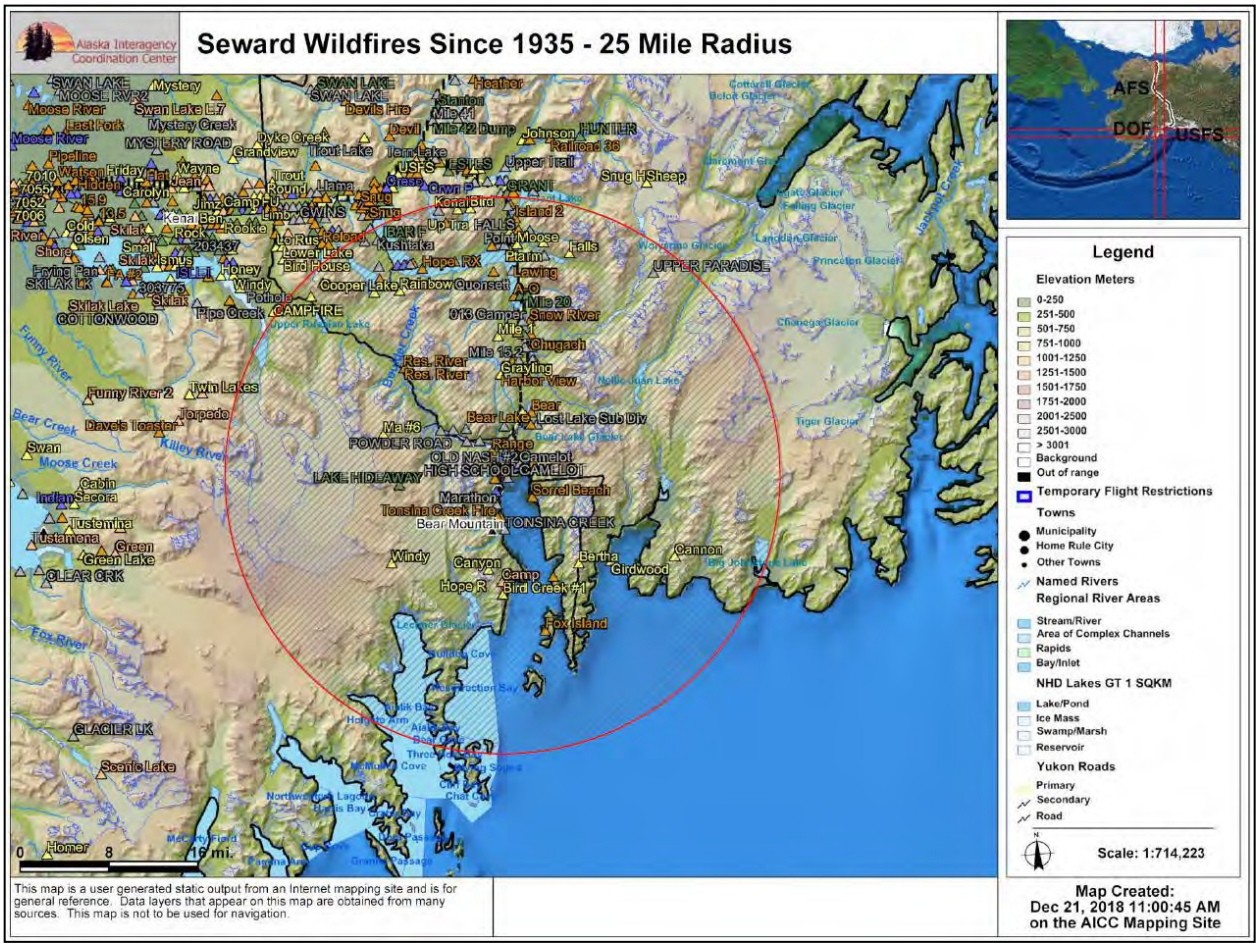


Figure 5-21 Seward Area's Wildfires Since 2009

Source: AICC 2018

The 2018 DHS&EM Disaster Cost Index delineates historical wildfire events affecting within 50 miles of the Seward Area. The index lists the following events that occurred since the legacy 2010 HMP was implemented. *(Older disaster declaration details will not be included in this HMP update)*

AK-15-250 2015 Kenai Wildfire declared by Governor Walker on June 19, 2015:
Beginning on June 15, 2015 a series of wildfires have occurred in the Kenai Peninsula Borough as a result of prolonged hot, dry weather and human error. The most significant of these is the Card Street Wildfire which began on June 15 and damaged 11 buildings in Sterling, including 3 primary residences. The fire moved away from residences into the Kenai Wildlife Refuge but is not yet fully contained. The Alaska Division of Forestry, local firefighters, and national wildland firefighter teams are currently working to gain control of the Card Street fire and numerous other fires within the Borough. A federal Fire Management Grant (FMAG) has been authorized to assist in the cost of suppression. The SEOC has been fully activated to support firefighting efforts. In addition, the AK National Guard and DOD are providing fire suppression support with troop and resource deployments as well as supporting SEOC operations.

AK-15-251 2015 Summer Alaska Wildfires declared by Governor Walker on June 26, 2015: *Beginning on June 14, 2015 and continuing, wildland fires have impacted multiple communities throughout the state requiring emergency response, evacuations, and sheltering. Due to ongoing fire growth and new fire starts, the number of communities that will be impacted or threatened and the extent of community fire damage is unknown. Current and forecasted weather including warm temperatures, strong winds, low humidity, and dry thunderstorms indicate a continued wildland fire threat to the state. The following conditions exist as a result of this disaster: a robust emergency response and management operation requiring substantial additional labor, equipment, and support costs to combat the fire; activation of the emergency operations center; evacuation and sheltering of over 200 residents from five different communities.*

5.4.7.3 Location, Extent, Impact, and Recurrence Probability

Location

Under certain conditions wildland fires may occur near Seward when weather, fuel availability, topography, and ignition sources combine. Since fuels data is not readily available, for the purposes of this plan, all areas outside the Seward City boundaries are considered to be vulnerable to wildland fire impacts. Since 1939, only 21 wild fire events have occurred within 25 miles of the Seward area (Figure 5-21).

Extent

Generally, fire vulnerability dramatically increases in the late summer and early fall as vegetation dries out, decreasing plant moisture content and increasing the ratio of dead fuel to living fuel. However, various other factors, including humidity, wind speed and direction, fuel load and fuel type, and topography can contribute to the intensity and spread of wildland fires. The common causes of wildland fires in Alaska include lightning strikes and human negligence.

Fuel, weather, and topography influence wildland fire behavior. Fuel determines how much energy the fire releases, how quickly the fire spreads, and how much effort is needed to contain the fire. Weather is the most variable factor. High temperatures and low humidity encourage fire activity while low temperatures and high humidity retard fire spread. Wind affects the speed and direction of fire spread. Topography directs the movement of air, which also affects fire behavior. When the terrain funnels air, as happens in a canyon, it can lead to faster spreading. Fire also spreads up slope faster than down slope.

Based on the limited number of past wildland fire events and the criteria identified in Table 5-2, the magnitude and severity of impacts in Seward are considered “Limited”, with minor injuries, there is potential for critical facilities to be shut down for more than one week, more than 10 percent of property or critical infrastructure being severely damaged.

However due to the rapidly spreading spruce bark beetle infestation throughout the Kenai Peninsula; the wildfire threat could increase as the surrounding forest dies; creating ample fuels for a catastrophic wildfire event.

Impact

Impacts of a wildland fire that interfaces with Seward’s population center could potentially grow into an emergency or disaster if not properly controlled. A small fire can threaten lives and resources and destroy property. In addition to impacting people, wildland fires may severely

impact livestock and pets. Such events may require emergency watering and feeding, evacuation, and alternative shelter.

Indirect impacts 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 siltation of rivers and streams, thus increasing flood potential, harming aquatic life, and degrading water quality.

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 the fire management planning process and the full range of fire management activities is exercised in Alaska, to help achieve ecosystem sustainability, including its interrelated ecological, economic, and social consequences on firefighters, public safety and welfare; natural and cultural resources threatened; and the other values to be protected dictate the appropriate management response to the fire. In Alaska, and within 25 miles of Seward, the natural fire regime is characterized by a return interval of approximately 100 years due to their diverse vegetation and gently rolling topography.

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

Appendix A provides a wildfire figure that depict potential impact areas as well as critical facilities that may be affected within the City limits.

Recurrence Probability

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

Based on the history of wildland fires in the Seward area and applying the criteria identified in Table 5-3, it is "Unlikely" but possible a wildland fire event could occur within in the next ten years. The event has up to 1 in 10 years chance of occurring and the history of events is less than or equal to 10 percent likely each year. Climate change and the growing Spruce Bark Beetle infestation threat could increase which in-turn would increase flammable fuel sources and subsequently increase future wildfire events.

5.5 TECHNOLOGICAL HAZARD PROFILE

5.5.1 Hazardous Substances

5.5.1.1 Nature

Technological hazards include hazardous materials or substance releases. These materials may have negative effects on public health or the environment. Exposure may cause injury, illness, or death. Effects may be felt over seconds, minutes, or hours (short-term), or not emerge until days, weeks, or even years after exposure (long-term). Some substances are harmful after single short-duration exposures; while others require long exposure episodes or repeated exposure over time to create harm.

Hazardous substances can be found nearly everywhere in our society. Paints, solvents, adhesives, gasoline, household cleaners, batteries, pesticides and herbicides, and even medicines are all potential sources of hazardous materials.

While many people are beginning to question the wisdom of surrounding ourselves with so many potential toxins, this plan does not focus on the hazards in everyday products, but rather on larger quantities of hazardous substances that are transported through the region by highway, rail, and marine vessel, as well as potential extremely hazardous substances (EHS) releases from facilities within, or within contamination range of Seward.

Unless exempted, facilities that use, manufacture, or store hazardous materials in the U.S. fall under the Emergency Planning and Community Right to Know Act's regulatory requirements, and must report to the EPA. The EPA identifies Hazardous substances that pose the greatest risk for causing catastrophic emergencies are classified as EHSs. EHS and other hazardous substance releases can occur at facilities or during transport vehicles and equipment. Transportation-related releases are generally more troublesome because they may occur anywhere, including close to human populations, critical facilities, or environmentally sensitive areas. Transportation-related EHS releases can also be more difficult to mitigate due to the great area over which any given incident might occur, and the potential distance from response resources.

There are various technologically created hazard potential locations within the Seward area. They include fuel storage facilities, explosives storage, and hazardous materials shipped into the city by marine vessel, truck, or train cargo. One of the most prevalent is anhydrous ammonia that is used in local fish processing plant chilling facilities. These facilities are located at the Seward Marine Industrial Center (SMIC), the north end of the boat harbor, and the south end of town.

Anhydrous ammonia is a corrosive and toxic gas that is an eye, nose and throat irritant. It is highly toxic if inhaled and may be an explosive hazard in a confined space.

The following locations have listed anhydrous ammonia quantities:

- Icicle Seafood's Seward Plant, located in the Seward boat harbor and within 1 mile of downtown Seward, holds 23,000 lbs. of anhydrous ammonia in their system with an additional 300 lb., external cylinder.
- Resurrection Bay Seafoods, located at the southern end of town has 650 lbs. in the system.
- Polar Seafoods, located in the SMIC area has 4500 lbs.

Due to the proximity of two of these processing plants to populated areas, the city has a high risk from the effects of an anhydrous ammonia release.

Icicle Seafoods has a current anhydrous ammonia release Emergency Response Plan (ERP) in place. They conduct simulated leak exercises in coordination with the Seward Fire Department and in-house monthly exercises as part of their ERP.

The plan is designed to meet Process Safety Management of Highly Hazardous Chemicals, the Hazardous Waste Operations and Emergency Response regulation, and Part 68 of Risk Management Plan regulation requirements. The ERP is available at the Icicle Seafoods, Seward Fisheries Plant.

Fuel Storage Tanks – Small Boat Harbor. Besides the boat harbor area, there are other various city locations that store gasoline, heating oil, motor oil, diesel, and propane. All of these facilities have can potentially cause extreme environmental disasters and/or fire/explosion incidents.

Fuel storage tank system failure probability is low. In the event of a failure of any of these tank systems. The probability however of such failures is low. The largest threat from a fuel spill would be environmental contamination. The petroleum tank facility is located within a few hundred yards of the shoreline. A major spill or rupture of any tank would have far reaching impacts. The risk to the City of Seward is high.

Technological hazards can also occur as secondary impacts from earthquakes, flooding, and tsunami events. During the 1964 earthquake, bulk fuel lines ruptured and subsequently ignited causing additional problems for the City of Seward.

The 2019 KPB Hazard Mitigation Plan contains other technical hazards that could affect the Seward area. The KPB HMP is available at:
https://www.fedcenter.gov/Bookmarks/index.cfm?id=783

5.5.1.2 History

The legacy 2010 HMP identified only Seward's seafood processors and the City bulk fuel tank farm located within the Seward area.

The National Response Center (NRC) serves as the point of contact for reporting oil, chemical, radiological, biological, and etiological discharges within the U.S for several federal agencies including the EPA and Department of Transportation.

The NRC's Internet-based query system of non-Privacy-Act data (http://www.nrc.uscg.mil/Default.aspx) only lists small or limited quantity events since the legacy 2010 HMP was implemented. Most of these events included fuel or oil spills in close proximity to open water such as the marina or small boat harbor.

5.5.1.3 Location, Extent, Impact, and Recurrence Probability

Location

Under certain conditions technological events may occur near Seward by accident or when natural hazard events or when sources combine causing secondary or tertiary impacts. For example, the 1964 earthquake and subsequent tsunami and seiche waves destroyed Seward's seaport and coastline, railroad facilities, and shipping facilities, and the bulk fuel tank farm.

Potential hazardous substance spills can include small quantities at gas stations, garages, and automotive repair facilities, radiator repair facilities, industrial, fish processing, university, and school laboratories. The vast majority of these sites would be places where an unintentional release would be classified as a small localized event. The greatest exceptions would be from the fish processors or an EHS materials spill from road, rail, or vessel transport accident involving a great quantity of a hazardous substance. Other site-specific contamination could occur from repeated spills or improper storage, but again, these effects would be extremely localized. Table 5-14 lists Seward's known EHS materials handling facilities.

Table 5-14 2017 Seward, Alaska Area EHS Sites

Seward	EHS	Quantity
Icicle Seafoods	Anhydrous Ammonia	8,978 lbs.
Polar Seafoods	Anhydrous Ammonia	6,000 lbs.
Icicle Seafoods	Diesel #1	29,900 gals.
Shoreside Petroleum	Diesel #1	3,000,000 gals
	Diesel #2	1,000,000 gals

Extent

Seward's EHS vulnerability can vary by the season or occur year round. Fish processors are year round activities and depend on seasonal catch availability. Bulk fuels are transported continuously due to active shipping.

Table 5-14 lists EPA's regulated facilities within the Seward Area. The three seafood processors are permitted hazardous waste handlers and authorized to discharge to water. Generally, the small, fixed facilities (drycleaners, auto body shops, etc.) have varying hazardous chemicals uses, but in general do not pose a significant risk to the Seward Area.

In addition to fixed facilities, hazardous material events could potentially occur along the Seward Highway, along the Alaska Railroad corridor, and from ocean vessels. Trucks, trains, and vessels commonly carry a variety of hazardous materials including gasoline, crude oil derivatives, and other chemicals such as anhydrous ammonia and chlorine. Anhydrous ammonia and chlorine are known to cause severe human health problems from large releases.

Base on Seward's having no listed historical EHS events and the criteria identified in Table 5-2, EHS event magnitude and severity in Seward are considered "Negligible." Illnesses would most likely be treatable with first-aid; critical facilities could potentially shut down for less than 24 hours, with less than 10 percent of property or critical infrastructure being severely damaged.

Impact

Specific substance toxicity is one important factor in determining risk. There are other factors that can be just as, if not more, significant. Factors affecting accidental release severity include:

- Toxicity
- Quantity
- Dispersal characteristics
- Location of release in relation to population and sensitive environmental areas
- Efficacy of response and recovery actions

Hazardous materials are generally classified by their primary health effects on humans. Some common types include:

- Anesthetics and narcotics: depress the central nervous system.
- Asphyxiants: substances that interfere with normal breathing and can cause suffocation.
- Explosives: substances that pose a risk of exploding; fires and chemical effects may also be a danger.
- Flammable materials: substances that catch fire easily, although they may pose other dangers such as explosion or chemical effects. Gasoline, propane, and diesel fuel are common examples in this category.
- Irritants: cause burns or irritation to body tissues such as eyes, nose, throat, lungs, or skin.

Hazardous substance exposure generally takes place by one, or a combination of, the following mechanisms:

- Direct skin or eyes contact
- Ingestion via contaminated food or water
- Inhalation of particles or gas in contaminated air

In addition to accidental and technological hazardous material or substance events; natural phenomena may cause hazardous materials release that may complicate response activities. Earthquakes pose a particular risk, because they can damage or destroy facilities containing hazardous substances. The threat of any hazardous substance event may be amplified by restricted access, reduced fire suppression, spill containment capability, and even completely cut-off response personnel and equipment essential to contain a release.

Hazardous substance events or releases can also cause a host of secondary effects, depending on the nature and size of the incident. Fuel spills can create fires, incidents on highways or railroads can halt or impede transportation, and EHS releases can trigger evacuation and short- or long-term displacement and social disruption.

Recurrence Probability

While it is beyond the scope of this HMP to evaluate hazardous material event recurrence probabilities or impact severity in the Seward Area in detail, it is possible that an event could potentially occur.

However, more comprehensive magnitude and recurrence probability from all source types (such as fixed facilities or transport vehicles) is not available. Wide variations among the hazardous material source characteristics and among the materials themselves make such an evaluation difficult.

Base on Seward's having no listed historical EHS releases, their relatively small number of EHS material storage locations; applying the criteria identified in Table 5-3, it is "Unlikely" but possible an EHS event would occur within in the next ten years. The event has a potential (1/10=10) percent chance of occurring and the history of events is less than or equal to 10 percent likely each year.

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6.0 VULNERABILITY ASSESSMENT

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

6.1 OVERVIEW

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

1. Asset Inventory
2. Exposure Analysis for Current Assets
3. National Flood Insurance Program Participation
4. Land Use and Development Trends
5. Vulnerability Analysis Methodology
6. Data Limitations
7. Vulnerability Exposure Analysis
8. Future Development

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

DMA 2000 Multi-Jurisdictional Requirements
ELEMENTS. Planning Area and Natural Hazard Profiles
B3. Is there a description of each identified hazard's impact on the community as well as an overall summary of the community's vulnerability for each jurisdiction? (Requirement §201.6(c)(2)(ii))
B4. Does the Plan address NFIP insured structures within the jurisdiction that have been repetitively damaged by floods? (Requirement §201.6(c)(2)(ii))
Source: FEMA, March 2015

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

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

Vulnerability assessment requirements include:

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

The KPB Risk Report, FEMA Region X – Kenai Peninsula Borough, Alaska, December 2017 provides *"Table 41. City of Seward Recommended Resilience Strategies"* that easily summarizes potential infrastructure hazard vulnerabilities. Many of these strategies are listed in the MAP, Table 7-10.

Recommended Resilience Strategies

Table 41: City of Seward Recommended Resilience Strategies

HAZARD	PROBLEM STATEMENT	RECOMMENDED STRATEGIES
Multi-Hazard	*Compared to Alaska and the Nation, the Kenai Peninsula Borough has a higher percentage of residents living with a disability. In Seward, 16.3% of residents live with a disability.* *There is a need for internal capacity building in terms of community connectivity and ability to address the needs of vulnerable populations.*	• *Know where vulnerable populations are located and assist with personal preparedness, appropriate evacuations and after-event repairs.* • *Work with FEMA and partners to develop engagement resources.* • *Stage emergency evacuation events.* • *Develop a Community Engagement Plan for the CRS.*
Flood	*There are 21 buildings in Zones A, AE, AH, and AO, and 4 buildings in Zone VE. The building dollar loss ratio for a 1-percent-annual-chance flood event totals roughly $1.9M, or a 9.66% loss ratio.*	• *Consider limiting additional development in flood hazard zones.* • *Develop a priority list for essential facility flood capability enhancements.* • *Develop a buyout program for repetitive loss properties.* • *Provide outreach to homeowners and business owners regarding flood risk.* • *Peruse floodplain management and training for local staff.* • *Develop CRS outreach and engagement materials and support to help raise awareness about the value of participating in the CRS in terms of saving money and reducing flood risk.*
Flood: Gravel and Sediment	*Several million cubic yards of silt comes from glacial melting each year, resulting in increased flooding in multiple areas. This issue will only get worse as more silt builds up.* *Identified floodplains are based on historic flood levels and may not adequately account for changes associated with rising stream floors.* *There is limited developable land in Seward and much of what appears to be appropriate for development is at risk to flooding due to sediment issues and related channel migration.*	• *Develop a Sediment Management Plan.* • *Identify sources for change direction maps, sediment detection, and the identification of locations where sediment can be deposited.* • *Reframe sediment removal as more than a maintenance issue. Emphasize that action is necessary because the build-up of sediment exacerbates the intensity of flood events.* • *Consider beach nourishment projects using removed gravel.*
Earthquake	*The City of Seward would experience loss ratios of 0.01% ($58K) and 3.04% ($17M) following the M7.1 event or M9.2 scenario, respectively.* *Additionally, 46.06% of the buildings in Seward were built with moderate building codes.*	• *•Adopt and enforce updated building code provisions that reduce earthquake risk.* • *•Develop a priority list for essential facility earthquake retrofits.* • *•Develop an outreach program about earthquake risk and mitigation activities for homes, schools, and businesses.*
Tsunami	*In the City of Seward, 13.14% of improved parcels are within the tsunami zone, with an estimated value of almost $62M.*	• *Adopt and enforce building codes and design standards for tsunami-resistant design.* • *Limit new development in tsunami run-up areas.* • *Elevate or relocate critical infrastructure.* • *Provide education and outreach materials to educate residents about risks and evacuation routes.*
Dam Failure	*The USACE is conducting a Hybrid Risk Assessment of the Lowell Creek Dam. The risk assessment will include:* • *Potential failure mode analysis* • *existing condition of project with credible failure modes* • *risk reduction alternatives* *The tentative schedule of this study is between June 2017 and August 2019.*	• *Map dam failure inundation areas.* • *Provide outreach to homeowners and business owners regarding risk.* • *Adopt higher regulatory floodplain standards in mapped dam failure inundation areas.* • *Establish early warning capability downstream of listed high-hazard dams.*
Levees	*Numerous levees (many of which are essentially just gravel banks), constructed at different times in and around the city to protect different areas, are well beyond their original intended useful life and could be at risk to breaching.* *Multiple levees have eroded during flood events in recent years. Some have been restored, but future breaches of these levees could lead to major damage to schools, residences, and businesses.*	• *Conduct regular maintenance for drainage systems and flood control structures.* • *Map levee failure inundation areas.* • *•Provide outreach to residents and businesses in levee failure inundation areas.* • *Work with landowners, businesses, and levee partners to gather information about levee stability and maintenance.*

Source: FEMA KPB Risk Report, 2017; https://www.commerce.alaska.gov/web/Portals/4/pub/Risk_Report_Kenai_Final.pdf

6.2 CULTURAL AND SACRED SITE SENSITIVITY

6.2.1 Location

The Qutekcak Native Tribe did not identify sacred or culturally sensitive locations within the Seward area.

Note: *Anyone desiring information concerning their respective culturally sensitive information must contact their tribal administrator for assistance.*

6.3 LAND USE AND DEVELOPMENT TRENDS

6.3.1 Land Use

Land use in Seward is predominately residential with collocated commercial services and community (or institutional) facilities. Suitable developable vacant land is in short supply within the city boundaries. The northern end of Seward contains airport and the boat harbor, and industrial structures. (See Section 6.9 for Seward's future development goals.)

The community's risk has not changed since the 2010 HMP was developed and implemented during its 5-year life cycle as all mentioned structures were in place prior to the 2020 MJHMP being developed.

The City of Seward's 2030 Comprehensive Plan (Volumes I & II) adopted May 2017 describers their land use initiatives and goals:

> *The 2030 Seward Comprehensive Plan Update (2030 Plan) is organized into two volumes. Volume I identifies the goals, objectives, and implementation action items, updated and developed for each comprehensive plan element. Volume II presents background information and planning issues identified for each of these elements.*
>
> *The nine comprehensive plan elements include: economic development, land use, housing, transportation, port and harbor development, recreation, public facilities and services, natural hazards, and quality of life. The planning issues are community issues that have developed over time and are necessary to consider in implementing new projects that follow from the plan.*
>
> *The intent of Volume I is to provide a readily useable guide to aid the City of Seward and its citizens in the preparation, adoption, amendment, revision, and implementation of specific plans, programs and regulations that derive from the vision embodied by the goals and objectives. In this introduction, the accomplishments of the 2020 Plan are listed as a baseline from which to proceed. The overall community vision and values follow immediately from the introduction. In the final section, the heart of the 2030 Plan, the goals, objectives and implementation action items are listed for the each of the plan elements.*
>
> *Volume II briefly describes the history, setting, and demographics of Seward, and then presents the background and analysis of each plan element identified in Volume I. The intent of this volume is to supply important supplemental information to assist the City of Seward in attaining the goals and objectives set forth in Volume I.*
>
> *Source: City of Seward, https://www.cityofseward.us/index.aspx?NID=909.*

6.4 CURRENT ASSET EXPOSURE ANALYSIS

6.4.1 Asset Inventory

Asset inventory is the first step of a vulnerability analysis. Assets that may be affected by hazard events include population (for community-wide hazards), residential buildings (where data is available), and critical facilities and infrastructure.

6.4.1.1 Population and Building Stock

Population data for Seward were obtained from the 2017 U.S. Census and the 2017 DCCED certified population data. The U.S. Census reports Seward's total population as 2,831 and DCCED reported a population of 2,518 (Table 6-1).

Table 6-1 Estimated Population and Building Inventory

Population		Residential Buildings	
2017 Census	DCCED 2017 Data	Total Building Count	Total Value of Buildings[1]
2,831	2,518	1,086	US Census $248,585,400 City of Seward: 271,500,000

1 Sources: U.S. Census 2017, and 2017 DCCED population data. US Census listed housing value at $228,900
The project team determined that the average structural replacement value of all single-family residential buildings is $250,000

Estimated replacement values for those structures, as shown in Table 6-2, were obtained from the 2017 U.S. Census, and 2017 DCCED certified estimate.

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 2,000 square feet residential structure costs $250,000. A total of 1,086 single-family residential buildings were considered in this analysis.

6.4.1.2 Existing Infrastructure

The State DCRA provides Seward's capital improvement projects since the legacy 2010 HMP was implemented (Table 6-2). These projects highlight their ongoing efforts toward maintaining and improving their aging infrastructure.

Note: *recent infrastructure improvement projects are still ongoing.*

Table 6-2 Seward's Completed Capital Improvement Project List

Recipient	Award Year	Project Description/Comments	Award Amount	Award Date	End Date
City of Seward	2019	Community Assistance Program	$123,423	7/1/2018	Undefined
City of Seward	2019	Shared Fisheries Business Tax Program	$1,664	3/15/2019	Undefined
City of Seward	2018	Community Assistance Program	$140,976	7/1/2017	Undefined
City of Seward	2018	Shared Fisheries Business Tax Program	$2,477	3/15/2018	Undefined
City of Seward	2018	Hazardous material removal and site remediation at the Jesse Lee Home for	$1,073,441	6/30/2018	6/30/2021

Table 6-2 Seward's Completed Capital Improvement Project List

Recipient	Award Year	Project Description/Comments	Award Amount	Award Date	End Date
		the fiscal years ending June 30, 2019, June 30, 2020, and June 30, 2021			
City of Seward	2017	Flood Protection Scoping and Feasibility Study	$300,000	7/1/2016	11/7/2016
Alaska Railroad Corporation	2017	Seward Cruise Ship Terminal Planning & Design	$300,000	7/1/2017	6/30/2022
Alaska Railroad Corporation	2017	Seward Dock Safety Enhancements	$1,200,000	7/1/2017	6/30/2022
Seward Association for the Advancement of Marine Science, dba The Alaska Sealife Center	2014	Veterinary and Emergency Oil Spill Response Equipment	$450,000	7/1/2014	3/31/2018
City of Seward	2014	Dredge/Dispose of Sludge Accumulating at Lowell Point Sewage Lagoon	$1,300,000	7/1/2014	9/30/2015
City of Seward	2014	Marine Expansion Including Breakwater	$5,900,000	7/1/2014	6/30/2019
City of Seward	2013	Marine Industrial Center Expansion	$10,000,000	7/1/2012	9/30/2016
Seward Association for the Advancement of Marine Science, dba The Alaska Sealife Center	2013	Major Maintenance and Repairs	$500,000	6/30/2012	2/26/2014
City of Seward	2013	Lowell Canyon Water Tank Refurbishment	$575,000	7/1/2013	10/25/2018
City of Seward	2013	Seward Marine Industrial Center/ Development Homeport Coastal Villages Region Fund's Fleet to Alaska Project	$10,000,000	7/1/2013	3/31/2018
Seward Association for the Advancement of Marine Science, dba The Alaska Sealife Center	2013	Critical Building and Equipment Repairs, Upgrades and Replacements	$450,000	7/1/2013	3/31/2015
Alutiiq Pride Shellfish Hatchery	2013	Shellfish Hatchery Facilities Upgrades	$460,000	7/1/2012	12/31/2013
City of Seward	2012	CDQ Fishing Fleet Relocation Study	$400,000	7/1/2011	12/31/2013
Seward Senior Citizens Inc.	2012	Kitchen Expansion Project	$100,000	7/1/2011	10/6/2011
City of Seward	2012	Alutiq Pride Shellfish Hatchery Upgrade	$250,000	7/1/2011	7/31/2012
City of Seward	2012	Cruise Ship Boardwalk Extension	$25,000	7/1/2011	8/18/2016
City of Seward	2012	Harbor Restrooms Improvements	$130,000	7/1/2011	3/31/2014
City of Seward	2011	Mooring Dolphins and Dock Improvements at Seward Marine Center	$1,500,000	4/19/2010	6/30/2012
City of Seward	2011	Seward - Community Library	$4,700,000	6/30/2010	2/28/2014
Seward Assoc. for the Advancement of Marine Science	2011	Alaska Sealife Center - Seawater Intake Pipelines Biofouling Remediation	$1,000,000	7/1/2010	11/30/2011
Alutiiq Pride Shellfish Hatchery	2011	Alutiiq Pride Shellfish Hatchery Repairs and Upgrade	$150,000	7/1/2010	5/30/2011

Table 6-2 Seward's Completed Capital Improvement Project List

Recipient	Award Year	Project Description/Comments	Award Amount	Award Date	End Date
City of Seward	2011	Commercial Passenger Vessel Harbor Security - Coast Guard Building Relocation	$300,000	7/1/2010	6/30/2015
City of Seward	2011	Security and Fire Protection for Commercial Passenger Vessels	$2,000,000	7/1/2010	10/31/2013
City of Seward	2011	for construction of a new water storage tank and improving restrooms in the Seward harbor area	$1,992,000	6/30/2011	3/31/2016
City of Seward	2010	Bus Transportation Assistance for Cruise Ship Passengers	$167,000	4/19/2009	10/31/2011
City of Seward	2010	Dredging Cruise Ship Berthing Basins and Approaches	$4,500,000	4/19/2010	9/25/2014
City of Seward	2010	Purchase of Electricity and Bulk Fuel	$78,706	6/1/2009	2/28/2010
Seward Association for the Advancement of Marine Science, dba The Alaska Sealife Center	2010	Walrus Diets in Bristol Bay: Conservation Concerns and Environmental Monitoring	$454,253	3/1/2012	9/30/2016
City of Seward	2010	Seward NE Harbor Fish Cleaning Station	$579,000	7/1/2012	4/30/2016

Source: DCRA 2018

6.4.1.3 Seward Area Critical Facilities

A critical facility is defined as one that provides essential products and services to the general public, such as preserving the quality of life and fulfilling important public safety, emergency response, and disaster recovery functions. Due to many of Alaska's remote rural location – a long distance from their nearest neighboring community, most all facilities are deemed "critical" to their survival. The critical facilities profiled in this plan include the following:

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

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

Table 6-3 Community Name Critical Facilities and Infrastructure

Facilities	Facilities	Latitude	Longitude	Earthquake	Flood	Ground Failure	Tsunami	Volcanic Ash	Weather	Wildland Fire
Government	Seward City Hall	60.103171	-149.439186	x				x	x	x
	Seward Harbormaster	60.116738	-149.439763	x				x	x	x
	Qutekcak Tribal Office	60.06.113	149.26.573	x				x	x	x
	KPB Seward Annex	60.100361	-149.441679	x				x	x	x
	Seward Parks and Recreation Department	60.128974	-149.43395	x				x	x	x
	Kenai Fjords National Park Service Office	60.06.981	149.26.409	x				x	x	x
	Seward Public Works Department	60.106284	-149.436509	x				x	x	x
	Seward Post Office	60.106133	-149.43788	x				x	x	x
Emergency Response	Seward Police Station/Department of Motor Vehicles (DMV)	60.102996	-149.439219	x				x	x	x
	Bear Creek Volunteer Fire & Ems	60.168515	-149.402418	x				x	x	x
	Seward Volunteer Fire Department	60.103673	-149.439995	x				x	x	x
	Seward Volunteer Ambulance Corps	60.06.750	149.26.610	x				x	x	x
	Alaska State Troopers	60.06.063	149.26.593	x				x	x	x
Educational	Seward High School	60.130007	-149.443275	x				x	x	x
	Seward Middle School - New	60.131879	-149.44152	x				x	x	x
	Seward Elementary	60.132676	-149.436109	x				x	x	x
	University of Alaska Institute of Marine Science	60.099159	-149.442602	x				x	x	x
	Alaska Sealife Center	60.099857	-149.440822	x				x	x	x
	AVTEC Culinary Arts	60.06486	149.26482	x				x	x	x
Medical	Providence Seward Medical Center North Star Health Clinic	60.105032	-149.446345	x				x	x	x
	North Star Health Clinic	60.101251	-149.442503	x				x	x	x
	Glacier Family Medical Clinic	60.15065	-149.418838	x				x	x	x
Community	Bear Creek Volunteer Fire & Ems - Emergency Shelter	60.168267	-149.402508	x				x	x	x
	Seward Military Resort - Emergency Shelter	60.13303	-149.433258	x				x	x	x
	Seward Elementary - Emergency Shelter	60.132587	-149.43611	x				x	x	x
	Seward Middle School - Emergency Shelter	60.13173	-149.442087	x				x	x	x
	Seward Chapel - Emergency Shelter	60.130704	-149.37824	x				x	x	x
	Church of The Nazarene - Emergency Shelter	60.1111	-149.440966	x				x	x	x
	Alaska Vocational Technical Center (AVTEC) First Lake Facility - Emergency Shelter	60.110651	-149.444416	x				x	x	x
	AVTEC Food Service Building - Emergency Shelter	60.107566	-149.441535	x				x	x	x
	Sacred Heart Catholic Church - Emergency Shelter	60.105152	-149.439375	x				x	x	x
	Seward Senior Center - Emergency Shelter	60.104388	-149.441682	x				x	x	x
	Memorial United Methodist Church	60.104034	-149.440917	x				x	x	x

Table 6-3 Community Name Critical Facilities and Infrastructure

Facilities	Facilities	Latitude	Longitude	Earthquake	Flood	Ground Failure	Tsunami	Volcanic Ash	Weather	Wildland Fire
	- Emergency Shelter									
	St Peters Episcopal Church - Emergency Shelter	60.102704	-149.444147	x				x	x	x
	Seward Chamber of Commerce & Visitor Center	60.128353	-149.433886	x				x	x	x
	Seward Senior Center	60.104485	-149.441718	x				x	x	x
	Seward Public Library	60.102679	-149.438496	x				x	x	x
	Resurrection Camping Area	60.105684	-149.435105	x				x	x	x
	Seward Waterfront Park	60.103141	-149.434574	x				x	x	x
	National Park Service Exit Glacier Visitor Center	60.188241	-149.629134	x				x	x	x
	Spring Creek Correctional Facility	60.093858	-149.337414	x				x	x	x
Roads	Seward Roads	Total Miles:		x				x	x	x
Bridges	Spruce Creek Bridge	60.073547	-149.445816	x				x	x	x
	Lowell Point Road Bridge	60.05866	149.26733	x				x	x	x
Transpiration	Seward Airport	60.132813	-149.422543	x				x	x	x
	Providence Med Center Heliport	60.06.330	149.26.778	x				x	x	x
	Seward Small Boat Harbor	60.118224	-149.437019	x				x	x	x
	City of Seward Boat Launch	60.115918	-149.439107	x				x	x	x
	Seward East Side Boat Launch	60.120181	-149.433081	x				x	x	x
	Cruise Ship & State Ferry Dock	60.119708	-149.428158	x				x	x	x
	Alaska Railroad Depot	60.122155	-149.434579	x				x	x	x
Utilities	Seward Transfer Facility	60.148459	-149.448076	x				x	x	x
	Seward Electric System Generators	60.07849	149.26071	x				x	x	x
	Electric Generation Facility	60.07.846	149.26.064	x				x	x	x
	City of Seward Fuel Storage Tanks (40,000 Gal)	60.07.866	149.26.139	x				x	x	x
	Shoreside Petroleum Fuel Storage Tanks (4,000,000 Gal)	60.07.472	149.26.028	x				x	x	x
	Shoreside Petroleum Fuel Storage Tanks (120,000 Gal)	60.07.365	149.26.003	x				x	x	x
	Water Treatment Facility (Permit # 240757)	60.06.219	149.26.038	x				x	x	x
	Water Supply/Storage Forest Acres	60.06.219	149.26.038	x				x	x	x
	Reservoir/Water Supply Lowell Canyon Tanks	60.06281	149.27069	x				x	x	x
	Water Wells	60.07.855	149.26.206	x				x	x	x
	Lowell Point Wastewater Treatment Plant	60.072321	-149.444382	x				x	x	x
	Sewage Lagoon	60.04341	149.2665	x				x	x	x

Source: Seward 2019, DHS&EM 2009

6.5 NATIONAL FLOOD INSURANCE PROGRAM PARTICIPATION

The City of Seward has been an active NFIP participant since November 11, 1986. Table 6-4 provides their NFIP participation details. Italicized information was gleaned from the 2018 KPB Draft Review HMP.

Table 6-4 NFIP Participation Data

(City of Seward Community Identification Number (CID): 020113

Category	Date	Category	Date
Date joined NFIP:	11/20/1986	Number of policies in force as of *1/31/2018*	*298*
CRS class / discount:	7 / 15%	Insurance in force as of *1/31/2018*	*$77,521,800*
CAV date:	01/16/2014	Number of claims *1/1978 to 1/31/2018*	*75*
CAC date:	06/18/2010	Total claims paid *1/1978 to 1/31/2018*	*51*
Date of current FIRM:	12/06/1999	Total claim payments *1/1978 to 1/31/2018*	*$569,583.04*

CAC = Community Assistance Contact
CAV = Community Assistance Visit
CRS = Community Rating System
FIRM = Flood Insurance Rate Map
NFIP = National Flood Insurance Program

The following NFIP participation details were gleaned from the 2018 KPB Draft Review HMP. However, there was no accurate RL property information contained within their 2018 MJHMP.

Note: *Only the City of Seward is listed within this 2020 MJHMP update.*

2.2 FLOODPLAIN MANAGEMENT…

2.2.2 Flood Insurance

The NFIP is a source of reasonably-priced flood insurance for property owners that build to floodplain standards.

Table 2.1 [City of Seward] Flood Insurance Information – (NFIP)

Community Name	No. of policies as of 1/31/18	Total current coverage as of 1/31/18	Total current premiums as of 1/31/2018	Total claims (1/1978 – 1/31/2018)	Paid claims (1/1978 – 1/31/2018)	Total claim payments (1/1978 – 1/31/2018)
City of Seward	*18*	$6,732,000	$13,033	-	-	-

2.2.3 Repetitive Flood Losses

Although FEMA tracks repetitive insurance losses, it does not track uninsured losses, which have been significant in past flood events. The current data available on the FEMA website is valid through October 2017 and does not show any current Severe Repetitive Loss (SRL) claims for the State of Alaska.

Table 2.2 [City of Seward] Community Characteristics in the Borough

Community Name	*Total Population*	*CRS Community*	*Flood Claims*	*Loss Properties*	*Total Policies*	*Total Insurance Coverage*
City of Seward	*2,663*	*7*	*0*	*0*	*15*	*$4,319,600*

2.2.4 Community Rating System Program

The KPB participates in the NFIP Community Rating System, which is an incentive program that reduces premiums when communities exceed the minimum requirements of the NFIP. The KPB's Class 8 rating provides a 10% insurance premium reduction, which represents an average annual savings of approximately $83 per policy, based upon 2017 FEMA policy statistics. To improve the Borough's CRS rating, the subdivision code would need to be more restrictive, to include building code requirements and zoning in the unincorporated areas of the Borough. The code has been changed over the years to be slightly more restrictive, however any changes that would be as restrictive as needed for the improved rating are not feasible now or in the foreseeable future. Most residents of the Borough do not currently favor restrictive development regulations outside city limits. The cities of Kenai and Soldotna do not participate in the NFIP CRS program.

2.3 FLOOD HAZARD ASSESSMENT OVERVIEW

Given the Borough's large size and diversity of topography, geology, hydrology and weather, the flood hazard risk assessment is organized into a general Borough-wide overview with more specific floodplain information provided in each of the following KPB Emergency Management Zone sections.

Table 2.3 [City of Seward] Special Flood Hazard Areas (SFHAs) in the Borough

Community Name	Structures in the HAZUS Flood Analysis	Zone: A, AE, AH, AO	Zone VE	Building Dollar Loss for a 1% Annual Chance Flood Event	Loss Ratio (Dollar Losses/Total Building Value)
City of Seward	*25*	*21*	*4*	*$1,952,753*	*9.66%*

2.6 COMMUNITIES AND FLOOD RISK – EAST ZONE

2.6.1 East Zone Communities

The East Zone covers approximately 4,960 square miles and includes the localities and communities of Hope, Sunrise, Moose Pass, Crown Point, Lawing, Primrose, Bear Creek, Lowell Point and the [C]ity of Seward.

The 2016 population is estimated to be 5,372 people with an increase of up to 18,000 people during the summer tourist season, according to the State of Alaska Departments of Labor & Workforce Development and Commerce, Community & Economic Development. Much of the area outside the population centers is largely uninhabited.

The City of Seward participates in the National Flood Insurance Program and issues permits for floodplain construction using Flood Insurance Rate Maps provided by FEMA. Additional information is provided in the City of Seward Hazard Mitigation Plan, part of the multi-jurisdictional Borough Plan, and adopted as an Annex to the KPB Plan. The at-risk population estimate was calculated based on the percentage change in population in the zone between 2013 and 2016. The population changes are somewhat indicative of development trends in the Borough.

Table 2.19 [Seward Area Portion] East Zone Communities with Know3n Flood Hazard Risk

CDP	2013 Population Estimate	2016 Population Estimate	Water Body	FEMA SFHA Maps	Type of Flooding
Seward and outlying Lowell Point, Bear Creek areas	*4,573*	*4,805*	*Resurrection Bay, Resurrection River, Lowell Cr., Spruce Cr., Japanese Cr., Kwechak/Salmon Cr., Clear Cr., Lost Cr., Sawmill Cr., Grouse Cr., Godwin Cr., Fourth of July Cr.*	*Numbered and unnumbered A and V Zones - Although FIRM flood maps do not accurately predict flood hazards due to rapid, continual changes in the alluvial stream systems.*	*Riverine, alluvial fan, surge-release/debris slide, ice jam, coastal storm, tsunami.*

Table 2.20 East Zone Flood Problem Areas 7 Possible Mitigation Measures… is located in Section 6 Vulnerability Assessment to better describe problem areas.

