

Draft
Akiak Native Community
MULTI-HAZARD MITIGATION PLAN



Photo Credit: Ivan M. Ivan, via KYUK News, May 20, 2019.

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List of Acronyms and Abbreviations

°F	degrees Fahrenheit
ADEC	Alaska Department of Environmental Conservation
ADOL	Alaska Department of Labor
AICC	Alaska Interagency Coordination Center
ANC	Akiak Native Community
ANSCA	Alaska Native Settlement Claim Act
ANTHC	Alaska Native Tribal Health Consortium
AST	Akiak Storage Tank
ATVs	All-Terrain Vehicles
BEA	Baseline Erosion Assessment
BIA	Bureau of Indian Affairs
BLM	Bureau of Land Management
CD	compact disc
CDBG	Community Development Block Grant
CFR	Code of Federal Regulations
City	City of Akiak
DCCED	Department of Community, Commercial, and Economic Development
DCRA	Division of Community and Regional Affairs
DGGS	Division of Geological and Geophysical Surveys
DHS&EM	State of Alaska, Department of Homeland Security and Emergency Management
DMA 2000	Disaster Mitigation Act of 2000
DOT&PF	Department of Transportation and Public Facilities
ft	Feet
FMA	Flood Mitigation Assistance
FEMA	Federal Emergency Management Agency
FY	Fiscal Year
g	Gravity
GAO	Government Accountability Office
GIS	Geographic Information Systems
HAZUS-MH	Hazards

HMA	Hazard Mitigation Assistance
HMGP	Hazard Mitigation Grant Program
HMP	Hazard Mitigation Plan
HWE	High Water Elevation
HUD	Housing and Urban Development
IGAP	Indian General Assistance Program
IRA	Indian Reorganization Act
M	Magnitude
MAP	Mitigation Action Plan Strategy
MMI	Modified Mercalli Intensity
Mph	Miles per Hour
MSL	Mean Sea Level
NFIP	National Flood Insurance Program
NRCS	Natural Resources Conservation Services
NWS	National Weather Service
PDM	Pre-Disaster Mitigation
PER	Preliminary Engineering Report
PGA	Peak Ground Acceleration
PSHAs	Probabilistic Seismic Hazard Analyses
REAA	Rural Education Attendance Area
Sq.	Square
STAPLEE	Social, Technical, Administrative, Political, Legal, Economic and Environmental
U.S.	Unites States
USACE	U.S. Army Corps of Engineers
USC	U.S. Code
USFA	U.S. Fire Administration
USGS	U.S. Geological Survey
YK	Yukon-Kuskokwim

1.0 Introduction

This section provides a brief introduction to hazard mitigation planning, the grants associated with these requirements, and a description of this Multi-Hazard Mitigation Plan (HMP). This HMP has been developed in 2019 for the Akiak Native Community (ANC).

1.1 HAZARD MITIGATION PLANNING

Hazard mitigation, as defined in Title 44 of the Code of Federal Regulations (CFR), Part §201.4, is “any action taken to reduce or eliminate the long-term risk to human life and property from natural hazards.” As such, hazard mitigation is any work done to minimize the impacts of any type of hazard event before it occurs. Planning aims to reduce losses from future disasters. Hazard mitigation is a process in which hazards are identified and profiled, people and facilities at risk are analyzed, and mitigation actions are developed. Implementation of the mitigation actions, which include long-term strategies that may consist of planning, policy changes, programs, projects, and other activities, is the end result of this process. Hazard mitigation is the only phase of emergency management specifically dedicated to breaking the cycle of damage reconstruction and repeated damage. As such, State, Local, and Tribal governments are encouraged to take advantage of funding provided by Federal Hazard Mitigation Assistance (HMA) programs.

1.2 PLANNING REQUIREMENTS

1.2.1 Tribal Mitigation Plans

On October 30, 2000, Congress passed the Disaster Mitigation Act of 2000 (DMA 2000) (P.L. 106-390) which amended the Robert T. Stafford Disaster Relief and Emergency Assistance Act (Stafford Act) (Title 42 of the United States Code [USC] 5121 et seq.) by repealing the act’s previous mitigation planning section (409) and replacing it with a new mitigation planning section (322). Section 322 directs State, Local, and Tribal entities to closely coordinate mitigation planning and implementation efforts. Additionally, Section 322 establishes the HMP requirement for the Federal Emergency Management Agency’s (FEMA) HMA.

On October 2, 2015, FEMA published the Mitigation Planning Final Rule in the Federal Register, [Docket ID: FEMA-2015-0012], 44 CFR Part 201, effective November 2, 2015. Planning requirements for Tribal entities are described in detail in Section §201.7. Tribally-adopted and FEMA-approved HMPs qualify jurisdictions for several HMA grant programs. This Multi-Hazard HMP for the ANC complies with Title 44 CFR Section §201.7 and applicable FEMA guidance documents as well as the 2018 State of Alaska HMP.

Section 322 of the Stafford Act (42 USC 5165) as amended by P.L. 106-390 provides for State, Local, and Tribal governments to undertake a risk-based approach to reducing risks from natural hazards through mitigation planning. The National Flood Insurance Act of 1968 (42 USC 4001 et seq.) as amended, further reinforced the need and requirement for HMPs, linking Flood Mitigation Assistance (FMA) programs to State, Local, and Tribal HMPs. This change also required participating National Flood Insurance Program (NFIP) communities’ risk assessments and mitigation strategies to identify and address repetitively flood damaged properties.

1.3 GRANT PROGRAMS WITH MITIGATION PLAN REQUIREMENTS

FEMA HMA grant programs provide funding to State, Local, and Tribal entities that have a FEMA-approved State, Local, or Tribal HMP. 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. As of June 19, 2008, the grant programs were segregated. The Hazard Mitigation Grant Program (HMGP) is a competitive, disaster-funded grant program whereas the other Unified Mitigation Assistance Programs (Pre-Disaster Mitigation [PDM] and FMA, although competitive) rely on specific pre-disaster grant funding sources, sharing several common elements.

“The Division of Homeland Security and Emergency Management’s (DHS&EM) FEMA HMA grant programs present a critical opportunity to protect individuals and property from natural hazards while simultaneously reducing reliance on Federal disaster funds. The HMA programs provide PDM grants annually to State, Local, and Tribal communities. The statutory origins of the programs differ, but all share the common goal of reducing the loss of life and property due to natural hazards. The PDM program is authorized by the Stafford Act and focuses on mitigation project and planning activities that address multiple natural hazards, although these activities may also address hazards caused by manmade events. The FMA program is authorized by the National Flood Insurance Act and focuses on reducing claims against the NFIP” (FEMA, 2019h).

1.3.1 Hazard Mitigation Assistance Unified Programs

The HMGP provides grants to State, Local, and Tribal entities to implement long-term hazard mitigation measures after a major disaster declaration. The purpose of the HMGP is to reduce the loss of life and property due to natural disasters and to enable mitigation measures to be implemented during the immediate recovery from a disaster. Projects must provide a long-term solution to a problem; for example, elevation of a home to reduce the risk of flood damages as opposed to buying sandbags and pumps to fight the flood. In addition, a project’s potential savings must be more than the cost of implementing the project. Funds may be used to protect either public or private property or to purchase property that has been subjected to, or is in danger of, repetitive damage. The amount of funding available for the HMGP under a particular disaster declaration is limited. FEMA may provide a State, City, or Village with up to 20% of the total aggregate disaster damage costs to fund HMGP project or planning grants. The cost-share for this grant is 75% Federal/25% non-Federal.

The PDM grant program provides funds to State, Local, and Tribal entities for hazard mitigation planning and mitigation project implementation prior to a disaster event. PDM grants are awarded on a nationally-competitive basis. Like HMGP funding, a PDM project’s potential savings must be more than the cost of implementing the project. In addition, funds may be used to protect either public or private property or to purchase property that has been subjected to, or is in danger of, repetitive damage. The total amount of PDM funding available is appropriated by Congress on an annual basis. In Fiscal Years (FY) 2016 and 2017, PDM program funding totaled approximately \$90 million each year. The cost-share for this grant is 75% Federal/25% non-Federal.

The goal of the FMA grant program is to reduce or eliminate flood insurance claims under the NFIP. Particular emphasis for this program is placed on mitigating repetitive loss properties. The primary source of funding for this program is the National Flood Insurance Fund. Grant funding is available for three types of grants, including Planning, Project, and Technical Assistance. Project grants, which use the majority of the program's total funding, are awarded to State, Local, and Tribal entities to apply mitigation measures to reduce flood losses to properties insured under the NFIP. In FY 2016, FMA funding totaled \$199 million. In FY 2017, FMA funding totaled \$160 million. The cost-share for this grant is 75% Federal/25% non-Federal.

The City of Akiak and the Akiak Native Community do not currently participate in the NFIP, and are therefore, ineligible for National Flood Insurance Act Grant Programs until they become a NFIP participant.

1.4 HMP Description

The remainder of this HMP consists of the following sections and appendices:

Community Description

Section 2 provides a general history and background of the Akiak community, including historical trends for population, and the demographic and economic conditions that have shaped the area. This section also provides the community's capacity in terms of regulatory tools, and staff and financial resources. Location figures of the Akiak area with relation to the various surrounding water bodies are included in Section 5 with hazard areas identified.

Planning Process

Section 3 describes the planning process and identifies the Planning Team members, the meetings held as part of the planning process, the LeMay Engineering & Consulting, Inc. planners, and the key stakeholders within the community and the surrounding area. In addition, this section documents public outreach activities (Appendix A) and the review and incorporation of relevant plans, reports, and other appropriate information.

Section 3 also describes the Planning Team's formal plan maintenance process to ensure that the HMP remains an active and applicable document. This process includes monitoring, evaluating, and updating the HMP (Appendix E); implementation of the mitigation process through existing planning mechanisms; and continued public involvement.

Prerequisites

Section 4 addresses the prerequisites of plan adoption, which include adoption by the ANC Tribal Council. The adoption resolution is included in Appendix F.

Hazard Analysis

Section 5 describes the process through which the Planning Team identified, screened, and selected the hazards to be profiled in this HMP. The hazard analysis includes the characteristics, history, location, extent, impact, and recurrence probability for each hazard. In addition, historical and hazard location figures are included when applicable.

Vulnerability Analysis

Section 6 identifies potentially vulnerable assets—people, residential and nonresidential buildings, and critical facilities and infrastructure—in Akiak. The resulting information identifies the full range of hazards that the ANC could face and potential social impacts, damages, and economic losses. Trends in land use and development are also discussed.

Mitigation Strategy

Section 7 defines the mitigation strategy which provides a blueprint for reducing the potential losses identified in the vulnerability analysis. The Planning Team developed a list of mitigation goals and potential actions to address the risks facing Akiak. Mitigation actions include preventive actions, property protection techniques, natural resource protection strategies, structural projects, emergency services, and public information and awareness activities.

References

Section 8 lists the reference materials used to prepare this HMP.

Appendix A

Appendix A provides public outreach information, including newsletters, meeting sign-in sheets and agendas, trip reports, and public comments.

Appendix B

Appendix B contains the Akiak Land Use Map.

Appendix C

Appendix C provides the FEMA Tribal Multi-Hazard Mitigation Plan Review Crosswalk for the ANC; the review crosswalk documents compliance of this HMP with FEMA criteria.

Appendix D

Appendix D contains the Benefit-Cost Analysis Fact Sheet used to prioritize mitigation actions.

Appendix E

Appendix E provides plan maintenance documents, such as an annual review sheet, a progress report form, and a community survey.

Appendix F

Appendix F contains the Adoption Resolution of the ANC Tribal Council as well as the FEMA approval letter for this 2019 HMP.

Appendix G

Appendix G identifies potential funding sources.

2.0 Community Description

This section describes the location, geography, climate, history; demographics; and economy of the Akiak community. This section also provides the community's capacity in terms of regulatory tools, and staff and financial resources.

2.1 LOCATION, GEOGRAPHY, CLIMATE, AND HISTORY



Figure 1. Akiak Location Map

Location and Geography

Akiak is located on the west bank of the Kuskokwim River, 42 air miles northeast of Bethel, on the Yukon-Kuskokwim (Y-K) Delta (see Figures 1 and 2). It lies at approximately 60.912220 North Latitude and -161.213890 West Longitude (Sec. 32, T010N, R067W, Seward Meridian). Akiak is not located in an organized Borough and falls within the Bethel Recording District (Department of Community, Commerce, and Economic Development [DCCED], Division of Community and Regional Affairs [DCRA], 2019). Akiak is classified as an isolated village and is found in Emergency Management Service Region 7A in the Y-K Region. The community has river and air access. Snow machines, all-terrain vehicles (ATVs), and skiffs are used extensively for local transportation.

The community of Akiak covers approximately 2.0 square (sq.) miles of land and approximately 1.1 sq. miles of water. Akiak is located in a broad alluvial floodplain in the Y-K Delta that is underlain by fine soils, comprised primarily of silt with intermixed layers of sand. This type of soil does not have much structural strength to resist erosion forces from the meandering Kuskokwim River. The outer channel is the primary flow path, and the inner channel is the secondary flow path (NRCS, 2013).

Climate

Akiak falls within the western transitional climate zone, characterized by tundra interspersed with boreal forests, and weather patterns of long, cold winters and shorter, warm summers. Temperatures range from a winter low of -2 degrees Fahrenheit (°F) to a high of 62 °F. The Akiak area receives approximately 16 inches of rain and 50 inches of snow annually. The Kuskokwim River is ice-free from mid-June through October; however, the pattern in the past five years is mid-May to Thanksgiving.

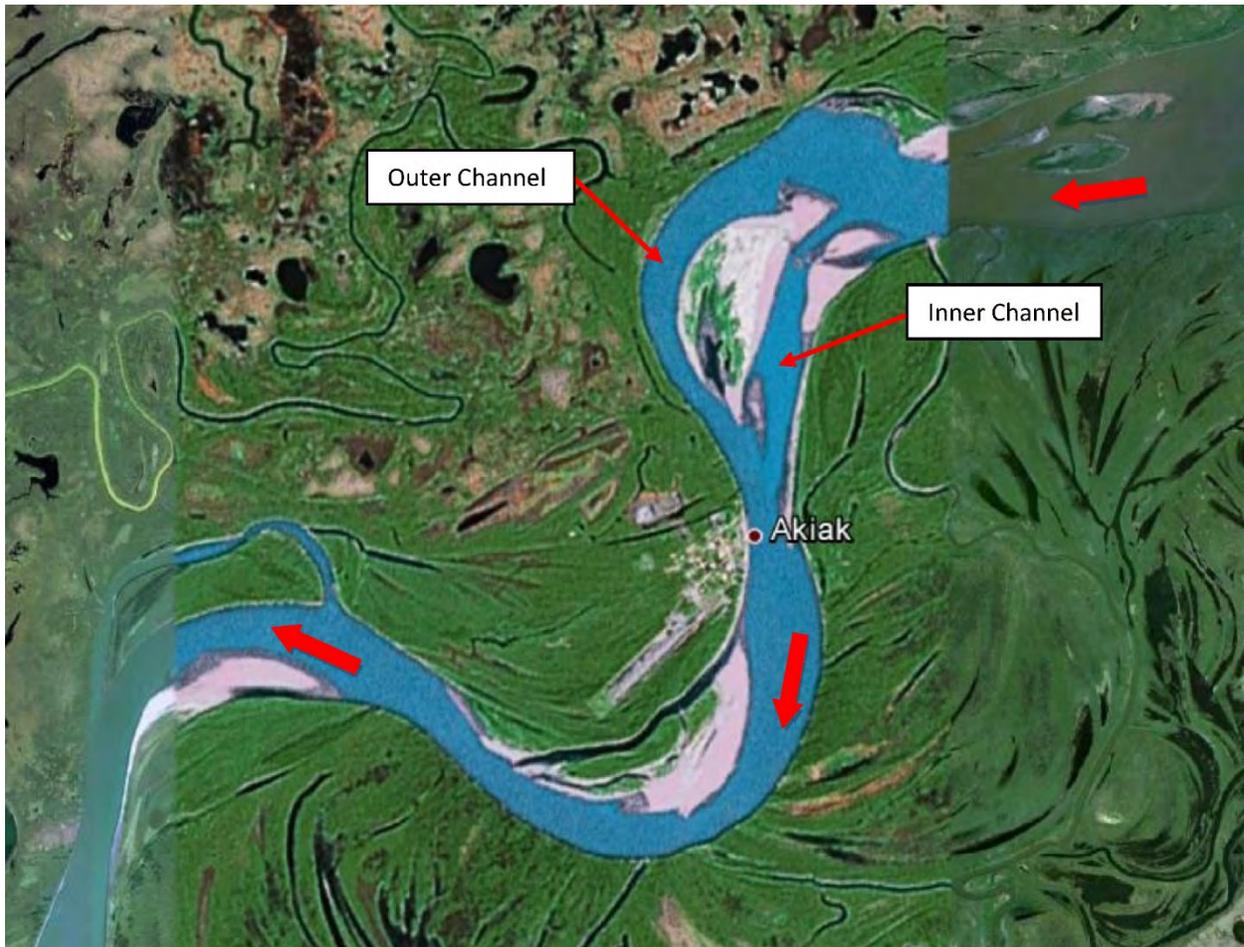


Figure 2. Aerial Image of Akiak

History

Akiak was originally known by its Yup'ik name, Ackiagmute, which had a population of approximately 175 residents. "The name Akiak (Akiak in Central Yup'ik) means 'the other side,' since this place was a crossing to the Yukon River basin during the winter for area Eskimos" (DCCED/DCRA, 2019). The following is a brief sketch of the community's history:

- 1880 A population of 175 lived in Ackiagmute.
- 1916 The Akiak Post Office was established.
- 1920s The U.S. Public Health Service built the first hospital.
- 1970 The City was incorporated as a second-class city in the State's Unorganized Borough.

2.2 DEMOGRAPHICS

Akiak is a Yup'ik Eskimo community that relies heavily on fishing, hunting, and wild food

harvesting subsistence as food sources as well as income. The 2010 United States (U.S.) Census recorded 346 residents, of which the median age was 25.6, indicating a relatively young population. The population of Akiak is expected to remain steady, because the greatest percentage of the population is younger than 34 years of age. The 2017 DCCED certified population is 394. Figure 3 illustrates the historic population of the community. Approximately 94.6% of residents recognize themselves as Alaska Native. The male and female composition is approximately 46 and 54%, respectively. The 2010 U.S. Census identified 98 households with the average household having approximately four individuals.

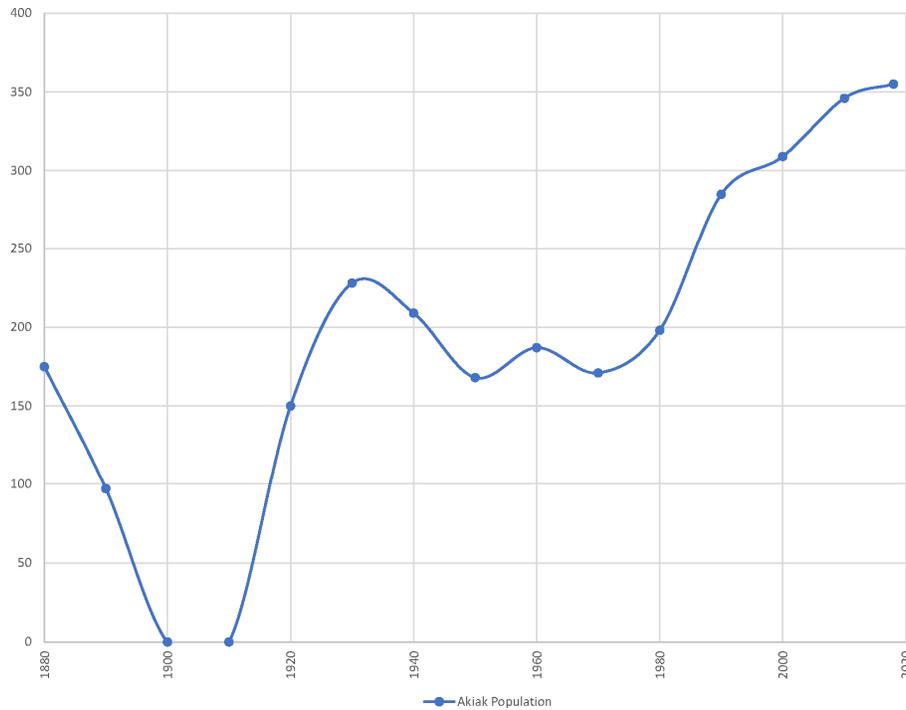


Figure 3. Historic Population Estimates for Akiak

2.3 ECONOMY

The majority of the year-round employment in Akiak is with the City, ANC, Kokarmiut Corporation, Yupiit School District, or other public services. Subsistence activities and fishing are important to residents and are the major source of their food, especially salmon. Poor fish returns since 1997 have significantly affected the community. The community is interested in developing a fish processing plant and tourism. Akiak is currently home to the world’s third largest museum of taxidermy (ANC, 2019).

According to the 2010 U.S. Census, the median household income in Akiak was \$41,563. Approximately 158 individuals (44.5%) were estimated to be living below the poverty level. The potential work force (those aged 16 years or older) in Akiak was estimated to be 240, of which 153 were actively employed. In 2017, the unemployment rate was 25.5%; however, this rate included part-time and seasonal jobs, and practical unemployment or underemployment is likely to be significantly higher (ADOL, 2017). Akiak is considered a distressed community per

the 2017 DOL and Workforce Development, Research, and Analysis Section (DHS&EM, 2018a).

2.4 COMMUNITY CAPACITY

Akiak community’s capability assessment reviews the technical and fiscal resources available to the community. Table 1 shows how the City and Tribal governments within Akiak work together to provide essential services to residents. Tables 2, 3, and 4 show the City and Tribal governments’ capacities.

Table 1. Public Facility and Service Providers in Akiak

Public Services	City of Akiak	Akiak Native Community	Other local Providers	State/Federal Agency
Fire Protection	Volunteer Fire Department; people only (no building)			
Water Utility		XX		
Sewer Utility		XX		
Landfill	XX			
Electric Utility	XX			
Road Maintenance	City provides equipment.	IRA contracts City equipment.		State of Alaska
Public Safety		XX		
Washeteria		XX		
Tribal Operation		XX		
General Assistance		XX		
Environmental		IGAP		
Clinic and Health		XX		
Dental Program		XX		
Mental Health		XX		
Public School			Yupit School District	
Airport Construction and Updates				DOT & PF
Airport Maintenance	Under contract to DOT & PF			DOT & PF
Communication			GCI	
Fuel			Kokarmiut Corporation	

Table 2. Akiak’s Regulatory Tools

Regulatory Tools (ordinances, codes, plans)	Existing?	Comments (Year of most recent update; problems administering it, etc.)
Building code	No	Neither the City or the ANC exercise this authority.
Zoning ordinances	No	
Subdivision ordinances	No	
Special purpose ordinances	No	
Comprehensive Plan	No	
Emergency Response Plan	Yes	The Small Community ERP has been developed. The ANC is in the adoption process.
Land Use	No	Alaska Native Settlement Claims Act (ANSCA) 14(c) (2) and (3) status.
Wildland Fire Protection Plan	No	The community does not have a plan that defines community fire threats.
Feasibility Study/Master Plans	No	
Transportation Plan	Yes	The ANC has one.

Table 3. Akiak’s Staff Resources

Staff/Personnel Resources	Y/N	Department/Agency and Position
Planner or engineer with knowledge of land development and land management practices	No	The ANC and the City hire consultants with land development and land management knowledge.
Engineer or professional trained in construction practices related to buildings and/or infrastructure	No	The ANC and the City hire consultants with engineering consulting services.
Planner or engineer with an understanding of natural and/or human-caused hazards	No	Both the ANC and the City hire consultants with hazard mitigation knowledge.
Floodplain Manager	Yes	Jimmy C. Smith, State DCRA Floodplain Manager
Surveyors	No	Both the ANC and the City hire surveyors.
Staff with education or expertise to assess the jurisdiction’s vulnerability to hazards	No	
Personnel skilled in Geospatial Information System (GIS) and/or HAZUS-MH	No	
Scientists familiar with the hazards of the jurisdiction	No	U.S. Fish & Wildlife Service, Anchorage office; Alaska Department of Fish & Game, Anchorage office
Emergency Manager	Yes	City Administrator or Tribal Administrator (Situation-dependent)
Grant Writer	Yes	City Administrator or Tribal Administrator (Situation-dependent)
Land Planner	No	
Public Information Officer	Yes	City Administrator or Tribal Administrator (Situation-dependent)
Tribal Administrator	Yes	Sheila Carl
Tribal Indian General Assistance Program (IGAP) Coordinator	Yes	
City Administrator	Yes	David Gilila, Sr.

Table 4. Financial Resources for Hazard Mitigation

Financial Resource	Accessible or Eligible to Use for Mitigation Activities
General funds	The City has limited funding from the State, can exercise this authority with voter approval.
Community Development Block Grants	The City and the ANC have limited funding, can exercise this authority with voter approval.
Capital Improvement Projects Funding	No
Authority to levy taxes for specific purposes	No
Hazard Mitigation Grant Program (HMGP)	FEMA funding which is available to local communities after a Presidentially-declared disaster. It can be used to fund both pre- and post-disaster mitigation plans and projects. The ANC will be eligible once their HMP is FEMA-approved and ANC Tribal Council-adopted.
Pre-Disaster Mitigation (PDM) grant program	FEMA funding which is available on an annual basis. This grant can only be used to fund pre-disaster mitigation plans and projects only. The ANC will be eligible once their HMP is FEMA-approved and ANC Tribal Council-adopted.
Flood Mitigation Assistance (FMA) grant program	None
Bureau of Indian Affairs (BIA) Grants	The ANC receives BIA grants for roads.

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 HMP. Outreach support documents and meeting information regarding the Planning Team and public outreach efforts are provided in Appendix A.

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

DMA 2000 Requirements
1. REGULATION CHECKLIST
<p>Local Planning Process</p> <p>§201.7(b): An open public involvement process is essential to the development of an effective plan. In order to develop a more comprehensive approach to reducing the effects of natural disasters, the planning process shall include Elements A in the Plan.</p>
ELEMENT A. Planning Process
<p>A1. Does the Plan document the planning process, including how it was prepared and who was involved in the process for each jurisdiction? [Requirement §201.7(c)(1)]</p> <p>A2. Does the Plan document how the public was involved in the planning process during the drafting stage? [Requirement §201.7(c)(1)(i)]</p> <p>A3. 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 §201.7(c)(1)(ii)]</p> <p>A4. Does the Plan describe the review and incorporation of existing plans, studies, reports, and technical information? [Requirement §201.7(c)(1)(iii)]</p> <p>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? [Requirement §201.7(c)(1)(iv)]</p> <p>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 §201.7(c)(4)(i)]</p> <p>A7. Is there discussion of how the Tribe will continue public participation in the plan maintenance process? [Requirement §201.7(c)(4)(iv)]</p>
Source: FEMA, 2015.

3.1 OVERVIEW OF PLANNING PROCESS

During the 2019 planning process, the ANC developed their HMP. The Planning Team reviewed their roles in the planning process, such as: advocating community participation, creating opportunities for public participation, and gathering and organizing information. The Planning

Team identified applicable community resources and capabilities. They also discussed hazards affecting the community (Section 5).

The Planning Team asked participants to review hazards affecting the community, assess risks to residential and critical facilities, and assist the Team with reviewing and prioritizing mitigation actions.

The following five-step process took place in June and July 2019:

1. **Organize resources:** Members of the Planning Team identified information resources, such as local experts and various organizations capable of providing the technical expertise and historical information necessary for a thorough HMP.
2. **Monitor, evaluate, and update the HMP:** The Planning Team developed their implementation process to ensure compatibility with community needs and involved the population in deciding how they would assess how well the implementation process worked.
3. **Assess risks:** The Planning Team reviewed the hazards specific to the community and the associated risk assessment to include the vulnerability analysis for the ANC.
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 the mitigation strategy:** The Planning Team developed their mitigation goals and actions. Subsequently, the ANC prioritized future projects into a Mitigation Action Plan (MAP) strategy.

3.2 HAZARD MITIGATION PLANNING TEAM

Table 5 identifies the Hazard Mitigation Planning Team. Table 6 summarizes Planning Team meetings.

Table 5. Hazard Mitigation Planning Team

Name	Title	Organization	Key Input	Contact Information
Sheila Carl	Tribal Administrator	ANC	Planning Team Lead, data input, and HMP review.	akiarmiu@yahoo.com
Joel Neimeyer	Consultant	ANC	Planning Team member, data input, and HMP review.	Joel.neimeyer@gmail.com
Ivan M. Ivan	Tribal Chief	ANC		765.2071
Moses Owen	IRA Member	ANC		mowen@yupiiit.org ; 765.2087
James S. Nicolai	IRA Member	ANC		
David Gilila, Sr.	City Administrator	City of Akiak		d.gililasr@yahoo.com ; 765.7411
Robert Williams	Mayor, Tribal Transportation Director	City of Akiak, ANC		bobbywilliams08@yahoo.com
Mike Williams	IRA Member	ANC		Mwilliams19522004@yahoo.com
Sammy Jackson, II	IRA Member	Resident/Tribal Member/IRA		765.7112

		Member	
Shirley Allain	Resident/Tribal Member	ANC	
Dorothy Andrews	Resident/Tribal Member	ANC	765.7117
Jason Andrews	Resident/Tribal Member	ANC	
Ronald Andrews	Resident/Tribal Member	ANC	765.2258
Natalia Andrews	Resident	ANC	
Undecipherable	Kokarmiut Corporation	ANC	765.7919
Olga Charles	Resident/Tribal Member	ANC	
Waylon Charles	Resident	ANC	
Evan Evan	Resident/Tribal Member	ANC	
Kurt Foss	APU	APU	545.2776
Lenore Gilila	Resident/Tribal Member	ANC	765.7411
Anna L. Ivan	Resident/Tribal Member/City Council Member	City of Akiak	765.7411
Eliz Ivan	Resident/Tribal Member	ANC	lizivan@yahoo.com
Helen Ivan	Resident/Tribal Member	ANC	765.2072
Ruth Ivan	Resident/Tribal Member	ANC	765.7830
Debra M. Jackson	City Council Member, City Secretary/ Treasurer	City of Akiak	Akiarmiu.dmj81@yahoo.com
Katrina Jackson	Resident	ANC	
Sam Jackson	Kokarmiut Corporation	ANC	765.7912
Ida Jasper	Resident/Tribal Member	ANC	
John Jasper, Sr.	Kokarmiut Corporation	ANC	Jjasper07@yahoo.com ; 765.2279
Olinka Jones	City Council Member	Resident/Tribal Member/City of Akiak	Olinka.jones@yahoo.com
Frank G. Kawagley	Resident/Tribal Member	ANC	
Doraann Kozeunukoff	City Council Member	Resident/Tribal Member/City of Akiak	Dmkozeunukoff81@yahoo.com ; 765.7112
Norman Lott	Resident/Tribal Member	ANC	

Amelia Nicolai	Kokarmiut Corporation	ANC		765.7919
James Nicolai	Kokarmiut Corporation	ANC		765.2271
Elena Owen	Resident/Tribal Member	ANC		
Faith Owen	Resident/Tribal Member	ANC		765.7112
Mr. Owen	Resident/Tribal Member	ANC		
Katie Phillip	Resident/Tribal Member	ANC		545.2476
Melani Phillip	Resident/Tribal Member	ANC		765.2086
Kimberly Smith	Resident/Tribal Member	ANC		Kimberlyjay_07@hotmail.com
Jackson Williams	Kokarmiut Corporation	ANC		765.2002
Lily Williams	Resident/Tribal Member	ANC		765.2100
Robert Williams	Resident/Tribal Member/City Council Member	City of Akiak		765.2100
Theodore Williams	Resident/Tribal Member	ANC		765.7830
Judy Anderson	School Representative	Yupit School District		janderson@yupit.org
Jennifer LeMay, PE, PMP	Senior Planner	LeMay Engineering & Consulting, Inc.	HMP development, lead writer, project coordinator.	jlemay@lemayengineering.com ; 350.6061
Shannon LeMay	Intern	LeMay Engineering & Consulting, Inc.	Senior in College studying civil engineering.	350.6061

Table 6. Planning Team Meetings

Date	Type	Subject	Summation
May 18, 2019	Tri-Party Agreement	Mitigate Flood/Erosion Hazard	The ANC, City, and Kokarmiut Corporation executed a tri-party agreement to address the May 2019 flood/erosion event together as a community.
June 6, 2019	Initial Communications	HMP Development and Update Process	Team began learning the HMP planning process.
June 10, 2019	Public Meeting #1: HMP Kickoff Meeting	Community Awareness and Data Gathering	Team discussed community hazards and identified critical facilities.
June 17, 2019	Review and Outreach – Distribution of the Draft HMP for a 30-day public comment period	Hazards and Goals	Team reviewed their hazards and goals, other plans, and reviewed the Draft HMP.

July 29, 2019	Public Meeting #2: Plan Summary and Review; Public Forum to Provide Comments	Project Review & Prioritization	Team reviewed and prioritized their projects to meet their goals. Team and community provided comments.
July 30, 2019	Incorporation of Public Review Comments	Draft Plan Review	Final plan review session.

3.3 PUBLIC INVOLVEMENT PROCESS

Table 6 above summarizes the public involvement process. An invitation was extended to individuals and entities via a project newsletter describing the planning process and announcing the upcoming public meeting. Newsletter #1 was posted at the City Office, Tribal Office, U.S. Post Office, and two community stores on June 7, 2019, announcing the public meeting.

The Planning Team held a public meeting on June 10, 2019. During the meeting, Jennifer LeMay led the attending public through a hazard identification and screening exercise. The attendees developed a list of hazards which have the potential to impact the community: flood/erosion, severe weather, changes in the cryosphere, earthquake, and wildland/conflagration fire.

LeMay Engineering & Consulting, Inc. described the specific information needed from the Planning Team and public to complete the risk assessment, including the locations and values of critical facilities in the community. After the community asset data was collected by the Planning Team, a risk assessment was completed that illustrated the assets that were exposed and vulnerable to specific hazards. Mitigation actions were also developed and prioritized.

Jennifer LeMay of LeMay Engineering, Inc. has been developing/updating HMPs for the State of Alaska DHS&EM since 2015 and has worked in nearly 50 communities. She noted that the public turnout of 39 people at the June 10, 2019 meeting in Akiak with three days' notice was absolutely incredible and unprecedented in her experience. The Akiak community is passionately concerned about the effects of natural hazards that are being felt and observed within their community.

Additionally, the City of Akiak had a FEMA-approved HMP that expired in 2018. When the Akiak community contacted the State of Alaska DHS&EM to update their HMP, they were told that funding would not be available for approximately 18 months. Instead of waiting for government assistance, the community decided to self-fund a consultant to develop their HMP in June 2019. Again, this is unprecedented in Jennifer LeMay, PE, PMP's professional 23 years' experience working in rural Alaska.

During the June 10, 2019 meeting, the community unanimously recognized that the \$80 million dollar cost estimate developed by the Natural Resources Conservation Services (NRCS), an agency of the U.S. Department of Agriculture (see Section 5.3.3.2 for details of their study and subsequent cost estimate) has a benefit cost ratio (see Appendix D) for the proposed revetment project is not favorable, and therefore, it is highly unlikely that Congress or the State of Alaska will appropriate funding of this magnitude. Therefore, the ANC accepted that their most viable solution to the flooding and erosion threats to their community is an organized and planned retreat (see resolution in Appendix A) away from the riverbank. Their community goal is to develop a new housing subdivision behind the existing school and airport (see Section 6.7.2).

Another newsletter was developed and posted at the City Office, Tribal Office, U.S. Post Office, and two community stores on June 17, 2019, announcing the availability of the Draft HMP and beginning the 30-day public comment period. This newsletter was also posted on DCRA’s webpage inviting public comment.

On July 23, 2019, representatives from the ANC, the City of Akiak, and Kokarmiut Corporation, and LeMay Engineering & Consulting, Inc. met with leadership from several federal and state agencies to brief the agencies on the atypical erosion caused by the recent high water/spring melt May 18/19, 2019 event in which 50 to 75 feet of riverbank were claimed along 1,200 feet of river front with seven homeowners now in peril. Agencies provided thoughts on how they may be able to assist Akiak (see Appendix A).

On July 29, 2019, the Akiak Planning Team held another public meeting and received input on the Draft HMP. Jennifer LeMay provided a summary of the Draft HMP in a PowerPoint® presentation and led the attending public through the mitigation actions. The Planning Team and public were very helpful in finetuning the mitigation actions and providing comments on the Draft HMP so that the HMP best fit the needs of their community. Public comments were incorporated into the Draft HMP as applicable.

3.4 INCORPORATION OF EXISTING PLANS

During the planning process, the Planning Team reviewed and incorporated information from existing plans into this HMP. Table 7 summarizes existing plans that were used. Section 8 provides a complete list of references.

Table 7. Incorporated Planning Documents

Existing Plans, Studies, Reports & Ordinances	Contents Summary
National Resources Conservation Service (NRCS), <i>EWP Visit</i> , June 24, 2019.	The data developed during the May 2019 site visit show that the closest home to the top of the bank is approximately 50 linear feet, and that there are five homes that are within approximately 100 feet of the top of the bank. A high-water event could easily erode 50 feet of land in a single day. The current trend appears to be towards more erosion at this location. NRCS will continue to work with the community to define the scope of a potential EWP project.
Alaska Native Tribal Health Consortium, <i>Akiak Water & Sewer Service Preliminary Engineering Report</i> , June 2018.	ANTHC completed a Preliminary Engineering Report (PER) that analyzed four separate alternatives for serving the six HUD homes and eight lots (the beginning of the proposed subdivision).
State of Alaska, <i>DCCED/DCRA Community Profile</i> , 2019	This website provided historical and demographic information.
State of Alaska DHS&EM <i>HMP</i> , October 2018	This HMP defined statewide hazards and potential risks.

State of Alaska DHS&EM <i>Disaster Cost Index</i> , June 2018	The cost index identified State Disaster Declarations.
Denali Commission, <i>Draft Statewide Threat Assessment</i> , 2018	This assessment identified Akiak as one of the Alaskan communities most vulnerable to infrastructure impacts associated with flood/erosion and flooding.
NRCS, <i>An Assessment of Streambank Erosion and a Revetment Concept Design on the Kuskokwim River at Akiak, Alaska</i> , April 2013	<p>This report identified some of the major morphologic responses that were easily identified in aerial photos of the Kuskokwim River, between Akiak and Kwethluk, and briefly discussed how these responses were likely related to the erosion issue at Akiak.</p> <p>The NRCS developed a concept design that could be developed into a final design capable of stabilizing the eroding streambank. The rough estimate of a cost for this project is \$80M in current dollars. It is possible that, instead of a revetment, a river training technique could be utilized, and this approach might reduce the project cost. However, whether via rock revetment or river training, stabilizing the streambank at Akiak, for any significant period of time, is going to be a construction project of considerable scope and cost.</p>
<i>City of Akiak Hazard Mitigation Plan</i> , 2013	This plan addressed Akiak’s vulnerability to potential hazards, summarized risk, and developed mitigation actions to implement as a preventative measure.
United States Army Corps of Engineers (USACE) Alaska <i>Community Erosion Assessment: Akiak, Alaska</i> , January 27, 2009	Akiak has an erosion problem that will affect the community over the next 50 years. The community has the potential to have over \$18 million in damages.

3.5 PLAN MAINTENANCE

This subsection describes a formal HMP maintenance process ensuring the HMP remains an active and applicable document. It explains the Planning Team’s coordination of efforts, ensuring an efficient improvement and revision process.

The following three process steps are addressed:

1. Implement mitigation actions through existing planning mechanisms.
2. Continue public involvement.
3. Monitor, review, evaluate, and update the HMP.

3.5.1 Incorporating Existing Planning Mechanisms

The Planning Team will incorporate planning mechanisms into their HMP by undertaking the following activities:

- Review their community-specific regulatory tools to facilitate mitigation strategy integration as defined in the capability assessment section (Section 2.4).