Table 2.21 East Zone Critical and Service Facilities

Facility Name	*Facility Type*	*Susceptibility*
Bear Creek Fire Dept.	*Emergency service*	*Earthquake (E), Flood (F), Weather (W), Volcano(V), Tsunami (T)*
City of Seward Docks & Harbor	*Harbor*	*E, F, W, V, T*
Seward/Bear Creek Flood Service Area	*Emergency service*	*E, F, W, V, T*
Chugachimiut North Star Health Clinic	*Emergency medical*	*E, F, W, V, T*
Providence Seward Medical & Care Clinic	*Hospital*	*E, F, W, V, T*
AK Railroad Terminal	*Transport*	*E, F, W, V, T*
Seward City Hall/Police Station	*Government offices, law enforcement*	*E, F, W, V, T*
AK DPS – Fish & Wildlife Protection	*Law enforcement*	*E, F, W, V, T*
AK State Trooper Post	*Law enforcement*	*E, F, W, V, T*
Kenai Fjords National Park Hdqt.	*Law enforcement*	*E, F, W, V, T*
Spring Creek Correctional Facility	*Law enforcement*	*E, F, W, V*
US Forest Service – Seward Ranger District	*Law enforcement*	*E, F, W, V, T*
Clearview Haven Assisted Living Facility	*Vulnerable pop. housing*	*E, F, W, V, T*
Providence Seward Med & Care Center	*Vulnerable pop. housing*	*E, F, W, V, T*

Table 2.23 East Zone East Zone SFHA Summary

Mapped Floodplains	Seward Area
Total Parcels	941
Total Value	$226,262,200

Table 2.23 East Zone East Zone SFHA Summary

Mapped Floodplains	Seward Area
Total Acres	40,351
Number of Parcels with Improvements	*562*
Total Value of Improved Parcels	$159,224,300
Total Value of Improvements	$106,060,700
Total Acres with Improvements	2,556

Note: all parcels are in or intersecting the SFHA

Seward FIRM Area

The Seward Area SFHA includes portions of Resurrection Bay, the Resurrection River, Lowell Creek, Marathon Creek, Japanese Creek, Kwechak/Glacier Creek, and Salmon Creek.

Table 2.27 Seward SFHA Parcel Summary by Ownership Category

Owner	Total # Parcels	Total Value	Total Acres	Total # Imp Parcels	Total Value Imp Parcels	Total Value Imp	Total Acres Imp Parcels
Borough	*27*	*$10,322,700*	*1,546*	*4*	*$8,848,100*	*$4,179,600*	*163*
City of Seward	*77*	*$42,557,300*	*954*	*13*	*$15,182,700*	*$2,128,500*	*446*
State	*39*	*$59,254,200*	*35,205*	*5*	*$30,277,900*	*$22,200,200*	*413*
Federal	*2*	*$276,600*	*70*	*0*	*0*	*0*	*0*
Native	*2*	*$31,800*	*19*	*0*	*0*	*0*	*0*
Nat. Allotment	*2*	*$405,800*	*25*	*1*	*$322,900*	*$273,400*	*5*
Private	*792*	*$113,413,800*	*2,532*	*539*	*$104,592,700*	*$77,279,000*	*1,529*
TOTALS	***941***	***$226,262,200***	***40,351***	***562***	***$159,224,300***	***$106,060,700***	***2,556***

Note: all parcels in or intersecting SFHA

Source: 2017 KPB Risk Report: https://www.commerce.alaska.gov/web/Portals/4/pub/Risk_Report_Kenai_Final.pdf

6.5.1 Repetitive Loss Properties

This section estimates the number and type of structures at risk to repetitive flooding in the Seward area that have experienced repetitive loss (RL), the extent of flood depth, and damage potential. However, not all FEMA required FMA program required information is accessible or readily available.

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

DMA 2000 Requirements
ELEMENT B. NFIP Insured Structures
B4. Does the Plan address NFIP insured structures within the jurisdiction that have been repetitively damaged by floods? (Requirement §201.6(c)(2)(ii))
C2. Does the Plan address each jurisdiction's participation in the NFIP and continued compliance with NFIP requirements, as appropriate? (Requirement §201.6(c)(3)(ii))
Source: FEMA, March 2015.

The City of Seward is an active NFIP participant. The State (DCRA) Floodplain Coordinator contacted the FEMA Region X floodplain manager to obtain Seward's listed RL properties' inventory. (Table 6-5)

Table 6-5 Seward Community Repetitive Loss Property Data

Seward, City Of (Community Identification Number [CID]: 020113)

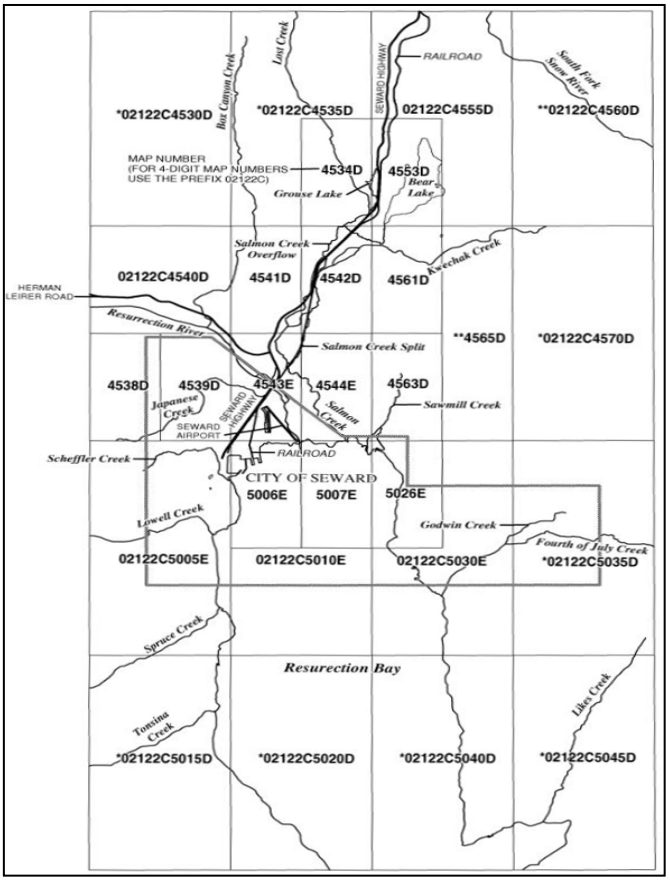
Classification	A, AE, A1-30, AO, AH	V, VE, V1-30	B, C, D, X	TOTAL
RL Buildings (Insured)	1	--	2	3
RL Losses (Insured)	1	--	2	3
RL Losses (Total)	1	--	2	3
Building	$19,203.49	--	$14,199.00	$33,402.49
Contents	--	--	43.75	--
RL Payments (Total)	**$19,203.46**		**$14,242.37**	**$33,4455.86**
Post - FIRM SFHA RL Buildings:	Unknown	Unknown	Unknown	Unknown
Insured Buildings with 4 or More Losses:	Unknown	Unknown	Unknown	Unknown
Insured Buildings with 2-3 Losses > Building Value:	Unknown	Unknown	Unknown	Unknown
Total Target RL Buildings:	Unknown	Unknown	Unknown	Unknown

Source: Alaska State (DCRA) Floodplain Coordinator and FEMA Region X Floodplain Manager

The following Seward map panels define the area's diverse watershed relationships and their complex flood threat sources.

The City of Seward's FEMA issued Flood Insurance Rate Map (FIRM) 02012C, Panels:

- 02122C4534D: Lost Creek and Grouse Lake
- 02122C4535D: Box Canyon Creek and Lost Creek
- 02122C4538D: Jap Creek Origin
- 02122C4539D: Jap Creek
- 02122C4540D: Box Canyon Creek and Resurrection River
- 02122C4541D: Box Canyon Creek and Salmon Creek
- 02122C4542D: Salmon Creek
- 02122C4543E: Jap Creek, Resurrection River, and Salmon Creek
- 02122C4544E: Salmon Creek
- 02122C4553D: Bear Lake and Bear Creek
- 02122C4555D: Bear Creek
- 02122C4560D: South Fork Snow River
- 02122C4561D: Bear Creek and Kwechak Creek
- 02122C4563D: Sawmill Creek Origin
- 02122C4565D: Kwechak Creek



- 02122C4570D: Kwechak Creek Origin
- 02122C5005E: Lowell Creek and Spruce Creek
- 02122C5006E: Scheffler Creek
- 02122C5007E: Undefined
- 02122C5010E: Undefined
- 02122C5015D: Tonsina Creek
- 02122C5026E: Undefined
- 02122C5030E: Godwin Creek
- 02122C5045E: Likes Creek

Seward's Natural Hazards & Disasters website provides residents floodplain construction siting and compliance instructions:

> ***Important Information Concerning Flooding Potential in Seward:***
>
> ***Special Flood Hazard Areas (SFHAs):*** *Certain areas have been designated by the Federal Emergency Management Agency (FEMA) as Special Flood Hazard Areas. SFHAs are areas within the 100-year flood boundary as mapped by FEMA. A &quot100-year flood" refers to a flood level with a 1 percent or greater chance of being equaled or exceeded in any given year. There is a 26% chance that a structure located in an SFHA will be inundated by a 100-year flood during the life of a 30-year mortgage. In comparison, the risk of fire is approximately 5% in the same time period. Smaller floods have a greater chance of occurring in any given year and can still create a significant hazard to life and property…*
>
> ***Floodplain Development and Permit Requirements****: Any development within the City of Seward is subject to federal and City's floodplain management requirements. Always check with the Building Department before you build on, alter, re-grade, or fill on your property. To report illegal floodplain development activity, call the* ***City Community Development Department at (907) 224-4048****…*
>
> ***Flood Insurance:*** *The National Flood Insurance Program (NFIP) makes flood insurance available to everyone in the City. Renters can also purchase flood insurance to cover their possessions. For information about flood insurance, call your insurance agent or the NFIP customer service line at 1-800-638-6620…*
>
> ***Community Rating System (CRS):*** *The NFIP created the Community Rating System (CRS) to promote flood awareness and reduce flood losses. The City of Seward is a participant of the program. As the result, the residents of the City of Seward who purchase flood insurance enjoy an automatic reduction of their insurance premiums.*
>
> *(Source: http://www.cityofseward.us/index.aspx?NID=880)*

6.6 VULNERABILITY ASSESSMENT METHODOLOGY

The methodology used the most recent Geospatial Information System (GIS) data available at the City of Seward. These data do not contain essential facility specific information to estimate how many occupants could be in any given facility, what facilities are located within Seward's boundaries

This data includes update critical facility locations in relation to potential hazard's threat exposure and vulnerability. The planning team used this data to develop a viable vulnerability assessment for those hazards where GIS-based hazard mapping information was available.

6.7 DATA LIMITATIONS

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

It is also important to note that the quantitative vulnerability assessment results are limited to the exposure of people, buildings, critical facilities, and infrastructure to the identified hazards.

It was beyond the scope of this MJHMP to develop a more detailed or comprehensive risk assessment (including annualized losses, people injured or killed, shelter requirements, facility/system function losses and economic losses).

6.8 VULNERABILITY EXPOSURE ANALYSIS

Tables 6-6, 6-7, and 6-8 provide 2019 GIS vulnerability analysis data obtained from the City of Seward and the 2013 SBCFSA HMP. The discussion following these tables contains natural hazard data narrative descriptions from these analyses as well as information obtained from the planning team.

Table 6-6 Potential Hazard Exposure Analysis Overview – Residential

Hazard Type		Hazard Area	Methodology	Buildings			
				Residential		Non-Residential	
				Number	Value ($)[2]	Number	Value ($)[2]
Earthquake[3]		Strong	9-20% (g)	0	--	0	--
		Very strong	20-40% (g)	0	--	0	--
		Severe	>40-60% (g)	783	222,174,087	269	302,085,377
Flood	Riverine Flood[4]	Moderate	500-year floodplain	0	--	1	219,2190
		High	100-year floodplain	2	601,221	2	2,487,872
	Coastal Flood	High	Coastal VE Flood Zone	0	--	1	220,508
Ground Failure		High	Within 100 ft of slopes >20 degrees	47	14,873,719	3	10,061,513
Tsunami Seiche		Within Max inundation Area	descriptive	71	33,826,700	117	105,605,512
Volcanic Ash		Low to Moderate Ash	descriptive	783	222,174,087	269	302,085,377
Weather		Severe	descriptive	783	222,174,087	269	302,085,377
Wildland Fire		Low	Low fuel rank	603	167,946,749	223	251,935,410
		Moderate	Moderate fuel rank	179	53,983,582	36	50,149,966
		High	High fuel rank	1	243,754	0	--

1. Affected population was estimated by multiplying the percentage of buildings impacted in each category by the total population.
2. Replacement values taken from User-Defined Facilities data based on KPB parcel datasets and RS Means information.
3. Exposure due to Earthquake is the same for all hazard levels.
4. Exposure due to Lowell Creek is not included in the Riverine Flood overview, as hazard events on Lowell Creek are more extreme than those included here.
5. NA = Not Available. Affected population cannot be estimated for these facilities.
6. <Null>: Not located in the hazard area

Table 6-7 Potential Natural Hazard Exposure Analysis – Seward Critical Facilities

Hazard Type		Severity	Description	Government/		Emergency Response		Educational		Medical		Community	
				# Bldgs	Value ($)	# Bldgs	Value ($)	# Bldgs	Value ($)	# Bldgs	Value ($)	# Bldgs	Value ($)
Earthquake		Strong	9-20% (g)	0	<Null>	0	<Null>	0	<Null>	0	<Null>	0	<Null>
		Very Strong	20-40% (g)	0	<Null>	0	<Null>	0	<Null>	0	<Null>	0	<Null>
		Severe	>40-60% (g)	8	5,416,700	5	2,558,700	6	96,108,900	3	6,745,400	19	99,602,600
Flood	Riverine	Moderate	500-Year Floodplain	0	<Null>	1	322,700	0	<Null>	0	<Null>	1	322,700
		High	100-Year Floodplain	0	<Null>	0	<Null>	0	<Null>	1	642,200	0	<Null>
	Coastal	High	Coastal VE Flood Zone	0	<Null>	0	<Null>	0	<Null>	0	<Null>	0	<Null>
Ground Failure		Low	<14 Degrees	0	<Null>	0	<Null>	0	<Null>	0	<Null>	0	<Null>
		High	Within 100 ft of slopes >20 degrees	0	<Null>	0	<Null>	0	<Null>	1	3,933,800	1	271,000
Tsunami / Seiche		Within Max Inundation Area	Descriptive	3	1,865,500	1	280,000	2	5,339,400	0	<Null>	3	883,700
Volcanic Ash		Low to Moderate	Descriptive	8	5,416,700	5	2,558,700	6	96,108,900	3	6,745,400	19	99,602,600
Weather		Severe	Descriptive	8	5,416,700	5	2,558,700	6	96,108,900	3	6,745,400	6	99,602,600
Wildland Fire		Low	Low Fuel Rank	0	<Null>	0	<Null>	0	<Null>	0	<Null>	0	<Null>
		Moderate	Moderate Fuel Rank	2	331,900	0	<Null>	5	62,180,000	2	2,811,600	9	66,465,400
		High	High Fuel Rank	0	<Null>	1	322,700	0	<Null>	0	<Null>	1	322,700

1. Affected population was estimated by multiplying the percentage of buildings impacted in each category by the total population.
2. Replacement values taken from User-Defined Facilities data based on KPB parcel datasets and RS Means information.
3. Exposure due to Earthquake is the same for all hazard levels.
4. Exposure due to Lowell Creek is not included in the Riverine Flood overview, as hazard events on Lowell Creek are more extreme than those included here.
5. NA = Not Available: Affected population cannot be estimated for these facilities.
6. <Null>: Not located in the hazard area

Table 6-8 Potential Natural Hazard Exposure Analysis – Seward Critical Facilities

Hazard Type		Severity	Description	Roads		Bridges/ Culverts		Transportation Facilities		Utilities	
				Miles	Value ($)	No.	Value ($)	# Bldgs	Value ($)	# Bldgs	Value ($)
Earthquake		Strong	9-20% (G)	0	--	0	<Null>	0	<Null>	0	<Null>
		Very Strong	20-40% (G)	0	--	0	<Null>	0	<Null>	0	<Null>
		Severe	>40-60% (G)	36	180,000,000	11	Unknown	7	40,690,100	12	16,406,700
Flood	Riverine	Moderate	500-Year Floodplain	0.3	1,500,000	0	<Null>	0	<Null>	0	<Null>
		High	100-Year Floodplain	2.4	12,000,000	4	Unknown	4	4,105,400	0	<Null>
	Coastal	High	Coastal VE Flood Zone	0.2	1,000,000	0	<Null>	1	30,534,700	1	Unknown
Ground Failure		High	Within 100 ft of slopes >20 degrees	2.5	12,500,000	0	<Null>	0	<Null>	2	6,032,400
Tsunami / Seiche		DGGS GIS	Max Inundation Area	12.4	62,000,000	4	Unknown	6	36,756,600	4	2,574,500
Volcanic Ash		Low to Moderate	Descriptive	36	180,000,000	11	Unknown	7	40,690,100	12	16,529,400
Weather, Severe		--	Descriptive	36	180,000,000	11	Unknown	7	40,690,100	12	16,406,700
Wildfire		Low	Low Fuel Rank	27.6	138,000,000	11	Unknown	0	<Null>	0	<Null>
		Moderate	Moderate Fuel Rank	8.5	42,500,000	6	Unknown	1	2,116,200	9	11,480,500
		High	High Fuel Rank	0.2	1,000,000	0	<Null>	0	<Null>	0	<Null>

1. Affected population was estimated by multiplying the percentage of buildings impacted in each category by the total population.
2. Replacement values taken from User-Defined Facilities data based on KPB parcel datasets and RS Means information.
3. Exposure due to Earthquake is the same for all hazard levels.
4. Exposure due to Lowell Creek is not included in the Riverine Flood overview, as hazard events on Lowell Creek are more extreme than those included here.
5. NA = Not Available. Affected population cannot be estimated for these facilities.
6. <Null>: Not located in the hazard area

Note: *The Alaska Department of Transportation and Public Facilities (DOT/PF) estimates road construction cost equals approximately $5M dollars per paved road mile and $1.5M per unpaved road miles. Source: 2018 SHMP.*

The DOT GIS data does not differentiate between paved and unpaved (gravel) roads. For the purpose of this estimate all roads were deemed as paved. Loss would be reduced for unpaved road damages

6.8.1 Exposure Analysis – Narrative Summaries

Earthquake

The City of Seward, the Qutekcak Native Tribe, and surrounding area can expect to experience severe earthquake ground movement that may damage infrastructure. Intense shaking may be seen or felt. Although all structures are exposed to earthquakes, buildings within Seward city center are generally wood construction; they are slightly less vulnerable to earthquake effects than masonry structures.

Based on earthquake probability (PGA) maps produced by the USGS, the entire Seward area is at risk of experiencing significant earthquake impacts as a result of its close proximity to known earthquake faults.

The probability is rated "Highly Likely" (see Section 5.4.1.3) that impacts to the community ranging from "moderate to severe" ground movement may result in infrastructure damage and personal injury. The entire existing, transient, and future population, residential and non-residential structures and critical facilities are potentially exposed to severe ground motion. The following summaries potential impacts from a worst case scenario event:

- 783 residential properties (approximate value $222,174,087)
- 269 non-residential properties (approximate value $302,085,377)
- 8 government and emergency response facilities (approximate value $5,416,700)
- 5 emergency response facilities (approximate value $2,558,700)
- 6 educational facilities (approximate value $96,108,900)
- 3 medical facilities (approximate value $96,108,900)
- 19 community facilities (approximate value $99,602,600)
- 36 road system miles (approximate value $180,000,000)
- 11 bridges/culverts (approximate value Unknown)
- 7 transportation facilities (approximate value $40,690,100)
- 12 utility facilities (approximate value $16,406,700)

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 (see Section 5.4.2.3).

Seward has detailed 100-year (1% chance of occurring) floodplain and 500-year (2% of occurring) probability maps.

For brevity, this HMP does not duplicate information readily available from other sources such as the 2013 SBCFSA HMP and flood study and the 2019 KPB HMP.

The following provides a brief glimpse into these data: The KPB 2019 HMP Section 2, Flood and Coastal Erosion contains detailed Seward area infrastructure impact information such as:

2.6 Communities and Flood Risk – East Zone

2.6.1 contains Table 2.20 East Zone Flood Problem Areas describes Seward's problems and potential mitigation initiatives

Section 2.6.3 Flood Event Susceptibility: defines the area's flood cycle and infrastructure risk to specific borough zone critical facility tables.

Table 2.21 East Zone Critical and Service Facilities, lists the City's critical facilities and their relative risk to each identified hazard

The Transportation subsection defines area facility threats. Table 2.22 and Map 2.3 East Zone Bridges (and Culverts) describes the location for the area's 48 critical bridges and culverts and the water sources that threatens them. Source: KPB 2017

The 2013 SBCFSA contains a detailed flood study for the entire SBCFSA that includes the City of Seward. It is difficult to confine this data to the City only because the City does not have a refined GIS dataset. They lack capacity to determine critical facility values, building types, and average occupant information. This

Based on these data, it is "Highly Likely" Seward will continue to experience severe flood impacts. Seward's flood threats could potentially impact the following located in the 100-year (1% chance of occurring) floodplain. The following summaries potential impacts from a worst case scenario event:

- 2 residential properties (approximate value $601,221)
- 2 non-residential properties (approximate value $2,487,872)
- 0 government facilities
- 0 emergency response facilities
- 0 educational facilities
- 1 medical facility (approximate value $642,000)
- 0 community facilities
- 2.4 road system miles (approximate value $12,000,000)
- 4 bridges/culverts (approximate value S322,700)
- 4 transportation facilities (approximate value $4,105,400)
- 0 utility facilities

Seward's flood threats could potentially impact the following located in the 500-year (2% chance of occurring) floodplain. The following summaries potential impacts from a worst case scenario event:

- 0 residential facilities
- 1 non-residential property (approximate value $219,219)
- 0 government facilities
- 1 emergency response facilities (approximate value $322,700)
- 0 educational facilities
- 1 community facility (approximate value $322,700)
- 0.3 road system miles (approximate value $1,500,000)
- 0 bridges/culverts

- 0 transportation facilities
- 0 utility facilities

Seward's Coastal VE zone flood threats could potentially impact the following facilities from a worst case scenario event:

- 0 residential facilities
- 1 non-residential facility (approximate value $220,508
- 0 government facilities
- 0 emergency response facilities
- 0 educational facilities
- 0 community facilities
- 0.2 road system miles (approximate value $1,000,000)
- 0 bridges/culverts
- 1 transportation facility (approximate value $30,534,700)
- 1 utility facility (approximate value Unknown)

Ground Failure

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

The potential ground failure impacts from avalanches, landslides, and subsidence can be widespread. Potential debris flows and landslides can impact transportation, utility systems, and water and waste treatment infrastructure along with public, private, and business structures located adjacent to steep slopes, along riverine embankments, or within alluvial fans or natural drainages. Response and recovery efforts will likely vary from minor cleanup to more extensive utility system rebuilding. Utility disruptions are usually local and terrain dependent. Damages may require re-establishing electrical, communication, and gas pipeline connections occurring from specific breakage points. Initial debris clearing from emergency routes and high traffic areas may be required. Water and wastewater utilities may need treatment to quickly improve water quality by reducing excessive water turbidity and re-establishing waste disposal capability.

USGS elevation datasets were used to determine the ground failure hazard areas within the Seward area. Risk was assigned based on slope angle. A slope angle greater than (>) 20 degrees was assigned as having "high" risk potential to ground failure.

Ground Failure hazards periodically affect access issues to adjacent road systems. Ground Failure recurrence probability to these infrastructure are categorized as either "Null" or High" risk areas as indicated in the following data (See Section 5.4.3.3)

There have been periodic landslides and other ground failure incidents in the Seward area. Threatened facilities in a "High" severity area (>20 Degrees) include the following potential impacts from a worst case scenario event:

- 47 residential properties (approximate value $14,873,719)
- 3 non-residential properties (approximate value $10,061,513)

- 0 government response facilities
- 0 emergency response facilities
- 0 educational facilities
- 1 medical facility (approximate value $3,933,800)
- 1 community facility (approximate value $271,000)
- 2.5 road system miles (approximate value $12,500,000)
- 0 bridges/culverts
- 0 transportation facilities
- 2 utility facilities (approximate value $6,032,400)

Tsunami and Seiche

The UAF/GI, DGGS, and NTWC indicate it is "Highly Likely" a severe tsunami threat exists from distant and local source tsunami for Seward's population and infrastructure located within the identified tsunami impact area.

A distant source tsunami recurrence interval is unknown and it is therefore, unpredictable as too many factors determine when the next event will occur. Therefore, using information provided by the UAF/GI, DGGS, and NTWC tsunami research; Seward's residential structures and infrastructure located adjacent to the identified tsunami impact area have a "Highly Likely" with a recurrence probability threat from tsunamigenic sources. The following summaries potential impacts from a worst case scenario event:

- 71 residential properties (approximate value $33,826,700)
- 117 non-residential properties (approximate value $105,605,512)
- 3 government facilities (approximate value $1,865,500)
- 1 emergency response facility (approximate value $280,000)
- 2 educational facilities (approximate value $5,339,400)
- 3 community facilities (approximate value $883,700)
- 12.4 road system miles (approximate value $62,000,000)
- 4 bridges/culverts (approximate value Unknown)
- 6 transportation facilities (approximate value $36,756,600)
- 4 utility facilities (approximate value $2,574,500)

Volcano

Impacts associated with a volcanic eruption include strain on resources should other hub communities be significantly affected by volcanic eruption. An eruption of significant size in southcentral Alaska will certainly affect air routes, which in turn affects the entire state. Other impacts include respiratory problems from airborne ash, displaced persons, lack of shelter, and personal injury. Other potential impacts include general property damage (electronics and unprotected machinery), structural damage from ash loading, state/regional transportation interruption, loss of commerce, and contamination of water supply. (See Section 5.4.5.3)

A distant volcanic eruption recurrence interval is unknown and it is therefore, unpredictable as too many factors determine when the next event could occur. Therefore, using information provided by the City of Seward, the USGS, and AVO, Seward's entire existing and future

population, residences, and critical facilities have a nearly equal "Possible" recurrence frequency risk from volcanic eruptions. The following summaries potential impacts from a worst case scenario event:

- 783 residential properties (approximate value $222,174,087)
- 269 non-residential properties (approximate value $302,085,377)
- 8 government facilities (approximate value $5,416,700)
- 5 emergency response facilities (approximate value $2,558,700)
- 6 educational facilities (approximate value $96,108,900)
- 3 medical facilities (approximate value $6,745,400)
- 19 community facilities (approximate value $99,602,600)
- 36 road system miles (approximate value $180,000,000)
- 11 bridges/culverts (approximate value Unknown)
- 7 transportation facilities (approximate value $40,690,100)
- 12 utility facilities (approximate value $16,406,700)

Weather

Impacts associated with severe weather events includes roof collapse, trees and power lines falling, damage to light aircraft and sinking small boats, injury and death resulting from snow machine or vehicle accidents, overexertion while shoveling all due to heavy snow. A quick thaw after a heavy snow can also cause substantial flooding. Impacts from extreme cold include hypothermia, halting transportation from fog and ice, congealed fuel, frozen pipes, utility disruptions, frozen pipes, and carbon monoxide poisoning. Additional impacts may occur from secondary weather hazards or complex storms such as extreme high winds combined with freezing rain, high seas, and storm surge. Section 5.4.6.3 provides additional detail regarding severe weather impacts. Buildings that are older and/or not constructed with materials designed to withstand heavy snow and wind (e.g., hurricane ties on crossbeams) are more vulnerable to the severe weather damage.

Based on information provided by Seward's planning team, the NOAA/NWS, and Table 5-3 criteria; Seward has a "Highly Likely" recurrence probability rating. The entire area's existing, transient, and future population, residential structures, and critical facilities are exposed to future severe weather impacts. The following summaries potential impacts from a worst case scenario event:

- 783 residential properties (approximate value $222,174,087)
- 269 non-residential properties (approximate value $302,085,377)
- 8 government facilities (approximate value $5,416,700)
- 5 emergency response facilities (approximate value $2,558,700)
- 6 educational facilities (approximate value $96,108,900)
- 3 medical facilities (approximate value $6,745,400)
- 19 community facilities (approximate value $99,602,600)
- 36 road system miles (approximate value $180,000,000)
- 11 bridges/culverts (approximate value Unknown)

- 7 transportation facilities (approximate value $40,690,100)
- 12 utility facilities (approximate value $16,406,700)

Wildland Fire

Impacts associated with a wildland fire event include the potential for loss of life and property. It can also impact livestock and pets and destroy forest resources and contaminate water supplies. Buildings closer to the outer edge of town, those with a lot of vegetation surrounding the structure, and those constructed with wood are some of the buildings that are more vulnerable to the wildland fire impacts.

According to the Alaska Fire Service, there are potential wildland fire areas within Seward's city boundaries. However, only 19 wildland fires have occurred within a 25-mile radius of the area since the legacy 2010 HMP was implemented.

Based on Seward's limited wildland fire history and applying the criteria identified in Table 5-3, it is "Unlikely" but possible a wildland fire event could interface with the Seward area due to their forested location. A "Low" wildfire fuel rank event from a worst case scenario event could potentially impact:

- 603 residential properties (approximate value $167,946,749)
- 223 non-residential properties (approximate value $251,935,410)
- 0 government facilities (approximate value $331,900)
- 0 emergence response facilities
- 0 educational facilities
- 0 medical facilities
- 9 community facilities (approximate value $66,465,400)
- 27.6 road system miles (approximate value $138,000,000)
- 1 bridge/culvert (approximate value Unknown)
- 0 transportation facilities
- 0 utility facilities

A "Moderate" wildfire fuel rank from a worst case scenario event could potentially threaten:

- 179 residential properties (approximate value $53,983,582)
- 36 non-residential properties (approximate value $50,149,966)
- 2 government facilities (approximate value $331,900)
- 0 emergence response facilities
- 5 educational facilities (approximate value $62,180,000)
- 2 medical facility (approximate value $2,811,600)
- 9 community facilities (approximate value $66,465,400)
- 8.5 road system miles (approximate value $42,500,000)
- 6 bridges/culverts (approximate value Unknown)
- 1 transportation facility (approximate value $2,116,200)
- 9 utility facility (approximate value $11,480,000)

A "High" wildfire fuel rank from a worst case scenario event could potentially threaten:

- 1 residential property (approximate value $243,754)
- 0 non-residential properties
- 0 government facilities
- 1 emergency response facility (approximate value $322,700)
- 0 educational facilities
- 0 medical facility
- 1 community facility (approximate value $322,700)
- 0.2 road system miles (approximate value $1,000,000)
- 0 bridges/culverts
- 0 transportation facilities
- 0 utility facilities

6.9 FUTURE DEVELOPMENT

Seward continually seeks to maintain and upgrade their aging infrastructure. Section 7, Hazard Mitigation Strategy identifies potential projects they can accomplish to demonstrate how the community intends to continue pursuing their future development initiatives. These initiatives will culminate in their Mitigation Action Plan (MAP), Table 7-10.

The Seward's Comprehensive Plan, Volume II describes their various land area characteristics and future land concerns:

3 ***Geological Setting***

The glacial fjord of Resurrection Bay, approximately 18 miles long and 2 to 5 miles wide, extends southward from the mouth of the Resurrection River. The sides and bottom of the bay are generally quite steep, with near shore depths increasing quickly to a maximum depth of nearly 1,000 ft. The depth of the fjord in the vicinity of Seward is approximately 500 ft.

Most of the downtown portion of the City of Seward is built on the alluvial fan of Lowell Creek, which extends into the northwest corner of Resurrection Bay. This fan is approximately 1.25 miles long and 0.5 miles wide. Its maximum elevation of 130 feet is found at the mouth of the Lowell Creek canyon. Drilling performed after the 1964 earthquake suggests that Lowell Creek deposits average about 100 feet thick, with considerably thicker segments exceeding 300 feet found near the Seward end of the tongue.

Although no major fault lines have been identified in the Seward area, the topography of the region suggests the valley system extending north to Kenai Lake and south to Resurrection Bay is partially fault controlled. Surveys made after the 1964 earthquake identified numerous small shear zones and small faults in the Seward area…

4.2 **[Demographics]** ***Summary of Planning Issues and Trends***

* *Population decreased slightly between 2000 and 2010, but seems to be on an upward trend again.*

* *Population has grown faster outside city limits.*

* *The Seward population is aging – the median age has increased from 32 to 38 since 1990…*

5.5 **[Economy]** ***Summary of Planning Issues and Trends***

* *The Service sector has grown considerably since 2010*
* *Most industries have rebounded to pre-recession levels*
* *The local economy has diversified since the last comprehensive plan update*
* *State budget cuts have reduced local government funding…*

6.3 **[Land Use]**

6.3.1 Zoning Districts

* *Table 5 presents the existing zoning districts. The number and specific intent of zoning districts need to be reviewed and revised. The current zones do not reflect existing land uses in many areas, leading to requests for rezoning, conditional uses, and variances before the Planning and Zoning Commission when owners wish to improve their property. As a result, some districts have a broad range of uses…*

6.3.3 Road Standards

* *The City of Seward currently has no adopted road standards, which becomes an issue when land is subdivided. The developer builds roads within a subdivision, and those roads are turned over to the city for maintenance. Roads that are not built to proper standards can create safety and maintenance problems. In some cases, the city may elect not to take responsibility for road maintenance, which leaves that responsibility to homeowners. The city should evaluate and adopt road construction standards as part of the subdivision ordinances.*

6.3.4 Infill Development

* *There is a need to concentrate and enhance existing development in conformance with the Land Use Plan. There is also a need to limit unguided expansion of land uses throughout the community…*

6.3.5 Vacant Residential Land

* *Vacant, developable, privately-owned residential land in the City of Seward is limited to about 120 acres. Seventy-three acres are in parcels less than 5 acres in area. In total, there are over 301 vacant, developable residential parcels in the city. Together, these parcels equal over $11.5 million in taxable land value…*

7.1 **[Housing]** ***Summary of Planning Issues and Trends***

* *Home values increased significantly between the years 2000 and 2010.*
* *The portion of single unit detached housing increased markedly between the years 2000 and 2010. The number of structures with 2 or more units fell from 41% to 31% of the total housing stock.*
* *The rate of housing developed outside city limits continues to outpace development within Seward. This trend could have long term implications, such as increased cost of services, the development of natural amenities, and a change in the "character" of Seward. The city can continue to explore incentives to develop reasonably priced housing within Seward, such as zoning changes or tax increment financing…*

8.3 **[Transportation]** ***Summary of Planning Issues and Trends***

* *Investigate the viability of year-round public transit services.*
* *Conduct an inventory of non-ADA compliant sidewalks and bring them into compliance…*
* *Ensure connectivity between the harbor and downtown…*

9.3 **[Ports and Harbor]** ***Summary of Planning Issues and Trends***

* *The Seward Marine Industrial Center's recent and ongoing upgrades will potentially stimulate additional marine industry economic activity.*
* *Seward's marine facilities may see increased use with the opening of the Northwest Passage and additional arctic marine traffic…*

10.3 **[Recreation]** ***Summary of Planning Issues and Trends***

* *Outdoor recreation is a major attraction for visitors and residents of Seward.*
* *Continued increases in tourist numbers may impact recreation facilities…*

11.3.1 **[Public Facilities and Services]** ***Summary of Planning Issues and Trends***

* *Identify a mechanism for prioritizing and funding city infrastructure improvements and major maintenance of existing assets.*
* *State fiscal issues are resulting in less state funding assistance to local governments…*

12.3 **[Public Safety]** ***Summary of Planning Issues and Trends***

* *The main fire station is over 50 years old and needs to be updated.*
* *Diminishing state funding for State Troopers and community jails may increase responsibilities of local law enforcement…*

13.5 **[Utilities]** ***Summary of Planning Issues and Trends***

* *Generally, the city needs to have public utilities and services which are not out-of-date in order to maintain and attract new businesses, industry, and residents. Some development within city limits is stymied by lack of sufficient water and sewer service. The extension of the sewer system to properties within city limits on the west side of the bay, to SMIC, and the airport continues to be a need.*
* *People value the quality of city water. Replacement of aging infrastructure for water distribution, and protecting the city's potable water supply in the Lowell Canyon watershed, continues to be a concern.*
* *Providing sufficient power to attract industry is an ongoing concern; energizing the transmission line to a higher voltage into Seward remains a possibility. The city is also interested in bringing liquid natural gas as a fuel, if a viable distribution system can be established and gas can be shipped into Seward at a feasible rate. Such an effort may be more likely with the development of a natural gas line.*
* *Area wide animal control is an issue. The Kenai Peninsula Borough does not provide this function, but the city does and is called on to handle problems. Animal control services, in cooperation with the borough in areas beyond the city, should be continued. Relocation of the animal shelter to a more suitable location should be addressed.*
* *Most communication transmissions to and from Seward go through a limited number of main trunks, which are a limited slow speed. Although much improved, continued updating of telephone and telecommunications*

equipment and lines is necessary to provide fast, reliable service so agencies and businesses can be efficient and up-to-date in their practices…

14.4 **[Natural Hazards]** ***Summary of Planning Issues and Trends***

* The following flood dangers exist:
  - *The Lowell Creek Diversion Tunnel could in times of high water clog up or collapse, resulting in flooding public and private property, including the hospital.*
  - *The stream at Lowell Point is susceptible to landslides and can lead to road closures and flooding.*
  - *The dike next to the water tank could breach from high velocities of water from Japanese Creek, flooding Seward Resort and public and private property in Forest Acres subdivision.*
  - *Resurrection River channel problems can lead to airport erosion and potential flood problems for roads and structures in the industrial area, as occurred in the 2012 flood.*
  - *Clear Creak streams can clog up and flood roads, causing damage.*
  - *Potential for a flash flood from the breaching of the dike at Fourth of July Creek could endanger lives at Spring Creek Correctional Center and/or community security.*
  - *Some subdivisions, because of the way buildings are sited and spaced, are vulnerable* to flooding…

16.2 ***[Natural Environment and community Appearance] Summary of Planning Issues and Trends***

* *The Historic Preservation Plan, Phase II (1996) has set forth community goals for historic preservation in Seward along with the historical perspective and background for the political and economic framework within which these goals will be achieved. The Seward Historic Preservation Plan (1996) is currently in revision process by the Seward Historic Preservation Commission and be eliminated when the updated plan is finalized.*
* *Current responsibility for historic preservation oversight is administrated in cooperation with the staff of the Seward Library and Museum, Seward city administration, and the Community Development Department. Resources used by the volunteer commission is the state SHPO office and other state and federal agencies committed to historic preservation efforts.*
* *Actively working with the public and regulatory commissions, city council and city administration can assist to strengthen any uncertainty about enacting additional local regulations and zoning requirements as a strategy to implement historic preservation. Community opinion may be shaped by a lack of awareness of historic preservation goals, lack of explicit incentives, and unclear procedures to follow.*

Table 6-8 delineates DCRA identified current planned, and funded projects for the Seward area. However, the planning team stated they have had minimal infrastructure changes that would alter their projected hazard loss estimates.

Table 6-8 Planned and Funded Projects

Grant Recipient	Award Year	Project Description/Comments	Project Status	Award Amount	Start Date	End Date
City of Seward	2019	Shared Fisheries Business Tax Program	Pending	$1,664	3/15/2019	Undefined
City of Seward	2018	Hazardous material removal and site remediation at the Jesse Lee Home for the fiscal years ending June 30, 2019, June 30, 2020, and June 30, 2021	Active	$1,073,441	6/30/2018	6/30/2021
Alaska Railroad Corporation	2017	Seward Cruise Ship Terminal Planning & Design	Active	$300,000	7/1/2017	6/30/2022
Alaska Railroad Corporation	2017	Seward Dock Safety Enhancements	Active	$1,200,000	7/1/2017	6/30/2022
City of Seward	2014	Marine Expansion Including Breakwater	Active	$5,900,000	7/1/2014	6/30/2019

Source: DCRA 2018

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7.0 MITIGATION STRATEGY

This section delineates the City and Qutekcak Tribe's MJHMP mitigation strategy.

7.1 OVERVIEW

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

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

Seward's planning team will review and monitor their 2018 MJHMP annually and strive to integrate the Mitigation Strategy into their existing community plans and strategies to fulfill FEMA mitigation programs' and initiatives' regulatory requirements.

7.2 CITY OF SEWARD'S CAPABILITY ASSESSMENT

The City of Seward and the Qutekcak Native Tribe's governmental authorities, tools, and financial capacity is described in this section.

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

DMA 2000 Requirements
ELEMENT C. Mitigation Strategy
C1. Does the plan document each jurisdiction's existing authorities, policies, programs and resources and its ability to expand on and improve these existing policies and programs? (Requirement §201.6(c)(3))
Source: FEMA, March 2015

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

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

The city and tribe are collocated and intermingled within the same community footprint. Seward has defined planning and land management tools granted by the State Constitution as a First Class City. The Qutekcak Native Tribe only has a few facilities and its tribal membership is dispersed throughout the community with individual land ownership.

Their respective available resources have been assessed by the city and tribe as summarized in Tables 7-1 through 7-5 listing the city's and the tribe's regulatory tools, technical specialists, and financial and training resource available for project management.

Table 7-1 City of Seward's Regulatory Tools

Regulatory Tools (ordinances, codes, plans)	Existing Yes/No?	Comments (Year of most recent update; problems administering it, etc.)
Comprehensive Plan	Yes	2017 Comprehensive Plan Vol I & Vol II Explains the Seward's land use initiatives and natural hazard impacts.
Land Use Plan	Yes	2014 Seward Municipal Lands. Explains the Seward's land use goals and initiatives.
Tribal Land Use Plan	Yes/No?	Describes the Village's community development goals and initiatives.
Emergency Response Plan	Yes	City of Seward and Kenai Peninsula Borough Emergency Operations Plan Components
Wildland Fire Protection Plan		
Hazardous Materials Response Plan		
Terrorism		
Building code	Yes	2017 Comprehensive Plan and 2014 Municipal Lands The City exercises this authority.
Zoning ordinances		
Subdivision ordinances or regulations		
Special purpose ordinances		

Local Resources

The City of Seward has extensive "formal" planning and land management tools that will allow them to implement and integrate local hazard mitigation activities with FEMA mitigation actions and initiatives. The city works closely with State agencies such as the DCCED/DCRA, DHS&EM, DOT/PF, and DNR staff to guide them with project development, funding, and planning activities. The resources available in these areas have been assessed by the hazard mitigation planning team and are summarized below.

Table 7-2 City of Seward's Technical Specialists

Staff/Personnel Resources	Yes / No	Department/Agency and Position
Planner or engineer with knowledge of land development and land management practices	Yes	The City/Village has staff with this knowledge
Engineer or professional trained in construction practices related to buildings and/or infrastructure	Yes	The City/Village has staff with this knowledge.
Planner or engineer with an understanding of natural and/or human-caused hazards	Yes	The City/Village has staff with this knowledge.
Floodplain Manager	Yes	The City works with the SBCFSA and the Kenai Peninsula Borough to assess, manage and implement appropriate floodplain protective measures.

Table 7-2 City of Seward's Technical Specialists

Staff/Personnel Resources	Yes / No	Department/Agency and Position
Surveyors	Yes	The City/Village has staff with this knowledge.
Staff with education or expertise to assess the jurisdiction's vulnerability to hazards	Yes	The City/Village has staff with this knowledge.
Personnel skilled in Geospatial Information System (GIS) and/or Hazards Us-Multi Hazard (Hazus-MH) software	Yes	The City/Village has staff with this knowledge.
Scientists familiar with the hazards of the jurisdiction	No	City/ work with diverse agencies such as the Seward Marine Center, U.S. Fish & Wildlife Service and Alaska Fish & Game (ADF&G), DOT/PF, DNR and other agencies as are hazard applicable.
Emergency Manager	Yes	The City Manager, Assistant City Manager, Fire Chief, and Tribal Administrator as applicable
Finance (Grant writers)	Yes	City or Tribal Bookkeeper as applicable
Public Information Officer	Yes	The City Manager, Assistant City Manager, Fire Chief, and Tribal Administrator as applicable

Table 7-3 and 7-4 lists a sample of the city and tribal jurisdictions' funding resources. Table 7-5 lists a few FEMA specific funding programs while Appendix A provides a detailed list of potential state and federal agency funding resources.

Table 7-3 City of Seward's Financial Resources

Financial Resource	Accessible or Eligible to Use for Mitigation Activities
General funds	Can exercise this authority with voter approval
Payment in Lieu of Taxes (PILT)	Provides operating support funding
Municipal Energy Assistance Program (MEAP)	Provides operating support funding
Community Development Block Grants (CDBG)	City jurisdiction is eligible for this funding source
Community Development Block Grants (CDBG)	Native Village is eligible for this funding source
Capital Improvement Project Funding	Can exercise this authority with voter approval
Authority to levy taxes for specific purposes	Can exercise this authority with voter approval
Incur debt through general obligation bonds	Can exercise this authority with voter approval
Incur debt through special tax and revenue bonds	Can exercise this authority with voter approval
Incur debt through private activity bonds	Can exercise this authority with voter approval

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

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

Table 7-4 Qutekcak Tribal Financial Resources

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

FEMA and Other Mitigation Program and Initiative Eligibility

A FEMA approved and jurisdiction adopted MJHMP or Tribal HMP assures participant eligibility for FEMA mitigation grant programs and initiatives. The final MJHMP or Tribal HMP assures these jurisdictions can potentially fulfill grant management and integration with available grants listed in Table 7-5.

Table 7-5 Federal Agency Mitigation Programs

Financial Resources	Accessible or Eligible to Use for Mitigation Activities
Hazard Mitigation Grant Program (HMGP)	FEMA funding available to eligible local and tribal jurisdictions after a presidentially declared disaster. It can be used to fund both pre- and post-disaster mitigation plans and projects.
Pre-Disaster Mitigation (PDM) grant program	FEMA funding available to eligible local and tribal jurisdictions on an annual basis. This grant can only be used to fund pre-disaster mitigation plans and projects only
Flood Mitigation Assistance (FMA) grant program	FEMA funding available to eligible local and tribal jurisdictions on an annual basis. This grant can be used to mitigate repetitively flooded structures and infrastructure to protect repetitive flood structures. The City of Seward and the collocated Seward Bear Creek Flood Service Area (SBCFSA) which covers the entire City of Seward and surrounding area, qualifies for this funding source because they actively participate in the NFIP.
United State Fire Administration (USFA) Grants	The purpose of these grants is to assist state, regional, national or local organizations to address fire prevention and safety. The primary goal is to reach high-risk target groups including children, seniors and firefighters.
Fire Mitigation Fees	Finance future fire protection facilities and fire capital expenditures required because of new development within special districts.

The planning team developed their mitigation goals and potential mitigation actions to address identified potential hazard impacts (refer to Section 5.3) for the entire City of Seward area.

7.3 DEVELOPING MITIGATION GOALS

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

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

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

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

The planning team developed their mitigation goals and potential mitigation actions to address current and future potential hazard impacts to city and tribal residents and their infrastructure.

Mitigation goals are defined as general guidelines that describe what a community wants to achieve in terms of hazard and loss prevention. Goal statements are typically long-range, policy-oriented statements representing community-wide visions. The planning team developed the mitigation goals and potential mitigation actions to address identified potential hazard impacts for the city and the collocated tribe.

The exposure analysis results were used as a basis for updating the mitigation goals and actions (Table 7-6). Additionally, the planning team desired to have three new mitigation action or initiative categorizes developed that could address combined or complex hazard impacts. They are classified as Multi-Hazard (MH) goals and are listed separately along with identified natural and manmade hazard categories. These three MH Categories include:

- Multi-Hazard (MH) 1: Provide funding, planning, and outreach activities to educate and promote recognizing and mitigating natural and manmade hazards that potentially impact the City of Seward, the Qutekcak Native Tribe.
- Multi-Hazard (MH) 2: Cross-reference and integrate mitigation goals and actions within City and Qutekcak Tribal planning mechanisms and projects.
- Multi-Hazard (MH) 3: Construction activities that mitigate (to avoid or reduce) potential losses and damages from natural and manmade hazards that affect the Seward area.

Table 7-6 lists Seward's strategic mitigation goals developed to reduce or avoid identified long-term hazard vulnerabilities. They form the mitigation strategy's foundation that culminates within the Mitigation Action Plan (MAP), Table 7-10.

Table 7-6 Mitigation Goals

No.	Goal Description
Multi-Hazards (MH)	
MH 1	Provide funding, planning, and outreach activities to educate and promote recognizing and mitigating natural and manmade hazards that potentially impact the City of Seward, the Qutekcak Native Tribe.
MH 2	Cross-reference and integrate mitigation goals and actions within City and Qutekcak tribal planning mechanisms and projects.
MH 3	Construction activities that mitigate (to avoid or reduce) potential losses and damages from natural and manmade hazards that affect the Seward area.
Natural Hazards	
EQ 4	Reduce potential Earthquake (EQ) vulnerability, damage, and loss.
FL 5	Reduce potential Flood and erosion (FL) vulnerability, damage, and loss.
GF 6	Reduce potential Ground Failure (GF) vulnerability, damage, and loss.
TS 7	Reduce potential Tsunami or Seiche (TS) vulnerability, damage, or loss.
VO 8	Reduce potential Volcanic ash (VO) vulnerability, damage, or loss.
WX 9	Reduce potential Weather (WX) vulnerability, damage, or loss.
WF 10	Reduce Wildland Fire (WF) vulnerability, damage, or loss.
Technological Hazards	
HZ 11	Reduce potential vulnerability, damage, or loss from potential Hazmat events.

7.4 IDENTIFYING MITIGATION ACTIONS

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

DMA 2000 Requirements
ELEMENT C. Mitigation Actions
C4. Does the Plan identify and analyze a comprehensive range of specific mitigation actions and projects for each jurisdiction being considered to reduce the effects of hazards, with emphasis on new and existing buildings and infrastructure? (Requirement §201.6(c)(3)(ii))
Source: FEMA, March 2015

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

DMA 2000 Requirements
ELEMENT C. Mitigation Actions
C4. Does the Plan identify and analyze a comprehensive range of specific mitigation actions and projects for each jurisdiction being considered to reduce the effects of hazards, with emphasis on new and existing buildings and infrastructure?
Source: FEMA, October 2017

Mitigation actions are activities, initiatives, measures, or projects that help achieve the goals of a mitigation plan. Mitigation actions are usually grouped into three broad categories: property protection, public education and awareness, and construction projects.

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

> *Reviewing and incorporating information from the State, tribal, or local mitigation plan can help an Applicant or subapplicant facilitate the development of mitigation project alternatives. Linking the existing mitigation plan to project scoping can support the Applicant and subapplicant in selecting the most appropriate mitigation activity that best addresses the identified hazard(s), while taking into account community priorities, climate change, and resiliency. In particular, the mitigation strategy section of the plan identifies a range of specific mitigation activities that can reduce vulnerability and includes information on the process that was used to identify, prioritize, and implement the range of mitigation actions considered…*
>
> *It is important to reference the mitigation plan as potential project alternatives may have been considered during the planning process. If the project alternatives were not considered during the mitigation planning process, they should be considered in the next mitigation plan update (FEMA 2015b)*

During two joint Planning & Zoning Commission, SBCFSA Board, and Qutekcak Native Tribe work sessions;

- The planning team assessed the legacy 2010 MJHMP's existing mitigation actions status as well as those contained in the SBCFSA and KPB mitigation plans for those lands located within Seward's jurisdictional boundaries.
- Table 7-7 defines legacy HMP mitigation project's status as: "Completed," "Deleted." "Deferred," "Ongoing," and "Re-Defined, Combined, etc." to better meet participant's needs.
- Plan participants then reviewed and determined which projects would be selected for the 2020 MJHMP MAP inclusion (Table 7-10) during this 2020 MJHMP development process for each hazard type.
- During February 2019, the P&Z Commission then reviewed the Risk Report, FEMA Region X Kenai Peninsula Borough, Alaska, dated December 2017's risk data and projects for potential HMP inclusion:

The FEMA 2017 KPB Risk Report describes the borough's incorporated cities' natural hazard risks and analyses for integration consideration. This 2020 HMP update only lists Seward specific activities or initiatives:

> ***Hazard Mitigation Plan and Comprehensive Plan Analysis***
> *The City of Seward All-Hazard Mitigation Plan, effective April 2010, and the City of Seward 2020 Comprehensive Plan identify the following hazard mitigation projects that can be aided by information in this Risk Report.*

Table 40: City of Seward All-Hazard Mitigation Plan and Comprehensive Plan Analysis and Risk MAP Support

RISK REPORT DATA	PLAN TYPE	PLAN LINK	PROJECTS	RISK REPORT LINK
Flood Hazard Area: Spatial data identifies flood hazard areas for 1-percent and 0.2-percent-annual-chance events (select areas of Cook Inlet, Kenai River-Cooper Landing, and Seward only).	Comprehensive Plan	3.8.1	Promote community safety from natural disasters through mitigation measures and preparedness training.	Incorporate data from new flood hazard area, depth, and BFE+ grid analysis into educational outreach, education materials, and training. Host risk assessment data results on the State Parks parcel viewer.

Table 40: City of Seward All-Hazard Mitigation Plan and Comprehensive Plan Analysis and Risk MAP Support

RISK REPORT DATA	PLAN TYPE	PLAN LINK	PROJECTS	RISK REPORT LINK
Depth Grid: *Spatial data identifies flood depth for 1-percent-annual chance event (select areas of Cook Inlet, Kenai River-Cooper Landing, and Seward only).* ***BFE+ Grid:*** *Spatial data identifies 1-foot increases in Base Flood Elevations (select areas of Cook Inlet, Kenai River-Cooper Landing, and Seward only).*	*Comprehensive Plan*	*3.8.1.4*	*Control development on lands subject to risks from floods.*	*Incorporate new flood hazard area, depth, and BFE+ grids for local assessments. Use Hazus Flood Output and the AOMI section for areas most vulnerable to flooding. Host or link new flood hazard data and Hazus flood outputs on local permitting website and the State Parks parcel viewer. Use data to prioritize development standards, code enforcement, and NFIP enrollment.*
Hazus Flood Output: *Spatial and tabular data provides specific building and content loss data for properties affected by coastal flooding (select areas of Cook Inlet, Kenai River-Cooper Landing, and Seward only).*	*All-Hazard Mitigation Plan*	*Flood Mitigation Measure; Goal 1*	*Identify flood hazard areas and mitigation measures that will better protect individual and commercial property owners.*	*Incorporate new flood hazard area, depth, and BFE+ grids for local assessments, zoning maps, and development regulations or restrictions. Use Hazus Flood Output and AOMI to identify areas most vulnerable to flooding.*
	Comprehensive Plan	*3.8.1.3*	*Mitigate flood hazards: source funding to implement the comprehensive flood mitigation plan; maintain dike systems; cooperate with the Bear Creek/Seward Flood Service area. Seek solution and funding to address concerns with the Lowell Creek Diversion Tunnel and Dam complex.*	*Use new flood hazard area, depth, and BFE+ grid analysis to prioritize mitigation projects, and incorporate Risk Report data into grant applications to various funding sources.*
Earthquake ShakeMap: *Spatial data provides shaking intensity and ground motion following an earthquake. Data provided for M7.1 Old Iliamna event and M9.2 Great Alaska earthquake scenario.* ***Hazus Earthquake Output:*** *Spatial and tabular data provides specific building and content loss data for properties affected by a M7.1 Old Iliamna event or M9.2 Great Alaska earthquake scenario.*	*Comprehensive Plan*	*3.8.1*	*Promote community safety from natural disasters through mitigation measures and preparedness training.*	*Incorporate data from the earthquake ShakeMap and Hazus earthquake output into community education outreach and training materials. Host risk assessment data results on the State Parks parcel viewer. Present data analysis, outreach materials, and training at local events.*
	Comprehensive Plan	*3.8.1.4*	*Control development on lands subject to risks from earthquakes.*	*Use Hazus earthquake output and the AOMI section to review loss ratios to critical facilities for both earthquake scenarios. Regulate or restrict new construction in locations most affected*

Table 40: City of Seward All-Hazard Mitigation Plan and Comprehensive Plan Analysis and Risk MAP Support

RISK REPORT DATA	PLAN TYPE	PLAN LINK	PROJECTS	RISK REPORT LINK
				by earthquake hazards.
	All-Hazard Mitigation Plan	Earthquake Mitigation Measure; Goal 1	Identify hazard areas and select mitigation measures for those areas, including updating building codes, zoning maps, evacuation routes, and retrofitting critical infrastructure.	Use Hazus earthquake output and the AOMI section to review loss ratios to critical facilities for both earthquake scenarios. Regulate or restrict new construction in locations most affected by earthquake hazards. Host or link earthquake spatial data on local permitting sites, like the State Parks parcel viewer, so the data can be accessed by outside agencies, including the Department of Transportation.
Erosion Rate: Spatial data provides erosion rates along Cook Inlet. ***Erosion Historic Rate:*** Spatial data provides coastline extents in 1952, 1996, and 2004 along Cook Inlet. ***Master Output:*** Spatial and tabular data indicates whether a building is impacted by coastal erosion along Cook Inlet.	Comprehensive Plan	3.8.1	Promote community safety from natural disasters through mitigation measures and preparedness training.	Incorporate data from erosion rate spatial data, historical erosion rates, and analysis of erosion outputs into community education outreach and training materials. Present data analysis, outreach materials, and training at local events. Host risk assessment data results on the State Parks parcel viewer.
	Comprehensive Plan	3.8.1.4	Control development on lands subject to risks from erosion.	Use erosion rate spatial data, erosion outputs, and the AOMI section to review loss ratios to critical facilities. Regulate or restrict new construction in locations most affected by erosion hazards.
	All-Hazard Mitigation Plan	Coastal Erosion Mitigation Measure; Goal 1	Reduce the amount of shoreline erosion within allowable practices and monetary constraints.	Use the erosion rate spatial data to prioritize areas of coastal erosion hazards. Incorporate Risk Report data into grant applications to various funding sources.
Tsunami Hazard Area: Spatial data shows maximum tsunami extents in coastal regions of Homer, Seldovia, and Seward. ***Master Output:*** Spatial and tabular data indicates whether a building is within a tsunami hazard area along coastal regions of Homer, Seldovia, and Seward.	Comprehensive Plan	3.8.1	Promote community safety from natural disasters through mitigation measures and preparedness training.	Incorporate spatial data from the tsunami hazard area and tsunami output assessments into community education and outreach materials. Present data analysis, outreach materials, and training at local events. Host risk assessment data results on the State Parks

Table 40: City of Seward All-Hazard Mitigation Plan and Comprehensive Plan Analysis and Risk MAP Support

RISK REPORT DATA	PLAN TYPE	PLAN LINK	PROJECTS	RISK REPORT LINK
				parcel viewer.
	Comprehensive Plan	3.8.1.4	Control development on lands subject to risks from tsunami.	Use spatial data from the tsunami hazard area and tsunami output assessments to identify areas most impacted by tsunami wave and, where possible, regulate or restrict development.
	All-Hazard Mitigation Plan	Tsunami Mitigation Measure; Goal 2	Protect lives and properties in the event of a tsunami through public education and emergency response exercises.	Use spatial data from the tsunami hazard area and tsunami output assessments to locate landowners within the tsunami hazard zone. Provide educational outreach to community members, highlighting evacuation routes and drills. Host risk assessment data results on the State Parks parcel viewer.
	Comprehensive Plan	3.5.1	Create a thriving port of Seward through harbor improvements, infrastructure expansion, and implementation of management plans.	Use the tsunami output data to identify buildings located within the tsunami hazard zone. Determine total losses within the port and plan future port development accordingly.
The USACE is conducting a Hybrid Risk Assessment of the Lowell Creek Dam. The risk assessment will include: • Potential failure mode analysis • existing condition of project with credible failure modes • risk reduction alternatives The results of the risk assessment will contribute to the completion of a feasibility study which will act as a standalone report (FOUO).	Comprehensive Plan	3.8.1	Promote community safety from natural disasters through mitigation measures and preparedness training.	Use results from the USACE Hybrid Risk Assessment of the Lowell Creek Dam to identify at-risk structures and prioritize non-development areas, structure relocations, and educational outreach in Seward.
	Comprehensive Plan	3.8.1.4	Control development on lands subject to risks from tsunami.	Use results from the USACE Hybrid Risk Assessment of the Lowell Creek Dam to identify areas that would be flooded during a dam failure and enforce building standards that would withstand flooding.

Source: Risk Report, FEMA, KPB, December 2017 available at: https://www.commerce.alaska.gov/web/Portals/4/pub/Risk_Report_Kenai_Final.pdf

The 2020 MJHMP planning team determined that legacy 2013 SBCFSA and KPB HMP projects within the City of Seward were deemed new projects for the purposes of this plan and are labeled

as "Selected" for Seward MJHMP implementation. Legacy 2010 Seward HMP projects were reviewed and labeled as "Ongoing, Deferred, and Selected" actions and carried forward into the 2020 MJHMP's mitigation strategy's MAP (Table 7-10).

Table 7-7 Mitigation Goals and Potential Actions

(Blue text items are the current HMP Identified Mitigation Action Items and their respective status determinations)
(Red text items will not be carried forward into the 2018 MAP)

Goal No.	Goal Title	Authority	Status: Considered, Selected Complete, Deferred, Deleted, or Ongoing	Explain any Status Changes	Description
MH 1	Provide funding, planning, and outreach activities to educate and promote recognizing and mitigating natural and manmade hazards that potentially impact the City of Seward, the Qutekcak Native Tribe.	SBCFSA, City, KPB	Selected	New Combined two action items	From: 2013 SBCFSA: Identify and pursue funding opportunities to implement mitigation actions, including erosion and sediment control projects.

		SBCFSA, City, KPB	Selected	New Combined seven action items and reworded	From: 2013 SBCFSA: Publicize and educate residents of the service area about existing natural hazards and mitigation actions by:
					• Periodically organizing a Natural Hazards Workshop for homeowners and businesses
					• Provide information on the all-hazard benefits of modern building code compliance during rehabilitation or major repairs of buildings
					• Provide information on structural and non-structural retrofitting, including techniques and funding sources for elevating structures, wet and dry flood proofing, relocating structures, floodwalls, and other protective measures
					• Disseminate information to educate the public on:
					  • Flood insurance
					  • Natural and beneficial floodplain functions
					  • Mitigation, preparedness, and safety procedures for identified hazards
					  • Hazard warnings and evacuation procedures
					  • Evacuation routes away from high hazard areas

		SBCFSA, City, KPB	Selected	New	From: 2013 SBCFSA: Strive to formalize a Hazard Mitigation Planning Team to develop a sustainable process for implementing, monitoring, reviewing, and evaluating community wide mitigation actions.
		City	*Ongoing*	*Integrated with duplicate entry from EQ4*	*2010 HMP Brought Forward: Conduct community mock emergency exercises and evaluate response (earthquake, tsunami, etc.).*
		City	*Ongoing*	*Combined two action items Moved from 2010 Flood Education*	*2010 HMP Brought Forward: Continue working with FEMA and other Federal and State Agencies as the FIRMs are updated and researching other tools for accurately forecasting and mitigating Seward's complex alluvial fan flood problem. Provide local realtors and lending institutions with GIS copies of FIRM as they are updated.*
		City	*Ongoing*	*No available resources Combined two action items Moved from 2010 Flood Education*	*2010 HMP Brought Forward: Continue working with FEMA to obtain the latest NFIP information and scheduling workshops.*

Table 7-7 Mitigation Goals and Potential Actions

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Goal No.	Goal Title	Authority	Status: Considered, Selected Complete, Deferred, Deleted, or Ongoing	Explain any Status Changes	Description
		City	*Ongoing*	*No available resources Combined ten action items and reworded Moved from 2010 Flood Education*	*2010 HMP Brought Forward:* *Continue the City's efforts working with potential partners or agencies to provide publication and outreach services by:* • *Coordinating flood proofing or elevating workshops with FEMA for the City and public* • *Providing floodplain building regulation information, updates, or revisions to the citizens of Seward* • *Providing new homeowners, builders or renovators a brochure detailing the fuel tank stand codes helping to insure they're more flood/earthquake prepared.* • *Continuing to provide public education concentrating on the Emergency Alert Network and Siren Alert and Warning System; what it means and what to do in the event of an emergency.* • *Continue refining the education and outreach programs to notify current homeowners and potential homebuyers about flood hazard risks in identified areas.* • *Making public announcements using the utility billing memo and the scanner announcement page with GCI cable TV and KPFA 91.7 FM.* • *Hold FireWise workshop to educate residents and contractors concerning fire resistant landscaping.* • *Work with industry operators to educate the public on potential hazards and develop strategies for response, evacuation, and containment.* • *Provide public education on the effects of severe weather.*
		City	*Ongoing*	*No Available Resources Moved from TS 7*	*2010 HMP Brought Forward:* *Revise tsunami inundation hazard prediction maps as needed after an event or disaster.*
		City	*Ongoing*	*Moved from EC 11*	*2010 HMP Brought Forward:* *Make sure that accurate information is given to agencies that are responsible for dissemination of information concerning the City of Seward or other government agencies.* • *Make concise information available to the public about local industry concerning any government control.* • *Provide accurate and timely information to public groups with business interests (Chamber of Commerce, Lions, Rotary Clubs, etc.)*
		City	*Ongoing*	*Moved from WX 9*	*2010 HMP Brought Forward:* *Inform public of availability of AWS radios, in preparation of potential weather advisories.*
		City	*Completed/ Delete*	*Remove*	*2010 HMP Brought Forward from Flood Education: North Forest Acres Levee and Access Road Project.*
		City	*Completed/ Delete*	*Remove*	*2010 HMP Brought Forward from Flood Education: Dairy Hill Road/ Seward Lagoon culvert replacement.*

Table 7-7 Mitigation Goals and Potential Actions

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Goal No.	Goal Title	Authority	Status: Considered, Selected Complete, Deferred, Deleted, or Ongoing	Explain any Status Changes	Description
MH 2	Cross-reference and integrate mitigation goals and actions within City and Qutekcak Tribal planning mechanisms and projects.	SBCFSA, City, KPB	Selected	New Combined two action items and reworded	From: 2013 SBCFSA: Incorporate mitigation planning provisions to improve flood and erosion hazard aspects in permit application input to residents and review recommendations to regulatory agencies, land use decisions, subdivision actions, and KPB/ City of Seward Plans (KPB All-Hazards Plan, Comprehensive Plan, Land Use Plan, Coastal Management, Wetlands Management, Capital Improvement, Seward Long-term Development Plan).
		SBCFSA, City, KPB, State DNR	Selected	New Added DNR to Authorities	From: 2013 SBCFSA: Establish a cooperative relationship with the City of Seward to ensure hazard mitigation efforts are not being duplicated or opportunities missed.
		City, KPB, DNR	Selected	New Added KPB & DNR to Authority List	From: 2013 SBCFSA: Create a baseline assessment on Lowell Point Road, existing infrastructures and the feasibility of culvert/ditch line installation.
		City	*Ongoing*	*No Change*	*2010 HMP Brought Forward: Develop, incorporate, and enforce building ordinances to reflect survivability from flood, fire, wind, seismic, and other hazards to ensure occupant safety.*
		City	Selected	New	From: 2013 SBCFSA: The City of Seward should continue improving its NFIP Community Rating System, under the Federal Insurance Administration's Community Rating System (CRS) by exceeding the required standards to obtain further flood insurance premium reductions for policyholders within communities while simultaneously reducing flood losses.
		City	*Ongoing*	*Moved from GF 6, Integrate similar entry*	*2010 HMP Brought Forward: Identify avalanche areas within the city and generate GIS Hazard Maps. Coordinate with Community Development Office on locations of areas for any zoning issues.*
		City	*Ongoing*	*Moved from WX 9 Combined three action items and reworded*	*2010 HMP Brought Forward: Develop and implement programs to coordinate maintenance, mitigation and response activities as indicated in the City's Emergency Operations Plan.*
MH 3	Construction activities that mitigate (to avoid or reduce) potential losses and damages from natural and manmade hazards that affect the Seward area.	SBCFSA, City, KPB	Selected	New	From: 2013 SBCFSA: Relocate or acquire (buy-out and demolish) properties/structures away from hazard prone areas (erosion, flood, ground failure, etc.)
		City	*Ongoing*	*Ongoing*	*2010 HMP Brought Forward: Harden utility headers located along river embankments to mitigate potential flood, debris, and erosion damages.*
		City	*Ongoing*	*Mountain Haven and Schools have this, AVTEC still needs one*	*2010 HMP Brought Forward: Purchase and install generators with main power distribution disconnect switches for identified and prioritized critical facilities susceptible to short term power disruption. (i.e. first responder, medical facilities, schools, correctional facilities, and water and sewage treatment plants, etc.)*

Table 7-7 Mitigation Goals and Potential Actions

(Blue text items are the current HMP Identified Mitigation Action Items and their respective status determinations)
(Red text items will not be carried forward into the 2018 MAP)

Goal No.	Goal Title	Authority	Status: Considered, Selected Complete, Deferred, Deleted, or Ongoing	Explain any Status Changes	Description
		City, KPB	Selected	New	From: 2013 SBCFSA: Perform hydrologic and hydraulic engineering, drainage, and bed loading studies and analyses for each watershed. Use information obtained for feasibility determination and project design. This information should be a key component, directly related to a proposed project in order to qualify for FEMA funding. • Spruce Creek: evaluate the flow capacity of the flood control corridor and determine sedimentation rates. Use this information to develop a plan to preserve the flood control corridor and to create a long term maintenance strategy and funding plan. • Scheffler Creek: conduct a geomorphic investigation to determine the size, frequency, and potential deposition characteristics of future debris flows. Use this information to develop a plan to preserve the flood control corridor and to create a long-term maintenance strategy and funding plan.
		City	*Ongoing*	*Moved from WX 9*	*2010 HMP Brought Forward:* *Assess the City's Emergency Operations Center (EOC) to coordinate planning and logistical efforts in dealing with the emergency.*
		KPB	Selected	New	From: 2013 SBCFSA: Develop a vegetation management plan addressing slope-stabilizing root strength to maintain or encourage precipitation containment and to restore slope stability in avalanche and landslide areas.
		City	*Ongoing*	*Moved from EQ 4*	*2010 HMP Brought Forward:* *Acquire land within the city to develop a secondary evacuation route that bypasses the Seward lagoon and boat harbor areas. Provide barriers to this route and designate it as a recreational trail for use outside of emergency access. (Planning and Zoning Commission, May 6, 2004)* *2010 Update: Land has been designated in January. The survey of the route is scheduled to be accomplished in the spring of 2010.*
		City	*Ongoing*	*Moved from FL 5*	*2010 HMP Coastal Erosion Brought Forward:* *Current mitigation measures required at Waterfront Park include* • *Repairing, maintaining and redesigning the rock barrier located in the Waterfront Park area and,* • *Implementing a regenerative program of our native Beach Rye Grass (Elymus arenarius) by aggressively replanting, relocating city campground fire pits, implementing educational signage to redirect foot and recreational vehicle traffic and installing boulders and other barriers to prohibit vehicles from damaging the coastal vegetation.*
		City	*Ongoing*	*Moved from EQ 4*	*2010 HMP Brought Forward:* *Inspect, prioritize, and retrofit any critical facility or public*

Table 7-7 Mitigation Goals and Potential Actions

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Goal No.	Goal Title	Authority	Status: Considered, Selected Complete, Deferred, Deleted, or Ongoing	Explain any Status Changes	Description
					infrastructure that does not meet current State adopted Building Codes.
		City	*Ongoing*	*Moved from EQ 4 *RM Lands adjacent to Dieckgraeff Rd.*	*2010 HMP Brought Forward: Identify non-buildable sites through the city's land use plan and city zoning maps.*
		City	*Ongoing*	*Moved from MH 1*	*2010 HMP Brought Forward: Conduct a structural assessment of the Fourth of July Creek dike.*
		City	*Ongoing*	*Moved from MH 1*	*2010 HMP Flood Education Brought Forward: Obtain ongoing permits for the Lowell Creek outfall sediment and erosion control program.*
		City	*Ongoing*	*Moved from FL 5*	*2010 HMP Coastal Education Brought Forward: Maintain the rock barrier located in the Waterfront Park area.*
		City	*Ongoing*	*Moved from FL 5*	*2010 HMP Coastal Education Brought Forward: Maintain or redesign rip-rap barriers along Lowell Point Road.*
		City	*Ongoing*	*Moved from FL 5*	*2010 HMP Coastal Education Brought Forward: Dredging operations to remove debris and fill at the head of Resurrection Bay near the airport.*
		City	*Ongoing*	*Moved from FL 5*	*2010 HMP Coastal Education Brought Forward: Cover the underground electric line to Lowell Point with concrete*
EQ4	*Reduce potential Earthquake (EQ) vulnerability, damage, and loss.*	*City*	*Ongoing*	*Keep in EQ 4*	*2010 HMP Brought Forward: Evaluate critical public facilities with significant seismic vulnerabilities and complete retrofit. (e.g. evaluate fire stations, public works buildings, potable water systems, wastewater systems, electric power systems, and bridges, etc.)*
		City, SBCFSA, KPB	Selected	New	From: 2013 SBCFSA: Install non-structural seismic restraints for large furniture such as bookcases, filing cabinets, heavy televisions, and appliances to prevent toppling damage and resultant injuries to small children, elderly, and pets.
		City	Ongoing	Consider integrating this within MH3	*2010 HMP Brought Forward:* Earthquake proof priority structures (schools, city buildings, public safety offices, etc.) This project requires involving many government entities and structural assessments. Where possible, integrate Earthquake resistant building technology to mitigate damage.
FL 5	*Reduce potential Flood and erosion (FL) vulnerability, damage, and loss.*	City, SBCFSA, Erosion	Selected	New	From: 2013 SBCFSA: Develop mitigation initiatives such as: rip-rap (large rocks), sheet pilings, gabion baskets, articulated matting, concrete, asphalt, vegetation, or other armoring or protective materials to provide river bank and coastal erosion protection.
		City, SBCFSA Erosion	Selected	New	From: 2013 SBCFSA: Harden culvert entrance bottoms with concrete, rock, or similar material to reduce erosion or scour.

Table 7-7 Mitigation Goals and Potential Actions

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Goal No.	Goal Title	Authority	Status: Considered, Selected Complete, Deferred, Deleted, or Ongoing	Explain any Status Changes	Description
		City, SBCFSA Erosion	Selected	New	From: 2013 SBCFSA: Harden and/or retrofit existing levees per USACE guidelines.
		SBCFSA	Selected	New	From: 2013 SBCFSA: Pursue federal and state funding to improve and update Flood Insurance Rate Maps (FIRMs), as well as other maps and plans that may be more appropriate, such as Drainage Plans, Sediment Management Plans, or Watershed Management Plans in order to meet other goals.
		SBCFSA	Selected	New	From: 2013 SBCFSA: *Identify and list repetitively flooded structures and infrastructure, analyze the threat to these facilities, and raise mitigation action priorities.*
		City, SBCFSA	Selected	New	From: 2013 SBCFSA: *Establish flood mitigation priorities for critical facilities, residential structures, and commercial buildings located within the identified flood hazard area(s) (100- and 500-year floodplains, stormwater, etc.) based on current base flood elevation (BFE) and survey elevation data.*
		SBCFSA	Selected	New	From: 2013 SBCFSA: *Determine and implement most cost effective and feasible mitigation actions for locations with repetitive flooding, significant historical damages, or road closures.*
		City, SBCFSA	Selected	New	From: 2013 SBCFSA: *Obtain an exemption to the Alaska Department of Natural Resources (DNR) Material Sales Fees on navigable rivers and streams and state lands for sediment and debris management, stream channel maintenance, and flood control or other flood mitigation projects.*
		SBCFSA	Selected	New	From: 2013 SBCFSA: *Evaluate each watershed to develop land use plans for removing and storing creek bed load to:* • *Perform periodic sediment management/bed load removal as necessary.* • *Identify and permit fill areas for future flood-free development sites.* • *Identify storage sites that limit gravel transportation costs.* • *Construct debris basins or other debris catchment devices to retain debris to prevent downstream drainage structure clogging.* • *Seek funding for sediment and debris management*
		SBCFSA	Selected	New	From: 2013 SBCFSA: *Increase size and improve design to increase culvert/ stream crossing drainage capacity and/or efficiency. Specific locations that would benefit from improvement include:* • *Bear Creek at Bear Lake Rd (culvert)* • *Grouse Creek at Que Sera Drive (bridge)* • *Kwechak Creek at Bruno Road (bridge)*

Table 7-7 Mitigation Goals and Potential Actions

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Goal No.	Goal Title	Authority	Status: Considered, Selected Complete, Deferred, Deleted, or Ongoing	Explain any Status Changes	Description
					• *Sawmill Creek at Nash Road (bridge)* • *Salmon Creek at Nash Road (bridge)* • *Clear/Salmon Creek at Alaska Railroad north of Nash Road (culverts)* • *Lost/Salmon Creek at Seward Highway MM 5.9 (bridge)* • *Lost/Salmon Creek at the Alaska Railroad adjacent to Seward Highway MM 5.9 (bridge)*
		City and SBCFSA	Selected	New	From: 2013 SBCFSA: *Acquire and maintain stream flow and rainfall measuring gages.*
		City	*Ongoing*	*As opportunities arise*	*2010 HMP Brought Forward:* *Coordinate with the US Army Corps of Engineers as they develop a project to upgrade, replace or find an alternative to the Lowell Creek diversion tunnel and it's resulting out-flow sediment build up, and maintain access to the tunnel.*
		City	*Completed.*	*Remove*	*2010 HMP Brought Forward:* *Consider land use code regulation changes to more effectively guide development and floodplain use. Evaluate certain areas for additional preventative measures. The city subdivision regulations which govern the division of land for sale or development should include floodplain regulations. The floodplain regulations should be incorporated into the Alaska Coastal Management Program (ACMP) and the Seward Comprehensive Plan.*
		City Coastal Er	*Completed*	*Remove*	*2010 HMP Coastal Erosion Brought Forward:* *Build a protective barrier south of the Seward Marine Industrial Center (SMIC) for erosion control.*
		City	*Completed*	*Remove*	*2010 HMP Brought Forward:* *Complete wave barrier at the ship lift located in SMIC.*
GF 6	Reduce vulnerability, damage, or loss of structures from ground failure.	SBCFSA, City	Selected	New	From: 2013 SBCFSA: Install wire matting, debris catchment structure, cliff stabilization etc. to prevent Lowell Canyon Creek diversion tunnel obstruction and diversion dam overtopping from landslide debris, woody vegetation, trees, etc.
		SBCFSA	Selected	New	Develop vegetation projects to restore clear-cut and riverine erosion damage and to restore slope stability in avalanche and landslide areas.
		City	*Ongoing*	*As funding becomes available*	*2010 HMP Brought Forward:* *Create safe parking areas along Lowell Point Road for vehicles.*
		City	*Ongoing*	*As funding becomes available*	*2010 HMP Brought Forward:* *Establish a retaining structure in Lowell Canyon to prevent avalanches from disrupting city water storage system.*
		City	*Ongoing*	*As funding becomes available*	*2010 HMP Brought Forward:* *Design and develop a new generation of diversion structures and flexible transmission poles to bend with the snow impact.*

Table 7-7 Mitigation Goals and Potential Actions

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Goal No.	Goal Title	Authority	Status: Considered, Selected Complete, Deferred, Deleted, or Ongoing	Explain any Status Changes	Description
		City	*Completed.*	*Remove*	*2010 HMP Brought Forward:* *Place one electrical supply circuit underground across the Lagoon in an old waterline.*
		City	*Ongoing*	*Combined six action items into one and reworded*	*2010 HMP Brought Forward:* *Create redundancies within electrical infrastructure to reduce the risk of prolonged power outages by completing the following projects:* • *Complete an underground electrical supply circuit over Dairy Hill and through Two Lakes Park.* • *Complete an underground circuit from the South Harbor expansion to Jefferson along Ballaine Blvd.* • *Complete the SMIC electrical loop along Sorrel Rd.* • *Complete the electrical loop along Alemeda St. To Leirer Rd.* • *Complete the underground electrical loop on Lowell Pt. from Beach Drive to Lowell Pt. Rd., and the loop from Shady Ln. to Beach Dr.* • *Underground more of the distribution lines in avalanche areas, ex. Seward Hwy. Mile 22*
TS 7	See tsunami related projects in MH 1and WX 9				
VO 8	Reduce vulnerability, damage, or loss of structures from volcanic debris impacts	*City*	*Ongoing*	*Reworded*	*2010 HMP Brought Forward:* *Refer to KPB Hazard Mitigation Plan for volcano mitigation initiative guidance.*
		City	*Ongoing*	*Reworded*	*2010 HMP Brought Forward:* *Identify critical facilities risks and needs before, during and after an ash fall*
WX 9	Reduce vulnerability, damage, or loss of structures from severe weather damage.	SBCFSA, City, KPB	Selected	New	From: 2013 SBCFSA: Develop and implement tree clearing mitigation programs to keep trees from threatening lives, property, and public infrastructure from severe weather events.
		SBCFSA, City, KPB	Selected	New	From: 2013 SBCFSA: Develop, implement, and maintain partnership program with electrical utilities to use underground utility placement methods where possible to reduce or eliminate power outages from severe winter storms. Consider developing incentive programs.
		City	*Ongoing*	*As funding becomes available*	*2010 HMP Brought Forward:* *Rebuild the old transmission line sections in Lawing, Boulder Creek, and Lakeview to current distribution standards (its current use) so that it will withstand known weather conditions.*
		City	*Ongoing*	*As funding becomes available*	*2010 HMP Brought Forward:* *Rebuild the double Circuit line from Dimond Blvd. to Dairy Hill Rd to withstand known weather conditions.*
		City	*Ongoing*	*Reworded*	*2010 HMP Brought Forward:* *Install ~~AWS (Alaska Weather System)~~ **NOAA** radios in public buildings. These radios will also broadcast tsunami watches and warnings.*

Table 7-7 Mitigation Goals and Potential Actions

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Goal No.	Goal Title	Authority	Status: Considered, Selected Complete, Deferred, Deleted, or Ongoing	Explain any Status Changes	Description
WF 10		*City*	*Ongoing*	*No available resources*	*2010 HMP Brought Forward: Install EMWIN (Emergency Managers Weather Information Network), from the National Weather Service into the police dispatch area.*
	Reduce vulnerability, damage, or loss of structures from wildland fires.	*City*	*Ongoing*	*As project opportunities arise*	*2010 HMP Brought Forward: Acquire permission to clear hazard, and potentially hazardous trees beyond the permit area for the transmission line from Dave's Creek to Grouse Lake from the State and the USFS.*
		City	*Ongoing*	*As funding becomes available*	*2010 HMP Brought Forward: Clear the trees from the newly acquired permission areas and the brush within the permitted area.*
EC 11	*Reduce potential Economic (EC) vulnerability, damage or loss*	*City*	*Delete*	*This hazard no longer tracked*	*2010 HMP Brought Forward: Partner with the Kenai Peninsula Borough and the Seward Chamber of Commerce to develop a business continuity plan for critical facilities.*
TQ 12	Reduce potential Technological (TQ) vulnerability, damage, or loss	*City*	*Ongoing*	*Discussed during planning and community meetings*	*2010 HMP Brought Forward: Encourage sites to meet standards/regulations for all reportable hazard materials quantity.*
		City	*Ongoing*	*As funding is available*	*2010 HMP Brought Forward: Encourage installing utilidors to protect future pipelines during large renovation, repairs, or after a disaster.*

7.5 EVALUATING AND PRIORITIZING MITIGATION ACTIONS

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

DMA 2000 Requirements: Mitigation Strategy - Implementation of Mitigation Actions
ELEMENT C. MITIGATION STRATEGY
C5. Does the Plan contain an action plan that describes how the actions identified will be prioritized (including cost benefit review), implemented, and administered by each jurisdiction? (Requirement §201.6(c)(3)(iv)); (Requirement §201.6(c)(3)(iii))
Source: FEMA, March 2015

DMA 2000 requirements for implementing tribal governance regulations for prioritizing, implementing and administering the mitigation action plan.

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

The MAP represents mitigation projects and programs the city and tribe could implement to potentially reduce damaging hazard impacts to both current and future infrastructure and buildings.

The planning team prioritized Table 7-7 mitigation actions on March 19, 2019 to determine how they would best fulfill city and tribal needs. The MAP represents mitigation projects and programs to be implemented during this HMP's five-year life cycle. To complete this task, the planning team first prioritized the hazards that were regarded as the most significant within the community (earthquake, flood, ground failure, tsunami, volcano, weather, and wildland fire).

The planning team reviewed the simplified social, technical, administrative, political, legal, economic, and environmental (STAPLEE) evaluation criteria (Table 7-8) and the Benefit-Cost Analysis Fact Sheet (Appendix F) to consider the opportunities and constraints of implementing each particular mitigation action. For each action considered for implementation, a qualitative statement is provided regarding the benefits and costs and, where available, the technical feasibility. A detailed cost-benefit analysis is anticipated as part of the application process for those projects the city and tribe choose to implement.

Table 7-8 Evaluation Criteria for Mitigation Actions

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

On March 19, 2019, the hazard mitigation planning team prioritized 64 natural and 2 technological hazard mitigation actions that were selected to carry forward into the MAP.

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

- High priorities are associated with actions for hazards that impact the city and tribe on an annual or near annual basis and generate impacts to critical facilities and/or people.
- Medium priorities are associated with actions for hazards that impact the city and tribe less frequently, and do not typically generate impacts to critical facilities and/or people.
- Low priorities are associated with actions for hazards that rarely impact the city or tribe and have rarely generated documented impacts to critical facilities and/or people.

Prioritizing the mitigation actions within the MAP matrix (Table 7-10) was completed to provide the Seward MJHMP participants with an implementation approach. The city and tribe will primarily focus their mitigation efforts on their high priority initiatives as funding becomes available. Unfortunately, DHS&EM has insufficient funding for large (high priority) projects but can fund smaller projects. Therefore, due to limited available community funding sources, the city and tribe can strive to develop comprehensive but easily divided projects known as Phase Funded Projects. These projects can be easily divided among similar but smaller projects with an overarching major or complex project's categories to more easily fit within smaller available fund categories.

7.6 MITIGATION ACTION PLAN

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

DMA 2000 Requirements: Mitigation Strategy - Implementation of Mitigation Actions
ELEMENT C. MITIGATION STRATEGY
C5. Does the Plan contain an action plan that describes how the actions identified will be prioritized (including cost benefit review), implemented, and administered by each jurisdiction? (Requirement §201.6(c)(3)(iv)); (Requirement §201.6(c)(3)(iii))
Source: FEMA, March 2015.

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

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

The city and tribe have vastly different management structures. The city has a mayor led city council that is managed by a strong city manager structure. The Qutekcak Tribal Administrator leads the Qutekcak Tribal Council. These processes enable each jurisdiction to maximize governance capacity, coordinate project prioritization, commit needed resources, and closely monitor their diverse budgets.

City and tribal mitigation project selection requires different implementation and management processes due to their government authorities. City governments have specific authorities, laws,

and regulations that qualify them to apply for federal agency grants intended only for organized city or borough governments.

Tribal governments are not eligible for the same grants; they have specialized government-to-government specific grant opportunities provided by FEMA, the BIA as well as many other agency grant programs designated only for Indian or IRA tribes.

The Seward MHJHMP's Mitigation Strategy describes and delineates their respective capabilities and responsibilities. For example, the city and tribal officers are listed as the responsible "Agent" or "Authority." It is understood that each government's agency will seek grants to repair infrastructure that they own and are responsible for building or repairing using their respective grant programs to fulfilling grant specific and awarding agency implementation and management processes or requirements.

The MJHMP Mitigation Strategy, Table 7-10 contains their Joint MAP. Responsible Office will be either the city or tribal government's office. Their respective offices could conceivably receive funding to accomplish similar projects to improve their respectively managed initiatives or owned infrastructure.