- Involve local organizations when researching information.
- Incorporate HMP actions into relevant planning mechanisms.
- Update or amend existing planning mechanisms as necessary.
- Implement HMP goals and actions. This may require updating or amending specific planning mechanisms.

Planners are encouraged to integrate components of this HMP into their own plans.

3.5.2 Continued Public Involvement

The ANC is dedicated to involving the public directly in the continual reshaping and updating of the HMP. A paper copy of the HMP and any proposed changes will be available at the ANC Tribal Office. This HMP will also be stored on DCCED/DCRA’s plans website under Akiak for public reference.

The Planning Team will continue to raise community awareness about the HMP and the hazards that have the potential to affect Akiak. Each year in Akiak, there is a community gathering in July and a community Christmas party in December. The ANC will jointly use these opportunities to remind the community about the potential natural hazards that could affect Akiak as well as to provide an annual opportunity for residents to comment on their concerns. See Appendix E for a community survey. Any public comments or completed community surveys received regarding the HMP will be collected by the Tribal Administrator, included in the annual report, and considered during future HMP updates.

Through community outreach activities, the Planning Team will continue to raise awareness about its HMP. Outreach activities could include attendance and provision of materials at Tribal-sponsored events, outreach programs, and public mailings.

3.5.3 Monitoring, Reviewing, Evaluating, and Updating the HMP

This subsection addresses activities ensuring improvements and revisions occur in an efficient and coordinated manner. The following three activities form the process:

1. Update the HMP to reflect revisions to goals, actions, and priorities.
2. Submit a HMP Update at the end of the five-year life cycle for State- and FEMA-approval.
3. Continue implementing mitigation initiatives.

3.5.3.1 *Monitoring the HMP*

This HMP was prepared as a collaborative effort. To maintain momentum and build upon hazard mitigation planning efforts, the Planning Team will continue their involvement in monitoring, evaluating, and updating the HMP. Each authority identified in the MAP (Section 7.4) will be responsible for implementing the MAP strategy. The Tribal Administrator will serve as the primary point of contact and will coordinate local efforts to monitor, evaluate, and revise the HMP.

3.5.3.2 Reviewing the HMP

The ANC Tribal Administrator will review the success for achieving the HMP’s mitigation goals and implementing the MAP strategy’s projects during the annual review process.

During each annual review, each agency or authority administering a mitigation project will submit a progress report (Appendix E) to the Planning Team. The report will include the current status of the mitigation project, including any project changes, impediments (including strategies to overcome them), and a comparison of the project to the corresponding goal identified in the HMP.

3.5.3.3 Evaluating the HMP

The ANC Tribal Administrator will initiate the annual review two months prior to the planning meeting date. The findings from the review will be presented at the annual Planning Team meeting. Each review, as shown on the annual review worksheet in Appendix E, will include an evaluation of the following:

- Efforts to involve local authorities, outside agencies, stakeholders, and residents.
- Changes in risk for each identified and newly considered all-natural hazards.
- Impact upon land development activities and related programs.
- MAP Strategy implementation progress.
- HMP local resource implementation for HMP identified activities.

3.5.3.4 Updating the HMP

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

DMA 2000 Requirements
Reviewing, Evaluating, and Implementing the Plan §201.7(d)(3): A local jurisdiction must review and revise its plan to reflect changes in development, progress in local mitigation efforts, and changes in priorities, and resubmit the updated plan for approval within five years in order to continue to be eligible for mitigation project grant funding.
ELEMENT D. Planning Process
D1. Was the Plan revised to reflect changes in development? [Requirement §201.7(d)(3)] D2. Was the Plan revised to reflect progress in local mitigation effort? [Requirement §201.7(c)(4)(iii)] D3. Was the Plan revised to reflect changes in priorities? [Requirement §201.7(d)(3)]
Source: FEMA, 2015.

The ANC Tribal Council will review the HMP annually per Section 3.5.3 and update the HMP every five years, or when changes to hazards, actions, or priorities are made. The Planning Team will solicit community involvement through the distribution of community surveys. The

annual surveys (Appendix E) document the Community's insights into potential changes to hazards, actions, and resource allocations.

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

- Request grant assistance from FEMA to update the HMP (it can take up to one year to obtain and one year to update the HMP).
- Require each authority administering a mitigation project to submit a comprehensive progress report to the Planning Team.
- Develop a chart to identify those HMP sections needing improvement.
- Determine the current status of the mitigation actions (projects) in progress.
- Identify completed, deleted, or delayed projects. For statuses other than "completed", include a reason for the designation.
- Document changes to priorities.
- Assess the impact of completed projects.
- Identify any barriers preventing the implementation of mitigation projects such as financial, legal, or political restrictions, and develop strategies to overcome them.
 - Thoroughly analyze and update risks to natural hazards.
 - Prepare a "new" MAP Strategy for the Akiak community.
- Prepare a draft of the updated HMP.
- Submit the updated draft HMP to FEMA for review and approval.

3.5.3.5 Formal State and FEMA HMP Review

Completed HMPs do not qualify the ANC for mitigation grant program eligibility until they have been reviewed and adopted by the ANC Tribal Council, and received final FEMA-approval.

The ANC will submit the Draft HMP to FEMA for their review and conditional approval. Conditional approval is granted prior to passage of the ANC HMP Adoption Resolution. Upon receipt of the Adoption Resolution, FEMA will grant final approval and return the approved HMP Update to the ANC (Appendix F).

4.0 Plan Adoption

4.1 ADOPTION BY LOCAL GOVERNING BODIES AND SUPPORTING DOCUMENTATION

The DMA 2000 requirements for the adoption of this HMP by the local governing bodies are described below.

DMA 2000 Requirements
<p>Tribal Plan Adoptions</p> <p>§201.7(c)(5 and 6): [The plan shall include...] Documentation that the plan has been formally adopted by the governing body of the jurisdiction requesting approval of the plan (e.g., Tribal Council). For multi-jurisdictional plans, each jurisdiction requesting approval of the plan must document that it has been formally adopted.</p>
1. REGULATION CHECKLIST
ELEMENT E. Plan Adoption
<p>E1. Does the Plan include documentation that the plan has been formally adopted by the governing body of the jurisdiction requesting approval?</p> <p>E2. For multi-jurisdictional Plans, has each jurisdiction requesting approval of the plan documented formal plan adoption?</p> <p>E3. 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?</p>
Source: FEMA, 2015.

The ANC [Indian Restoration Act (IRA) Council] is represented in this HMP that meets the requirements in Section 322 of DMA 2000 and Section 44 CFR §201.7. There are 542 tribal members enrolled in the ANC as of June 10, 2019. The ANC will comply with all applicable Federal statutes and regulations in effect with respect to the periods for which it receives grant funding, in compliance with 44 CFR 13.11(c), 2 CFR Parts 200 and 3002, and will amend this HMP whenever necessary to reflect changes in Tribal or Federal laws and statutes as required in 44 CFR 13.11(d). The ANC IRA Tribal Council adopted this HMP on _____, 2019. A scanned copy of Akiak’s formal adoption and FEMA’s pending and final approval letters are included in Appendix F.

5.0 Hazard Profiles

This section identifies and profiles the hazards with the potential to impact the community of Akiak.

5.1 OVERVIEW OF A HAZARD ANALYSIS

A hazard analysis includes the identification, screening, and profiling of each hazard. Hazard identification is the process of recognizing the natural events threatening a populated area. A natural phenomenon, such as a volcanic eruption, must have an element of human involvement to be deemed a natural hazard. Human, Economic, Technological, and Terrorism-related hazards are beyond the scope of this HMP. All-natural hazards potentially impacting Akiak are considered, and those that are determined to be unlikely to occur or where the risk of damage is very low, are eliminated from consideration.

Hazard profiling is the act of describing hazards in terms of their characteristics, history, breadth, magnitude, frequency, location, extent, impact, and recurrence probability. Hazards are identified through historical and anecdotal information, and reviews of existing plans and studies. Hazards are mapped to determine their geographic extent and define their boundaries.

5.2 HAZARD IDENTIFICATION AND SCREENING

The DMA 2000 requirements for hazard identification are described below.

DMA 2000 Requirements
Identifying Hazards §201.7(c)(2)(i): The risk assessment shall include a] description of the type, location and extent of all-natural hazards that can affect the jurisdictions. The Plan shall include information on previous occurrences of hazard events and on the recurrence probability of future hazard events for each jurisdiction. §201.7(c)(2)(ii): 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 and planning area?
1. REGULATION CHECKLIST
ELEMENT B. HAZARD IDENTIFICATION AND RISK ASSESSMENT
B1. Does the Plan include a description of the type, location, and extent of all-natural hazards that can affect each jurisdiction? B2. Does the Plan include information on previous occurrences of hazard events and on the probability of future hazard events for each jurisdiction? B3. Is there a description of each identified hazard’s impact on the community as well as an overall summary of the community’s vulnerability for each jurisdiction?
Source: FEMA, 2015.

During the June 10, 2019 public meeting, the Planning Team evaluated hazards for the Yupiit Rural Education Attendance Area (REAA) contained in the 2018 State of Alaska HMP. All

hazards were considered, even if any particular one had not occurred within the past five years. The Planning Team evaluated hazards based on a range of factors, including their prior history, relative risk, mitigation potential, and availability of information. Table 8 contains hazards that were screened for this 2019 HMP.

Table 8. Identification and Screening of Hazards

Hazard Type	Should It Be Profiled?	Explanation
Flood/Erosion	Yes	Akiak has historically experienced riverbank destabilization in which the Kuskokwim River claims between five and ten feet per year. Typically, most erosion occurs with fall storms with some modest erosion due to spring melt/high river levels. However, there are years in which the river claims more riverbank – most notably in 2013 when a fall storm caused high waves that crashed on the silty sand riverbank and eroded up to 50 feet. That changed on May 17, 2019, when in a couple of hours, the river claimed up to 40 feet, and then over the next week, a total of 75 feet was claimed in some areas. The community now knows that it is threatened with significant riverbank destabilization both in May with spring melt and in September/October with fall storms.
Severe Weather	Yes	Severe cold, intense wind, and heavy rain are the primary weather impacts to the community. Severe cold events cause fuel price increases and frozen pipe damages. Heavy snow loads potentially damage house roofs. Winds potentially remove or damage roofs and move houses off their foundations.
Changes in the Cryosphere	Yes	Akiak experiences storm surge and riverine ice run-up. There is no permafrost in Akiak.
Tsunami & Seiche	No	This hazard does not exist for this community per the 2018 State of Alaska HMP.
Earthquake	Yes	Periodic, unpredictable occurrences. Akiak experienced no damage from the 11/2003 Denali earthquake, and experienced no damage throughout the area from the 1964 Good Friday Earthquake.
Ground Failure (Avalanche, Landslide/Debris Flow, Subsidence)	No	This hazard does not exist for Akiak.
Volcano	No	This hazard does not exist for this community per the 2018 State of Alaska HMP.
Wildland/Urban Interface Fire/Conflagration Fire	Yes	Akiak and the surrounding areas become very dry in summer months with weather and human-caused incidents igniting dry vegetation (i.e., lightning and trash burning).

5.3 HAZARD PROFILE

The Planning Team reviewed their local hazards using the following criteria:

- Characteristics (Type);
- History (Previous Occurrences);
- Location;
- Extent (to include breadth, magnitude, and severity);
- Impact (Section 5 provides general impacts associated with each hazard. Section 6 provides detailed impacts and a vulnerability summary of potential hazards to Akiak's residents and critical facilities); and
- Recurrence probability.

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

5.3.1 Cryosphere

5.3.1.1 Hazard Characteristics

The “cryosphere” is defined as those portions of Earth’s surface and subsurface where water is in solid form, including seas, lakes, and river ice, snow cover, glaciers, ice caps and ice sheets, and frozen ground (e.g., permafrost) (Figure 4). The components of the cryosphere play an important role in climate. Snow and ice reflect heat from the sun, helping to regulate the Earth’s temperature. They also hold Earth’s important water resources, and therefore, regulate sea and marine levels and water availability in the spring and summer. The cryosphere is one of the first places where scientists are able to identify global climate change.

Related hazards to the cryosphere include flood/erosion which also affect the Akiak community.

Hazards of the cryosphere can be subdivided into four major groups:

- Glaciers;
- Permafrost and periglacial features;
- Sea ice; and
- Snow avalanche.

Of these four major groups, none applies to the Akiak community (Figure 5).

5.3.1.2 Climate Factors

Climate has a major effect on cryosphere hazards because these hazards are so closely linked to snow and ice. Changes in climate can modify natural processes and increase the magnitude and recurrence frequency of certain geologic hazards (e.g., floods, erosion, which if not properly addressed, could have a damaging effect on Alaska’s communities and infrastructure, as well as on the livelihoods and lifestyles of Alaskans.

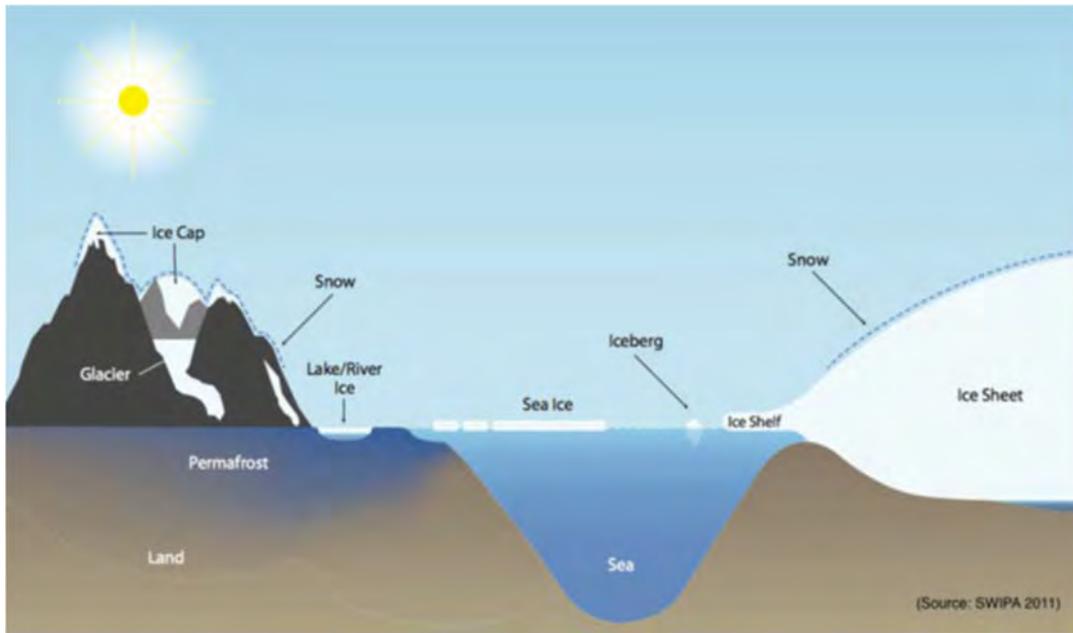


Figure 4. Cryosphere Components Diagram

Source: DHS&EM, 2018a

During the last several decades, Alaska has warmed twice as fast as the rest of the U.S. The major climatic factor leading to warming is an increase in air temperature. Another important factor is the potential increase in snow depth predicted by the majority of climate models. Even in non-ice-rich soils, process-driven models show more material is available for erosion and transport when the soil is thawed, which leads to increased exposure of underlying or adjacent frozen material to thermal and physical stressors.

5.3.1.3 Cryosphere Hazard History

There is no written record defining changes in the cryosphere in Akiak. Because Akiak is threatened during spring melt/high river level and fall storms/high waves caused by strong southerly winds, the DHS&EM Disaster Cost Index (DHS&EM, 2018b) is included as a historical index of historical flood/erosion events affecting Akiak. The nature of these storms has progressively gotten more intense, causing more damage to the community. The index lists the following events:

“94. Spring Floods, FEMA declared (DR-0832) on June 10, 1989: *Presidential Declaration of Major Disaster, incorporated sixteen local declarations and applied to all communities on Yukon, Kuskokwim, and Kobuk rivers and their tributaries. Provided public and individual assistance to repair damage.*

176. Yukon Kuskokwim Delta: *On June 5, 1995, the Governor declared a condition of disaster emergency in the Cities of Akiak, Kwethluk, Napaskiak, Emmonak, and Alakanuk, as a result of inundation. As a result of this disaster, roads, boardwalks, and other public works essential to vital community services were damaged.”*

06-218 2006 Spring Floods (AK-06-218) declared June 27, 2006 by Governor Murkowski, then FEMA declared (DR-1657) on August 04, 2006: *Beginning May 5, 2006 and continuing through May 30, 2006, the National Weather Service (NWS) issued flooding warnings and watches across the state as excessive*

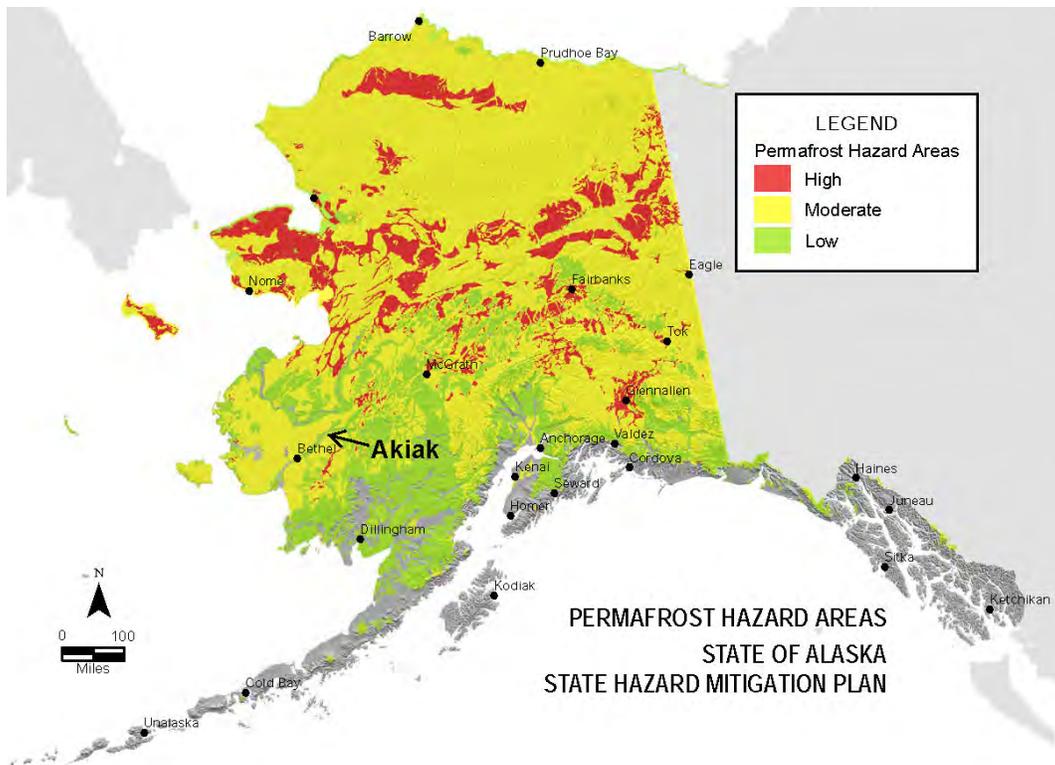


Figure 5. Permafrost Hazard Areas Distribution Map

Source: DHS&EM, 2018a

snowmelt and ice jams caused flooding along the Yukon, Kuskokwim, and Koyukuk river drainages. The most serious impacts were reported in the communities of Hughes, Koyukuk, Kwethluk, Alakanuk, and Emmonak, along with substantial damage to State-maintained airports, roads, and highways. In each community, large portions of the village, city infrastructure, and several roads were inundated and eroded by the floodwaters. Total eligible state damages (item V.C. Remaining Costs, \$6,704,370) less ineligible repairs for Federal-Aid roads (\$469,600), less IA funds (\$485,000), less ERFO road costs (\$240,500) still leaves approximately \$5,509,270 that may be eligible under FEMA’s Public Assistance program.”

09-227. 2009 Spring Flood declared by Governor Palin on May 6, 2009, then FEMA declared under DR-1843 on June 11, 2009: Extensive widespread flooding due to snow melt and destructive river ice jams caused by rapid spring warming combined with excessive snow pack and river ice thickness beginning April 28, 2009 and continuing. The ice jams and resultant water backup along with flood waters from snow melt left a path of destruction along 3,000 miles of interior rivers, destroying the Native Village of Eagle and forcing the evacuation of multiple communities. The following jurisdictions and communities in Alaska have been impacted: Alaska Gateway REAA including the City of Eagle and Village of Eagle; the Copper River REAA including the Village Community of Chisotchina; the Matanuska-Susitna Borough; the Yukon Flats REAA including the City Community of Circle, and City of Fort Yukon, the Village Communities of Chalkyistik, Beaver, Stevens Village, and Rampart; the Yukon-Koyukuk REAA including the Cities of Tanana, Ruby, Galena, Koyukuk, Nulato, and Kaltag; the Iditarod Area REAA including the Cities of McGrath, Grayling, Anvik, and Holy Cross; the Northwest Arctic Borough including the Cities of Kobuk and Buckland; the Lower Yukon REAA including the Cities of Russian Mission, Marshall, Saint Mary’s, Mountain Village, Emmonak, Alakanuk and Pilot Station and the Community of Ohogamiut; the Lower

Kuskokwim REAA including the Cities of Bethel, Kwethluk, Napakiak, Napaskiak, and the Village Community of Oscarville; the Yupiit REAA including the City of Akiak, and the Villages of Akiachak, and Tuluksak; the Kuspuk REAA including the Cities of Aniak, Upper Kalskag, Lower Kalskag, and the Village Communities of Stony River, Sleetmute, Red Devil, Crooked Creek, and Napaimute; the Fairbanks North Star Borough including the City of North Pole and Community of Salcha; the Bering Strait REAA including the City of Nome area.”

12-241 2012 October Kuskokwim Delta Flood declared by Governor Parnell on November 26,

2012: On October 5, 2012, a strong Fall storm moved north into the Bering Sea and produced severe winds, heavy rain, and storm surges up to 4 feet above mean tide levels in the Kuskokwim Delta, with severe impact to the Native Village of Napaskiak. The impact of the storm resulted in floodwaters surrounding the tribal-owned maintenance garage undermining and shifting the building and foundation; damage to the driveway ramp to the maintenance yard; and substantial damage to community boardwalks.

13-S-244 2013 November Storm Disaster declared by Governor Parnell on November 16, 2013, then FEMA declared January 23, 2014 (DR-4162):

On November 5, 2013, the NWS issued the first of several coastal flood and winter storm warnings ranging from the central Aleutians to and including the western coastline of Alaska from Bristol Bay to the North Slope. In their published message, the NWS warned of a very strong low-pressure system south of Shemya, moving to the central Bering and Chukchi Seas bringing a combination of gale, high surf, high wind, freezing spray, coastal flooding and sea surge warnings and watches. The west coast was impacted with hurricane force winds exceeding 85 miles per hour (mph), high tidal ranges, and strong sea surges. The resultant impact culminated in damage to public facilities including roads, seawalls, bridges, airports, and public buildings; damage to electrical distribution systems and drinking water systems; damages to private residences and the losses of personal and real property; and coastal flooding and power outages which necessitated evacuation and sheltering operations. Overall, the series of storms created a threat to life and property in 23 cities and villages in the Bering Strait REAA, Lower Yukon REAA, and Lower Kuskokwim REAA, and the Fairbanks North Star Borough.

Other historical information included:

An article from USA Today dated December 3, 2005, described the community’s erosion threat:

Like most of Alaska's riverside villages, Akiak is literally losing ground. The Kuskokwim River, fueled by storms and swift water during the spring breakup, claims five to 20 feet of riverbank a year. "We've been concerned for ages," Akiak elder Andrew Jasper said. Jetties installed more than 20 years ago have long since failed and federal engineers once estimated that full-scale erosion control would cost more than \$1 million.

Villagers in the Yupik Eskimo village, population 350, don't need government studies to document erosion's toll: Their gauge is an orange Dodge pickup that broke down sometime in 1965 and today dangles over the 8-foot bank. "I'm told there used to be 200 feet of bank between that truck and river," said Andrew Oxford, a soil and water conservation scientist with the Department of Agriculture's NRCS" (City, 2013).

An article from KYUK Public Media for Alaska’s Y-K Delta by Greg Kim dated May 22, 2019, describes the community’s current erosion threat:

People in Akiak woke up on Monday to find their smokehouses in the Kuskokwim River. Massive

erosion along the riverbank had eaten those structures that morning. “We lost anywhere from 75 to 100 feet of bank,” said Akiak City Administrator David Gilila. “That’s just in one day; that’s just in a matter of hours.” Gilila said Akiak has seen erosion problems before but nothing like this. “There’s no comparison to it. Before, it was just certain spots. Today, it’s the whole bank from the upper end of Akiak to the lower end of it,” said Gilila. That’s about a mile.

Smokehouses were the first to go, but people’s homes are in danger, too. Gilila said that one home is now only 10 to 15 feet from the riverbank, and another is within 75 feet. “We got about three houses in imminent danger, and the rest of them will be coming along pretty quickly,” Gilila said. “Yeah, if we don’t stop the erosion, we’re going to have to move two, three, four houses.” Gilila says that the immediate plan is to stabilize the riverbank by using metal poles to secure a tarp over it to try to hold it together.

The City is in communication with the state’s emergency response organization to get funds and technical expertise in managing erosion. “Hopefully they’ll come and advise us on how to stabilize the erosion down there,” Gilila said. If the erosion continues, Gilila said, Akiak may be surrounded by water. “We’ll still be here, but we’ll probably become an island,” Gilila said. “Because we got a slough just behind Akiak that’s not too far from being reached by the erosion, and when that happens, if that happens, Akiak will become an island.” Whatever happens, Gilila said, the cost of relocating an entire village would be so high that Akiak has no choice but to stay where it is.

Another article from KYUK Public Media for Alaska’s Y-K Delta by Greg Kim dated June 3, 2019, further describes the community’s erosion threat:

Akiak, a community of about 350 people on the river’s west bank northeast of Bethel, lost a one-mile stretch of riverbank to erosion in May, with parts of the river moving 75 feet closer to the community and putting one house within 15 feet of the river. “Moving houses and connecting them to services like water, sewer, and roads will cost millions of dollars,” said City Administrator David Gilila. “I can’t fathom even to estimate the dollar figure,” Gilila said. “A seawall could cost \$80 million. For now,” Gilila said, “the community is stabilizing the riverbank with metal poles and burlap tarps” (KYUK, 2019a).

5.3.1.4 Location, Extent, Impact, and Recurrence Probability

Location

Cryosphere hazards can impact any place in Alaska where water occurs seasonally or permanently in solid form, including snow cover and high river levels in Akiak. The elevation of the land in Akiak lies approximately 22 feet above sea level. All existing foundations, gravel pads, and pilings will experience disruption.

According to a permafrost map completed by the Institute of Northern Engineering, University of Alaska Fairbanks located in the 2018 State of Alaska HMP and comments received from the Planning Team, the Akiak area does not have permafrost (Figure 6).

Permafrost Characteristics of Alaska

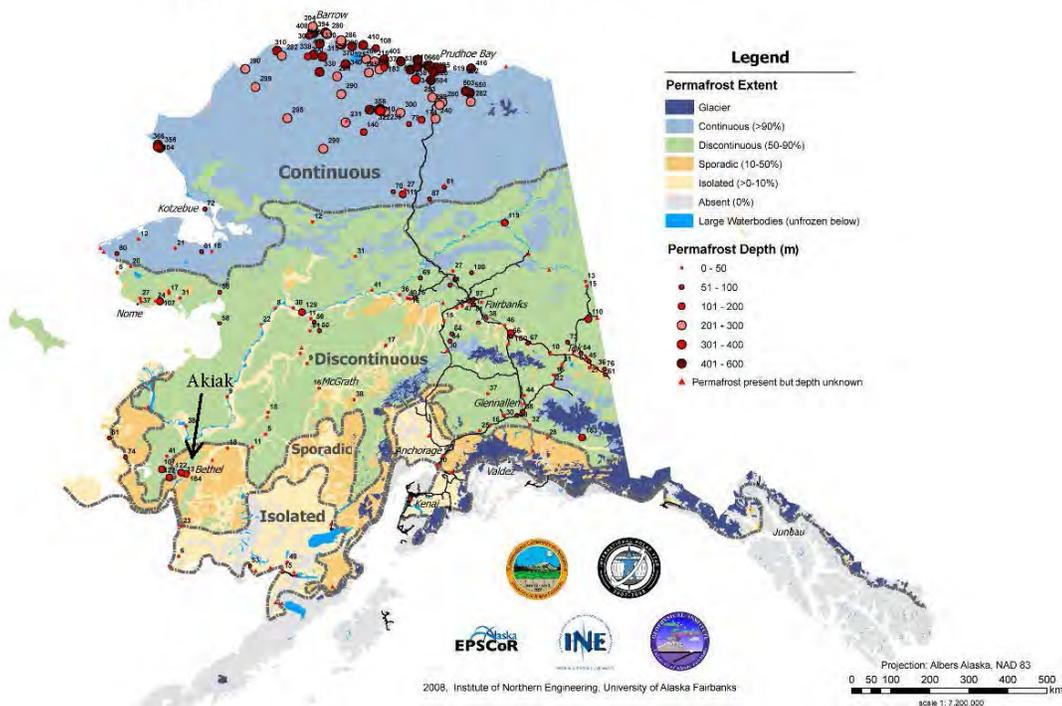


Figure 6. Permafrost Map of Alaska

Source: DHS&EM, 2013

Extent

The Kuskokwim River's erosion has occurred in the last 50 years, and the original village is now in the middle of the river. "We need immediate relief to prevent more properties lost and to save our present community" said [then current City Administrator and now Tribal Chief in 2019] Ivan M. Ivan. "We have witnessed this continuous erosion over my short lifetime. The USACE predictions on our historical shorelines have reached the 2017 baseline erosion line. So, the eroding of our shorelines is faster than the predications..." (USACE, 2009).

According to the 2018 Draft *Statewide Threat Assessment* (Denali Commission, 2018), Akiak is one of the Alaskan communities most vulnerable to infrastructure impacts associated with erosion and flooding. Furthermore, an increased incidence of flood events has been observed in the Akiak area. When combined, these discrete hazards can accelerate the rate of harmful environmental trends.

As fall/winter storms break up the ice in the Kuskokwim River, and the ice is pushed inland into the community, jeopardizing foundations and infrastructure. Akiak has historically been experiencing riverbank destabilization in which the Kuskokwim River claims between five and ten feet per year. However, there are years in which the river claims more riverbank – most notably in 2013, when a fall storm caused high waves that crashed on the silty sand riverbank and eroded up to 50 feet. On May 17, 2019, within a few hours, the Kuskokwim River claimed up to 40 feet, and then over the next week, a total of 75 feet was claimed in some areas. The

community knows that it is threatened with significant riverbank destabilization both in May with spring melt and in September/October with fall storms. As a community, they feel the urgency to respond to this new development. One home is imminently in peril, and five more are very close to the river.

Impact

Presently, seven homes must be moved from the river's edge, and it is anticipated that within five years or less, more homes and infrastructure will need to be relocated. At least one home must be moved this year before the fall storm season as it is within 25 feet of the river. Six of the seven homes are structurally sound to move. One home is not capable of being moved.

An understanding of river-wide morphology changes is essential to answering the question of where the Kuskokwim River will stop. In other words, how far does the community of Akiak need to retreat from the river?

Recurrence Probability

Akiak residents are noting that changes to the cryosphere are worsening every year. Given the recent river changes in May 2019, significant annual loss of riverbank during high water events and fall storms is expected. The community has agreed that its most viable solution to the changes in the cryosphere is an organized and planned retreat from the Kuskokwim River.

5.3.2 Earthquake

5.3.2.1 Characteristics

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 epicenter. Earthquakes usually occur without warning, and after only a few seconds, can cause massive damage and extensive casualties. The immediately perceived effect of earthquakes is ground motion.

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 seismic waves travelling through the earth's interior and surface waves along the earth's surface. There are two basic types of seismic waves: body waves and surface waves: The first jolt felt during an earthquake is the push-pull body wave, or P (primary) wave. P waves are compression waves moving through the earth. The second wave felt is another type of body wave, called an S (secondary) wave. S waves, also known as shear waves, are slower than P waves and are similar in character to sound waves. The rolling motion felt along the surface is an R or Raleigh wave. R waves move continuously forward, although the individual particles move in an elliptical path, similar to water waves. L (Love) waves, like R waves, are continuously forward travelling surface waves, but the individual particles move side to side, perpendicular to the direction of travel. Surface waves are responsible for much of the ground motion experienced during an earthquake.

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

- **Surface Faulting** is the differential ground movement of a fault at the earth's surface.

Displacement along faults varies but may be significant (e.g., over 20 ft), as may the length of the surface rupture (e.g., over 200 miles). Surface faulting may severely damage linear structures.

- **Liquefaction** occurs when seismic waves pass through saturated granular soil, distorting its granular structure, and causing the empty spaces between granules to collapse. The increase in pore water pressure will cause the soil to behave like a fluid and deform. There are three telltale signs indicating liquefaction has taken place:
 1. Lateral spread, horizontal movements commonly 10 to 15 ft, possibly reaching over 100 ft in length.
 2. Debris flows, massive flows of soil, typically hundreds of ft, possibly reaching over 12 miles in length.
 3. Loss of bearing strength, soil deformations causing structures to settle or tip.
- **Landslides** occur as a result of horizontal seismic inertia forces induced by ground shaking. The most common earthquake-induced landslides are rock falls, rockslides, and soil slides.

The severity of an earthquake is expressed in terms of intensity and magnitude. Intensity is determined from the effects on people and their environment. It varies depending upon the location with respect to the earthquake epicenter, which is the point on the earth’s surface that is directly above the spot, (Focus), where the earthquake occurred. The intensity generally increases with the amount of energy released and decreases with distance from the epicenter. The scale most often used in the U.S. to measure intensity is the Modified Mercalli Intensity (MMI) Scale. As shown in Table 9, the MMI Scale consists of 12 increasing levels of intensity that range from imperceptible to catastrophic destruction. Peak ground acceleration (PGA) is also used to measure earthquake intensity by quantifying how hard the earth shakes in a given location. PGA can be measured as acceleration due to gravity (g) (MMI, 2012).

Magnitude (M) is the measure of the earthquake’s strength. It is related to the amount of seismic energy released at the earthquake’s hypocenter; the actual location of the energy released inside the earth. It is based on the amplitude of the earthquake waves recorded on instruments, known as the Richter magnitude test scales, which have a common calibration (see Table 9).

Table 9. Magnitude/Intensity/Ground-Shaking Comparisons

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

	X		
7.3 – 8.9	XI	124 +	Extreme
	XII		

5.3.2.2 History

The Planning Team determined that Akiak has a minimal concern for earthquake damages as they have not experienced damaging effects from their historical earthquake events and only needed to be concerned with earthquakes with a magnitude > M 5.0. Table 10 lists historical earthquakes from 1973 to the present, none of which exceeded a M of 5.0 within 100 miles of the community (USGS, 2019).

Table 10. Historical Earthquakes of Akiak

Date	Latitude	Longitude	Depth	Magnitude	Place
3/8/2019	60.8198	-160.803	1	1.5	51 km E of Bethel, Alaska
11/25/2018	61.0929	-160.288	4.1	1.3	86 km ENE of Bethel, Alaska
7/26/2018	60.3307	-160.624	8.5	1.3	80 km SE of Bethel, Alaska
3/16/2018	61.1117	-160.299	0.6	1.4	86 km ENE of Bethel, Alaska
12/13/2018	61.0413	-160.082	6.6	2.2	94 km ENE of Bethel, Alaska
9/7/2017	61.3187	-160.323	12.5	1	97 km NE of Bethel, Alaska
9/7/2017	61.3013	-160.321	10.2	1.1	96 km NE of Bethel, Alaska
8/22/2017	61.0396	-160.222	19.4	1	87 km ENE of Bethel, Alaska
7/22/2017	61.0956	-160.269	19.1	1.1	87 km ENE of Bethel, Alaska
12/24/2013	61.2898	-160.113	7.9	2.3	102 km S of Holy Cross, Alaska
3/11/2013	60.3679	-162.184	22.6	3.4	52 km SSW of Bethel, Alaska
2/23/2013	60.3821	-162.173	10	4.4	61 km SW of Bethel, Alaska
6/11/2010	61.0371	-160.863	27.8	3.5	Southern Alaska

Note: 102 kilometers is approximately 63 miles.

Only 13 earthquakes have been recorded within a 100-mile radius of Akiak since 1973. The average magnitude of these earthquakes is M 1.96. The largest recorded earthquake measured a M of 4.4, occurring on February 23, 2013. This earthquake did not cause any damage to critical facilities, residences, non-residential buildings, or infrastructure.

Planning Team members stated that Akiak experienced moderate to severe ground shaking from the November 3, 2002 M 7.9 Denali Earthquake, located approximately 220 miles away. No significant damage occurred from this event. However, North America's strongest recorded earthquake occurred on March 27, 1964 in Prince William Sound, measuring M 9.2, and was felt by many residents throughout Alaska. Akiak felt ground motion resulting from this historic event; however, no local damage occurred.

5.3.2.3 Location, Extent, Impact, and Recurrence Probability

Location

Because earthquakes are impossible to predict, scientists must use a unique approach in 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 PGA that has a certain percent chance of being exceeded in a given amount of time (usually 50 years). Figure 7 indicates that the U.S. Geological Survey (USGS) earthquake probability model places the probability of an earthquake with a likelihood of experiencing strong shaking (0.20g to 0.30g PGA) in Akiak with a 2% probability in 50 years, based on the USGS Alaska hazard model. A 2% probability in 50 years is the rare, large earthquake, and statistically, it happens on average every 2,500 years.

The Division of Geological and Geophysical Survey (DGGs) Neotectonic Map of Alaska (Figure 8) depicts Alaska's known earthquake fault locations.

DGGs stated,

"The Neotectonic Map of Alaska is the most comprehensive overview of Alaskan Neotectonics published to date; however, users of this map should be aware of the fact the map represents the author's understanding of Alaskan Neotectonics at the time of publication. Since publication of the Neotectonic map, our understanding of Alaskan Neotectonics has changed and earthquakes have continued to occur. For example, M7.9 Denali fault earthquake ruptured three faults, including the Susitna Glacier fault, which was previously undiscovered..." (DGGs, 2009).

The western extent of the Denali Fault is located about 220 miles southeast of Akiak. The Ataskaksovluk-Holokuk Fault Zone with many small unnamed faults is located to the south. The Thompson Creek Fault intersects the Iditarod-Nixon Fork Fault near Aniak to the northeast of Akiak.

Extent

Earthquakes felt in the Akiak area have not exceeded M 4.4 in the past 46 years, and damage has never been reported due to an earthquake event.

Impact

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

Recurrence Probability

Akiak has no official record of significant earthquake activity resulting in damage or injuries. 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-second affects short, rigid buildings whereas one-second wavelengths affect multi-story structures.