Table 7-9 lists the acronyms used in the MAP (Table 7-10). See Appendix A for more compete yet summarized funding agency resource descriptions.

Table 7-9 Potential Funding Source Acronym List

(See complete funding resource description in Appendix A)

City of Seward City Office (City)

Qutekcak Tribal Council Office (Tribe)

US Department of Homeland Security (DHS)
Citizen Corps Program (CCP)
Emergency Operations Center (EOC)
Homeland Security Grant Program (HSGP)
Emergency Management Performance Grant (EMPG)

Federal Management Agency (FEMA)
Hazard Mitigation Assistance Grant Programs (HMA)
Emergency Management Program Grant (EMPG)

National Oceanic and Atmospheric Administration (NOAA)

USDA, Natural Resources Conservation Service (NRCS)
Emergency Watershed Protection Program (EWP)

Assistance to Native Americans (ANA)

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

Division of Homeland Security and Emergency Management (DHS&EM)
Mitigation Section (for PDM & HMGP projects and plan development)
Preparedness Section (for community planning)
State Emergency Operations Center (SEOC for emergency response)

Alaska Department of Community, Commerce, and Economic Development (DCCED)
Division of Community and Regional Affairs (DCRA)/
Alaska Climate Change Impact Mitigation Program (ACCIMP)

Alaska Department of Transportation (DOT/PF)
State road repair funding

Alaska Energy Authority (AEA)

Alaska Department of Environmental Conservation (DEC)

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

The MAP lists the city and tribe's projects and initiatives to address their various hazard impact threats. Table 7-10 defines how each mitigation action will be implemented and administered by the individual city and tribal governments.

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

Note: *The actions are applicable to both the city and the tribe. Therefore, the MAP, Table 7-10, identifies the "responsible office" for implementation as whether the city office or tribal office (or designated alternate) as responsible for grant management for each project grant received for their specific organization.*

Table 7-10 The Seward Area's Combined Mitigation Action Plan (MAP)

(Blue Italicized Initiatives were brought forward from the legacy 2010 HMP)

(See Table 7-9 Potential Funding Agency list and Appendix 9 for agency programmatic details)

Goal/ Action ID	Description	Priority (High, Medium, Low)	Responsible Office or Agency	Potential Funding Source(s)	Timeframe (1-3 Years 2-4 Years 3-5 Years)	Benefit-Costs (BC) / Technical Feasibility (T/F)
Multi-Hazard (MH)						
MH 1.1	From: 2013 SBCFSA: *Identify and pursue funding opportunities to implement mitigation actions, including erosion and sediment control projects.*	High	City Office, Tribal Council Office, or KPB Development Office as applicable	City, Tribe, (See Appendix A)	Ongoing	B/C: This ongoing activity is essential for the City as there are limited funds available to accomplish effective mitigation actions. TF: This activity is ongoing demonstrating its feasibility.
MH 1.2	From: 2013 SBCFSA: *Publicize and educate residents of the service area about existing natural hazards and mitigation actions by:* • *Periodically organizing a Natural Hazards Workshop for homeowners and businesses* • *Provide information on the all-hazard benefits of modern building code compliance during rehabilitation or major repairs of buildings* • *Provide information on structural and non-structural retrofitting, including techniques and funding sources for elevating structures, wet and dry flood proofing, relocating structures, floodwalls, and other protective measures* • *Disseminate information to educate the public on:* ○ *Flood insurance* ○ *Natural and beneficial floodplain functions* ○ *Mitigation, preparedness, and safety procedures for identified hazards*	Medium	City Office, Tribal Council Office, or KPB Development Office as applicable	City, Tribe, FEMA HMA, AFG, FP&S, SAFER, ANA, EEFSP, Lindbergh, Rasmussen, Denali	1-3 years	B/C: Sustained mitigation outreach program has minimal cost and will help build and support area-wide capacity. This type activity enables the public to prepare for, respond to, and recover from disasters. Flood hazard mitigation is among FEMA's highest national priorities. FEMA desires communities focus on repetitive flood loss properties. This activity will ensure the City and Tribal Councils focus on priority flood locations and projects. TF: This low cost activity can be combined with recurring community meetings where hazard specific information can be presented in small increments. This activity is ongoing demonstrating its feasibility.

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	○ *Hazard warnings and evacuation procedures* ○ *Evacuation routes away from high hazard areas*					
MH 1.3	From: 2013 SBCFSA: *Strive to formalize a Hazard Mitigation Planning Team to develop a sustainable process for implementing, monitoring, reviewing, and evaluating community wide mitigation actions.*	Low	City Office, Tribal Council Office, SBCFSA, or KPB Development Office as applicable	City, Tribe, SBCFSA	Ongoing	B/C: The existing team has gained experienced throughout this process which can provide invaluable insight for ensuring a sustained effort toward mitigating natural hazard damages. TF: This is feasible to accomplish as no cost is associated with the action and only relies on member availability and willingness to serve their community.
MH 1.4	*2010 HMP Brought Forward: Conduct community mock emergency exercises and evaluate response (earthquake, tsunami, etc.).*	*Medium*	*City Office, Tribal Council Office, or KPB Development Office as applicable*	*City, Tribe, FG, FP&S, SAFER*	*Ongoing*	*B/C: Sustained emergency response planning, notification, mitigation, exercise and outreach programs have minimal cost and will help build and support community capacity enabling the public to prepare for, respond to, and recover from disasters.* *TF: This project is technically feasible using existing City staff*
MH 1.5	*2010 HMP Brought Forward: Continue working with FEMA and other Federal and State Agencies as the FIRMs are updated and researching other tools for accurately forecasting and mitigating Seward's complex alluvial fan flood problem. Provide local realtors and lending institutions with GIS copies of FIRM as they are updated.*	High	*City Office, Tribal Council Office, or KPB Development Office as applicable*	*City, DCRA, FEMA NFIP, and Risk Map Coordinator*	*Ongoing*	*B/C: NFIP participation while one of FEMA's highest priorities also enables communities with an effective program focus on repetitive flood loss properties and other priority flood locations and projects to also receive CRS credit to lower flood insurance rates.* *TF: City is currently a member and residents enjoy lower cost insurance. Continuation is relatively simple.*
MH 1.6	*2010 HMP Brought Forward: Continue working with FEMA to obtain the latest NFIP information*	*Medium*	*City Office, Tribal Council Office, or KPB*	*City, DCRA, FEMA NFIP, and Risk Map Coordinator*	*Ongoing*	*B/C: NFIP participation while one of FEMA's highest priorities also enables communities with an effective program*

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Goal/ Action ID	Description	Priority (High, Medium, Low)	Responsible Office or Agency	Potential Funding Source(s)	Timeframe (1-3 Years 2-4 Years 3-5 Years)	Benefit-Costs (BC) / Technical Feasibility (T/F)
	and scheduling workshops.		*Development Office as applicable*			*focus on repetitive flood loss properties and other priority flood locations and projects to also receive CRS credit to lower flood insurance rates.* *TF: City is currently a member and residents enjoy lower cost insurance. Continuation is relatively simple.*
MH 1.7	*2010 HMP Brought Forward: Continue the City's efforts working with potential partners or agencies to provide publication and outreach services by:* • *Coordinating flood proofing or elevating workshops with FEMA for the City and public* • *Providing floodplain building regulation information, updates, or revisions to the citizens of Seward* • *Providing new homeowners, builders or renovators a brochure detailing the fuel tank stand codes helping to insure they're more flood/earthquake prepared.* • *Continuing to provide public education concentrating on the Emergency Alert Network and Siren Alert and Warning System; what it means and what to do in the event of an emergency.* • *Continue refining the education and outreach programs to notify current homeowners and potential homebuyers about flood hazard risks in identified*	*Low*	*City Office, Tribal Council Office, or KPB Development Office as applicable*	*City, DCRA, FEMA NFIP, and Risk Map Coordinator*	*Ongoing*	*B/C: NFIP participation while one of FEMA's highest priorities also enables communities with an effective program focus on repetitive flood loss properties and other priority flood locations and projects to also receive CRS credit to lower flood insurance rates.* *Sustained emergency warning, communication, and response activity capabilities enable communities to warn and protect their hazard threatened populations.* *This project will help build and support community capacity enabling the public to prepare for, respond to, and recover from disasters.* *TF: City is currently a member and residents enjoy lower cost insurance. Continuation is relatively simple.* *This project is technically feasible using existing City staff*

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	areas. • *Making public announcements using the utility billing memo and the scanner announcement page with GCI cable TV and KPFA 91.7 FM.* • *Hold FireWise workshop to educate residents and contractors concerning fire resistant landscaping.* • *Work with industry operators to educate the public on potential hazards and develop strategies for response, evacuation, and containment.* • *Provide public education on the effects of severe weather.*					
MH 1.8	*2010 HMP Brought Forward: Revise **tsunami inundation hazard** prediction maps as needed after an event or disaster.*	*Medium*	*City Office, Tribal Council Office, or KPB Development Office as applicable*	*City, Tribe, FEMA HMA, NRCS, USACE*	*Ongoing*	*B/C: Identifying threatened infrastructure proximity to natural hazards is vital to their sustainability. There are currently few mapped hazard areas. This is a vital first step. This knowledge will help the community focus on activities to protect their vital infrastructure.* *TF: This project is feasible using contractor surveying and map development expertise.*
MH 1.9	*2010 HMP Brought Forward: Make sure that accurate information is given to agencies that are responsible for dissemination of information concerning the City of Seward or other government agencies.* • *Make concise information available to the public about*	*Medium*	*City Office, Tribal Council Office, or KPB Development Office as applicable*	*City, Tribe, Chamber of Commerce, Lions & Rotary Clubs, etc.*	*Ongoing*	*B/C: This action assures that all government actions are accurate, effective, and timely communicated.* *TF: Low to no cost makes this a very feasible initiative to successfully educate large populations.*

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Goal/ Action ID	Description	Priority (High, Medium, Low)	Responsible Office or Agency	Potential Funding Source(s)	Timeframe (1-3 Years 2-4 Years 3-5 Years)	Benefit-Costs (BC) / Technical Feasibility (T/F)
	local industry concerning any government control. • *Provide accurate and timely information to public groups with business interests.*					
MH 1.10	*2010 HMP Brought Forward: Inform public of availability of Automatic Weather System (AWS) radios, in preparation of potential weather advisories.*	*Medium*	*City Office, Tribal Council Office,*	*City, Tribe, FEMA, AFG, FP&S, RFAG, SAFER, HSEP*	*Ongoing*	*B/C: Sustained emergency response planning, notification, mitigation, exercise and outreach programs have minimal cost and will help build and support community capacity enabling the public to prepare for, respond to, and recover from disasters.* *TF: This project is technically feasible using existing City staff*
MH 2.1	From: 2013 SBCFSA: *Incorporate mitigation planning provisions to improve flood and erosion hazard aspects in permit application input to residents and review recommendations to regulatory agencies, land use decisions, subdivision actions, and KPB/ City of Seward Plans (KPB All-Hazards Plan, Comprehensive Plan, Land Use Plan, Coastal Management, Wetlands Management, Capital Improvement, Seward Long-term Development Plan).*	High	City Office, Tribal Council Office, SBCFSA, or KPB Development Office as applicable	SBCFSA, City, KPB, DOT/PF, ARRC	Ongoing	B/C: Coordinated planning ensures effective damage abatement and ensures proper attention is assigned to reduce losses and damage to structures and City residents. TF: This is technically feasible because it requires application of knowledge of the hazard mitigation plan and other planning efforts. Feasibility is reliant on technical skills already possessed by employees holding positions that would implement this action.
MH 2.2	From: 2013 SBCFSA: *Establish a cooperative relationship with the SBCFSA to ensure hazard mitigation efforts are not being*	High	City Office, Tribal Council Office, SBCFSA, or KPB	SBCFSA, City	Ongoing	B/C: Coordinated planning ensures effective damage abatement and ensures proper attention is assigned to reduce losses and damage to structures and City

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	duplicated or opportunities missed.		Development Office as applicable			residents. TF: This is feasible to accomplish as no cost is associated with the action and only relies on member availability and willingness to serve their community.
MH 2.3	From: 2013 SBCFSA: *Create a baseline assessment on Lowell Point Road, existing infrastructures and the feasibility of culvert/ditch line installation.*	High	City Office, Tribal Council Office, SBCFSA, or KPB Development Office as applicable	City, SBCFSA	Ongoing	B/C: Coordinated planning ensures effective damage abatement and ensures proper attention is assigned to reduce losses and damage to structures and City residents. TF: This is feasible to accomplish as no cost is associated with the action and only relies on member availability and willingness to serve their community.
MH 2.4	*2010 HMP Brought Forward: Develop, incorporate, and enforce building ordinances to reflect survivability from flood, fire, wind, seismic, tsunami, and other hazards to ensure occupant safety.*	*Medium*	*City Office, Tribal Council Office, or KPB Development Office as applicable*	*City, Tribe, Denali Commission, DHS&EM DCRA, DOF, FEMA, HSEP*	*Ongoing*	*B/C: Coordinated planning ensures effective damage abatement and ensures proper attention is assigned to reduce losses and damage to structures and City residents.* *TF: This is technically feasible because it requires application of knowledge of the hazard mitigation plan and other planning efforts. Feasibility is reliant on technical skills already possessed by employees holding positions that would implement this action.*
MH 2.5	From: 2013 SBCFSA: *The City of Seward should continue improving its NFIP Community Rating System, under the Federal Insurance Administration's Community Rating System (CRS) by exceeding the required standards to*	High	City Office, Tribal Council Office, or KPB Development Office as applicable	City, Tribe	1-3 years	B/C: NFIP participation while one of FEMA's highest priorities also enables communities with an effective program focus on repetitive flood loss properties and other priority flood locations and projects.

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	obtain further flood insurance premium reductions for policyholders within communities while simultaneously reducing flood losses.					TF: City is currently a member and residents enjoy lower cost insurance. Continuation is relatively simple.
MH 2.6	*2010 HMP Brought Forward: Identify avalanche areas within the city and generate GIS Hazard Maps. Coordinate with Community Development Office on locations of areas for any zoning issues.*	*Low*	*City Office, Tribal Council Office, or KPB Development Office as applicable*	*City, Tribe, HMA, NOAA, AFG, FP&S, SAFER, ANA, EFSP, NRCS*	*Ongoing*	*B/C: Identifying threatened infrastructure proximity to natural hazards is vital to their sustainability. Providing advanced warning of pending disasters further reduces life loss and potentially can reduce damage if quick action is possible to mitigate the impact.* *TF: The project is technically feasible as the community has staff and resources they have used to relocate and elevate buildings.*
MH 2.7	*2010 HMP Brought Forward: Develop and implement programs to coordinate maintenance, mitigation and response activities as indicated in the City's Emergency Operations Plan.*	*Medium*	*City Office, Tribal Council Office, or KPB Development Office as applicable*	*City, Tribe, NOAA, NWS*	*Ongoing*	*B/C: Sustained emergency warning, communication, and response activity capabilities enable communities to warn and protect their hazard threatened populations.* *This project will help build and support community capacity enabling the public to prepare for, respond to, and recover from disasters.* *TF: This project is technically feasible using existing City staff*
MH 3.1	From: 2013 SBCFSA: *Relocate or acquire (buy-out and demolish) properties/structures away from hazard prone areas (erosion, flood, ground failure, etc.)*	Low	City Office, Tribal Council Office, or KPB Development Office as applicable	City, Tribe, Denali Commission, Division of Community and Regional Affairs (DCRA), FEMA/HMA	Ongoing	B/C: This project will ensure the community looks closely at their hazard areas to ensure they can safely evacuate their residents and visitors to safety during a natural hazard event. TF: This is technically feasible using

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						existing city and tribal resources.
MH 3.2	*2010 HMP Brought Forward: Harden utility headers located along river embankments to mitigate potential flood, debris, and erosion damages.*	*Low*	*City Office, Tribal Council Office, or KPB Development Office as applicable*	*City, Tribe, HMA, Natural Resources Conservation Service (NRCS), ANA, USACE, USDA, Lindbergh Grants Program*	*Ongoing*	*B/C: This project would ensure threatened infrastructures are available for use – there loss would exacerbate potential damages and further threaten survivability.* *TF: This project is feasible using existing staff skills, equipment, and materials.*
MH 3.3	*2010 HMP Brought Forward: Purchase and install generator for AVTEC with main power distribution disconnect switch.*	*High*	*City Office, Tribal Council Office, or KPB Development Office as applicable*	*City, Tribe, Lindbergh Grants Program, HMA, FP&S, SAFER, ANA, Department of Homeland Security (DHS), Homeland Security Grant Program (HSGP) Citizen Corps Program (CCP), Emergency Management Performance Grant (EMPG), Emergency Operations Center (EOC)*	*1-5 years*	*B/C: Emergency power generation is a minor cost to ensure utility availability for use after a hazard strikes.* *TF: Installing emergency generators is technically feasible for this community as they already have staff to maintain existing community power generation facilities. This project typically needs to be associated with essential facility upgrades for FEMA funding*
MH 3.4	From: 2013 SBCFSA: *Perform hydrologic and hydraulic engineering, drainage, and bed loading studies and analyses for each watershed. Use information obtained for feasibility determination and project design. This information should be a key component, directly related to a proposed project in order to qualify for FEMA funding.* • *Spruce Creek: evaluate the flow capacity of the flood*	High	City Office, Tribal Council Office, or KPB Development Office as applicable	City, Tribe, HMA, Natural Resources Conservation Service (NRCS), ANA, USACE, USDA, Lindbergh Grants Program	3-5 years	B/C: Improving water flow and containment capability will greatly reduce potential infrastructure and residential losses. Project costs would outweigh replacement costs of lost facilities. Hardening or relocating infrastructure to reduce flood and scour related impacts reduces potential future damages and replacement costs. TF: The community has the skill to implement this action. Specialized skills

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	control corridor and determine sedimentation rates. Use this information to develop a plan to preserve the flood control corridor and to create a long term maintenance strategy and funding plan. • *Scheffler Creek: conduct a geomorphic investigation to determine the size, frequency, and potential deposition characteristics of future debris flows. Use this information to develop a plan to preserve the flood control corridor and to create a long-term maintenance strategy and funding plan.*					may need to be contracted-out with materials and equipment barged in depending on the method selected.
MH 3.5	*2010 HMP Brought Forward: Assess the City's Emergency Operations Center (EOC) to coordinate planning and logistical efforts in dealing with the emergency.*	*Medium*	*City Office, Tribal Council Office, or KPB Development Office as applicable*	*City, Tribe, FEMA, AFG, FP&S, RFAG, SAFER, HSEP*	*Ongoing*	*B/C: Sustained emergency response planning, notification, mitigation, exercise and outreach programs have minimal cost and will help build and support community capacity enabling the public to prepare for, respond to, and recover from disasters.* *TF: This project is technically feasible using existing City staff*
MH 3.6	From: 2013 SBCFSA: *Develop a vegetation management plan addressing slope-stabilizing root strength to maintain or encourage precipitation containment and to restore slope*	Medium	City Office, Tribal Council Office, or KPB Development Office as applicable	City, Tribe, Denali Commission, Division of Community and Regional Affairs (DCRA)	1-3 years	B/C: Land Use plans are an essential community development and land management tool. Focused and coordinated planning enables effective damage abatement and ensures proper attention is assigned to reducing losses,

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	stability in avalanche and landslide areas.					damage, and injuries; and strengthens materials management. TF: This action is feasible with limited fund expenditures.
MH 3.7	*2010 HMP Brought Forward:* *Acquire land within the city to develop a secondary evacuation route that bypasses the Seward lagoon and boat harbor areas. Provide barriers to this route and designate it as a recreational trail for use outside of emergency access. (Planning and Zoning Commission, May 6, 2004)* *2010 Update: Land has been designated in January. The survey of the route is scheduled to be accomplished in the spring of 2010.*	*Medium*	*City Office, Tribal Council Office, or KPB Development Office as applicable*	*City, Tribe, HMA, Natural Resources Conservation Service (NRCS), ANA, USACE, USDA, Lindbergh Grants Program*	*Ongoing*	*B/C: This project would remove threatened structures from hazard areas, eliminating future damage while keeping land clear for perpetuity.* *TF: This project is feasible using existing staff skills, equipment, and materials. Acquiring contractor expertise may be required for large facilities.*
MH 3.8	*2010 HMP Coastal Erosion Brought Forward:* *Current mitigation measures required at Waterfront Park include* • *Repairing, maintaining and redesigning the rock barrier located in the Waterfront Park area and,* • *Implementing a regenerative program of our native Beach Rye Grass (Elymus arenarius) by aggressively replanting, relocating city campground fire pits, implementing educational signage to redirect foot and*	*Medium*	*City Office, Tribal Council Office, or KPB Development Office as applicable*	*City, Tribe, HMA, ANA, Denali Commission, NRCS, USACE, USDA/EWP, USDA/ECP, DCRA/ ACCIMP*	*2-4 years*	*B/C: Relocating, repairing, redesigning, and improving waterfront terrain will increase water flow capability greatly reducing potential coastal erosion and infrastructure and residential losses. Project costs would outweigh residential and facility replacement costs* *TF: The community has the skill to implement this action. Specialized skills may need to be contracted-out with materials and equipment barged in depending on the method selected.*

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	recreational vehicle traffic and installing boulders and other barriers to prohibit vehicles from damaging the coastal vegetation.					
MH 3.9	*2010 HMP Brought Forward: Inspect, prioritize, and retrofit any critical facility or public infrastructure that does not meet current State adopted Building Codes.*	*Medium*	*City Office, Tribal Council Office, or KPB Development Office as applicable*	*City, Tribe, Denali Commission, Division of Community and Regional Affairs (DCRA)*	*1-3 years*	*B/C: Coordinated planning ensures effective damage abatement and ensures proper attention is assigned to reduce losses and damage to structures and City residents.* *TF: This is feasible to accomplish as no cost is associated with the action and only relies on member availability and willingness to serve their community.*
MH 3.10	*2010 HMP Brought Forward: Identify non-buildable sites through the city's land use plan and city zoning maps. *RM Lands adjacent to Dieckgraeff Rd.*	*Medium*	*City Office, Tribal Council Office, or KPB Development Office as applicable*	*City, Tribe, Denali Commission, Division of Community and Regional Affairs (DCRA)*	*1-3 years*	*B/C: Preventing development or remove threatened structures from hazard areas, eliminates future damage while keeping land clear for perpetuity. Coordinated planning supports effective damage abatement initiatives and ensures proper attention is assigned to reduce losses and damage to structures and residents.* *TF: This is feasible to accomplish as no cost is associated with the action and only relies on member availability and willingness to serve their community.*
MH 3.11	*2010 HMP Brought Forward: Conduct a structural assessment of the Fourth of July Creek dike.*	*Medium*	*City Office, Tribal Council Office, or KPB Development Office as applicable*	*City, Tribe, Natural Resources Conservation Service (NRCS), ANA, USACE, USDA, Lindbergh Grants Program*	*Ongoing*	*B/C: Coordinated planning and infrastructure assessments; combined with effective damage abatement ensures proper attention is assigned to reduce losses and damage to properties and infrastructure.* *Sustained mitigation outreach program is*

Table 7-10 The Seward Area's Combined Mitigation Action Plan (MAP)

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						minimal in cost and will help build and support community capacity to enable the public to prepare for, respond to, and recover from disasters. *TF: This action is feasible with limited fund expenditures.*
MH 3.12	*2010 HMP Flood Education Brought Forward:* *Obtain ongoing permits for the Lowell Creek outfall sediment and erosion control program.*	*Medium*	*City Office, Tribal Council Office, or KPB Development Office as applicable*	*City, Tribe, Natural Resources Conservation Service (NRCS), ANA, USACE, USDA, Lindbergh and Rasmussen Grants Program*	*Ongoing*	*B/C: Scheduling maintenance and implementing cost beneficial mitigation activities will potentially reduce severe debris loading, road, bridge, and property damages caused by heavy floods with high water flow.* *This will reduce debris accumulation, encourage water movement from high to low areas; and lessen upstream flood potential.* *TF: This type activity is technically feasible within the community typically using existing labor, equipment, and materials. Specialized methods are not new to rural communities as they are used to importing required contractors.*
MH 3.13	*2010 HMP Coastal Education Brought Forward:* *Maintain the rock barrier located in the Waterfront Park area.*	*High*	*City Office, Tribal Council Office, or KPB Development Office as applicable*	*City, Tribe, HMA, ANA, NRCS, USACE*	*Ongoing*	*B/C: Hardening and improving continuous embankment stability will greatly reduce potential infrastructure and residential losses. Project costs would outweigh facility replacement costs.* *TF: The community has the skill to implement this action. Specialized skills may need to be contracted-out with materials and equipment barged in depending on the method selected.*

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MH 3.14	*2010 HMP Coastal Education Brought Forward:* *Maintain or redesign rip-rap barriers along Lowell Point Road.*	*High*	*City Office, Tribal Council Office, or KPB Development Office as applicable*	*City, Tribe, HMA, ANA, NRCS, USACE*	*Ongoing*	*B/C: Hardening and improving continuous embankment stability will greatly reduce potential infrastructure and residential losses. Project costs would outweigh facility replacement costs.* *TF: The community has the skill to implement this action. Specialized skills may need to be contracted-out with materials and equipment barged in depending on the method selected.*
MH 3.15	*2010 HMP Coastal Education Brought Forward:* *Dredging operations to remove debris and fill at the head of Resurrection Bay near the airport.*	*High*	*City Office, Tribal Council Office, or KPB Development Office as applicable*	*City, Tribe, HMA, NRCS, USACE, USDA/EWP, USDA/ECP, DCRA/Alaska Climate Change Impact Mitigation Program (ACCIMP)*	*Ongoing*	*B/C: The community' Resurrection River carrying capacity is rapidly being lost to river debris and sedimentation accumulation. Bed load accumulation at bridge locations threatens bridge survivability and community access. Reduced access threatens the community's only access road and lifelines.* *Scheduling maintenance and implementing cost beneficial mitigation activities will potentially reduce severe debris loading, road, bridge, and property damages caused by heavy floods with high water flow.* *This will reduce debris accumulation, encourage water movement from high to low areas; and lessen upstream flood potential.* *TF: This project is technically feasible by the funding entities that specialize in this complex hydrological / coastal*

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						engineering project.
MH 3.16	*2010 HMP Coastal Education Brought Forward: Cover the underground electric line to Lowell Point with concrete*	*Low*	*City Office, Tribal Council Office, or KPB Development Office as applicable*	*City, Tribe, HMA, Natural Resources Conservation Service (NRCS), ANA, USACE, USDA, Lindbergh Grants Program*	*1-5 years*	*B/C: Hardening or relocating infrastructure to reduce flood and scour related impacts reduces potential future damages and replacement costs.* *TF: The City has the technical capability to manage and conduct this project.*
Natural Hazards						
EQ 4.1	*2010 HMP Brought Forward: Evaluate critical public facilities with significant seismic vulnerabilities and complete retrofit. (e.g. evaluate fire stations, public works buildings, potable water systems, wastewater systems, electric power systems, and bridges, etc.)*	*Medium*	*City Office, Tribal Council Office, or KPB Development Office as applicable*	*City, Tribe, HMA, ANA, EFSP, DEC/MG&LP*	*2-4 years*	*B/C: Retrofit projects can be very cost effective. Project viability depends on the cost and extent of the modifications.* *A comprehensive BCA needs to be conducted to validate this activity.* *TF: The City will need phase funding to obtain engineering and design expertise to determine project viability.*
EQ 4.2	From: 2013 SBCFSA: *Install non-structural seismic restraints for large furniture such as bookcases, filing cabinets, heavy televisions, and appliances to prevent toppling damage and resultant injuries to small children, elderly, and pets.*	Medium	City Office, Tribal Council Office, or KPB Development Office as applicable	City, Tribe, HMA, ANA, EFSP, DOT/PF	2-4 years	B/C: Non-structural mitigation projects have minimal cost and will help the community reduce recurring earthquake impact damages from future events. TF: This project is technically feasible using existing Tribal Council staff
EQ 4.3	*2010 HMP Brought Forward:* Earthquake proof priority structures (schools, city buildings, public safety offices, etc.) This project requires involving many government entities and structural	*Medium*	*City Office, Tribal Council Office, or KPB Development Office as applicable*	*City, Tribe, FEMA HMA, AFG, VFAG, RFAG FP&S, SAFER, HSEP*	*Ongoing*	*B/C: This project will ensure the community looks closely at their critical facilities' operability to enable them to safely care for their population during and after a damaging earthquake event.* *TF: This is technically feasible using*

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	assessments. Where possible, integrate Earthquake resistant building technology to mitigate damage.					*existing city and tribal resources with assistance from State and Federal agency support and guidance.*
FL 5.1	From: 2013 SBCFSA: *Develop mitigation initiatives such as: rip-rap (large rocks), sheet pilings, gabion baskets, articulated matting, concrete, asphalt, vegetation, or other armoring or protective materials to provide river bank and coastal erosion protection.*	High	City Office, Tribal Council Office, or KPB Development Office as applicable	City, Tribe, HMA, ANA, NRCS, USACE	3-5 years	B/C: Improving embankment and slope stability will greatly reduce potential infrastructure and residential losses. Project costs would outweigh replacement costs of lost facilities. TF: The community has the skill to implement this action. Specialized skills may need to be contracted-out with materials and equipment barged in depending on the method selected.
FL 5.2	From: 2013 SBCFSA: *Harden culvert entrance bottoms with concrete, rock, or similar material to reduce erosion or scour.*	Medium	City Office, Tribal Council Office, or KPB Development Office as applicable	City, Tribe, HMA, ANA, NRCS, USACE	2-4 years	B/C: This retrofit project can be a very cost effective method for bush communities as materials and shipping costs are very high. This project is technically feasible as the community need only demonstrate cost savings by demonstrating losses from history utility impacts and down time.
FL 5.3	From: 2013 SBCFSA: *Harden and/or retrofit existing levees per USACE guidelines.*	Medium	City Office, Tribal Council Office, or KPB Development Office as applicable	City, Tribe, HMA, ANA, NRCS, USACE	2-4 years	B/C: This retrofit project can be a very cost effective method for bush communities as materials and shipping costs are very high. This project is technically feasible as the community need only demonstrate cost savings by demonstrating losses from history utility impacts and down time.
FL 5.4	From: 2013 SBCFSA: *Pursue federal and state funding to improve and update Flood*	Medium	City Office, Tribal Council Office, or KPB	City, Tribe, NRCS, USACE	2-4 years	B/C: Identifying threatened infrastructure proximity to natural hazards is vital to their sustainability. There are currently

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	Insurance Rate Maps (FIRMs), as well as other maps and plans that may be more appropriate, such as Drainage Plans, Sediment Management Plans, or Watershed Management Plans in order to meet other goals.		Development Office as applicable			few mapped hazard areas. This is a vital first step. This knowledge will help the community focus on activities to protect their vital infrastructure. TF: This project is feasible using contractor surveying and map development expertise.
FL 5.5	From: 2013 SBCFSA: *Identify and list repetitively flooded structures and infrastructure, analyze the threat to these facilities, and raise mitigation action priorities.*	Medium	City Office, Tribal Council Office, or KPB Development Office as applicable	City, Tribe, Denali Commission, Division of Community and Regional Affairs (DCRA)	1-3 years	B/C: Repetitive damage reduction is a high priority for FEMA and will therefore benefit the community greatly. Identifying repetitive loss and severe repetitive loss properties is the first step to reducing losses. Coordinated planning ensures effective damage abatement and ensures proper attention is assigned to reduce losses and damage to structures and City residents. TF: This is feasible to accomplish as no cost is associated with the action until appropriate mitigation actions are identified. This activity relies on community member availability and willingness to serve their community.
FL 5.6	From: 2013 SBCFSA: *Establish flood mitigation priorities for critical facilities, residential structures, and commercial buildings located within the identified flood hazard area(s) (100- and 500-year floodplains, stormwater, etc.) based on current base flood elevation (BFE) and survey elevation data.*	High	City Office, Tribal Council Office, or KPB Development Office as applicable	City, Tribe, HMA, NRCS, USACE, USDA/EWP, USDA/ECP, DCRA/ ACCIMP	1-3 years	B/C: Flood hazard mitigation is among FEMA's highest national priorities. FEMA desires communities focus on repetitive flood loss properties. This activity will ensure the City and Tribal Councils focus on priority flood locations and projects. TF: Low to no cost makes this outreach activity very feasible.

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FL 5.7	From: 2013 SBCFSA: *Determine and implement most cost effective and feasible mitigation actions for locations with repetitive flooding, significant historical damages, or road closures.*	Medium	City Office, Tribal Council Office, or KPB Development Office as applicable	City, Tribe, HMA, NRCS, USACE, USDA/EWP, USDA/ECP, DCRA/ ACCIMP	1-3 years	B/C: Flood hazard mitigation is among FEMA's highest national priorities. FEMA desires communities focus on repetitive flood loss properties. This activity will ensure the City and Tribal Councils focus on priority flood locations and projects. TF: Low to no cost makes this outreach activity very feasible.
FL 5.8	From: 2013 SBCFSA: *Obtain an exemption to the Alaska Department of Natural Resources (DNR) Material Sales Fees on navigable rivers and streams and state lands for sediment and debris management, stream channel maintenance, and flood control or other flood mitigation projects.*	High	City Office, Tribal Council Office, or KPB Development Office as applicable	City, Tribe, ANA, DNR, NRCS, Denali Commission, DCRA, USACE	Ongoing	B/C: Sedimentation, glacial till, and other river borne debris is a continual threat to the community from all 15 watershed river outflow sites create excessive bed load causing the water to overflow their embankments. Excess debris will eventually threaten harbor navigation. It is essential to have a recurring sedimentation removal program to prevent excessive build-up and the capability to sell or use the material to improve community infrastructure. T/F: Historical work has proven this project is technically feasible. The community needs the USCA to prioritize and fund the project.
FL 5.9	From: 2013 SBCFSA: *Evaluate each watershed to develop land use plans for removing and storing creek bed load to:* • *Perform periodic sediment management/bed load removal as necessary.* • *Identify and permit fill areas for*	Medium	City Office, Tribal Council Office, SBCFSA, or KPB Development Office as applicable	City, SBCFSA, DNR, NRCS, Denali Commission, DCRA, USACE	2-4 years	B/C: Sedimentation, glacial till, and other river borne debris is a continual threat to the community, Lowell River outflow site, and harbor navigation. It is essential to have a recurring sedimentation removal program to prevent excessive build-up. T/F: Historical work has proven this

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	future flood-free development sites. • *Identify storage sites that limit gravel transportation costs.* • *Construct debris basins or other debris catchment devices to retain debris to prevent downstream drainage structure clogging.* • *Seek funding for sediment and debris management*					project is technically feasible. The community needs the USCA to prioritize and fund the project.
FL 5.10	From: 2013 SBCFSA: *Increase size and improve design to increase culvert/ stream crossing drainage capacity and/or efficiency. Specific locations that would benefit from improvement include:* • *Bear Creek at Bear Lake Rd (culvert)* • *Grouse Creek at Que Sera Drive (bridge)* • *Kwechak Creek at Bruno Road (bridge)* • *Sawmill Creek at Nash Road (bridge)* • *Salmon Creek at Nash Road (bridge)* • *Clear/Salmon Creek at Alaska Railroad north of Nash Road (culverts)* • *Lost/Salmon Creek at Seward Highway MM 5.9 (bridge)* • *Lost/Salmon Creek at the*	High	City Office, Tribal Council Office, SBCFSA, or KPB Development Office as applicable	City, SBCFSA, HMA, Denali Commission, NRCS, USACE, USDA/EWP, USDA/ECP, DCRA/ ACCIMP	2-4 years	B/C: Improving water flow and containment capability will greatly reduce potential infrastructure and residential losses. Project costs would outweigh replacement costs of lost facilities. TF: The community has the skill to implement this action. Specialized skills may need to be contracted-out with materials and equipment barged in depending on the method selected.

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	Alaska Railroad adjacent to Seward Highway MM 5.9 (bridge)					
FL 5.11	From: 2013 SBCFSA: *Acquire and maintain stream flow and rainfall measuring gages.*	High	City Office, Tribal Council Office, or KPB Development Office as applicable	City, KPB, Tribe, NOAA	2-4 years	B/C: This project would potentially provide near-term flood threat warning, enabling responders to mitigate potential damages. TF: This project is feasible using existing staff skills, equipment, and materials.
FL 5.12	*2010 HMP Brought Forward: Coordinate with the USACE as they develop project to upgrade, replace or find an alternative to the Lowell Creek diversion tunnel and it's resulting out-flow sediment build up, and maintain access to the tunnel.*	*Medium*	*City Office, Tribal Council Office, or KPB Development Office as applicable*	*City, Tribe, Natural Resources Conservation Service (NRCS), ANA, USACE, USDA, Lindbergh Grants Program*	*Ongoing*	*B/C: Coordinated planning ensures effective damage abatement and ensures proper attention is assigned to reduce losses and damage to structures and City residents.* *TF: This action is feasible with limited fund expenditures.*
GF 6.1	From: 2013 SBCFSA: *Install wire matting, debris catchment structure, cliff stabilization etc. to prevent Lowell Canyon Creek diversion tunnel obstruction and diversion dam overtopping from landslide debris, woody vegetation, trees, etc.*	High	City Office, Tribal Council Office, or KPB Development Office as applicable	City, Tribe, HMA, ANA, NRCS, USACE	3-5 years	B/C: Improving and mitigating potential slope instability will greatly reduce potential infrastructure, business, and residential losses. Project costs would outweigh replacement costs of lost facilities. TF: The community has the skill to implement this action. Specialized skills may need to be contracted-out with materials and equipment barged in depending on the method selected.
GF 6.2	Develop vegetation projects to restore clear-cut and riverine erosion damage and to restore slope stability in avalanche and landslide areas.	High	City Office, Tribal Council Office, or KPB Development Office as	City, Tribe, HMA, ANA, NRCS, USACE	2-5 years	B/C: Improving slope stability will greatly reduce potential infrastructure and residential losses. Project costs would outweigh replacement costs of lost facilities.

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			applicable			Vegetative or other readily available materials may improve revitalization and facilitate community focused repairs with similar materials. TF: Technically feasible as the community has the skill to implement this action using native materials and equipment.
GF 6.3	*2010 HMP Brought Forward: Create safe parking areas along Lowell Point Road for vehicles.*	*Low*	*City Office, Tribal Council Office, or KPB Development Office as applicable*	*City, Tribe, HMA, NOAA, AFG, FP&S, SAFER, ANA, EFSP, NRCS*	*Ongoing*	*B/C: Identifying threatened infrastructure proximity to natural hazards is vital to properly address the threat and mitigate potential impacts.* *TF: The project is technically feasible as the community has staff and resources capable of completing this project safely.*
GF 6.4	*2010 HMP Brought Forward: Establish a retaining structure in Lowell Canyon to prevent avalanches from disrupting city water storage system.*	*High*	*City Office, Tribal Council Office, or KPB Development Office as applicable*	*City, Tribe, HMA, ANA, NRCS, USACE, USDA/EWP, USDA/ECP, DCRA/Alaska Climate Change Impact Mitigation Program (ACCIMP)*	*Ongoing*	*B/C: Pre-planning and implementing appropriate embankment stability, water, and debris retention will greatly reduce or delay potential infrastructure and residential losses. Project costs would outweigh replacement costs of lost facilities.* *TF: The community has the skill to implement this action. Specialized skills may need to be contracted-out with materials and equipment barged in depending on the method selected.*
GF 6.5	*2010 HMP Brought Forward: Design and develop a new generation of diversion structures and flexible transmission poles to bend with the snow impact.*	*Medium*	*City Office, Tribal Council Office, or KPB Development Office as applicable*	*AEA, AVEC, US Department of Energy*	*Ongoing*	*B/C: Mitigating utility poles or structures using alternative materials or diversion structures have been effective throughout Alaska to protect against wetland and snow avalanche damage and power*

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						distribution losses; avoiding severe disaster event failure *TF: This project is feasible for utility companies or may require specialized contractor experience and capability.*
GF 6.6	*2010 HMP Brought Forward: Create electrical infrastructure redundancies to reduce the risk of prolonged power outages by completing the following projects:* • *Complete an underground electrical supply circuit over Dairy Hill and through Two Lakes Park.* • *Complete an underground circuit from the South Harbor expansion to Jefferson along Ballaine Blvd.* • *Complete the SMIC electrical loop along Sorrel Rd.* • *Complete the electrical loop along Alemeda St. To Leirer Rd.* • *Complete the underground electrical loop on Lowell Pt. from Beach Drive to Lowell Pt. Rd., and the loop from Shady Ln. to Beach Dr.* • *Underground more of the distribution lines in avalanche areas, ex. Seward Hwy. Mile 22*	*Medium*	*City Office, Tribal Council Office, or KPB Development Office as applicable*	*City, HMA, NOAA, AFG, FP&S, SAFER, ANA, EFSP, NRCS*	*Ongoing*	*B/C: Identifying threatened infrastructure proximity to natural hazards is vital to their sustainability. Providing advanced warning of pending disasters further reduces life loss and potentially can reduce damage if quick action is possible to mitigate the impact.* *TF: The project is technically feasible as the community has staff and resources they have used to relocate and elevate buildings.*
TS 7.1	See identified tsunami projects in MH 1.4, 1.8; MH 2.4; and WX 9.5					
VO 8.1	*2010 HMP Brought Forward:*	*Medium*	*City Office,*	*City, Tribe, Natural*	*Ongoing*	*B/C: Coordinated planning ensures*

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	Refer to KPB Hazard Mitigation Plan for volcano mitigation initiative guidance.		*Tribal Council Office, or KPB Development Office as applicable*	*Resources Conservation Service (NRCS), ANA, USACE, USDA, Lindbergh Grants Program*		*effective damage abatement and ensures proper attention is assigned to reduce losses and damage to structures and City residents.* *Sustained mitigation outreach program is minimal in cost and will help build and support community capacity to enable the public to prepare for, respond to, and recover from disasters.* *TF: This action is feasible with limited fund expenditures.*
VO 8.2	*2010 HMP Brought Forward: Identify critical facilities risks and needs before, during, and after an ash fall*	*Low*	*City Office, Tribal Council Office, or KPB Development Office as applicable*	*City, Tribe, HMA, NOAA, AFG, FP&S, SAFER, ANA, EFSP, NRCS*	*Ongoing*	*B/C: Identifying threatened infrastructure proximity to natural hazards is vital to their sustainability. Providing advanced warning of pending disasters further reduces life loss and potentially can reduce damage if quick action is possible to mitigate the impact.* *TF: The project is technically feasible as the community has staff and resources they have used to relocate and elevate buildings.*
WX 9.1	From: 2013 SBCFSA: *Develop and implement tree clearing mitigation programs to keep trees from threatening lives, property, and public infrastructure from severe weather events.*	Low	City Office, Tribal Council Office, or KPB Development Office as applicable	City, Tribe, FEMA AFG, FP&S, SAFER DOF: VFAG, RAGP, FireWise	Ongoing	B/C: This mitigation activity will reduce severe winter storm damages caused by heavy snow loads and icy rain by avoiding damage to structures and infrastructure. TF: This type activity is technically feasible within the community by implementing existing programs such as Fire Wise and other State and Federal agency programs.

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WX 9.2	From: 2013 SBCFSA: *Develop, implement, and maintain partnership program with electrical utilities to use underground utility placement methods where possible to reduce or eliminate power outages from severe winter storms. Consider developing incentive programs.*	High	City Office, Tribal Council Office, or KPB Development Office as applicable	City, Tribe, HMA, ANA, DOT/PF, Denali Commission, NRCS, USACE, USDA/EWP, USDA/ECP, DCRA/ ACCIMP	Ongoing	B/C: Hardening infrastructure to reduce erosion and flood damages reduces potential future damages and replacement costs. TF: The City has the technical capability to manage and conduct this project.
WX 9.3	*2010 HMP Brought Forward: Rebuild the old transmission line sections in Lawing, Boulder Creek, and Lakeview to current distribution standards (its current use) so that it will withstand known weather conditions.*	*High*	*City Office, Tribal Council Office, or KPB Development Office as applicable*	*City, Tribe, HMA, NRCS, USACE, USDA/EWP, USDA/ECP, DCRA/ ACCIMP*	*Ongoing*	*B/C: Identifying threatened infrastructure proximity to natural hazards is vital to their sustainability. There are currently few mapped hazard areas. This is a vital first step. This knowledge will help the community focus on activities to protect their vital infrastructure.* *Emergency power generation is a minor cost to ensure facilities' availability for use after a hazard strikes.* *TF: Installing emergency generators is technically feasible for this community as they already have staff to maintain existing community power generation facilities. This project typically needs to be associated with essential facility upgrades for FEMA funding*
WX 9.4	*2010 HMP Brought Forward: Rebuild the double Circuit line from Dimond Blvd. to Dairy Hill Rd to withstand known weather conditions.*	High	*City Office, Tribal Council Office, or KPB Development Office as applicable*	*City, Tribe, HMA, NRCS, USACE, USDA/EWP, USDA/ECP, DCRA/ ACCIMP*	*Ongoing*	*B/C: Mitigating threatened infrastructure is vital to their sustainability. Emergency power critical to ensure facilities' availability for use after a hazard strikes.* *TF: This project is technically feasible for this community as they already have*

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						staff to maintain existing community power generation facilities and infrastructure.
WX 9.5	*2010 HMP Brought Forward: Install Alaska Weather System (AWS) NOAA radios in public buildings. These radios will also broadcast **tsunami** watches and warnings.*	*Medium*	*City Office, Tribal Council Office, or KPB Development Office as applicable*	*City, Tribe, FEMA, AFG, FP&S, RFAG, SAFER, HSEP*	*Ongoing*	*B/C: Sustained emergency response planning, notification, mitigation, exercise and outreach programs have minimal cost and will help build and support community capacity enabling the public to prepare for, respond to, and recover from disasters.* *TF: This project is technically feasible using existing City staff*
WX 9.6	*2010 HMP Brought Forward: Install EMWIN (Emergency Managers Weather Information Network), from the National Weather Service into the police dispatch area.*	*Medium*	*City Office, Tribal Council Office, or KPB Development Office as applicable*	*City, Tribe, FEMA, AFG, FP&S, RFAG, SAFER, HSEP*	*Ongoing*	*B/C: Sustained emergency response planning, notification, mitigation, exercise and outreach programs have minimal cost and will help build and support community capacity enabling the public to prepare for, respond to, and recover from disasters.* *TF: This project is technically feasible using existing City staff*
WF 10.1	*2010 HMP Brought Forward: Acquire permission to clear hazard, and potentially hazardous trees beyond the permit area for the transmission line from Dave's Creek to Grouse Lake from the State and the USFS.*	*High*	*City Office, Tribal Council Office, or KPB Development Office as applicable*	*City, Tribe, HMA, NRCS, USACE, USDA/EWP, USDA/ECP, DCRA/ ACCIMP*	*Ongoing*	*B/C: Identifying threatened infrastructure proximity to inaccessible areas requiring special permitting is vital for quick access to repair those facilities during disaster disruption events. There are currently few mapped hazard areas. This is a vital first step. This knowledge will help the community focus on activities to access, repair and protect their vital infrastructure.* *Emergency power generation is a minor*

Table 7-10 The Seward Area's Combined Mitigation Action Plan (MAP)

(Blue Italicized Initiatives were brought forward from the legacy 2010 HMP)

(See Table 7-9 Potential Funding Agency list and Appendix 9 for agency programmatic details)

Goal/ Action ID	Description	Priority (High, Medium, Low)	Responsible Office or Agency	Potential Funding Source(s)	Timeframe (1-3 Years 2-4 Years 3-5 Years)	Benefit-Costs (BC) / Technical Feasibility (T/F)
						cost to ensure facilities' availability for use after a hazard strikes. *TF: Installing emergency generators is technically feasible for this community as they already have staff to maintain existing community power generation facilities. This project typically needs to be associated with essential facility upgrades for FEMA funding*
WF 10.2	*2010 HMP Brought Forward: Clear the trees from the newly acquired permission areas and the brush within the permitted area.*	*High*	*City Office, Tribal Council Office, or KPB Development Office as applicable*	*City, Tribe, DOF: Volunteer Fire Assistance Grant Program (VFAGP), Rural Assistance Grant Program (RAGP)*	*Ongoing*	*B/C: Implementing these mitigation activities will potentially reduce ancillary damage from severe winter storms caused by heavy snow loads, icy rain, and wind.* *TF: This type activity is technically feasible within the community typically using existing labor, equipment, and materials.*
Manmade (MM) Hazards						
MH 11.1	*2010 HMP Brought Forward: Encourage sites to meet standards and/or regulations for all reportable hazard materials quantity.*	*Medium*	*City Office*	*FS, DCRA, CERCLA, SARA*	*Ongoing*	*B/C: Infrastructure protection to reduce disaster impacts to residents and essential facilities are critical disaster management tools.* *Focused HAZMAT knowledge, storage, and monitoring ensure proper attention is assigned to reduce losses, damage, and materials mismanagement.* *TF: This type activity is technically feasible within the community typically using existing labor, equipment, and materials. Specialized methods are not new to rural communities as they are*

Table 7-10 The Seward Area's Combined Mitigation Action Plan (MAP)

(Blue Italicized Initiatives were brought forward from the legacy 2010 HMP)

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Goal/ Action ID	Description	Priority (High, Medium, Low)	Responsible Office or Agency	Potential Funding Source(s)	Timeframe (1-3 Years 2-4 Years 3-5 Years)	Benefit-Costs (BC) / Technical Feasibility (T/F)
						used to importing required contractors.
MM 11.2	*2010 HMP Brought Forward: Encourage installing utilidors to protect future pipelines during large renovation, repairs, or after a damaging disaster event.*	*Medium*	*City Office*	*City, Tribe, HMA, ANA, DOT/PF, Denali Commission, NRCS, USACE, USDA/EWP, USDA/ECP, DCRA/ ACCIMP*	*Ongoing*	*B/C: Hardening infrastructure to reduce erosion and flood damages reduces potential future damages and replacement costs.* *TF: The City has the technical capability to manage and conduct this project.*

7.7 MONITORING MITIGATION STRATEGY PROGRESS

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

DMA 2000 Requirements
ELEMENT E: Plan Updates
D1. Was the plan revised to reflect changes in development? (Requirement §201.6(d)(3))
D2. Was the plan revised to reflect progress in local mitigation efforts? (Requirement §201.6(d)(3))
D3. Was the plan revised to reflect changes in priorities? (Requirement §201.6(d)(3))
Source: FEMA, March 2015

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

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

7.7.1 Reviewing HMP Successes

The city and tribal planning team leaders (or designees) will monitor and review their respective mitigation initiatives to determine potential successes or roadblocks to achieving their joint MJHMP's mitigation goals, activities, and projects. This activity will be documented throughout the MJHMP's five-year life cycle's annual review process.

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

During the 5-year HMP update; each agency or authority administering a mitigation project will provide an explanation as to each HMP project or initiative's current status for inclusion within Section 7-4, Table 7-7 to define whether their project's status is: "Completed," "Deleted," "Deferred," "Ongoing," or "Re-Defined" with an explanation as to how or why they may have changed.

Projects will be closed out according to the specific requirements of the funding source. If the source is Tribal funds or staff time, a closeout meeting will be held with the lead planner and/or the Planning Team to review the project in full and determine any opportunities to celebrate success.

FEMA's 2017 KPB Risk Report provided the following HMGP funded project details. Table 16 was cropped to only display Seward area projects.

...FEMA issued a series of Hazard Mitigation Grant Program (HMGP) funds to the Kenai Peninsula following DR-1445. These grants supported multiple hazard-specific projects including HMP updates, shoreline stabilization projects, stormwater management projects, infrastructure improvements, and utility system improvements. Table 16 lists the HMGP grants that were issued to Kenai Peninsula Borough communities. In total, almost $740,000 in grant assistance was awarded to the Borough.

Table 16: HMGP Funds Awarded to the Kenai Peninsula Borough Following DR-1445

PROJECT TYPE	PROJECT TITLE	PROJECT DESCRIPTION	PROJECT COUNTIES	SUB-GRANTEE	PROJECT AMOUNT
401.1: Water and Sanitary Sewer System Protective Measures	*Bishop property install well and septic*	---	*Kenai Peninsula*	*Alaska Dept. of Community and Economic Development*	*$9,475*
301.1: Shoreline Stabilization (Riprap, etc.)	*Alaska Railroad MP 29*	---	*Kenai Peninsula*	*Alaska Railroad Corporation*	*$118,438*
301.1: Shoreline Stabilization (Riprap, etc.)	*Alaska RR MP 19 to 23 - Embankment Rehab*	---	*Kenai Peninsula*	*Alaska Railroad Corporation*	*$235,211*
403.2: Stormwater Management - Diversions	*SO. Peninsula Hospital - Hillside runoff water diversion and drainage*	*Divert hillside water runoff by cutting back slope and re-routing run-off to natural drainage away from hospital offices and reception area.*	*Kenai Peninsula*	*South Peninsula Hospital*	*$96,360*
401.1: Water and Sanitary Sewer System Protective Measures	*City of Seward lift station #1 control reconfiguration*	*Raise controls above 100-year flood level.*	*Kenai Peninsula*	*Seward City Manager*	*$90,000*
				TOTAL	**$739,463**

7.8 INTEGRATING MITIGATION STRATEGY INTO EXISTING PLANNING MECHANISMS

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

DMA 2000 Requirements
ELEMENT C. Incorporate into Other Planning Mechanisms
C6. Does the Plan describe a process by which local governments will integrate the requirements of the mitigation plan into other planning mechanisms, such as comprehensive or capital improvement plans, when appropriate? (Requirement §201.6(c)(4)(ii))
Source: FEMA, March 2015.

DMA 2000 requirements and tribal governance regulations for integrating the MJHMP into existing planning mechanisms include:

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

After MJHMP adoption, each planning team member is recommitted to integrate the MJHMP, in particular its philosophy, as well as implemented mitigation actions, projects, or initiatives into existing planning mechanisms such as their Comprehensive Plan, Economic Development or Business Plan, Capital Improvement Plan, Transportation Plan, and BIA 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 city and tribal regulatory tools to determine where to integrate the mitigation philosophy and implementable initiatives within current and future planning mechanisms. Current regulatory tools are identified in Section 7.2 capability assessment.
- Work with pertinent community entities to implement MJHMP philosophies and mitigation strategy initiatives (including the MAP) into relevant current and future planning mechanisms (i.e. plans listed above).

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

8.0 REFERENCES

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

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9.0 APPENDICES

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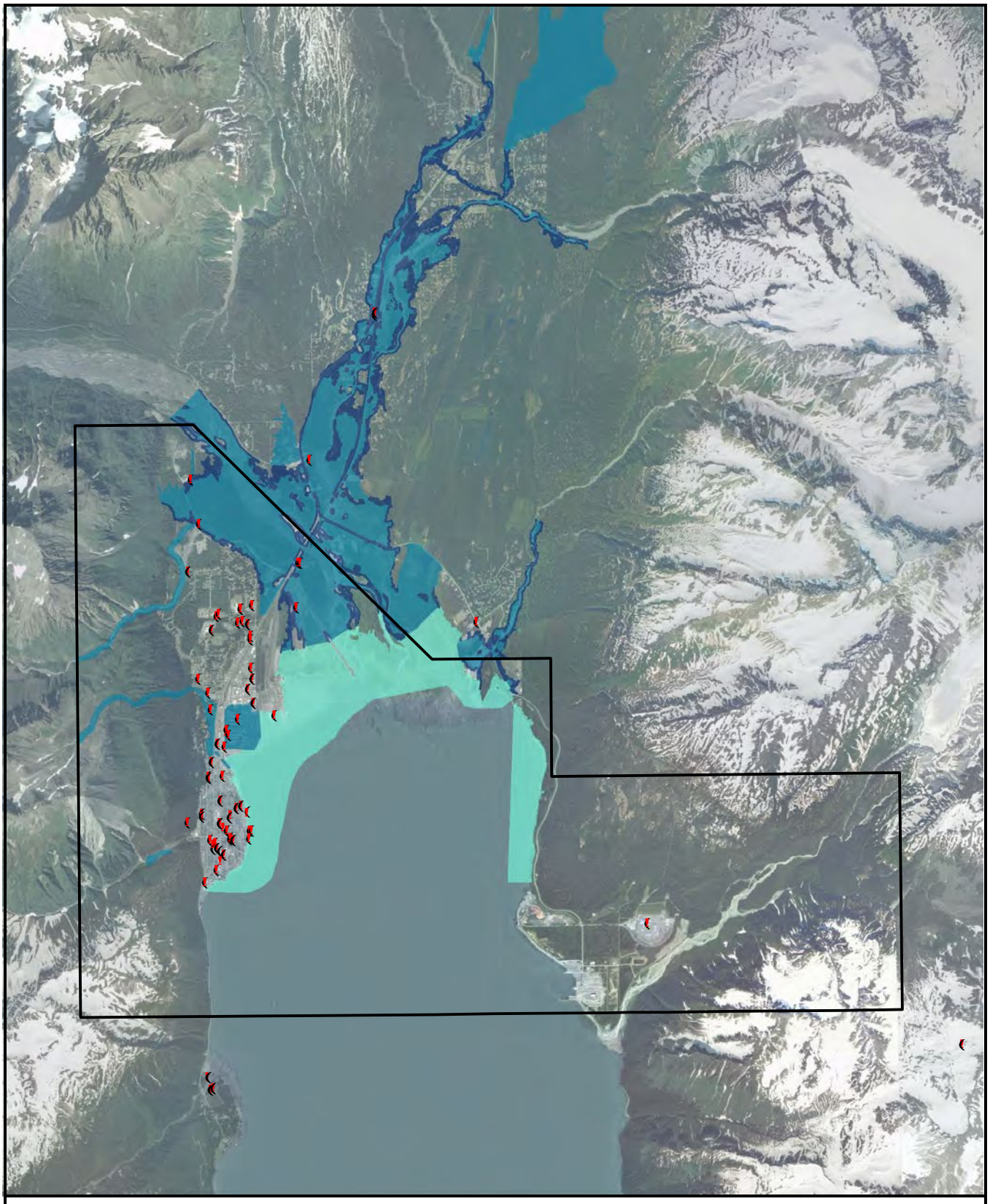
APPENDIX A CRITICAL FACILITIES LOCATED IN NATURAL HAZARD THREAT AREAS

Flood

Ground Failure

Tsunami Inundation

Wildland Fire



Sources: FEMA; AECOM; ESRI

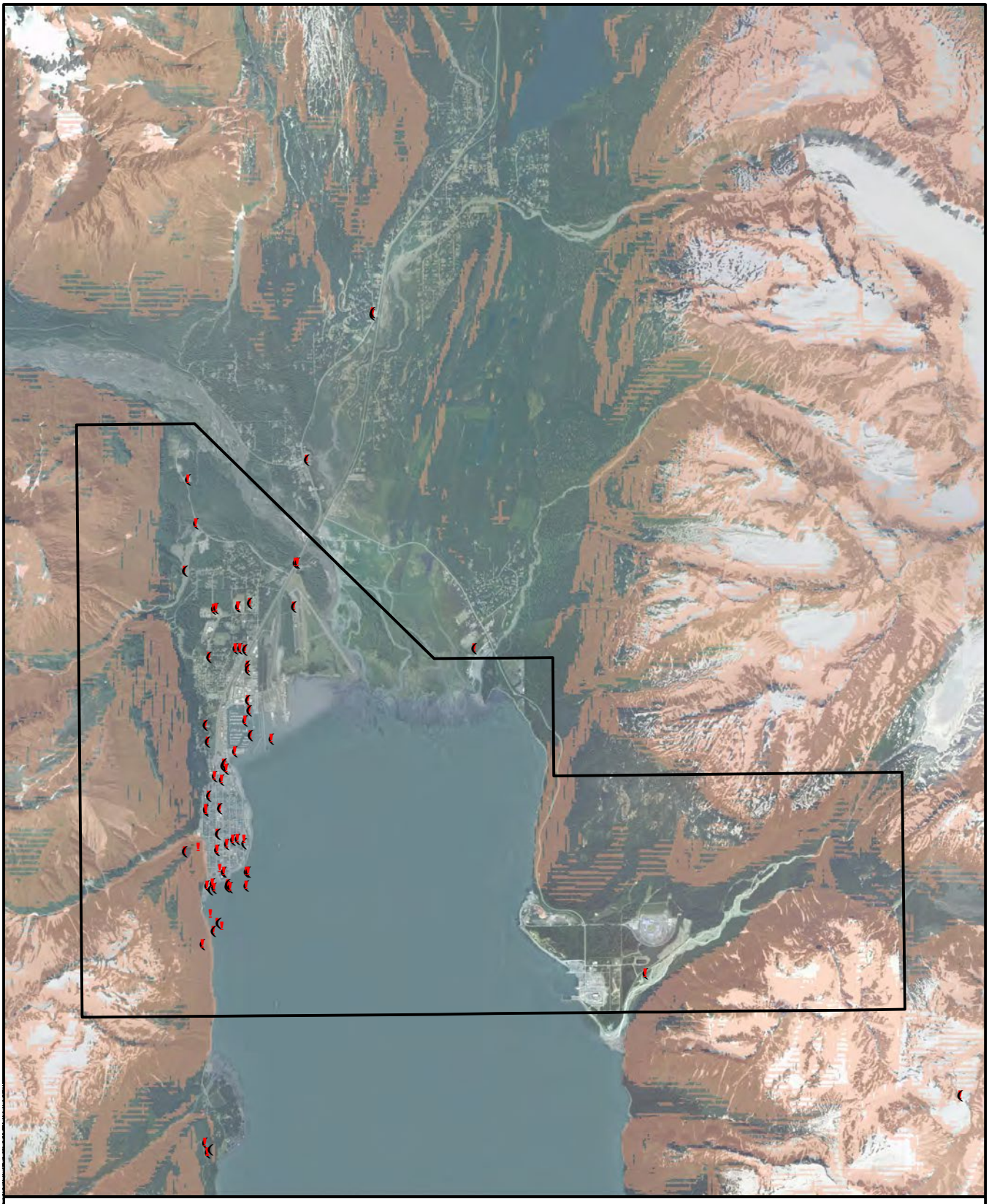
Critical Facility

Coastal Flood Zone
100 Year Flood Zone
500 Year Flood Zone
Seward City Limits

0.5 0 0.5 1
Miles

FLOOD HAZARD AREAS

HAZARD MITIGATION PLAN **2019**



Sources: AECOM; ESRI

Critical Facility

Slopes greater than 20 Degrees

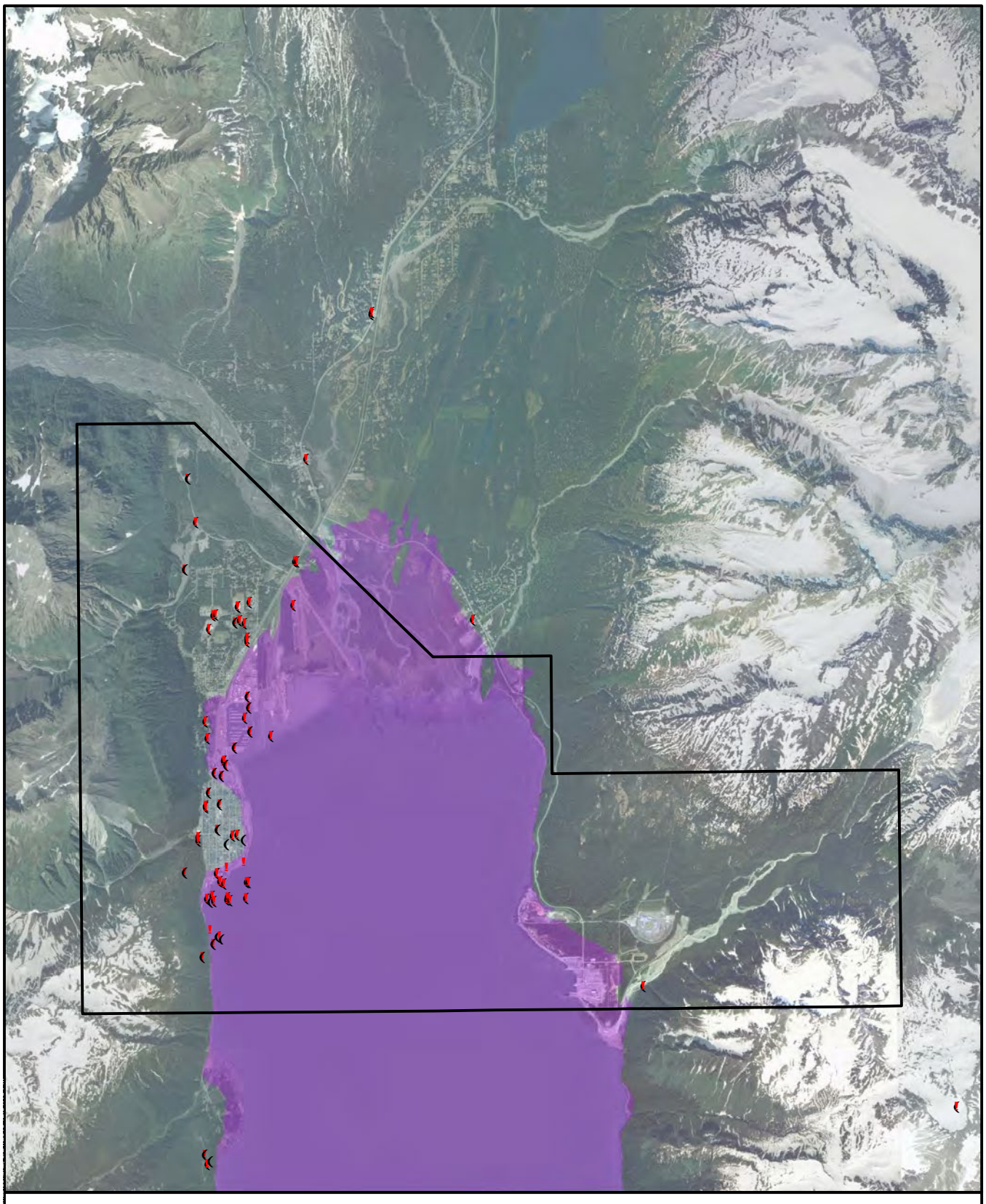
Seward City Limits

0.5 0 0.5 1

Miles

GROUND FAILURE HAZARD AREAS

HAZARD MITIGATION PLAN **2019**



Sources: UAF Alaska Earthquake Center; AECOM; ESRI

Critical Facility

Maximum Tsunami Inundation Area

0.5 0 0.5 1

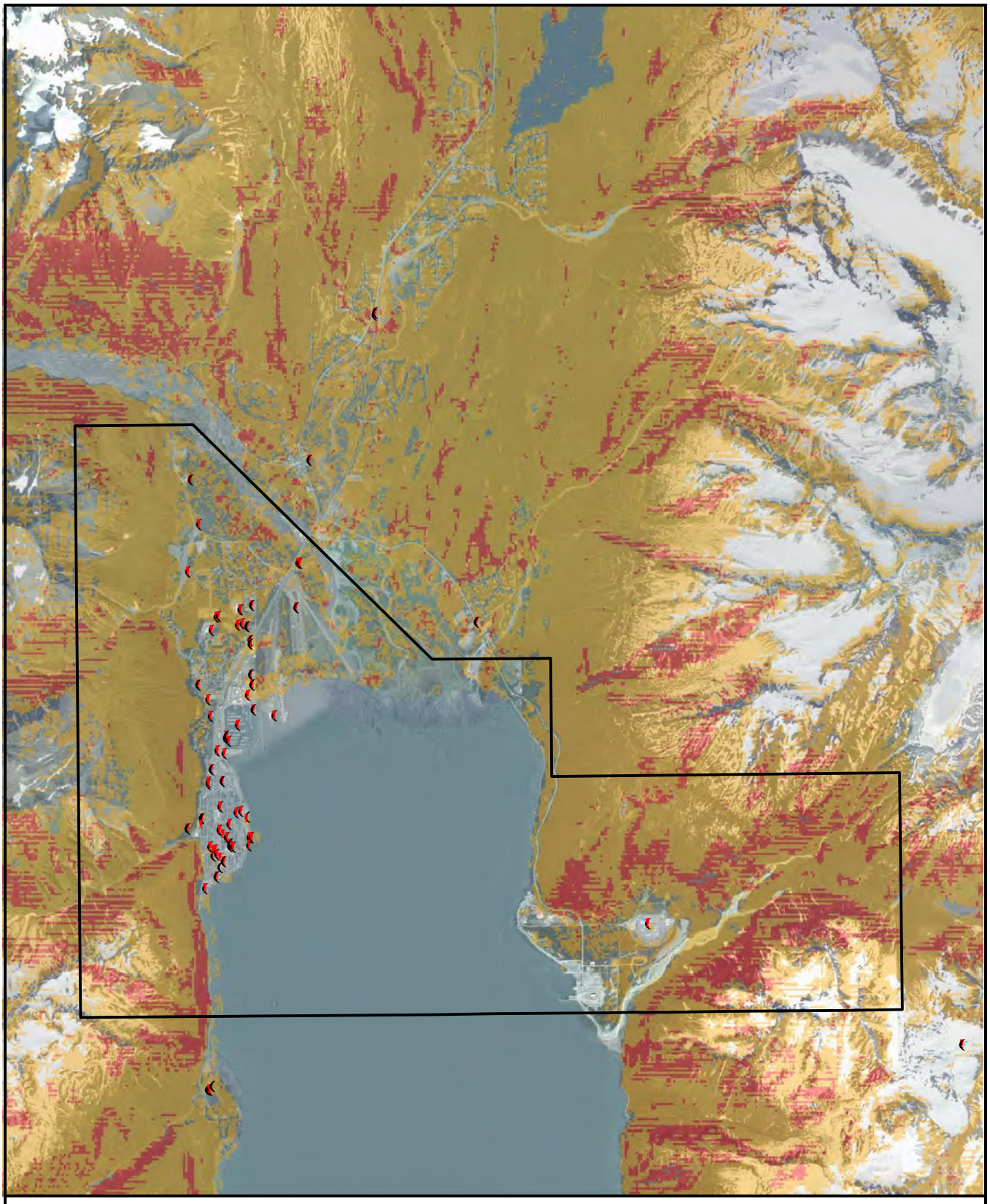
Miles

Seward City Limits

HAZARD MITIGATION PLAN

TSUNAMI INUNDATION AREA

2019



Sources: AECOM; ESRI

0.5 0 0.5 1

Miles

Critical Facility
Moderate Fuel Risk
High Fuel Risk
Seward City Limits

WILDLAND FIRE HAZARD AREAS

HAZARD MITIGATION PLAN **2019**

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APPENDIX B FUNDING RESOURCES

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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's web site, 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.

  NEHRP DHS 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. 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 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 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 provide 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 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. 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 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 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, 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: 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, who in turn assist communities in design and construct of sanitation projects.
    - Municipal Grants and Loans Program. The Department of Environmental Conservation / Division of Water administer the Alaska Clean Water Fund (ACWF) and the Alaska Drinking Water Fund. The division is fiscally responsible to the Environmental Protection Agency (EPA) to administer the loan funds as the EPA provides capitalization grants to the division for each of the loan funds. In addition, it is prudent upon the division to administer the funds in a manner that ensures their continued viability. (http://dec.alaska.gov/water/MuniGrantsLoans/loanoverview.html)
    - Under EPA's Clean Water State Revolving Fund (CWSRF) program, each state maintains a revolving loan fund to provide independent and permanent sources of low-cost financing for a wide range of water quality infrastructure projects, including: municipal wastewater treatment projects; non-point source projects; watershed protection or restoration projects; and estuary management, [and stormwater management] projects.

(http://yosemite.epa.gov/R10/ecocomm.nsf/6da048b9966d22518825662d00729a35/7b68c420b668ada5882569ab00720988!OpenDocument)

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

- Department of Transportation and Public Facilities (DOT/PF) personnel provide technical assistance to the various emergency management programs, to include mitigation. This assistance is addressed in the DHS&EM-DOT/PF Memorandum of Agreement and includes but is not limited to: environmental reviews, archaeological surveys, and historic preservation reviews.
  - DOT/PF and DHS&EM coordinate buy-out projects to ensure that there are no potential right-of-way conflicts with future use of land for bridge and highway projects, and collaborate on earthquake mitigation.
  - Additionally, DOT/PF provides the safe, efficient, economical, and effective State highway, harbor, and airport operation. DOT/PF uses it's Planning, Design and Engineering, Maintenance and Operations, and Intelligent Transportation Systems resources to identify hazards, plan and initiate mitigation activities to meet the transportation needs of Alaskans, and make Alaska a better place to live and work. DOT/PF budgets for temporary bridge replacements and materials necessary to make the multi-modal transportation system operational following natural disaster events.
- DNR administers various projects designed to reduce stream bank erosion, reduce localized flooding, improve drainage, and improve discharge water quality through the stormwater grant program funds. Within DNR,
  - The Division of Geological and Geophysical Survey (DGGS) is responsible Alaska's mineral, land, and water resources use, development, and earthquake mitigation collaboration.

    Their geologists and support staff are leaders in researching Alaska's geology and implementing technological tools to most efficiently collect, interpret, publish, archive, and disseminate information to the public. (http://dggs.alaska.gov/pubs/advanced-search)
  - The DNR's Division of Forestry (DOF) participates in a statewide wildfire control program in cooperation with the forest industry, rural fire departments and other agencies. Prescribed burning may increase the risks of fire hazards; however, prescribed burning reduces the availability of fire fuels and therefore the potential for future, more serious fires. (http://forestry.alaska.gov/pdfs/08FireSuppressionMediaGuide.pdf)
  - DOF also manages various wildland fire programs, activities, and grant programs such as the FireWise Program (http://forestry.alaska.gov/fire/firewise.htm),

Community Forestry Program (CFP) (http://forestry.alaska.gov/community/), Assistance to Fire Fighters Grant (AFG), Fire Prevention and Safety (FP&S), Staffing for Adequate Fire and Emergency Response Grants (SAFER), and Volunteer Fire Assistance and Rural Fire Assistance Grant (VFA-RFA) programs (http://forestry.alaska.gov/fire/vfarfa.htm). Information can be found at http://forestry.alaska.gov/fire/current.htm.

- The Alaska Interagency Coordination Center (AICC) is the Geographic Area Coordination Center for Alaska. AICC serves as the focal point for initial attack resource coordination, logistics support, and predictive services for all state and federal agencies involved in wildland fire management and suppression in Alaska.

Fire management planning, preparedness, suppression operations, prescribed burning, and related activities are coordinated on an interagency basis. DOF has cooperative agreements with the Departments of Agriculture and Interior, and numerous local government and volunteer fire departments to respond to wildland fires, reduce duplication of efforts, and share resources.

In 1984 the State of Alaska adopted the National Interagency Incident Management System Incident Command System concept for managing fire suppression. The Incident Command System (ICS) guiding principles are followed in all wildland fire management operations. All State of Alaska Departments adopted ICS in 1996 through the Governor's administrative order.

Other Funding Resources

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

- Rural Alaska Community Action Program Inc. (RurAL CAP) In the nearly 50 years since it began, it is difficult to imagine any aspect of rural Alaskan lives which has not been touched in some way by the people and programs of RurAL CAP. From Head Start, parent education, adult basic education, and elder-youth programs, to Native land claims and subsistence rights, energy and weatherization programs, and alcohol and substance abuse prevention, RurAL CAP has left a lasting mark on the history and development of Alaska and its rural Peoples. (http://ruralcap.com/?page_id=334)
  - Weatherization Assistance Program assists low to moderate income households in weatherization needs. The program is available to homeowners as well as renters and includes; single family homes, cabins, mobile homes, condominiums and multifamily dwellings. (http://ruralcap.com/?page_id=794)
  - Solid Waste Management. RurAL CAP continues to host an expert solid waste liaison, Ted Jacobson, through funding provided by the Environmental Protection Agency (EPA) and Senior Services America, Inc. The liaison provides solid waste management technical assistance to rural communities through training, site visits, hands-on demonstrations, and remote contact. Resources are provided for dump management activities, collaborating with funders for funding and technical assistance on solid waste management, recycling, and backhaul. (http://ruralcap.com/?page_id=198)

- American Planning Association (APA), http://www.planning.org - a non-profit professional association that serves as a resource for planners, elected officials, and citizens concerned with planning and growth initiatives.
- Institute for Business and Home Safety (IBHS), an initiative of the insurance industry to reduce deaths, injuries, property damage, economic losses, and human suffering caused by natural disasters. (http://www.disastersafety.org/)
- American Red Cross (ARC). Provides for the critical needs of individuals such as food, clothing, shelter, and supplemental medical needs. Provides recovery needs such as furniture, home repair, home purchasing, essential tools, and some bill payment may be provided. (http://www.redcross.org/find-help)
- Catalog of Federal Domestic Assistance (DFDA) Crisis Counseling Program (CCP). Provides grants to State and Borough Mental Health Departments, which in turn provide training for screening, diagnosing and counseling techniques. Also provides funds for counseling, outreach, and consultation for those affected by disaster. (http://dialoguemakers.org/Resourses4states+Nonprofits.htm)
- Denali Commission. Introduced by Congress in 1998, the Denali Commission is an independent federal agency designed to provide critical utilities, infrastructure, and economic support throughout Alaska. With the creation of the Denali Commission, Congress acknowledged the need for increased inter-agency cooperation and focus on Alaska's remote communities. Since its first meeting in April 1999, the Commission is credited with providing numerous cost-shared infrastructure projects across the State that exemplifies effective and efficient partnership between federal and state agencies, and the private sector. (http://www.denali.gov/grants)
    - The Energy Program primarily funds design and construction of replacement bulk fuel storage facilities, upgrades to community power generation and distribution systems, alternative-renewable energy projects, and some energy cost reduction projects. The Commission works with the Alaska Energy Authority (AEA), Alaska Village Electric Cooperative (AVEC), Alaska Power and Telephone and other partners to meet rural communities' fuel storage and power generation needs.
    - The goal of the solid waste program at the Denali Commission is to provide funding to address deficiencies in solid waste disposal sites which threaten to contaminate rural drinking water supplies.
- Lindbergh Foundation Grants. Each year, The Charles A. and Anne Morrow Lindbergh Foundation provides grants of up to $10,580 (a symbolic amount representing the cost of the Spirit of St. Louis) to men and women whose individual initiative and work in a wide spectrum of disciplines furthers the Lindbergh's vision of a balance between the advance of technology and the preservation of the natural/human environment. (http://www.thelindberghfoundation.org/awards)
- Rasmussen Foundation Grants. The Rasmussen foundation invests both in individuals and well-managed 501(c)(3) organizations dedicated to improving the quality of life for Alaskans.

  Rasmussen Foundation awards grants both to organizations serving Alaskans through a base of operations in Alaska, and to individuals for projects, fellowships and

sabbaticals. To be considered for a grant award, grant seekers must meet specific criteria and complete and submit the required application according to the specific guidelines of each program. (http://www.rasmuson.org/index.php?switch=viewpage&pageid=5)

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

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

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APPENDIX C FEMA REVIEW TOOL, MULTI-JURISDICTIONAL HAZARD MITIGATION PLAN (MJHMP)

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APPENDIX D COMMUNITY MJHMP ADOPTION RESOLUTIONS

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APPENDIX E PUBLIC OUTREACH ACTIVITIES

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Event Details

Planning & Zoning Work Session

Tuesday, August 2
August 2, 2016 work session topic / Hazard Mitigation Plan update

Date: August 2, 2016
Time: 6:00 PM - 9:30 PM
Location: City Hall Annex Building
Address: Seward, AK 99664

From: Simmons, Scott
To: "eathey@cityofseward.net"; "tribaladmin@qntak.org"
Cc: "dlsquires@cityofseward.net"; "jhunt@cityofseward.net"; "jwilde@cityofseward.net"
Subject: City of Seward Hazard Mitigation Plan Update Project
Date: Thursday, January 18, 2018 3:46:00 PM
Attachments: image001.png

Dear Mayor Squires, City Manager Hunt, Fire Chief Athey and Tribal Administrator Allen,

I am writing to introduce myself, Scott Simmons at AECOM. This project will cost you nothing because we were contracted by the Division of Homeland Security and Emergency Management (DHS&EM) to assist the City of Seward and Qutekcak Native Tribe with updating your legacy 2010 Hazard Mitigation Plan (HMP).

I worked with the SBCFSA to convert their legacy Flood Hazard Mitigation Plan into an all-hazards plan in 2013. This plan also included completing a comprehensive flood study incorporating City of Seward and KPB infrastructure to also provide future climate-change impact analysis for future planning purposes. Updating your legacy plan will reference the SBCFSA data while fulfilling current FEMA criteria and make you once again eligible for FEMA and other federal agency grants.

FEMA now requires that collocated City and Tribal governments should work together with developing a multi-jurisdictional hazard mitigation plan (MJHMP). Both city and tribal government criteria will be included throughout the updated plan. Both the City and Native Village Councils will adopt the plan once it has been state reviewed and received FEMA preliminary approval.

We will review and update all sections of your current plan; starting with the planning section. Your Planning Team membership needs to be manageable, with as few as four or five members; or consider how the prior Anvik leadership determined their City and Tribal council(s) were best suited as their Community Planning Team.

Therefore our first goal is for you to review your legacy HMPs planning team list (below) and determine if those members are still available and willing to work on updating the plan. I have provided your legacy HMP's planning team chart below. We will also need to include Native Village of Anvik Tribal Council members with the update effort. Please edit the list to update your planning team membership.

Table 4-1 Hazard Mitigation Planning Team

Name	Title	Organization	Phone
Dave Squires	Mayor	City of Seward	MJHMP review
Jim Hunt	City Manager	City of Seward	Data gathering and MJHMP review
			Data gathering

Jackie Wilde	City Planner	City of Seward	and MJHMP review
Eddie Ethey	Fire Chief	City of Seward	**City Planning Team lead**, Data gathering and MJHMP review
Doug Schoessler	Public Works Director	City of Seward	Data gathering and MJHMP review
Scott Allen	Tribal Administrator	Native Village of Anvik	**Tribal Planning Team lead**, data gathering and MJHMP review
Sarah Benjamin	Division Manager	Native Village of Anvik	Tribal data gathering and MJHMP review
Katherine Brown	IGAP Coordinator	Native Village of Anvik	Tribal data gathering and MJHMP review
Scott Simmons	Planner/Consultant	AECOM	Project Manage, lead writer, technical assistance

Typically the Mayor/City Administrator and Tribal First Chief/President desire to be their respective government's Planning Team Leads. Each of you can select alternates for example, Mayor Dave Squires (the former Fire Chief) was selected as Seward's HMP project lead. Alternates can report to those who appointed them (your respective Councils or planning team) as well as coordinate data review and approvals.

AECOM's role in this project is to ensure that the HMP update meets state and federal requirements. We are at the beginning stages of this project, and we are seeking information about the community infrastructure, residents, and jurisdictional authorities.

This is the typical plan review process:

Section 1. Introduction: added entire new section explaining City and Tribal HMP regulatory requirements.

Section 2. Community Description: update your community information, including new census and State data.

Section 3. Planning Process: update this section to reflect 2018 public processes including newsletters, public meetings and 2018 Planning Team changes.

- Did your planning team do what they said they'd do? For example, did the planning team perform their annual maintenance commitment?
- Were mitigation efforts integrated with or into other City and Tribal planning documents"

Section 4 Plan Adoption: 2018 formal adoption resolutions and dates.

Section 5. Hazard Profile Analysis: review current and newly identified hazards such as 2010 t 2018 earthquake, flooding, ground failure, severe weather, and

wildfire data.

Section 6 Vulnerability Analysis: analyze vulnerability with 2018 critical facilities and infrastructure tables as well as tribal culturally sensitive site and FEMA NFIP programmatic data as applicable.

Section 7 Mitigation Strategy: review and edit 2010 mitigation goals and actions.

- We will add short narrative descriptions as to their current status such as whether you have completed, deleted, or deferred those actions or projects;
- As well as provide a short explanation as to why they may have changed status.

Section 8. References: revised to reflect 2018 document searches and data used to support the update.

Our task is to write the plan while teaching you the hazard mitigation plan development and update process. We have been very successful accomplishing this by using a community Planning Teams. AECOM will write the plan. Your community Planning Team will work with us to provide essential information that only community residents will know or have experienced.

There will be opportunities for the entire community to review the team's work and should be tracked as part of FEMA's public involvement process. This can include distributing or posting newsletters or providing information during City Council Meetings or other public meetings, and working with us over the phone as we capture needed information. Please keep track of any public comments as FEMA pushes to see how this information benefited the plan development process.

Please provide the names of your respective planning team leaders to schedule an introductory meeting with the team leader and team members to introduce the project and coordinate information collection.

We look forward to working with you to complete your Seward Hazard Mitigation Plan update. Please call me if you have questions.

Kind Regards
-Scott-

AECOM
R. Scott Simmons, CFM, CPM
Senior Emergency Management Planner

700 G Street, Suite 500, Anchorage, AK 99501

From:	Simmons, Scott
To:	"sally.cox@alaska.gov"; "jimmy.smith@alaska.gov"; "twolf@denali.gov"; "callard@denali.gov"; "rick.dembroski@alaska.gov"; "mike.johnson@alaska.gov"; "scott.nelsen@alaska.gov"; "eli.ward@alaska.gov"; "deanne.stevens@alaska.gov"; "kathryn.pyne@alaska.gov"; "sheri.gray@alaska.gov"; "paul.khera@alaska.gov"; "dan.monteleone@alaska.gov"; "john.clendenin@alaska.gov"; "michael.angove@noaa.gov"; "louise.fode@noaa.gov"; "aimee.fish@noaa.gov"; "amy.holman@noaa.gov"; "kyle.wright@tananachiefs.org"; "djnicolsky@alaska.edu"; "naruppert@alaska.edu"; "Kenneth.J.Eisses@usace.army.mil"; "scott.crockett@ak.usda.gov"; "brett.nelson@ak.usda.gov"; "ann.Y.gravier@hud.gov"; "jconaway@usgs.gov"; "adevaris@usgs.gov"; "janet.schaefer@alaska.gov"; "robin.bronen@akijp.org"; "denise.pollock@akijp.org"; "essmith@anthc.org"; "kwallace@usgs.gov"; "swhite@avcp.org"; "steve.heppner.bia.ak@gmail.com"; "terri.lomax@alaska.gov"; "Soderlund.Dianne@epamail.epa.gov"; "joel.curtis@noaa.gov"; "sam.albanese@noaa.gov"; "meg.mueller@ak.usda.gov"; "merlaine.kruse@ak.usda.gov"; "patty.burns@alaska.gov"; "margie.goatley1@alaska.gov"; "khoward@blm.gov"; "nicole.kinsman@noaa.gov"; "bruce.r.sexaur@usace.army.mil"; "mtavelton@usace.army.mil"; "steve.mcgroarty@alaska.gov"; "megan.kohler@alaska.gov"; "jade.gamble@alaska.gov"; "essmith@anthc.org"; "kwallace@usgs.gov"; "swhite@avcp.org"; "steve.heppner.bia.ak@gmail.com"; "jimmy.smith@alaska.gov"; "terri.lomax@alaska.gov"; "Soderlund.Dianne@epamail.epa.gov"; "joel.curtis@noaa.gov"; "sam.albanese@noaa.gov"; "meg.mueller@ak.usda.gov"; "merlaine.kruse@ak.usda.gov"; "ak_le@fws.gov"; "eddie.zingone@noaa.gov"; "patty.burns@alaska.gov"; "margie.goatley1@alaska.gov"; "khoward@blm.gov"; "nicole.kinsman@noaa.gov"; "bruce.r.sexaur@usace.army.mil"; "mtavelton@usace.army.mil"; "steve.mcgroarty@alaska.gov"; "megan.kohler@alaska.gov"; "jade.gamble@alaska.gov"
Cc:	Evans, Jessica (jessica.evans@aecom.com); Rabon, Angel; Cogger, Corinne; Volper, Kaley
Subject:	Hazard Mitigation Project Agency Involvement Participant Invitation Letter
Date:	Friday, February 02, 2018 11:38:00 AM
Attachments:	image003.png

Dear Potential HMP Development Participants,
AECOM (formerly URS) has received a 2014 contract from the State Division of Homeland Security and Emergency Management (DHS&EM) to develop Local/Tribal Multi-Jurisdictional Hazard Mitigation Plans (MJHMPs) for the following communities: Each group defines the HMP type and targeted communities.