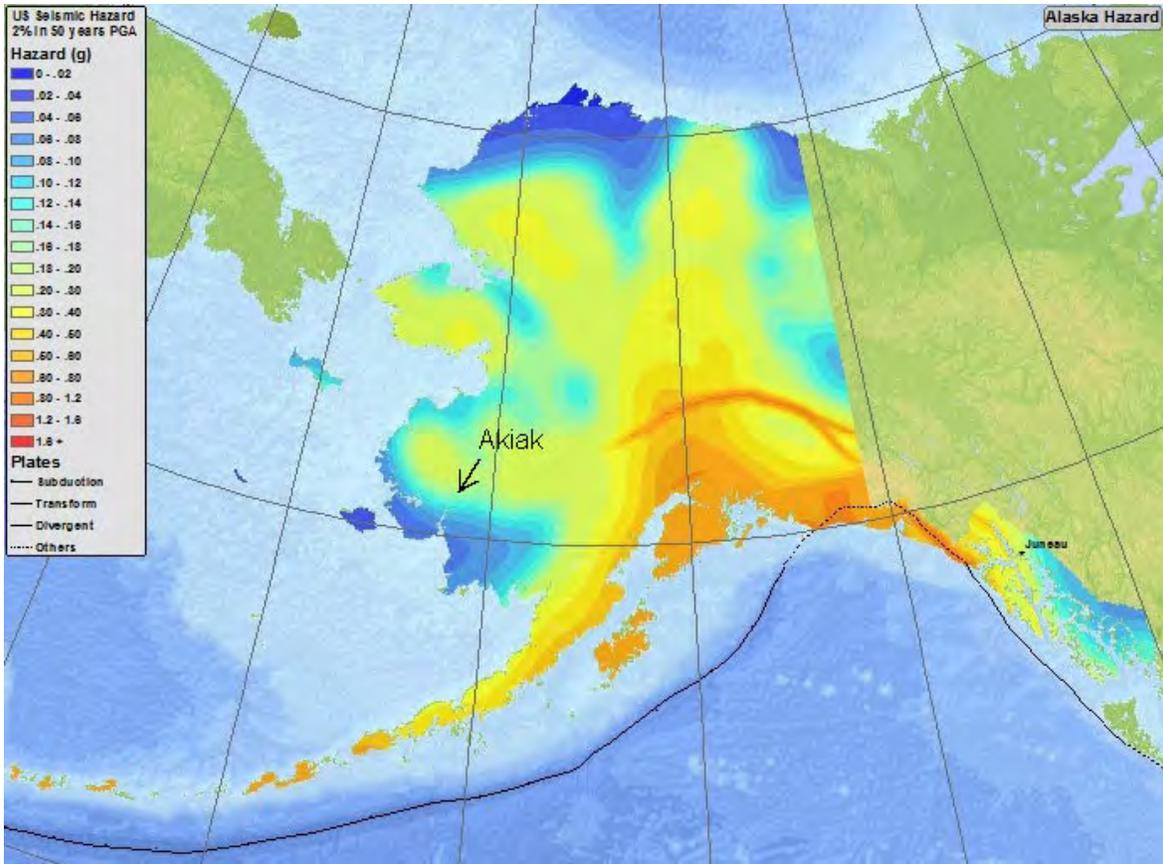


Figure 7. Akiak Earthquake Probability

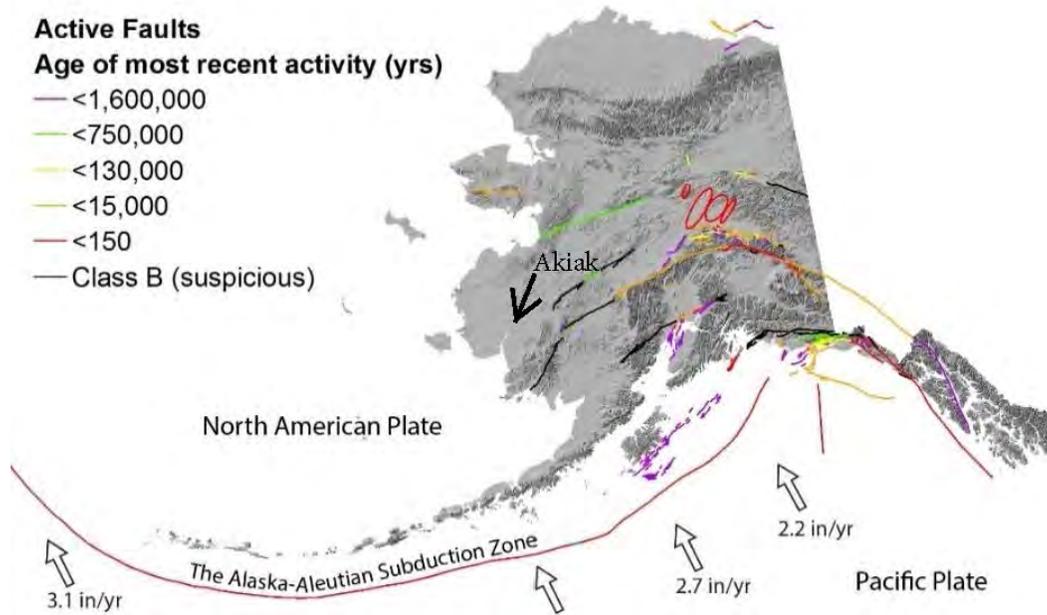


Figure 8. Active and Potentially Active Faults in Alaska

5.3.3 Flooding and Erosion

5.3.3.1 Characteristics

Approximately 6,600 miles of Alaska's coastline and many low-lying areas along Alaska's riverbanks are subject to severe flooding and erosion. The U.S. Government Accountability Office (GAO) reported in 2003 that flooding and erosion affected 184 out of 213 (86%) of Alaska Native villages because of rising temperatures. Akiak was also included in the 2009 GAO Report 09-551 as one of the 31 Alaska Native Villages imminently-threatened by flooding and erosion. Akiak was included in the USACE 2009 Baseline Erosion Assessment (BEA), which was funded by Congress to coordinate, plan, and prioritize erosion responses in Alaska from 2005 to 2009.

Many of the problems are long-standing, although studies indicate that increased flooding and erosion are being caused in part by changing climate (DHS&EM, 2018a). Flooding and erosion occur together in Akiak because of increased water currents that get raised above the normal riverbank.

Flooding is the accumulation of water where usually none occurs or the overflow of excess water from a stream, river, lake, or 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.

Four primary types of flooding occur in the community of Akiak: rainfall-runoff, snowmelt, storm surge, and ice override floods.

Rainfall-Runoff flooding occurs in late summer and early fall. The rainfall intensity, duration, distribution, and geomorphic characteristics of the watershed all play a role in determining the magnitude of the flood.

Snowmelt floods typically occur from April through June. Snowpack depths, spring weather patterns, and geomorphic characteristics of the watershed determine the magnitude of flooding.

Ice jam floods occur after an ice jam develops on a river or stream and blocks the path of flowing water. Ice jam flooding in the Lower Kuskokwim River occurs primarily during spring break-up. The depth of the ice jam snowpack and break-up weather patterns upriver influence the volume of water entering the Lower Kuskokwim River drainage. When an ice jam occurs, water collects upstream from the jam, flooding an area by creating a lake-like effect, analogous to a dam. Once the jam is breached, there is usually a rapid draining of the water from behind the jam. Not only does the downstream water level rise significantly once the jam is breached, but there is substantial current which can cause erosion and extensive damage. Additionally, the rising water causes the ice to float and the increased velocities move the ice further downstream. The motion of large solid blocks of ice is often very destructive. In Akiak, the highest risk to ice jams and snow melt flooding occurs in early summer, also referred to as breakup season. The highest risk to rainfall flooding occurs during late summer and early fall seasons. Most of the annual precipitation occurs April through October with August typically being the wettest month. The risk to rainfall generated floods corresponds to this cycle.

Additionally, for Akiak, flooding has originated from a riverine storm surge and is linked to high

winds and storms in the fall. Floods of this origin are addressed under Cryosphere (Section 5.3.1) and Severe Weather (5.3.4).

Erosion is a process that involves the gradual wearing away, transportation, and movement of land. However, not all erosion is gradual. It can occur quite quickly as the result of a flash flood, storm, or other event. Most of the geomorphic change that occurs in a river system is in response to a peak flow event. Erosion is a natural process, but its effects can be exacerbated by human activity.

Erosion is a problem in developed areas where the disappearing land threatens development and infrastructure. Three main types of erosion affect human activity in Alaska:

- Coastal erosion;
- Riverine erosion; and
- Wind erosion.

In Alaska, coastal erosion is the most destructive, riverine erosion a close second, and wind erosion a distant third.

Rivers constantly alter their course, changing shape and depth, trying to find a balance between the sediment transport capacity of the water and the sediment supply. This process, called riverine erosion, is usually seen as the wearing away of riverbanks and riverbeds over a period of time.

Riverine erosion is often initiated by high sediment loads or heavy rainfall. This generates high volume and velocity run-off which concentrates in the lower drainages within the river's catchment area. Erosion occurs when the force of the flowing water exceeds the resistance of the riverbank material. The water continues to increase its sediment load as it flows downstream. Eventually, the river deposits its sediment in slower moving sections such as dams or reservoirs. The river may eventually change course or develop a new channel. In less stable braided channel reaches, erosion and deposition are constant issues. In more stable meandering channels, erosion episodes may infrequently occur.

Akiak is primarily vulnerable to riverine erosion, which results from the force of flowing water in and adjacent to river channels. This erosion affects the bed and banks of the channel and can alter or preclude any channel navigation or riverbank development. In less stable braided channel reaches, erosion and deposition of material are a constant issue. In more stable meandering channels, episodes of erosion may only occur occasionally. Riverine erosion in Akiak threatens both critical and non-critical facilities.

Akiak sits on the Lower Kuskokwim River. The multi-year impact of waves, storm surges, and flooding causes severe riverine erosion. The fall storm season has the greatest impact. In winter, bottom shore-fast ice inhibits the vulnerability. Climate change will potentially increase the threat of erosions.

The constant erosion and deposition of material affects channel navigation and accessibility. Maintaining a navigable waterway is essential to the community as the annual supply of fuel and other bulk supplies are shipped by barge. Summer commercial and subsistence fishing, as

well as intra-village transportation are dependent upon the use of privately-owned boats. People in Alaska are losing the ground beneath their feet because of erosion. Riverine erosion is a major threat to Akiak as it threatens the embankment, structures, and the subsistence livelihood of residents. Not only do high river flow rates (such as during breakup) contribute to increased erosive scour, climate change has accelerated the normal process along Alaska's rivers; warmer temperatures degrade the soil, and heavier rains produce more floods and swollen rivers that wash away the soil (DHS&EM, 2018a). Riverine erosion is a problem for communities where disappearing land threatens development and infrastructure from spring snowmelt run-off and increased water flow when ice jams back-up and the rapidly increased water column overflows into the community. Surface and ground water flow and freeze-thaw cycles may also play a role. Not all of these forces may be present at any particular location.

5.3.3.2 History

Akiak experiences yearly erosion impact damage from spring thaw surface run-off, river ice break-up, and ice jam flooding. Scour is very strong along the entire length of the river bank.

The USACE Flood Hazard Data reported, "The flood of record was the 1964 ice-jam flood, which reached an elevation of 35.2 ft (mean sea level [MSL]). Flooding occurred in 1920, 1964, 1971, 1982, 1984, 1987, and 1988" (USACE, 2009).

The USACE completed a detailed erosion assessment for the City of Akiak on January 27, 2009 which states,

Erosion at Akiak generally occurs in the spring, when snowmelt and the breakage of ice jams cause[s] increased flow through the Kuskokwim River.

An attempt was made in the past to control erosion along the upstream bank of Akiak by placing two semi-submerged jetties of cylindrical pile perpendicular to the bank. These jetties proved to be problematic as they were not marked with buoys and caused some damages to boats colliding with them while they were submerged. No evidence of the jetties' impact on the bank such as accretion deposits and scour pockets associated with this kind of structure was found during the site visit (USACE, 2009).

Figure 9 and the following narrative describe the USACE's research location:

For this study the area was divided into two reaches. Reach 1 is a 2,230-foot portion of riverbank that fronts the community and is eroding at a rate of 4.1 feet per year. Reach 2 is a 3,790-foot portion of riverbank directly upstream (and north) of Reach 1 and is eroding at a rate of 6 feet per year (USACE, 2009).

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

The approach used to determine potential erosion damages is based on several assumptions as they pertain to the damage categories of residential, commercial, public infrastructure, and land values. This evaluation relies on previous reports and information gathered during site visits to determine appropriate values where data was unavailable. Assumptions used for the various damage categories are described more fully in the following discussion of future damages.

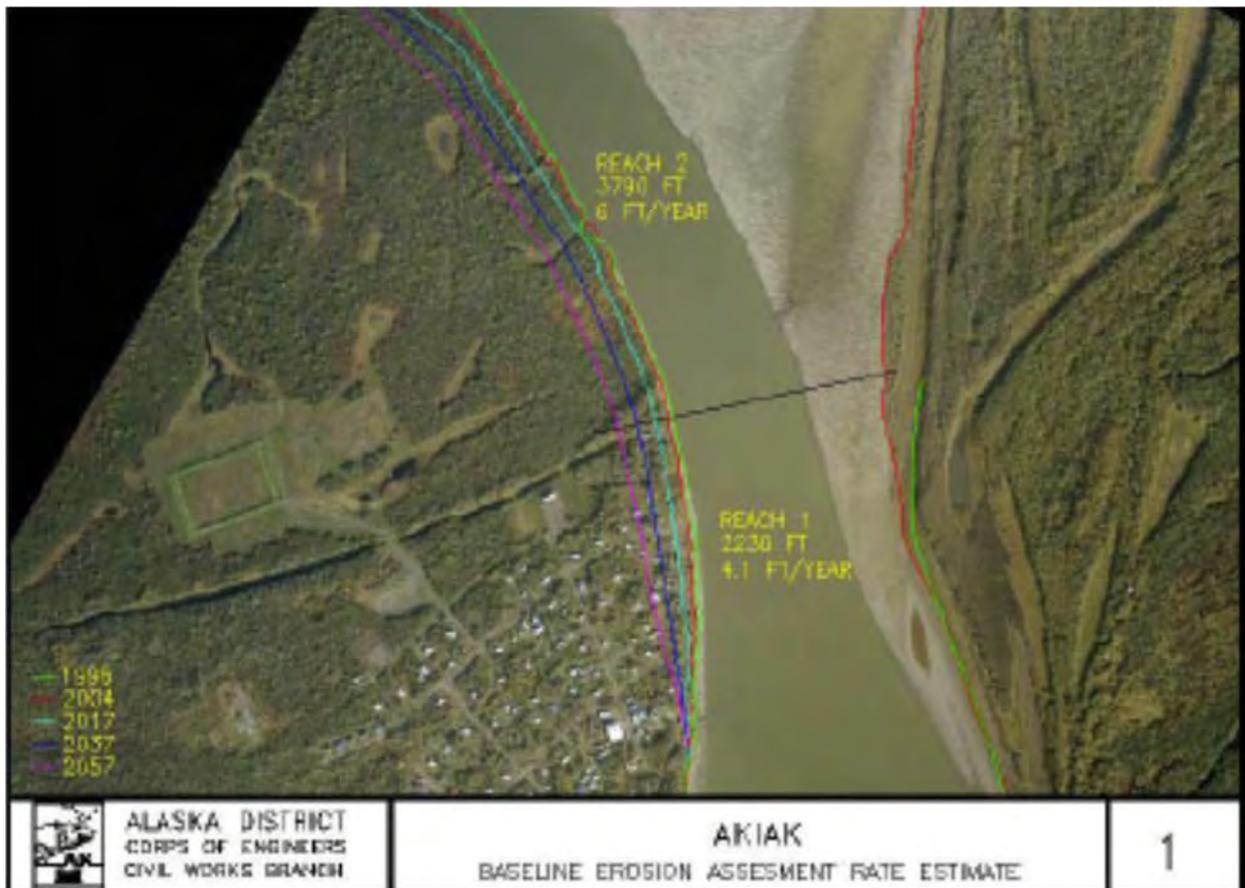
Damages caused by erosion in Akiak fall into seven damage categories: land, residential structures,

commercial structures, public structures, infrastructure, cemeteries, and environmental hazards. Structures were considered a loss when the bank line encroached within ten feet of the structure's foundation. Approximately 47% of erosion damages in Akiak are expected to occur within the first 10 years of the examined time period" (USACE, 2009).

USACE's BEA estimated the following potential damage impacts and timelines:

"Expected residential damages in Akiak are widely dispersed throughout the community. At-risk structures include 21 outbuildings (fish camps and related structures) and eight residences. Each of the outbuildings is valued at \$1,000 and each residence is valued at \$205,000.

Figure 9. USACE Erosion Assessment Location



(USACE, 2009)

Four commercial buildings are estimated to be subject to damages including the communications hub with an associated microwave tower as well as three other structures assumed to be commercial in nature based on analysis of on-site and aerial photographs.

The communications hub is expected to be lost in years 11 to 30. The three other commercial structures are expected to be lost in years 31 to 50. Our estimates likely understate the commercial damages. Were these structures to be lost, it would compromise the income earning opportunities for the businesses and the workers they employ. In addition, communications for the community would be lost and relocation efforts would impact these facilities as well.

One public building is at risk in Akiak. At this time, detailed information regarding this structure and its uses is not available. This building was assumed to be a public structure based on analysis of on-site and aerial photographs. The building is estimated to be lost in years 31 to 50.

Building damages in Akiak are expected to total \$4.5 million with a net present value of \$1.4 million and an average annual cost of \$73,300. Infrastructure that lies within the 50-year erosion profile includes: 23,070 feet of roads, 270 feet of sewer lines, and the old bulk fuel farm. It is likely that phone lines associated with the communications hub are also at risk during the period of analysis; however, they have been omitted from these damage calculations as the quantity threatened is unknown.

Based on engineering estimates for erosion, about 13,920 feet of roads will be affected in years 0 to 10, 8,580 feet will be affected in years 11 to 30, and 570 feet will be affected in years 31 to 50.

It is estimated that 270 feet of sewers are expected to be lost in years 31 to 50. This number is understated as there are additional sewer lines buried in areas projected to be lost to erosion. As of August 2007, these lines had been installed but not connected.

Damages to sewer lines would cause sewage and related materials to enter the Kuskokwim River. While it is unknown how significant the effects will be, it is possible that these harmful contaminants could pose significant damage to local fish stocks and their related environment as well as pose a threat to human health.

As of August 2007, the fuel farm was 28 feet from the bank. It is estimated to be lost in years 0 to 10. There are environmental considerations that accompany this loss that are discussed later in this section.

In total, Akiak has \$9.7 million of infrastructure at risk due to erosion. The combined net present value of these items is \$6.3 million. The average annual loss of infrastructure is valued at \$323,400.

The primary environmental concern in Akiak is the old fuel farm. It is unknown if the tanks are empty or still contain fuel. The surrounding soils are likely contaminated and will pose a threat to the local ecosystem and related fish stocks when they are eroded away. Decommissioning and closure of the facility is essential to avoid these harmful effects. Based on our above assumptions, this will be necessary within the 0 to 10-year time frame. This process has a cost of \$512,000 with a net present value of \$444,000 and an average annual cost is \$22,900.

Another environmental concern is the risk associated with eroding graves. Akiak was once a regional medical hub serving patients from many of the surrounding communities. Many of the patients who died were buried on-site due to the expense of shipping the remains back home. Many of the deceased buried in the cemetery are thought to have died during a tuberculosis outbreak. The State of Alaska Department of Health and Social Services confirms that tuberculosis was a significant problem in this area during the first half of the 1900's. Despite the passage of time, residents are concerned that they would be at risk of contracting the disease if these graves are exposed.

Akiak's cemetery was established in the early 1900's and associated with the first hospital in the area. It lies next to the river in a region where erosion is moving at an average rate of 6.0 feet per year and parts of the cemetery grounds have already been lost. While exact numbers are not known, individuals in the community indicate that between 1,000 and 1,500 graves existed in the original cemetery; we assume a total of 1,250 for this analysis. These discussions also suggested that between 50 to 75 percent of the graves have already been lost; for this analysis, we assume that 40 percent of the graves remain intact. Assuming even grave distribution and accounting for past losses, it is anticipated that 500 graves will need to be relocated over the 50-year period of analysis.

Environmental damages, as well as disaster avoidance, environmental remediation, and grave relocation costs are estimated to be in excess of \$4.3 million with a net present value in excess of \$3.2 million and an average annual cost in excess of \$170,200” (USACE, 2009).

The Alaska Department of Environmental Conservation (ADEC) Contaminated Sites Database indicates the Akiak Storage Tank (AST) farm was moved in 2009. However, the site has contamination issues at the old AST site with the City working with ADEC to determine the most appropriate remediation alternatives (City, 2013).

The City and ANC Tribal Councils’ emphatically expressed they overwhelmingly believe that “no action leads to increased damages”. Inaction and project development delays have resulted in infrastructure losses that could have been avoided. It is imperative that the threatened sewage lagoon and water infiltration gallery have mitigation actions developed to assure their longevity. Loss of these critical infrastructures creates a strain on the community.

Table 11 identifies erosion-threatened facilities and their approximate distance from the Kuskokwim River. Figure 9 shows these infrastructure elements are within the proposed 2057-year erosion impact line. The City’s NWS base flood elevation gauges indicate a 0.0 elevation of 31.8 feet (Figure 18). Data in Table 11 indicates the majority of Akiak’s infrastructure is higher than the minimum elevation (USACE, 2009). The HWE markers infer that several structures are barely at or slightly above the HWE of record.

Table 11. Critical Facilities' Distance from Eroding Embankment

Description	Distance (ft)
Fuel Tank Piping and Header	<10
National Guard Armory	75
Kokarmiut Corporation Office/ Multi-Purpose Office	100
Residence, Ralph Demantle	121
Teachers Trailer (School District)	200
Teacher’s Quarters (City Building)	240
Akiak’s City Office	250
Head Start Building	307
School Maintenance Building	326
Teachers Quarters (Corporation)	326
Robert Ivan Store	330
Kokarmiut Store #2 (Corporation Offices)	356
Old School (now Corporation offices)	441
Village Public Safety Office	558

Three, Teacher's Duplexes (Corporation)	730
Consolidated Fuel Storage Tank Farm	742
Ben Street	3
Doops Street (Corporation Housing)	72
Laps Street (Old School Road)	53
Mukluk Street (Armory)	25

The 2012 flood season eroded away over 150 feet, taking the community's original cemetery, fuel header protective embankment, and one house. The City stated they were able to relocate two houses before their land was lost; several essential infrastructure and residential properties still remain within the identified erosion threatened area.

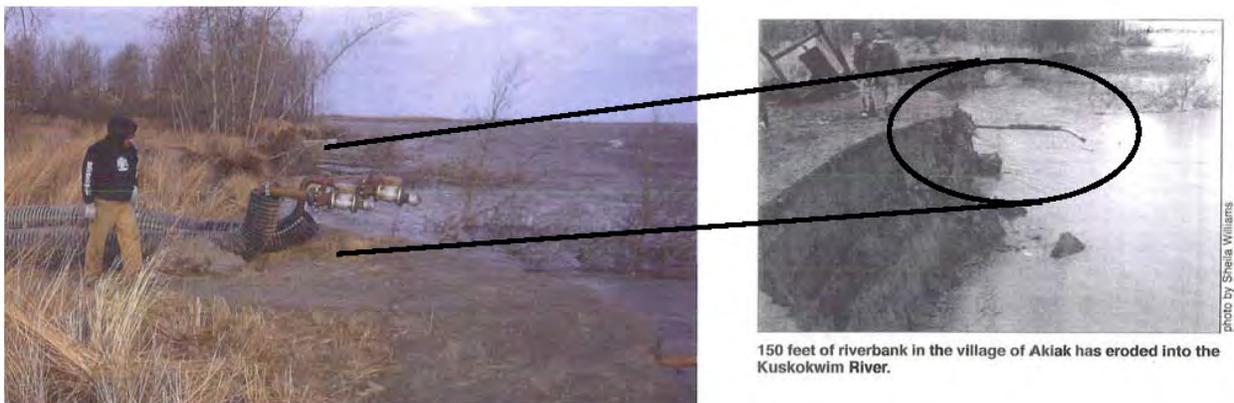
As a result of this catastrophic severe flood impact and subsequent erosion damages, the City of Akiak and the ANC submitted a disaster declaration to the Governor on September 28, 2012, which stated:

"CITY OF AKIAK AND AKIAK NATIVE COMMUNITY JOINTLY DECLARES DISASTER FOR RIVERFRONT EROSION OCCURJNG DUE TO HIGH WATER OF THE KUSKOKWIM RIVER.

Consistent rains and winds all summer long have increased the level of water on the Kuskokwim River that impacted the waterfront of Akiak with the properties eroding quickly to the river. Approximately 150 feet of land have been consumed to date. One house is currently being moved to another location because it will fall into the river. Several houses are in danger of falling into the river. The electrical poles and lines need to be removed and the fossil fuel lines are in danger along with the polychlorinated biphenyls for the electrical system.

The community provided Figures 10 and 11 depicting the 2012 erosion event:

Figure 10. Fuel Header Area Erosion



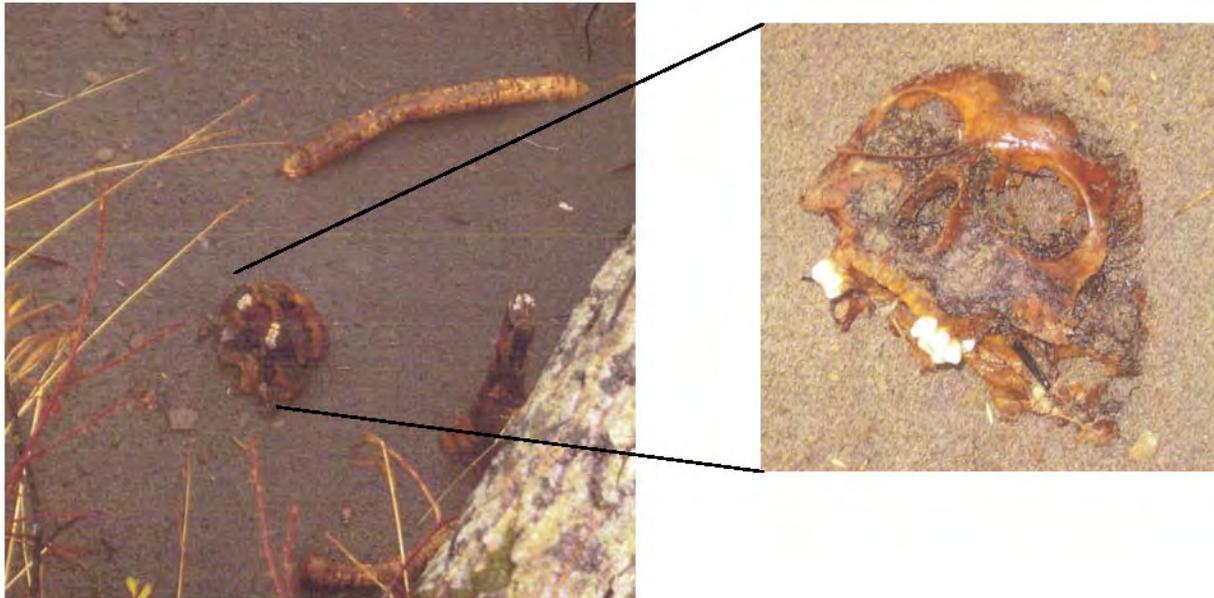
(City, 2013)

Figure 11 depicts exposed cemetery human remains resulting from the September 2012 flood and erosion event that washed away the City's original inhabitants' cemetery. Additional lost infrastructure included:

“On the last week of September 2012, the City of Akiak had to provide assistance with our meager funds to move two private homes away from the riverfront. One home had to be dismantled and relocated to another site and one smaller house was also moved to another safe location away from the erosion area. We lost one gravel road to erosion, moved three electrical utility poles with high tension wires, and a fuel header connected to the community fuel storage tanks” (City, 2013).

Mr. Fred Broerman’s, Local Government Specialist for DCCED, trip report to the City of Akiak dated October 10, 2012 documented his findings.

Figure 11. Erosion Exposed Cemetery Remains



(City, 2013)

“To inspect and document the erosion occurring along the banks of the Kuskokwim River which is cutting into the community of Akiak. To meet with tribal and municipal leaders to discuss the disaster resolutions they had sent to state and federal agencies. During the fall of 2012, the Y-K Delta region experienced several significant wind and rainfall events. Two daily rainfall records were broken. On September 3, it rained 0.82" breaking the 2005 record of 0.72" and on October 7, it rained 0.88" breaking the 1970 record of 0.53". The rain has caused watersheds to swell and has accentuated erosion along the [Kuskokwim] Delta's river banks. Exposed river banks, consisting of layered deposits of silt and fine sand (termed "glacial flour" by geologists), break away when subject to the strong currents associated with increased quantities and velocities of water. The community of Akiak is situated on a naturally occurring oxbow of the Kuskokwim River. In recent years, but especially this fall, the Kuskokwim has been eroding away the community's land base, causing significant damage...

Immediately after landing in Akiak at 0930, we reviewed various aerial photo maps with Tribal and City leaders who described in detail the extent of the erosion problems. The leaders also summarized efforts they had taken over the years to work with the USACE and NRCS to deal with the erosion problem as well as contacting various other state and federal agencies for

assistance...Damage included the washing away of a grave site (exposing human remains) and an important city road. The erosion had also exposed buried water and wastewater lines and bulk fuel transfer lines and headers. One home had been washed away by the river; another home had to be moved to another location” (City, 2013).

On May 17, 2019, within a few hours, the Kuskokwim River claimed up to 40 feet, and then over the next week, a total of 75 feet was claimed in some areas.

NRCS was in Akiak on May 30, 2019, and met with representatives from the ANC, the City of Akiak, and Kokarmut Corporation. After the May 30th public meeting, they carried out bathymetric measurements and determined the depth of the main river channel (now flowing directly in front of the village) to be over 60 feet. In 2013, the depth of the river channel of 60 feet was further upriver from the community. They used a handheld GPS to record the top of bank location and then measured the distance from the top of the bank to each structure. Figure 18 shows the results of this effort. This figure also illustrates how the bank erosion at Akiak has progressed from 1957 to 2019. Table 12 summarizes the data with the measured distance to the top of the bank. It appears that the active erosion at the downstream end of the community observed on May 30, 2019, is worse than it was in 2013. Figure 18 reinforces that impression and shows that the most significant erosion between 2017 (the date of the image) and 2019 has occurred in the lower 1/3 of the image with the largest amount of erosion adjacent to a home (Identified as #554) where almost 100 feet of land has eroded between July 2017 and May 2019.

Table 12. May 30, 2019 Data

GPS Point #	Description	Distance to top of River Bank (feet)
553	5,000 Gallon Gasoline storage tank (School District)	100
554	House	50
555	House	65
556	Smokehouse	60
557	House	95
558	House	160
559	House	90
560	Small Shed	60
561	Abandoned House	85
562	National Guard Building	220
563	3000 Gallon Heating Oil Tank	180
564	20 ft Connex	180
565	Abandoned wellhead	-5
566	Shed on barrels	25
567	Shed on ground	28
568	House - probably not movable	155

569	Steam bath	115
570	Drying rack	115
571	Shed	90
572	Shed	50
573	Truck/dead	50
574	House	125
575	Shed (not movable)	100
576	Shed (not movable)	50
577	Fuel header (no current issues)	90
578	House	90
579	Steam bath (not moveable)	40

During the May 30, 2019 site meeting, NRCS asked to look at the erosion in the slough channel on the inside of the bend just downstream from the community. Local reports indicate this slough has increased in depth and width in the last decade. Although active erosion exists along both banks of the slough for much of its length, the erosion is not currently threatening any structures. Overall the erosion situation that NRCS observed in May 2019 reinforced the conclusion of the 2013 investigation. The hydraulic conditions of the Kuskokwim River at Akiak are severe. There are planform geomorphic changes ongoing in this reach of the river that represent a threat to several structures in the community.

Several homes are immediately threatened. The data presented in Figure 18 and Table 12 show that the closest home to the top of the bank is approximately 50 linear feet, and that there are five homes that are within approximately 100 feet of the top of the bank. A high-water event could easily erode 50 feet of land in a single day. The current trend appears to be towards more erosion at this location. NRCS will continue to work with the community to define the scope of a potential EWP project.

The NWS continued to modify their system for assigning weather zones to facilitate and more accurately confine weather patterns to relevant geographic areas. Consequently, the data in Table 13 reflects different zone numbering patterns. Each weather event may not have specifically impacted the community, but they are listed due to Akiak’s close proximity to listed communities or by location within the identified zone.

Table 13. Historic NWS Flood and Erosion Events

Location	Date	Event Type
Kuskokwim River erosion	May 17, 2019	Within a few hours, the high river levels from spring melt on the Kuskokwim River claimed up to 40 feet of land, and then over the next week, a total of 75 feet was claimed.
Kuskokwim River erosion	November 16, 2013	A fall storm caused high waves that crashed against the silty sand riverbank and eroded up to 50 feet of land in a matter of hours.
Kuskokwim River erosion	2012	The 2012 flood season eroded away over 150 feet, taking Akiak’s original cemetery, fuel header protective embankment, and one house. The City stated they were able to relocate two houses before their land was lost; several essential infrastructure and residential properties still remain within the identified erosion threatened area.

Akiachak	May 7, 2009	Ice Jam Flood (\$2.6M Damages): The annual spring river ice break up resulted in extensive flooding along the Kuskokwim River over the 11 days it took for the river to open up from its head waters in the Kuskokwim Valley to the mouth of the Kuskokwim River on the Bering Sea coast. Damage estimates are from the State of Alaska disaster declaration request to the President.
Kuskokwim River Flood	May 2006	Ice Jam Flood: NWS issued flooding warnings and watches across the state as excessive snowmelt and ice jams caused flooding along the Yukon, Kuskokwim, and Koyukuk River drainages.
Kuskokwim River Flood	1989	Federal disaster declaration, applied to all communities on the Kuskokwim, Yukon, and Kobuk Rivers.
Kuskokwim River Flood	1988	Ice Jam Flood
Kuskokwim River Flood	1987	Flood
Kuskokwim River Flood	1984	Flood
Akiak, Akiachak, and Russian Mission	1982	Severe windstorms generating high waves caused extensive damage in the villages of Russian Mission, Akiak, and Akiachak.
Kuskokwim River Flood	1971	Flood
Kuskokwim River Flood	1964	Ice-Jam Flood
Kuskokwim River Flood	1920	Flood

5.3.3.3 Location, Extent, Impact, and Recurrence Probability

Location

The entire community of Akiak is within the floodplain and will be potentially impacted by flood/erosion events. The USACE Flood Hazard Database shows five High Water Elevation (HWE) sign locations for Akiak (Figures 12 thru 16).

Figure 12. HWE Sign #1



Figure 13. HWE Sign #2



Figure 14. HWE Sign #3



Figure 15. HWE Sign #4



Figure 16. HWE Sign #5



The USACE, Floodplain Management Flood Hazard Data report stated:

“The following references are based on the NWS's slope gauge, which has an arbitrary base. The "A" marker on the slope gauge is a brass cap on a steel rod at the streamward, upstream corner of Mary Jackson's home. A NWS staff gauge is on the same corner. The elevation of the "A" marker is 30.81 ft. (Add 19.05 ft to the staff readings to correlate to the slope gauge data.)...

The flood gauge was installed on the Akiak library. HWE signs were also placed on utility poles adjacent to the road between the high school and the library about 300 and 500 yards upstream of the high school. HWE signs were placed on the shoreward, downstream corner of the library and on the shoreward, downstream corner of the old BIA school” (USACE, 2009).

The USACE reported the structure elevations depicted in Table 14 were accurate as of June 1998.

Table 14. USACE Community Flood Survey Elevations

Description	Elevations (ft)
Recommended building elevation	37.2
Front doorsill of the Clinic	36.4
Front doorsill of Arlicaq School	35.0
First floor of the City office building	34.2
Centerline of the runway at the tarmac	33.7
0.0 ft elevation on the flood gauge	31.8
Typical bottom of the school fuel tank farm	30.2
Water level of the Kuskokwim River on 6/18/98	19.5

Akiak has noticed a pattern based on past events of flooding during spring melt when an ice

dam forms downriver. The flood path has come from a slough behind the village. This slough is also a concern, beyond flooding, for the Akiak community, as well. Given how the river morphology is changing, Akiak is concerned that the flows in the slough may grow and develop a new branch of the river, which would effectively put Akiak on an unstable island. In 2019, the community requested that the USACE, DCRA Risk Map Program, and NRCS conduct a river hydrological analysis to determine what the Kuskokwim River will do and how Akiak can best respond.

Based on Akiak's observations from 2013-2019, a combination of mild winters resulting in limited ground freezing, high river levels from spring melt, and a change in the river course upriver from Akiak are combining to erode riverbank due to bank destabilization. In 2013, NRCS found that the Kuskokwim River had a long trough (over 60 feet) just upriver from Akiak (see Figure 17). Akiak believes that this long trough has moved downriver and closer to the community, thus leading to the May 2019 loss of riverbank from the high river levels. This causes the community concern as the 2013 riverbank loss (similar in magnitude to this 2019 event) was in Fall during a storm event that created high waves that crashed on the riverbank shoreline.

Extent

Floods are described in terms of their extent (including the horizontal area affected and the vertical depth of floodwaters) and the related probability of occurrence. The following factors contribute to riverine flooding frequency and severity:

- Rainfall intensity and duration;
- Antecedent moisture conditions;
- Watershed conditions, including terrain steepness, soil types, amount, vegetation type, and development density;
- The attenuating feature existence in the watershed, including natural features such as swamps and lakes and human-built features such as dams;
- Flow velocity;
- Availability of sediment for transport, and the bed and embankment watercourse erodibility; and
- Location of Akiak related to the base flood elevation as indicated with its certified high-water mark.

Figure 19 depicts Akiak's susceptibility to flooding by its adjacent location to the Kuskokwim River and surrounding wetlands. Akiak's location adjacent to the very serpentine Kuskokwim River makes Akiak prone to flood and erosion, especially during Spring break-up when frequent ice jams form at the river bends causing water to back-up into adjacent communities. Also, refer to Section 5.3.1.4 for the extent of changes in the cryosphere as that natural hazard is related to extent for the floods/erosion hazards.

Impact

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

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

The primary impact from erosion is the loss of land and anything on it. Other impacts include reduction in water quality due to high sediment loads, loss of native aquatic habitats, damage to public utilities (fuel headers and electric and water/wastewater utilities), and economic impacts associated with the costs of trying to prevent or control erosion sites.

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

Impacts and problems also related to flooding are deposition and riverbank erosion (erosion is discussed in detail in Section 5.3.2).

Recurrence Probability

The community knows that it is threatened with significant riverbank destabilization both in May with spring melt and in September/October with fall storms.