The following communities' do not currently have an HMP. These communities will develop plans that meet FEMA's current MJHMP requirements:

New MJHMP and Tribal HMP Development

- ***Organized Cities with Co-Located Villages***
  - Gustavus (2nd Class City)
  - Manokotak (2nd Class City with Tribal Village)
  - Tenakee Springs (2nd Class City)

The following communities' currently have expired HMPs. These communities will have their plans updated from HMP to MJHMPs to meet current FEMA city and tribal requirements:

MJHMP/Tribal HMP Updates Required

- ***Organized Cities with Co-Located Native Villages***
  - Anvik (2nd Class City with Native Village)
  - Seward (2nd Class City with Native Village)

Borough HMPs converted to MJHMP Update Required

  - The City and Borough of Wrangell's (CBW) legacy HMP includes two-collocated villages. CBW's HMP is currently expired. CBW's HMP will be

converted to meet FEMA's Multi-Jurisdictional Plan requirements with each Tribe receiving separate Tribal HMPs within CWB's MJHMP to meet current FEMA city and tribal requirements.

- The Aleutians East Borough's (AEB) legacy HMP includes six organized cities and their collocated villages. AEB's HMP is currently expired. AEB's HMP will be converted to meet FEMA's Multi-Jurisdictional Plan requirements with each constituent community and native village receiving separate HMPs within AEB's MJHMP to meet current FEMA requirements:

  - ***AEB Organized Cities with Co-Located Villages***

    - Akutan (2nd Class City with Tribal Village)
    - Cold Bay (2nd Class City only)
    - False Pass (2nd Class City with Tribal Village)
    - King Cove (2nd Class City with 2-Tribal Villages)
    - Nelson Lagoon (2nd Class City with Tribal Village)
    - Sand Point (2nd Class City with 2-Tribal Villages)

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

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

I encourage you to acknowledge receiving this invitation at your earliest convenience to allow me to include your participation (with appropriate acknowledgments) within the Draft and Final HMPs prior to State and FEMA review and subsequent approvals.

Kind Regards
-Scott-

AECOM
R. Scott Simmons, CFM, CPM
Senior Emergency Management Planner

700 G Street, Suite 500, Anchorage, AK 99501
eMail: scott.simmons@aecom.com
Phone: 907.261.9706 or 800.909.6787
Fax: 907.562.1297
Personal Cell: 907.841.1832

From: Smith, Jimmy C (CED)
To: Simmons, Scott
Subject: RE: Repetitive Loss Property Information needed for the City of Seward. Alaska
Date: Wednesday, December 19, 2018 2:20:49 PM
Attachments: image001.png

Scott,

Here is what I have on R/L for Seward. It appears that Seward does not have any claims, which seems improbable. Let me check with the FEMA staff to make sure there are no claims.

Jimmy

Community Repetitive Loss

COMMUNITY : SEWARD, CITY OF

	AE, A1-30, AO, AH, A	VE, V1-30, V	B, C, X	TOTAL
RL Buildings (Total)				
RL Buildings (Insured)				
RL Losses (Total)				
RL Losses (Insured)				
RL Payments (Total)				
Building				
Contents				
RL Payments (Insured)				
Building				
Contents				

Post - FIRM SFHA RL Buildings:

Insured Buildings with 4 or More Losses:
Insured Buildings with 2-3 Losses > Building Value:
Total Target RL Buildings: 0

From: Simmons, Scott <scott.simmons@aecom.com>

Sent: Tuesday, December 18, 2018 3:01 PM
To: Smith, Jimmy C (CED) <jimmy.smith@alaska.gov>
Subject: RE: Repetitive Loss Property Information needed for the City of Seward. Alaska

Hi Jimmy
Sorry, I was unclear. I need the current R/L because this is a 2018 HMP update.

Thanks for having me clarify…!

Kind Regards
-Scott-

AECOM
R. Scott Simmons, CFM, CPM
Senior Emergency Management Professional

700 G Street, Suite 500, Anchorage, AK 99501
eMail: scott.simmons@aecom.com
Phone: 907.261.9706 or 800.909.6787
Fax: 907.562.1297
Personal Cell: 907.841.1832

From: Smith, Jimmy C (CED) [mailto:jimmy.smith@alaska.gov]
Sent: Tuesday, December 18, 2018 1:46 PM
To: Simmons, Scott
Cc: Johnson, Mike E (MVA)
Subject: RE: Repetitive Loss Property Information needed for the City of Seward. Alaska

Scott,
I don't know if I can be able to get to your request for 2009. As far as I know I can get the current R/L. I will look into this and let you know.

Thank you for the Merry Christmas and you have the same.

Jimmy

From: Simmons, Scott <scott.simmons@aecom.com>
Sent: Tuesday, December 18, 2018 1:39 PM
To: Smith, Jimmy C (CED) <jimmy.smith@alaska.gov>
Cc: Johnson, Mike E (MVA) <mike.johnson@alaska.gov>
Subject: Repetitive Loss Property Information needed for the City of Seward. Alaska

Merry Christmas Jimmy,
I pray things are well with you.

Would you please obtain a City of Seward repetitive loss (RL) property list from FEMA for inclusion within their 2009 HMP update? I need the following "general- nonspecific" data

- Please don't include addresses or ownership names as these are confidential information

Please have them provide this information needed to fulfill their NFIP HMP reporting criteria:

Table 6-5 Repetitive Loss Properties

Type (RL/SRL)	Community Name (Consecutive Numbering ID)	Occupancy (#)	No. of Losses	Flood Insurance (Yes/No)	Structure Value ($)[1]	Total Claims ($)[2]
RL	House #1	Single Family (# or people)	#		$	$
RL	House #2	Single Family (# of people)	#		$	$
SRL	House #3 (etc.)	Single Family (# of people)	#		$	$
SRL	Duplex #1, or	Multi-Family (# of people)	#		$	$
RL	Fourplex #1, or	Multi-Family (# of people)	#		$	$
RL	Multi-Unit # (how many unites)	Multi-Family (# of people)	#		$	$
Etc.	Etc.		#		$	$

[1] Insured structural value as of *date*.
[2] Content and building claims.

Thank YOU!
-Scott-

AECOM
R. Scott Simmons, CFM, CPM
Senior Emergency Management Professional

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eMail: scott.simmons@aecom.com
Phone: 907.261.9706 or 800.909.6787
Fax: 907.562.1297
Personal Cell: 907.841.1832

From:	Simmons, Scott
To:	"Eddie Athey"; "tribaladmin@qntak.org"; "Presley, Stephanie"
Cc:	DHSEM Mike Johnson
Subject:	RE: 2010 HMP Update Project - Next Steps
Date:	Wednesday, February 28, 2018 3:25:00 PM
Attachments:	2018 Update Seward HMPs Projects List W-StatusActions.doc 2010 Seward Mitigation Successes.docx 2010 HMP Extracted Potential Project List.docx AECOM-SewardCF.xlsx image003.png

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Good Afternoon Eddie and Scott,
The next step is to have a project kick-off meeting either in-person or via telephonic conference call. I suggest having one during a public meeting, Planning Team meeting, etc. I can travel down to attend, lead, and or facilitate the meeting(s).

Unfortunately, the State staff have conflicts during March so they will not likely be able to participate until April.

I have attached a few examples I have extracted from the 2013 SBCFSA HMP and the legacy 2010 Seward HMP to highlight few important tasks.

1. We need to determine whether we are going to update the 2010 Seward HMP, the 2013 SBCFSA, or create a highbred multi-jurisdictional HMP (MJHMP) by combining both plans into one. Either way the MJHMP will then be adopted by each participant (City, SBCFSA, and Tribe).
2. The 2010 HMP Extracted Potential Project List: These projects were spread all over the 2010 HMP so I consolidated the list on this sheet to be able to see what the City was expected to accomplish during the plan's 5-year lifecycle.
3. The 2018 Update…Projects list W-Status: The is a combined list from your 2010 HMP and the SBCFSA HMP. The 2010 HMP projects are listed as "City 2010". The SBCFSA project list have multiple responsible entities (i.e. SBCFSA, City, and/or KPB) and were either placed within the HMP's hazards' sections or I moved them to where I would like to place them in the new plan layout.

   Goals: please review my simplified 2010 legacy HMP's goals. They reflect a high-level viewpoint of how the community desires to focus its "mitigation" efforts. It gets confusing to readers who wonder which goal each action strives to fulfill or support.

   Projects: this list needs to be reviewed and each project's current status addressed using column that states: "completed, deferred, deleted, combined or ongoing, etc." Then a simple comment as to why you are keeping them (ongoing), deleting them, or why they were deferred. I can do this over the phone with you to simplify the process.

   I suggest you and your planning team (City, SBCFSA, Tribe, and KPB) review the project list and either combine or delete a few; there are simply too many listed

projects that may not have been implemented during the 2010 HMPs 5-year life-cycle.

4. The AECOM –Seward Critical Facilities (CF) excel spreadsheet: has a few items shaded in pink. I would like to obtain their GPS Coordinates to add to our GIS database. Is that possible?
5. Mitigation Successes: I also gleaned a few completed projects from the 2010 HMP.
    a. Did they accomplish what they were intended to accomplish?
    b. Can you provide a brief description as to how the City, SBCFSA, or Lowell Point benefited from the mitigation project.
    c. Do you have any actual successful projects?
6. HMP Integration within participating jurisdiction's planning documents or activities: We need to state how the 2010 HMP was integrated within other City planning documents and initiatives. This is a major attention point with FEMA. The plan is intended to help the City succeed with implementing mitigation actions through the Community Plan, Capital Improvement Projects Plan or list, Transportation Plan, etc. Can you state a few instances where the plan was integrated into other planning mechanisms?

So this is a lengthy list but it can be accomplished rather quickly. It's simple for me, but I need you and your Planning Team's input because it's your plan. But the good news' that's what I'm here for.

I'm looking forward to working with each of you to accomplish your 2018 Seward Area MJHMP update to assure it fulfills FEMA stringent multi-jurisdictional and tribal HMP requirements.

Kind Regards
-Scott-

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R. Scott Simmons, CFM, CPM
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Personal Cell: 907.841.1832

this message in error or are not the intended recipient, you should not retain, distribute, disclose or use any of this information and you should destroy the e-mail and any attachments orcopies.

From: Eddie Athey [mailto:eathey@cityofseward.net]
Sent: Tuesday, February 27, 2018 4:52 PM
To: Simmons, Scott
Subject: Catch up

Hello Scott,
I did receive your message on Friday but haven had a chance to catch up with you yet….is there a time after 11 tomorrow that would work for you?
Eddie

Edward Athey
Fire Chief / Building Official
City of Seward
(907) 224-3445 wk
(907) 224-8633 fax

From: Simmons, Scott
To: "Eddie Athey"
Subject: RE: Seward HMP update
Date: Wednesday, February 28, 2018 7:13:00 AM
Attachments: image003.png

Hi Eddie,
Yes, anytime is good for me. I typically start early and leave around 3:30.

We have a few planning options. So I'm looking forward to discussing how you'd like to proceed.

Kind Regards
-Scott-

AECOM
R. Scott Simmons, CFM, CPM
Senior Emergency Management Planner

700 G Street, Suite 500, Anchorage, AK 99501
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Eddie

Edward Athey
Fire Chief / Building Official
City of Seward
(907) 224-3445 wk
(907) 224-8633 fax

From:	Jackie Wilde
To:	"Presley, Stephanie"; Simmons, Scott; Eddie Athey; tribaladmin@qntak.org
Cc:	DHSEM Mike Johnson
Subject:	RE: 2010 HMP Update Project - Next Steps
Date:	Thursday, March 01, 2018 9:09:11 AM
Attachments:	image001.png

Stephanie,

I think it's a great idea ☺

Jackie C. Wilde

~"My mission in life is not merely to survive, but to THRIVE and to do so with passion, compassion, humor and style."~Maya Angelou

From: Presley, Stephanie [mailto:spresley@kpb.us]
Sent: Wednesday, February 28, 2018 4:05 PM
To: Simmons, Scott; Eddie Athey; tribaladmin@qntak.org
Cc: DHSEM Mike Johnson; Jackie Wilde
Subject: RE: 2010 HMP Update Project - Next Steps

The SBCFSA board and the City Planning & Zoning Commission have a joint work session scheduled Tuesday, March 20th at 6pm. If Jackie thinks it would work, we could use it as the public meeting.

Stephanie Presley
SBCFSA Program Lead, CFM
Seward/ Bear Creek Flood Service Area
PH: 907.224.3340 F: 907.224.5197
www.kpb.us/service-areas/sbcfsa
spresley@kpb.us

From: Simmons, Scott [mailto:scott.simmons@aecom.com]
Sent: Wednesday, February 28, 2018 3:26 PM
To: Eddie Athey <eathey@cityofseward.net>; tribaladmin@qntak.org; Presley, Stephanie <spresley@kpb.us>
Cc: DHSEM Mike Johnson <mike.johnson@alaska.gov>
Subject: RE: 2010 HMP Update Project - Next Steps

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Kind Regards
-Scott-

AECOM
R. Scott Simmons, CFM, CPM
Senior Emergency Management Planner

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eMail: scott.simmons@aecom.com
Phone: 907.261.9706 or 800.909.6787
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(907) 224-3445 wk
(907) 224-8633 fax

NOTE: This message was trained as non-spam. If this is wrong, please correct the training as soon as possible.
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From: Simmons, Scott
To: jwilde@cityofseward.net
Subject: FW: 2010 HMP Update Project - Next Steps
Date: Monday, March 12, 2018 12:01:00 PM
Attachments: 2018 Update Seward HMPs Projects List W-StatusActions.doc
2010 Seward Mitigation Successes.docx
2010 HMP Extracted Potential Project List.docx
AECOM-SewardCF.xlsx
image003.png
image004.png

Hi Jackie,
Please look over the attachments. I think these are a good place to start with the Planning Commission to show them HMP update editing needs.

Your thoughts?

Kind Regards
-Scott-

AECOM
R. Scott Simmons, CFM, CPM
Senior Emergency Management Planner

700 G Street, Suite 500, Anchorage, AK 99501
eMail: scott.simmons@aecom.com
Phone: 907.261.9706 or 800.909.6787
Fax: 907.562.1297
Personal Cell: 907.841.1832

From: Simmons, Scott
Sent: Wednesday, February 28, 2018 3:25 PM
To: 'Eddie Athey'; 'tribaladmin@qntak.org'; 'Presley, Stephanie'
Cc: DHSEM Mike Johnson
Subject: RE: 2010 HMP Update Project - Next Steps

Good Afternoon Eddie and Scott,
The next step is to have a project kick-off meeting either in-person or via telephonic conference call. I suggest having one during a public meeting, Planning Team meeting, etc. I can travel down to attend, lead, and or facilitate the meeting(s).

Unfortunately, the State staff have conflicts during March so they will not likely be able to participate until April.

I have attached a few examples I have extracted from the 2013 SBCFSA HMP and the legacy 2010 Seward HMP to highlight few important tasks.

1. We need to determine whether we are going to update the 2010 Seward HMP, the 2013 SBCFSA, or create a highbred multi-jurisdictional HMP (MJHMP) by combining both plans into one. Either way the MJHMP will then be adopted by each participant (City, SBCFSA, and Tribe).
2. The 2010 HMP Extracted Potential Project List: These projects were spread all over the 2010 HMP so I consolidated the list on this sheet to be able to see what the City was expected to accomplish during the plan's 5-year lifecycle.
3. The 2018 Update…Projects list W-Status: The is a combined list from your 2010 HMP and the SBCFSA HMP. The 2010 HMP projects are listed as "City 2010". The SBCFSA project list have multiple responsible entities (i.e. SBCFSA, City, and/or KPB) and were either placed within the HMP's hazards' sections or I moved them to where I would like to place them in the new plan layout.

   Goals: please review my simplified 2010 legacy HMP's goals. They reflect a high-level viewpoint of how the community desires to focus its "mitigation" efforts. It gets confusing to readers who wonder which goal each action strives to fulfill or support.

   Projects: this list needs to be reviewed and each project's current status addressed using column that states: "completed, deferred, deleted, combined or ongoing, etc." Then a simple comment as to why you are keeping them (ongoing), deleting them, or why they were deferred. I can do this over the phone with you to simplify the process.

   I suggest you and your planning team (City, SBCFSA, Tribe, and KPB) review the project list and either combine or delete a few; there are simply too many listed projects that may not have been implemented during the 2010 HMPs 5-year life-cycle.
4. The AECOM –Seward Critical Facilities (CF) excel spreadsheet: has a few items shaded in pink. I would like to obtain their GPS Coordinates to add to our GIS database. Is that possible?
5. Mitigation Successes: I also gleaned a few completed projects from the 2010 HMP.
   a. Did they accomplish what they were intended to accomplish?
   b. Can you provide a brief description as to how the City, SBCFSA, or Lowell Point benefited from the mitigation project.
   c. Do you have any actual successful projects?
6. HMP Integration within participating jurisdiction's planning documents or activities: We need to state how the 2010 HMP was integrated within other City planning documents and initiatives. This is a major attention point with FEMA.

The plan is intended to help the City succeed with implementing mitigation actions through the Community Plan, Capital Improvement Projects Plan or list, Transportation Plan, etc. Can you state a few instances where the plan was integrated into other planning mechanisms?

So this is a lengthy list but it can be accomplished rather quickly. It's simple for me, but I need you and your Planning Team's input because it's your plan. But the good news' that's what I'm here for.

I'm looking forward to working with each of you to accomplish your 2018 Seward Area MJHMP update to assure it fulfills FEMA stringent multi-jurisdictional and tribal HMP requirements.

Kind Regards
-Scott-

AECOM
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Senior Emergency Management Planner

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eMail: scott.simmons@aecom.com
Phone: 907.261.9706 or 800.909.6787
Fax: 907.562.1297
Personal Cell: 907.841.1832

From: Eddie Athey [mailto:eathey@cityofseward.net]
Sent: Tuesday, February 27, 2018 4:52 PM
To: Simmons, Scott
Subject: Catch up

Hello Scott,
I did receive your message on Friday but haven had a chance to catch up with you yet….is there a time after 11 tomorrow that would work for you?
Eddie

Edward Athey
Fire Chief / Building Official
City of Seward
(907) 224-3445 wk
(907) 224-8633 fax

From:	Simmons, Scott
To:	eathey@cityofseward.net
Cc:	jwilde@cityofseward.net; bhickok@cityofseward.net; "Presley, Stephanie"
Subject:	RE: HMP questions. Can you help with these?
Date:	Tuesday, March 05, 2019 10:42:00 AM
Attachments:	image004.png image002.png

Good Morning Eddie,
Could you please provide the requested information below. I drastically need it to complete your critical facility vulnerability assessment.

Kind Regards
-Scott-

AECOM
R. Scott Simmons, CFM, CPM
Senior Emergency Management Professional

700 G Street, Suite 500, Anchorage, AK 99501
eMail: scott.simmons@aecom.com
Phone: 907.261.9706 or 800.909.6787
Fax: 907.562.1297
Personal Cell: 907.841.1832

From: Simmons, Scott
Sent: Friday, January 11, 2019 2:25 PM
To: eathey@cityofseward.net
Subject: FW: HMP questions. Can you help with these?

Thanks Eddie,

I forgot to send you this question?

- Can you send me City's residential tax or appraisal values data to add within our GIS vulnerability assessment.
- Can the planning department send me the critical facility tax or appraisal value date? It was not included on the attached critical facility spreadsheet you sent earlier.

As a portion of Seward's critical facility and residential structure vulnerability assessment, I include these estimated averages combined within the population and building stock information below:

- What is the average replacement cost (yellow highlight below):

- What is the average structure size (yellow highlight below):
- Census estimates there are 1,086 residential structures in Seward. What would you like me to insert:

"Population and Building Stock

Population data for Seward were obtained from the 2017 US Census and the 2017 DCCED certified population data. The US Census reports Seward's total population as 2,831 and DCCED reported a population of 2,518 (Table 6-2).

Table 6-2 Estimated Population and Building Inventory

Population		*Residential Buildings*	
2017 Census	*DCCED? 2017 Data*	*Total Building Count*	*Total Value of Buildings*[1]
2,831	*2,518*	*1,086*	*US Census $248,585,400* *City of Seward:$*

1 Sources: US Census 2017, and 2017 DCCED population data. US Census listed housing value at $228,900

The project team determined that the average structural replacement value of all single-family residential buildings is $XXXX

Estimated replacement values for those structures, as shown in Table 6-2, were obtained from the 2017 US Census, and 2017 DCCED certified estimate.

The planning team stated that residential replacement values are generally understated because replacement costs exceed Census structure estimates due to material purchasing, barge or airplane delivery, and construction in rural Alaska. The planning team estimates an average 30ft by 40 ft (1,200 sq ft) residential structure costs $#. A total of 1,086 single-family residential buildings were considered in this analysis."

Eddie, could you also look over the email below to see if you can answer or have someone determine how you'd like to address them?

Kind Regards
-Scott-

AECOM
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Senior Emergency Management Professional

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Personal Cell: 907.841.1832

From: Simmons, Scott
Sent: Tuesday, January 08, 2019 2:29 PM
To: eathey@cityofseward.net
Cc: jwilde@cityofseward.net; 'Presley, Stephanie'; DCRA Jimmy Smith (Jimmy.Smith@alaska.gov)
Subject: FW: Repetitive Loss Property Information needed for the City of Seward. Alaska

Good Afternoon Eddie, Jackie, and Stephanie,

Does Seward have a repetitive flood loss (RL) property inventory? I need the information for completing the table below.

I thought there were RL properties identified by the City of Seward during these disasters:

- 2012 September Storm Flood Disaster (FEMA 4094-DR),
- 2013 October KPB Flood Disaster (DR-4161),
- 2017 December KPB Storm Disaster (DR 4369), and the
- 2018 October KPB Flooding (AK-18-264 State disaster declared by Gov. Walker).

These properties may be eligible to file NFIP damage claims.

I need to identify any Repetitive Loss Properties within the HMP to assure Seward remains NFIP and CRS compliant. This is what your city website and planning ordinances state:

> ***Important Information Concerning Flooding Potential in Seward***
>
> ***Special Flood Hazard Areas (SFHAs):*** *Certain areas have been designated by the Federal Emergency Management Agency (FEMA) as Special Flood Hazard Areas. SFHAs are areas within the 100-year flood boundary as mapped by FEMA. A &quot100-year flood" refers to a flood level with a 1 percent or greater chance of being equaled or exceeded in any given year. There is a 26% chance that a structure located in an SFHA will be inundated by a 100-year flood during the life of a 30-year mortgage. In comparison, the risk of fire is approximately 5% in the same time period. Smaller floods have a greater chance of occurring in any given year and can still create a significant hazard to life and property…*
>
> ***Floodplain Development and Permit Requirements****: Any development within the City of Seward is subject to federal and City's floodplain management requirements. Always check with the Building Department before you build on, alter, re-grade, or fill on your property. To report illegal floodplain development activity, call the* ***City Community Development Department at (907) 224-4048****…*
>
> ***Flood Insurance:*** *The National Flood Insurance Program (NFIP) makes flood insurance available to everyone in the City. Renters can also purchase flood*

insurance to cover their possessions. For information about flood insurance, call your insurance agent or the NFIP customer service line at 1-800-638-6620…

Community Rating System (CRS): *The NFIP created the Community Rating System (CRS) to promote flood awareness and reduce flood losses. The City of Seward is a participant of the program. As the result, the residents of the City of Seward who purchase flood insurance enjoy an automatic reduction of their insurance premiums.*

(Source: http://www.cityofseward.us/index.aspx?NID=880)

Eddie, can you provide this information. I'm still awaiting Seward Floodplain Coordinator, DCRA Flood Coordinator, and FEMA Floodplain Manager to supply this information

Table 6-4 Seward Community Repetitive Loss Property Data
Seward, City Of (Community Identification Number [CID]: 020113)

Classification	AE, A1-30, AO, AH, A	VE, V1-30, V	B, C, X	TOTAL
RL Buildings (Total)				
RL Buildings (Insured)				
RL Losses (Total)				
RL Losses (Insured)				
RL Payments (Total)				
Building				
Contents				
RL Payments (Insured)				
Building				
Contents				
Post - FIRM SFHA RL Buildings:				
Insured Buildings with 4 or More Losses:				
Insured Buildings with 2-3 Losses > Building Value:				
Total Target RL Buildings:		0		

Source: Alaska State Floodplain Coordinator and FEMA Region X Floodplain Manager Data

Kind Regards
-Scott-

AECOM
R. Scott Simmons, CFM, CPM
Senior Emergency Management Professional

700 G Street, Suite 500, Anchorage, AK 99501
eMail: scott.simmons@aecom.com

From: Simmons, Scott
To: "Jackie Wilde"
Cc: eathey@cityofseward.net
Subject: FW: Seward Area Hazard Mitigation Plan Update Project Newsletter for review
Date: Monday, March 12, 2018 10:52:00 AM
Attachments: SewardMJHMP draft Newsletter-1_030518.pdf
image003.png
image005.png
image004.png

Good Morning Jackie,
You have freedom to create your own newsletter as desired. Copy and paste any pertinent information from the attachment as you deem appropriate.

If using our, please coordinate review comments with Eddie. The return to me for editing. I will then return our version to either Eddie or you for distribution before the 03/20 meeting.

Please send a short email requesting that I attend your 03/20/18 Planning Commission meeting. I need to send my travel request and itinerary “today” for the DMVA Commissioner’s approval one week before anticipated travel.

Kind Regards
-Scott-

AECOM
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eMail: scott.simmons@aecom.com
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Fax: 907.562.1297
Personal Cell: 907.841.1832

From: Simmons, Scott
Sent: Monday, March 05, 2018 2:41 PM
To: 'Eddie Athey'; 'Scott Allen'
Cc: Jim Hunt; 'divmgr@qntak.org'
Subject: RE: Seward Area Hazard Mitigation Plan Update Project

Good Afternoon Edward and Scott,
Thank you for contacting me. Please call me so we can discuss the next steps. It may be beneficial to have your City as well as Qutekcak Native Tribal leaders at a personal

in-town meeting or we can complete this via teleconference if preferred.

I have copied the Qutekcak Native Tribal administrators Scott Allen and Sara Benjamin and invite them to participate with this planning effort. I will call them separately.

Please review and update the Planning Team table where needed:

Table X-x Seward Area MJHMP PlanningTeam

NAMe	TiTle	OrgANizATiON	PHONe
Eddie Ethey	Fire Chief	City of Seward	**City HMP Lead**, data input and MJHMP review
Jim Hunt	City Manager	City of Seward	Data gathering and MJHMP review
Jackie Wilde	City Planner	City of Seward	Data input and MJHMP review
Doug Schoessler	Public Works Director	City of Seward	Data input and MJHMP review
Norm Regis	Harbormaster	City of Seward	Data input and MJHMP review
Tom Clemens	Police Chief	City of Seward	Data input and MJHMP review
Scott Allen	Tribal Administrator	Qutekcak Native Tribe	**Tribal HMP Lead**, data input and MJHMP review
Sarah Benjamin	Division Manager	Qutekcak Native Tribe	Tribal data input and MJHMP review
Katherine Brown	IGAP Coordinator	Qutekcak Native Tribe	Tribal data input and MJHMP review
Stephanie Presley	SBCFSA Coordinator	SBCFSA	Data input and MJHMP review
		Lowell Point	Data input and MJHMP

		Council(s)	review
Scott Simmons	Planner/Consultant	AECOM	Project Manage, lead writer, technical assistance

The email below explains the planning update process (corrections made). I can come to Seward to meet with the planning team. We can discuss when the City and Tribe may be available to meet collectively.

I understand that the Borough is including the SBCFSA HMP into the KPB HMP update. However, FEMA requires that we coordinate this planning effort by reaching out to other communities adjacent to Seward that may desire to participate in your planning effort such as the Lowell Point Council and the SBCFSA?

Are you willing to include them within this plan as we included Seward, Lowell Point, and the Borough within the 2013 SBCFSA HMP?

I have attached a draft HMP update newsletter for review, editing and eventual distribution. Please let me know if you desire edits to this newsletter. I will make the corrections and return for distribution.

Kind Regards
-Scott-

AECOM
R. Scott Simmons, CFM, CPM
Senior Emergency Management Planner

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eMail: scott.simmons@aecom.com
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Fax: 907.562.1297
Personal Cell: 907.841.1832

From: Eddie Athey [mailto:eathey@cityofseward.net]
Sent: Thursday, February 22, 2018 11:49 AM

To: Simmons, Scott
Cc: Jim Hunt
Subject: RE: City of Seward Hazard Mitigation Plan Update Project

Hello Scott,
I will be the team lead for this project working under the direction of City Manager Mr. Hunt. Scott Allen and Sara Benjamin are administrators for the Qutekcak Native Tribe . Mayor Squires has enough irons in the fire and does not wish to be part of the planning team, especially in a lead role.

What is our next step to move this process forward?
Eddie

Edward Athey
Fire Chief / Building Official
City of Seward
(907) 224-3445 wk
(907) 224-8633 fax

From: Simmons, Scott [mailto:scott.simmons@aecom.com]
Sent: Tuesday, February 13, 2018 1:45 PM
To: Eddie Athey; tribaladmin@qntak.org
Cc: David Squires; Jim Hunt; Jackie Wilde; divmgr@qntak.org
Subject: RE: City of Seward Hazard Mitigation Plan Update Project

Good Afternoon,
I was informed by DHS&EM's Mike Johnson, the Seward HMP is a go. As described in our prior email.

I have copied all of you (Mayor Squires, City Manager Hunt, Fire Chief Athey and Tribal Administrator Allen, and Tribal Director Benjamin) for inclusion and continuity with this Hazard Mitigation Planning update project for the City of Seward and Qutekcak Native Tribe.

I worked with the SBCFSA to convert their legacy Flood Hazard Mitigation Plan into an all-hazards plan in 2013. This plan also included completing a comprehensive flood study incorporating Seward's and KPB's infrastructure to facilitate providing future climate-change impact analysis for future planning purposes. Updating your legacy plan will reference the SBCFSA data while fulfilling current FEMA criteria and make you once again eligible for FEMA and other federal agency grants.

FEMA now requires that collocated City and Tribal governments should work together with developing a multi-jurisdictional hazard mitigation plan (MJHMP). Both city and tribal government criteria will be included throughout the updated plan. Both the City and Native Village Councils will need to adopt the plan once it has been state reviewed and received

preliminary FEMA approval.

We will review and update all sections of your current plan; starting with the planning section. Your Planning Team membership needs to include City and tribal leadership and community participants, be manageable with as few as four or five members; or consider including other members such as your Planning & Zoning Commission, or city and tribal councils as your Community Planning Team.

Our first goal is for you to review your legacy HMPs planning team list (below) and determine if those members are still available and willing to work on updating the plan. I have provided your legacy HMP's planning team chart below. We will also need to include the Qutekcak Tribal members within the Planning Team. Please edit the list to update your planning team membership.

Table x-x Hazard Mitigation Planning Team

NAME	TITLE	ORGANIZATION	PHONE
Dave Squires	City Mayor	City of Seward	MJHMP review
Jim Hunt	City Manager	City of Seward	Data gathering and MJHMP review
Jackie Wilde	City Planner	City of Seward	Data gathering and MJHMP review
Eddie Ethey	Fire Chief	City of Seward	**City Planning Team Lead**, Data gathering and MJHMP review
Doug Schoessler	Public Works Director	City of Seward	Data gathering and MJHMP review
Scott Allen	Tribal Administrator	Qutekcak Native Tribe	**Tribal Planning Team Lead**, data gathering and MJHMP review
Sarah Benjamin	Division Manager	Qutekcak Native Tribe	Tribal data gathering and MJHMP review
Katherine Brown	IGAP Coordinator	Qutekcak Native Tribe	Tribal data gathering and MJHMP review
			Project

Scott Simmons	Planner/Consultant	AECOM	Manage, lead writer, technical assistance

Typically the Mayor/City Administrator and Tribal First Chief/President desire to be their respective government's Planning Team Leads. Each of you can select alternates for example, Mayor Dave Squires (the former Fire Chief) was selected as Seward's legacy HMP project lead. Alternates can report to those who appointed them (your respective Councils or planning team) as well as coordinate data review and approvals.

AECOM's role in this project is to ensure that the new MJHMP update meets state and federal requirements. We are at the beginning stages of this project, and we are seeking information about the community infrastructure, residents, and jurisdictional authorities.

This is the typical plan review process:

Section 1. Introduction: added entire new section explaining City and Tribal HMP regulatory requirements.

Section 2. Community Description: update your community information, including new census and State data.

Section 3. Planning Process: update this section to reflect 2018 public processes including newsletters, public meetings and 2018 Planning Team changes.

- Did your planning team do what they said they'd do? For example, did the planning team perform their annual maintenance commitment?
- Were mitigation efforts integrated with or into other City and Tribal planning documents"

Section 4 Plan Adoption: 2018 formal adoption resolutions and dates.

Section 5. Hazard Profile Analysis: review current and newly identified hazards such as 2010 t 2018 earthquake, flooding, ground failure, severe weather, and wildfire data.

Section 6 Vulnerability Analysis: analyze vulnerability with 2018 critical facilities and infrastructure tables as well as tribal culturally sensitive site and FEMA NFIP programmatic data as applicable.

Section 7 Mitigation Strategy: review and edit 2010 mitigation goals and actions.

- We will add short narrative descriptions as to their current status such as whether you have completed, deleted, or deferred those actions or projects;
- As well as provide a short explanation as to why they may have changed status.

Section 8. References: revised to reflect 2018 document searches and data used to support the update.

Our task is to write the plan while teaching you the hazard mitigation plan development and update process. We have been very successful accomplishing this by using community Planning Teams. AECOM will write the plan. Your community Planning Team will work with us to provide essential information that only community residents will know or have experienced as well as engaging the community by posting public notices and providing HMP update information during community meetings.

There will be opportunities for the entire community to review the MJHMP and should be tracked as part of FEMA's public involvement process. This can include distributing or posting newsletters or providing information during City Council Meetings or other public meetings, and working with us over the phone as we capture needed information. Please keep track of any public comments as FEMA pushes to see how this information benefited the plan development process.

Please provide the names of your respective planning team leaders to schedule an introductory meeting them and team members to coordinate information collection.

We look forward to working with you to complete your Seward Hazard Mitigation Plan update. Please call me if you have questions.

Kind Regards
-Scott-

AECOM
R. Scott Simmons, CFM, CPM
Senior Emergency Management Planner

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eMail: scott.simmons@aecom.com
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Personal Cell: 907.841.1832

Event Details

P&Z Joint Work Session with SBCFA

Tuesday, March 20
Topic "Hazard Mitigation Plan update"

Date: March 20, 2018
Time: 6:00 PM - 9:30 PM
Location: Seward Library Community Room
Address: 239 6th Ave
Seward, AK 99664

From:	Eddie Athey
To:	Simmons, Scott
Subject:	RE: P&Z Joint Work Session Packet 03.20.2018 - P_Z Joint Work Session Packet 03.20.2018.pdf
Date:	Tuesday, March 19, 2019 2:05:38 PM
Attachments:	image001.png P_Z Joint Work Session Packet 03.20.2018.pdf

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From: Simmons, Scott [mailto:scott.simmons@aecom.com]
Sent: Tuesday, March 19, 2019 11:56 AM
To: Eddie Athey
Subject: RE: P&Z Joint Work Session Packet 03.20.2018 - P_Z Joint Work Session Packet 03.20.2018.pdf

Hi Eddie, I can't access this because it is located on your intranet. No outside access from anyone but Seward Employees or those that may be authorized.

Kind Regards
-Scott-

AECOM
R. Scott Simmons, CFM, CPM
Senior Emergency Management Professional

700 G Street, Suite 500, Anchorage, AK 99501
eMail: scott.simmons@aecom.com
Phone: 907.261.9706 or 800.909.6787
Fax: 907.562.1297
Personal Cell: 907.841.1832

From: Eddie Athey [mailto:eathey@cityofseward.net]
Sent: Tuesday, March 19, 2019 11:09 AM
To: Simmons, Scott
Subject: P&Z Joint Work Session Packet 03.20.2018 - P_Z Joint Work Session Packet 03.20.2018.pdf

https://history.cityofseward.net/WebLink/PDF/sb3iwzsbdorwxzmlc4tvykuz/2/P_Z%20Joint%20Work%20Session%20Packet%2003.20.2018.pdf

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Seward Planning & Zoning Commission

&

SBCFSA

Joint Work Session Packet

March 20, 2018

Seward Library Con11nu11ity Roo111 Beginning at 6:00p.1n.

http://history.cityofseward.net/weblink/0/doc/22728/Page1.aspx

Legacy HMP Review and Update Needs Determination

Planning Process	Planning process obligations	NF: Complete annual HMP review	None	Refine plan maintenance processes	Planning team will begin annual review meetings
	Planning team membership Mitigation resource list Continue public outreach initiatives HMP integration initiatives into other planning mechanisms Plan Maintenance Activities	NF: Integrate any legacy HMP components into other planning mechanisms or initiatives NF Continue public involvement during five-year lifecycle		responsibilities	Strive to integrate HMP initiatives into other planning mechanisms
Hazard Profile Update	Update hazard profile and review past history Profile new hazards Identify risks	NF Update hazard profile and new event history	Mitigation projects that were combined or due to similarity	Identify new hazards Update hazards' impact; Determine mitigation project status; add, delete, defer, or combine projects Develop new MAP	Define new actions within the MAP
Risk Analysis and Vulnerability Assessment	Inventory Vulnerability analysis & summarize	NF: Identify development and land use changes	None	Develop asset methodology Determine vulnerabilities Determine structure vulnerabilities Identify alternative appropriate to properties	Fill data gaps Acquire scientific information to augment this data. Delineate climate change impacts to infrastructure
Mitigation Strategy	Determine existing mitigation actions, progress, and barriers	NF: Did not track implementation process	Delete completed, combined, or dropped actions, [mplemented &	Legacy (2010) HMP status MAV initiatives' Identify new	Annual review action progress status,
					or progress

non-relcvanl mitigation

mill!l-litiun actions lbr newly

feasit,ility

Table 3-2 acton Imprcmi-ntatton acttnns identified ha r Impkmntato

	succcssc-s or harmer			lkvdop communitv specifc capabilit• assessmc:nt(s	
• F Fulfilled	Nf' Not Fuifilled				

Planning Process Considerations

The planning team did not complete their designated annual HMP integration into other plan ning mechanism, annual reviews or other plan maintenance activities. Therefore it bccam.e a primary consideration to update the legacy 20 lx MJHMP to analyze city and triba l changes as well as all hazards that have, or could potentially have, impac te d the community during the legac y **HMP's** five-year lifecycle.

All sect ions of the MJHMP were updated throughout the year long planning activity due to intermittent community staff availability. Therefo re, Table 3-2 was develo ped to categorize pla nnin g team identified HMP components that neces s itated information update. The team determined ho,v community changes , construction and infrastructure conditio ns, climate change im pacts, and population increases or decreases have influenced hazard risks and/or facility vulnerabilities.

The 2018 MJHMP update process included inviting new and existing stakeholders to review the legacy HMP to determine what was accomplished versu s \Yhat ,vas intended to accomplish. Participants v,;ere also asked to describe how they integrated legacy 2010 HMP components into their respective plans, activities, or processes.

Pertinent section data are listed within Tab le 3-2, which provided the foundation for completing the 2018 MJHMP update.

Mitigation Strategy

Review and simplify existing Mitigation Goals for 2018 MJHMP update.

Table 7-x lists the communities newly refined strategic mitigation goals which forms the founda tion for the City of Seward's Mitiga tion Action Plan (MAP) depicted in Table 7-x.

Delete those hazards, which no longer affec t the community and explain why they were deleted or changed.

Table 7-x Mitigation Goals

No.	Goal Description
Multi-Hazards (MH)	
MH1	Provide outreach activities to educate and promote recognizing and mitigatin g natural and manmade hazards that potentially impact the City of Seward, th e Qutekcak Native Tribe, the SBCFSA, and Kenai Peninsula Borough (KPB) (Seward area).
MH2	Cross-referencemitigation goals and actions with Seward, the Qutekcak Native Tribe, the SBCFSA, and KPB planning mechanisms and projects.
MH3	Develop construction activities or projects that reduce vulnerability, potential damage, and losses from natural and manmade hazards that affect the Seward area.
Natural Hazards	
EQ4	Reduce potential Earthquake (EQ) vulnerability, damage, and loss.
FL 5	Reduce potential Flood and erosion (FL) vulnerability, damage, and loss.
GF6	Reduce potential Ground Failure (GF) vulnerabilrty, damage , and loss.
TS 7	Reduce potential Tsunami or Seiche (TS) vulnerabi.lit y, damage, or loss.
VOe	Reduce potential Volcanic ash (VO) vulnerability, damage, or loss.
WX9	Reduce potential Weather (WX) vulnerability, damage, or loss.
Wf 10	Reduce Wildland Fire (WF) vulnerability, damage , or loss.
Manmade Hazards	
EC 11	Reduce potential Economic(EC) vulnerability, damage, or loss.
TQ 12	Reduce potential Technol!ogical (TQ) vulnerability, damage , or loss.

Review existing Mitigation Actions listed in the identified mitigation action or project list for validity for carrying forward into the 2015 HMP update . Define current HMP Mitigation project's status within the project review table below. List current HMP projects as: **Completed, Deleted, Deferred, Re-Defined, or Ongoing.**

Explain why th e existing actions status may have changed such as: No available resources (staff , funding, equipment, etc.)

Newly identified projects need to indicate whether they were considered, or selected for implementation. Considered proj,ects are not carried forward into the MAP.

Table 7-x Mitigation Goals and Potential Actions

('Blue text items are the current HMP Identified Mitigation Action It ems and their reSf)ective status determinations.)

No.	Description	Authority	Status: *Considered, Selected Complete, Deferred, Deleted, or Ongoing*	Explain any Status Changes	Description
	Promote recognition and mitigation of all natural hazards that affect the SBCFSA.	SBCFSA, City, KPB			Develop a strategy for accessing (applying for and managing) mitigation grant funds
		SBCFSA, City, KPB			Ident ify and pursue funding opportunities to implement mitigation actions.
		SBCFSA, City, KPB			Organize a Floodproofing Workshop for Homeowners and Businesses to learn about techniques and funding sources for elevating, and floodproofing structures (agency[ies]) to participate - USACE Floodproofing Committee, FEMA, DCCED; Businesses to support SBS, Wells Fargo, others
		SBCFSA, City, **KPB**			Strive to formalize a Hazard Mitigation Planning Team to develop a sustainable process for implementing, monitoring, reviewing, and evaluating community wide mitigation actions.
		SBCFSA, City, **KPBA**			Hold periodic outreach events or activities to educate populi:Ition concerning existing natural hazards. **Activities** are designed to provide pertinent natural hazards information to residents about recognizing and mitigating hazards that could potentially affect the SBCFSA
		SBCFSA, Citv, **KPB**			Develop, produce, and distribute information materials concerning mitigation, preparedness, and safety procedures for all identified natural hazards.
		SBCFSA, Otv, KPB			Develop and implement strategies and educational outreach programs for debris management from natural hazard events.
		SBCFSA			Disseminate FEMA pamphlets to educate and encourage homeowners concerning structural and non-structural retrofit benefits.
		SBCFSA, Citv, KPB			Develop outreach program to educate residents concerning all-hazard benefits of modern building code compliance during rehabilitation or major repairs for residences or businesses.
		SBCFSA			Disseminate information to increase public knowledge about flood Insurance, and the natural and beneficial floodplain functions.
		SBCFSA, City, KPB			Identify critical facilities and vulnerable populations based on identified (and mapped where applicable) high hazard areas.
		SBCFSA, City, **KPB**			Identify evacuation routes **away** from high hazard areas and develop outreach program to educate the public concerning warnings and evacuation procedures.
		SBCFSA, Citv, KPB		Suggest moving to MH 2	Establish a cooperative relationship with the City of Seward to ensure hazard mitigation efforts are not being duplicated or opportunities missed.
		SBCFSA			Coordinate with the Kenai Peninsula. Borough and other appropriate agencies to obtain funding and permitting to establish an clnnual maintenance schedule and contract to remove excess debris throughout the SBCFSA.

Table 7-x Mitigation Goals and Potential Actions

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

No.	Description	Authority	Status: *Considered, Selected Complete, Deferred, Deleted, or Ongoing*	Explain any Status Changes	Description
		2010 Flood Education			Continue distributing the brochure describing the City of Seward flood dangers and floodplain building regulations.
		2010 Flood Education			Continue working with FEMA and other Federal and State Agencies as the FIRMs are updated and researching other tools for accurately forecasting and mitigating Seward's complex alluvial fan flood problem.
		2010 Flood Education			Continue working with FEMA to obtain the latest NFIP information and scheduling workshops.
		2010 Flood Education			Provide floodplain regulations information, updates or revisions to the citizens of Seward.
		2010 Flood Education			Continue coordination with FEMA to conduct flood proofing or elevating workshops for the Qty and public.
		2010 Flood Education			Continue the City's efforts working with potential partners or agencies while capitalizing on multiple funding sources for mitigation projects, including erosion and sediment control roiects.
		2010 Flood Education			Continue refining the education and outreach programs to notify current homeowners and otential homebuyers about flood hazard risks in identified areas.
		2010 Flood Education		Suggest moving to **MH** 2	Provide local realtors and lending institutions with GIS copies of FIRM as they are updated.
		2010 Flood Education		Suggest moving to MH 3	Complete North Forest Acres Levee and Access Road Project.
		2010 Flood Education		Suggest moving to MH 3	Complete Dairy Hill Road/ Seward Lagoon culvert replacement.
		2010 Flood Education		Suggest moving to MH 3	Conduct a structural assessment of the Fourth of July Creek dike.
		2010 Flood Education			Obtain ongoing permits for the Lowell Creek outfall sediment and erosion control program.
		2010 Flood Education -			Continue public education concentrating on the Siren Alert and Warning System (SAWS), what it means and what to do In the event of an emergency. Educate the public on the Emergency Alert Network. (Toe Planning and Zoning Commission identified this item during their **May** 6, 2004 meeting.)
		2010 Flood Education			Continue providing new homeowners, builders or renovators a brochure detailing the fuel tank stand codes helping to insure they're more flood/earthquake prepared. (The Planning and Zoning Commission identified this item during their May 6, 2004 meetinq.

Table 7-x Mitigation Goals and Potential Actions

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No.	Description	Authority	Status: *Considered, Selected Complete, Deferred, Deleted, or Ongoing*	Explain any Status Changes	Description
	Promote cross-**referendng** mitigation **goals** and act:lOns with other SBCFSA, City of Seward, and KPB planning mechanisms and projects.	SBCFSA			The SBCFSA wit! manage their existing plans to incorporate mitigation **planning** provisions into alt service area planning processes such as comprehensive, **capital** improvement, and land use plans, etc. to demonstrate multi-benefit considerations and facilitate using **multiple** funding source consideration.
		SBCFSA, City, KPB			Improve flood and erosion hazard aspects in land use decisions, subdMsion actions, and Plans that affect the SBCFSA including: KPB All-Hazards Plan, Comprehensive Plan, Coastal Management; Wetlands Management Plan, Seward Long-term development plan.
		City			Develop, incorporate, and enforce building ordinances to reflect survivability from flood, fire, wind, seismic, and other hazards to ensure occupant safety.
		SBCFSA, City' KP6			Adopt the Risk MAP coastal velocity zone mapping studies into the floodplain code.
		SBCFSA		Suggest moving to MH 3	Relocate or acquire (buy-out and demolish) structures away from hazard prone area (erosion, flood, ground failure, etc.)
		SBCFSA			The SBCFSA will manage their existing plans to incorporate mitigation planning provisions into all service area planning processes such as comprehensive, capit?I improvement, and land use plans, etc. to demonstrate multi-benefit considerations and facilitate using multiple funding source consideration,
	Reduce **vulnerability,** damage, or **loss** of structures from all natural hazards that affect the SBCFSA.	FSA, City, KPB			Relocate or acquire (buy-out and **demolish)** structures away from hazard prone area (erosion, flood, ground failure, **etc.**)
		City			Harden utility headers located along river embankments to mitigate potential flood, debris, and erosion damages.
		Qty			Purchase and install generators with matn power distribution disconnect switches for identified and prioritized critical facilities susceptible to short term power disruption. **(i.e.** first responder, medical facilities, schools, correctional facilities, and water and sewage treatment plants, etc.)
		FS.A, City, KPB			Develop vegetation projects to restore clear-cut and riverine eroSion damage and to restore slope stability in avalanche and landslide areas.
		City, KPB			Perform hydrologic and hydraulic engineering, drainage, and bed loading studies and analyses for each watershed. Use information obtained for **feasibility** determination and project design. • This information should be a key component, directly related to a proposed project in order to qualify for FEMA funding.

Table 7-x Mitigation Goals and Potential Actions

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No.	Description	Authority	Status: Considered, Selected Complete, Deferred, Deleted, or Ongoing	Explain any Status Changes	Description
		KPB		Suggest moving to MH 2	Develop a vegetation management plan addressing slope-stabilizing root strength to maintain or encourage precipitation containment.
	Reduce tJOtential Earth quake (EQ) vulnerability, damage, and toss.	City			Evaluate critical public faciliti es with significant seismic vulnerabilit ies and complete retrofit. (e.g. evaluate fire stations, public works buildings, potable water systems, wastewater systems, electric power systems, and bridges, etc.)
		City			Inspect, prioritize, and retrofit any critical facility or public infrastructure that does not meet current State adopted Bullding Codes.
		C: FSA O: City, KPB			Install non-structural seismic restra ints for large furniture such as bookcases, filing cabinets, heavy televisions, and appliances to prevent toppling damage and resultant injurie s to small children, elderly, and pets.
		City 2010		Suggest moving to MH 2	Update building codes to stay current with State requirements and industry concerning earthquake protection.
		City 2010			Identify non-buildable sites through the city's land use plan and city zoning maps.
		Oty 2010			Earthquake proof priority structures(schools, city buildings, public safety offices, etc.) This project requires the involvement of many government entitles and assessments of various structures. Where possible employ Earthquake resistant building technology to mitigate damage.
		City 2010			Acquire land within the city to develop a secondary evacuation route that bypasses the Seward lagoon and boat harbor areas. Provide barr iers to this route and designate it as a recreational trail for use outside of emergency access. (Planning and Zoning Commission, May 6, 2004) • 2010 Update: Land has been designated in January. The survey of the route is scheduled to be accomplished in the spring of 2010.
		City 2010		Suggest moving to **MH** 1	Conduct community mock emergency exercises and evaluate response.
		City 2010		Suggest moving to **MH** 1	Develop public education to concentrate on the SAWS (Siren Alert and Warning System), what it means and what to do in the event of an emergency. Educate the public on EAN (Emergency Alert Network). (Planning and Zoning Commission May 6, 2004) Possibly make public announcements using the utility billing memo and the scanner announcement page with GCI cable TV and radio.

Table 7·x Mitigation Goals and Potential Actions

(Blue text items are the current HMP Identified Mitigation Action I tems and their respective status determinatio!lf+...

No.	Description	Authority	Status: *Considered, Selected Complete, Deferred, Deleted, or Ongoing*	Explain any Status Changes	Description
		City 2010		Suggest moving to MH 1	Continue to update brochures and handouts to educate homeowners on fuel tank stand codes and earthquake mitigation measures so they wiUbe more flood/earthquake prepared
		SBCFSA Erosion			Develop mitigation initiatives such as: Rip-rap (large rocks), sheet pilings, gabion baskets, articulated matting, concrete, asphalt, vegetation, or other armoring or protective materials to provide river bank protection.
		SBCFSA Erosion			Harden culvert entrance bottoms with concrete, rock, or similar material to reduce erosion or scour.
		SBCFSA Erosion			Install walls at the end of a drainage structure to prevent embankment erosion at its entrance or outlet. (headv.,_alls- or wing-walls).
		SBCFSA Erosion			Harden and/or retrofit existing levees to quailfy for USACE certification.
		SBCFSA		Suggest moving to MH l	Pursue federal and state funding to improve and update Flood Insurance Rate Maps (FIRMs), as wetl as other maps and plans that may be more appropriate such as Drainage Plans or watershed management plans in order to meet other goals.
	Reduce potential Flood and erosion {FL) vulnerability, damage, and loss.				This should also include extending coastal floodpl.ain mapping to Lowell Point.
		SBCFSA			Identify and list repetitively flooded structures and infrastructure, analyze the threat to these facilities and raise mitigation action oriorities to orotect the threatened oooulation.
		SBCFSA			Work. with the USACE to develop a direct channel to direct water conveyance away from the three Seward Highway Bridges and the airport directing flow to Resurrection Bay.
		SBCFSA			Work with USACE, NRCS, and State to purse sediment and debris management at the mouth of the Resurrection River.
		SBCFSA			Develop and maintain NFIP compliant Repetitive Loss property inventory. Inventory should include property type, structure type, number of buildings,and their geo-referenced locations.
		SBCFSA			Establish flood mitigation priorities for critical facilities, residential structures, and commercial buildings located within the identified flood hazard area(s) (100- and 500-year floodplains, stormwater, etc.)_Qased on curren!_base flood elevation (BFE) and survey elevation data.
		SBCFSA			Determine and implement most cost beneficial and feasible mitigation actions for locations with repetitive flooding, significant historical damages, or road closures.
		SBCFSA			Obtain an exemption to the Alaska Department of Natural Resources (DNR) Material Sales Fees on navigablelivers and streams for sediment and debris management, stream channel

Table 7-x Mitigation Goals and Potential Actions

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No.	Description	Authority	Status: Considered, Selected Complete, Deferred, Deleted, or Ongoing	Explain any Status Changes	Description
					maintenance, and flood control or other flood mitigation projects.
		SBCFSA			Develop Bridge Mainte nancewith **KPB,** DOT/PF, and ARRC for all stream crossings throughout the flood service area to Include: sediment removal under bridges.
		SBCFSA			Evaluate each watershed to develop land use plans for removing and storing creek bed load to: • Perfonn periodic sediment managemet/bed load removal as necessary. • Identify and permit fill areas for future flood-free development sites. • Identify storage sites that limit gravel transportation costs.
		SBCFSA		Suggest moving to MH 1	Seek funding for sediment and debris management to removeexcessivestream bed sediment load, gravel, and glacial debris.
		SBCFSA		Suggest moving to MH 1	Apply for grant funding to assist critical facilities, public infrastructure,and residential properties with elevating flood threatened structures at least two feet above the identified Base Flood Elevation (BFE). *(Current FEMA minimum is 1 ft. above BFE.)*
		SBCFSA			Acquire and maintain **NOAA/NWS** stream flow and rainfall measuring gages.
		SBCFSA			Increase culvert sizes to increase their drainagecapacity or efficiency. Specificlocations that would benefit from this improvement Include: • Bear Creek at Bear Lake Rd • Grouse Creek at Timber Lane • Kwechak Creek at Bruno Road • Salmon Creek at Nash Road • Salmon Creek at the Alaska Railroad culvert northeast of Salmon Creek Road • Salmon Creek at Seward Highway **MM** 13.9 • Salmon Creek at the Alaska Railroad adjacent to Seward Highway MM 13.9 • Salmon Creek Overflow at Seward Highway and Granite Loop • Sawmill Creek at Nash Road
		SBCFSA			Construct debris basins or other debris catchment devices to retain debris to prevent downstream drainage structure clogging.
		City 2010 Coastal Er			Build a protective barrier south of the Seward Marine Indus trial Center (SMIC} for erosion control.
		City 2010			Complete wave barrier at the ship lift located in **SMIC.**
		City 2010 Coastal Er			Maintain the rock barrier located in the Waterfront Park area.
		City2010 Coastal Er		Suggest moving to MH 2	Create a baseilne assessment on Lowell Point Road, existing infrastructures and the

Table 7-x Mitigation Goals and Potential Actions

('Blue text items are the current HMP Identified Mitigation Action Items and their respective status determmations.)

No.	Description	Authority	Status: Considered, Selected Complete, Deferred, Deleted, or Ongoing	Explain any Status Changes	Description
					feasibility of culvert/ditch line installation.
		Oty 2010 Coastal Er			Maintain or redesign rip -rap barriers along Lowell Point Road.
		City 2010 Coastal Er			Dredging operations to remove debris and fill at the head of Resurrection Bay near the airport.
		City 2010 Coastal Er			Cover the underground electric line to Lowell Point with concrete
		City 2010 Coastal Er			Current mitigation measures required at Waterfront Park Include • Repairing , maintaining and redesigning the rock barrier located in the Waterfront Park area and, • Implementing a regenerative program of our native Beach Rye Grass (Elymu s arenarius) by aggressively replanting, relocating city campground fire pits, implementingeducational signage to redirect foot and recreational vehicle traffic and installing boulders and other barriers to prohibit vehicles from damaging the coastal vegetation.
		City 2010 Coastal Er			Install a protective "spit " near the waterfront in cooperation with the state, to protect from coastal erosion, storm surge tides and tsunami inundation. Similar to the south harbor upland, but smaller.
		City 2010 -			Acqu ire land within the Gty to develop a usable secondary evacuation route that bypasses the Seward lagoon and boat harbor areas. Provide barriers to this route and designate It as a recreational trail for use outside of emergency access. (The Planning and Zoning Comm ission identi fied this item during their May 6, 2004 meeting .)
		City 2010			Complete the Two Lakes Park Replat and the joint use access agreements providing the secondary evacuation route .
		City 2010			Update Flood Insurance Rate Maps: the 1981 maps need to be reevaluated with 29 years of additional data. Evaluate additional programs that address Seward's unique alluvial fan flood problem.
		City 2010		Suggest moving to MH 2	The City of Seward should continue improving its NFIP Community Rating System, under the Federal Insurance Administration's Community Rating System (CRS) by exceedingthe required standards to obtain further flood insurance premium reductions for policyholders within communities while simultaneously reducing flood losses.
		City 2010			North Forest Acres Levee and Access Road Project: Phase 2 of this project has begun to

Table 7-x Mitigation Goals and Potential Actions

('Blue te>;t it e ms are the c urr en t HMP Identified Mitigation Action I tems and their respective status determinations"

No.	Description	Authority	Status: Considered, Selected Complete, Deferred, Deleted, or Ongoing	Explain any Status Changes	Description
					protect the North Forest Acres Subdivision and other areas of the City of Seward from recurrent flood damage by constructing a levee along the lower portion of Japanese Creek. Flood-proofing existing structures: Improving existing structures to make them less susceptible to flood damage could be a viable project for many of the historic buildingsor non-elevated structures
		City 2010 -			Replace the Dairy Hill Road/ Seward Lagoon culverts with larger culverts. During flood events, the existing culvertscannot divert enough water to prevent flooding of the road.
		City 2010			Conduct a structural assessment of the Fourth of July Creek dike. A failure of the existing dike would cause damage to infrastructure of the city water supply and Spring Creek Correctional Center.
		Oty 2010			Coordinate with the US Army Corps of Engineers as they develop a project to upgrade, replace or find an alternative to the Lowell Creek diversion tunnel and it's resulting out-flow sediment build up
		City 2010 -			Japp Creek investigation to evaluatethe flow capacity of the existing flood control corridor, to determine sedimentation trends/rates, and to utilize this information to developa long term maintenance strategy and funding plan to preserve the system.
		City 2010			Fourth of July Creek investigation to evaluate the flow capacity of the existing flood control corridor, to determine sedimentation trends/rates, and to utilize this information to develop a long term maintenance strategy and funding plan to preserve the system
		City 2010 --			Spruce Creek evaluate the flow capacity of the flood control corridor and determine sedimentation rates. Use this information to develop a plan to preserve the flood control corridor and to create a long term maintenanecstrategy and funding plan.
		City 2010			**A** geomorphic investigation should be conducted of Scheffler Creekto determine the size, frequency, and potential deposition characteristics of future debris flows.
		City 2010		Suggest moving to **MH** 2	Consider land use code regulation changes to more effectively guide developmentand floodplain use. Evaluate certain areas for additional preventative measures. The city subdivision regulations which govern the division of land for sale or development should include floodplain regulation.sThe floodplain regulations should be incorporated into the Alaska Coastal Management Program (ACMP) and the Seward Comprehensive Plan.
		City 2010			Support an Alaska District USACE needs Assessment this fall to consider needs throughout the greater Seward watershed area. Alternative, the City could proceed ahead to request our

Table 7-x Mitigation Goals and Potential Actions

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No.	Description	Authority	Status: Considered, Selected Complete, Deferred, Deleted, or Ongoing	Explain any Status Changes	Description
					Congressional delegation to establish earmarks of $100K for our preliminary assessments.
		SBCFSA, Oty			Install wire matting, debris catchment structure, diff stabilizationetc. to prevent Lowell Canyon Creek diversion tunnel obstruction and diversion dam overtopping from landslide debris, woody vegetation, trees, e,tc
		SBCFSA			Develop vegetation projects to restore clear-cut and riverine erosion damage and to restore slope stabilityin avalanche and landslide areas.
		-- City 2010		Suggest moving to MH 2	Identify avalanche areaswithin the city and generate GIS Hazard Maps. Coordinate with Community Development Office on locations of areas for any zoning issues
	Reduce vulnerability, damage, or loss of structures from ground failure.	City 2010			Create safe parking area? along_ Lowell Point Road for vehicles.
		City 2010			Develop and install signsdesignatirig avalanche danger zone.
		City 2010			Lowell Canyon Tunnelaccess.
		Qty 2010			Establish a retaining structure in Lowell Canyon to prevent avalanches from disrupting city water storage system.
		City 2010			Design and develop a new generation of diversion structures and flexible transmission poles to bend with the snow impact.
		City 2010			Underground more of the distribution lines in avalanche areas, ex. Seward Hwy Mile 22.
	Reduce vulnerability, damage, or loss of structures from tsunami or seiche	City 2010			Revise tsunami inundation hazard prediction maps as needed after an event or disaster.
		City 2010			Develop a secondary evacuation route that bypasses the Seward lagoon and boat harbor areas. Provide barriers to this route and designate It as a recreational trail for use outside of emergency access. (The Planning and Zoning Commission identi.fied this item during their May 6, 2004 meeting.
		City 2010		Suggest moving to MH 1	Drills or practice community evacuations of above and existing evacuation routes.
		City 2010			Place one electrical supply circuit underground across the Lagoon in an old waterline.
		City 2010			Complete an underground electrical supply circuit over Dairy Hill and through Two Lakes Park.
		City 2010			Complete an underground circuit from the South Harbor expansion to Jefferson along Ballaine Blvd.

Table 7 x Mitigation Goals and Potential Actions

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No.	Description	Authority	Status: *Considered, Selected Complete, Deferred, Deleted, or Ongoing*	Explain any Status Changes	Description
		City 2010			Complete the SMIC electrical loop along Sorrel Rd.
		City 2010			Complete the electrical loop along Alemeda St. To Leirer Rd.
		City 2010			Complete the underground electrical loop on Lowell Pt. from Beach Drive to Lowell pt_ Rd., and the loop from Shady Ln. to Beach Dr.
		City 2010			Install AWS (Alaska Weather System) radios in public buildings These radios will also broadcast tsunami watches and warnings.
		City 2010			Install EMWIN (Emergency Managers Weather Infom1ation Network), from the National Weather Seivice into the police dispatch area.
		City 2010		Suggest moving to MH 1	Conduct community mock tsunami exercises and review responses, correct deficiencies.
		City 2010		Suggest moving to MH 1	Develop public education program(s) to concentrate on the SAWS (Siren Alert and Warning System), what it means and what to do in the event of an emergency. Educate the publc on EAN (Emergency Alert Network).
	Reduce vulnerabliity, damage, or loss of structures from volcanic debris impacts	City 2010			Refer to KPB Hazard Mitigation Plan for guidance on mitigation plans
		City 2010			Identify critical facilities, the risk and needs before, during and after an ash fall
	Reduce vulnerability, damage, or loss of structures from severe weather damage.	**SBCFSA,** City, KPB		Suggest moving to **HM** 2	Develop and implement programs to coordinate maintenance and mitigation activities to reduce risk to public infrastructure from severe winter storms (snow load, ice, and wind).
		SBCFSA, City, KPB			Develop and implement tree clearing mitigation programs to keep trees from threatening lives, property, and public infrastructure from severe weather events.
		SBCFSA, City, KPB			Develop, implement, and maintain partnership program with electrical utilities to use underground utility placement methods where possible to reduce or eliminate power outages from severe winter storms. Consider developing incentive programs.
		Qty 2010		Suggest moving to HM 2	Coordinate responses of private contractors during a severe event as indicated in the City's Emergency Operations Plan.
		Oty 2010		Suggest moving to **HM** 1	Public education on the effects of severe weather.
		City 2010		Suggest moving to HM 1	Inform public of availability of **AWS** radios, in preparation of potential weather advisories.
		Oty 2010			Activate the City's Emergency Operations Center (EOC) to coordinate planning and logistical

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No.	Description	Authority	Status: *Considered, Selected Complete, Deferred, Deleted, or Ongoing*	Explain any Status Changes	Description
					efforts in dealing with the emergency.
		City 2010			Rebu ild the old transmission line sections in Lawing, Boulder Creek, and Lakeview to current distribution standards (its current use) so that it will withstand known weather conditions.
		City 2010			Rebuild the double Circuit fine from Dimond Blvd. to Dairy Hill Rd to withstand known weather conditions.
	Reduce vulnerability, damage, or loss of structures from wildland fires.	SBCFSA, City, KPB		~~Suggest moving to HM 1~~	Hold FireWise workshop to educate residents and contractors concerning fire resistant landscaping.
		~~City 2010~~			Acquire permission to clear hazard, and potential hazard trees beyond the permit area for the transmission line from Dave's Creek to Grouse Lake from the State and the USFS.
		~~City 2010~~			Clear the trees from the newly acquired permission areas and the brush within the permitted area.
		City 2010		Suggest moving to HM 1	Make concise information available to the public about local industry concerning any overnment control.
	Reduce vulnerability, damage, or loss of structures from wlldland fires.	City 2010		Suggest moving to HM 2	Make sure that accurate information is given to agencies that are responsible for dissemination of information concerning the City of Seward or other government agencies.
		City 2010		Suggest moving to HM 2	Public groups (Chamber of Commerc,eLions, and Rotary Clubs, etc.) with business interests have accurate and timely information available to dispel rumors.
		City 2010		Suggest moving to HM 1	Develop and find existing programs that ensure that the City of Seward is a safe and dean place for visitors to come.
	Reduce				
		City 2010		Suggest moving to HM 1	Work with industry operators to educate the public on potential hazards and develop strategies for response, evacuation, and containment.
	vulnerability, damage, or loss of structures from wildland fires.	City 2010		Suggest moving to HM 2	Develop spill/clean-up plans with industty.
		City 2010			Encourage sites to meet standards/regulations for all reportable quantity hazard materials.
		City 2010			During large renovation, repairs or after a disaster, encourage the use of utllidors for future ioelines.

OBJECTID	Shape *	PARCE_ID	CATEGORY	NAME	LATITUDE	LONGITUDE	Hazus UDF	10 CATEGORY_ANC
10	Point	149120 11	CITY OFFICE	SEWARD CITY HALL	60.1031 71	-149.439186	2127	GOVERNMENT
16	Point	1473 3040	CITY OFFICE	SEWARD HARBORMASTER	60 .116738	-149 .4 39763	1764	GOVERNMENT
			Tribal Office	Qutekcak Tribal Office				GOVERNMENT
41	Point	1 4907009	BOROUGH OFFICE	KPB SEWARD ANNEX	60.100361	-149A41679	2070	GOVERNMENT
47	Point	<Null>	<Null>	SEWARD PARKS AND RECREATION DEPARTMENT	60.128974	-149.43395	<Null>	GOVERNMENT
			Federal Office	Kenai Fjords National Park Service Office				GOVERNMENT
45	Point	<Null>	<Null>	SEWARD PUBLIC WORKS DEPARTMENT	60.106284	-149.436509	<Null>	GOVERNMENT
14	Point	14815011	POST OFFICE	SEWARD POST OFFICE	60.106133	-149.43788	1943	GOVERNMENT
13	Point	1 4912 011	POLICE STATION	SEWARD POLICE STATION/OMV	60.102996	-149.439219	2127	EMERGENCY RESPONSE
S	Point	1 4401102	FIRE STATION	BEAR CREEK VOLUNTEER FIRE & EMS	60.16 8515	-149.402418	558	EMERGENCY RESPONSE
32	Point	14912006	FIRE STATION	SEWARD VOLUNTEER FIRE DEPARTMENT	60.103673	-149.439995	2124	EMERGENCY RESPONSE
			State Office	Alaska State Police Office				EMERGENCY RESPONSE
1	Point	1450 2134	SCHOOL	SEWARD HIGH SCHOOL	60.130007	-149.443275	1056	EDUCATION
38	Point	14 502 134	SCHOOL	SEWARD MIDDLE SCHOOL - NEW	60.131879	-149.44152	1057	EDUCATION
2	Point	14502 134	SCHOOL	SEWARD MIDDLE SCHOOL - OLD	60.128666	-149.44492	1055	EDUCATION
3	Point	1450 2621	SCHOOL	SEWARD ELEMENTARY	60.13 2676	-149.436 109	1128	EDUCATION
35	Point	149200 15	COLLEGE	UNIVERSITY OF ALASKA INSTITUTE OF MARINE SOENCE	60.099 159	-149.442602	2202	EDUCATION
9	Point	149 20012	LEARNING CENTER	ALASKA SEAUFE CENTER	60.099857	-149.44082 2	2200	EDUCATION
			Learning Center	AK Vocational Technical Center (AVTEC) AK Institute ofTechnology				EDUCATION
			Learning Center	Culinary Arts Institute				EDUCATION
11	Point	14801010	HOSPITAL	Providence Seward Medical Center North Star Health Clinic	60.10 5032	-149.446345	1774	MEDICAL
44	Point	<Null>	<Null>	NORTH STAR HEALTH CLINIC	60.10 1 251	-1 49. 442503	<Null>	MEDICAL
48	Point	<Null>	<Null>	GLACIER FAMILY MEDICAL CLINIC	60. 1S065	-1 49 .418838	<Null>	MEDICAL
			Health Care	Wesley Rehabilitation and care				MEDICAL
			Health Care	Seward Life Action Council Counseling facility				MEDICAL
33	Point	14912006	EMERGENCY	SEWARD VOLUNTEER FIRE DEPARTMENT - EMERGENCY SHELTER	60 .10367	-149.439936	2124	COMMUN
6	Point	144011 02	EMERGENCY SHELTER	BEAR CREEK VOLUNTEER FIRE & EMS- EMERGENCY SHELTER	60.168267	-149.402508	559	COMM UNITY
4	Point	12529004	EMERGENCY SHELTER	LDS CHAPEL - EMERGENCY SHELTER	60.17 4003	-149.40051 8	301	COMMUNITY
7	Point	14404010	EMERGENCY SHELTER	LE BARN APPETIT - EMERGENCY SHELTER	60.15 1978	-149.42218	729	COMMUNITY
22	Point	14502 604	EMERGENCY SHELTER	SEWARD MILITARY RESORT - EMERGENCY SHELTER	60.13303	-149.433258	1106	COMMUNITY
23	Point	14502621	EMERGENCY SHELTER	SEWARD ELEMENTARY - EMERGENCY SHELTER	60_13 2587	-149_43611	1128	COMM UNITY
40	Point	14502134	EMERGENCY SHELTER	SEWARD MIDDLE SCHOOL - EMERGENCY SHELTER	60.13173	-149.442087	1057	COMM UNITY
24	Point	14514107	EMERGENCY SHELTER	SEWARD CHAPEL - EMERGENCY SHELTER	60.13 0704	-149 .37824	9999	COMMUNITY
25	Point	14724005	EMERGENCY SHELTER	CHURCH OF THE NAZARENE- EMERGENCY SHELTER	60.1111	-149.440966	1714	COMM UNITY
26	Point	14714008	EMERGENCY SHELTER	AVTEC FIRSTLAKE FACILITY - EMERGENCY SHELTER	60 .110651	-1 49.444416	1616	COMMUNITY
27	Point	14811003	EMERGENCY SHELTER	AVTEC FOOD SERVICE BUILDING - EMERGENCY SHELTER	60 .107 566	-149.441535	1888	COMMUNITY
28	Point	14812033	EMERGENCY SHELTER	SACRED HEART CATHOLIC CHURCH - EMERGENCY SHELTER	60.10 5152	-149 .439375	1900	COMMUNITY
30	Point	14909019	EMERGENCY SHELTER	SEWARD SENIOR CENTER - EMERGENCY SHELTER	60.104388	-149.441682	2105	COMM UNITY
31	Point	14909018	EMERGENCY SHELTER	MEMORIAL UNITED METHODIST CHURCH - EMERGENCY SHELTER	60 .104034	-149. 440917	2104	COMM UNITY
34	Point	1490 2021	EMERGENCY SHELTER	ST PETERS EPISCOPAL CHURCH - EMERGENCY SHELTER	60.10270 4	-149.444147	2004	COMMUNITY

20 Poi nt	14502611	VISITOR CENTER	SEWARD CHAMBER OF COMMERCE & VISITOR CENTER	60.1283 53	-149.4338 86	11 22	COMMUNITY
29 Point	14909019	SENIOR CENTER	SEWARD SENIOR CENTER	60 .1044 85	-1 49. 441718	2105	COMMUNITY
12 Point	14913010	LIBRARY	SEWARD PUBLIC LIBRARY	60 .102679	-1 49.438496	2137	COMMUN ITY
36 Point	0	CAMP GROUND	RESURRECTION CAMPING AREA	60.1056 84	-149.4 35105	9999	COMMUNITY
46 Point	<Null>	<Null>	SEWARD WATERFRONT PARK	60 .103141	-1 49.43457 4	<Null>	COMM UNITY
49 Poi nt	<:Null >	<Null>	NATIONAL PARK SERVI CE EXIT GLACIER VISITOR CENTER	60 .188241	-149.629134	<Null>	COMMUNITY
50 Poi nt	<Null>	<Null>	STONEY CREEK RV PARK	60 .18098 7	-149.375939	<Null>	COMMUNITY

21	Point	14532008	PRISON	SPRING CREEK CORRECTIONAL FACILITY	60.093858	-149.337414	1549	COMMUNITY
			Cemeta ry	Seward Cemetary				COMMUNITY
8	Point	14502401	AIRPORT	SEWARD AIRPORT	60 .13 2813	-1 49.422543	2321	TRANS PORT ATION
			Heliport	Providence Med Ctr Heliport				TRANSPORTATION
15	Point	0	BOAT HARBOR	SEWARD SMALL BOAT HARBOR	60.118224	-149.437019	9999	TRAN SPORTATIO N
17	Point	0	BOAT LAUNCH	CITY OF SEWARD BOAT LAUNCH	60.115918	-149.439107	9999	TRANSPORTATION
18	Point	0	BOAT LAUNCH	SEWA RD EAST SIDE BOAT LAUNCH	60.120181	-149.433081	9999	TRANSPORT ATION
19	Poin t	0	BOAT DOCK	CRUISE SHIP & STATE FERRY DOCK	60 .119708	-14 9.428 158	10 92	TRANSPORTATION
43	Point	<Null>	<Nut.I>	ALASKA RAILROAD DEPOT	60 .12215 5	-149.434579	<Null>	TRANSPORTATION
				Electric Bus Station				TRANSPORTATION
39	Point	<Null>	BRIDGE	SPRUCE CREEK BRIDGE	60.073547	-149.445816	9999	BRIDGES
			Bridg e	Lowell Poi nt Road Bridge				BRIDGES
			Bridge	Resurrection Rlver Bridge				BRIDGES
			Bridge	Resurrection River RR Bridge				BRI DGES
37	Point	14424004	LANDFILL/TRANSFER FACILITY	SEWARD TRANS FER FACILITY	60 .14 8459	-149.448076	1047	UTILITIES
			Power Generation	Seward Electric System Generator s				UTILITIES
			Pow er Generation	Electrl c Generat ion Facility				UTILITIES
			Bulk Fuel Storage	City of Seward Fuel Storage Tanks (40,000 gal)				UTILITIES
			Bulk Fuel St orag e	Shoreside Petrol eum Fuel Storage Tank s {120,000 gal)				UTILITIES
			Bulk Fuel St orage	Fuel Storage Tanks (>SOOgal)				UTI LITIES
			Bulk Fuel Storage	Fuel Storage Tanks (>SOOg al)				UTILITIES
			Water Treatment Facility	Wat er Treatment Facility (permit II 240757)				UTILITIES
			Rese rvoi r/ Water Supp ly	Reservoir/Water Supply				UTILITIES
			Rese rvoir/W ate r Suppl y	Re seiv oi r/W ater Supply				UTILITIES
			Reservoi r/Water Supply	Re servoir/ Water Supply				UTILITIES
			Reservo ir / Water Supply	Reservoir/Water Supply				UTILITIES
			Reservoir/W ater Supply	Rese rvoi r/ Water Supply				UTILITIES
			Re servoir/ Wat er Suppl y	Rese rv oir/ Water Supply				UTILITIES
			Reservoir/ Water Suppl}'	Reservoir/Water Supply				UTILITIES
			Re servoir/Wa ter Supply	Reservoir/Water Supply				UTILITIES
			Reservoir/Water Supply	Reservoir/W ater Supply				UTILITIES
			Water Df<:tributlon Syste m	Sew ard Water Distrib ut ion Syst em {,4 000 served)				UTILITIES
42	Point	<N ull>	wastewater Treatment Pl ant	LOWELL POINT WASTEWATER TREATMENT PLANT	60.0723 2.1	-149. 444382	2317	UTILITIES
			W aste water Treatm ent Plant	Seward Wastewater Tx System				UTILITIES
			Wastewater Collection System	Seward Wastewater Collection System				UTILITIES
			Wastewater Treatment Facility	Sew age Lagoon				UTILITIES

6.7 VULNERABILITY EXPOSURE ANALYSIS

The Kenai Peninsula Borough provided extensive area wide GIS data which formed the basis for the SBCFSA's critical facility hazard exposure analysis.

6.7.1 Existing Infrastructure

Tables 6-9, 6-10, and 6-11 summarize the results of the GIS-based exposure analysis for SBCFSA's loss estimations.

Taible 6-9 SBC:FSA Potenlli:ia l Haza rd Exposure Anaulysfis Overview - Population and Buildungs

Hazard Type	Hazard Area	Methodology	Population Number[1]	Buildings			
				Residential		Non-Residential	
				Number	Value ($)[2]	Number	Value ($)[2]
Earthquake[3]	Strong Very strong Severe	9-20% (g) 20-40% (g) >40-60% (g)	4,762	1,919	$418,708,000	478	$351,682,000
Erosion	Within 30 ft of erosion	Descriptive	Unknown	12	$2,051,300	4	$31,881,600
Rood Riverine Aood[4]	Moderate	500-year floodolain	755	272	$59,468 713	100	$89,063 105
	High	100-vear floodplain	558	199	$42 928,270	76	$75,883 673
Coastal Rood	Hioh	CoastalVE Flood Zone	117	51	$13 013.583	7	$20,182,014
Ground Failure (Avalanche, landslide, subsidence, unstable soils)	Low	0·11%	Unknown	1,885	$418,708 000	428	$351,682,000
	Moderate	11-21%	Unknown	23	$3 520,000	Unknown	Unknown
	High	21-41%	Unknown	11	$9,506,400	Unknown	Unknown
	Very High	>41%	Unknown	Unknown	Unknown	Unknown	Unknown
severe weather	-	cle!icrlotiVe	4,762	1,919	$418,708,000	478	$351,682 000
Tsunami Seiche	OGGS GIS	descriptive	645	184	$78 182,123	134	$221 500,871
Volcanic	--	descriotive	4,762	1,919	$418 708,000	478	$351 682,000
Wildland Fire	Low	Low fuel rank	Unknown	892	$217.771,800	298	$351,682,000
	Moderate	Moderate fuel rank	Unknown	968	$375,945 900	127	$142 270,300
	High	High fuel rank	Unknown	59	$79,983,900	3	$860,000
	Extreme	Extreme fuel rank	Unknown	Unknown	Unknown	Unknown	Unknown

1, Affected population was estimated by multiplying the percentage of buildings impacted in each category by the total population.
2. Replacemetitvalues raken from User-Defined Facilities data based oti KPB parcel datasets and RS Means Infurmation. Values .ire In 2012 dollars.
3. Exposure due tu Earthquake is the same for all hazard levels.
4. Exposure due to Lowell Creek is not induded in the Riverine Rood overview, as hazard events on Lowell Creek are more extreme than those induded here.

Table 6-10 Potenti al Hazard Exposure Analysis - Critical Facilities

Hazard Type	Hazard Area	Methodology	Government and Emergency Response # Bldgs/ # Occ[3]	Government and Emergency Response Value[1] ($)	Educational # Bldgs/ # Occ[3]	Educational Value[1] ($)	Medical Care # Bldgs/ # Occ[3]	Medical Care Value[1] ($)	Community # Bldgs/ # Occ[3]	Community Value[1] ($)
Earthquake[2]	Strong	9-20% (g)								
	Vel}' strong	20-40% {g}	9/NAJ	$15,46s,oz7	6/NA[3]	$42,501,375	3/NA[3]	*$11,211,3a1*	23/NA[3]	$45,324661
	Severe	>40-60% (g)								
Erosion	Within 30 ft of erosion areas	Descriptive	--/NAJ	Unknown	--/NA[3]	Unknown	·· /NA[3]	Unknown	--/NA[3]	Unknown
Rood i	Riverin e **Moderate**	500-vear floodplain	**1/NA[3]**	**$2,002,127**	**0/NA[3]**	--	**1/NA[3]**	$1,082,668	3/NA[3]	$3 469,176
	Coastal Hiah	100-vearfloodPlain	**0/NA[3]**	--	**0/ NA[3]**	-	**I / NA[3]**	$1,082,668	2/NA[3]	$2,695,217
	Hiah	Coastal VE Rood Zone	**O/NA[3]**	-	**0/NA[3]**	--	**0/ NA[3]**	-	0/NA3	
Ground Failure	LOW	0-11%	**9/NA[3]**	**$7,394,300**	**6/NA[3]**	$121 762,600	**3/NA[3]**	$6,745,400	23/NA3	$100,789,300
	Moderate	11-21%	**- /NA[3]**	Unknown	**-:fNA[3]**	Unknown	**--/NA[3]**	Unknown	**--/NA[3]**	Unknown
	High	21-41%	**--/NA[3]**	**Unknown**	··/ NA	Unknown	**·-/NA[3]**	Unknown	**- /N A'**	Unknown
	Verv Hiah	**>41%**	**··/ NA:;**	Unknown	**··/NA [3]**	Unknown	--/ NA3	Unknown	--/NA3	Unknown
Severe Weather	--	Oescriotive	**19/NA[3]**	$36 483.842	**11/NA[3]**	**$142 498,908**	**I /NA[3]**	$18 438,505	10/NA[3]	$19,442,383
Tsunami/ Seiche			**2/NA[3]**	**$9,054 415**	**2/NA[3]**	$4 246 316	**O/ NA[3]**	-	**O/ NA[3]**	
Volcanic			**19/NA [3]**	**$36 483 842**	**11/NA[3]**	**$142,498,908**	**1/NA[3]**	**$18 438,505**	10/NA[3]	$19,442383
Wildland/ Urban Interface Fire	Low	Low fuel rank	**8/NA[3]**	$7,071,600	5/NA[3]	**$87,8 33,700**	**2/NA[3]**	$4,576,000	15/NA[3]	$49,698200
	Moderate	Moderate fuel rank	**1/NA[3]**	$322 700	**I /NA[3]**	**$33 928 900**	I/NA[3]	$2,169 400	**8/NA[3]**	**$51091100**
	Hiah	Hiah fuel rank	--/NA3	Unknown	**--/NA[3]**	Unknown	**--/NA>**	Unknown	**··/NA[3]**	Unknown
	Extreme	Extreme fuel rank	**- /NA[3]**	Unknown	**--/NA[3]**	Unknown	**--/NA[3]**	U nkno w:n	--/NA[3]	Unknown

1. Replacement values taken from Utah Defined Facilities data based on KPB parcel datasets and RS Means information. Values are in 2012 dollars.
2. Exposure due to Earthquake is the same for all hazard levels.
3. NA = Not Available. Affected population cannot be estimated for these facilities.
4. Exposure due to Lowell Creek is not included in the Riverine Flood overview, as hazard events on Lowell Creek are more extreme than those included here.

2010 HMP Potential Project List

Annex .A: Floods

Goal 1: Identify hazard areas and select mitigation measures for those areas

Potential Projects:

- Acquire land within the City to develop a usable secondary evacuation route that bypasses the Seward lagoon and boat harbor areas. Provide barriers to this route and designate it as a recreational trail for use outside of emergency access. *(The Planning and Zoning Commission identified this item during their May 6, 2004 meeting.)*
- Complete the Two Lakes Park Replat and the joint use access agreements providing the secondary evacuation route.
- Update Flood Insurance Rate Maps: the 1981 maps need to be reevaluated with 29 years of additional data. Evaluate additional programs that address Seward's unique alluvial fan flood problem.
- The City of Seward should continue improving its NFIP Community Rating System, under the Federal Insurance Administration's Community Rating System (CRS) by exceeding the required standards to obtain further flood insurance premium reductions for policyholders within communities while simultaneously reducing flood losses.
- North Forest Acres Levee and Access Road Project Phase 2 of this project has begun to protect the North Forest Acres Subdivision and other areas of the City of Seward from recurrent flood damage by constructing a levee along the lower portion of Japanese Creek. Flood-proofing existing structures: Improving existing structures to make them less susceptible to flood damage could be a viable project for many of the historic buildings or non-elevated structures.
- Replace the Dairy Hill Road/ Seward Lagoon culverts with larger culverts. During flood events, the existing culverts cannot divert enough water to prevent flooding of the road.
- Conduct a structural assessment of the Fourth of July Creek dike. A failure of the exlsting dike would cause damage to infrastructure of the city water supply and Spring Creek Correc tional Center.
- Coordinate with the US Army Corps of Engineers as they develop a project to upgrade, replace or find an alternative to the Lowell Creek diversion tunnel and it's resulting out-flow sediment build up
- Japp Creek inves tigation to evaluate the flow capacity of the existing flood control corridor, to determine sedimentation trends/rates, and to utilize this information to develop a long term maintenance strategy and funding plan to preserve the system.
- Fourth of July Creek investigation to evaluate the flow capacity of the existing flood control corridor, to determine sedimentation trends/rates, and to utilize this informat ion to develop a lon9 term maintenance strategy and funding plan to preserve the system.
- Spruce Creek evaluate the flow capacity of the flood control corridor and determine sedimentation rates. Use this informatiion to devellop a plan to preserve the flood control corridor and to create a long term maintenance strategy and funding plan.
- A geomorphic investigation should be conducted of Scheffler Creek to determine the size, frequency, and potential deposition characteristics of future debris flows.

- Consider land use code regulation changes to more effectively guide development and floodplain use. Evaluate certain areas for additional preventative measures. The city subdivision regulations which govern the division of land for sale or development should include floodplain regulations. The floodplain regulations should be incorporated into the Al aska Coastal Management Program (ACMP) and the Seward Comprehensive Plan.
- Support an Alaska District USACE needs Assessment this fall! to consider needs throughout the greater Seward watershed area. Alternative, the City could proceed ahead to request our Congressional delegation to establish earmarks of $100K for our preliminary assessments..