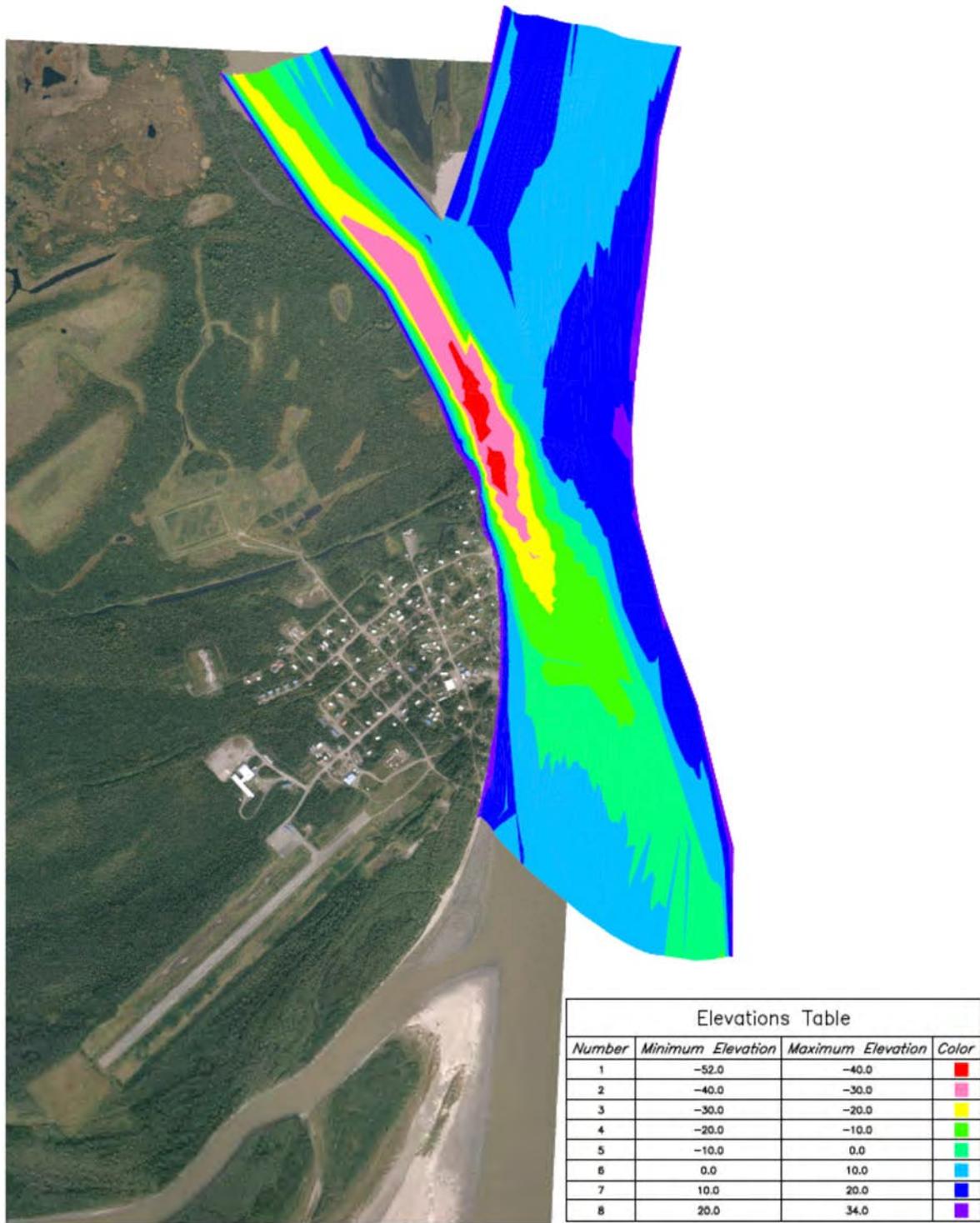


Figure 17. NRCS survey data from 2012

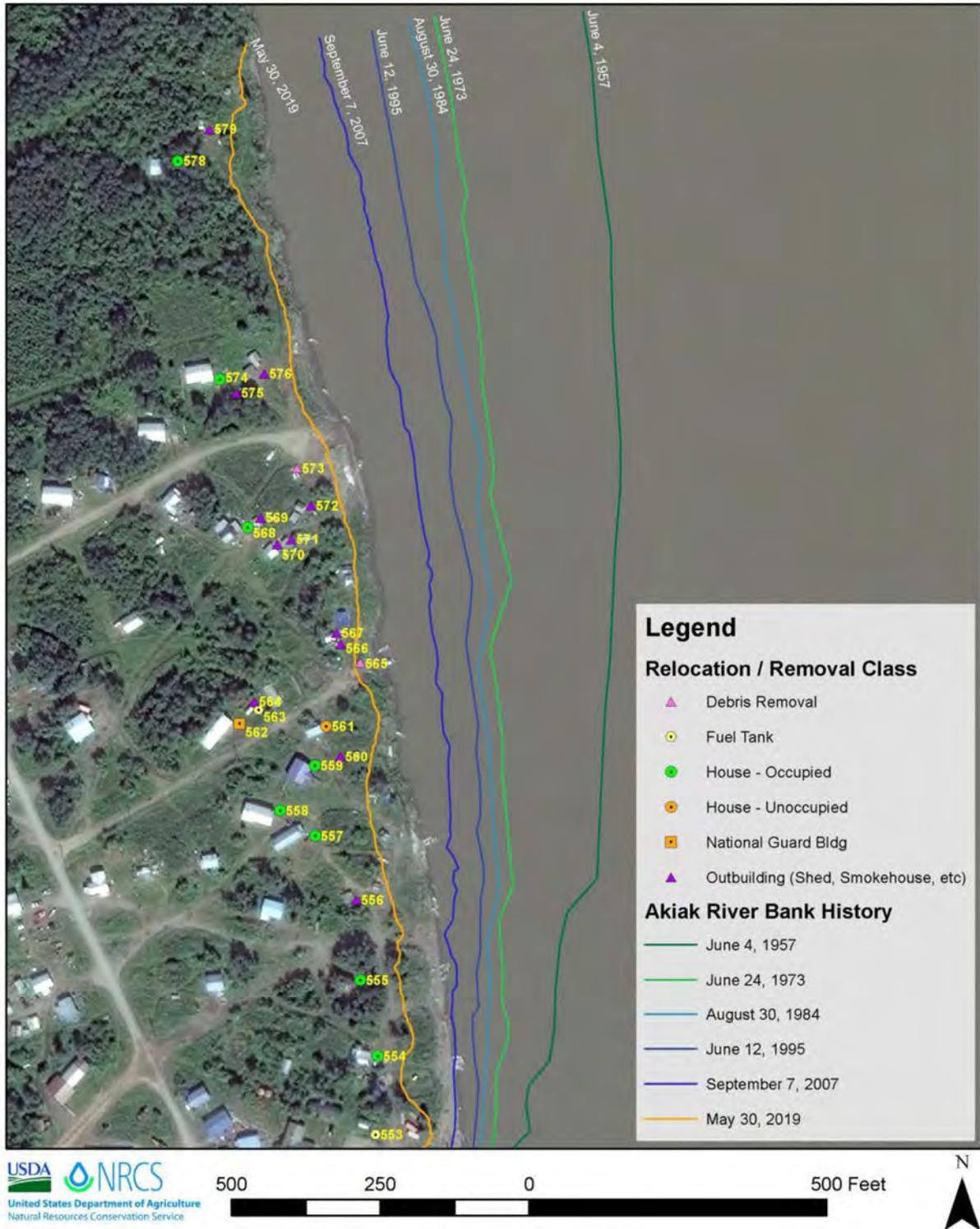


Figure 18. NRCS Top of Bank Calculations from May 30, 2019

Figure 19. Akiak's Kuskokwim Upriver Ice Jam



5.3.4 Severe Weather

5.3.4.1 Characteristics

Winter weather includes heavy snows, ice storms, extreme cold, and high winds.

Heavy Snow generally means:

- Snowfall accumulating to four inches or more in depth in 12 hours or less.
- Snowfall accumulating to six inches or more in depth in 24 hours or less.

Snow Squalls are periods of moderate to heavy snowfall, intense, but of limited duration, accompanied by strong, gusty surface winds and possibly lightning.

A **Snow Shower** is a short duration of moderate snowfall.

Snow Flurries are an intermittent light snowfall of short duration with no measurable accumulation.

Blowing Snow is wind-driven snow that reduces surface visibility. Blowing snow can be falling snow or snow that already has accumulated but is picked up and blown by strong winds.

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

A **Blizzard** means that the following conditions are expected to prevail for a period of three hours or longer:

- Sustained wind or frequent gusts to 35 mph or greater.
- Considerable falling and / or blowing snow, reducing visibility to less than 1/4 mile.

Freezing Rain occurs when rain or drizzle freezes on surfaces. Excessive accumulation may immobilize a community and hamper rescue efforts.

Extreme Cold varies according to the normal climate of a region. In areas unaccustomed to winter weather, near freezing temperatures are considered "extreme cold." In Alaska, extreme cold usually involves temperatures less than -40°F. Excessive cold may accompany winter storms or high barometric pressure and clear skies.

Ice Storms describe occasions when damaging accumulations of ice are expected during a freezing rain event. Freezing rain most commonly occurs in a narrow band within a winter storm that is also producing heavy amounts of snow and sleet in other locations.

5.3.4.2 History

Storms that were included in Sections 5.3.3.1 and 5.3.3.2 are not included in this subsection if their main consequence was storm surge or flooding/erosion-related.

Table 15 provides a representative sample of the major storm events the NWS identified for Akiak’s Weather Zone (Y-K Delta) since 2006. Each weather event may not have specifically impacted the community, but it is listed due to Akiak’s close proximity to listed communities or by location within the identified zone.

Table 15. Severe Weather Events

Location	Date	Event Type	Magnitude
Kuskokwim Delta	11/8/2011	High Wind, Blizzard	A storm crossed the western Aleutians and intensified as it moved through the Bering Sea toward the Bering Strait. This storm produced high wind (maximum of 49.7 mph) along with blizzard conditions.
Kuskokwim Delta	11/8/2011	High Wind, Blizzard, Storm Surge	A storm crossed the western Aleutians and intensified as it moved through the Bering Sea toward the Bering Strait. This storm produced high wind (maximum of 37.9 mph) along with blizzard conditions and a storm surge that resulted in minor coastal flooding. Several ship reports were of wind around 80 knots in the Bering Sea associated with this storm. The strong wind and long fetch resulted in a coast storm surge that produced minor coastal flooding in the Y-K Delta region.
Kuskokwim Delta	4/6/2011	High Wind, Blizzard	A large intense Bering Sea storm impacted Alaska from the Aleutian Islands to south-central Alaska. Wind gusts ranged from 72 to 78 mph along the Aleutian Islands, Alaska Peninsula, and Pribilof Islands. This storm also produced blizzard conditions across the Pribilof Islands to the Bering Sea coast and Bristol Bay coast.
Kuskokwim Delta	1/23/2011	Blizzard	A strong storm produced strong wind and snow across the Pribilof Islands and Y-K Delta resulting in blizzard conditions, resulting in one death.
Kuskokwim Delta	2/8/2010	Blizzard	This storm produced blizzards across the central Aleutians to the Pribilof Islands and along the Bering Sea coast of the Y-K.

Kuskokwim Delta	1/10/2010	High Wind	A deep cold arctic air mass over the Alaska mainland combined with low pressure in the eastern Bering Sea produced strong wind (maximum of 37.9 mph) in the Y-K Delta.
Kuskokwim Delta	12/20/2009	High Wind	An intense Bering Sea Storm produced localized high wind along the Y-K Delta and Bristol Bay coast. The peak wind was 78 mph in this region.
Akiachak	5/7/2009	Ice Jam Flood, Ice Breakup	The annual spring river ice break up resulted in extensive flooding along the Kuskokwim River over the 11 days it took for the river to open up from its head waters in the Kuskokwim Valley to the mouth of the Kuskokwim River on the Bering Sea coast. Damage estimates are from the State of Alaska disaster declaration request to the President. (\$2.6M Damages)
Kuskokwim Delta	2/25/2009	Blizzard	A strong low brought high wind and snow to the Bering Sea coast the evening of February 25th that produced blizzard conditions.
Kuskokwim Delta	2/25/2009	High Wind, Blizzard	An intense hurricane force storm moved across the Aleutians into the eastern Bering Sea. This storm produced hurricane force wind as it moved through the region. This storm produced blizzard conditions along the Bering Sea coast from Bristol Bay north across the Y-K Delta. Wind gusts were reported in excess of 100 mph in the Pribilof Islands and in Bristol Bay. Extensive damage occurred to many homes and buildings. This storm also produced a storm surge in the Bristol Bay region near Dillingham, Clarks Point, and Eku. (\$200K Damages)
Kuskokwim Delta	12/24/2008	Blizzard	A strong front moved into the Bering Sea coast, producing strong wind and snow that resulted in a blizzard Christmas Eve and Christmas Day.
Tuluksak, Kipnuk	7/5/2008	Thunderstorm, Wind	Very unstable atmospheric conditions in southwest Alaska produced severe thunderstorms in the Bethel area the evening of July 5th. Wind gust of 31 mph.
Kuskokwim Delta	1/19/2008	High Wind, Blizzard	High Wind of 42.8 mph to Heavy Snow Aleutians to South Central. An intense storm moved into the Bering Sea. High wind in advance of this storm blew through portions of the Aleutians, then moved to the Bristol Bay Coast and eventually hit the south-central portion of Alaska on the 20th. The strong southeast flow pushed ample moisture into the Alaska Range dumping 14 inches of snow in that region on the 20th.
Kuskokwim Delta	1/15/2008	Blizzard	An intense storm in the Bering Sea produced snow and strong wind over the Y-K Delta that resulted in a blizzard across the region.
Kuskokwim Delta	1/30/2007	High wind, Utility Disruptions	A secondary storm center south of the Alaska Peninsula delivered high wind (maximum of 42.25 mph swept through southwest and south-central Alaska and along the central Aleutians and Alaska Peninsula. Wide-spread power outages plagued the Y-K Delta with this storm along with roofs being blown off two houses, two houses shifted on their foundations. Unconfirmed wind gusts were reported to 127 mph at Sand Point on the Alaska Peninsula. \$100K Damages

Bethel	7/5/2007	Thunderstorm, Hail, Wind	A severe thunderstorm moved through the Y-K Delta possibly producing large hail and strong gusty wind. While the actual observed wind was not 60 mph, it is reasonable to assume the wind did reach 60 mph due to the sparse data network in this region.
Kuskokwim Delta	1/9/2007	High Wind, Blizzard	A storm in the north Pacific and its associated weather front caused gusty south wind (maximum of 56 mph), snow, and blowing snow across southwest Alaska. Winds peaked along the coast with visibilities reduced to near zero.

5.3.4.3 Location, Extent, Impact, and Recurrence Probability

Location

Akiak experiences periodic severe weather impacts. The intensity, location, and the land's topography influence the impact of severe weather conditions on a community.

Extent

Akiak is equally vulnerable to the severe weather effects. Akiak experiences severe storm conditions with heavy snow depths; wind speeds can reach 100 mph; and extreme low temperatures that reach -2°F.

Impact

Structures and infrastructure have largely been constructed to withstand annual occurrences of severe winter storms. High winds resulting from the storms pose the greatest risk. They can combine with loose snow to produce blinding blizzard conditions and dangerous wind chills. In addition, high winds have the potential to reach hurricane speed. Such winds may damage community facilities and infrastructure.

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 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.

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 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.

Recurrence Probability

Severe winter storms occur annually along the western coast of Alaska; therefore, the probability of a severe winter storm impacting Akiak is highly likely.

5.3.5 Wildfires

5.3.5.1 Characteristics

Fires can be divided into the following categories:

Conflagration Fires – Fires involving man-made structures.

Prescribed Fires – Fires ignited under predetermined conditions to meet specific objectives, to mitigate risks to people and their communities, and / or to restore and maintain healthy, diverse ecological systems.

Wildland Fire – Any non-structure fire, other than prescribed fire, that occurs in the wildland.

Wildland Fire Use – A wildland fire functioning in its natural ecological role and fulfilling land management objectives.

Wildland-Urban Interface Fires – Fires burning in an area where human development meets undeveloped wildland. The potential exists in areas of wildland-urban interface for extremely dangerous and complex fire burning conditions, which pose a tremendous threat to public and firefighter safety.

5.3.5.2 History

Neither wildland or conflagration fires have been documented within the boundaries of the community; however, wildland fires have occurred in Akiak’s vicinity. The Alaska Interagency Coordination Center (AICC) lists 72 GIS-based wildland fires that occurred within 50 miles of the community since 1939. Table 16 lists 38 fires that exceeded 50 acres.

Table 16. Akiak’s Historic Wildfire Locations

Fire Name	Fire Year	Estimated Acres	Latitude	Longitude	Cause
Gweek River	2016	1,320	61.05883	161.33334	Lightning
Akiachak	2016	50	61.02983	161.18000	Human
Mishevik	2015	81	60.97617	161.01966	Lightning
Kwethluk River # 2	2015	23,241	60.78417	161.29277	Lightning
Kwethluk Airport	2015	349	60.77778	161.440333	Human
Hawk River	2010	10766	60.48333	-161.083	Lightning

Nunap	2006	60	60.93333	-162.45	Lightning
Taksleksluk North	2006	4016.7	61.16667	-162.7	Lightning
Pikmiktalik	2005	649	61.08333	-162.167	Lightning
Johnson River	2005	57.5	61	-162.617	Children
Otter Creek	2005	3098.7	60.91667	-160.283	Lightning
Bethel 2	2003	75	60.75	-161.917	Human
Kalskag	2002	3390	61.5	-160.383	Human
South Bogus	1997	130	61.16667	-160.167	Lightning
Tundra George	1997	160	61.45	-161.433	Lightning
Fog	1997	50	60.9	-160.683	Lightning
304295	1993	110	60.71667	-161.017	Lightning
Kasigluk	1993	240	60.63334	-160.65	Lightning
Columbia	1991	180	60.7	-160.783	Lightning
Reindeer	1990	218	61.38334	-162.7	Lightning
Kushluk	1988	700	60.61666	-160.917	Lightning
Bet E 11	1984	1500	60.76667	-161.5	Human
Long Lake	1972	1800	61.33333	-162.417	Lightning
Benny's Bog	1972	300	61.33333	-162.667	Lightning
Johnson River	1972	900	61.41667	-162	Lightning
Water	1971	2000	61.31667	-162.75	Lightning
Bethel 1/2s	1957	2491	60.75	-161.75	Debris Bng
Bethel 30-E	1957	1000	60.83333	-161.917	Lightning
Phillips	1954	160	61.3	-161.083	Miscellaneous
Bethel #2	1943	200	60.96667	-161.8	Lightning
Nunipitchuk	1941	1500	60.93333	-162.217	Lightning
Nunipitchuk #2	1941	1500	60.91667	-162.2	Lightning
Lomavik	1940	16000	60.58333	-162.117	Unknown
Napaiskak	1940	20000	60.66667	-161.917	Unknown
Whitefish Lake	1940	32000	61.33333	-160.15	Trappers
Ogilvik (Uknavik)	1940	10000	61.41667	-160.617	Unknown
Akiak	1940	204800	60.93333	-161.25	Unknown
Tuluksak	1940	102400	61.1	-161.083	Unknown

5.3.5.3 *Location, Extent, Impact, and Recurrence Probability*

Location

Under certain conditions, wildland fires may occur in any area with fuel. Since fuels data is not readily available, for the purposes of this HMP, all areas outside City limits are considered to be vulnerable to tundra/wildland fire impacts. Figure 20 depicts wildland fires and their perimeter areas within 50 miles of the City.

Extent

Fuel, weather, and topography influence wildland fire behavior. Fuel (e.g., slash, dry undergrowth, flammable vegetation) 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.

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.

Impact

Akiak is considered a Level I Isolated village with no professional fire department. The City administers Rural Basic Firefighter training within the volunteer fire department. Akiak has a volunteer fire department but no fire building. They have Code Red equipment.

Residents have limited air and marine access to larger hub communities and must rely on their own resources for a significant period of time during a wildland or conflagration fire.

Impacts of a wildland fire that interfaces with the population center of Akiak could 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.

Recurrence Probability

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. In Alaska, and within 50 miles of Akiak, the natural fire regime is characterized by a return interval of approximately 150 years due to its tundra vegetation, gently-rolling topography, and riverine location.

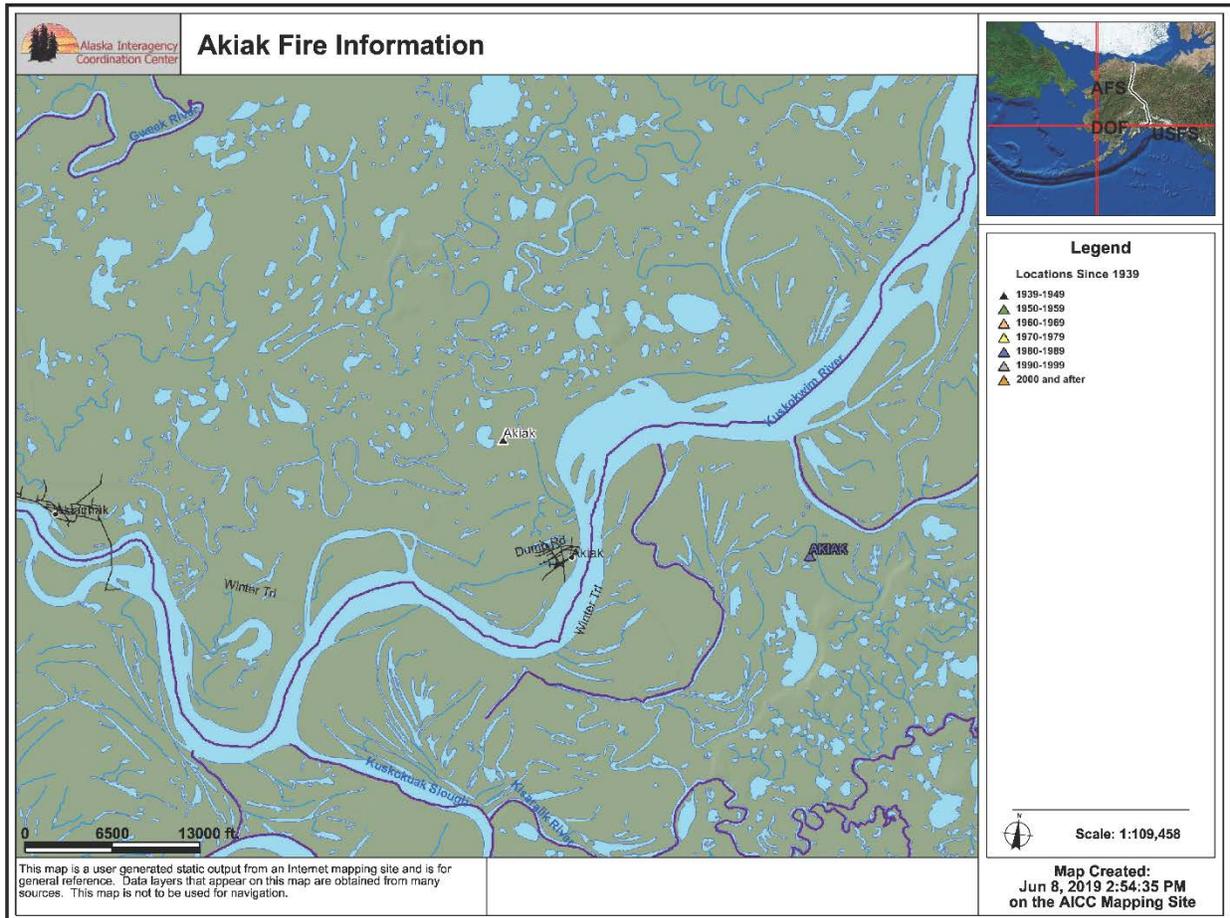


Figure 20. Akiak Fire History Map

6.0 Vulnerability Analysis

6.1 VULNERABILITY ANALYSIS OVERVIEW

According to recommendations stipulated in DMA 2000, a risk assessment and vulnerability analysis should include the following elements:

- A summary of the community’s vulnerability to each hazard that addresses the impact of each hazard on the community.
- Identification of the types and numbers of repetitive loss properties in the hazard areas.
- Identification of the types and numbers of existing vulnerable buildings, infrastructure, and critical facilities.
- Estimation of potential dollar losses to vulnerable structures.
- Documentation of the methodology used to prepare the estimate.

A vulnerability analysis is divided into eight steps:

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

DMA 2000 Recommendations

Assessing Risk and Vulnerability, and Analyzing Development Trends

§201.7(c)(2)(ii): The risk assessment shall include a] description of the jurisdiction’s vulnerability to the hazards described. This description shall include an overall summary of each hazard and its impact on the community. The plan should describe vulnerability in terms of:

§201.7(c)(2)(ii)(A): The types and numbers of existing and future buildings, infrastructure, and critical facilities located in the identified hazard areas;

§201.7(c)(2)(ii)(B): An estimate of the potential dollar losses to vulnerable structures identified in and a description of the methodology used to prepare the estimate.

§201.7(c)(2)(ii)(C): Providing a general description of land uses and development trends within the community so that mitigation options can be considered in future land use decisions.

§201.7(c)(2)(ii)(D): Cultural and sacred sites that are significant, even if they cannot be valued in monetary terms.

1. REGULATION CHECKLIST
ELEMENT B. Risk Assessment, Assessing Vulnerability, Analyzing Development Trends
B3. Does the plan include a description of each hazard’s impact as well as an overall summary of the vulnerability of the Tribal planning area?
Source: FEMA, 2015.

The ANC has 542 tribal members enrolled; some of its members have moved outside the community. The DCCED 2017 certified population was 394. In general, everyone in the City is also an ANC tribal member. The City and ANC define their public as all residents. Akiak is all-inclusive of its entire population.

The City and ANC are co-located in Akiak within the same boundaries. In general, the ANC and the City do not own any land, except for that which is specifically provided to them by the Kokarmiu Corporation. The surface land owner within Akiak boundaries is the Kokarmiu Corporation.

The sacred sites or cultural sites in the community consist of one cemetery. The other cemetery and old village site eroded away into the Kuskokwim River. Fish camps are very important sites for Yup’ik people of the Y-K Delta, where they go before salmon return to the Kuskokwim River, and cut and put up fish to dry and smoke for the long winter months. People have their fish camps located inside the City of Akiak’s boundaries.

6.2 ASSET ANALYSIS

6.2.1 Asset Inventory

Assets that may be affected by hazard events include population (for community-wide hazards), residential buildings (where data is available), and critical facilities and infrastructure. The assets and associated values throughout Akiak are identified and discussed in detail in the following subsections.

6.2.1.1 Population and Building Stock

Population data for Akiak was obtained from the 2010 U.S. Census and the DCRA. The U. S. Census reported Akiak’s population for 2010 as 346, and 2017 DCCED data reported a population of 394 (Table 17).

Table 17. Estimated Population and Building Inventory

Population		Residential Buildings	
2010 Census	DCCED 2017 Data	Total Building Count	Total Value of Buildings ¹
346	394	98	US Census: \$17,453,800 City: \$26,950,000

Sources: 2010 U.S. Census and 2017 DCCED/DCRA Certified population data.

¹ Planning Team determined the average replacement value of all single-family residential buildings to be \$275,000

per structure.

Estimated replacement values for structures, as shown in Table 18, were obtained from the 2010 U.S. Census and DCCED. A total of 98 single-family residential buildings were considered in this analysis. Ninety homes are occupied, one is for seasonal use, and seven are vacant. Akiak considered the residential replacement values were generally understated by the U.S. Census. The City and ANC considered increased replacement costs in a remote environment. The Planning Team determined a more accurate replacement estimate for the average 30 feet by 40 feet house at approximately \$275,000.

6.2.1.2 Critical Facilities and Infrastructure

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

- Government facilities, such as City and Tribal administrative offices, departments, or agencies;
- Emergency response facilities;
- Educational facilities, including K-12;
- Care facilities, such as medical clinics, congregate living health, residential and continuing care, and retirement facilities;
- Gathering places, such as community and youth centers; and
- Utilities, such as electric generation, communications, water and waste water treatment, sewage lagoons, and landfills.

The Planning Team reviewed Akiak's current critical facilities and infrastructure and determined the approximate number of occupants during any given time during a typical business day, the facilities' location within the community, estimated value, HAZUS building type, and identified those hazards which pose a potential threat to the facilities and residential properties.

Table 18. Critical Facilities

Facilities	Number of Occupants	Facilities	Address	Latitude	Longitude	Estimated Value	Building Type	Earthquake	Flood/Erosion	Changes in the Cryosphere	Severe Weather	Wildland/Conflagration Fire
Government	7	City Office	56 Niakpuk Road	Unknown	Unknown	\$750,000	W1 (24x72)	X	X	X	X	X
	15	Akiak Tribal Office	80 Airport Road	Unknown	Unknown	\$750,000	W2	X	X	X	X	X
	5	Kokarmuit Corporation Office/Multi-Purpose Office	Kilbuk Street	Unknown	Unknown	\$500,000	W1 (24x32)	X	X	X	X	X
	0	National Guard Armory	12 Mukluk Street	Unknown	Unknown	\$300,000	S1L (24x40)	X	X	X	X	X
	6	U.S. Post Office	Post Office Road	Unknown	Unknown	\$750,000	S1L	X		X	X	X
	0	Old School	Kilbuk Street	Unknown	Unknown	\$1,000,000	S1L	X	X	X	X	X
Transportation	0	Akiak Airport-gravel 03/21, 3,196' X 75', 30' Elevation	N/A	60.90481	-161.22701	\$3,700,000	ARW	X		X	X	X
	0	Snow Equipment Removal Building	Airport	Unknown	Unknown	\$607,440	AMF (30x40)	X		X	X	X
	0	Snow Equipment Removal Building	Airport	Unknown	Unknown	\$500,000	S1L (30x40)	X		X	X	X
	2	School Maintenance Building	East side Kilbuk Street	Unknown	Unknown	\$56,194	S1L	X	X	X	X	X
Emergency Response	5	Village Public Safety Office & Jail	Porks Street	60.91222	-161.21389	\$400,000	W1	X	X	X	X	X
Educational	118	Arlicaq School (P- 12)	Airport Road	Unknown	Unknown	\$13,498,704	S1L	X		X	X	X
	20	Head Start Building	Doops Street	Unknown	Unknown	\$550,000	W1, 3 sections	X	X	X	X	X
	15	Yupit School District Office	Doops Road	Unknown	Unknown	\$250,000	W1 (24x32)	X		X	X	X
Medical	20	Edith Kawagley Memorial Clinic	Post Office Road	60.88744	-161.17347	\$1,363,540	W1, Steel Siding	X		X	X	X
Community	0	Community Hall (Corporation Office)	Kilbuk Street	Unknown	Unknown	\$0	Corp Office	X	X	X	X	X
	50	Moravian Church	Dummock Street	Unknown	Unknown	\$800,000	W1 (40x60)	X		X	X	X
	20	Robert Ivan Store (#1)	Kilbuk Street	Unknown	Unknown	\$500,000	W1 (24x30)	X	X	X	X	X
	20	Kokarmuit Store #2 (Corporation Offices)	Kaku Street	Unknown	Unknown	\$400,000	W1 (24x30)	X	X	X	X	X
	4	Teachers' Quarters (City Building)	Kilbuk Street	Unknown	Unknown	\$890,788	W2	X	X	X	X	X
	1	Teachers' Trailer	Laps Street	Unknown	Unknown	\$400,000	W2	X	X	X	X	X

		(School District)												
	2	Teachers' Quarters	Laps Street	Unknown	Unknown	\$250,000	W1 (24x32)		X					
	4	Teachers' Quarters (Village Corporation)	Porks Street	Unknown	Unknown	\$250,000	W1 (24x32)	X	X	X	X	X		
	4	Teachers' Quarters (Village Corporation)	Porks Street	Unknown	Unknown	\$250,000	W1 (24x32)	X	X	X	X	X		
	4	Teachers' Quarters Duplex (Village Corporation)	Porks Street	Unknown	Unknown	\$250,000	W1 (24x34)	X	X	X	X	X		
	4	Teachers' Quarters Duplex (Village Corporation)	Porks Street	Unknown	Unknown	\$250,000	W1 (24x36)	X	X	X			X	
	4	Teachers' Quarters Duplex (Village Corporation)	Porks Street	Unknown	Unknown	\$250,000	W1 (24x36)	X	X	X	X			
	8	Teachers' Quarters 2-plex (Village Corporation)	Airport Road	Unknown	Unknown	\$400,000	W1 (24x36)	X		X	X	X		
	0	ANTHC Storage	Doops Street	Unknown	Unknown	\$150,000	W1	X		X	X	X		
	0	Cemetery 1 (Original - Lost to erosion)	N/A	Unknown	Unknown	\$0	N/A							
	0	Cemetery 2	Dummock Street	Unknown	Unknown	\$20,000	N/A	X	X	X	X	X		
Roads	0	Akiak Circle	N/A	N/A	N/A	\$3,500,000	HRD2	X			X	X		
	0	Airport Access Road		N/A	N/A			X			X	X		
	0	Ben Street		N/A	N/A			X	X		X	X		
	0	Doops Street		N/A	N/A			X	X		X	X		
	0	Dummocks Street		N/A	N/A			X			X	X		
	0	Jaup Street		N/A	N/A			X			X	X		
		Kaku Street		N/A	N/A			X			X	X		
	0	Kilbuk Street		N/A	N/A			X			X	X		
	0	Landfill Access Road	N/A	N/A	N/A			X			X	X		
	0	Laps Street		N/A	N/A			X	X	X	X	X		
	0	Mukluk Street		N/A	N/A			X	X		X	X		
	0	Nyukpuk Road		N/A	N/A			X			X	X		
	0	Porks Street		N/A	N/A			X			X	X		
	0	Post Office Road		N/A	N/A			X			X	X		
	Bridges	0	Old River Bridge (Kwiguaq)	Porks Street	Unknown	Unknown	\$450,000	Steel, gravel	X			X	X	
Utilities	0	Community Well	Doops Street	Unknown	Unknown	\$75,000	PWE	X		X	X	X		
	2	Akiak Community Water Treatment Plant	Doops Street	60.9123	-161.2124	\$1,170,000	PWTS	X		X	X	X		
	0	Potable Water Storage Tank	Doops Street	Unknown	Unknown	\$500,000	PSTS	X		X	X	X		
	0	Community Buried Waterline (9000')	Citywide	Unknown	Unknown	\$9,609,528	PWPB	X	X	X	X	X		
	0	Washeteria	Doops Street	Unknown	Unknown	\$0	W1	X		X	X	X		
	3	Akiak Power Utilities	Doops Street	Unknown	Unknown	\$5,400,000	EPPS	X		X	X	X		
	0	Consolidated Fuel Storage Tank Farm	Kilbuk Street	Unknown	Unknown	\$781,600	OTF	X	X	X	X	X		
		Fuel Tank Piping and Header	Kuskokwim River Bank	Unknown	Unknown	\$25,000	OIPE	X	X	X	X	X		
	0	Akiak Class III Municipal Landfill	Landfill Access Road	60.91126	-161.2403	\$200,000	N/A	X		X	X	X		

	0	Akiak Alternative Dumpsite #1	Dump Road	60.9158	-161.2267	\$200,000	N/A	X		X	X	X
	0	Akiak Alternative Dumpsite #2	Dump Road	60.91571	- 161.2417	\$200,000	N/A	X		X	X	X
	0	Sewage Lagoon (2 Cell)	Doops Street	Unknown	Unknown	\$1,015,000	WWTS	X		X	X	X
	0	Filter Backwash	Doops Street	Unknown	Unknown	\$500,000	WWP1	X		X	X	X
	0	Lift Station and Force Main	Citywide	Unknown	Unknown	\$400,000	WLSW	X		X	X	X
	0	Lift Station and Force Main	Citywide	Unknown	Unknown	\$400,000	WLSW	X		X	X	X
	0	Buried Arctic Sewer Line (9,000 ft)	Citywide	Unknown	Unknown	\$9,199,550	WWP1	X	X	X	X	X
	0	ACS Telephone Receiver & Tower	Dump Road	Unknown	Unknown	\$1,500,000	CBO	X		X	X	X
	0	United Utilities Telephone Satellite Dish	Dump Road	Unknown	Unknown	\$2,000,000	CBO	X		X	X	X
Total Occ	343				Total Damages:	\$53,162,794						

6.2.1.3 Non-Critical Facilities

Due to Akiak’s remote rural location, most facilities including City facilities are deemed “critical” to the community’s survival. See Table 18.

6.2.2 Assessment Exposure Analysis

Table 19 illustrates the vulnerability assessment, which includes the population and the number of residential and critical facility structures affected for each identified hazard.

Table 19. Vulnerability Overview

Hazard	Percent of Jurisdiction’s Geographic area	Percent of Population	Percent of Building Stock	Percent of Critical Facilities and Utilities
Flood/Erosion	33% (north end of the community is affected)	33% (north end of the community is affected)	33% (north end of the community is affected)	33% (north end of the community is affected)
Severe Weather	33%	33%	33%	33%
Changes in the Cryosphere	33%	33%	33%	33%
Wildland/Conflagration	25%	25%	25%	25%
Earthquake	5%	5%	5%	5%

6.3 VULNERABILITY ANALYSIS METHODOLOGY

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

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

Replacement structure and contents values were developed for physical assets. These value estimates were provided by the Planning Team. For each physical asset located within a hazard area, exposure was calculated by assuming the worst-case scenario (that is, the asset would be completely destroyed and would have to be replaced). Finally, the aggregate exposure, in terms of replacement value or insurance coverage, for each category of structure or facility was estimated. A similar analysis was used to evaluate the proportion of the population at risk. However, the analysis simply represents the number of people at risk; no estimate of the number of potential injuries or deaths was prepared.

There is limited GIS data available for Akiak. The results of the GIS-based exposure analysis for loss estimations in the community are summarized in Tables 20 and 21.

Table 20. Potential Hazard Exposure Analysis – Critical Facilities

Hazard Type	Methodology	Government and Emergency Response		Educational		Medical		Community	
		# Bldgs/ # Occ	Value (\$)	# Bldgs/ # Occ	Value (\$)	# Bldgs/ # Occ	Value (\$)	# Bldgs/ # Occ	Value (\$)
Changes in the Cryosphere	Descriptive	6/38	4,450,000	3/153	14,298,704	1/20	1,363,540	16/125	5,060,788
Flood/Erosion	Within 300 ft of erosion areas	5/32	3,700,000	1/20	550,000	0/0	0	12/67	3,710,786
Severe Weather	Descriptive	6/38	4,450,000	3/153	14,298,704	1/20	1,363,540	16/125	5,060,788
Wildland/Conflagration Fire	Descriptive	6/38	4,450,000	3/153	14,298,704	1/20	1,363,540	16/125	5,060,788
Earthquake	Descriptive	6/38	4,450,000	3/153	14,298,704	1/20	1,363,540	16/125	5,060,788

Table 21. Potential Hazard Exposure Analysis – Critical Infrastructure

Hazard Type	Methodology	Highway		Bridges		Transportation Facilities		Utilities	
		Miles	Value (\$)	No.	Value (\$)	# Bldgs/ # Occ	Value (\$)	# Facilities /# Occ	Value (\$)
Changes in the Cryosphere	Descriptive	Unknown	3,500,000	1	450,000	4/2	4,863,634	18/5	33,175,678
Flood/Erosion	Within 300 ft of erosion areas	0/0	0	0/0	0	1/2	56,194	4/0	19,615,678
Severe Weather	Descriptive	Unknown	3,500,000	1	450,000	4/2	4,863,634	18/5	33,175,678
Wildland/ Conflagration Fire	Descriptive	Unknown	3,500,000	1	450,000	4/2	4,863,634	18/5	33,175,678
Earthquake	Descriptive	Unknown	3,500,000	1	450,000	4/2	4,863,634	18/5	33,175,678

6.4 DATA LIMITATIONS

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

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

6.5 EXPOSURE ANALYSIS – HAZARD NARRATIVE SUMMARIES

Population Percentages

The population that could be affected by each of the identified hazards is used in determining the anticipated loss. Many older residents remain active in subsistence activities, while village youth have become dependent on modern infrastructure and commercial food supplies. It was the consensus that in a worst-case scenario, even residents living a more traditional lifestyle will be affected due to the isolation of the community and the dire needs of their relatives and neighbors. Should all critical facilities be lost, some residents may find relocation is their only option. Also, flooding/erosion and changes in the cryosphere are the community's highest concerns.

Critical and Essential Facilities

Akiak is an isolated village. Bethel, the nearest community with resources, is 42 air miles away. During a natural disaster, outside resources may be unavailable due to weather and accessibility. Additionally, surrounding villages may also be suffering from the same disaster. In a worst-case scenario, Akiak will need to rely only on local resources.

A summary of hazard vulnerabilities follows. Hazards are listed in the order of priority assigned by the Akiak community.

Floods/Erosion

Akiak is located adjacent to the Kuskokwim River. All development near the riverbank is threatened by flooding and erosion. The Tribal Council stated they believe "the entire community is located within the 100-year floodplain." However, no detailed 100-year flood analysis has been prepared for the community.

The 2018 State of Alaska HMP categorizes the Akiak area at risk of experiencing high flooding and erosion impacts (see Section 5.3.3). Akiak does not participate in the NFIP.

For this vulnerability analysis, it is assumed that 33% of the population and residential/commercial structures from Tables 17 and 18 will be affected. This includes 130 people in 33 residences (worth \$8,893,500) and 17 critical and essential facilities (worth approximately \$17,543,722).

Similar to severe weather and changes in the cryosphere vulnerabilities, changing floods/erosion conditions vary across Alaska and are already critically affecting Akiak. Therefore, the current and future populations, residential structures, critical and essential facilities, and infrastructure are more vulnerable to recurrent floods/erosion hazard impacts.

Akiak has lost as much as 115 feet of riverbank since 2012. The community has decided they must retreat from the Kuskokwim River to save their lives and property.

Changes in the Cryosphere

The integrity of all community structures is dependent upon a secure foundation. Compromised housing and infrastructure would have a greater effect on those residents living a less

traditional lifestyle. Buildings built close to the river are in greatest danger due to erosion.

The 2018 State of Alaska HMP categorizes the Akiak area at risk of experiencing changes in the cryosphere. For this vulnerability analysis, it is assumed that 33% of the population and residential/ commercial structures from Tables 17 and 18 will be affected. This includes 130 people in 33 residences (worth \$8,893,500) and 17 critical and essential facilities (worth approximately \$17,543,722).

Similar to weather vulnerabilities, changing cryospheric conditions also vary across Alaska and are already affecting Akiak. Therefore, the current and future populations, residential structures, critical and essential facilities, and infrastructure are more vulnerable to recurrent cryosphere hazard impacts.

Severe Weather

Storms, storm surge, and high winds are particularly hazardous and contribute to infrastructure failure. For Akiak, storm surge and high winds are linked to storms due primarily to fall/winter storms and spring melt run-off.

The 2018 State of Alaska HMP categorizes the Akiak area at risk of experiencing high severe weather impacts. Section 5.3.4 provides additional detail regarding the impacts of severe weather. Using information provided by Akiak and the NWS, it is assumed that 33% of the population and residential/ commercial structures from Tables 17 and 18 will be affected. This includes 130 people in 33 residences (worth \$8,893,500) and 17 critical and essential facilities (worth approximately \$17,543,722).

Similar to flood/erosion conditions and changes in the cryosphere vulnerabilities, severe weather conditions also vary across Alaska and are already critically affecting Akiak. Therefore, the current and future populations, residential structures, critical and essential facilities, and infrastructure are more vulnerable to severe weather. Climate change will negatively continue to influence weather patterns which will result in significant impacts to current and future populations.

Wildfire and Conflagration Fires

Wildland and conflagration fires, with an inadequate fire prevention response, could potentially result in the loss of all community structures. Neither of these types of fires have occurred in Akiak. For this vulnerability analysis, it is assumed that 25% of the population and residential/commercial structures from Tables 17 and 18 will be affected. This includes 99 people in 25 residences (worth \$6,875,000) and 13 critical and essential facilities (worth approximately \$13,290,699).

The 2018 State of Alaska HMP categorizes the Akiak area at risk of experiencing moderate fire impacts (Section 5.3.5). Hotter, drier summers also increase the probability of conflagration fires. Therefore, the current and future populations, residential structures, critical and essential facilities, and infrastructure located in dryer regions of Alaska are anticipated to experience increased fire events over time.

Earthquake

Alaska should expect the full spectrum of potential earthquake ground motion scenarios. Although all structures are at some risk due to earthquakes, short wooden buildings are less vulnerable than multi-story and complex masonry/steel structures. The majority of Alaska's schools, State, and Federal buildings are built and sited based on stringent seismic construction standards and are expected to survive major earthquake events. Earthquakes felt in the Akiak area have never caused any damage.

The 2018 State of Alaska HMP categorizes the Akiak area at risk of experiencing moderate earthquake impacts (see Section 5.3.2). For this vulnerability analysis, it is assumed that 5% of the population and residential/commercial structures from Tables 17 and 18 will be affected. This includes 20 people in five residences (worth \$1,347,500) and five critical and essential facilities (worth approximately \$1,020,000).

Impacts to the community such as significant ground movement that may result in infrastructure damage are not expected. Minor shaking may be seen or felt. Although all structures are exposed to earthquakes, buildings within Akiak constructed with wood have slightly less vulnerability to the effects of earthquakes than those with masonry.

Akiak does not desire to develop mitigation actions for earthquakes in the next section of this 2019 HMP.

6.6 REPETITIVE LOSS PROPERTIES

This subsection estimates the number and type of structures at risk to repetitive flooding.

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

ELEMENT B. NFIP Insured Structures
B4. Does the Plan address NFIP-insured structures within the jurisdiction that have been repetitively damaged by floods? C2. Does the Plan address each jurisdiction’s participation in the NFIP and continued compliance with NFIP requirements, as appropriate?
Source: FEMA, 2015.

Neither the City nor ANC participate in the NFIP.

6.7 LAND USE AND DEVELOPMENT TRENDS

6.7.1 Akiak Land Use

The requirements for land use and development trends, as stipulated in DMA 2000 and its implementing regulations, are described below.

DMA 2000 Requirements
Plan Review and Updates §201.7(d)(3): Tribal governments must review and revise their plan to reflect changes in development, progress in local mitigation efforts, and changes in priorities.
1. REGULATION CHECKLIST
ELEMENT D. HMP Updates
D1. Was the plan revised to reflect changes in development? D2. Was the plan revised to reflect progress in tribal mitigation efforts? D3. Was the plan revised to reflect changes in priorities?
Source: FEMA, 2015.

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

6.7.2 Akiak Development Trends

Akiak’s community goal is to develop a new housing subdivision behind the existing school and airport. This area is located over 2,100 linear feet from the main Kuskokwim River areas experiencing erosion and thus would not be subject to erosion. While the planned project area is within the flood of record floodplain, it is not subject to seasonal breakup erosion (ANTHC, 2018).

The community has been fortunate to have infrastructure improvements in the past decade by

the BIA-Tribal Transportation Program for community-wide roads by the Alaska Native Tribal Health Consortium (ANTHC) for water and sewer system improvements and the Alaska Energy Authority for power plant and distribution system improvements. These all serve as the backbone for development of the proposed subdivision. Furthermore, the community has benefited from the construction of six new homes funded by the U.S. Housing and Urban Development (HUD). Unfortunately, there was insufficient funding to provide these HUD homes with water and sewer service. The HUD homes are located adjacent to where the new subdivision will be developed, and the ANC is working with sanitation funders to extend water and sewer mains to serve both the HUD homes and the new subdivision (presently unfunded).

Existing Water Main Loop 1 @ Existing Sewer Mains A, B, C, and D: ANTHC constructed two circulating water mains, of which Water Main Loop 1 serves homes nearest the river. Water Main Loop 1 is, in general, located parallel to the river. Furthermore, ANTHC constructed four sewer mains that run perpendicular to the river. When the community relocates homes from the river (Section 7), the water, sewer, and power lines will be disconnected. In addition, the sewer mains will be “pulled back” from the river (i.e., excavated out) so as not to allow the river to flow into the sewer mains. The sewer work anticipated is straight forward. However, a plan of how to pull back and/or reroute Water Main Loop 1 is necessary to respond to erosion of the riverbank. This entails how, or not, to continue water service to existing homes that may be impacted by relocating or changing the configuration of Water Main Loop 1.

Existing City Bulk Fuel Farm: The existing bulk fuel farm is located approximately 600 feet from the river’s edge. While the bulk fuel tanks are in relatively good shape and have more design life left, relocating the bulk fuel farm is more of a logistical challenge than moving homes.

2018 Preliminary Engineering Report: ANTHC completed a Preliminary Engineering Report (PER) that analyzed four separate alternatives for serving the six HUD homes and eight lots (the beginning of the proposed subdivision). However, the recent erosion event has convinced the community that a much larger subdivision is necessary. Towards this end, the Kokarmiut Corporation has committed to the City as prescribed by ANCSA for a larger subdivision.

While the 2018 PER is sufficient for the modest subdivision proposed, it is incomplete for the larger subdivision, as recently envisioned by the community. Specifically, the 2018 PER found that the existing water and sewer system can be readily expanded to serve up to 14 new homes. With a larger subdivision, the water storage, lift station capacity, piping hydraulics, and other elements that were sufficiently sized for the six homes need to be expanded for the expanded subdivision. In addition, the 2018 PER is silent on road and power improvements.

Solid Waste Site & Honey Bucket Lagoon: The community’s existing solid waste site and honey bucket lagoon are located adjacent to the proposed subdivision and very near to the recently constructed HUD homes. Both the solid waste site and honey bucket lagoon, by close proximity to housing, are a community health hazard. Consequently, development of a new subdivision will require relocation of these community assets further from housing.

The community of Akiak needs to undertake these development trends within the next two years as the Kuskokwim River is anticipated to advance.

7.0 Mitigation Strategy

This section outlines the six-step process for preparing a mitigation strategy including:

1. Identifying each jurisdiction’s existing authorities for implementing mitigation action initiatives;
2. NFIP Participation;
3. Developing Mitigation Goals;
4. Identifying Mitigation Actions;
5. Evaluating Mitigation Actions; and
6. Implementing MAP Strategies.

DMA 2000 Requirements
<p>Identification and Analysis of Mitigation Actions</p> <p>§201.7(c)(3)(i): Does the plan include a description of mitigation goals to reduce or avoid long-term vulnerabilities to the identified hazards?</p> <p>§201.7(c)(3)(ii): [The mitigation strategy shall include a] section that identifies and analyzes a comprehensive range of specific mitigation actions and projects being considered to reduce the effects of each hazard, with particular emphasis on new and existing buildings and infrastructure.</p> <p>§201.7(c)(3)(iii): [The hazard mitigation strategy shall include an] action plan, describing how the action identified will be prioritized, implemented, and administered by the Tribal government.</p> <p>§201.7(c)(3)(iv): 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?</p> <p>§201.7(c)(3)(v): Does the plan include a discussion of tribal funding sources for hazard mitigation projects and current and potential sources of Federal, tribal, or private funding to implement mitigation actions?</p>
ELEMENT C. Mitigation Strategy
<p>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?</p> <p>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?</p> <p>C3. Does the Plan include goals to reduce/avoid long-term vulnerabilities to the identified hazards?</p> <p>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?</p> <p>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?</p> <p>C6. 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?</p>
Source: FEMA, 2015

7.1 DEVELOPING MITIGATION GOALS

The exposure analysis results were used as source material (Section 6) for developing mitigation goals and actions. Mitigation goals are long-range, policy-oriented statements representing community-wide visions. As such, the ANC developed goals in 2019 to reduce or avoid long-term vulnerabilities to identified hazards (Table 22).

Table 22. ANC Mitigation Goals

No.	Goal Description
Natural Hazards	
FL&ER 1	Reduce the possibility of damage and losses from flooding and erosion by implementing a managed retreat.
CC 2	Reduce the possibility of damage and losses from changes in the cryosphere.
SW 3	Reduce the vulnerability of structures to severe weather damage.
W&CF 4	Reduce the possibility of damage and losses from wildland and conflagration fires.

7.2 IDENTIFYING MITIGATION ACTIONS

Mitigation actions are activities, measures, or projects implemented to achieve the goals of a mitigation plan. Mitigation actions are grouped into three broad categories: property protection, public education and awareness, and structural projects. On July 29, 2019, the Planning Team reviewed their mitigation actions for this HMP (Table 23). The Planning Team placed particular emphasis on projects and programs that reduce the effects of hazards on both new and existing buildings and infrastructure.

Table 23. Mitigation Goals and Related Actions

Goal		Actions	
No.	Description	Status <i>Considered</i> <i>Selected</i> <i>Ongoing</i>	Description
	Reduce the	C	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.
		C	Harden culvert entrance bottoms with asphalt, concrete, rock, or similar material to reduce erosion or scour.

F&E 1	possibility of damage and losses from flooding and erosion by implementing a managed retreat.	C	Install wing walls at the end of a drainage structure to prevent embankment erosion at its entrance or outlet (end- or wing-walls).
		X	Develop realistic and fundable river sediment management project within the main channel to divert water away from the "Short-cut" channel. This will keep the river in its main channel to reduce city erosion.
		S	Elevate residential, public, or critical facilities at least two feet above the Base Flood Elevation (BFE)
		C	Dry flood-proof historical, residential, and/or non-residential structures.
		C	Increase culvert sizes to increase their drainage capacity or efficiency.
		X	Construct debris basins to retain debris in order to prevent downstream drainage structure clogging.
		C	Install debris cribs over culvert inlets to prevent inflow of course bed-load and light floating debris.
CC2	Reduce the possibility of damage and losses from changes in the cryosphere.	S	Since changes in the cryosphere are causing the flood/erosion increase, these two goals will be combined into one.
SW 3	Reduce the vulnerability of structures to severe weather damage.	S	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.
		S	Develop personal use and educational outreach training for a "safe tree harvesting" program. Implement along utility and road corridors to prevent or reduce potential winter storm damage.
W&CF 4	Reduce the possibility of damage and losses from wildland and conflagration fires.	C	Develop an evacuation plan for the community.
		C	Educate the public on ways to prevent fires.

7.3 EVALUATING AND PRIORITIZING MITIGATION ACTIONS

The Planning Team evaluated and prioritized each local hazard and corresponding mitigation action on June 10, 2019. The selected mitigation actions are included in the Mitigation Action Plan (MAP). The MAP represents mitigation projects and programs to be implemented through the cooperation of the community. Neither the City or ANC has laws, regulations, policies, and programs that pertain to hazard mitigation.

The Planning Team reviewed the simplified social, technical, administrative, political, legal, economic, and environmental (STAPLEE) evaluation criteria (shown in Table 24) and the Benefit-Cost Analysis Fact Sheet (Appendix E) considering the opportunities and constraints of each mitigation action. Each action considered for implementation is accompanied by a qualitative statement addressing the benefits, costs, and, where available, a technical feasibility study. A detailed cost-benefit analysis is anticipated as part of the project application process.

Table 24. Evaluation Criteria for Mitigation Actions

Social, Technical, Administrative, Political, Legal, Economic, and Environmental (STAPLEE)

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 appropriate personnel and administrative capabilities or if outside help is necessary.	Staffing Funding allocation Maintenance/operations
Political	Public perceptions 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 current or future funding sources may be applied. If the costs seem reasonable for the size of the project. 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 June 10, 2019, the Planning Team prioritized mitigation actions according to the hazard vulnerability assessment. The Team selected a high, medium, and low rating system. Actions receiving a high priority address hazards impacting the community on an annual or near annual basis and damage critical facilities or people. Actions receiving a medium priority address hazards impacting the community less frequently and are typically not a threat to critical facilities or people. Actions receiving a low priority rarely impact the community and have rarely impacted critical facilities or people.

If no mitigation actions from Table 25 are implemented, Akiak will continue to be vulnerable to all hazards identified in Section 5 and the risks associated with those hazards in Section 6. If mitigation actions from Table 25 are implemented, Akiak will become a resilient community in retreat that is prepared for potential hazards identified and profiled in Section 5 and the risks associated with those hazards in Section 6.

Table 25 contains statuses, priorities, responsible agencies, potential funding sources, and timelines for mitigation actions selected to be implemented.

7.4 IMPLEMENTING A MITIGATION ACTION PLAN

Table 25. Mitigation Action Priority Matrix

Goals		Rank	Action Number and Action
1	Reduce possibility of damage and losses from flooding and erosion by implementing a managed retreat.	HIGH	FL&ER 1 – Home Relocation Level 1: Seven homes nearest the river, and the infrastructure serving these homes will need to move first. One home is not structurally sound in its present condition to move. Existing infrastructure (power, water, and sewer lines) will need to be disconnected and relocated to the new subdivision. Three of these homes will need to be significantly braced prior to relocation. The one home that is very close to the riverbank (which is structurally sound) must be moved before the 2020 spring melt or it will likely be in the river.
			FL&ER 2 – Close out Existing Solid Waste Site/ Development of a New Solid Waste Site: The existing 30-year old solid waste site prevents reasonable development of a new subdivision. Closing out the existing solid waste site and building a new solid waste site (and access road) will allow for the development of the new housing subdivision.
			FL&ER 3 – Development of a new community subdivision: No platted lots are available in Akiak to relocate existing homes from the riverbank. Kokarmiut Corporation, as the largest surface landowner in the community, is working on the ANCSA 14(c)(3) process to make available vacant lots the six homes that are readily moveable.
			FL&ER 4 – Home Relocation Level 2: Additional homes (the total number isn't known as scientists need to determine where the river erosion will stop) and a water main loop (Loop #1) that will be in jeopardy within a few years must be relocated to the new subdivision. Abandonment of the water main means many homes that are not in immediate peril will lose community water service. A mid-term solution will be required to address this concern.
			FL&ER 5 – Home Relocation Level 3: Additional homes that do not need to be relocated (i.e., these homes are already located far enough from where the river erosion will stop), will be elevated in place to mitigate potential flooding.
			FL&ER 6 – Riverbank stabilization: Research other activities that will reduce the pace of the river claiming more riverbank. Some federal agencies are advocates of conservation districts where infrastructure is relocated, and the land is contoured and planted to resist erosion (with no future development). In Akiak, the riverbank is destabilized by two actions. The first is the structural scouring of the riverbank at the river's edge. The second is the high riverbank (between five to ten feet) that collapses due to the unstable slope, and by paring the slope back this second form of

			destabilization is minimized.
			FL&ER 7 – The community would like to study the effects that the proposed Donlin Gold barge will add to the erosion rate of the channel in the river. The life of the Donlin Gold barge is 30 years, and four barges twice a day will be traveling in front of Akiak for 30 years. What will this additional traffic add to the existing riverbank erosion?
			FL&ER 8 – Kuskokwim River Morphology: Both the USACE in 2009 and NRCS in 2013 have carried out erosion studies and impacts to the community by changing river morphology. A close reading between the two reports demonstrates a difference of opinion between the two agencies with NRCS estimating a very costly \$80+M solution to the bank destabilization (a massive rock revetment effort) and USACE estimating a modest \$3.4M revetment solution. Furthermore, there are rapidly changing variables that may have impacted the river morphology. These include: the increased flows in Kuskokuak Slough between Akiak and Kwethluk (which may impact upriver flow dynamics above Akiak), an increase in flow in the easterly Kuskokwim River channel just above Akiak, gravel barge operators who unload gravel in the river upriver from Akiak when they run aground, and the delay in ice developing along the river’s edge in the fall time. In the past several years, the Kuskokwim River main channel has moved to the Akiak river side as opposed to the historic main channel flow on the easterly side of the river. Recently, NRCS staff carried out bathymetric survey of the river and found the river to be approximately 60 feet deep in front of the community (~ 100 feet from the shoreline) where the recent erosion started. The ANC will pursue partnerships in an effort to understand the local river morphology changes in Akiak as well as the larger question of what is happening to a number of villages along the river. Fundamentally, the community seeks an answer to this question – where will the river stabilize and stop. In other words – how far do they retreat.
			FL&ER 9 – The lower portion of the river by the airport has erosion and needs to be addressed. Since the early 1980s, the channel has changed due to barges getting stuck and subsequently, unloading gravel into the river. The channel has changed every year, and one year, a barge could not travel at all and was stuck for an entire year.
			FL&ER 10 – The 5,000-gallon fuel tank by the current school has gasoline. This tank is within 100 feet from today’s riverbank and is not connected to the school’s diesel tank pipeline. This tank needs to be removed.
2	Reduce the vulnerability of structures to severe weather damage.	HIGH	SW 1 – Finalize Small Community Emergency Response Plan that has been written and requires adoption.

3	Reduce the possibility of damage and losses from wildland and conflagration fires.	MODERATE	W1 – Identify methods of alerting the community if wildfire threat develops.
			W2 – Develop an evacuation plan for the community.
			W3 – Replace Project Code Red Equipment. Akiak received Code Red equipment that entails mobile carts trailerable with a snowmobile or ATV. This equipment is housed in a 10 ft connex van that is insulated and heated. No maintenance has been done due to lack of funding. Equipment has either been stolen or has degraded. Replace Project Code Red Equipment.
			W4 – Promote FireWise building design, sites, and construction materials.
			W5 – Ongoing maintenance of existing firebreaks.
			W6- Hydrants are not included in the new subdivision, and there are vulnerable areas within Akiak that need hydrants. Add hydrants.
			W7 – Replace fire extinguishers that have been used.

Table 26. Funding Sources

FL&ER1	Action Item	Home Relocation Level 1: Six homes nearest the river, and the infrastructure serving these homes will need to move first. Existing infrastructure (power, water, and sewer lines) will need to be disconnected and relocated to the new subdivision which has not yet been developed.
	Ranking	High
	Department	Tribal Administrator
	Potential Funding Source	BIA, HUD, HMGP, PDM, Congress, State of Alaska, NRCS
	Implementation Timeline	2019-2020
	Benefit-Costs	These homes will eventually be lost in the near future. Relocating these homes prevents loss of life and property.
FL&ER2	Action Item	Close out Existing Solid Waste Site/ Development of a New Solid Waste Site: The existing 30-year old solid waste site prevents reasonable development of a new subdivision. Closing out the existing solid waste site and building a new solid waste site (and access road) will allow for the development of the new housing subdivision.
	Ranking	High
	Department	Tribal Administrator
	Potential Funding Source	BIA, HUD, HMGP, PDM, Congress, State of Alaska, IHS, EPA, USDA, VSW
	Implementation Timeline	2019-2020
	Benefit-Costs	These homes will eventually be lost in the near future. Relocating these homes prevents loss of life and property.
FL&ER3	Action Item	Development of a new community subdivision: No platted lots are available in Akiak to relocate existing homes from the riverbank. Kokarmiut Corporation, as the largest surface landowner in the community, is working on the ANCSA 14(c)(3) process to make available vacant lots the six homes that are readily moveable.
	Ranking	High
	Department	Tribal Administrator
	Potential Funding Source	BIA, HUD, HMGP, PDM, Congress, State of Alaska, IHS, EPA, USDA, VSW
	Implementation Timeline	2019-2020
	Benefit-Costs	Homes will eventually be lost in the near future. Relocating these homes to a safe place in the community prevents loss of life and property.
FL&ER4	Action Item	Home Relocation Level 2: Additional homes (the total number isn't known as scientists need to determine where the river erosion will stop) and a water main loop that will be in jeopardy within a few years must be relocated to the new subdivision. Abandonment of the water main means many homes that are not in immediate peril will lose community water service. A mid-term solution will be required to address this concern.
	Ranking	High
	Department	Tribal Administrator
	Potential Funding Source	BIA, HUD, HMGP, PDM, Congress, State of Alaska
	Implementation Timeline	2019-2024
	Benefit-Costs	This mitigation action addresses buildings at risk of destruction due to forces caused by erosion. Significant environmental impacts will occur if homes are allowed to continue to erode into the river. Once homes, sheds, and other property end up in the river, fuel, hazardous material, human waste, snow machines, ATVs, and boats could be released into the river. Exposure of hazardous wastes in the river could contaminate drinking water, fish, and birds. Costs

		from environmental cleanup, medical costs related to injuries or deaths, and costs of residents' relocation could result in much higher costs than avoiding the relocation of homes at all.
FL&ER 5	Action Item	Home Relocation Level 3: Additional homes that do not need to be relocated (i.e., these homes are already located far enough from where the river erosion will stop), will be elevated in place to mitigate potential flooding.
	Ranking	High
	Department	Tribal Administrator
	Potential Funding Source	BIA, HUD, HMGP, PDM, Congress, State of Alaska
	Implementation Timeline	2019-2024
	Benefit-Costs	This mitigation action allows buildings to remain in their current locations (less expensive option than relocation), yet protects them from flooding damages.
FL&ER 6	Action Item	Riverbank stabilization: In Akiak, the riverbank is destabilized by two actions. The first is the structural scouring of the riverbank at the river's edge. The second is the high riverbank (between five to ten feet) that collapses due to the unstable slope, and by paring the slope back this second form of destabilization is minimized. NCRS will evaluate the appropriateness of conservation districts and other ideas for reducing the pace of bank destabilization.
	Ranking	High
	Department	Tribal Administrator
	Potential Funding Source	NCRS
	Implementation Timeline	In progress now
	Benefit-Costs	This may be a less-expensive alternative and save time.
FL&ER 7	Action Item	The community would like to study the effects that the proposed Donlin Gold barge will add to the erosion rate of the channel in the river. The life of the Donlin Gold barge is 30 years, and four barges twice a day will be traveling in front of Akiak for 30 years. What will this additional traffic add to the existing riverbank erosion?
	Ranking	High
	Department	Tribal Administrator
	Potential Funding Source	Donlin Gold, Corporation
	Implementation Timeline	2019
	Benefit-Costs	This would allow the community peace of mind in knowing all aspects of the big picture concerning future flooding/erosion of the Kuskokwim River.
FL&ER 8	Action Item	The ANC will pursue partnerships in an effort to understand the local river morphology changes in Akiak as well as the larger question of what is happening to a number of villages along the river. Fundamentally, the community seeks an answer to this question – where will the river stabilize and stop. In other words – how far do they retreat.
	Ranking	High
	Department	Tribal Administrator
	Potential Funding Source	FEMA RiskMap, NCRS, State of Alaska
	Implementation Timeline	2019
	Benefit-Costs	This would allow the community peace of mind in knowing all aspects of the big picture concerning future flooding/erosion of the Kuskokwim River.

FL&ER 9	Action Item	The lower portion of the river by the airport has erosion and needs to be addressed. Since the early 1980s, the channel has changed due to barges getting stuck and subsequently, unloading gravel into the river. The channel has changed every year, and one year, a barge could not travel at all and was stuck for an entire year. Study this area.
	Ranking	High
	Department	Tribal Administrator
	Potential Funding Source	HMGP Seed Money
	Implementation Timeline	2019
	Benefit-Costs	This would allow the community peace of mind in knowing all aspects of the big picture concerning future flooding/erosion of the Kuskokwim River.
FL&ER 10	Action Item	The 5,000-gallon fuel tank by the current school has gasoline. This tank is within 100 feet from today's riverbank and is not connected to the school's diesel tank pipeline. This tank needs to be removed.
	Ranking	High
	Department	Yupit School District
	Potential Funding Source	Yupit School District
	Implementation Timeline	2019-2020
	Benefit-Costs	Significant environmental impacts will occur if gasoline enters river. Exposure of hazardous wastes in the river could contaminate drinking water, fish, and birds.
SW1	Action Item	Finalize Small Community Emergency Response Plan that has been written and requires adoption.
	Ranking	High
	Department	Tribal Administrator
	Potential Funding Source	The ANC
	Implementation Timeline	2019
	Benefit-Costs	This plan has already been developed and simply requires adoption.
W1	Action Item	Identify methods of alerting the community if wildfire threat develops.
	Ranking	Moderate
	Department	Fire Chief
	Potential Funding Source	The ANC
	Implementation Timeline	2019
	Benefit-Costs	Planning saves lives in case of an emergency.
W2	Action Item	Develop an evacuation plan for the community.
	Ranking	Moderate

	Department	Fire Chief
	Potential Funding Source	Denali Commission, FEMA
	Implementation Timeline	2019
	Benefit-Costs	Planning saves lives in case of an emergency.
W3	Action Item	Replace Project Code Red Equipment.
	Ranking	Moderate
	Department	Fire Chief
	Potential Funding Source	Staffing for Adequate Fire and Emergency Response (SAFER) Grant
	Implementation Timeline	2019
	Benefit-Costs	Planning saves lives in case of an emergency.
W4	Action Item	Promote FireWise building design, sites, and construction materials.
	Ranking	Moderate
	Department	Fire Chief
	Potential Funding Source	HMGP
	Implementation Timeline	2019
	Benefit-Costs	Planning saves lives in case of an emergency.
W5	Action Item	Ongoing maintenance of existing firebreaks.
	Ranking	Moderate
	Department	Fire Chief
	Potential Funding Source	The ANC
	Implementation Timeline	2019
	Benefit-Costs	Planning saves lives in case of an emergency.
W6	Action Item	Hydrants are not included in the new subdivision, and there are vulnerable areas within Akiak that need hydrants. Add hydrants.
	Ranking	Moderate
	Department	Fire Chief
	Potential Funding Source	DoF, Rural Firefighter Grant
	Implementation Timeline	2019
	Benefit-Costs	Planning saves lives in case of an emergency.

W7	Action Item	Replace fire extinguishers that have been used.
	Ranking	Moderate
	Department	Fire Chief
	Potential Funding Source	DoF, Rural Firefighter Grant
	Implementation Timeline	2019
	Benefit-Costs	Planning saves lives in case of an emergency.

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Appendix A: Public Participation

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**MEMORANDUM OF UNDERSTANDING
BETWEEN
AKIAK NATIVE COMMUNITY
AND
CITY OF AKIAK
AND
KOKARMIUT CORPORATION**

**FOR
A Common Community Approach to Akiak Disaster Response, Recovery and Mitigation
And Other Community Development Projects and Activities**

May 2019

Background

The Akiak Native Community (ANC) is recognized by the US Bureau of Indian Affairs (BIA) as the tribe serving tribal members in Akiak; the City of ^{AKIAK} Alaska (City) is recognized by the State of Alaska as a Second Class City; and Kokarmiut Corporation (Corporation) is a village corporation (as defined by the Alaska Native Claims Settlement Act) and is a significant community surface land owner. Hereafter, the three organizations shall be collectively referred to as the Parties.

This is not an enforceable legal agreement. The Parties may develop separate, more detailed agreements as needed. Efforts under this agreement shall be consistent with applicable federal, state, local and tribal law and regulations, and are subject to the availability of duly appropriated funds. Nothing in this agreement will alter, impede, or interfere with the authorities and procedures of the organizations involved in implementing their respective responsibilities, authorities, and missions.

Purpose

The Parties desire to work together to ensure the efficient, effective and economical response to increasing community threats from erosion, flooding and permafrost degradation. In general, the Parties support a community approach of “protect in place” as opposed to relocation of the entire community as a result of riverbank erosion from the Kuskokwim River and associated flooding events. Specifically, a community approach of retreating from the Kuskokwim River to higher and safer ground is one of the most likely solutions to responding to increasing environmental threats.

In addition, the Parties recognize the value of combined efforts for other community development projects that may support disaster response, recovery and mitigation projects and activities.

The Parties understand that in a time of limited State and Federal funding there is value in having a common community approach and coordinating investments and mutually prioritizing community development projects and activities. Furthermore, the Parties understand (that in a multi-

agency/multi-jurisdictional disaster framework) timely response to environmental threats is best achieved if managed and coordinated locally with external support from State, Federal and other stakeholder agencies/organizations (i.e. few State and Federal agencies have a broad community development mandate with corresponding legislative authorities and appropriations).

Guiding Principles

The Parties agree to the following principles.

1. The Parties will respond to each other promptly to requests for meetings and information exchange with respect to Akiak disaster mitigation and community development projects and activities. Likewise, the Parties agree to share State, Federal and other stakeholder agencies/organizations information as it is provided to one of the Parties.
2. The Parties will seek funding support for a community coordinator for disaster response, recovery and mitigation projects and activities. The coordinator will be central to information exchange as discussed in Paragraph No. 1, above.
3. The Parties recognize the importance of developing community infrastructure and infrastructure-related programs, projects and activities that will have a positive, lasting effect for Akiak. The Parties agree to communicate and coordinate project planning, pre-development, site planning, design and construction processes.
4. The Parties recognize the value of meaningful private sector development. The Parties agree to coordinate on activities and appropriate contracting vehicles which can stimulate economic growth with a preference for local businesses, regional businesses, and Alaska businesses.
5. The Parties will strive to collectively agree on priority projects and activities to address environmental threats. Three key documents that will initially serve to start these discussions follow: a) An Assessment of Streambank Erosion and a Revetment Concept Design on the Kuskokwim River at Akiak, Alaska – a Natural Resources Conservation Service report dated April 2013, b) City of Akiak Hazard Mitigation Plan (HMP) – a document prepared with funding from the Federal Emergency Management Administration (FEMA) and dated June 2013, and c) Community Erosion Assessment – Akiak Alaska – a document prepared by the US Army Corps of Engineers and dated January 2009.
6. The Parties understand that the June 2013 HMP document has lapsed and must be reviewed, updated and then submitted to FEMA for approval. This is a priority activity facing the Parties.

- 7. Workforce development is critical to long term operation and maintenance of community infrastructure. The Parties agree to coordinate on programs and policies that promote local skilled workforces.

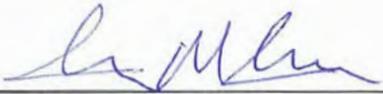
Effective Date/Modifications

This document is effective for five years after the last date of signature. Each Party may sign on a separate page to streamline the signature process. Amendments or additional appendices may be developed and implemented by mutual agreement at any time, without renegotiating the entire agreement. A Party may also terminate its participation in this agreement by providing 30 days written notice to the other Parties.

Signatures

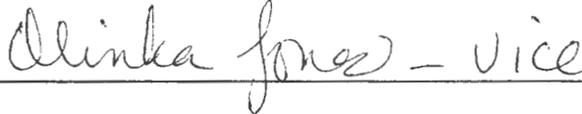
IN THE WITNESS WHEREOF, the parties have subscribed their names

May 17, 2019
Date



Tribal Chief
Akiak Native Community

May 18, 2019
Date



Mayor
City of Akiak

May 18, 2019
Date



Chief Executive Officer
Kokarmiut Corporation

AKIAK NATIVE COMMUNITY
AKIAK IRA COUNCIL
P.O. BOX 52127
AKIAK, ALASKA 99552
PHONE: (907)765-7112 FAX (907) 765-7512

May 30, 2019

Special Joint Akiak IRA Council/City of Akiak/Kokarmuit Meeting

I. Meeting called to order @ 1:47 p.m. by Akiak IRA Chief Ivan M. Ivan.

II. Roll Call: Akiak IRA Council: James Nicolai, Michael Williams, Ivan M. Ivan, Moses Owen and Sam Jackson II. Quorum established. City of Akiak Council: Ida Jasper, Robert Williams, Lenora Gilila, Anna Ivan, Debra Jackson, and Olinka Jones. Quorum established. Dora Kozenvnikoff excused. Kokarmuit Board: Jackson Williams, David Gilila, Anna Ivan, Robert Williams and Sam Jackson I. Quorum established. Guests: Joel Neimeyer, Jeff Oatley and Ryan Maroney.

III. Invocation by Moses Owen.

IV. Approval of Agenda: MICHAEL WILLIAMS MOVED TO APPROVE AGENDA. SAM JACKSON II SECONDED. ALL IN FAVOR. MOTION CARRIED.

V. Business:

A. Incidence Commander-Moses Owen Report on Current Erosion: Moses Owen reported it first started on May 17, 2019 eroding in front of Akiak. While in Anchorage, he called an 1 800 number for assistance and got referrals to Anchorage offices. With Anchorage phone number, he briefed their office of the erosion happening in Akiak.

B. David Gilila-Riverbank Stabilization Coordinator: He reported there was some work done at the riverbank to stabilize the erosion. Loss of riverbank was from 50 to 75 feet and still happening at the upper end of Akiak which was not stabilized. Currently dumping sand at the eddies to keep from eroding from the bottom. Heavy equipment being used. Once the river level goes down, will concentrate on those eddies filling them with sand or gravel. Also will built barriers between river and homes.

C. Ivan M. Ivan, Chief-MOU Between City of Akiak, Kokarmuit and ANC: Ivan thanked David Gilila for his work and to keep journals of what is being done and happening with the shoreline. They have no supplies and are using any they can find. Community of Akiak will need to go thru Akiak Native Community to receive funding to address the problem. Michael Williams commented this was predicted some 50 yeas ago. He has attended meetings that include climate change that covered erosion. Some homes need to be relocated. Ivan M. Ivan stated that the 3 entities need to be involved and enter into a MOU.

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D. Joel Neimeyer: He is retiree federal employee and a descendant of Akiak. It was fortunate that leaderships of Akiak were in Anchorage when the erosion was happening. There were some contacts made with State of Alaska. There needs to be a hazard mitigation plan. Ivan raised the question of if and when will the erosion be stopped. Joel Neimeyer poised the question to the NRCS personnel present and that it does not only affect Akiak but also other villages on the Kuskokwim and Yukon Rivers. Jeff Oatley responded that erosion control design and survey was and the scope of the problem and still are at that stage. NRCS is a small federal agency and awards funds received from congress and works with communities. If a community is eligible, develop a project. Funding can be from 2 to 4 million. It is a complicated issue with Akiak to try and stop the river erosion. NCRS can give assistance with moving homes. The Army Corp of Engineers can give assessments on erosion of the river and they can get information of the historic riverbank and assess how much erosion has occurred. Best chance of getting funding now is to relocating homes that are in danger of the river. NCRS site visits will make maps with GPS, identify structures that are threatened and if Akiak is eligible, estimate how much it will cost to relocate homes. Develop a proposal and present to national headquarters. Once approved, it is given 249 days to complete work and it is not a grant but a flat rate. ANTHC have environmental threatened monies available. NCRS do not pay for utilities and they asked that the community contact homeland security to examine structures. Timeline of the survey can be up to 2 to 3 weeks. It will be a 90% funding with 10% from the community which can be in kind.

D. Next Steps MOU Between City of Akiak/Kokarmuit Corporation/Akiak Native Community: MICHAEL WILLIAMS MOVED TO ACCEPT JOINT RESOLUTION #19-01-05 UPDATING AKIAK'S HAZARD MITIGATION PLAN AND ALASKA DIVISION OF HOMELAND SECURITY GRANT FUNDING. DEBRA JACKSON SECONDED. Discussion: Sam Jackson I stated that Kokarmuit has already approved their share of the approved funding for this. Money will be set aside for professional services, mitigation plan and that Akiak Native Community spearhead the project. ALL IN FAVOR. MOTION CARRIED. SAM JACKSON II MOVED TO APPROVE RESOLUTION #19-05-02. MICHAEL WILLIAMS SECONDED. ALL IN FAVOR. MOTION CARRIED. MICHAEL WILLIAMS MOVED TO APPROVE RESOLUTION #19-05-03. SAM JACKSON II SECONDED. Discussion: Joel commented that Lemay will be paid \$15,000 and that he will be paid \$7,000. This will cover the Hazard Mitigation Plan. ALL IN FAVOR. MOTION CARRIED. MICHAEL WILLIAMS MOVED TO APPROVE SOLE SOURCE JUSTIFICATION CONTRACT WITH BILL ZACCERAS. SAM JACKSON II SECONDED. ALL IN FAVOR. MOTION CARRIED. MICHAEL WILLIAMS MOVED TO APPROVE CONTRACT WITH LEMAY ENGINEERING. SAM JACKSON II SECONDED. ALL IN FAVOR. MOTION CARRIED. MICHAEL WILLIAMS MOVED TO APPROVE TASK ORDER #1 CONTRACT WITH JOEL NEIMEYER, P.E. AND AKIAK NATIVE COMMUNITY. ALL IN FAVOR. MOTION CARRIED. Akiak need to alert homeland security to apply for grant without the mitigation plan but it will be worked on and completed. MICHAEL WILLIAMS MOVED TO APPROVE MICHAEL SUTTON LETTER OF INTEREST TO APPLY FOR FEDERAL ASSISTANCE. MOSES OWEN SECONDED. ALL IN FAVOR. MOTION CARRIED. SAM JACKSON II MOVED TO ADOPT RESOLUTION

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19-05-06 WITH ATTACHMENT RESOLUTION #19-05-07. MICHAEL WILLIAMS SECONDED. Discussion: Sam Jackson I stated Kokarmuit has not approved due to 14C. ALL IN FAVOR. MOTION CARRIED. SAM JACKSON II MOVED TO APPROVE RESOLUTION-19-05-10 AND TO SUBMIT TO NCAI TO PROSECUTE DOMESTIC VIOLENCE. MOSES OWEN SECONDED. ALL IN FAVOR. MOTION CARRIED. There will be meetings in June and July 2019. Sam Jackson I asked if sand bags can be deposited at the eddies and will it stop the erosion. MICHAEL WILLIAMS MOVED TO DIRECT ANC/COA STAFF FOR FIND MORE EMERGENCY FUNDINGS FOR THE RECEDING SHORELINE. No second. Also contact the Alaskan legislature to get funding.

Meeting adjourned 4:25 p.m.

Certification

Passed and approved this 21 day of June, 2019 at their regular meeting at Akiak, Ak. By a vote of 5 for 0 against and 0 abstaining.



Ivan M. Ivan, Chief



Michael Williams, Secretary

May 30, 2019
Meeting attendees

- | | | |
|----|------------------------|-------------------------|
| 1. | Mike Williams | Chuk Native Community |
| 2 | Jackson Williams | Ko. Corporation Akiaak |
| 3 | Ivan M, Ivan | Akiaak Native Community |
| 4 | Sam Jackson | Kolcammit Co-op |
| 5 | Sunny Jackson II | Akiaak IRA Council |
| 6 | Patrick Sigler | Community member |
| 7 | Lyndy Duv | AK |
| 8 | Ryan & Ann | Kolcammit Corp, |
| 9 | Patrick Sigler | Akiaak, Corp LP |
| 10 | Dily Williams | |
| 11 | Margaret Ivan Williams | |
| 12 | JEFF DATLEY | USDA/NRCS |
| 13 | RYAN MARONEY | USDA/NRCS |
| 14 | Joel Neimeyer | Consultant to ANK |
| 15 | Maureen | |
| 16 | Wendell H. | Chuk |
| 17 | Theodore Williams | ANC IGAP Assistant |
| 18 | Albert Kwasame | Man of Faith Akiaak |
| 19 | Rt Rd St. | Akiaak |
| 20 | Jay Delfa | Akiaak |
| 21 | Olga Charles | Akiaak |
| 22 | Reuben D. Charles | Akiaak |
| 23 | Ruth Ivan | ANC IGAP Coordinator |
| 24 | | |
| 25 | | |



Jennifer L. LeMay, PE, PMP
Vice President
4272 Chelsea Way
Anchorage, AK 99504
(907) 350-6061
jlemay@lemayengineering.com

June 6, 2019

Sheila Williams, Tribal Administrator
Akiak Native Community
P.O. Box 52127
Akiak, AK 99552

Subject: Summary of June 6, 2019 Meeting regarding a Tribal Hazard Mitigation Plan

Sheila:

Thank you for meeting with Patrick and I this afternoon. To summarize our discussion, LeMay Engineering & Consulting, Inc. will prepare a FEMA-Direct Tribal Hazard Mitigation Plan for the Akiak Native Community (ANC) in accordance with Title 44 Code of Federal Regulations Section §201.7 and applicable FEMA guidance documents as well as the 2018 State of Alaska Hazard Mitigation Plan. LeMay Engineering & Consulting, Inc. will also complete the FEMA Tribal Multi-Hazard Mitigation Plan Review Crosswalk for the ANC; this document will be included as an appendix to the Plan. It is my understanding that the City will adopt this Plan on its one-year anniversary of FEMA approval.

Per FEMA guidance, two community meetings will be held in Akiak. The first community meeting will be held on Monday, June 10, and the second community meeting will be held on Wednesday, July 17. The Draft Hazard Mitigation Plan will be submitted to you on June 17 for a 30-day Public Comment Period from June 17 to July 17. I recommend that you distribute the Plan within the Akiak community to community members, specifically to Tribal Council members who will be responsible for adopting the Plan after FEMA approval, and also forward the emailed document to any agencies that your community is working with to allow interested parties the opportunity to provide comments on the Plan. Comments may be submitted to me via email or telephone or in person at the July 17 community meeting in Akiak. I will incorporate comments as applicable and submit a copy of the Revised Draft Hazard Mitigation Plan to FEMA by close of business on Friday, July 19. FEMA typically takes 45 days to review a Plan, and we should anticipate receiving comments around Labor Day or shortly thereafter.

Once the Tribal Hazard Mitigation Plan is adopted by the ANC Tribal Council and issued a final approval by FEMA, ANC will be eligible to apply for Robert T. Stafford Disaster Relief and Emergency Assistance Act (Stafford Act) programs, i.e., Pre-Disaster Mitigation project grants, Public Assistance (Categories C-G), Fire Management Assistance and Hazard Mitigation Grant Program (HMGP) grants through September 2024. Grant recipients are required to maintain Hazard Mitigation Plans compliant with FEMA standards as a condition for receiving funds. To continue eligibility, within five years from the date of FEMA's approval letter, tribes must review, revise as appropriate, and re-submit Plans for approval.

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

6/6/19
Jennifer L. LeMay, PE, PMP/Date

Tribal Hazard Mitigation Plan for the Community of Akiak

Newsletter #1: June 6, 2019



Photo Credit: Ivan Ivan via KYUK News, May 20, 2019.

The Akiak Native Community is developing a Hazard Mitigation Plan for their community. LeMay Engineering & Consulting, Inc. was contracted to assist with development of the HMP. The HMP will identify applicable natural hazards to the community of Akiak. The HMP will also identify the people/facilities potentially at risk and ways to mitigate damage from future hazard impacts.

Attend the June 10, Community Introductory Meeting starting at 11 am at the Tribal Office in Akiak: The agenda will be a summary of the hazard mitigation planning process, presentation of applicable hazards, and identification of critical infrastructure that has the potential to be impacted by a natural hazard. You're invited to provide input to the planning process.

For more information, contact:

Sheila Williams, Tribal Administrator (907) 765-7112

Jennifer LeMay, PE, PMP, Planner, (907) 350-6061

Akiak Public Meeting for 2019 Tribal Hazard Mitigation Plan

June 10, 2019

11:00 am at the Tribal Hall

Name	Organization Represented or Akiak Resident	Contact Information (email)
Sheela Carl	Akiak Native Comm	akiarmu@yahoo.com
Judy Anderson	YSD	janderson@yapit.org
Debra Jackson	City of Akiak	akiarmu.dmy81@yahoo
Elizabeth	Akiak Native Comm.	lizivan@yahoo.com
Ida Jasper	Akiak Council Member	
Lenora Gilib	Akiak Council Member	lenora-gilib@yahoo.com
Jackson Williams	Akiak Co. Crop.	
Robert Williams	City of Akiak	bobbyWilliams08@yahoo.com
Dora Kozonickoff	City Council	
Olga Charter	Akiak	
Moses Oever	Akiak FRC	
Tina	Akiak	
James S. Nicolai	Akiak IIA	
Olinka Jones	City of Akiak Akiak	olinka.jones@yakea.com

Name	Organization	Contact Information (phone and email)
Sam Jackson	Kokarmit Corp	765-7919
Lily Williams	Community Member	765-2100
Kimberly Smith	Akiak Native Community	Kimberlyjay_07@hotmail.com
Katie Phillip	Akiak Native Community	545-2476
Sam Jackson	Kokarmit Corp.	765-7919
John Jasper Sr	Kokarmit Corp	765-7919
Amelia Nicola	Kokarmit Corp	765-7919
David Gilasa	City Chief	765-7411
Theodore Williams	Akiak Native Community	765-7830 (office)
Sammy Jackson	Akiak IRA	765-7112
Ivan Ivan	Tribal Chief	via phone
Carathy Andrews	Akiak Native Community	765-7117
Melanie Phillip	ANIC	765-2084
Faith Owen	ANIC	765-7112
Kurt Foss	APU	765 545-2776
Ronell Andrews	Akiak Native Comm.	765-2258

Name	Organization	Contact Information (phone and email)
Norman K Lett	ANC	
Evan Ewon	—	
Joan Anderson	ANC	
Shirley Allaire	ANC	
Elena Owen	ANC	
Shannon LeMay	LeMay Engineering	907-554-4278
Mark	Tribal Council Member	via phone.
Archie		via phone.
Jennifer LeMay	LEMAY ENGINEERING, INC. + CONSULTING	907 350-6061



Hazard Mitigation Planning Process

Development of a Tribal Plan for Akiak Native Community

Public Meeting #1: June 10, 2019

LeMay Engineering & Consulting, Inc. was hired last week to prepare a FEMA-Direct Tribal Hazard Mitigation Plan for the Akiak Native Community. The effort to develop this plan specifically for the Akiak community is a public process, and you are invited to participate.

Today is Public Meeting #1. On June 17, the Tribal Administrator will post the Draft 2019 Hazard Mitigation Plan for review by the community and begin a 30-day public comment period. Public Meeting #2 will occur on July 17 at 11 am and serve as a public hearing and forum to provide comments on the Draft Plan.

Today's meeting is a forum to present an overview of the planning process. I welcome your input. Comments can be provided during this meeting or by email or phone. Send Jennifer LeMay, PE, PMP an email at jlemay@lemayengineering.com or call her at (907) 350-6061.

For hazards, we're interested in information related to:

- Hazard Identification,
- Profiles (characteristics),
- Previous occurrences,
- Locations,
- Extents (breadth, magnitude, and severity)
- Impacts, and
- Recurrence probability statements.

Which hazards are applicable for your community?

- Floods/Erosion **Applicable to Akiak** ★
- Wildland/Conflagration Fires **Applicable to Akiak** ★
- Earthquakes **Applicable to Akiak** ★
- Severe Weather **Applicable to Akiak** ★
- Changes in the Cryosphere **Applicable to Akiak** ★
- Permafrost is not applicable. The ground freezes in Akiak, but there is not a layer that stays permanently frozen.

Plan Process

- Introductory meeting on June 6, 2019.
- Data gathering occurs in June.
- Public Meeting #1 on June 10, 2019.
- Draft Plan available for public comment (June 17, 2019).
- Public comment period (June 17 to July 17, 2019).
- Public hearing for Draft Plan (July 17, 2019).
- FEMA review and pre-approval of Draft Plan.
- Newsletter announcing Final Plan (the public may still comment).
- ANC Tribal Council adoption.
- Final Approval from FEMA (expected to occur in September 2019).

After the 2019 Hazard Mitigation Plan is completed, approved, and adopted, the ANC will be eligible to apply for mitigation project funds from the State of Alaska DHS&EM and FEMA for five years until the plan requires an update in 2024.

Contacts:

Jennifer LeMay, PE, PMP, LeMay Engineering & Consulting, Inc. Planner (907) 350-6061
Sheila Williams, Tribal Administrator (907) 765-7112

Vulnerability of the Akiak Native Community to Natural Hazards

Population

- ▶ 2010 U.S. Census was 346.
- ▶ 2017 DCCED was 394.

Houses and Critical Infrastructure

- ▶ 98 single-family residential structures (\$26,950,000).
- ▶ 50 critical facilities and infrastructure have been identified (\$53,162,794).

According to the 2018 Draft Statewide Threat Assessment by the Denali Commission, Akiak is one of the Alaskan communities most vulnerable to infrastructure impacts associated with erosion/flooding/changes in the cryosphere.

Floods/Erosion

- Flooding and erosion occur together in Akiak because increased water currents often are raised above the normal riverbank and slough. The community of Akiak is situated on the west/north side of the Kuskokwim River, at the beginning of a bend in the river. A large amount of the community's development is located adjacent to the river.
- Akiak experienced high river levels from spring melt in May 2019 that claimed up to 75 feet of riverbank in a matter of hours. In 2013 during a fall storm of similar magnitude with high southerly winds, waves claimed 40 feet of riverbank in a matter of hours. In the past, flooding has occurred from spring melt when an ice dam forms downriver. The flood path has come from a slough behind the village. This slough is also a concern for Akiak beyond flooding. Given how the river morphology is changing, the Akiak community is concerned that the flows in the slough may grow and develop a new branch of the river, which would effectively put Akiak on an unstable island.
- The multi-year impact of storms and flooding causes severe riverine erosion. The fall storm season has the greatest impact and greatly increases the community's vulnerability to flooding/erosion. Changes in the cryosphere will potentially increase the threat of erosion due to the associated rising water levels and scouring of the land.
- The community realizes it is threatened with significant riverbank destabilization both in May with spring melt and in September/October with fall storms. One home is imminently in peril, and five more are very close to the river.

Conclusions from Previous Government Documents:

1. In 2003, the U.S. Government Accountability Office (GAO) reported that flooding and erosion affected 184 out of 213 (86%) of Alaska Native Villages because of rising temperatures (includes Akiak).
2. In 2009, Akiak was also included in the GAO report as one of 31 Alaska Native Villages imminently-threatened by flooding and erosion.
3. Also, in 2009, Akiak was included in the U.S. Army Corps of Engineers' Baseline Erosion Assessment.
4. The USACE Flood Hazard Data reported that the flood of record was the 1964 ice-jam flood, which reached an elevation of 35.2 feet mean sea level. Flooding has occurred in 1920, 1964, 1971, 1982, 1984, 1987, and 1988.
5. Per the State DHS&EM Cost Index as of June 30, 2018, Akiak has had Disasters declared by either the Governor or FEMA in 1989, 1995, 2006, 2009, 2012, and 2013.
6. The United States Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS) published a study in 2013 entitled "An Assessment of Streambank Erosion and a Revetment Concept Design on the Kuskokwim River at Akiak, Alaska."

The 2013 NRCS Study found that the Kuskokwim River had a deep hole (over 60 feet) just upriver from Akiak. NRCS is currently amending their 2013 report based on their collection of river depth measurements and analysis from May 30, 2019, after the May event where 75 feet of riverbank about a mile long disappeared overnight. NRCS determined that the depth of the main river channel is now over 60 feet directly in front of the village.



Figure 6. NRCS survey data from October 2012 showing channel bed elevation. Note: elevation of high water mark on staff gauge in Figure 3 is 32.8 feet, and the water surface elevation during the survey was 22 feet.

Based on Akiak's observations from 2013-2019, a combination of mild winters resulting in limited ground freezing, high river levels from spring melt, and a change in the river course upriver from Akiak are combining to erode riverbank due to bank destabilization. This causes the community concern as the 2013 riverbank loss (similar in magnitude to this 2019 event) was in the Fall during a storm event that created high waves that crashed on the riverbank shoreline. Akiak is now threatened during spring melt/high river levels and fall storms/high waves caused by strong southerly winds.

The Akiak Native Community is now developing a Tribal Hazard Mitigation Plan documenting Akiak's natural hazards, assessing the vulnerability of the community to the risks associated with these hazards, identifying mitigation goals, and developing mitigation actions to implement.

Strategy after the May 2019 Storm Event

1. In 2013, the U.S. Department of Agriculture Natural Resources Conservation Service (NRCS) assessed the Streambank Erosion in Akiak and prepared a Revetment Concept Design for the Kuskokwim River. NRCS estimated that it will cost over \$80M to stabilize the river bank with large rip rap.
 - If this project were funded, it would be many years for all funding to be obtained, design of the solution to be engineered, award of the construction contract, and execution of the work. During this time, the river will claim more of the riverbank.
 - The Federal and State Government likely will not appropriate this level of funding to a stabilization project.
2. Does Akiak accept the NRCS cost estimate and the unlikelihood of funding being awarded?
3. If the answer is Yes, then the Akiak community adopts a policy of retreating from the river.

Strategy after the May 2019 Storm Event, continued

4. The retreat location is a new subdivision behind the new school and near the airport. This land is higher and safer ground than the area where existing structures are built adjacent to the Kuskokwim River. This is the most viable solution to respond to increasing environmental threats by natural hazards. The Kokarmiut Corporation is the surface land owner.
5. Three levels of retreat include:
 - a. The six immediate homes nearest the river and the infrastructure serving these homes will need to move first. Existing infrastructure (power, water, and sewer service lines) will need to be disconnected and relocated to the new subdivision.
 - b. Additional homes (the total number isn't known as scientists need to determine where river erosion will stop), the old BIA school, and most importantly, a water main loop that will be in jeopardy within a few years must be moved next. Abandonment of the water main means many homes that are not in immediate peril will lose community water service. A mid-term solution will be required to address this concern.
 - c. Two homes that do not need to be relocated will be elevated in place to mitigate potential flooding.

Mitigation Goals for Floods/Erosion/Changes in the Cryosphere:

1. Reduce the possibility of damage and losses from the combined hazard of flooding/erosion/changes in the cryosphere.

Mitigation Actions for Flooding/Erosion

Action ID	Description	Priority	Responsible Party	Potential Funding	Timeframe
FL&ER1	The six immediate homes nearest the river and the infrastructure serving these homes will need to move first. Existing infrastructure (power, water, and sewer service lines) will need to be disconnected and relocated to the new subdivision.	High	ANC Tribal Administrator	HUD; DHS Preparedness Technical Assistance Program; PDM Grants, HMGP Grants; USACE; Congressional Appropriations; NRCS; AEA	2019-2020
FL&ER2	Additional homes (the total number isn't known as scientists need to determine where river erosion will stop), the old BIA school, and most importantly, a water main loop that will be in jeopardy within a few years must be moved next. Abandonment of the water main means many homes that are not in immediate peril will lose community water service. A mid-term solution will be required to address this concern.		ANC Tribal Administrator		2019-2024
FL&ER3	Two homes that do not need to be relocated will be elevated in place to mitigate potential flooding.		ANC Tribal Administrator		

Earthquakes

- The largest recorded earthquake within 50 miles of Akiak measured a Magnitude of 4.4 and occurred on February 23, 2013. This earthquake did not cause any damage to critical facilities, residences, or infrastructure in Akiak.
- The Y-K Delta appears to be the least seismically area active in western Alaska. In general, the seismicity in western Alaska in the M 2.0 to 5.0 range appears to be widespread and confined to relatively shallow crustal depths.
- The USGS earthquake probability model places the probability of an earthquake with a likelihood of experiencing strong shaking within Akiak at 0.2 to 0.3 g PGA with a 2% probability in 50 years. A 2% probability in 50 years is a rare, large earthquake, and statistically, it happens on average every 2,500 years.

The Akiak Native Community chose not to carry forward earthquakes in the Hazard Mitigation Plan as a hazard to develop mitigation actions for. (VERY LOW RISK)

Severe Weather

In Akiak, severe weather consists of blizzards, high wind events, and several cold spells.

Mitigation Goal for Severe Weather

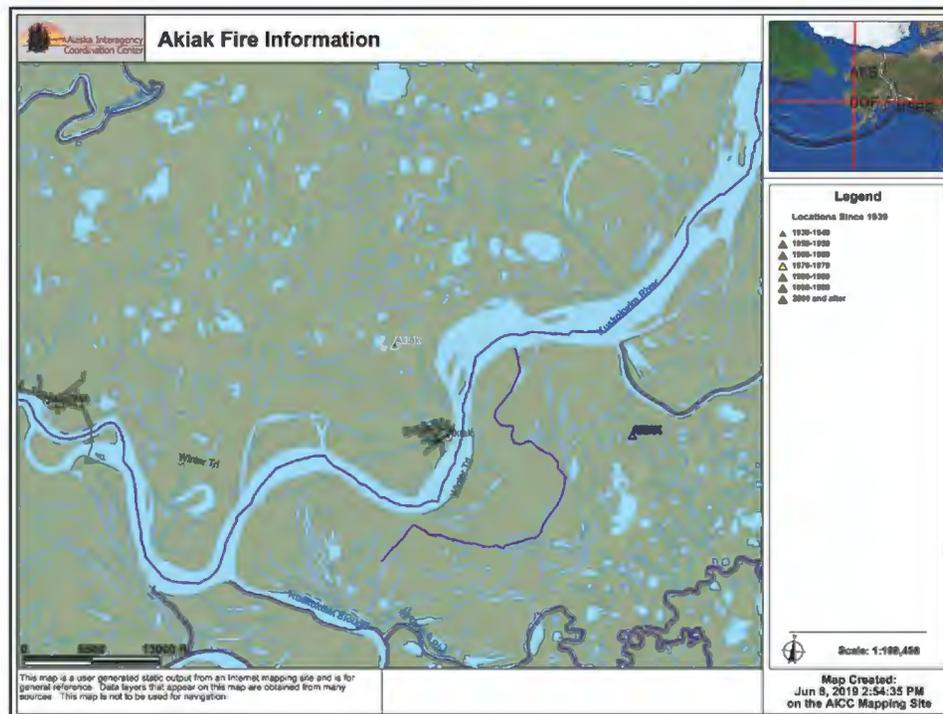
2. Reduce vulnerability of structures to severe winter storm damage.

Mitigation Actions for Severe Weather

Action ID	Description	Priority	Responsible Party	Potential Funding	Time-frame
SW1					
SW2					

Tundra-Wildland/Conflagration Fire

Wildland fires have not been documented within the boundaries of Akiak; however, wildland fires have occurred in the vicinity. Since 1939, 72 wildland fire events have occurred within 50 miles of the community. The Alaska Interagency Coordination Center identified 38 of these 72 fires as exceeding 50 acres. No conflagration fires have occurred in Akiak.



Mitigation Goals for Fire:

3. Reduce the risk of damage and losses from fires.

Mitigation Actions for Fires

Action ID	Description	Priority	Responsible Party	Potential Funding	Time-frame
F1	Identify methods of alerting the community if wildfire threat develops.	Low	ANC Tribal Administrator	DOF, Federal Fire Fighters Grants,	2019-2020
F2	Develop an evacuation plan for the community. FEMA and the Denali Commission have resources to support evacuation route planning.	Low	ANC Tribal Administrator	Rural Fire Assistance Grants, FEMA, Denali Commission	2019-2020
F3	Is there a rural volunteer Fire Department? Does Akiak have Project Code Red Equipment? If so, is it in good and usable condition?	Low	ANC Tribal Administrator		2019-2020
F4	Promote FireWise building design, sites, and construction materials.	Low	ANC Tribal Administrator		2019-2020
F5	In 2016, there were crews weeding and cutting tall grass near the roads. Has ongoing maintenance of firebreaks occurred?	High	ANC Tribal Administrator		2019-2020
F6	Is there a Small Community Emergency Response Plan for the community? If not, one should be developed.	Low	ANC Tribal Administrator	DHS&EM	2019

AKIAK NATIVE COMMUNITY
AKIAK IRA COUNCIL
P.O. BOX 52127
AKIAK, ALASKA 99552
PHONE: (907)765-7112 FAX (907) 765-7512

June 10, 2019

Joint Akiak IRA/COA/Kokarmuit Meeting

I. Meeting called to order @ 11:15 a.m. by Chief Ivan M. Ivan.

II. Roll Call: Akiak IRA Council- James Nicolai, Moses Owen, Sam Jackson II, Ivan M. Ivan and Michael Williams by cell phone. Quorum established. COA Members- Ida Jasper, Debra Jackson, Dora Kozevnikoff, Lenora Gilila, Robert Williams, Olinka Jones and Anna Ivan. Quorum established. Kokarmuit Board- Sam Jackson I, Jackson Williams, Robert Williams, Anna Ivan and John Jasper. Quorum established. Guests: Judy Anderson, YSD Director of Maintenance and Sharon and Shajnnon Lemay of Lemay Engineering.

III. Lemay Engineering was hired by Akiak Native Community to complete a hazard mitigation plan and to be submitted to FEMA. The process should take about 45 days for approval and this will open doors for funding. Erosion has been happening at a rate Akiak has not seen before. A Hazard Mitigation Planning Process packet given to all members attending the meeting which outlines the process it will take to complete the process. Time is of essence. Final approval from FEMA expected 9/19, then applying for grants from State of Alaska, DHS EM and FEMA. Vulnerability to natural hazards discussed. Ivan recommended to support the plan and make a motion to accept the technical assistance. MICHAEL WILLIAMS MOVED TO UPDATE NCRS PLAN AND GIVE SUPPORT TO THE PLAN AND GO FORWARD. Moses stated NBRS has only done a survey and has not done a updated plan. Akiak , as of 2018, is identified as vulnerable to infrastructure impacts due to erosion, flooding , wildlife fires, earthquake, severe weather and changes to Cryosphere. Permafrost is not applicable due to the fact ground freezes and there is not a layer that stays permanently frozen. A significant deep hole discovered with recent survey by NCRS and something needs to be done ASAP. 2013-19 observations included in packet. With the 2013 NCRS report, cost estimate was 80 million which is not fundable. There are homes that need to be relocated due to imminent danger of erosion due to spring/fall weather events. Kokarmuit is willing to make land available for homes to be relocated. Question was asked if NCRS and other agencies can determine when and if erosion will stop. For future relocating, phase 2 can be planned. Sheila Carl, Tribal Administrator, stated 11 identified 11 homes to be relocated and are looking into funding . Plans are updated every 5 years. Sam Jackson I stated that Akiak will not be around due to the slough behind being opened up and eroding,. Ivan recommended to approve mitigation plan and declare disaster with State of Alaska. Jackson Williams stated that Donlin Gold barges travelling up and down the river affect the erosion. Donlin should, with their profits, should assist with erosion mitigation. ANC has a SCERB plan that needs approval by the IRA Council that can be utilized by the

AKIAK NATIVE COMMUNITY

AKIAK IRA COUNCIL

P.O. BOX 52127

AKIAK, ALASKA 99552

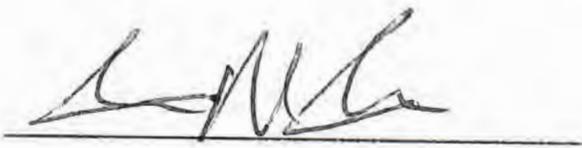
PHONE: (907)765-7112 FAX (907) 765-7512

plan. Ivan stated the NCRS submitted plan to congress in 2013 and that Lemay Engineering contact NCRS. Earthquake hazard not to be included in the plan and there are no wildlife plan. Akiak have fire hydrants, but some are vulnerable and need more at the new housings. Lemay Engineering will be here in July 2019. David Gilila stated Akiak is being eroded from both upper and lower ends and from behind Akiak. Due low water levels, barges sometime dump gravel into the river and change river channels. Michael stated local workers are doing what they can do repairing the riverbank. Ivan stated that Joel Neimeyer needs to be informed of all matters, to use the 80 million estimate. First step, tribal approve hazard mitigation plan and then, after a year, COA adopt plan. SAM JACKSON II MOVED TO DECLARE A EMERGENCY DIASTER. MICHAEL WILLIAMS SECONDED. ROLL CALL VOTE: JAMES NICOLAI-YES, MOSES OWEN-YES, SAM JACKSON II-YES, MICHAEL WILLIAMS-YES AND IVAN M. IVAN-YES. MOTION CARRIED.

IV. SAM JACKSON II MOVED TO ADJOURN @ 12:30 P.M.

Certification

Passed and approved this 21 day of June, 2019 at their regular meeting at Akiak, Ak. By a vote of 5 for 0 against and 0 abstaining.



Ivan M. Ivan, Chief



Michael Williams, Secretary



**LeMay Engineering
& Consulting, Inc.**

Jennifer L. LeMay, PE, PMP
Vice President
4272 Chelsea Way
Anchorage, AK 99504
(907) 350-6061
jlemay@lemayengineering.com

June 11, 2019

File

Subject: Hazard Mitigation Planning Process Trip Report

On June 10, 2019, Jennifer L. LeMay, PE, PMP and Shannon M. LeMay of LeMay Engineering & Consulting, Inc. traveled to Akiak, Alaska. The purpose of this trip was to conduct an introductory meeting, gather hazard data, review with community leaders the applicable hazards for the area, review potential mitigation strategies, and identify the critical facilities within the community. The City and Village were both well-represented at the meeting; there were 39 people in attendance.

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

6/11/19

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

Akiak Native Community

Akiak IRA Council

P.O. Box 52127

Akiak, Alaska 99552

Phone: (907) 765-7112 Fax: (907) 765-7512

Resolution #19-07-07

RESOLUTION: Acceptance of Akiak Outline for an Organized Retreat

WHEREAS, The Akiak Native Community (ANC) is recognized by the US Bureau of Indian Affairs (BIA) as the tribe serving tribal members in Akiak;

WHEREAS, ANC, the City of Alaska (City) and the Kokarmiut Corporation (Corporation) entered into a tri-party agreement (executed on May 18, 2019) to collectively address environmental threats facing the community, including, but not limited to, flooding, permafrost degradation and erosion;

WHEREAS, the City, the Corporation and ANC collectively approved a July 3, 2019 Akiak Outline for an Organized Retreat (attached); and

NOW THEREFORE BE IT RESOLVED, ANC accepts the responsibility to carry out the tasks set forth in the Akiak Outline for an Organized Retreat including, but not limited to, the following:

1. Applying for Village Safe Water Infrastructure Protection program funding up to \$150,000
2. Applying for US Department of Housing and Urban Development – Imminent Threat program funding up to \$450,000, and
3. Requesting a cooperative agreement with the Natural Resources Conservation Services (NRCS) – Emergency Watershed Protection program for relocating six homes, moving some sheds and demolishing other structures, as appropriate (as identified in the NRCS June 26th trip report).

CERTIFICATION

This resolution was passed and approved this 19th day of July, 2019 with a vote of 5 yea, 0 nay, 0 absent, 0 abstain



IVAN M IVAN, CHIEF



MIKE WILLIAMS, SEC/TREAS

**Akiak Outline for an Organized Retreat from the Kuskokwim River
For the Akiak Native Community, The City of Akiak & the Kokarmiut Corporation
July 10, 2019**

Approval is sought for this outline from the three organizations in accordance to the tri-party agreement of May 18, 2019 to work on erosion matters. It includes tasks to be undertaken in 2019.

1. ANC applies for Village Safe Water (VSW) Infrastructure Protection Program funding for disconnecting six homes from water and sewer service and reconnecting the six homes on vacant lots away from the river.
2. ANC applies for Natural Resources Conservation Services (NRCS) funding for relocation of the six homes and some sheds and other structures and demolishing of some structures (in place). It is estimated that NRCS funding (through a cooperative agreement and not through a grant) will be between \$150,000 to \$200,000. Note that NRCS does not provide funding up front, but that it reimburses ANC once the project is completed. There is a 220-day performance period with this funding. If we do not move the six homes and other structures in the 220 day period, we will not receive any reimbursement. Akiak will also have to identify construction financing for the NRCS work.
3. ANC applies to the US Housing and Urban Development – Imminent Threat program for additional costs associated with moving the homes and civil earthwork at the rivers edge to reduce the rate of erosion. The scope of work includes:
 - a. Structural bracing for some homes
 - b. Lot clearing and grubbing, importing sand as necessary
 - c. Six home power line connections
 - d. Additional costs associated with sanitation (such as road repairs)
 - e. Pare back the slope at the rivers edge to a 30 to 35% angle, which is what geo-technical engineers recommend for sandy soils. Also cut down trees so that when the river comes to claim them, the tops of the trees (gravity) will not fall over. This will allow the tree roots to work in reducing the erosion.
 - f. Temporary lodging expenses for homeowners to be moved. It is expected that homes will be moved one at a time and homeowners will be displaced during this time.
 - g. Moving and packaging expenses for possessions.
 - h. With funding that remains site work at the new subdivision for future expansion including road work and power line expansion.
4. The Corporation at its July 9th meeting considers two requests for land.
 - a. The first is to set aside land (vacant lots) for six homes. It may turn out that these lots cannot be developed (to high of a cost to develop, unknown contaminants, etc.), and if that is the case the alternative is to place some of the six homes temporarily across the street from the HUD homes in the new subdivision. When funding later becomes available for the new subdivision expansion then these homes will be relocated to more appropriate lots.
 - b. The second land request is for an access road to a new solid waste site west of the community. The current solid waste site, given the growth of housing in its direction, may soon become a public health matter. Furthermore, if the existing solid waste site was closed

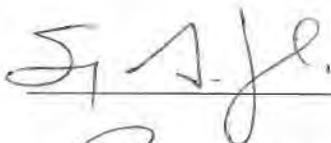
and capped, new housing can be developed adjacent to it – where there are already roads and nearby sanitation and power line connections.

5. Review alternatives for future housing expansion: as currently envisioned the new subdivision will extend west along the Kwiguaq slough (on some A-DCRA maps listed as “Small River”) and then once past the school property swing south towards the airport. There are some concerns about the cost of developing such a subdivision as it will require a bridge to cross the Kwiguaq. Alternatives for housing expansion include the following.
 - a. Move the existing solid waste site and allow development to occur towards this location.
 - b. Discuss with Alaska Department of Transportation (A-DOT) about land between the airport and the school.
 - c. School land based upon the A-DOT discussions.
6. Pursue grant funding to undertake design of housing expansion in the new subdivision including the two most likely alternatives of a) abandonment of the existing solid waste site, and b) development along a road towards a proposed new solid waste site.
7. Revise the schedule for the Akiak Hazard Mitigation Plan (HMP). Delay the next community meeting from July 17 to the week of July 29/31. Ask the family of Federal and State agencies to participate in an HMP draft presentation on July 23rd in Anchorage. We will seek their thoughts on the community’s strategy and tasks identified for an organized retreat. This meeting will serve to help Akiak draft an implementation plan to accompany the HMP document.
8. Pursue other funding opportunities for an organized retreat.
9. Develop a construction plan to carry out the proposed HUD, NRCS, VSW funded improvements that would start in 2019. In short, we have to figure out what we need to get to Akiak by the final barge of the season.

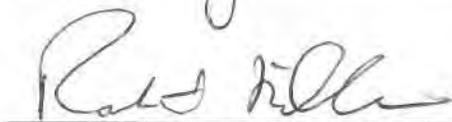
Approved on this date: 7/11/19



Ivan M. Ivan, ANC Chief



Sammy Jackson, Kokarmiut Corp. Board Chairman



Robert Williams, Mayor, City of Akiak

Akiak Hazard Mitigation Plan and Organized Retreat Meeting

July 23, 2019

Meeting Summary

In Attendance

COMMUNITY OF AKIAK

Akiak Native Community: Sheila Carl. *On phone:* Ivan Ivan, James Nicolai, Mike Williams, Moses Owen, Sammy Jackson II

City of Akiak: David Gilila, Sr. *On phone:* Robert Williams

Kokarmiut Corporation: Amelia Nikolai

AGENCY AND ORGANIZATION REPRESENTATIVES

Akiak Consultant: Joel Neimeyer

Alaska Department of Commerce, Community and Economic Development, Division of Community and Regional Affairs: Sandra Moller, Division Director; Sally Russell Cox; Diane Sam. *On phone:* CeCe Franko

Alaska Department of Environmental Conservation: Melinna Faw, Solid Waste Program; Marty Brewer, Village Safe Water Program. *On phone:* Carrie Bohan, Facilities Programs Manager; Stephen Price, Solid Waste Program

Alaska Department of Military and Veteran's Affairs, Division of Homeland Security and Emergency Management: Brent Nichols, Mike Johnson, Richard Hildreth, Rick Dembroski

Alaska Department of Natural Resources, Division of Geological and Geophysical Surveys: *On phone:* Jaci Overbeck

Alaska Energy Authority: David Lockard

Alaska Native Tribal Health Consortium: Max Neale, Center for Environmentally Threatened Communities. *On phone:* Ed Smith, Emergency Management

Association of Village Council Presidents Regional Housing Authority: *On phone:* Abraham Palacios, Jason Smith, Mark Charlie

Alaska Institute for Justice: *On phone:* Kate Glover

KYUK Radio, Bethel: *On phone:* Greg Kim

LeMay Engineering & Consulting, Inc.: Patrick LeMay, PE

Office of Alaska Representative Tiffany Zulkosky: Logan Basner

Office of Alaska Senator Lyman Hoffman: Sam Greely

Office of US Senator Dan Sullivan: Kate Wolgemuth

Office of US Senator Lisa Murkowski: Deborah Vo

Rural Community Assistance Corporation: *On phone:* Kristen K'eit

ThinkProgress: *On phone:* Kyla Mandel

US Department of Agriculture: Jeff Oatley, Natural Resources Conservation Service; Misty Hull, Rural Development

US Department of Commerce, National Oceanic and Atmospheric Administration: Amy Holman, Nicole Fernandez

US Department of Homeland Security, Federal Emergency Management Agency (FEMA), Region 10: *On phone:* Cynthia McCoy

US Department of Housing and Urban Development, Office of Native American Programs: *On phone:* Deb Alston

US Department of the Interior, Bureau of Indian Affairs: Andrew White, Transportation; Gary Hanson. *On phone:* DeWayne Cooper, Housing; Stu Hartford, Director of Transportation

Yukon-Kuskokwim Health Corporation: *On phone:* Bob White, Brian Leffert, Mike Vicente

Yupit School District: *On phone:* Judy Anderson

Meeting called to order, approval of agenda, introductions

Sally Russell Cox (Alaska Division of Community and Regional Affairs) called the meeting to order, reviewed the agenda and housekeeping, led introductions and served as meeting facilitator.

Community presentation

Ms. Sheila Carl (Tribal Administrator for the Akiak Native Community [ANC]), Ms. Amelia Nicholai (Business Manager for the Kokarmiut Corporation), and Mr. David Gililia, Sr, (City Administrator for the City of Akiak) were present at the meeting and led the following discussion points.

1. The three community representatives spoke to the recent high water / spring melt event of May 18/19 in which 50 to 75 feet of riverbank was claimed along 1200 feet of river front. This is atypical as erosion is generally driven by fall storms with strong southerly winds. In response, the community executed a tri-party agreement (executed on May 18) to work together in responding to this new environmental threat.
2. The community's current Hazard Mitigation Plan (HMP) lapsed last year. In response, the City, ANC, and the Corporation pooled their resources and hired a consultant (LeMay Engineering) well-versed in development HMP documents for rural Alaska communities to draft a new tribal HMP.
3. In the process of drafting the new HMP, the community in June 2019 decided for a strategy of a managed retreat from the river instead of seeking funding for a \$80M rock revetment project. Mr. Jeff Oatley, an engineer with the Natural Resources Conservation Service (NRCS), shared his agency's findings with respect to recent river morphology changes and provided further insight to extensive effort required to constrain the Kuskokwim River from claiming additional riverbank.
4. In addition, the community has been in close contact with seven homeowners who are near the river's edge. At least one home must be relocated this year and five more by next year. Unfortunately, the seventh home is not structurally sound for relocation. The Corporation recently took action to make available lots for the six homes to be relocated. All of the Corporation lots are near the electrical power distribution system, and some of the lots are near water and sewer mains. However, this leaves no lots for future housing expansion whether from new housing or relocated homes (beyond the six, noted above).
5. The riverbank is not stable as in many areas it is at a 90-degree angle and easily sloughs into the river. Walking near the river's edge is not safe, and the City has undertaken efforts to pare back the river bank, but due to limited City funds and existing homes and other structures, City crews were limited in this effort. The City would like to pare back the river's edge to a more stable 30 % slope once homes are relocated.
6. The community as part of its managed retreat intends to develop a new housing subdivision in anticipation that their managed retreat will include homes beyond the seven discussed above. Key to this effort will be closing out of the 30-year old solid waste site and honey bucket lagoon which would be a public health risk for the expansion of homes. The community wants to develop a new solid waste site and access road concurrent with closing out the existing solid waste site. This will allow for development of the new housing subdivision.

LeMay Engineering Presentation on Draft Hazard Mitigation Plan (HMP) and HMP Approval Process

Mr. Patrick LeMay (ANC consultant for the draft HMP) led the discussion on the following points.

1. Overall discussion of the HMP timeline and pending ANC submittal to FEMA for approval of a tribal HMP.
2. Types of homes that are imperiled: those that cannot be moved, those that can be relocated, and those that are not facing erosion threats but flooding threats and must be elevated.
3. Alaska Division of Homeland Security and Emergency Management staff discussed the various disaster mitigation funding grants that the community can compete for once the draft Akiak HMP is approved by FEMA. Furthermore, they would be supportive of working on a task force to address how the community can carry out its managed retreat including closing out the existing solid waste site and developing a new site.

Community Dialogue with Funders

Mr. Joel Neimeyer, ANC Consultant, led the discussion on the following points.

1. The community, in the interest of reducing project development timelines, intends to solicit for an indefinite delivery / indefinite quantity (IDIQ) architectural & engineering (A&E) consultant. Agency representatives were asked to consider review and approval of the community's solicitation process, in advance of any future agency grant, so that pre-construction task orders can be issued quickly to the A&E firm upon receipt of grant funding. In general, agency staff stated an understanding for this request, but could not commit their agencies at this time.
2. Likewise, the community intends to carry out a programmatic environmental assessment in accordance to National Environmental Policy Act statutes in order to shorten Federal agency environmental reviews. A lead Federal agency is necessary, and the community will ask likely Federal agencies to serve in this capacity.
3. Agencies provided thoughts on how they may be able to assist Akiak.

Akiak Draft Hazard Mitigation Plan Meeting

Tuesday, July 23, 2019

NAME	AGENCY/ORGANIZATION	Do you want to be notified of future Akiak meetings?	PHONE	EMAIL
RICK DEMBROSKI	SOA DHS&EM	YES	907 428-7015	RICK.DEMBROSKI@ALASKA.GOV
MIKE JOHNSON	" "	"	907 428 7055	MIKE.JOHNSON@ALASKA.GOV
Brent A. Nichols	" "	"	907-428-7085	Brent.Nichols@alaska.gov
RICHARD K HILDRETH	SOA DHSTEM	YES	907 428-7047	RICHARD.HILDRETH@ALASKA.GOV
Judy Anderson	YSD	YES	907.825.2035	janderson@yupitit.org
Marty Brauer	ADEC USW	Yes	269-7613 907- 870-8	martybrauer@alaska.gov
JEFF OATLEY	USDA/NRCS	YES	907-479-3159 x105	JEFF.OATLEY@USDA.GOV
Sheila Carl	Akiak Native Community	Yes	907 765-7112	akiarmiia@yahoo.com
Amelia Nicolai	Kokamiut Corporation	yes	907-765-7919	
David Gilulas	City of Akiak	yes	907-765-7411	coa.ivan@yahoo.com
Patrick Lemay	Lemay Engineering	Yes	907-250-9038	Patrick.Lemay@lemayengineering.com
ANDREW WHITE	BJA TRAFUS	YES	907-2714565	ANDREW.WHITE@BJA.GOV

NAME	AGENCY/ORGANIZATION	Do you want to be notified of future Akiak meetings?	PHONE	EMAIL
Misty Hull	USDA Rural Development	yes	907-761-7733	misty.hull@usda.gov
Max Neale	ANTHC	Yes	729-4521	Mjneale@anthc.org
Sam Greely	Staff to Sen. Hoffman	yes	723-1285	Samgreely@akleg.gov
Legan Bissner	Staff to Rep Zalkoski	Yes	982-8617	Legan.Bissner@AKLeg.gov
Diane Sam	DCRA - ANC	optional	328-9841	diane.sam@alaska.gov
MELINNA FAW	DEC - SOLID WASTE	YES, PLEASE	269-7642	melinna.faw@alaska.gov
SANDRA MOLLER	DCRA -		269-4569	sandra.moller@alaska.gov
Kate Wolgemuth	US Senator Sullivan	yes	907 271-5915	kate-wolgemuth@sullivan.senate.gov

Agency/Organization Representatives Who Called In

NAME	AGENCY/ORGANIZATION	Do you want to be notified of future Akiak meetings?	PHONE	EMAIL
Ivan Ivan	Akiak Native Community			
James Nicolai	Akiak Native Community			
Mike Williams	Akiak Native Community			
Moses Owen	Akiak Native Community			
Sammy Jackson II	Akiak Native Community			
Malinda Chase	Alaska Climate Adaptation Science Center (AK CASC) / APIA			
CeCe Franko	AK Dept. of Commerce, Community & Economic Development, Division of Community & Regional Affairs			
Stephen Price	Alaska Department of Environmental Conservation, Solid Waste Program			
Jaci Overbeck	Alaska Department of Natural Resources, Division of Geological and Geophysical Surveys			
Carrie Bohan	Alaska Department of Environmental Conservation, Division of Water			
Ed Smith	Alaska Native Tribal Health Consortium			
Abraham Palacios	Association of Village Council Presidents Regional Housing Authority (AVCP RHA)			
Jason Smith	Association of Village Council Presidents Regional Housing Authority (AVCP RHA)			

NAME	AGENCY/ORGANIZATION	Do you want to be notified of future Akiak meetings?	PHONE	EMAIL
Mark Charlie	Association of Village Council Presidents Regional Housing Authority (AVCP RHA)			
Robert Williams	City of Akiak			
Kyla Mandel	ThinkProgress			
Greg Kim	KYUK Radio, Bethel			
Kristen K'eit, RCAC	Rural Community Assistance Corporation			
Cynthia McCoy	US Dept of Homeland Security, Federal Emergency Management Agency (FEMA), Region 10			
Deb Alston	US Dept of Housing and Urban Development , Office of Native American Programs			
DeWayne Cooper, BIA Housing	US Department of the Interior, Bureau of Indian Affairs			
Stu Hartford	US Department of the Interior, Bureau of Indian Affairs			
Bob White, YKHC	Yukon-Kuskokwim Health Corporation			
Brian Lefferts, YKHC	Yukon-Kuskokwim Health Corporation			
Mike Vicente, YKHC	Yukon-Kuskokwim Health Corporation			
Kate Glover	Alaska Institute for Justice			

Tribal Hazard Mitigation Plan for the Community of Akiak

Newsletter #2: July 9, 2019



Photo Credit: Ivan Ivan via KYUK News, May 20, 2019.

The Akiak Native Community is developing a Hazard Mitigation Plan for their community. LeMay Engineering & Consulting, Inc. was contracted to assist with development of the HMP. The HMP will identify applicable natural hazards to the community of Akiak. The HMP will also identify the people/facilities potentially at risk and ways to mitigate damage from future hazard impacts.

Attend the July 29, Community Meeting starting at 11 am at the Tribal Office in

Akiak: Jennifer LeMay will be presenting a summary of the proposed mitigation actions for the community. You can review the Hazard Mitigation Plan before the meeting by stopping in the Tribal Office and asking for a paper copy or going to this website.

https://www.commerce.alaska.gov/dcra/DCRARepoExt/RepoPubs/Plans/2019_Draft_Akiak_Native_Community_HMP.pdf

For more information, contact:

Sheila Williams, Tribal Administrator (907) 765-7112

Jennifer LeMay, PE, PMP, Planner, (907) 350-6061

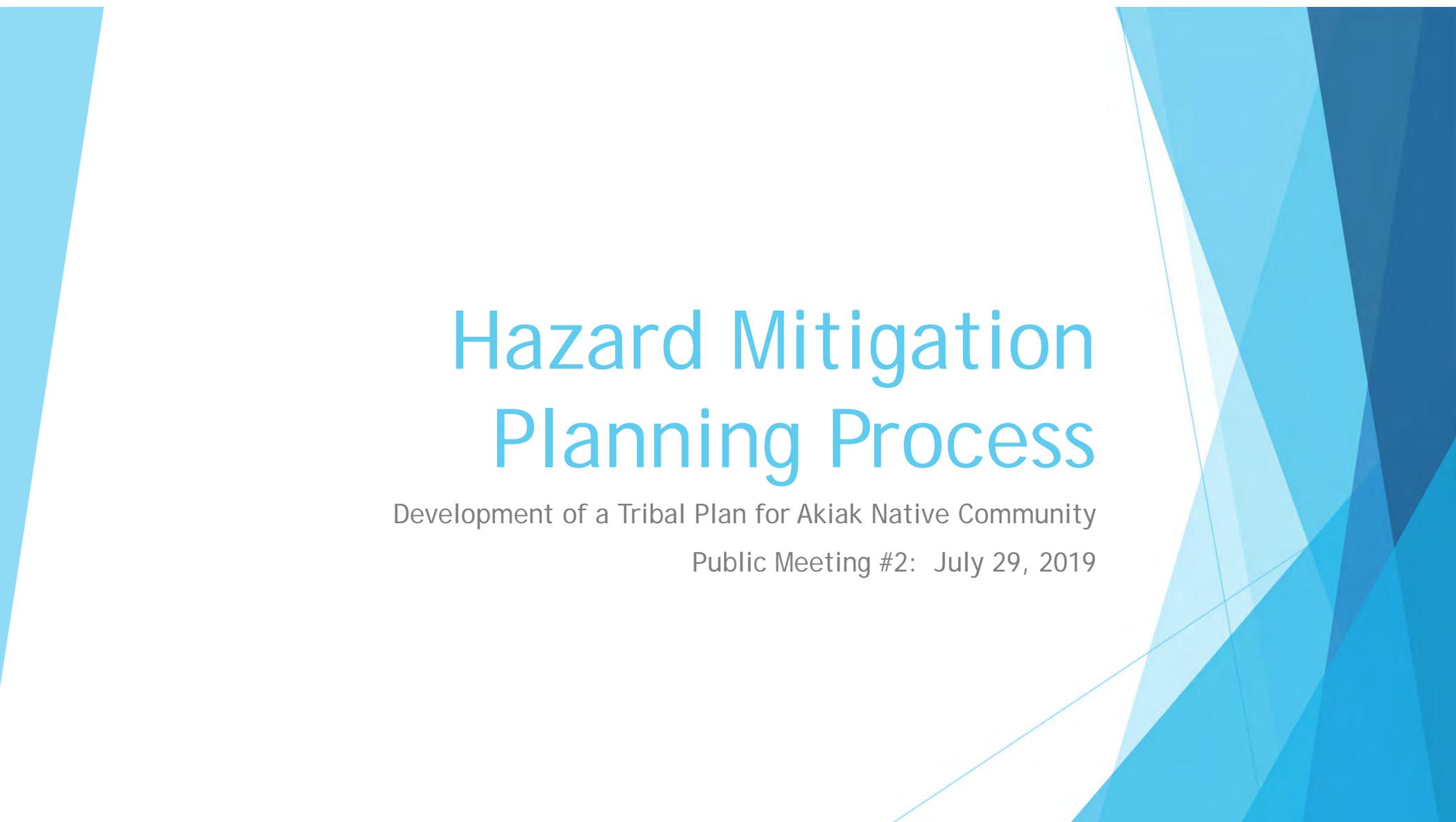
Akiak Public Meeting for 2019 Tribal Hazard Mitigation Plan

July 29, 2019

11:00 am at the Tribal Hall

Name	Organization Represented or Akiak Resident	Contact Information (email)
Ivan M. Ivan	AKIAK NATIVE Community	(907) 765-2071 (cell)
Helen N Ivan	AKIAK	765-2072
Sunny Jackson	ANC	765-7112
JAMES NIEOAI	ANC	765-2271
Anna L. Ivan	City of Akiak	765-7411
Robert Williams	CITY OF AKIAK	765-2100
Debra Jackson	City of Akiak	545 5513
Lily Williams	Lily wms	765-2100
Moses Owen	ANC	Mowene yapiti.org (907) 765-2087
Olenka Jones	City of Akiak	Olenka.jones@akiaak.ak.gov
Doraann KOZEUNIKOFF	city of Akiak	dinkozeunikoff81@yahoo.com 765-7112
Jackson Williams	Ke. Crop.	765-2002
Cimelia Nedor	Kelcomint Corp	765-7919
Katrina Jackson	Wentor	

Name	Organization	Contact Information (phone and email)
Waylon Charles		
Natalia Andrews		
Lenora Gilila	City of Akiak	lenora.gilila@yahoo.com 765-7411
John Jasper Sr.	Kolikarunt	jjasper07@yahoo.com 765-2279
Frank G. Kawalecy	Akiak Native Comm.	N/A
David J Gilila Sr	City	COA. wa 907 765-7411
Sheela W Carl	Akiak Native Comm	907-765-2009
Ruth Ivan	AKIAK Native Community	765-7830
JENNIFER LEMAY	LEMAN ENGINEERING + CONSULTING	907 350 6061



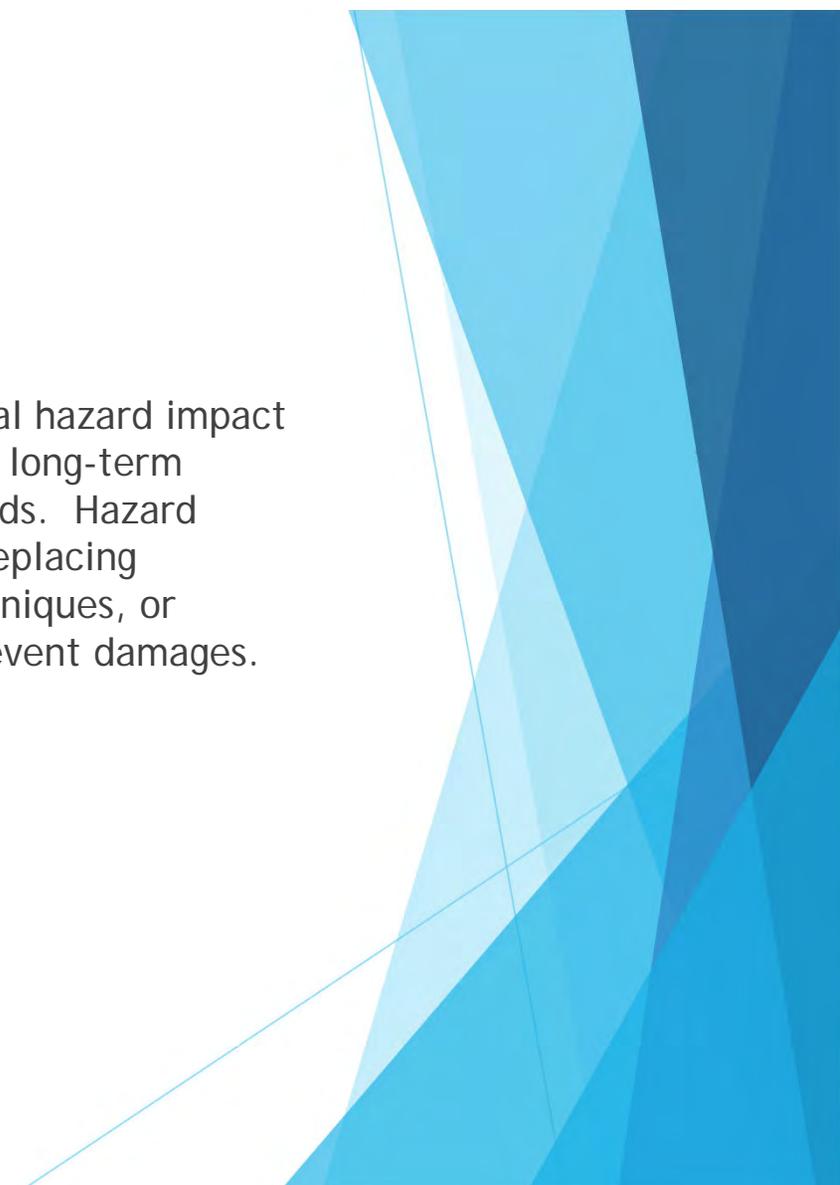
Hazard Mitigation Planning Process

Development of a Tribal Plan for Akiak Native Community

Public Meeting #2: July 29, 2019

What is Hazard Mitigation?

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



Why is a Hazard Mitigation Plan needed?

Communities must have a FEMA-approved, and community-adopted HMP to receive a project grant from FEMA's pre- and post-disaster grants identified in their Hazard Mitigation Assistance and other agencies' mitigation grant programs. The HMP will make the Akiak Native Community (ANC) eligible to apply for mitigation funds after the HMP is approved by FEMA and adopted by the Tribal Council. A FEMA-approved and community-adopted HMP enables Tribal governments to apply for the Hazard Mitigation Grant Program (HMGP), a disaster-related assistance program and the Pre-Disaster Mitigation (PDM) grant programs.

After the 2019 Hazard Mitigation Plan is completed, approved, and adopted, the ANC will be eligible to apply for mitigation project funds from the State of Alaska DHS&EM and FEMA for five years until the plan requires an update in 2024.

LeMay Engineering & Consulting, Inc. was hired in June to prepare a FEMA-Direct Tribal Hazard Mitigation Plan for the Akiak Native Community. The effort to develop this plan is a public process, and everyone is invited to participate.

Plan Process

- Introductory meeting occurred on June 6, 2019.
- Gathering of data occurred in June.
- Public Meeting #1 on June 10, 2019.
- Draft Plan available for public comment (June 17, 2019).
- Public hearing for Draft Plan (July 29, 2019).
- FEMA review and pre-approval of Draft Plan.
- Newsletter announcing Final Plan (the public may still comment).
- Tribal Council adoption.
- Final Approval from FEMA.

Today's meeting is a forum to present an overview of the potential mitigation actions. I welcome your input. Comments can be provided during this meeting or by email or phone. Send Jennifer LeMay, PE, PMP an email at jlemay@lemayengineering.com or call her at (907) 350-6061.

For hazards, we're interested in information related to:

- Hazard Identification,
- Profiles (characteristics),
- Previous occurrences,
- Locations,
- Extents (breadth, magnitude, and severity),
- Impacts, and
- Recurrence probability statements.

Which hazards are applicable for your community?

- Floods/Erosion **Applicable to Akiak** ★
- Wildland/Conflagration Fires **Applicable to Akiak** ★
- Earthquakes **Applicable to Akiak** ★
- Severe Weather **Applicable to Akiak** ★
- Changes in the Cryosphere **Applicable to Akiak** ★
- Permafrost is not applicable. The ground freezes in Akiak, but there is not a layer that stays permanently frozen.

Vulnerability of the Akiak Native Community to Natural Hazards

Population

- ▶ 2010 U.S. Census was 346.
- ▶ 2017 DCCED was 394.

Houses and Critical Infrastructure

- ▶ 98 single-family residential structures (\$26,950,000).
- ▶ 50 critical facilities and infrastructure have been identified (\$53,162,794).

According to the 2018 Draft Statewide Threat Assessment by the Denali Commission, Akiak is one of the Alaskan communities most vulnerable to infrastructure impacts associated with erosion/flooding/changes in the cryosphere.

Floods/Erosion

- Flooding and erosion occur together in Akiak because increased water currents often are raised above the normal riverbank and slough. The community of Akiak is situated on the west/north side of the Kuskokwim River, at the beginning of a bend in the river. A large amount of the community's development is located adjacent to the river.
- Akiak experienced high river levels from spring melt in May 2019 that claimed up to 75 feet of riverbank in a matter of hours. In 2013 during a fall storm of similar magnitude with high southerly winds, waves claimed 40 feet of riverbank in a matter of hours. One home is imminently in peril. In the past, flooding has occurred from spring melt when an ice dam forms downriver. The flood path has come from a slough behind the village. This slough is also a concern for Akiak beyond flooding. Given how the river morphology is changing, the Akiak community is concerned that the flows in the slough may grow and develop a new branch of the river, which would effectively put Akiak on an unstable island.
- On June 25, 2019, a southerly wind created another event. Now, six homes are in immediate danger.
- The multi-year impact of storms and flooding causes severe riverine erosion. The fall storm season has the greatest impact and greatly increases the community's vulnerability to flooding/erosion. Changes in the cryosphere will potentially increase the threat of erosion due to the associated rising water levels and scouring of the land.

The Akiak community realizes it is threatened with significant riverbank destabilization both in May with spring melt and in September/October with fall storms. Six homes are imminently in peril.

Conclusions from Previous Government Documents:

1. In 2003, the U.S. Government Accountability Office (GAO) reported that flooding and erosion affected 184 out of 213 (86%) of Alaska Native Villages because of rising temperatures (includes Akiak).
2. In 2009, Akiak was also included in the GAO report as one of 31 Alaska Native Villages imminently-threatened by flooding and erosion.
3. Also, in 2009, Akiak was included in the U.S. Army Corps of Engineers' Baseline Erosion Assessment.
4. The USACE Flood Hazard Data reported that the flood of record was the 1964 ice-jam flood, which reached an elevation of 35.2 feet mean sea level. Flooding has occurred in 1920, 1964, 1971, 1982, 1984, 1987, and 1988.
5. Per the State DHS&EM Cost Index as of June 30, 2018, Akiak has had Disasters declared by either the Governor or FEMA in 1989, 1995, 2006, 2009, 2012, and 2013.

6. The United States Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS) published a study in 2013 entitled "An Assessment of Streambank Erosion and a Revetment Concept Design on the Kuskokwim River at Akiak, Alaska."

The NRCS evaluated the study area from 2013 in May 2019. An excerpt from their trip report stated: "We used a handheld GPS to record the top of bank location. We then measured the distance from the top of the bank to each structure. Figure 1 shows the results of this effort. This figure also illustrates how the bank erosion at Akiak has progressed from 1957 to 2019.

It appears that the active erosion at the downstream end of the community observed on May 30, 2019 is now worse than it was in 2013. Figure 1 reinforces that impression and shows that most significant erosion between 2017 (the date of the image) and 2019 has occurred in the lower 1/3 of the image. With the largest amount of erosion adjacent to a home (Identified as #554) where almost 100 feet of land has eroded between July 2017 and May 2019.

During the meeting we were asked to look at the erosion in the slough channel on the inside of the bend just downstream from the community. Local reports indicate this slough has increased in depth and width in the last decade. Although active erosion exists along both banks of the slough for much of its length, the erosion is not currently threatening any structures.

Overall the erosion situation that we observed on this trip reinforces the conclusion of the 2013 investigation. The hydraulic conditions of the Kuskokwim River at Akiak are severe. There are planform geomorphic changes ongoing in this reach of the river that represent a threat to several structures in the community.

Several homes are immediately threatened. The data presented in Figure 1 show that the closest home to the top of the bank is approximately 50 linear feet, and that there are five homes that are within approximately 100 feet of the top of the bank. A high-water event could easily erode 50 feet of land in a single day. The current trend appears to be towards more erosion at this location."

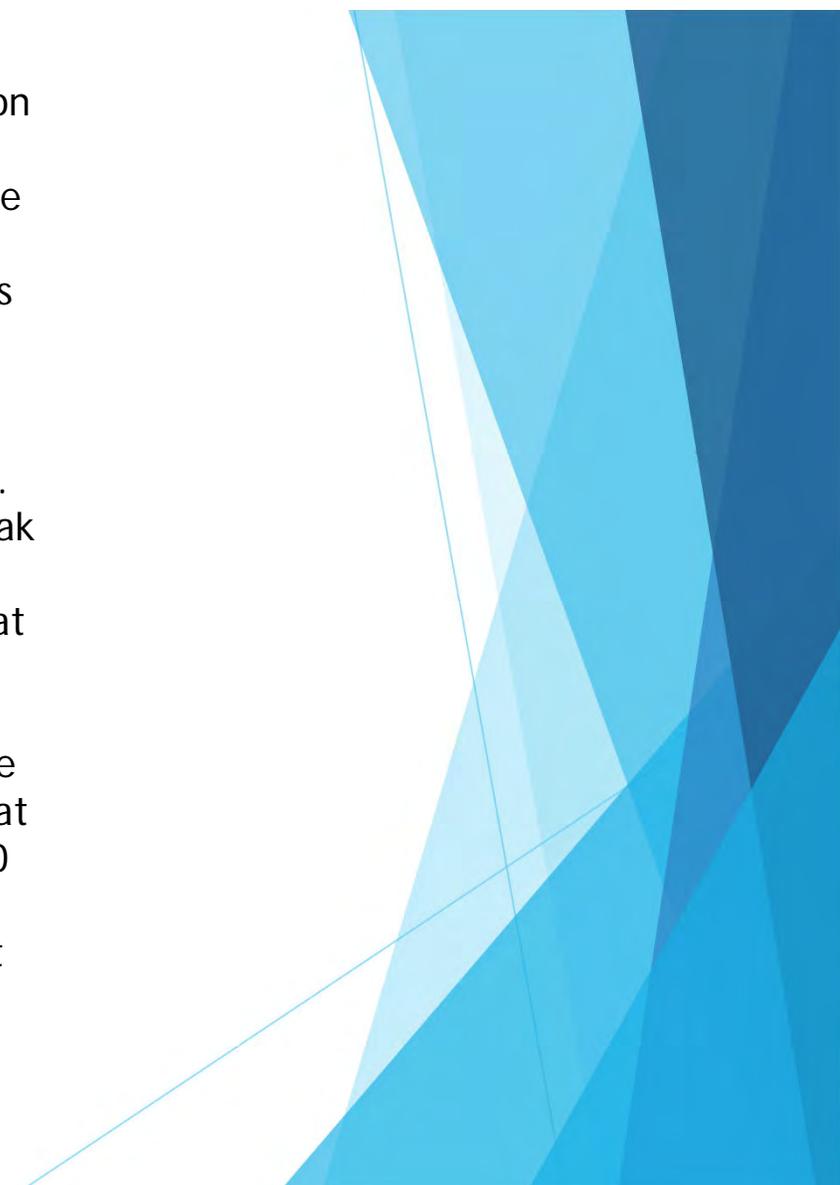
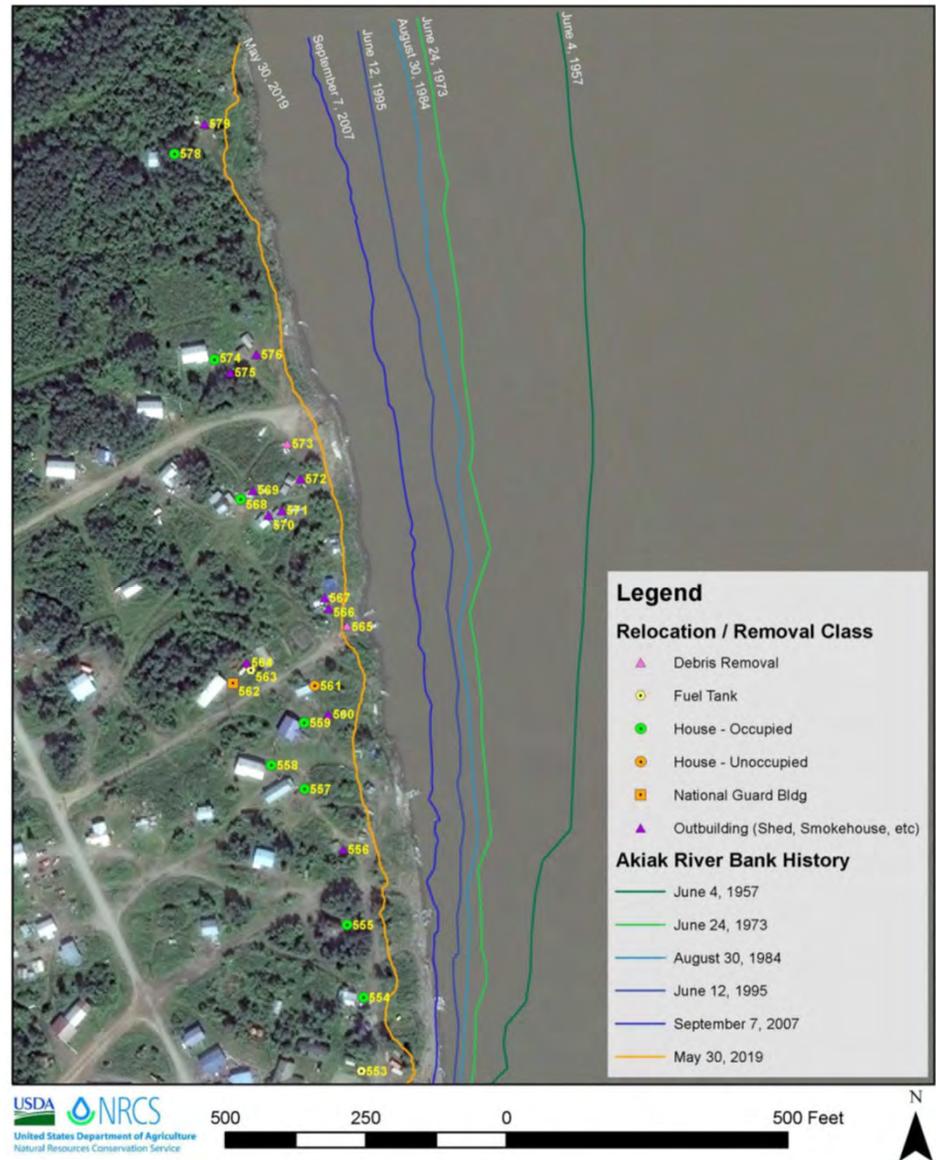


Figure 1. This 2017 image shows the approximate location of the top of the bank in 2019, as well as the top of bank location for 1957, 1973, 1984, 1995, and 2007. Also identified are the homes and other features identified during the May 30th, 2019 site visit.



The 2013 NRCS Study found that the Kuskokwim River had a deep hole (over 60 feet) just upriver from Akiak. NRCS is currently updating this figure from the 2013 Study based on their collection of river depth measurements and analysis from May 30, 2019, after the May event where 75 feet of riverbank about a mile long disappeared overnight. NRCS determined that the depth of the main river channel is now over 60 feet directly in front of the village.

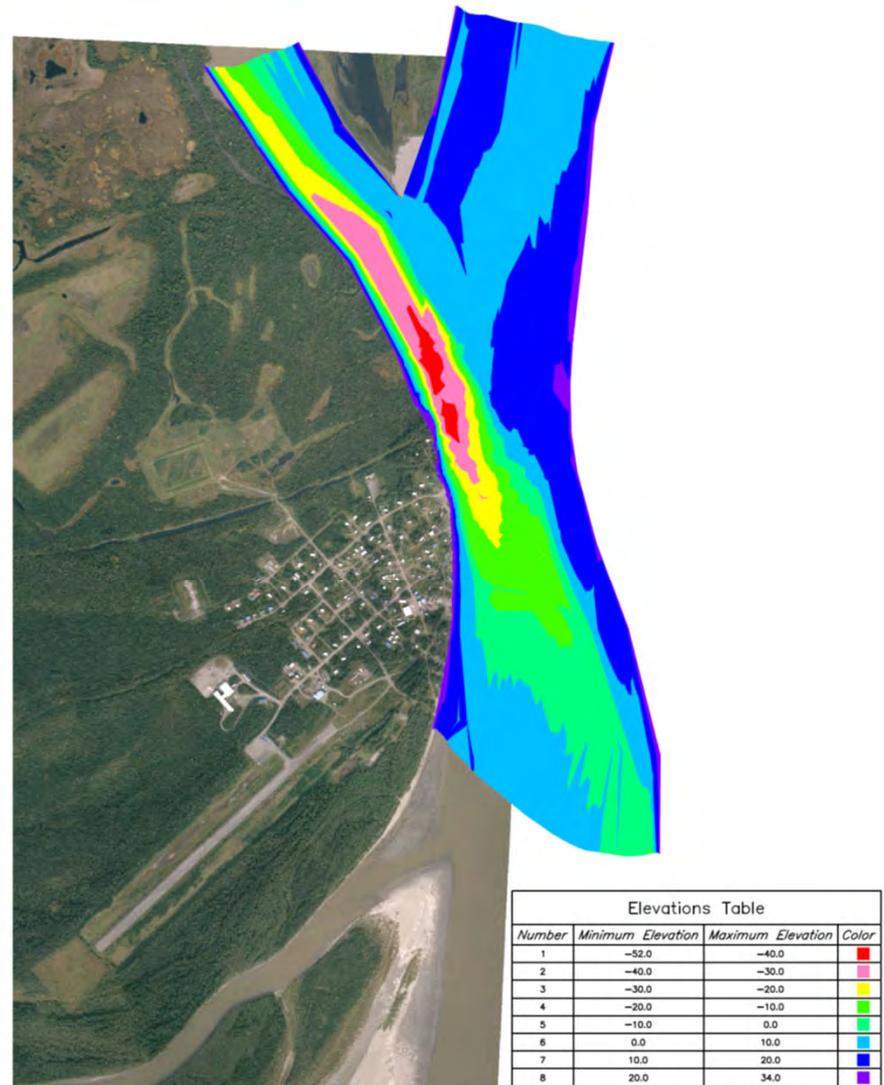


Figure 6. NRCS survey data from October 2012 showing channel bed elevation. Note: elevation of high water mark on staff gauge in Figure 3 is 32.8 feet, and the water surface elevation during the survey was 22 feet.

Based on Akiak's observations from 2013-2019, a combination of mild winters resulting in limited ground freezing, high river levels from spring melt, and a change in the river course upriver from Akiak are combining to erode riverbank due to bank destabilization. This causes the community concern as the 2013 riverbank loss (similar in magnitude to this 2019 event) was in the Fall during a storm event that created high waves that crashed on the riverbank shoreline. Akiak is now threatened during spring melt/high river levels and fall storms/high waves caused by strong southerly winds.

The Akiak Native Community developed a Tribal Hazard Mitigation Plan documenting Akiak's natural hazards, assessing the vulnerability of the community to the risks associated with these hazards, identifying mitigation goals, and developing mitigation actions to implement. The 30-day public comment period ends July 29, and Public Meeting #2 will be held in Akiak on July 29. The Hazard Mitigation Plan will be submitted to FEMA for review the first week in August.

The community resolved on June 10, 2019 to implement a Managed Retreat Away from the River.

The retreat location is a new subdivision behind the new school and near the airport. This land is higher and safer ground than the area where existing structures are built adjacent to the Kuskokwim River. This is the most viable solution to respond to increasing environmental threats by natural hazards. The Kokarmiut Corporation is the surface land owner.

Three levels of retreat include:

- a. The six immediate homes nearest the river and the infrastructure serving these homes will need to move first. Existing infrastructure (power, water, and sewer service lines) will need to be disconnected and relocated to the new subdivision.
- b. Additional homes (the total number isn't known as scientists need to determine where river erosion will stop), the old BIA school, and most importantly, a water main loop that will be in jeopardy within a few years must be moved next. Abandonment of the water main means many homes that are not in immediate peril will lose community water service. A mid-term solution will be required to address this concern.
- c. Two homes that do not need to be relocated will be elevated in place to mitigate potential flooding.

Mitigation Goals for Floods/Erosion/Changes in the Cryosphere:

1. Reduce the possibility of damage and losses from the combined hazard of flooding/erosion/changes in the cryosphere.

Mitigation Actions for Flooding/Erosion

Action ID	Description	Priority	Responsible Party	Potential Funding	Timeframe
FL&ER1	The six immediate homes nearest the river and the infrastructure serving these homes will need to move first. Existing infrastructure (power, water, and sewer service lines) will need to be disconnected and relocated to the new subdivision.	High	ANC Tribal Administrator	HUD; DHS Preparedness Technical Assistance Program; PDM Grants, HMGP Grants; USACE; Congressional Appropriations; NRCS; AEA	2019
FL&ER2	Development of a new community subdivision: Virtually no platted lots are available in Akiak to relocate existing homes from the riverbank. Kokarmiut Corporation, as the largest surface landowner in the community is working on the ANCSA 14(c)(3) process.		ANC Tribal Administrator		2019
FL&ER3	Additional homes (the total number isn't known as scientists need to determine where river erosion will stop), the old BIA school, and most importantly, a water main loop that will be in jeopardy within a few years must be moved next. Abandonment of the water main means many homes that are not in immediate peril will lose community water service. A mid-term solution will be required to address this concern.		ANC Tribal Administrator		2019-2024
FL&ER4	Additional homes that do not need to be relocated will be elevated in place to mitigate potential flooding.	Medium	ANC Tribal Administrator		

Mitigation Actions for Flooding/Erosion, continued

Action ID	Description	Priority	Responsible Party	Potential Funding	Timeframe
FL&ER5	Riverbank stabilization: Research other activities that will reduce the pace of the river claiming more riverbank. Some federal agencies are advocates of conservation districts where infrastructure is relocated, and the land is contoured and planted to resist erosion (with no future development). In Akiak, the riverbank is destabilized by two actions. The first is the structural scouring of the riverbank at the river's edge. The second is the high riverbank (between five to ten feet) that collapses due to the unstable slope, and by paring the slope back this second form of destabilization is minimized.	High	ANC Tribal Administrator	NRCS	2019
FL&ER6	The community would like to study the effects that the proposed Donlin Gold barge will add to the erosion rate of the channel in the river. The life of the Donlin Gold barge is 30 years, and four barges twice a day will be traveling in front of Akiak for 30 years. What will this additional traffic add to the existing riverbank erosion?	High	ANC Tribal Administrator	HMGP, PDM	2019

Mitigation Actions for Flooding/Erosion, continued

Action ID	Description	Priority	Responsible Party	Potential Funding	Timeframe
FL&ER7	<p>Kuskokwim River Morphology: Both the USACE in 2009 and NRCS in 2013 have carried out erosion studies and impacts to the community by changing river morphology. A close reading between the two reports demonstrates a difference of opinion between the two agencies with NRCS estimating a very costly \$80+M solution to the bank destabilization (a massive rock revetment effort) and USACE estimating a modest \$3.4M revetment solution. Furthermore, there are rapidly changing variables that may have impacted the river morphology. In the past several years, the Kuskokwim River main channel has moved to the Akiak river side as opposed to the historic main channel flow on the easterly side of the river. Recently, NRCS staff carried out bathymetric survey of the river and found the river to be approximately 60 feet deep in front of the community (~ 100 feet from the shoreline) where the recent erosion started.</p> <p>The ANC will pursue partnerships in an effort to understand the local river morphology changes in Akiak as well as the larger question of what is happening to a number of villages along the river. Fundamentally, the community seeks an answer to this question - where will the river stabilize and stop. In other words - how far do they retreat.</p>	High	ANC Tribal Administrator	HUD; DHS Preparedness Technical Assistance Program; PDM Grants, HMGP Grants; USACE; Congressional Appropriations; NRCS; AEA	2019

Mitigation Actions for Flooding/Erosion, continued

Action ID	Description	Priority	Responsible Party	Potential Funding	Timeframe
FL&ER8	The lower portion of the river by the airport has erosion and needs to be addressed. Since the early 1980s, the channel has changed due to barges getting stuck and subsequently, unloading gravel into the river. The channel has changed every year, and one year, a barge could not travel at all and was stuck for an entire year.	High	ANC Tribal Administrator	HUD; DHS Preparedness Technical Assistance Program; PDM Grants, HMGP Grants; USACE; Congressional Appropriations; NRCS; AEA; Yuuit School District	2019
FL&ER9	The 5,000-gallon fuel tank by the current school has gasoline. This tank is within 100 feet from today's riverbank and is not connected to the school's diesel tank pipeline. This tank needs to be removed.				2019

Earthquakes

- The largest recorded earthquake within 50 miles of Akiak measured a Magnitude of 4.4 and occurred on February 23, 2013. This earthquake did not cause any damage to critical facilities, residences, or infrastructure in Akiak.
- The Y-K Delta appears to be the least seismically area active in western Alaska. In general, the seismicity in western Alaska in the M 2.0 to 5.0 range appears to be widespread and confined to relatively shallow crustal depths.
- The USGS earthquake probability model places the probability of an earthquake with a likelihood of experiencing strong shaking within Akiak at 0.2 to 0.3 g PGA with a 2% probability in 50 years. A 2% probability in 50 years is a rare, large earthquake, and statistically, it happens on average every 2,500 years.

The Akiak Native Community chose not to carry forward earthquakes in the Hazard Mitigation Plan as a hazard to develop mitigation actions for. (VERY LOW RISK)

Severe Weather

In Akiak, severe weather consists of blizzards, high wind events, and several cold spells.

Mitigation Goal for Severe Weather

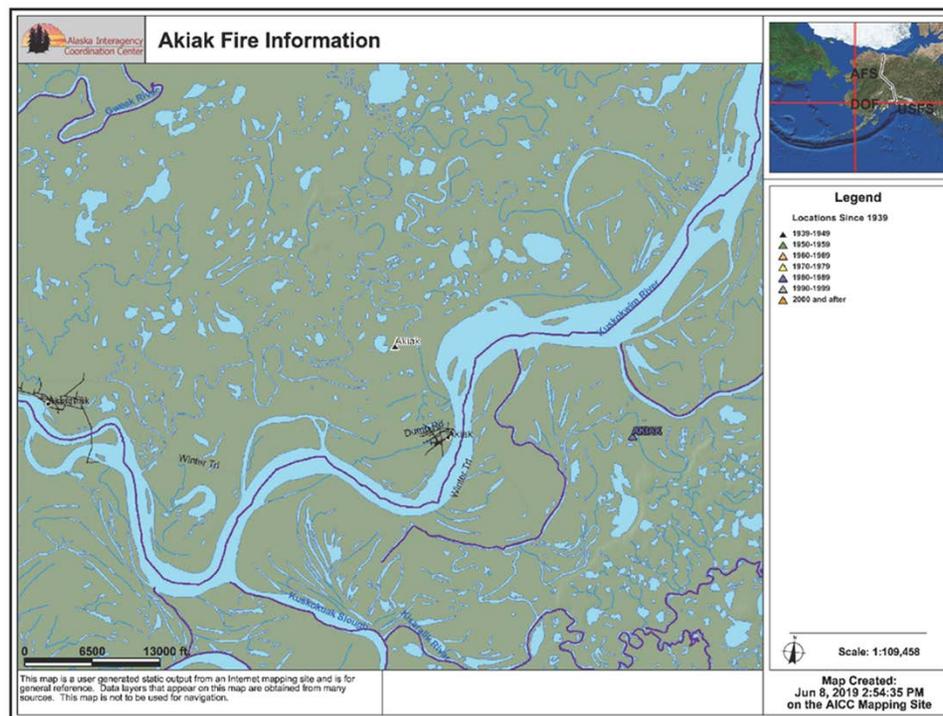
2. Reduce vulnerability of structures to severe winter storm damage.

Mitigation Actions for Severe Weather

Action ID	Description	Priority	Responsible Party	Potential Funding	Time-frame
SW1	Finalize Small Community Emergency Response Plan that has been written and requires adoption.	High	Tribal Administrator	ANC	2019

Tundra-Wildland/Conflagration Fire

Wildland fires have not been documented within the boundaries of Akiak; however, wildland fires have occurred in the vicinity. Since 1939, 72 wildland fire events have occurred within 50 miles of the community. The Alaska Interagency Coordination Center identified 38 of these 72 fires as exceeding 50 acres. No conflagration fires have occurred in Akiak.



Mitigation Goals for Fire:

3. Reduce the risk of damage and losses from fires.

Mitigation Actions for Fires

Action ID	Description	Priority	Responsible Party	Potential Funding	Time-frame	
W1	Identify methods of alerting the community if wildfire threat develops.	Moderate	Fire Chief	DOF, Federal Fire Fighters Grants, Rural Fire Assistance Grants, FEMA, Denali Commission	2019	
W2	Develop an evacuation plan for the community. FEMA and the Denali Commission have resources to support evacuation route planning.	Moderate	Fire Chief		2019	
W3	Replace Project Code Red Equipment.	Moderate	Fire Chief		2019	
W4	Promote FireWise building design, sites, and construction materials.	Moderate	Fire Chief		2019-2020	
W5	Ongoing maintenance of existing firebreaks.	Moderate	Fire Chief		2019-2020	
W6	Hydrants are not included in the new subdivision, and there are vulnerable areas within Akiak that need hydrants. Add hydrants.	Moderate	Fire Chief		DoF, Rural Firefighter Grant	2019
W7	Replace fire extinguishers that have been used.	Moderate	Fire Chief		DoF, Rural Firefighter Grant	2019



**LeMay Engineering
& Consulting, Inc.**

Jennifer L. LeMay, PE, PMP
Vice President
4272 Chelsea Way
Anchorage, AK 99504
(907) 350-6061
jlemay@lemayengineering.com

July 29, 2019

File

Subject: Hazard Mitigation Planning Process Trip Report

On July 29, 2019, Jennifer L. LeMay, PE, PMP of LeMay Engineering & Consulting, Inc. traveled to Akiak, Alaska. The purpose of this trip was to summarize the mitigation actions and receive public comments on the Draft Hazard Mitigation Plan.

The public comment period began June 17 and ended at the conclusion of today's meeting. The Draft Hazard Mitigation Plan was emailed to all attendees of the June 10, 2019 meeting whom had written their email address next to their name on the sign in sheet as well as federal agencies that were interested in the recent hazard events occurring in Akiak in Summer 2019. The plan was also posted by Sally Russell Cox of DCRA on DCRA's web site, and the link to the plan on DCRA's website was posted on newsletters within the Akiak community. No comments were received in the meeting. One comment was received via email, and I've attached the email to this trip report.

Attendees voted unanimously to submit the Draft Hazard Mitigation Plan for FEMA review and to ask for an expedited review as more riverbank eroded into the river on July 27. Ms. Sheila Williams showed me video of the event. The City and Village were both well-represented at the meeting; there were 23 people in attendance.

Tribal Chief Ivan M. Ivan stated that the IRA Council will immediately adopt the Hazard Mitigation Plan after FEMA issues an Adoption Pending Approval letter.

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

7/29/19

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

jlemay@lemayengineering.com

From: Mike Williams <mwilliams19522004@yahoo.com>
Sent: Tuesday, June 18, 2019 8:58 AM
To: jlemay@lemayengineering.com
Subject: Fw: Draft ANC Hazard Mitigation Plan for Review

Sorry, misspelled

----- Forwarded Message -----

From: Mike Williams <mwilliams19522004@yahoo.com>
To: Sheila Williams <akiarmiu@yahoo.com>
Cc: Ivan M. Ivan <iivan@yupiit.org>; Moses Owen <mowen@yupiit.org>; Sammy Jackson II <sammy_jackson03@hotmail.com>
Sent: Tuesday, June 18, 2019 08:11:52 AM AKDT
Subject: Re: Draft ANC Hazard Mitigation Plan for Review

Quyana,

It is well written in a very short order. Thank you for your report. I am reading it again.

Mike Williams

Sent from my iPhone

On Jun 17, 2019, at 8:14 PM, Sheila Williams <akiarmiu@yahoo.com> wrote:

----- Forwarded Message -----

From: jlemay@lemayengineering.com <jlemay@lemayengineering.com>
To: "akiarmiu@yahoo.com" <akiarmiu@yahoo.com>; 'Joel Neimeyer' <joel.neimeyer@gmail.com>
Cc: 'David Gilila Sr' <d.gililasr@yahoo.com>; "bobbywilliams08@yahoo.com" <bobbywilliams08@yahoo.com>; "lenora_gil6@yahoo.com" <lenora_gil6@yahoo.com>; "lizivan@yahoo.com" <lizivan@yahoo.com>; "akiarmiu.dmj81@yahoo.com" <akiarmiu.dmj81@yahoo.com>; "olinka.jones@yahoo.com" <olinka.jones@yahoo.com>; "kimberlyjay_07@hotmail.com" <kimberlyjay_07@hotmail.com>; "janderson@yupiit.org" <janderson@yupiit.org>
Sent: Monday, June 17, 2019, 7:50:57 PM AKDT
Subject: Draft ANC Hazard Mitigation Plan for Review

All,

I've done my best to incorporate comments from the June 10, 2019 meeting into this Draft Hazard Mitigation Plan for the Akiak Native Community. As you're reviewing the plan, please feel free to comment on anything I may have misinterpreted someone saying, typos, grammar, thoughts, etc. It is important that as many people review this plan as possible to ensure that the ANC has a plan that truly represents its community and needs. Please do not assume that funding sources in Table 25 have committed to the mitigation actions. FEMA requires that I list ideas even though at this time, many of the sources are unknown. The plan is not a legal document, and FEMA knows that sources change.

I will attend the July 17 meeting. You can provide comments by either emailing me, calling me, or talking to me in person at the meeting. Feel free to forward this email to anyone that is interested in Akiak. I've only included the email addresses that were provided at the June 10 meeting on the sign in sheet.

Thank you.

Jennifer LeMay, PE, PMP

Vice President

(907) 350-6061

<image002.png>

<2019 Draft Akiak Native Community HMP.pdf>

<image002.png>

From: Mike Williams <mwilliams19522004@yahoo.com>
Sent: Tuesday, June 18, 2019 9:52 AM
To: Sheila Williams
Cc: Ivan M. Ivan; Moses Owen; Sammy Jackson II
Subject: Re: Draft ANC Hazard Mitigation Plan for Review

The commercial fishing has not been in operation for the last 10 years and no fire fighting for the last over 20 years.

Page 12 please include Michael Williams, Sec/Treasurer

Sent from my iPhone

On Jun 17, 2019, at 8:14 PM, Sheila Williams <akiarmiu@yahoo.com> wrote:

----- Forwarded Message -----

From: jlemay@lemayengineering.com <jlemay@lemayengineering.com>
To: "akiarmiu@yahoo.com" <akiarmiu@yahoo.com>; 'Joel Neimeyer' <joel.neimeyer@gmail.com>
Cc: 'David Gilila Sr' <d.gililasr@yahoo.com>; "bobbywilliams08@yahoo.com" <bobbywilliams08@yahoo.com>; "lenora_gil6@yahoo.com" <lenora_gil6@yahoo.com>; "lizivan@yahoo.com" <lizivan@yahoo.com>; "akiarmiu.dmj81@yahoo.com" <akiarmiu.dmj81@yahoo.com>; "olinka.jones@yahoo.com" <olinka.jones@yahoo.com>; "kimberlyjay_07@hotmail.com" <kimberlyjay_07@hotmail.com>; "janderson@yupiit.org" <janderson@yupiit.org>
Sent: Monday, June 17, 2019, 7:50:57 PM AKDT
Subject: Draft ANC Hazard Mitigation Plan for Review

All,

I've done my best to incorporate comments from the June 10, 2019 meeting into this Draft Hazard Mitigation Plan for the Akiak Native Community. As you're reviewing the plan, please feel free to comment on anything I may have misinterpreted someone saying, typos, grammar, thoughts, etc. It is important that as many people review this plan as possible to ensure that the ANC has a plan that truly represents its community and needs. Please do not assume that funding sources in Table 25 have committed to the mitigation actions. FEMA requires that I list ideas even though at this time, many of the sources are unknown. The plan is not a legal document, and FEMA knows that sources change.

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Thank you.

Jennifer LeMay, PE, PMP

Vice President

(907) 350-6061

<image002.png>

<2019 Draft Akiak Native Community HMP.pdf>

<image002.png>

Appendix B: Akiak Land Use Map

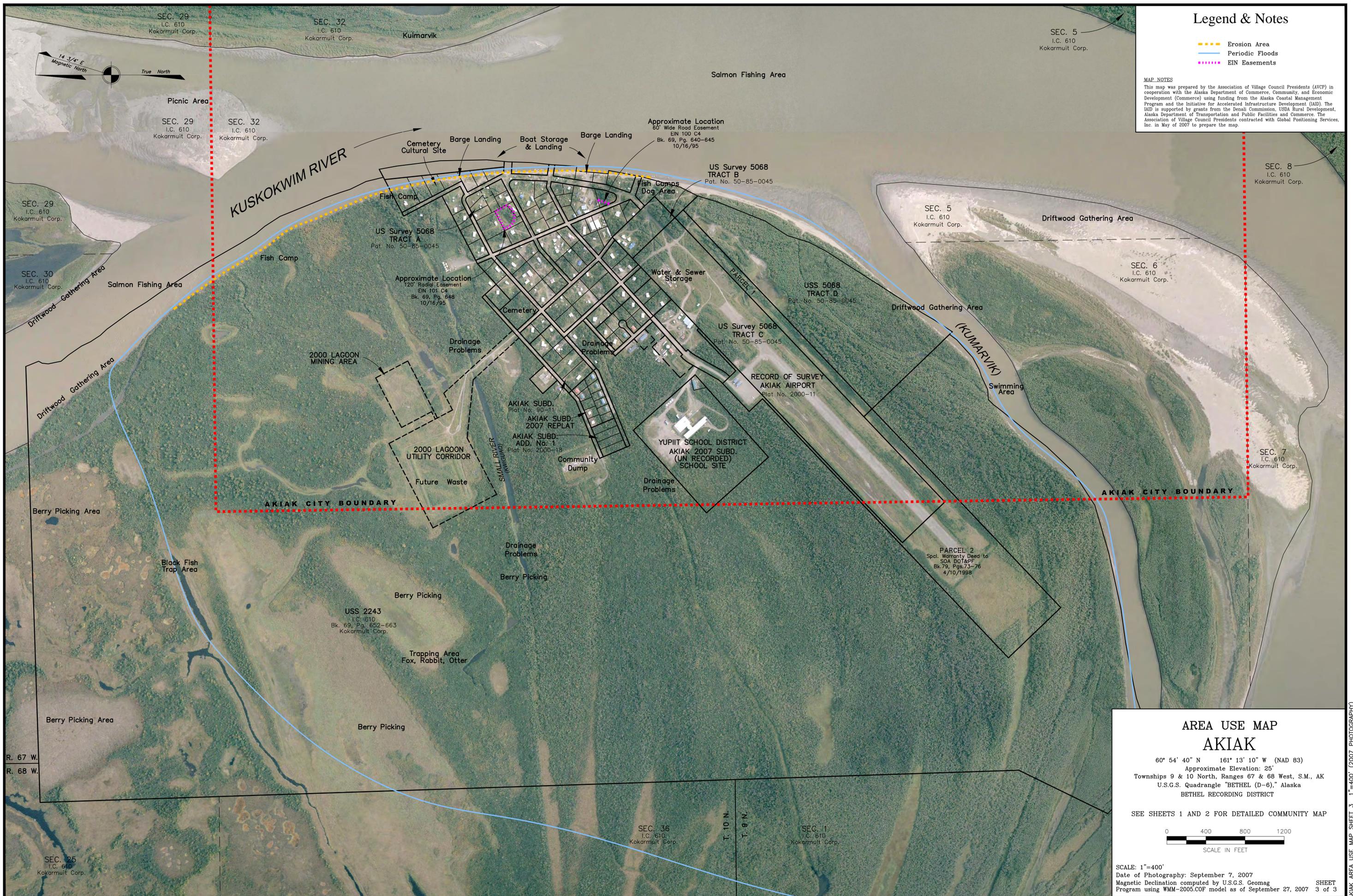
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Legend & Notes

- Erosion Area
- Periodic Floods
- EIN Easements

MAP NOTES

This map was prepared by the Association of Village Council Presidents (AVCP) in cooperation with the Alaska Department of Commerce, Community, and Economic Development (Commerce) using funding from the Alaska Coastal Management Program and the Initiative for Accelerated Infrastructure Development (IAID). The IAID is supported by grants from the Denali Commission, USDA Rural Development, Alaska Department of Transportation and Public Facilities and Commerce. The Association of Village Council Presidents contracted with Global Positioning Services, Inc. in May of 2007 to prepare the map.



AREA USE MAP AKIAK

60° 54' 40" N 161° 13' 10" W (NAD 83)
 Approximate Elevation: 25'
 Townships 9 & 10 North, Ranges 67 & 68 West, S.M., AK
 U.S.G.S. Quadrangle "BETHEL (D-6)," Alaska
 BETHEL RECORDING DISTRICT

SEE SHEETS 1 AND 2 FOR DETAILED COMMUNITY MAP



SCALE: 1"=400'
 Date of Photography: September 7, 2007
 Magnetic Declination computed by U.S.G.S. Geomag Program using WMM-2005.COP model as of September 27, 2007
 SHEET 3 of 3

AKIAK AREA USE MAP SHEET 3 1"=400' (2007 PHOTOGRAPHY)

Akiak



- Legend**
- Residential Bldg
 - Commercial Bldg
 - Public Bldg
 - Lines Airport Surveyed
 - Shore Lines
 - Easement Lines
 - Subdivision Lot
 - Subdivision Bk
 - US Surveys
 - US Survey Meanders
 - Unsurveyed Lines
 - Township Line
 - Section Lines
 - City Boundary
 - Block No.



Date of Imagery: 9/1/2015 with 2007 profile imagery as a transparency to show the change.

Appendix C: FEMA Review Tool

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FEMA Region 10 Tribal Mitigation Plan Review Tool

The *Tribal Mitigation Plan Review Tool* records how the tribal mitigation plan meets the regulations in [44 CFR §§ 201.7](#) and [201.5](#) (if applicable) and offers FEMA plan reviewers an opportunity to provide feedback to the tribal government.

- **Section 1:** The Regulation Checklist documents FEMA’s evaluation of whether the plan has addressed all requirements. If plan requirements are not met, FEMA uses each Required Revisions section to indicate necessary changes.
- **Section 2:** The Strengths and Opportunities for Improvement summary identifies plan’s strengths as well as areas for improvement as part of the next plan update.

The FEMA mitigation planner must reference the [Tribal Mitigation Plan Review Guide](#) when completing the *Tribal Mitigation Plan Review Tool*.

Tribal Jurisdiction: Akiak Native Community, Alaska (Region 10)	Title of Plan: Draft Akiak Native Community Multi-Hazard Mitigation Plan	Date of Plan: July 31, 2019
Tribal Point of Contact: Sheila Carl	Address: P.O. Box 52127 Akiak, AK 99552	
Title: Tribal Administrator		
Agency: Akiak Native Community		
Phone Number: (907) 765-2009	Email: akiarmiu@yahoo.com	

State Reviewer (if applicable): N/A	Title:	Date:
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FEMA Reviewer:	Title:	Date:
Date Received in FEMA Region 10		
Plan Not Approved		
Plan Approvable Pending Adoption		
Plan Approved		

Section 1: REGULATION CHECKLIST

1. Standard Regulation Checklist Regulation (44 CFR § 201.7 Tribal Mitigation Plans)	Location in Plan (section and/or page number)	Met	Not Met
ELEMENT A. PLANNING PROCESS			
A1. Does the plan document the planning process, including how it was prepared and who was involved in the process? [44 CFR § 201.7(c)(1)]	PDF 19-24, Appendix A (PDF 101-175)	X	
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)]	PDF 22, 24, 69 Appendix A (PDF 109, 144, 172-175)	X	
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)]	PDF 22, 24, Appendix A (PDF 144, 172-175)	X	
A4. Does the plan describe the review and incorporation of existing plans, studies, and reports? [44 CFR § 201.7(c)(1)(iii)]	PDF 24, 25 Appendix A (PDF 95-97, 119-120)	X	
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)]	PDF 45-52, Appendix A (136-143, 154-158)	X	
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)]	PDF 25-28 Appendix E (PDF 198-206)	X	
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)]	PDF 26 Appendix E (PDF 198-206)	X	
ELEMENT A: REQUIRED REVISIONS			
ELEMENT B. HAZARD IDENTIFICATION AND RISK ASSESSMENT			
B1. Does the plan include a description of the type, location, and extent of all natural hazards that can affect the tribal planning area? [44 CFR § 201.7(c)(2)(i)]	PDF 30-67	X	

1. Standard Regulation Checklist		Location in Plan (section and/or page number)	Met	Not Met
Regulation (44 CFR § 201.7 Tribal Mitigation Plans)				
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)]	Cryosphere: 33-36, 38; Earthquake: 40-41; Flooding/Erosion: 45-53, 57-60; Severe Weather: 61-64; Wildland and Conflagration Fire: 64-67	X		
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)]	Vulnerabilities: 73-79; Cryosphere: 38; Earthquake: 41; Flooding/Erosion: 57; Severe Weather: 63-64; Wildland and Conflagration Fire: 66	X		
<u>ELEMENT B: REQUIRED REVISIONS</u>				
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)]	PDF 85-86	X		
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)]	PDF 90-94, Appendix A (136-143), Appendix G (211-215)	X		
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)]	PDF 83-84	X		
C4. Does the plan identify and analyze a comprehensive range of specific mitigation actions and projects being considered to reduce the effects of each hazard, with emphasis on new and existing buildings and infrastructure? [44 CFR § 201.7(c)(3)(ii)]	PDF 87-94	X		
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)]	PDF 85-86, 87-94	X		
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)]	PDF 25-26	X		

1. Standard Regulation Checklist		Location in Plan (section and/or page number)	Met	Not Met
Regulation (44 CFR § 201.7 Tribal Mitigation Plans)				
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)]	PDF 26-28, 198-206	X		
<u>ELEMENT C: REQUIRED REVISIONS</u>				
ELEMENT D. PLAN UPDATES				
D1. Was the plan revised to reflect changes in development? [44 CFR § 201.7(d)(3)]	N/A; First Tribal Plan			
D2. Was the plan revised to reflect progress in tribal mitigation efforts? [44 CFR §§ 201.7(d)(3) and 201.7(c)(4)(iii)]	N/A; First Tribal Plan			
D3. Was the plan revised to reflect changes in priorities? [44 CFR § 201.7(d)(3)]	N/A; First Tribal Plan			
<u>ELEMENT D: REQUIRED REVISIONS</u>				
ELEMENT E. ASSURANCES AND PLAN ADOPTION				
E1. Does the plan include assurances that the tribal government will comply with all applicable Federal statutes and regulations in effect with respect to the periods for which it receives grant funding, including 2 CFR Parts 200 and 3002, and will amend its plan whenever necessary to reflect changes in tribal or Federal laws and statutes? [44 CFR § 201.7(c)(6)]	PDF 29	X		
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)]	29, Adoption Resolution to be included in Appendix F			X
<u>ELEMENT E: REQUIRED REVISIONS</u>				
2. Enhanced Regulation Checklist		Location in Plan (section and/or page number)	Met	Not Met
Regulation (44 CFR § 201.5 Enhanced Tribal Mitigation Plans)				

1. Standard Regulation Checklist		Location in Plan (section and/or page number)	Met	Not Met
Regulation (44 CFR § 201.7 Tribal Mitigation Plans)				
ENHANCED ELEMENT F. STANDARD PLAN REQUIREMENTS				
F1. Does the enhanced plan include all elements of the standard tribal mitigation plan? [44 CFR §§ 201.3(e)(3), 201.5(b), and 201.7]				
ENHANCED ELEMENT F: REQUIRED REVISIONS				
ENHANCED ELEMENT G. INTEGRATED PLANNING				
G1. Does the enhanced plan demonstrate integration to the extent practicable with other tribal and/or regional planning initiatives and FEMA mitigation programs and initiatives? [44 CFR §§ 201.3(e)(3) and 201.5(b)(1)]				
ENHANCED ELEMENT G: REQUIRED REVISIONS				
ENHANCED ELEMENT H. TRIBAL MITIGATION CAPABILITIES				
H1. Does the tribal government demonstrate commitment to a comprehensive mitigation program? [44 CFR §§ 201.3(e)(3) and 201.5(b)(4)]				
H2. Does the enhanced plan document capability to implement mitigation actions? [44 CFR §§ 201.3(e)(3), 201.5(b)(2)(i), 201.5(b)(2)(ii), and 201.5(b)(2)(iv)]				
H3. Is the tribal government using existing mitigation programs to achieve mitigation goals? [44 CFR §§ 201.3(e)(3), 201.5(a) and 201.5(b)(3)]				
ENHANCED ELEMENT H: REQUIRED REVISIONS				
ENHANCED ELEMENT I. HMA GRANTS MANAGEMENT PERFORMANCE				
I1. With regard to HMA, is the tribal government maintaining the capability to meet application timeframes and submitting complete project applications? [44 CFR §§ 201.3(e)(3), 201.5(b)(2)(iii)(A)]				

1. Standard Regulation Checklist		Location in Plan (section and/or page number)	Met	Not Met
Regulation (44 CFR § 201.7 Tribal Mitigation Plans)				
12. With regard to HMA, is the tribal government maintaining the capability to prepare and submit accurate environmental reviews and benefit-cost analyses? [44 CFR §§ 201.3(e)(3) and 201.5(b)(2)(iii)(B)]				
13. With regard to HMA, is the tribal government maintaining the capability to submit complete and accurate quarterly progress and financial reports on time? [44 CFR §§ 201.3(e)(3) and 201.5(b)(2)(iii)(C)]				
14. With regard to HMA, is the tribal government maintaining the capability to complete HMA projects within established performance periods, including financial reconciliation? [44 CFR §§ 201.3(e)(3) and 201.5(b)(2)(iii)(D)]				
<u>ENHANCED ELEMENT I: REQUIRED REVISIONS</u>				

Section 2: STRENGTHS AND OPPORTUNITIES FOR IMPROVEMENT

INSTRUCTIONS: The purpose of the *Strengths and Opportunities for Improvement* section is for FEMA to provide more comprehensive feedback on the tribal mitigation plan to help the tribal government advance mitigation planning. The intended audience is the tribal staff responsible for the mitigation plan update. FEMA will address the following topics:

1. Plan strengths, including specific sections in the plan that are above and beyond the minimum requirements; and
2. Suggestions for future improvements.

FEMA will provide feedback and include examples of best practices, when possible, as part of the *Tribal Mitigation Plan Review Tool*, or, if necessary, as a separate document. The tribal mitigation plan elements are included below in italics for reference. FEMA is not required to provide feedback for each element.

Required revisions from the **Regulation Checklist** are not documented in the **Strengths and Opportunities for Improvement** section. Results from the **Strengths and Opportunities for Improvement** section are not required for Plan Approval.

Describe the mitigation plan strengths areas for future improvements, including areas that may exceed minimum requirements.

- Planning process
- *Hazard identification and risk assessment*
- *Mitigation strategy (including Mitigation Capabilities)*
- *Plan updates*
- *Adoption and assurances*
- *Enhanced Plan - Integrated planning*
- *Enhanced Plan - Tribal government mitigation capabilities (commitment to a comprehensive mitigation program)*
- *Enhanced Plan - HMA grants management performance*

Appendix D: Benefit-Cost Analysis Fact Sheet

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Benefit Cost Analysis Fact Sheet

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

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

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 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 (e.g., flood, wind, seismic).
- Discuss how the proposed measure will mitigate against future damages.
- Document the project’s 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 FEMA Region 10 staff prior to submittal of the application.

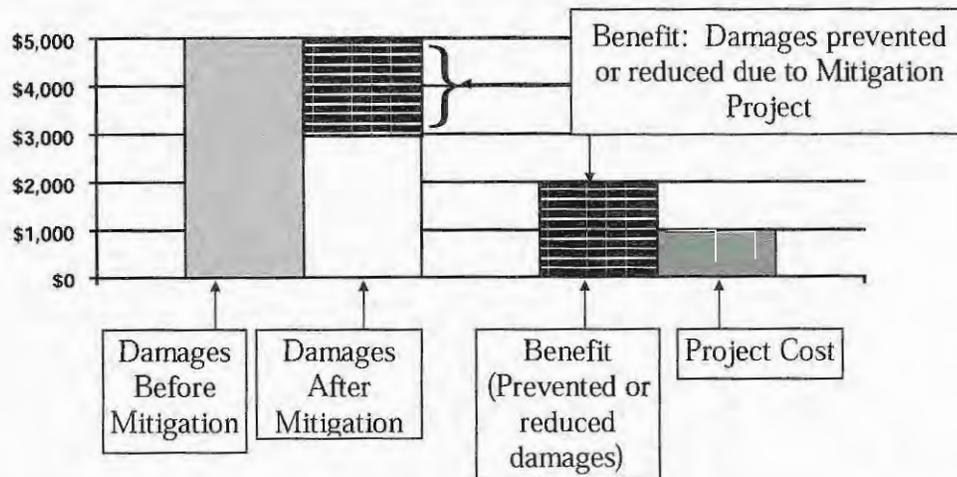
Damage and Benefit Data

- 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.

Benefit Cost Analysis Process

How to Determine Cost-Effectiveness of Mitigation Projects

When Congress enacted the Stafford Act's mitigation provisions, one of the criteria to determine priorities for mitigation funding was cost effectiveness. This cost effective provision was in response to the recognition that there would never be enough funding to completely mitigate against every hazard. To determine the cost effectiveness of proposed mitigation projects, FEMA implemented a benefit cost analysis (BCA) requirement to mitigation grant funding applications. The basic requirement of the BCA is that the benefit of the mitigation project must equal or exceed the cost, a benefit cost ratio (BCR) of 1:1 or greater. Over several years, FEMA developed a set standard values for use in BCA and custom software that establishes mitigation benefits and calculates the BCR. Benefit cost analysis submitted to FEMA to justify mitigation funding requires substantial documentation of project costs and benefits. FEMA provides the custom BCA software and training online at <https://www.fema.gov/benefit-cost-analysis>. An overview of the BCA process for a mitigation projects follows.



FEMA Basic Benefit-Cost Model. For more information about FEMA's Benefit-Cost Modules, please contact the FEMA Region X Mitigation Division at 425-487-4600.

It is important to understand that benefit-cost analysis is basically the same for each type of hazard mitigation project. The only differences are the types of data that are used in the calculations, depending on whether the project is for floods, earthquakes, or other natural hazards. For example, whereas the depth of flooding is used to estimate damage for flood mitigation projects, the severity of ground shaking is used to estimate damage for earthquake mitigation projects.

Calculating the Benefit - Cost Ratio

In the graph above, cost-effectiveness is determined by comparing the project cost of \$1,000, to the value of damages prevented after the mitigation measure, which is \$2,000. Because the dollar value of benefits exceeds the costs of funding the project, the project is cost-effective. This relationship is depicted numerically by dividing the benefits by the costs, resulting in a benefit-cost ratio (BCR). The BCR is simply a way of stating whether benefits exceed project costs, and

Benefit Cost Analysis Process

by how much. To derive the BCR, divide the benefits by the cost ($\$2,000 \div \$1,000$); if the result is 1.0 or greater, then the project is cost-effective. In this instance, the BCR is 2.0, which far exceeds the 1.0 level. On the other hand, if the cost of the project is \$2,000 and the benefits are only \$1,000, the project would have a BCR of 0.50 ($\$1,000 \div \$2,000$) and would not be cost-effective.

Conducting a benefit-cost analysis determines one of two things: either the project is cost-effective ($BCR > 1.0$), or it is not ($BCR < 1.0$). If the project is cost-effective, then no further work or analysis needs to be done, there is no third step other than to move the project to the next phase in the approval process. However, if the project is not cost-effective, then it is generally not eligible for FEMA mitigation grant funding.

There are four key elements to all benefit-cost analyses of hazard mitigation projects:

1. An estimate of damages and losses before mitigation
2. An estimate of damages and losses after mitigation
3. An estimate of the frequency and severity of the hazard causing damages (e.g., floods), and
4. The economic factors of the analysis (e.g., discount rate and mitigation project's useful lifetime)

These four key elements and their relationships to one another are detailed in the following example.

Consider a 1,500 square foot, one-story, single family residence located in the Acorn Park subdivision along Squirrel Creek. A proposed mitigation project will elevate the structure four feet at a cost of \$20,000. Whether this project is cost-effective depends on the damages and losses from flooding without the mitigation project, the effectiveness of the mitigation project in reducing those damages and losses, the frequency that the house is flooded and the depth of the flood water, and the mitigation project's useful lifetime.

If the pre-mitigation damages are frequent and/or severe, then the project is more likely to be cost-effective. Even minor damage that occurs frequently can, over the life of a project, exceed the up-front costs of implementing a mitigation measure. On the other hand, if the building in the example above only flooded once, then it may not be cost-effective to elevate, unless the damages were significant in relation to the value of the structure and its contents.

Benefit Cost Fact Sheet

- 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 (FFE's).
- 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 (e.g., 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 FFE's.
- Use of incorrect project useful life (not every mitigation measure equals 100 years).

Appendix E: Plan 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 Task Force undertaken any public outreach activities regarding the MHMP or implementation of mitigation actions?			
HAZARD PROFILES	Has a natural and/or human-caused disaster occurred in this reporting period?			
	Are there natural and/or human-caused hazards that have not been addressed in this HMP and should be?			
	Are additional maps or new hazard studies available? If so, what have they revealed?			
VULNERABILITY ANALYSIS	Do any new critical facilities or infrastructure need to be added to the asset lists?			
	Have there been changes in development patterns that could influence the effects of hazards or create additional risks?			
MITIGATION STRATEGY	Are there different or additional resources (financial, technical, and human) that are now available for mitigation planning within the			
	Are the goals still applicable?			
	Should new mitigation actions be added to the a community's Mitigation Action Plan?			
	Do existing mitigation actions listed in a community's Mitigation Action Plan need to be reprioritized?			
	Are the mitigation actions listed in a community's Mitigation Action Plan appropriate for available resources?			

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Plan Goal (s) Addressed:

Goal: _____

Indicator of Success: _____

Project Status

Project Cost Status

Project on schedule

Cost unchanged

Project completed

Cost overrun*

Project delayed*

*explain: _____

*explain: _____

Cost underrun*

Project canceled

*explain: _____

Summary of progress on project for this report:

A. What was accomplished during this reporting period?

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

C. How was each problem resolved?

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

Other Comments:

Tribal Hazard Mitigation Plan Survey

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

[Critical facilities include airport, community shelter, bulk fuel storage tanks, generators, health clinic, law enforcement office (VPO, VPSO, police department), school, public works, e.g. washeteria/water treatment, reservoir/water supply, satellite dish, communications tower, landfills, sewage lagoons, and stores.]

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

Please Specify:

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

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

Please Specify:

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

If yes, please describe: _____

Tribal Hazard Mitigation Plan Survey

Preparedness

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

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

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

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

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

<input type="checkbox"/>	Less than \$100	<input type="checkbox"/>	Desire to relocate for protection
<input type="checkbox"/>	\$100-\$499	<input type="checkbox"/>	Other, please explain
<input type="checkbox"/>	\$500 and above		
<input type="checkbox"/>	Nothing / Don't know		
<input type="checkbox"/>	Whatever it takes		

Tribal Hazard Mitigation Plan Survey

Mitigation Activities

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

Mitigation activities are those types of actions you can take to protect your home and property from natural hazard events such as floods, severe weather, and wildfire. Please check the box for the following statements to best describe their importance to you. Your responses will help us determine your community's priorities for planning for these mitigation activities.

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

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

General Household Information

9. Please indicate your age: _____

and Gender: Male Female

Tribal Hazard Analysis

Tribal Hazard Mitigation Plan Survey

10. Please indicate your level of education:

<input type="checkbox"/>	Grade school/no schooling	<input type="checkbox"/>	College degree
<input type="checkbox"/>	Some high school	<input type="checkbox"/>	Postgraduate degree
<input type="checkbox"/>	High school graduate/GED	<input type="checkbox"/>	Other, please specify
<input type="checkbox"/>	Some college/trade school		

11. How long have you lived in the Akiak community?

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

12. Do you have internet access? Yes No

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

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

Thank You for Your Participation!

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

Name: _____

Address: _____

Phone: _____

Appendix F: Adoption Resolution and Approval Letter

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Appendix G: Potential Funding Sources

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Hazard Mitigation Planning and Disaster Preparedness Resources

G.1 Federal Resources

Several Federal agencies provide guidance and assistance for hazard mitigation planning and disaster preparedness. Agencies and assistance include:

■ FEMA

- Pre-Disaster Mitigation Assistance Program (PDM). Provides funds to state, tribes, and local entities, including universities, for hazard mitigation planning and implementation of mitigation projects prior to a disaster event. The total amount of PDM funding available is appropriated by Congress on an annual basis.
- Hazard Mitigation Grant Program. Provides grants to states and local governments to implement long-term hazard mitigation measures after a major disaster declaration.
- Mitigation Technical Assistance Program. Provides hazard mitigation technical assistance to local/tribal jurisdictions via the State of Alaska, which would be the eligible Applicant with FEMA. The State would then provide subgrants to local jurisdictions.
- Emergency Management Institute. Offers various emergency management trainings, including hazard mitigation.
<http://training.fema.gov/>
- Publications
 - ⌘ How-to Guides. A series of how-to guides to assist states, communities, and tribes in enhancing their hazard mitigation planning capabilities.
 - ⌘ FEMA DAP-12 “Post-Disaster Hazard Mitigation Planning Guidance for State and Local Government” (FEMA DAP-12, September 1990). Explains basic concepts of hazard mitigation and shows state and local governments how they can develop and achieve mitigation goals within the context of FEMA’s post-disaster hazard mitigation planning requirements.
 - ⌘ FEMA 372 “Mitigation Resources for Success CD” (FEMA 372, September 2001). Provides mitigation case studies, success stories, information about Federal mitigation programs, suggestions for mitigation measures to homes and businesses, appropriate relevant mitigation publications, and contact information.

Appendix G. Hazard Mitigation Planning and Disaster Preparedness Resources

- ⌘ FEMA 262 “A Guide to Federal Aid in Disasters” (FEMA 262, April 1995). Discusses the procedures and process for obtaining Federal disaster assistance and provides a brief overview of each program.
- ⌘ FEMA 141 “The Emergency Management Guide for Businesses and Industry” (FEMA 141, October 1993.). 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.
- Department of Agriculture. Programs include the Emergency Conservation Program, Non-insured Crop Disaster Assistance Program, Emergency Watershed Protection, Rural Housing Service, Rural Utilities Service, and Rural Business and Cooperative Service.
- Department of Energy (Office of Energy Efficiency and Renewable Energy). Weatherization Assistance Program helps minimize the adverse effects of high energy costs on low income, elderly, and handicapped citizens through client education activities and weatherization services.
- Department of Housing and Urban Development.
 - Section 108 Loan Guarantee 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.
 - Community Development Block Grants Program (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.
- Department of Labor (Employment and Training Administration). Disaster Unemployment Assistance provides weekly unemployment subsistence grants for those who become unemployed because of a major disaster or emergency. Applicants must have exhausted all benefits for which they would normally be eligible.

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- Federal Financial Institutions. May waive Certificate of Deposit and retirement early withdrawal penalties if funds are used for disaster recovery.
- Internal Revenue Service. Provides tax relief by providing extensions to current year's tax returns, allows deductions for disaster losses and allows amendments of previous tax returns to reflect loss back to three years.
- Small Business Administration. May provide disaster loans to individuals and businesses that have suffered a loss due to a disaster.
- American Planning Association. Serves as a resource for planners, elected officials, and citizens concerned with planning and growth initiatives.
- Institute for Business and Home safety. Provides information on hazards and ways to protect property from damage.

A.2 State Resources

- Alaska Department of Military and Veteran's Affairs, Division of Homeland Security and Emergency Management (DHS&EM). Responsible for improving hazard mitigation technical assistance for local governments in Alaska. Provides hazard mitigation training, provides current hazard information, and facilitates communication with other agencies to enhance local hazard mitigation efforts. Website: <http://ready.alaska.gov>
- Alaska Department of Commerce, Community, and Economic Development, Division of Community and Regional Affairs, Floodplain Management Program. Provides coordination, funding, and technical assistance to National Flood Insurance Program (NFIP) communities to reduce public and private sector losses and damage caused by flooding and erosion. Website: <http://www.commerce.alaska.gov/web/dcra/>
- Alaska Department of Commerce, Community, and Economic Development, Division of Insurance. Provides assistance in obtaining copies of policies and provides information regarding filing claims. Website: <http://www.dced.state.ak.us/insurance/>
- Alaska Department of Commerce, Community, and Economic Development, Division of Community and Regional Affairs, CDBG Program. The goals of the Alaska CDBG are to provide financial resources to Alaskan communities for public facilities and planning activities that address issues detrimental to the health and safety of

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local residents and to reduce the costs of essential community services. The program may also fund Special Economic Development activities that result in the creation of jobs for low and moderate income persons.

- Alaska Department of Health and Social Services, Division of Senior and Disabilities Services. Provides resources for seniors, including food, shelter and clothing.
- Department of Health and Social Services, Section of Injury Prevention and Emergency Medical Services (EMS) Program. The mission of the EMS program in Alaska provides leadership in EMS by consensus building, developing and administering guidelines and regulations, and by developing and distributing publications for planning, treatment, and evaluation. The overall goal of the EMS program is to prevent life-threatening and disabling injuries whenever possible and to establish a comprehensive, coordinated system of emergency medical services.
- Department of Environmental Conservation. Primary roles and responsibilities concerning hazard mitigation are ensuring safe food and safe water, and pollution prevention and pollution response. 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.
- Department of Forestry. Participates in a statewide wildfire control programs in cooperation with the forest industry, rural fire departments and other agencies.
- Department of Transportation and Public Facilities. Provides technical assistance to various emergency management programs, to include mitigation. Assistance includes, but is not limited to: environmental reviews, archaeological surveys, historic preservation reviews, and coordination of buyout projects.
- Alaska Department of Natural Resources. Administers various projects designed to reduce stream bank erosion, reduce localized flooding, improve drainage, and improve discharge water quality through the storm water grant program funds.

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G.3 Other Funding Sources and Resources

Other organizations that may provide funding or resources for hazard mitigation planning or disaster preparedness include:

- American Red Cross. Provides for the critical needs of individuals such as food, clothing, shelter, and supplemental medical needs. Provides recovery needs such as furniture, home repair, home purchasing, essential tools, and some bill payment.
- Crisis Counseling Program. Provides grants to state and borough mental health departments, which in turn provide training for screening, diagnosing, and counseling techniques. Also provides funds for counseling, outreach, and consultation for those affected by disaster.