Goal 2: Increase publiic awareness of hazards

Potential Projects:

- Continue distributing the brochure describing the City of Seward flood dangers and floodplain building regulations.
- Continue working with FEMA and other Federal and State Agencies as the FIRMs are updated and researching other tools for accurately forecasting and mitigating Seward's complex alluvial fan flood problem.
- Continue working with FEMA to obtain the latest NF!P information and scheduling workshops.
- Provide flood'pl'ain regulation s information, updates or reviisions to the citiizens of Seward.
- Continue coordination with FEMA to conduct flood proofing or elievating workshops for the City and public.
- Continue the City's efforts working with potential partners or agencies while capitalizing on multiple funding sources for mitigation projects, including erosion and sediment control projects.
- Continue refining the education and outreach programs to notify current homeowners and potential homebuyers about flood hazard risks in identified areas.
- Provide local realtors and lending instiitutions with GIS copies of FIRM as they are updated.
- Complete North Forest Acres Levee and Access Road Project.
- Complete Dairy Hill Road/ Seward Lagoon culvert replacement..
- Conduct a structural assessment of the Fourth of July Creek dike.
- Obtain ongoing permits for the Lowel,l Creek outfal!l sediment and erosion control program.
- Continue public education concentrating on the Siren Alert and Warning System (SAWS), what it means and what to do in the event of an emergency. Educate the public on the Emergency Alert Network. *(The Planning and Zoning Commission identified this item during their May 6, 2004 meeting.)*
- Continue providing new homeowners, builders or renovators a brochure detailing the fuel tank stand codes hellping to insure they're more flood/earthquake prepared. *(The Planning and Zoning Commission identified this item during their May 6, 2004 meeting.)*

Goal 3: Develop and Implement Mitigation Solutions

Potential Projects;

The City Is work ing closely with the SBCFSA to jointly identify flood mitigation problems and recommended solutions with in their capabilities and authorities. They focus on those projects which have been through the public process and approved by the City Council, with some funded and others competing for state or federal funding.

The City and SBCFSA have determined that each will seek to budget projects within their respective budgets. Other grant funding resources are being sought on those that exceed either's budgetary capacity. Completion of any project will depend on a project's determ ine priority and availab le fund ing.

Mitigation problems exceeding the City and SBCFSA capabilities and expertise have been forwarded to FEMA, USACE and other Federal and State organizations for their assistance.

Annex B: Earthquake

Goal 1: Identify hazard areas and select mitigation measures for those areas

- Upda te building codes to stay current with State requirements and industry concerning earthquake protection.
- Identify non-buildable sites through the city's land useplan and city zoning maps.
- o Earthquake proof priority structures (schools, city buildings, public safety offices , etc.) This project requires the involvement of many government entities and assessments of various structures. Where possible employ Earthquake resistant building technology to mitigate damage.
- Acquire land within the city to develop a secondary evacuation route that bypasses the Seward lagoon and boat harbor areas. Provide barriers to this route and designate it as a recreational trail for use outside of emergency access. (Planning and Zoning Commission, May 6, 2004)
- o Update: Land has been designated in January of 2010. The survey of the route is scheduled to be accomplished in the spring of 2010. See above section for further explanation.

Goal 2: Increase public awareness of hazards

- 111 Conduct community mock emergency exercises and evaluate response.
- Develop public education to concentrate on the SAWS (Siren Alert and Warning System), what it means and what to do in the event of an emergency. Educate the public on EAN (Emergency Alert Network). (Planning and Zoning Commission May 6, 2004) Possibly make public announcements using the utility billing memo and the scanner announcement page with GCI cable TV and radio.
- Continue to update brochures and handouts to educate homeowners on fuel tank stand codes and earthquake mitiga tion measures so they will be more flood/earthquake prepared.

Goal **3: Enact mitigation measures**

The third goa l in the process is to enact mitigation solutions. Once the potential problems and solutions have been addressed along with input from the public process and approval of the City Council, the mitigation can go forward. The process of funding each project can be addressed

during the normal budget process and/or with grant funding. Completion of any project will depend on the availability of funds and any changes of priority.

Annex C: Tsunami

Goal 1: **Identify earthquake and tsunami hazards within the City of Seward and evaluate and prioritize potential miUgation measures .**

Potential Projects:

- Revise tsunami inundation hazard prediction maps as needed after an event or disaster.
- Develop a secondary evacuation route that bypasses the Seward lagoon and boat harbor areas. Provide barriers to this route and designate it as a recreational trail for use outside of emergency access. *(The Planning and Zoning Commission identified this item during their May 6, 2004 meeting.)*
- Drills or practice community evacuations of above and existing evacuation routes.
- Place one electrical supply circuit underground across the Lagoon in an old waterline.
- Complete an underground electrical supply circuit over Dairy Hill and through Two Lakes Park.
- Complete an underground circuit from the South Harbor expansion to Jefferson along Ballaine Blvd.
- Complete the SMIC electrical loop along Sorrel Rd.
- Complete the electrical loop along Alemeda St. To Leirer Rd.
- Complete the underground electrical loop on Lowell Pt. from Beach Drive to Lowell Pt. Rd., and the loop from Shady Ln. to Beach Dr.

Goal 2: **Protect lives and properties in the event of a tsunami through pubUc education and emergency r,esponse exercises .**

- Install AWS (Alaska Weather System) radios in public buildings. These radios will also broadcast tsunami watches and warnings.
- Install EMWIN {Emergency Managers Weather Information Network), from the National Weather Service into the police dispatch area.
- Conduct community mock tsunami exercises and review responses, correct deficiencies.
- Develop public education program(s) to concentrate on the SAWS (Siren Alert and Warning System), what it means and what to do in the event of an emerg1ency. Educate the public on EAN (Emergency Alert Network).

Annex D: Coast Erosion

Goal: Reduce the amount of shoreline erosion within allowable practices and monetary constraints.

Potential Project s:

- Build a protective barrier south of the Seward Marine Industrial Center (SMIC) for erosion control.
- Complete wave barrier at the ship lift located in SMIC.
- Maintain the rock barrier located in the Waterfront Park area.
- Create a baseline assessment on Lowell Point Road, existing infrastructures and the feasibility of culvert/ditch line installation.
- Maintain or redesign rip-rap barriers along Lowell Point Road.
- Dredging operations to remove debris and fill at the head of Resurrection Bay near the airport.
- Cover the underground electric line to Lowell Point with concrete
- Current mitigation measures required at Waterfront Park include
    1. Repairing, maintaining and redesigning the rock barrier located in the Waterfront Park area and,
    2. 2) Implementing a regenerative program of our native Beach Rye Grass (Elymus arenarius) by aggressively replan ting, relocating city campground fire pits, implementing educational signage to redirect foot and recreational vehicle traffic and installing boulders and other barriers to prohibit vehicles from damag1ing the coastal vegetation.
- Install a protective "spit" near the waterfront in cooperation with the state, to protect from coastal erosion, storm surge tides and tsunami inundation. Similar to the south harbor upland, but smaller.

Annex E: Wildland Fire

Goal:?

Potential projects:

- Acquire permission to clear hazard, and potential hazard trees beyond the permit area for the transmission line from Dave's Creek to Grouse Lake from the State and the USFS.
- Clear the trees from the newly acquired permission areas and the brush within the permitted area.

Annex F: Weather

Goal: **Increase public awareness of hazards related to severe weather**

- Coordinate responses of private contractors during a severe event as indicated in the City's Emergency Operations Pian.
- Public education on the effects of severe weather.
- Inform public of availability of AWS radios, in preparation of potential weather advisories.
- Activate the City's Emergency Operations Center (EOC) to coordinate planning and logistical efforts in dealing with the emergency.

Potential Projects:

- Rebuild the old transmission line sections in Lawing, Boulder Creekk, and Lakeview to current distribution standards (its current use) so that it will withstand known weather conditions.
- Rebuild the double Circuit liine from Dimond Blvd. to Dairy Hi ll Rd to withstan d known weather conditions.

Annex G: Snow Avalanche

Goal: Increase public awareness of hazards of avalanche/landslides in the community

- Identify avalanche areas within the city and generate GIS Hazard Maps. Coordinate with Community Development Office on locations of areas for any zoning issues.
- Create safe parking areas along Lowell Point Road for vehicles.
- Develop and install signs designating avalanche danger zone.
- Lowell Canyon Tunnel access.
- Establish a retaining structure in Lowell Canyon to prevent avalanches from disrupting city water storage system.

Potential Projects:

- Design and develo p a new generation of diversion structures and flexible transmission poles to bend with the snow impact.
- Underground more of the distribution lines in avalanche areas, ex. Mile 22.

Annex H: Volcano

Goal: Increase public awareness of hazards

- Refer to KPB Hazard Mitigation Plan for guidance on mitigation plans
- I d entify critical facilities, the risk and needs before, dur in g and after an ash fall

Annex I: Technological

Goal: **Increase public awareness of hazards of potential spHfs/accidents**

- & Work with industry operators to educate the public on potential hazards and develop strategies for response, evacuation, and containment.
- o Develop spill/clean up plans with industry.
- e Encourage sites to meet standards/regulations *for* all reportable quantity hazard materials.
- During large renovation, repairs or after a disaster, encourage the use of utilidoors for future pipelines.

Annex J: Economic

Goal 1: **Increase public awareness of potential hazards**

- e Make concise information available to the public about local industry concerning any government control.
- e Make sure that accurate information is given to agencies that are responsible for dissemination of information concerning the City of Seward or other government agencies.
- Public groups (Chamber of Commerce, Lions, and Rotary Clubs, etc.) with business interests have accurate and timely information available to dispel rumors.

Gaal 2: **Support and encourage planned economic development that will be beneficial to the City of Seward.**

- Develop and find existing programs that insure that the City of Seward is a safe and clean place for visitors to come.

Goal 3: **Support and encourage the permitting and construction of an in-State gas line to the State's vast gas reserves.**

Seward Mitigation Project Successes

Completed Projects - Success Story- Was it effective?

Flood

- **Completed in 2009 with the help of the Kenai Watershed Forum.**

Dairy Hill Drainage Improvements: Upsize culverts and improve haphazard drainage in the Dairy Hill Area. During heavy rainfall events, the flows in the drainages can become severe and cause washouts ofr oadways, culverts and building improvements .. An HMGP grant application was submitted in 2010 in the amount of $339,387.00.

Tsunami

1. Seward was one of the first cities in the US to be considered Tsunami Ready by the National Weather Service. The city has put together evacuation maps, pamphlets and signs designated to help people in our community escape potential risk.
2. Due to the history of tsunamis in Seward, the city has cooperated with the State of Alaska and the Kenai Peninsula Borough in the development of tsunami warning signals .
3. The city has developed response plans to deal with the effects of tsunamis.
4. In the 2004 version of this HMP, Goal 1 identified two potential projects that benefit the community.

   a. With the assistance of The State of Alaska DHS/EM, USGS, University of Alaska Fairbanks (UAF) Geological Department and NOAA we have finalized a new inundation map for the community. This map shows the effects of different size waves and effects from waves generated inside and outside of Resurrection Bay. The State Division of Geological and Geophysical Surveys (DGGS) sent the final version of the map to the publishers in January 2010. It is now available at:
   ht tp://www.dggs.dnr.s tate.ak.us/pub s/p ubs? reqtype=citation& lD=2 i 00 l

   b. The second project was to acquire land to develop a secondary evacuation route. An agreement has been reached with the private landowner who will alJow for this route over their property. Survey of the route has been completed and we are currently looking into any engineering studies that may be required.

Wildland Fire

1 . The Kenai Peninsula Borough, Office of Emergency Management and Central Emergency Services in Soldotna offered a course on urban interface fire fighting in May of 2004 to better prepare firefighters for wildland/urban fire situations. It was designed to address wi]dland/urhan fire interface on the peninsula.

2. The City of Seward has participated in the Alaska Firewise Program, which identifies hazards to homeowners and offers solutions to protect residents in or near forested areas.
3. Relocating the Seward Building Department into the Fire Department has helped streamline this part of the process for builders by consolidating review of potential response to a structure, operational needs of the builder and City department's requirements in one location.
4. During this plan review structures that are in a Wildland/Urban Interface fire risk or exposure area have been required to incorporate protective measures.
5. KPB is tracking the spread of the spruce bark beetle throughout the peninsula. The KPB Spruce Bark Beetle Office offers assistance and advice to businesses and homeowners.

rrv OF SEWARD AND THE Qu r EKCPK NAT!VE "r RrBJU
2010 HAZARD MITIGATION PLAN UPDATE

Newsletter #1 March 2018

This newsletter describes the Ci f.J' Of Seward and the Qutekcak Nt1ti ve Tl'ibe's Ha zard Mitigati on Plan Up date project development processes to all interested agencies, stakeholders, an rl the public; and to solicit plan update commeut.5.

The State of Alaska , Departmen t of Military and Veterans Affairs, Division of Homeland S,ecuiity and Emergency Management (DHS&EM) was awarded a Pre-Disaster Mitigation Program grant from the Federal Emergency Manageme nt Agency (FEMA) to update your legacy 2010 Hazard Mitigation P lan (HMP) and convert it into a Multi-Jurisdictional Hazard Mitigation Plan (MJHMP) that includes both collocated City and Tribal governments.

AECOM was contracted to assist City Of Seward and the Qutekcak Native Tribe with preparing a 2018 FEMA approvable MJHMP update.

The MJHMP will identify all natural hazards , such as earthquake , flood, ground failure, tsunam i, volcano , weather, a:nd wlldla:nd fire ha zards, etc. The plan will a ls o identify the people and facilities potentially at ris k and ways to mitigate damage from future hazard impacts. The pub1ic participation and plan ning prncess is documented as part of these projects.

What is Hazard Mitigation?

Hazard mitigation projects eliminate the risk or reduce the haz.ard impac t severity to people and property. Projects may include short- or long-term activ ities to reduce exposure to or the effects of known hazards. Hazard mitigation activities include relocating or elevating buildin gs, replacing insufficiently sized culverts, using alternative construction techn iques, or develop ing, impl emen ting , or enforcing building codes, and edu ca tion.

Why Do We Need to Update the HMP?

Communities must have a current State , FEMA approved, and community adopted mitigation plan to receive project grants from FEMA ' s pre- and post- dis as ter grants identified in their Hazard Mitigatio n Assistance (HMA) guidance and other agency's mitigation grant programs,

A FEMA approved and participating jurisdic tion adopted MJHM P enables the local and collocated Tribal govern me nts to apply for the Hazard Mitigation Grant Program (H MGP), a disaster related assistance program; the Pre-Disaster Mitigation (PDM), and the National Flood Insurance Program (NFIP) Flood Mitigation Assistance (FMA) grant programs.

The Planning Process

Th ere are very specific federal requirements that must be met when updating a FEMA approvable MJHMP. These requirements are commonly referred to as the Disaster Mitigation Act of 2000 , or DMA2000 criteria. Infonnation about the criteria and other applica ble laws and regulations may be found at: http://www.fema.gov/mitigation -plannin g-laws-reg ula ti ons- guida nce.

T he DMA2000 requir es the updated HMP to include and document the following topics :

- O New Pla1ming Team membership and processes
- ☐ HMP update participation and plan reviewers,
- o Identify new hazards not formerly addressed,
- ☐ Explain how your hazard impacted you since adoption and implementatio n,
- o Identify new, existing, and future ctitical faciliti es that were or may be impacted by known hazards,
- o Determine their critical facilities "estimated" replacement costs,
- ☐ Define the community's population risk and critical facility vulnerabilities,
- o The followi ng can be reviewed within the 2013 2013 SBCFSA HMP update:
  - e Review cWTe nt, and update existing haza rd mitigation goals as needed to better meet needs,
  - c Determine each project's current status within the Mitigatio n Strategy. Were they completed, deleted, delayed, combined/changed , or still viable and ongoing? Also provide a brief explanation for any changes.
- ☐ Update the MJHMP Maintenance sec tion to reflect how the (City, Village, or Borough) completed legacy HMP annual review commitments , in tegrated HMP components into community planning mechanisms, and identify whether it was effective or not. Then update the process to make it more effective for future use.
- ☐ Provide a copy of City ' s and Tribal 2018/2019 MJHMP Adoption Resolution

FEMA has prepared Local and Triba l Planning Guidance (respectiv e ly avai lable at: https:// www.fema.gov /hazard-mitigation -planning-resources) that explains how the

legacy 2010 HMP conversion process that ful fills DMA200 0 MJHMP criteria and reg ulatory requireme nts.

We are cutTently in the very beginning stages of update p rocess. We will sche dule a Planning Team in-person meet ing or teleconf erence to further define project needs, to gather comments from communi ty reside nts update hazards lis ts , and collect data to refine the vulnerability assessmen t.

We Need Your Help

Please use the fo llowing table to con finn the hazards AND identify new hazards not formerly addressed.

Seward Area Hazard Worksheet

Hazard	2010 HMP	Still Valid? Yes/No
Natural Hazards		
Earthquake (Eq)	Yes	
Flood (Erosion) (Fl	Yes	
Ground Failure (GF) Avalanche, Landsilde, Melting Permafrost, and/or Subsidence	No	
Weather x	Yes	
Tsunami &. Seiche Ts	Yes	
Volcano (Vo)	Yes	
Wildland Fire (Wf)	Yes	
Manmade		
Tochnolo ical	Yes	
Economic	Yes	
New		

T he legac y 2010 Seward HMP and the 2013 SBCFSA HMP identified cri tical facilities within the Seward area, but the lis t needs to be reviewed and updated and the est imated replacemen t value and loc ations (latitude/lo ngitude) confirme d or deter mined.

In addit ion, to the number and val ue of structures ; we need to estimate the average number of people living or working in these structur e at any point-in-time. O nce this informat ion is co llected we will determine which critic al faci lities, residences, and popu lations are vulnerable to your specific hazard thr eats. The following facilities list is not inclusive for this newsle tter; but provides a re presenta tion of the Se ward area' s facility types.

Seward Alaska Area Critical Facility Hazard Impacts

Critical Facility	Current Natural Hazards					
	EQ	FL	TS	VO	WK	WF
1. City Office	X			X	X	X
2. US Post Office	X			X	X	X
3. BoroughOffice (former: Water Resources Office)	X			X	X	X
4. FireStation	X			X	X	X
5. Police Station	X			X	X	X
6. Alaska State Troopers	X			X	X	X
7. William H SewardElem School (PK-5, - 329)	X			X	X	X
8. SewardMiddle School (6-8, - 138}	X			X	X	X
9. Seward Hill li School, (9-12. -348	X			X	X	X
10. UA Instituteof MarineScience	X			X	X	X
1 1. AK Sealife Center	X			X	X	X
1 2. AK Vocational Technical Center {AvTEC), AK Institute of Technology	X			X	X	X
13. AVTEC FirstLake Facillty- Emergency Shelter				X		
14. AVTEC Food Service Building - Emergency Shelter				X		
15. Culinary Arts Institute	X			X	X	X
16. AK Shellfish Institute	X			X	X	X
17. North Siar Health Clinic - Chugachmiut	X			X	X	X
18. Providence Seward Medcial and Care Center	X			X	X	X
19. Seaview Communlty Services	X			X	X	X
20. Seward PublicHealthCenter	X			X	X	X
21. Wesley RehabifrtationandCare	X			X	X	X
22. Seward Life Action Council CounselingFacility	X			X	X	X
23. Seward Volunteer Fire Departmer - Emergency Shelter	X			X	X	X
24. Bear Creek VolunteerFire & Ems Emergency Shelter	X			X	X	X
25. LDS Chapel - Emergency Shelter	X			X	X	X
26. Le Barn Appelit - Emergency Shetter	X			X	X	X
27. Seward Military Resort. - Emeroency Shetter	X			X	X	X
28. Seward Elementary - Emergency Shelter	X			X	X	X
29. Sewad Middle School - Emergency Sheller	X			X	X	X
30. Seward Chapel -· Emergency Shelter	X			X	X	X
31. Church of the Nazarene • Emergency Shelter	X			X	X	X
32. Sacred Heart Catholic Church- Emergency Shelter	X			X	X	X
33. Seward Senior Center - Emergency Shelter	X			X	X	X
34. Memorial Untted Methodist Church - Emergency Shelter	X			X	X	X
35. St Peters Episcopal Church - Emergency Sheller	X			X	X	X
36. Seward Waterfront Park	X			X	X	X
37. Seward Volunteer Fire Departmen - Emergency Shetter	X			X	X	X
38. Bear Creek Volunteer Fire & EMS - Emergency Shelter	X			X	X	X
39. Spring Creek Correctional Facility	X			X	X	X
Transportation, Bridges, and Utility facilities not listed due lo space	X	X	X	X	X	X

Please email or fax updated hazard and critic al facility informa tion directly to AECOM or provide it to you r commu nity Plan nin g Team Leader.

The Planning Team

The planning tean1 is being led by City of Seward's Fire Chief Edward Athey, with assistance from City Manager Jim Hunt, City Planner Jackie Wilde, and Public Works Director Doug Schoessler along with Qutekcak Native Tribal administrators Scott Allen and Sara Benjamin, and AECOM (contracted by DHS&EM) prov1ding tec hnical assistance and guidance while writing the final plan and DHS&EM 's Hazard Mitigation Planning Lead, Mike Johnson.

Public Participation

Public involvement will continue throughout the project. The goal is to receive comments, identify key issues or concerns, and improve mitigation ideas and to guide the community.

We encourage you to take an active part in preparing the City of Seward and Qutekcak Native Tribe's Hazard Mitigation Plan update effort. The purpose of this newsletter is to keep you informed and to allow you every opportunity to voice your opinion regarding this important project. Please contact your community MJHMP Team Leader or Scott Simmons, AECOM directly if you have any questions, comments, or requests for more information:

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AECOM
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Emergency Management Planner
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907.26 1.9706 or 800.909.6787
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DHS&EM
Mike Johnson
State Hazard Mitigation Planner
PO Box 5750
Anchorage, AK 99505-5750
428.7055 or 800.478.2337
eMail: mike.iohnson@alaska.gov

From: Eddie Athey
To: Simmons, Scott
Subject: FW: Seward permitting day April 24th
Date: Tuesday, March 19, 2019 10:53:10 AM

From: Presley, Stephanie [mailto:spresley@kpb.us]
Sent: Wednesday, January 10, 2018 1:18 PM
To: Aldridge, Morgan; 'Alicia Greene'; Andy Mitzel; 'Benjamin Polley'; Templin-SOA, Bonnie; Blossom-SOA, Brian; Byker, Lucas; Harris, Bryr; Carver, Nancy; Noyes, Karyn; Dearlove, Tom; 'Core'; Hyslop, Jamie R CIV USARMY CEPOA (US) (Jamie.R.Hyslop@usace.army.mil); 'Katherine McCafferty'; 'Kyle Graham (kyle_graham@fws.gov)'; 'Linda Speerstra'; 'Michael Setering'; 'George Kalli (George.A.Kalli@usace.army.mil)'; Russel, Pam - State Address; 'tracy.smith@alaska.gov'; 'Gray, Andrew A CIV USARMY CESWF (US) (Andrew.A.Gray@usace.army.mil)'; 'Peterson, Ryan E (DEC)'; 'Long, Chandler J (DNR)'; Ron Long; Jim Hunt; Jackie Wilde; Andy Bacon; Eddie Athey; building; Doug Schoessler; Harbor Master; Christeffal Terry (TerryC@akrr.com); Jeanette Greenbaum (greenbaumj@akrr.com); Quick, John; Nelson, Dan; Mueller, Marcus; Griebel, Scott; Best, Max; Shears, Jennifer; Browning, Roy; Bacon, Connie; kevin.knotek@alaska.gov; aaron.hughes@alaska.gov
Cc: Cinereski, Heather
Subject: Seward permitting day April 24th

Please save the date for the Seward Permitting & Agency Info Day!

This is a great opportunity to connect with residents of Seward/ Bear Creek, to provide assistance with their projects, or provide information and receive input on your agency's upcoming projects.

Site visits can be scheduled in the afternoon.

Lunch provided!

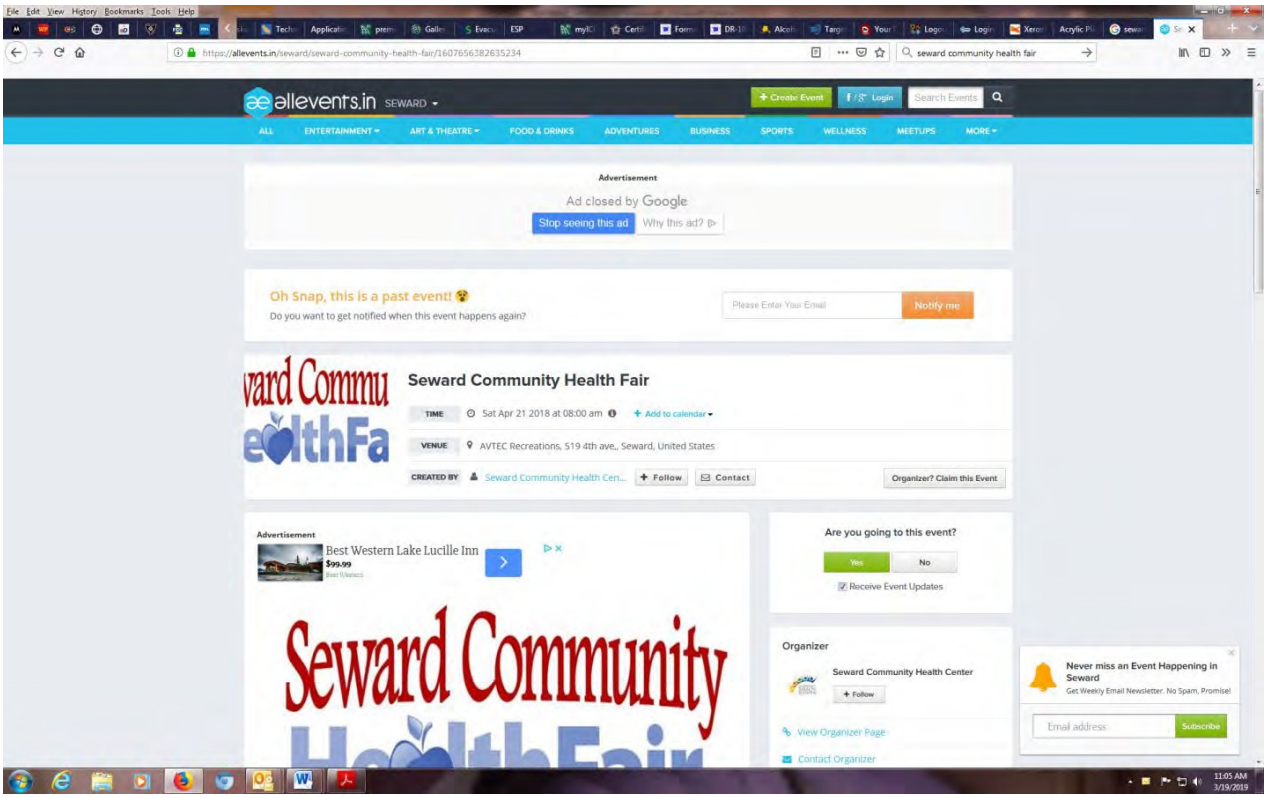
Tuesday, April 24th, 10 am – 2 pm
Seward Community Library
Downstairs Community Room

Spam
Phish/Fraud
Not spam
Forget previous vote

Seward Outreach Efforts

The City of Seward's Health Fair and Permit Day provides an opportunity to present their hazard mitigation initiatives to the public. These event allows Seward's departments opportunities to talk directly with interested attendees concerning, health, safety, ongoing infrastructure improvement projects focused engage and solicit ideas to address needed community health and well fair issues.

April 21, 2018 Health Fair Public Notice



April 22, 2019 Health Fair Public Notice

From:	Simmons, Scott
To:	"Janice Melvin"; sewardfd@cityofseward.net
Cc:	eathey@cityofseward.net
Subject:	RE: Seward HazMit Plan
Date:	Friday, January 11, 2019 12:39:00 PM
Attachments:	2019 Seward HMP Human-TechHazard Profile.docx image002.png

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Hi Janice,
Thank for these reports.

Are you aware as to whether the Fire Department (City) is tracking other Extremely Hazardous Substances (EHSs) such as chlorine (school or public pools), Bulk Fuel Storage Tanks, or items that are transported by train, truck, ocean vessels, etc.?

It currently contains limited information from the 2010 legacy HMP:

> ***Anhydrous ammonia*** *is a corrosive and toxic gas that is an eye, nose and throat irritant. It is highly toxic if inhaled and may be an explosive hazard in a confined space.*
>
> *The following locations have listed anhydrous ammonia quantities:*
>
> - *Icicle Seafood's Seward Plant, located in the Seward boat harbor and within 1 mile of downtown Seward, holds 23,000 lbs. of anhydrous ammonia in their system with an additional 300 lb., external cylinder.*
> - *Resurrection Bay Seafoods, located at the southern end of town has 650 lbs. in the system.*
> - *Polar Seafoods, located in the SMIC area has 4500 lbs.*
>
> *Due to the proximity of two of these processing plants to populated areas, the city has a high risk from the effects of an anhydrous ammonia release.*
>
> *Icicle Seafoods has a current anhydrous ammonia release Emergency Response Plan (ERP) in place. They conduct simulated leak exercises in coordination with the Seward Fire Department and in-house monthly exercises as part of their ERP.*
>
> *The plan is designed to meet Process Safety Management of Highly Hazardous Chemicals, the Hazardous Waste Operations and Emergency Response regulation, and Part 68 of Risk Management Plan regulation requirements. The ERP is available at the Icicle Seafoods, Seward Fisheries Plant.*
>
> ***Fuel Storage Tanks – Small Boat Harbor.*** *Besides the boat harbor area, there are other various city locations that store gasoline, heating oil, motor oil, diesel, and propane. All of these facilities have can potentially cause extreme environmental disasters and/or fire/explosion incidents.*

Fuel storage tank system failure probability is low. In the event of a failure of any of these tank systems. The probability however of such failures is low. The largest threat from a fuel spill would be environmental contamination. The petroleum tank facility is located within a few hundred yards of the shoreline. A major spill or rupture of any tank would have far reaching impacts. The risk to the City of Seward is high.

I've attached what I have updated within the Manmade Hazard section for all y'all's review.

I've also requested the red text information within this draft from DEC to see what they have on file to better update the 2019 HMP's Manmade Hazard Section.

Have a great weekend!
-Scott-

AECOM
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Senior Emergency Management Professional

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Fax: 907.562.1297
Personal Cell: 907.841.1832

From: Janice Melvin [mailto:jmelvin@cityofseward.net]
Sent: Friday, January 11, 2019 10:36 AM
To: Simmons, Scott
Subject: Seward HazMit Plan

Scott
Sorry for the delay- these are the two reports for Tier II.
Janice

Janice Melvin, Executive Assistant
Seward Fire Department
Seward Building Department
316 Fourth Avenue
PO Box 167 - Seward, AK 99664

From: Simmons, Scott
To: "eathey@cityofseward.net"; "tribaladmin@qntak.org"
Cc: "dlsquires@cityofseward.net"; "jhunt@cityofseward.net"; "jwilde@cityofseward.net"
Subject: City of Seward Hazard Mitigation Plan Update Project
Date: Thursday, January 18, 2018 3:46:00 PM
Attachments: image001.png

Dear Mayor Squires, City Manager Hunt, Fire Chief Athey and Tribal Administrator Allen,

I am writing to introduce myself, Scott Simmons at AECOM. This project will cost you nothing because we were contracted by the Division of Homeland Security and Emergency Management (DHS&EM) to assist the City of Seward and Qutekcak Native Tribe with updating your legacy 2010 Hazard Mitigation Plan (HMP).

I worked with the SBCFSA to convert their legacy Flood Hazard Mitigation Plan into an all-hazards plan in 2013. This plan also included completing a comprehensive flood study incorporating City of Seward and KPB infrastructure to also provide future climate-change impact analysis for future planning purposes. Updating your legacy plan will reference the SBCFSA data while fulfilling current FEMA criteria and make you once again eligible for FEMA and other federal agency grants.

FEMA now requires that collocated City and Tribal governments should work together with developing a multi-jurisdictional hazard mitigation plan (MJHMP). Both city and tribal government criteria will be included throughout the updated plan. Both the City and Native Village Councils will adopt the plan once it has been state reviewed and received FEMA preliminary approval.

We will review and update all sections of your current plan; starting with the planning section. Your Planning Team membership needs to be manageable, with as few as four or five members; or consider how the prior Anvik leadership determined their City and Tribal council(s) were best suited as their Community Planning Team.

Therefore our first goal is for you to review your legacy HMPs planning team list (below) and determine if those members are still available and willing to work on updating the plan. I have provided your legacy HMP's planning team chart below. We will also need to include Native Village of Anvik Tribal Council members with the update effort. Please edit the list to update your planning team membership.

Table 4-1 Hazard Mitigation Planning Team

Name	Title	Organization	Phone
Dave Squires	Mayor	City of Seward	MJHMP review
Jim Hunt	City Manager	City of Seward	Data gathering and MJHMP review
			Data gathering

Jackie Wilde	City Planner	City of Seward	and MJHMP review
Eddie Ethey	Fire Chief	City of Seward	**City Planning Team lead**, Data gathering and MJHMP review
Doug Schoessler	Public Works Director	City of Seward	Data gathering and MJHMP review
Scott Allen	Tribal Administrator	Native Village of Anvik	**Tribal Planning Team lead**, data gathering and MJHMP review
Sarah Benjamin	Division Manager	Native Village of Anvik	Tribal data gathering and MJHMP review
Katherine Brown	IGAP Coordinator	Native Village of Anvik	Tribal data gathering and MJHMP review
Scott Simmons	Planner/Consultant	AECOM	Project Manage, lead writer, technical assistance

Typically the Mayor/City Administrator and Tribal First Chief/President desire to be their respective government's Planning Team Leads. Each of you can select alternates for example, Mayor Dave Squires (the former Fire Chief) was selected as Seward's HMP project lead. Alternates can report to those who appointed them (your respective Councils or planning team) as well as coordinate data review and approvals.

AECOM's role in this project is to ensure that the HMP update meets state and federal requirements. We are at the beginning stages of this project, and we are seeking information about the community infrastructure, residents, and jurisdictional authorities.

This is the typical plan review process:

Section 1. Introduction: added entire new section explaining City and Tribal HMP regulatory requirements.

Section 2. Community Description: update your community information, including new census and State data.

Section 3. Planning Process: update this section to reflect 2018 public processes including newsletters, public meetings and 2018 Planning Team changes.

- Did your planning team do what they said they'd do? For example, did the planning team perform their annual maintenance commitment?
- Were mitigation efforts integrated with or into other City and Tribal planning documents"

Section 4 Plan Adoption: 2018 formal adoption resolutions and dates.

Section 5. Hazard Profile Analysis: review current and newly identified hazards such as 2010 t 2018 earthquake, flooding, ground failure, severe weather, and

wildfire data.

Section 6 Vulnerability Analysis: analyze vulnerability with 2018 critical facilities and infrastructure tables as well as tribal culturally sensitive site and FEMA NFIP programmatic data as applicable.

Section 7 Mitigation Strategy: review and edit 2010 mitigation goals and actions.

- We will add short narrative descriptions as to their current status such as whether you have completed, deleted, or deferred those actions or projects;
- As well as provide a short explanation as to why they may have changed status.

Section 8. References: revised to reflect 2018 document searches and data used to support the update.

Our task is to write the plan while teaching you the hazard mitigation plan development and update process. We have been very successful accomplishing this by using a community Planning Teams. AECOM will write the plan. Your community Planning Team will work with us to provide essential information that only community residents will know or have experienced.

There will be opportunities for the entire community to review the team's work and should be tracked as part of FEMA's public involvement process. This can include distributing or posting newsletters or providing information during City Council Meetings or other public meetings, and working with us over the phone as we capture needed information. Please keep track of any public comments as FEMA pushes to see how this information benefited the plan development process.

Please provide the names of your respective planning team leaders to schedule an introductory meeting with the team leader and team members to introduce the project and coordinate information collection.

We look forward to working with you to complete your Seward Hazard Mitigation Plan update. Please call me if you have questions.

Kind Regards
-Scott-

AECOM
R. Scott Simmons, CFM, CPM
Senior Emergency Management Planner

700 G Street, Suite 500, Anchorage, AK 99501

From:	Simmons, Scott
To:	eathey@cityofseward.net; jwilde@cityofseward.net; "tribaladmin@qntak.org"
Cc:	AECOM Kelly Isham; "Johnson, Mike E (MVA)"
Subject:	City of Seward's Newsletter 2 for posting
Date:	Wednesday, March 27, 2019 12:32:00 PM
Attachments:	032719 SewardMJHMP Nwsltr-2.pdf 032719 SewardMJHMP Nwsltr-2.doc image002.png

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Hi Eddie, Jackie, and Pam,

Here is your last newsletter. It advertises the MJHMP is available for public review. I have provide both MS Word and PDF versions. You can edit the MSWord version to fine tune where the draft MJHMP can be reviewed and where you'd like them to post comments.
We need an email stating you have reviewed the plan and approve it for State and FEMA formal review by April 25, 2019.

Mike Johnson has a copy so he can start an "informal" review to help prevent any major hiccups.

It is vital that you edit those comments to assure we only make constructive changes. Send your edits to Kelly Isham to change within the plan if needed.

Mike and Kelly are cc'd to this email.

This is a reminder,
I will be on a lengthy sabbatical until potentially October 2019.
I will not available in the office or to work with you to complete your plan. However, Kelly is available to work through the remaining activities needed to complete your plan. His contact info is:

Kelly Isham
Kelly.isham@aecom.com
907261.9724

Kind Regards
-Scott-

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eMail: scott.simmons@aecom.com

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THE CITY OF SEWARD AND THE QUTEKCAK TRIBE
MULTI-JURISDICTIONAL HAZARD MITIGATION PLAN (MJHMP)

April 2019 **Newsletter 2**

This newsletter discusses the preparation of the City of Seward and the Qutekcak Tribe's Hazard Mitigation Plan. It has been prepared to inform interested agencies, stakeholders, and the public about the project and to solicit comments.

HMP Development

The City of Seward was selected by the State of Alaska, Division of Homeland Security and Emergency Management (DHS&EM) for a Multi-Jurisdictional Hazard Mitigation Plan Update (MJHMP) development project. The plan identifies natural hazards that affect the community including earthquake, flood, ground failure, tsunami, volcanic, weather, and wildland fire. The MJHMP also identifies the people and facilities potentially at risk and potential actions to mitigate community hazards. The public participation and planning process is documented as part of the project.

What is Hazard Mitigation?

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

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

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

Why Do We Need A Hazard Mitigation Plan?

A community is only eligible to receive grant money for mitigation programs by preparing and formally adopting a hazard mitigation plan that has received Federal Emergency Management Agency's (FEMA) official approval that assures community or tribal mitigation program participation eligibility.

The Planning Process

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

The DMA2000 requires the plan to document the following topics:

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

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

The planning process kicked-off on January 18, 2018 by establishing a local planning committee. The City then organized and a Planning and Zoning Commission meeting in March to discuss legacy 2010 HMP update requirements. The P&Z examined the full spectrum of hazards listed in the State Hazard Mitigation Plan and identified those the MJHMP would address.

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

A mitigation strategy was the next component of the plan to be developed. Understanding the community's local capabilities and using information gathered from the public, the P&Z, and the expertise of the consultants and agency staff, a mitigation strategy was developed. The mitigation strategy is based on an evaluation of Seward's identified hazards and the assets at risk from those hazards.

Mitigation goals and a list of potential actions, initiatives, or projects were developed that formed the foundation of the mitigation strategy.

Mitigation goals are defined as general guidelines that explain what a community wants to achieve in terms of hazard and loss prevention. Goals are positively stated future situations that are typically long-range, policy- oriented statements representing community-wide visions. Mitigation actions and projects are undertaken in order to achieve your stated objectives. On August, 2018, the P&Z reviewed the legacy 2010 HMP to refine the area's needed actions for each hazard. They focused on six categories: prevention, property protection, public education and awareness, natural resource protection, emergency services, and structural projects. A representative sample of the mitigation actions identified as a priority by the planning team are listed below, and explained in more detail within the MJHMP.

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

The draft MJHMP is available in the City and Tribal offices for public review and comment. Comments should be made via email, fax, or phone to Kelly Isham (listed below) and be received no later than April, 25, 2019. The plan will be provided to DHS&EM and FEMA for their preliminary approval and returned to the City of Seward's City Council and the Qutekcak Tribal Council for formal adoption.

The Planning Committee

The plan was developed with the assistance from the community's planning committee consisting of a cross section from the community. Planning Team members included Team Leader, Eddie Athey, with assistance from City Planner Jackie Wilde, the Seward Planning and Zoning Commission, Qutecak Tribal Administrator Pam Jarosz, and AECOM.

Sample of Seward's Mitigation Actions. ***(Review the draft HMP for a complete project list)***		
Identify and pursue funding opportunities to implement mitigation actions, including erosion and sediment control projects.	Continue working with FEMA to obtain the latest NFIP information and scheduling workshops.	Revise tsunami inundation hazard prediction maps as needed after an event or disaster.
Incorporate mitigation planning provisions to improve flood and erosion hazard aspects in permit application input to residents and review recommendations to regulatory agencies, land use decisions, subdivision actions…	Obtain an exemption to the Alaska Department of Natural Resources (DNR) Material Sales Fees on navigable rivers and streams and state lands for sediment and debris management, stream channel maintenance, and flood control or other flood mitigation projects.	Acquire land within the city to develop a secondary evacuation route that bypasses the Seward lagoon and boat harbor areas. Provide barriers to this route and designate it as a recreational trail for use outside of emergency access.
Establish a cooperative relationship with the SBCFSA to ensure hazard mitigation efforts are not being duplicated or opportunities missed.	Perform hydrologic and hydraulic engineering, drainage, and bed loading studies and analyses for each watershed. Use information obtained for feasibility determination and project design.	Identify avalanche areas within the city and generate GIS Hazard Maps. Coordinate with Community Development Office on locations of areas for any zoning issues.
Inspect, prioritize, and retrofit any critical facility or public infrastructure that does not meet current State adopted Building Codes.	Create a baseline assessment on Lowell Point Road, existing infrastructures and the feasibility of culvert/ditch line installation.	Identify non-buildable sites through the city's land use plan and city zoning maps. *RM Lands adjacent to Dieckgraeff Rd.

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APPENDIX F BENEFIT-COST ANALYSIS FACT SHEET

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

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

All benefit-costs must be:

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

General Data Requirements:

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

Damage and Benefit Data

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

- When using the Limited Data (LD) BCA module, users cannot extrapolate data for higher frequency events for unknown lower frequency events.

Building Data

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

Use Correct Occupancy Data

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

Questions to Be Answered

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

Common Shortcomings

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

APPENDIX G PLAIN MAINTENANCE DOCUMENTS

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Annual Review Questionnaire

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

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Mitigation Action Progress Report

Progress Report Period: _____ **To** _____
(Date) (Date)

Project Title: **Project ID#:**

Responsible Agency:

Address:

:

Contact Person: **Title:**

Phone #(s): **email Address(s):**

List Supporting Agencies and Contacts:

Total Project Cost:

Anticipated Cost Overrun/Underrun:

Project Approval Date: **Project Start Date:**

Anticipated Completion Date:

Description of project (describe each phase, if applicable, and the time frame for completing each phase:

Milestones	Complete	Projected Completion Date

Mitigation Action Progress Report *(Continued)*

Plan Goal(s) Addressed:

Goal:

Success Indicators:

Project Status

- ☐ On Schedule
- ☐ Completed
- ☐ Delayed*
- ☐ Canceled

*** Explain:**

Project Cost Status

- ☐ Cost Unchanged
- ☐ Cost Overrun**
- ☐ Cost Underrun***

**** Explain:**

***** Explain:**

Summary of progress on project for this report:

A. What was accomplished during this reporting period?

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

C. How was each problem resolved?

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

Other Comments: