NINILCHIK VILLAGE TRIBE
2022 TRIBAL HAZARD MITIGATION PLAN

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LIST OF ACRONYMS AND ABBREVIATIONS

ADOT&PF	Alaska Department of Transportation and Public Facilities
AECOM	AECOM Technical Services, Inc.
BRIC	Building Resilient Infrastructure and Communities
CFR	Code of Federal Regulations
DMA 2000	Disaster Mitigation Act of 2000
FEMA	Federal Emergency Management Agency
GIS	geographic information system
HMA	Hazard Mitigation Assistance
HMGP	Hazard Mitigation Grant Program
PGA	peak ground acceleration
SNAP	Scenarios Network for Alaska + Arctic Planning
THMP	Tribal Hazard Mitigation Plan
USACE	United States Army Corps of Engineers
USGS	United States Geological Survey

1.0 INTRODUCTION

1.1 NINILCHIK OVERVIEW

Ninilchik Village is a census-designated place in the Kenai Peninsula Borough on the Sterling Highway, 38 miles southwest of the city of Kenai and 100 miles southwest of Anchorage (Figure 1). It is situated on the coast of the Cook Inlet, on the west side of the Kenai Peninsula. Ninilchik comprises 207.2 square miles, with 0.03 square miles of water.

The village is considered an Alaska Native village under the Alaska Native Claims Settlement Act, and is a traditional Athabascan village; however, the majority of the population is non-Native. Ninilchik is not incorporated and is under the jurisdiction of the Kenai Peninsula Borough. According to the 2020 US Census, the population of Ninilchik is 845, down from 883 in 2010.

1.2 HAZARD MITIGATION PLANNING

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

Over the past two decades, hazard mitigation planning has been driven by a federal law, known as the Disaster Mitigation Act of 2000 (DMA 2000). On October 30, 2000, Congress passed the DMA 2000 (Public Law 106-390), which amended the Robert T. Stafford Disaster Relief and Emergency Assistance Act of 1988 (Title 42 of the United States Code Section 5121 et seq.) by repealing the act's previous mitigation planning section (409) and replacing it with a new mitigation planning section (322). This new section emphasized the need for state, tribal, and local entities to closely coordinate mitigation planning and implementation efforts. This new section also provided the legal basis for the Federal Emergency Management Agency's (FEMA's) mitigation plan requirements for the Hazard Mitigation Assistance (HMA) grant programs.

1.3 2022 TRIBAL HAZARD MITIGATION PLAN SYNOPSIS

The 2022 Tribal Hazard Mitigation Plan (THMP) is organized to follow FEMA's Tribal Mitigation Plan Review Tool (Appendix A), which demonstrates how hazard mitigation plans meet the DMA 2000 regulations. As such, specific planning elements of this review tool are in their appropriate plan sections.

The 2022 THMP structure includes the following sections:

- **Section 1 Introduction**, which includes an introduction to Ninilchik Village and information on hazard mitigation planning.
- **Section 2 Planning Process**, which includes an overview of the planning process, starting with a timeline; identification of planning team members and their involvement with the planning process; and details on stakeholder outreach, public involvement, and continued public involvement. This section also includes an overview of the existing plans and reports, details how those documents were incorporated into the 2022 THMP, and a plan update method and schedule. Supporting planning process documentation is provided in Appendix B.

- **Section 3 Hazard Identification**, which includes a description of the eight hazards addressed in this plan. Hazard figures are provided in Appendix C.
- **Section 4 Risk Assessment**, which includes hazard impact tables or descriptions for land area, population centers, and critical facilities. An overall summary of vulnerability for each hazard is also provided.
- **Section 5 Mitigation Strategy**, which includes a description of Ninilchik's mitigation goals; potential mitigation actions and projects; and prioritization process. A capability assessment, prioritized action plan, and the process to integrate the 2022 THMP into other planning mechanisms is also addressed.
- **Section 6 Plan Adoption**, which includes information about the formal adoption.
- **Section 7 Appendices**, which include Appendix A (FEMA Documentation), Appendix B (Planning Process), and Appendix C (Figures).

2.0 PLANNING PROCESS

This section addresses Element A of the Tribal Mitigation Plan Regulation Checklist.

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

2.1 OVERVIEW OF THE 2022 THMP PLANNING PROCESS

The development of the 2022 THMP was collaborative effort between Ninilchik Traditional Council, AECOM Technical Services, Inc. (AECOM), and a planning team. The planning process officially kicked off in November 2021 and ended in [month, year]. A timeline of the major planning tasks and milestones by month, including when the planning team met, is provided in Table 2-1. A list of the planning team members and how they contributed to the development of the plan is provided in Table 2-2. Planning team agendas are provided in Appendix B.

Table 2-1: THMP Timeline

Date	Tasks	People Involved
November 2021	First THMP planning team meeting, project overview. Initial information collected: hazards to be profiled, critical facility information.	THMP project manager, consultant
November 2021	Initial public outreach via Ninilchik Traditional Council newsletter and stakeholder emails. Hazard profiles drafted.	THMP project manager, consultant, planning team
February 2022	Hazard figures created, hazard impact assessments drafted. Draft mitigation actions developed.	consultant
March 2022	Second planning team meeting. Hazard maps and draft mitigation actions reviewed.	THMP project manager, consultant, planning team

Table 2-1: THMP Timeline

Date	Tasks	People Involved
March 2022	Prioritization action plan developed. Integration of THMP into other planning documents determined.	THMP project manager, consultant, planning team
May 2022	Internal Draft THMP	THMP project manager, consultant, planning team
[month, year]	Public Draft THMP Follow-up public outreach and stakeholder involvement.	THMP project manager, consultant, public
[month, year]	Final Draft THMP	THMP project manager, consultant, Alaska Division of Homeland Security and Emergency Management, FEMA Region X
[month, year]	Adoption of Final THMP	THMP project manager, Ninilchik Traditional Council, consultant

Table 2-2: Planning Team

Name	Title, Department/Agency	Contribution
Darrel Williams	Resource Director, Ninilchik Traditional Council	Served as the THMP project manager. Led planning team meetings; reviewed and commented on hazard figures, risk assessment tables, mitigation strategies, and the Internal Draft THMP.
Jayke Cooper	Resource Technician, Ninilchik Traditional Council	Participated in planning team meetings and/or reviewed planning team documents; reviewed and commented on hazard figures, mitigation strategies, and the Internal Draft THMP.
Gina Wiste	Tribal Administrator, Ninilchik Traditional Council	Participated in planning team meetings and/or reviewed planning team documents; reviewed and commented on hazard figures, mitigation strategies, and the Internal Draft THMP.
Jessica Evans	AECOM	Consultant; Participated in planning team meetings and/or reviewed planning team documents; reviewed and commented on hazard figures, mitigation strategies, and the Internal Draft THMP.
Arika Mercer	AECOM	Consultant; prepared plan, including hazard figures, risk assessment tables, mitigation strategies, and Draft and Final THMP.

2.2 OPPORTUNITIES FOR STAKEHOLDERS

On January 28, 2022, the THMP project manager reached out to stakeholders via email (Appendix B) about the 2022 THMP and invited them to participate in the planning process. Stakeholders included the State of Alaska Department of Homeland Security and Emergency Management (hazard mitigation planner), the Bureau of Indian Affairs (Alaska region tribal operations), United States Forest Service (Chugach National Forest, supervisor), Ninilchik Village Tribe (executive director), Kenai Peninsula Borough (borough

mayor), Cook Inlet Region, Inc (general)., Ninilchik Natives Association, Inc. (office administrator), and the CIRI Foundation (general). No comments were received.

The THMP project manager reached out to the stakeholders again via email on [date], inviting them to review and provide comments about the Public Draft THMP (Appendix B). [Summary of comments]

2.3 PUBLIC INVOLVEMENT

Ninilchik Village defines its public as members of the Ninilchik tribal, local, and partner organizations and other interested members. On November 20, 2021, the Ninilchik Traditional Council used their semi-monthly mailed newsletter to announce to their public that they were beginning the THMP process and provided contact information for those interested. No comments were received from the public.

Also, on [date], Ninilchik Village used their newsletter to send out information about the Public Draft THMP and comment period. [Summary of Comments]. Screenshots of the Ninilchik Village newsletters are provided in Appendix B.

2.4 REVIEW AND INCORPORATION OF EXISTING PLANS AND REPORTS

A list of the major relevant plans and reports reviewed and incorporated into the 2022 THMP is provided in Table 2-3.

Table 2-3: Existing Plans and Reports

Plans and Reports	Information to be Incorporated into the 2022 THMP
2019 Kenai Peninsula Borough Hazard Mitigation Plan	Hazard profiles, capability assessment, and mitigation strategy sections were reviewed and incorporated into sections to ensure continuity.
University of Alaska Fairbanks Scenarios Network for Alaska + Arctic Planning (SNAP)	Provided community historic, current, and future predicted weather for Ninilchik.
2018 National Climate Assessment	Climate change information incorporated into the climate change hazard profiles.
Erosion Information Paper – Ninilchik, Alaska (United States [US] Army Corps of Engineers [USACE] 2007)	Location, history, extent, and severity information incorporated into erosion section.
Ninilchik Area Community Wildfire Protection Plan (2006)	Location, history, extent, and severity information incorporated into wildfire section.
Floods on the Kenai Peninsula, Alaska, October and November 2002 (US Geological Survey [USGS] 2004)	Flood location, history, extent, and severity information incorporated into flood hazard section.
Alaska Climate Research Center	Annual temperature and precipitation data incorporated into climate change hazard section.
Kenai Peninsula Borough Community Wildfire Protection Plan (2022)	Ninilchik Village and Ninilchik polygon summary appendices reviewed and data incorporated into wildland fire hazard section.

2.5 OTHER ONGOING TRIBAL EFFORTS

Ninilchik Village has Community Wildfire Protection Plan and is included in Kenai Peninsula Borough planning efforts. The planning team identified several items not included in these plan that would be

important in the event of a natural disaster. Once the 2022 THMP is completed, Ninilchik Village intends to apply for available Hazard Mitigation Grant Program (HMGP) funding and will work closely with the FEMA Region X Tribal Liaison in doing so. In addition, on completion of the 2022 THMP, information will be incorporated into the future planning efforts.

2.6 PLAN UPDATE METHOD AND SCHEDULE

The 2022 THMP will be monitored and evaluated by a subset of the planning team, specifically the THMP project manager: the Ninilchik Traditional Council resource director. Should the project manager no longer be involved with the 2022 THMP, the Ninilchik Traditional Council will select a new THMP project manager to oversee the annual reviews and plan update.

The THMP project manager will get input from specific planning team members as needed. They will complete the Annual Review Tracker every January and after any major disaster to ensure that the 2022 THMP is relevant and effective in achieving the plan's goals. Annual review will be tracked in a table in this document (Table 2-4). FEMA-funded mitigation projects will continue to be tracked and reviewed using FEMA Mitigation Progress Report forms; progress summaries will be included in the Annual Review Tracker (Table 2-4) at the beginning of each year.

Four years after the 2022 THMP's adoption:

- The Ninilchik Traditional Council resource director or designee will complete the Annual Review Tracker.
- The Ninilchik Traditional Council resource director or designee will reconvene the planning team and update membership, if necessary.
- The Ninilchik Traditional Council resource director or designee will review Table 2-4, which includes annual summaries of the disasters that have occurred; new permanent information that becomes available; implementation measures; and public outreach and response to determine the hazards to be included in the next THMP.
- The Ninilchik Traditional Council resource director or designee will develop a new work plan.
- The Ninilchik Traditional Council resource director or designee—with support from the planning team—will begin the plan update process, which is expected to take up to 6 months.

Table 2-4: Annual Review Tracker

Year	Disasters that Occurred	Mitigation Actions Implemented	New Relevant Studies/Reports to Include in 2022 THMP	Public Outreach Conducted	Changes Made to 2022 THMP
2023					
2024					
2025					
2026					

2.7 CONTINUED PUBLIC PARTICIPATION

A copy of the 2022 THMP will remain available at the Ninilchik Traditional Council office and the State of Alaska Division of Community and Regional Affairs online community planning library along with contact information. The THMP project manager will use the Ninilchik Village newsletter to notify the public of, and seek input on, any changes or updates to the 2022 THMP, including the prioritized action plan and 2027 THMP kickoff.

3.0 HAZARD IDENTIFICATION AND RISK ASSESSMENT

This section addresses Element B of the Tribal Mitigation Plan Regulation Checklist.

Regulation Checklist – 44 CFR 201.7 Tribal Mitigation Plans
Element B: Hazard Identification and Risk Assessment
B1. Does the plan include a description of the type, location, and extent of all natural hazards that can affect the tribal planning area? (Requirement 44 CFR § 201.7(c)(2)(i))
B2. Does the plan include information on previous occurrences of hazard events and on the probability of future hazard events for the tribal planning area? (Requirement 44 CFR § 201.7(c)(2)(i))

Hazard identification consists of describing the nature of the hazard, disaster history, location, extent/severity, and probability of future events. Hazard identification profiles have been developed for each of the eight hazards addressed in Section 3.1 through Section 3.8. The hazards profiled for this THMP are discussed in alphabetical order and not hazard classification. The order does not signify level of risk.

3.1 CLIMATE CHANGE

Table 3-1: Climate Change

Profile	Description
Nature	Climate is defined as the average statistics of weather, which includes temperature, precipitation, and seasonal patterns in a particular region. Climate change refers to the long-term and irrevocable shift in these weather-related patterns. The Fourth National Climate Assessment Report (2018) states that Earth's climate is now changing at a faster rate than at any time in the history of modern civilization, primarily due to human activities. The disruption in the climate is already impacting the way people live, the food they grow, their health, the wildlife, the availability of water, and much more. The impacts of global climate change are being felt today, from sea level rise and storm surge in coastal areas, increased riverine flooding and stormwater inundation; more frequent and prolonged higher temperatures (leading to extreme heat events, droughts, and wildfires); and more severe and frequent extreme weather events. Changing climate conditions are more pronounced in the polar regions. Alaska is often identified as being at the forefront of climate change because it is warming faster than any other state and faces multiple issues associated with a changing climate. These climate change impacts include: • Retreat of sea ice will disrupt marine ecosystems and other animals (such as polar bears and walruses); impact local communities where sea ice is important for subsistence or tourism; and contribute to increased storm surge, coastal flooding, and erosion. • Increase of ocean temperature impacting marine ecosystems and Alaska's fisheries. • Flooding and erosion of coastal and river areas related to changes in sea ice and increase in storm intensity. • Increase in ocean acidification, which will impact marine organisms and thereby disrupting the marine food web. • Increase in the size and frequency of wildfires and droughts. • Thawing permafrost, melting glaciers, and the associated effects on the state's infrastructure and hydroelectric power. • Increase of health threats, such as injuries; smoke inhalation; damage to vital infrastructure; decrease of food and water security; and new infectious diseases.
Location	Climate change refers to long-term change; therefore, the entire community of Ninilchik is vulnerable to the impacts of increased temperatures and precipitation associated with climate change. In addition, the coastal area of Ninilchik will be most affected by sea level rise and storm surge (which causes flooding and erosion) while bluff areas are most vulnerable to increased wildfire risks. In addition, all of Ninilchik Village will be affected by mega storms.
History	Coastal communities on the Kenai Peninsula are coping with a variety of challenges related to the changing climate. According to the 2018 National Climate Assessment, the rate at which Alaska's temperature has been warming is twice as fast as the global average since the middle of the twentieth century. Statewide annual average temperatures from 1925 to the late 1970s were variable with no clear pattern of change. However, over the past 40 years (from late 1970s through 2016), statewide annual average temperatures began to increase with an average rate of 0.7 degrees Fahrenheit (ºF) per decade. The temperature increase was especially strong in the Arctic due to the polar amplification of global warming. During that period, the Alaska Climate Research Center also observed a 17% average increase precipitation throughout the state. No historical data exists for Ninilchik regarding annual average temperatures or precipitation. However, in nearby - Homer (approximately 45 miles from Ninilchik), the Alaska Climate Research Center has observed an increase annual average temperature from 34.9ºF in 1950 to 38.9ºF in 2020 (11.4% increase). During that period, the Alaska Climate Research Center also observed an increase of annual precipitation from 15.47 inches to 23.68 inches (53% increase).

Table 3-1: Climate Change

Profile	Description
Extent / Severity	The University of Alaska Fairbanks SNAP models climate data for mid-range global emissions. SNAP temperature models show that Ninilchik will experience a temperature increase of 5.4ºF by the end of the century (Table 3-2). Likewise, precipitation models show that for the same reporting period, Ninilchik will experience an average rainfall increase of 2.7 inches (Table 3-2).
Recurrence Probability	Climate change is a significant and lasting change in the statistical distribution of weather patterns over periods of time ranging from decades to millions of years. It may be a change in average weather conditions or in the distribution of weather around the average conditions (i.e., more or fewer extreme weather events). According to the National Aeronautics and Space Administration, "the current warming trend is of particular significance because most of it is extremely likely (i.e., greater than 95% probability) to be the result of human activity since the mid-twentieth century and proceeding at a rate that is unprecedented over decades to millennia." The National Aeronautics and Space Administration also states that "scientists have high confidence that global temperatures will continue to rise for decades to come, largely due to greenhouse gases produced by human activities."

Table 3-2: Mean Annual Temperature and Precipitation Predictions

	2010-2019	2050-2059	2090-2099
Mean Annual Temperature	37.2°F	40.3°F	42.6°F
Mean Annual Precipitation	26.0 inches	26.5 inches	28.7 inches

3.2 EARTHQUAKE

Table 3-3: Earthquake

Profile	Description
Nature	An earthquake is a sudden motion or trembling caused by a release of strain accumulated within or along the edge of Earth's tectonic plates. The effects of an earthquake can be felt far beyond the site of its occurrence. Earthquakes usually occur without warning and can cause massive damage and extensive casualties in a few seconds. Common effects of earthquakes are ground motion and shaking; surface fault ruptures; and ground failure. Ground motion is the vibration or shaking of the ground during an earthquake. When a fault ruptures, seismic waves radiate, causing the ground to vibrate. The severity of the vibration increases with the amount of energy released and decreases with distance from the causative fault or epicenter. Soft soils can amplify ground motions. In addition to ground motion, several secondary hazards can occur from earthquakes, such as the following: • Surface Faulting: Surface faulting is the differential movement of two sides of a fault at the Earth's surface. Displacement along faults—in terms of both length and width—varies but can be significant (e.g., up to 20 feet), as can the length of the surface rupture (e.g., up to 200 miles). Surface faulting can cause severe damage to linear structures including railways, highways, pipelines, tunnels, and dams. • Liquefaction: Liquefaction occurs when seismic waves pass through saturated granular soil, distorting its granular structure, and causing some of the empty spaces between granules to collapse. Pore water pressure may also increase sufficiently to cause the soil to behave like a fluid for a brief period and cause deformations. Liquefaction causes lateral spreads (i.e., horizontal movements, typically 10 to 15 feet, but up to 100 feet), flow failures (i.e., massive flows of soil, typically hundreds of feet, but up to 12 miles), and loss of bearing strength (i.e., soil deformations causing structures to settle or tip). Liquefaction can cause severe damage to property. • Landslides/Debris Flows: Landslides/debris flows occur as a result of horizontal seismic inertia forces induced in the slopes by the ground shaking. The most common earthquake induced landslides include shallow, disrupted landslides such as rock falls, rockslides, and soil slides. Debris flows are created when surface soil on steep slopes becomes totally saturated with water. Once the soil liquefies, it loses the ability to hold together and can flow downhill at very high speeds, taking vegetation and/or structures with it. Slide risks increase after an earthquake during a wet winter. The two most common measures of earthquake intensity used in the US are the Modified Mercalli Intensity scale, which measures felt intensity; and peak ground acceleration, which measures instrumental intensity by quantifying how hard the earth shakes in a given location. Magnitude is measured by the amplitude of the earthquake waves recorded on a seismograph using a logarithmic scale.
Location	The vast majority of earthquakes that occur on the Kenai Peninsula are due to subduction zones that result from the oceanic northwestward moving Pacific Plate colliding and then descending beneath the continental North American Plate. Earthquakes also are a result of active faults in the area. Faults in the region include the Lake Clark Fault (71 miles from Ninilchik) and Bruin Bay Fault (46 miles from Ninilchik) on the other side of the Cook Inlet; the Sterling Fault (37 miles), Eagle River Fault (54 miles), and Border Range Fault (30 miles); and the closest being the Homer Fault, approximately 17 miles from Ninilchik. The faults in the Kenai Peninsula Borough are shown in Figure 2.
History	The planning team identified 20 to 30 small seismic events occurring a year on the southern Kenai Peninsula.

Table 3-3: Earthquake

Profile	Description
	The USGS Earthquake Center Earthquake Hazards Program lists two earthquakes over M 5.0 near Ninilchik since 2000. In 2017, a M 5.3 earthquake occurred 9 miles north of Ninilchik. The earthquake was recorded to be felt in Anchorage and throughout the Kenai Peninsula. The generated ShakeMap that reports a weak to light shaking intensity is shown in Figure 3. In 2022, a M 5.1 earthquake occurred 30 miles northwest of Ninilchik. The generated ShakeMap for the event (Figure 4) shows weak to light shaking intensity.
Extent / Severity	The strength of an earthquake's ground movement can be measured by peak ground acceleration (PGA). PGA measures the rate in change of motion relative to the established rate of acceleration due to gravity (g = 980 centimeters per second). PGA is used to predict the risk of damage from future earthquakes by showing earthquake ground motions that have specified probability (e.g., 10%, 5% or 2%) of being exceeded in 50 years. The ground motion values are used for references in construction design for earthquake resistance and can also be used to assess the relative hazard between sites when making economic and safety decisions. The current USGS seismicity model for Alaska was developed in 2007. A 2022 earthquake hazard map using past data (Figure 5) represents the seismic PGA with a 5% probability of exceedance in 50 years. Based on these data, there is a 5% chance of an earthquake that exceeds 47.76% PGA with severe perceived shaking and moderate to heavy potential damage occurring in Ninilchik in the next 50 years.
Recurrence Probability	Based on modeling and Figure 4, the seismic PGA for Ninilchik has a 5% probability of severe shaking in Ninilchik in the next 50 years. Based on these data, there is a 5% chance of an earthquake that will exceed 47.76% PGA occurring in Ninilchik in the next 50 years.

3.3 EROSION

Table 3-4: Erosion

Profile	Description
Nature	Erosion is the wearing and transportation of land. Erosion is typically gradual land loss through wind or water scour. In developed regions, erosion undermines buildings and infrastructure. Erosion can be experienced from coastal, riverine, or wind sources. Erosion forces are embodied in waves, currents, and winds; 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. In the US, Alaska is unique because of how permafrost thaw interacts with flooding and erosion to exacerbate the impacts of these hazards. Frozen ground can disintegrate under the compounding influences of permafrost thaw, flooding, and erosion in an escalating feedback loop that can result in damage that is much greater than would be expected from the individual processes alone. Coastal erosion is a common term used to describe the retreat of the shoreline along the ocean. It describes the attrition of land resulting in loss of beach; shoreline; or dune material from natural activity or human influences and rarely causes death or injury. However, erosion causes property destruction, prohibits development, and impacts community infrastructure. Erosion can occur rapidly as the result of floods, storms, or other events; or slowly as the result of long-term environmental changes such as melting permafrost. Erosion is a natural process, but its effects can be easily exacerbated by human activity. Coastal erosion can occur from rapid short-term daily, seasonal, or annual natural events such as waves, storm surge, wind, coastal storms, and flooding; or from human activities including boat wakes and dredging. The most dramatic erosion often occurs during storms, particularly because the highest energy waves are generated under storm conditions. Coastal erosion occurs over the area from roughly the top of the shore into the nearshore region to about 30 foot water depth. It is measured as the rate of change in the position or horizontal displacement of a shoreline over a period of time. Bluff recession is the most visible aspect of coastal erosion because of the dramatic change it causes to the landscape. As a result, this aspect of coastal erosion usually receives the most attention. Coastal erosion may also be due to multi-year impacts and long-term climatic change such as sea-level rise; lack of sediment supply; subsidence; or long-term human factors such as aquifer depletion or the construction of shore protection structures and dams. Attempts to control erosion using shoreline protective measures such as groins, jetties, seawalls, or revetments can lead to increased erosion. 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 in 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.
Location	Ninilchik is threatened by coastal erosion from Cook Inlet and riverine erosion from Ninilchik River and Deep Creek. The USACE 2007 Erosion Information Paper report for Ninilchik identifies the entire west shore of the Kenai Peninsula is being eroded by the sea. The 1964 earthquake caused the shores of Cook Inlet to lower; this subsidence reached as much as 10 feet, but ranged between 3 to 6 feet on average. The shore areas that were formerly stabilized are now inundated by high tides. Erosion has created problems at the Ninilchik Harbor and elsewhere. High tides, storm surges, high winds, and traffic on the beach and coast of Cook Inlet cause erosion.

Table 3-4: Erosion

Profile	Description
History	Past estimates of annual coastal erosion rate in the Ninilchik River-Deep Creek area are 7 to 10 feet. - The USACE Baseline Erosion Report (2007) for Ninilchik estimates three or four major erosion events for the Ninilchik community, based on interviews. In 1992 and 2000, 25 feet of the bluff along Cook Inlet eroded during storm events; in 2002, 50 feet were lost. At the time of the USACE 2007 report, no specific distances to the bluff or river's edge, or number of structures were provided. Homes, shops, garages, cabins, and bridges have been damaged by erosion in the community. The planning team reported that erosion of the access road is a major concern.
Extent / Severity	Impacts from erosion include loss of land and any development on that land. Erosion can cause increased sedimentation of river deltas and hinder channel navigation affecting marine transport. Other impacts include reduction in water quality due to high sediment loads, loss of native aquatic habitats, damage to public utilities (fuel headers, and electric and water/wastewater utilities), and economic impacts associated with the costs of trying to prevent or control erosion sites. Various types of shore protection have been tested in the community. In 1967, a metal-barrel beach protection was constructed but cited as inadequate in a USACE 1974 feasibility report. Between 1968 and 1984, the Ninilchik River was diverted and various materials were installed for erosion protection, such as spruce logs, filter cloth revetment, and timer groins. USACE and the Alaska Department of Transportation and Public Facilities (ADOT&PF) has installed riprap, gabions, and sandbags to help slow erosion. The statewide threat assessment conducted by the Denali Commission in 2019 places Ninilchik in erosion severity group 3, where there is no information available that indicates a threat to critical infrastructure or to the viability of a community, or there is low likelihood that a threat will detrimentally impact the community in the near term. If communities in group 3 experience threats, they should notify officials and collect data to support understanding the impacts. Communities in group 3 are predicted to be damaged in the long-term future.
Recurrence Probability	Erosion in Ninilchik is episodic and caused by both riverine and coastal forces. Based on past estimated erosion rates, Ninilchik Village can expect several inches of erosion to occur annually along Ninilchik River and Deep Creek.

3.4 FLOOD

Table 3-5: Flood

Profile	Description
Nature	A flood occurs when the existing channel of a stream, river, canyon, or other watercourse cannot contain excess runoff from rainfall or snowmelt, resulting in overflow onto adjacent lands. In coastal areas, flooding may occur when high winds or tides result in a surge of seawater into areas that are above the normal high tide line. Secondary hazards from floods can include: • Erosion or scouring of stream banks, roadway embankments, foundations, footings for bridge piers, and other features • Impact damage to structures, roads, bridges, culverts, and other features from high-velocity flow and debris carried by floodwaters (debris may also accumulate on bridge piers and in culverts, increasing loads on these features or causing overtopping or backwater effects) • Destruction of crops, erosion of topsoil, and deposition of debris and sediment on croplands • Release of sewage and hazardous or toxic materials when wastewater treatment plants are inundated, storage tanks are damaged, and pipelines are severed
Location	Due to its location on the coast, riverine and coastal storm flooding are common on the Ninilchik River, Deep Creek, and Cook Inlet. The community is subject to flooding from high tides, storm surges, and overflow.
History	The planning team reported flooding events have occurred several times in the area and have damaged bridges and have washed away roads. A 2016 Flood Insurance Study lists a 1985 Peninsula-wide flood that caused by heavy rain that resulted in minor erosion and mud slides at the Ninilchik boat harbor. In October 2002, severe flooding occurred on the Kenai Peninsula between Ninilchik and Homer. The flooding destroyed critical portions of the already limited road system and isolated communities. The Ninilchik River Bridge approach washed out, resulting in the closure of the only road into Ninilchik Village. Repair costs for damaged roads exceeded $10 million. A November flood that same year caused less damage but washed out bridge approaches on the Ninilchik River, resulting in Ninilchik Village being cut off a second time.
Extent / Severity	The magnitude of flooding that is used as the standard for floodplain management in the US is a flood with a 1% probability of occurrence of in any given year. This flood is also known as the 100 year flood (i.e., base flood). The USGS fact sheet for the October and November 2002 Kenai Peninsula floods indicates the 100-year flood measurements for the Cook Inlet Tributary near Ninilchik is 169 cubic feet per square mile, and 1,780 cubic feet per square mile for Ninilchik River. The 2019 statewide threat assessment conducted by the Denali Commission places Ninilchik in flood severity group 3, where there is no information available that indicates a threat to critical infrastructure or to the viability of a community, or there is low likelihood that a threat will detrimentally impact the community in the near term. If communities in group 3 experience threats, they should notify officials and collect data to support understanding the impacts. Communities in group 3 are predicted to be damaged in the long-term future.
Recurrence Probability	Floods can occur at any time in Ninilchik Village but are most common in the fall. Based on previous occurrences of flood events, severe flooding is likely to occur every 2 to 5 years, with mild flooding occurring almost annually.

3.5 GROUND FAILURE—LANDSLIDE

Table 3-6: Ground Failure—Landslide

Profile	Description
Nature	Landslide is a general term for the dislodging and fall of a mass of soil or rocks along a sloped surface, or for the dislodged mass itself. The term is used for varying phenomena, including mudflows, mudslides, debris flows, rock falls, rockslides, debris avalanches, debris slides, and slump-earth flows. Landslides may result from a wide range of combinations of natural rock, soil, or artificial fill. The susceptibility of hillside and mountainous areas to landslides depends on variations in geology, topography, vegetation, and weather. Landslides may also occur because of indiscriminate development of sloping ground or the creation of cut-and-fill slopes in areas of unstable or inadequately stable geologic conditions. In addition, landslides often occur together with other hazards, which can exacerbate conditions, as described below: • Shaking due to earthquakes can trigger events ranging from rock falls and topples to massive slides • Intense or prolonged precipitation that causes flooding can also saturate slopes and cause failures leading to landslides • Wildfires can remove vegetation from hillsides, significantly increasing runoff and landslide potential • Landslides into a reservoir can indirectly compromise dam safety; a landslide can even affect the dam itself Another type of landslide occurs in areas cut by perennial streams; as floodwaters erode channel banks, rivers have undercut clay-rich sedimentary rocks along their south bank, thereby destabilizing the ground and causing the ground above it to slide.
Location	No landslide data exist for Ninilchik. However, in North America, there is an association between landslides and hilly terrain (particularly with slopes ranging from about 20 to 40 degrees). Areas in Ninilchik with slopes greater than 20 degrees are shown in Figure 6. These areas on bluffs above the coast at Cook Inlet, Ninilchik River, and Deep Creek.
History	As mentioned previously, there are few written reports on landslides in Ninilchik. The planning team reported that weather, fires, and climate change have increased the number and size of landslides. Landslides have occurred along the Sterling Highway in 2012 and in 2021.
Extent / Severity	In Ninilchik, slope saturation by water is a primary cause of landslides. Saturation can occur in the form of intense or prolonged rainfall, snowmelt, changes in groundwater levels, and surface water level changes along coastlines in the banks of lakes and near rivers. There are 2,451.93 acres (1.85%) in Ninilchik with steep slopes greater than 20 degrees.
Recurrence Probability	Landslides have a high probability of occurring repetitively in areas where they have occurred in the past. For Ninilchik, landslides are generally triggered by slope saturation and therefore typically follow major storm events As such, Ninilchik can expect to experience recurring landslides and along its road system and along the coast every 2 to 5 years, which coincide with flood event frequencies.

3.6 SEVERE WEATHER

Table 3-7: Severe Weather

Profile	Description
Nature	Severe weather occurs throughout Alaska with extremes includes thunderstorms; lightning; hail; heavy and drifting snow; freezing rain/ice storm; extreme cold; and high winds. Severe weather events can include the following: • A winter storm is an event in which the main types of precipitation are snow, sleet, or freezing rain and be accompanied by high winds, cold temperatures, and storm surge. A winter storm can range from a moderate snow over a few hours, to blizzard conditions with blinding wind-driven snow that lasts several days. Some winter storms may be large enough to affect several states, while others may affect only a single community. In more temperate continental climates (such as Southeast Alaska) these storms are not necessarily restricted to the winter season and may occur in the late autumn and early spring as well. • Heavy snow and rain that occurs frequently in coastal areas, and snowfall can accumulate 4 inches or more in 12 hours or less. • Freezing rain and ice storms occur when rain or drizzle freezes on surfaces and can cause damage to powerlines, pipelines, and other infrastructure. • Extreme cold varies according to normal regional climate. Alaska's extreme cold usually involves temperatures between -20 to -50ºF. Excessive cold may accompany winter storms, occur after storms, or can occur without storm activity. • High winds in Alaska can equal hurricane force but fall under a different classification because they are not cyclonic nor possess other hurricane characteristics. Strong winds occasionally occur over the interior due to strong pressure differences, especially where influenced by mountainous terrain; however, the windiest places in Alaska are generally along the coastlines.
Location	The entirety of Ninilchik Village is vulnerable to the effects of severe weather. Ninilchik Village regularly experiences winter storms, high winds, and seasonal heavy rainfall. Large weather events often have an area-wide impact to Ninilchik. Severe winter weather is often accompanied by high wind, freezing rain, icy conditions, heavy snowfall, and extended periods of cold weather.
History	The Kenai Peninsula Borough regularly experiences storm events. The borough has been included in eight weather-related presidential disaster declarations since 2008. The National Oceanic and Atmospheric Administration tracks storm data in their Storm Events Database. Weather events for the Kenai Peninsula Borough that mention the Ninilchik Village region are listed below: • **January 7, 2000—Heavy Snow.** Moderate snowfall was observed across much of the Kenai Peninsula. Snowfall amounts ranged upwards of 8 inches at Soldotna, Kenai, Ninilchik, and Homer. Seward recorded 6 inches of new snow, while heavier snowfall close to 12 inches was reported in Turnagain Pass. • **January 26, 2000—Winter Storm**. A complex low, preceded by a northward moving front through Prince William Sound and the Kenai Peninsula, moved north through Prince William Sound. Highway reports included white out conditions, 30 to 50 mile per hour winds, and temperatures of 32ºF. Twelve to 15 inches of new snow was reported around Seward and 6 inches of new snow around Homer. Ninilchik recorded up to 6 inches of new snow. • **March 28, 2000—Winter Storm.** Six inches of snow was reported along the Sterling Highway around Ninilchik and Homer. Well behind the original front, arctic air began to move toward Cook Inlet. Localized heavy snow was reported along and immediately behind the front. • **December 25, 2001—Winter Storm**. A strong front with several lows along it, moved toward Kodiak Island. Freezing was rain reported around Kachemak Bay the following day. Storm sewers choked with rain runoff and icy side roads were a concern to Homer officials.

Table 3-7: Severe Weather

Profile	Description
	For more than 2 hours, 1,699 households between Ninilchik and Anchor Point were without power, according to Homer Electric Association. • **December 17, 2002—Heavy Snow**. Overrunning across a modified arctic airmass resulted in areas of freezing rain around Girdwood and heavy snow across portions of the southern Kenai Peninsula. Elsewhere across the southern Kenai Peninsula, snowfall reached 16 inches at higher elevations around Seldovia and the community received 10 inches; 12 inches of snow fell at Stariski Creek; and 6 to 8 inches at Ninilchik, out along Oil Well Road, and at the Anchor River Inn. • **February 8, 2002—Heavy Snow**. ADOT&PF reports indicated 6 inches of new snow in Homer and 5 inches in Ninilchik. In this snowfall zone, the maximum snowfall was recorded over 30 inches along Homer Bluff.
Extent / Severity	Severe weather events may impact Ninilchik and pose a threat to life and property. High winds, winter storms, and heavy snowfall can make driving and walking extremely hazardous; damage structures and utilities; and require substantial repair and snow removal costs. Severe weather may also disrupt utilities and transportation and telecommunication. Prolonged extreme cold with little or no snow cover may damage underground utilities. Periods of extreme cold (-20 to -50 degrees) may also cause ice to form in Cook Inlet and increase the likelihood of ice jams and associated flooding of rivers and streams. Heavy snow in upwards of 12 inches of accumulation in less than 24 hours, can immobilize Ninilchik, closing major roadways in and out of the Village. Severe weather may contribute directly or indirectly to other hazards included in this plan, such as flooding, erosion, wildland fires, tsunamis, and ground failure events. According to the Alaska Climate Research Center, Soldotna, approximately 40 miles north of Ninilchik, the average annual precipitation is 21.58 inches. Data for Homer, approximately 36 miles southeast of Ninilchik, the average annual snowfall is 100.6 inches and winds are commonly 40-60 MPH in the area.
Recurrence Probability	Based on historic occurrences, Ninilchik Village can expect to experience a winter storm approximately 3 to 5 days each year. High winds and heavy snow can occur annually for several days at a time.

3.7 VOLCANO

Table 3-8: Volcano

Profile	Description
Nature	A volcano is a vent or opening in the earth's crust from which molten lava (magma), pyroclastic materials, and volcanic gases are expelled onto the surface. The vent may be visible as a small bowl-shaped depression at the summit of a cone or shield-shaped mountain. Through a series of cracks within and beneath the volcano, the vent connects to one or more linked storage areas of molten or partially molten rock. There are four general volcano types: • Lava domes, which are formed when lava erupts and accumulates near the vent. • Cinder cones, which are shaped and formed by cinders, ash, and other fragmented material accumulations that originate from an eruption. • Shield volcanoes, which are broad gently sloping volcanic cones with a flat dome shape that usually encompass several tens or hundreds of square miles, built from overlapping and inter-fingering basaltic lava flows. • Composite or stratovolcanoes, which are typically steep-sided large dimensional symmetrical cones built from alternating lava, volcanic ash, cinder, and block layers; most composite volcanoes have a crater at the summit containing a central vent or a clustered group of vents. There are three types of volcanic eruptions, described below. Some volcanoes may exhibit only one type of eruption during an event, while others may display an entire sequence of all three types in one event. • Magmatic eruptions are the most well-observed eruptions. Magmatic eruptions produce juvenile clasts (composed fragments) during explosive decompression from gas releases. Magnetic eruption subtypes include: Hawaiian, Strombolian, Vulcanian, Peléan, and Plinian. • Phreatomagmatic eruptions are volcanic eruptions resulting from the interaction between magma and water. Grain deposits from phreatomagmatic explosion involving high water to magma ratios are extremely fine-grained and distinctly poorly sorted, while deposits resulting from low water to magma ratios are commonly coarse and relatively well-sorted. Phreatomagmatic eruption subtypes include: Surtseyan, Submarine, and Subglacial. • Phreatic eruptions are steam-blast eruptions. These eruptions occur when cold ground or surface water come into contact with hot rock or magma. Phreatic eruptions blast out steam, water, ash, volcanic bombs, and volcanic blocks, but no new magma. Other hazards potentially caused a volcanic eruption include: • Volcanic Ashfall • Lava Flows • Lahars (Debris Flows) • Volcanic Gas • Pyroclastic Surges or Flows • Volcanic Landslides
Location	Across Cook Inlet from Ninilchik is an active volcano range. The volcanoes are in the Lake Clark National Park and Preserve and include Mount Augustine, approximately 70 miles west of Ninilchik, Mount Iliamna, Mount Redoubt, and Mount Spur. Ninilchik is approximately 47 miles southeast of Mount Iliamna and Mount Redoubt. As shown in Figure 7, the Ninilchik Village is at risk for heavy tephra ashfall hazard with 1 to 4 inches of accumulation.

Table 3-8: Volcano

Profile	Description
History	The Alaska Volcano Observatory keeps track of reported current and historic volcanic activity in Alaska. Since 1778, Mount Redoubt has had 12 events, with the most recent eruption in 2009 and noneruptive activity in 2015. Mount Redoubt erupted in 1902, 1966, 1989, and 2009. The 1989 eruption began December 14, 1989 and ended June 1990. The eruption impacted the communities, commerce, and oil production throughout the Cook Inlet region. Air traffic as far away as Texas was affected. The total estimated economic cost is $160 million, making the 1989 eruption of Mount Redoubt the second most costly in US history. The 2009 eruption started March 15, 2009 and ended July 2009. The eruption consisted of multiple ash-producing explosions, lasted several months, and removed significant amounts of ice from the summit crater. Ashfall reached Anchorage, resulting in the shutdown of the Ted Stevens International Airport for 20 hours from March 28 until March 29. The April 4 ash cloud reached 50,000 feet and moved southeast, depositing up to 2 millimeters of ash in Homer, Anchor Point, and Seldovia. Mount Iliamna has not erupted since 7000 years before present but often experiences debris/rock/snow/ice avalanches and landslides.
Extent / Severity	As noted above, all of Ninilchik Village is susceptible to moderate tephra ashfall. According to the Alaska Volcano Observatory, ash accumulation of 0.25 inch to 1 inch is likely from moderate tephra ashfall.
Recurrence Probability	Given the proximity of Mount Redoubt and history of past events, Ninilchik Village could experience an ashfall event within the next 10 years.

3.8 WILDLAND FIRE

Table 3-9: Wildland Fire

Profile	Description
Nature	A wildfire—sometimes referred to as a wildland fire—is a fire in an area of combustible vegetation occurring in rural areas. Wildfires can be caused by human activities (such as unattended burns, campfires, or off-road vehicles without spark-arresting muffles); or by natural events (such as lightning, drought, or infestation). Wildfires can be classified as forest, urban, tundra, or interface or intermix fires, and prescribed burns. The following three factors contribute significantly to wildfire behavior and can be used to identify wildfire hazard areas: • Topography describes slope increases, which influences wildfire spread rate increases. South-facing slopes are also subject to more solar radiation, making them drier and thereby intensifying wildfire behavior. However, ridge tops may mark the end of wildfire spread because fire spreads more slowly or may even be unable to spread downhill. • Fuel is the type and condition of vegetation that plays a significant role in wildfire spread occurrence. Certain plant types are more susceptible to burning or will burn with greater intensity. Dense or overgrown vegetation increases the amount of combustible material available as fire fuel (referred to as the "fuel load"). The living-to-dead plant matter ratio is also important. Certain climate changes may increase wildfire risk significantly during prolonged drought periods as both living and dead plant matter moisture content decreases. Horizontal and vertical fuel load continuity are both also important factors. • Weather is the most variable factor affecting wildfire behavior. Temperature, humidity, wind, and lightning can affect ignition opportunities and fire spread rate. Extreme weather (such as high temperatures and low humidity) can lead to extreme wildfire activity. Climate change increases fire to vegetation ignition susceptibility due to longer dry seasons. By contrast, cooling and higher humidity often signal reduced wildfire occurrence and easier containment. Indirect wildfire effects 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 exacerbate river and stream siltation thereby increasing flood potential, harming aquatic life, and degrading water quality. Vegetation-stripped lands are more susceptible to increased debris flow hazards.
Location	As shown in Figure 8, the majority of Ninilchik Village has a moderate to high risk of wildfire. The areas of high and very high risk are on bluffs above the coast at Cook Inlet, Ninilchik River, and Deep Creek. The Kenai Peninsula Borough noted that Nikolaevsk, North Fork area (Anchor Point), and Oilwell Road area (Ninilchik) are at the highest risk for future wildfires.
History	Larger fires that have occurred on the western region of the Kenai Peninsula over the past century include: the 1947 Skilak Lake fire (310,000 acres), the 1969 Swanson River Fire (79,000 acres), the 1991 Pothole Lake Fire (7,900 acres), the 1996 Crooked Creek Fire (17,500 acres), the 1996 Hidden Creek Fire (5,200 acres), the 2004 Glacier Creek Fire (8,600 acres), the 2005 Tracy Ave Fire (5,400 acres), the 2005 King County Creek Fire (10,131 acres), and the 2005 Fox Creek Fires (26,300 acres). In 2007, a fire in Caribou Hills burned 56,000 acres and destroyed 88 homes and cabins, and 109 outbuildings. In 2019, a 2.5-acre brush fire occurred on Bluff Drive in Ninilchik. At least two homes were immediately threatened and evacuated but no structures were lost and no injuries occurred. Due to a quick response by local fire personnel, the fire was declared contained hours after its start. In 2014, the Funny River Fire (approximately 53 miles from Ninilchik) burned 196,620 acres.

Table 3-9: Wildland Fire

Profile	Description
Extent / Severity	As shown in Figure 8, the majority of Ninilchik Village has a moderate to high risk of wildfire. Approximately 27,772.07 acres (20.94%) of the community is in the moderate risk zone. 98,379.15 acres (74.18%) of the community are in the high zone, 6,441.56 acres (4.86%) are in the very high zone, and 24.01 acres (0.02%) are in the extreme risk zone. Wildfires can destroy habitat; impact watersheds; burn down homes, buildings, and critical facilities; cause loss of life to humans and animals; and restrict access to recreational areas. Wildfires can cause fire-related injuries; and local and regional transport of smoke, ash, and fine particles, which increase respiratory and cardiovascular risks. People without means for evacuation are also vulnerable to wildfires. The Kenai Peninsula Borough noted that 87.2% of the community is classified as Wildland Urban Interface.
Recurrence Probability	Fire season on the Kenai Peninsula typically lasts from April to September with the greatest activity occurring between May and July when temperatures are highest and humidity is low. Based on previous events, Ninilchik is likely to experience a significant wildland fire almost every 5 years. It is anticipated that this probability will continue into the future or increase in frequency as climate change and spruce bark beetles create more fuel for potential fires.

4.0 RISK ASSESSMENT

This section addresses Element B of the Tribal Mitigation Plan Regulation Checklist.

Regulation Checklist – 44 CFR 201.7 Tribal Mitigation Plans
Element B: Hazard Identification and Risk Assessment
B3. Does the plan include a description of each identified hazard's impact as well as an overall summary of the vulnerability of the tribal planning area? (Requirement 44 CFR § 201.7(c)(2)(ii))

4.1 HAZARD IMPACT

A hazard impact assessment predicts the current or expected impact of a hazard on a community or given area. The analysis provides quantitative data that may be used to identify and prioritize potential mitigation measures by allowing communities to focus attention on areas with the greatest risk of damage.

For this 2022 THMP, a conservative exposure-level analysis was conducted to assess the risks associated with the identified hazards. Due to a combination of a lack of adequate information and methodology, a semi-quantitative hazard impact assessment has only been prepared for the following hazards: climate change; earthquake; ground failure—landslide; volcano; and wildland fire.

For the 2022 THMP, hazard impact assessments were prepared for Ninilchik Village land area, population center, and critical facilities (Table 4-1). A land area of 132,616.79 acres and a population center (i.e., a geographical point that describes a center point of the village population) of 2,531.65 acres were determined using geographic information system (GIS). The critical facilities include facilities that provide services and functions essential to the village, especially during and after a disaster (Figure 9). Common types of critical facilities include fire stations; police stations; hospitals; schools; water and wastewater systems; and utilities. Critical facilities may also include places that can be used for sheltering or staging purposes, such as community centers and libraries, or large public gathering spots and places of worship. For the 2022 THMP, a list of 19 of critical facilities and private critical facilities was collected from Ninilchik Village. Critical facility names were then geocoded to a location and the resulting geographic features were used for hazard impact assessment. Facility-specific information was given to Ninilchik Village and will be kept on file.

The overall results of the hazard assessments are provided below. This analysis is a simplified assessment of the potential effects of the hazards on land area (Table 4-2), population center (Table 4-3), and critical facilities (Table 4-4) at risk, without consideration of the probability or level of damage. In addition, elevation data were not available; therefore, additional analysis will need to be conducted to develop a more accurate understanding of hazard vulnerabilities.

Table 4-1: Total Land Area, Population Center, and Critical Facilities

Category	Number (Acres)
Land Area	132,616.79
Population Center	2,531.65
Critical Facilities	19

Table 4-2: Total Acres of Land in a Hazard Area

Hazard Area	Acres	Percent of Total Acres
Climate Change	132,616.79	100
Earthquake		
Weak-Light	0	0
Moderate	0	0
Strong-Severe	132,616.79	100
Erosion	No mapping data are available for erosion. Based on existing reports and the community planning team, approximately 5% of total land area is susceptible to erosion.	
Flood	No mapping data are available for flooding. Based on existing reports and the community planning team, approximately 5% of total land area is susceptible to flooding.	
Wildfire		
Moderate	27,772.07	20.94
High	98,379.15	74.18
Very High	6,441.56	4.86
Extreme	24.01	0.02
Ground Failure—Landslide	2,451.93	1.85
Severe Weather	132,616.79	100
Volcano	132,616.79	100

Table 4-3: Total Number of Acres of Population Center in a Hazard Area

Hazard Area	Acres	Percent of Total Acres
Climate Change	132,616.79	100
Earthquake		
Weak-Light	0	0
Moderate	0	0
Strong-Severe	2,531.65	100
Erosion	No mapping data are available for erosion. Based on existing reports and the community planning team, less than 5% of the population center is susceptible to erosion.	
Flood	No mapping data are available for flooding. Based on existing reports and the community planning team, less than 5% of population center is susceptible to flooding.	
Wildfire		

Table 4-3: Total Number of Acres of Population Center in a Hazard Area

Hazard Area	Acres	Percent of Total Acres
Moderate	1,051.53	41.54
High	1,327.99	52.46
Very High	152.13	6.01
Extreme	0	0
Ground Failure—Landslide	120.04	11.42
Severe Weather	132,616.79	100
Volcano	132,616.79	100

Table 4-4: Total Number of Critical Facilities in a Hazard Area

Hazard Area	Number	Percent of Total Facilities
Climate Change	19	100
Earthquake		
Weak-Light	0	0
Moderate	0	0
Strong-Severe	19	100
Flood		
1% Annual Chance	2	10
0.2% Annual Chance	0	0
Erosion	No mapping data are available for erosion. Based on existing reports and the community planning team, approximately 2 critical facilities are susceptible to erosion.	
Severe Weather	19	100
Ground Failure—Landslide	6	31.57
Volcano	19	100
Wildland Fire		
Moderate	13	68.4
High	3	15.7
Very High	1	5.2
Extreme	0	0

4.2 OVERALL SUMMARY OF VULNERABILITY

A list of the key issues or overall summary of vulnerability for each hazard profiled in the 2022 THMP is provided in Table 4-5.

Table 4-5: Overall Summary of Vulnerability

Hazard	Vulnerability
Climate Change	Climate change is affecting critical facilities in Ninilchik due to changes in ambient conditions that were not engineered for when the facilities were built. Annual temperatures are expected to increase of 5.4ºF by the end of the century. Likewise, average rainfall is expected to increase 2.7 inches for the same reporting period. In the summer, an increase in temperature can cause fungi to thrive and fire risk to increase. Drier, hotter conditions can also make wildfires more frequent and intense. Wildfires can burn homes, businesses, and critical facilities; interrupt transportation and utilities; reduce air quality; and result in fatalities of people and animals. Mega storms that are linked to climate change can cause severe flooding. Along the coast, deadly and destructive storm surges may push farther inland than they once did, which means more frequent nuisance flooding.
Earthquake	The current USGS seismicity model for Alaska shows Ninilchik within the severe range for perceived shaking and moderate to heavy range for potential damage. Based on this model, 100% (2,531.65) of Ninilchik is in this shaking zone. Violent perceived shaking can produce the potential for heavy damage. According to USGS, this could mean that well-designed framed structures could be thrown out of plumb and substantial buildings could experience partial building collapse. In extreme shaking, USGS notes that some well-built wooden structures could be destroyed, and most masonry and frame structures with foundations could be destroyed.
Erosion	Ninilchik experiences erosive forces from Cook Inlet, Ninilchik River, and Deep Creek. Past events have eroded 25 to 50 feet of bluff along Cook Inlet. The primary impact from erosion is loss of land for use as boat launches, development, and subsistence activities. Structures that are in the path of erosion often need to be relocated to avoid heavy damage. Structures threatened by coastal or river erosion includes houses, outbuildings, sheds, water tanks, water lines, the community cemetery, roads, boat launches, and public buildings.
Flood	Riverine and coastal storm flooding is common on the Ninilchik River, Deep Creek, and Cook Inlet. The community is subject to flooding from high tides, storm surges, and overflow. Floods can cause creek bank erosion; road and bridge wash outs; and downed trees. Along the coast, waves generated by winter storms—in combination with high astronomical tides and strong winds—can cause a significant wave runup, resulting in erosion and coastal flooding to low-lying portions of the shoreline.
Ground Failure: Landslides	No official landslide data exist for Ninilchik. However, in North America, there is an association between landslides and hilly terrain (particularly with slopes ranging from about 20 to 40 degrees). There are 2,451.93 acres (1.85%) of total land area and 120.04 acres (11.42%) of the population center of Ninilchik with steep slopes greater than 20 degrees. Structures threatened by landslides include the boat harbor, cemetery, church, Deep Creek recreation area, RV park, and community water source. Weather, fires, and climate change have increased the number and size of landslides. Landslides can cause damage to buildings (including moving them off of their foundation) and impact critical infrastructure, including water, sewer, and roadways.

Table 4-5: Overall Summary of Vulnerability

Hazard	Vulnerability
Severe Weather	Past weather events have required presidential disaster declarations for Ninilchik. High winds, winter storms, and heavy snowfall can make driving and walking extremely hazardous; damage structures and utilities; and require substantial repair and snow removal costs. Severe winter storms can result in landslides on the highways, storm surge / coastal inundation around the waterfront, and wind damage to building roofs and siding.
Volcano	Ashfall is a public health hazard when humans inhale fine ash. Ash will also interfere with the operation of mechanical equipment including aircraft. In Alaska, this is a major problem because many of the major flight routes are near historically active volcanoes. Based on modeling, Ninilchik is in a high ashfall hazard area. Even a small ashfall event in Ninilchik could cause significant damage to the built environment (e.g., clogged filters and damaged parts of vehicles and machinery, clogged filters of air-ventilation systems, roof collapse, cellular and radio communication interruption) and the natural environment (e.g., habitat damage, water pollution, weather pattern shifts). In addition, an ashfall event can cause respiratory problems, eye problems, and skin irritation to humans.
Wildland Fire	Vulnerability to wildfires is commonly based on exposure to the hazard. Those that live in rural, woody, and/or hilly areas are more at risk than those living in urban areas. Extreme and high-hazard woody fuels can be found in many areas of Ninilchik and occupy an estimated 74,289 acres. Approximately 27,772.07 acres (20.94%) of Ninilchik are in the moderate fire hazard zone. The majority of the community, 98,379.15 acres (74.18%) is in the high hazard zone, 6,441.56 acres (4.86%) are in the very high hazard zone, and 24.01 acres (0.02%) are in the extreme hazard zone. Approximately 13 (68.4%) critical facilities are in the moderate hazard zone, and 3 (15.7%) are in the high hazard zone, with 1 (5.2%) facility in the extreme hazard zone. In the population center, 1,051.53 acres (41.54%) is located in the moderate fire hazard zone, 1,327.99 acres (52.46%) are located in the high fire hazard zone and 152.13 (6.01%) are located in the very high fire hazard zone. Wildfires are not only capable of burning down vegetation, homes, critical facilities, and infrastructure, but they can also cause loss of life to humans and animals, soil erosion, debris flows, air pollution, serious health problems, and restriction of access to recreational areas.

5.0 MITIGATION STRATEGY

This section addresses Element C of the Tribal Mitigation Plan Regulation Checklist.

Regulation Checklist – 44 CFR 201.7 Tribal Mitigation Plans
Element C: Mitigation Strategy
C1. Does the plan include a discussion of the tribal government's pre and post-disaster hazard management policies, programs, and capabilities to mitigate the hazards in the area, including an evaluation of tribal laws and regulations related to hazard mitigation as well as to development in hazard-prone areas? (Requirement 44 CFR §§ 201.7(c)(3) and 201.7(c)(3)(iv))
C2. Does the plan include a discussion of tribal funding sources for hazard mitigation projects and identify current and potential sources of Federal, tribal, or private funding to implement mitigation activities? (Requirement 44 CFR §§ 201.7(c)(3)(iv) and 201.7(c)(3)(v))
C3. Does the Mitigation Strategy include goals to reduce or avoid long-term vulnerabilities to the identified hazards? (Requirement 44 CFR § 201.7(c)(3)(i))
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? (Requirement 44 CFR § 201.7(c)(3)(ii))
C5. Does the plan contain an action plan that describes how the actions identified will be prioritized, implemented, and administered by the tribal government? (Requirement 44 CFR § 201.7(c)(3)(iii))
C6. Does the plan describe a process by which the tribal government will incorporate the requirements of the mitigation plan into other planning mechanisms, when appropriate? (Requirement 44 CFR § 201.7(c)(4)(iii))
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? (Requirement 44 CFR §§ 201.7(c)(4)(ii) and 201.7(c)(4)(v))

5.1 PRE AND POST-DISASTER HAZARD MITIGATION POLICIES, PROGRAMS, AND CAPABILITIES

Ninilchik's pre- and post-disaster hazard mitigation policies, programs, and capabilities available for hazard mitigation are provided in Table 5-1 (human and technical resources), Table 5-2 (financial resources), and Table 5-3 (planning and policy resources).

Table 5-1: Human and Technical Resources for Hazard Mitigation

Staff/Personnel	Department/Agency	Principal Activities Related to Hazard Mitigation
Planner(s) and technical staff with knowledge of land development, land management practices, human-caused hazards, and natural hazards	Village has staff with this knowledge.	Anticipates and acts on the need for new plans, policies, and code changes. Applies the approved plans, policies, code provisions, and other regulations to proposed land uses.
Engineer(s), building inspectors / code enforcement officers or other professional(s), and technical staff trained in construction requirements	Village hires consultants	Oversees the effective, efficient, fair, and safe enforcement of the building codes.
Engineers, construction project managers, and supporting technical staff	Village hires consultants	Provides direct or contract civil, structural, and mechanical engineering services, including contract, project, and construction management.
Engineer(s), project manager(s), technical staff, equipment operators, and maintenance and construction staff	Village has staff with this knowledge	Maintains and operates of a wide range of local equipment and facilities and assists members of the public. This includes providing sufficient clean fresh water, reliable sewer services, street maintenance, storm drainage systems, street cleaning, street lights, and traffic signals.
Emergency Manager	Tribal President and Vice President	Maintains and updates the Ninilchik Village's Emergency Operations Plan. In addition, coordinates local response and relief activities in the Emergency Operations Center; works closely with local, state, and federal partners to support planning and training and to provide information and coordinate assistance.
Procurement Services Manager	Village has staff with this knowledge	Provides a full range of municipal financial services and administers several licensing measures.
Public Information Officer	Tribal Administrator	Coordinate and facilitate a public information program regarding activities of Ninilchik Village and its various departments; actively promotes the services and successes of operating departments and the benefits to residents; proactively establishes and maintains productive relationships between Ninilchik Village and any media; and performs related duties as required.

Table 5-2: Financial Resources for Hazard Mitigation

Type	Source	Purpose	Amount
Tribal Resilience Program	US DOE Bureau of Indian Affairs	This grant program funds tribal projects that support tribal resilience planning as tribes incorporate science (including traditional ecological knowledge) and technical information to prepare for the impacts of extreme events and harmful environmental trends.	Project-specific
Energy Infrastructure Deployment on Tribal Lands	US DOE Office of Indian Energy	This grant supports Indian tribal energy development, efficiency, and use; reduces and stabilizes energy costs; and enhances and strengthens Indian tribal energy and economic infrastructure relating to natural resource development and electrification. Grants may include: the installation of energy efficiency measure(s) and/or energy generating system(s) for tribal buildings; deploying community-scale energy generating system(s) on tribal lands; and installing energy system(s) for autonomous operation to power a single or multiple essential tribal loads for emergency situations or for tribal community resilience.	Project-specific
Renewable Energy Fund	Alaska Energy Authority	Provides funding for the development of qualifying and competitively selected renewable energy projects in Alaska. The program is designed to produce cost-effective renewable energy for both heat and power For Fiscal Year 2019, $11 million has been allocated by the governor to fund the Renewable Energy Fund. This program runs through 2023.	Project-specific
HMA: HMGP	FEMA	Supports pre- and post-disaster mitigation plans and projects. Available to communities in Alaska after a presidentially declared disaster has occurred in Alaska.	Project-specific
HMA: Building Resilient Infrastructure and Communities (BRIC)	FEMA	Focuses on reducing the nation’s risk by funding public infrastructure projects that increase a community’s resilience before a disaster affects an area.	Project-specific
Homeland Security Preparedness Technical Assistance Program	FEMA/Department of Homeland Security	Build and sustain preparedness technical assistance activities in support of the four homeland security mission areas (i.e., prevention, protection, response, recovery) and homeland security program management.	Project-specific
Assistance to Firefighters Grant Program	FEMA/US Fire Administration	Provides equipment, protective gear, emergency vehicles, training, and other resources needed to protect the public and emergency personnel from fire and related hazards. Available to fire departments and nonaffiliated emergency medical services providers.	Project-specific

Table 5-2: Financial Resources for Hazard Mitigation

Type	Source	Purpose	Amount
Community Action for a Renewed Environment	US Environmental Protection Agency	Through financial and technical assistance, this program offers an innovative way for a community to organize and take action to reduce toxic pollution (e.g., stormwater) in its local environment. Through this program, a community creates a partnership that implements solutions to reduce releases of toxic pollutants and minimize exposure to them.	Project-specific
Community Block Grant Program Entitlement Communities Grants	US Department of Housing and Urban Development	Acquisition of real property; relocation and demolition; rehabilitation of residential and nonresidential structures; construction of public facilities and improvements, such as water and sewer facilities, streets, neighborhood centers; and the conversion of school buildings for eligible purposes.	Project-specific

Table 5-3: Planning and Policy Resources for Hazard Mitigation

Name	Description	Hazards Addressed	Emergency Management
Kenai Peninsula Borough Comprehensive Plan	Describes hazard areas and lists goals and policies to reduce the potential risk of death, injuries, and economic damage resulting from natural and human-caused hazards.	Flood, Erosion, Landslide, Avalanche, Earthquake, Volcano, Tsunami, Wildfire	Mitigation, Preparedness, Response
Kenai Peninsula Borough Hazard Mitigation Plan	Describes hazard areas and lists goals and policies to reduce the potential risk of death, injuries, and economic damage resulting from natural and human-caused hazards.	Flood and Erosion, Wildfire, Earthquake, Weather, Tsunami and Seiche, Volcano, Avalanche	Mitigation, Preparedness, Response
Kenai Peninsula Borough Code of Ordinances	Promotes public health, safety, and general welfare through enforced laws. Building permits are issued and based on the current edition of the building code and local amendments, which encompass building, electrical, mechanical, plumbing, state energy requirements, and state accessibility laws. The Borough can update and revise local amendments, as needed or required.	Flood, Wildfire	Mitigation
Ninilchik Area 2006 Community Wildfire Protection Plan	Identifies and prioritize areas for hazardous fuel reduction treatments and recommend the types and methods of treatment on federal and nonfederal land that will protect an at-risk community or its essential infrastructure. The plan also recommends measures to reduce the ignitability of structures throughout the community.	Wildfire	Mitigation
Public Outreach	Ninichik Village uses the Ninilchik Traditional Council website and semi-monthly newsletter to provide outreach to the community on relevant events, activities, and planning processes happening in the village.	All	All Phases

5.2 MITIGATION GOALS

Mitigation goals are defined as general guidelines that explain what an agency wants to achieve in terms of hazard and loss prevention. Goal statements are typically long-range, policy-oriented statements representing a community-wide vision. FEMA's 2022 BRIC priorities are the basis for the three goals (Table 5-4) for the 2022 THMP.

Table 5-4: Mitigation Goals

Goal #	Description
1	Enhance climate protection and adaptation efforts
2	Create a healthy and safe community
3	Protect critical facilities and infrastructure against hazards

5.3 RECOMMENDED MITIGATION ACTIONS

Mitigation actions help achieve the goals of the THMP. The recommended mitigation actions provided in Table 5-5 include: education and awareness; structure and infrastructure projects; preparedness and response; local plans and regulations. This list addresses every hazard profiled in this plan and is based on the plan's risk assessment as well as lessons learned from recent disasters. It was developed using FEMA success stories and best management practices; FEMA job aids; local and regional plans and reports; and input from planning team members and sustainability practitioners.

Table 5-5: Recommended Mitigation Actions

No.	Project Name	Hazard Mitigated	Project Description	Type of Development
1	Fuel storage capacity/ contingency	All	Determine and secure enough fuel storage for generators to use. Develop contingency plans for obtaining generator fuel.	Existing
2	Community Planning	All	Establish a formal role for the hazard mitigation planning team to develop a sustainable process to implement, monitor, review, and evaluate community-wide mitigation actions.	New and Existing
3	Emergency Operations Plan and Centralized Emergency Response Location	All	Prepare an Emergency Operations Plan. As part of the plan, identify a location (potentially the City Building) to act as an emergency command center and evacuation shelter in the event of a natural disaster. Facility would house shelter supplies, provisions, and medical supplies. Identify a person(s) in the community to oversee response and logistics of emergency response.	New and Existing
4	Utility Headers	All	Harden utility headers along river embankments to mitigate potential flood, debris, and high water flow or erosive scour damages.	Existing

Table 5-5: Recommended Mitigation Actions

No.	Project Name	Hazard Mitigated	Project Description	Type of Development
5	Generators	All	Purchase and install generators with main power distribution disconnect switches for identified and prioritized critical facilities susceptible to short term power disruption. (e.g., first responder, medical facilities, schools, correctional facilities, and water and sewage treatment plants)	New and Existing
6	Creek Restoration	Climate change	Develop projects to restore creeks to more natural conditions, ensure flood protection, and enhance the ability of wildlife species to adapt to climate change.	New and Existing
7	Seismic Retrofits	Earthquake	Seismically retrofit existing critical facilities to be more resistant to earthquakes.	Existing
8	Earthquake-resistant pipes replacement	Earthquake	Replace aging critical pipes in areas of extreme or violent shaking hazard and landslide hazard areas to improve seismic reliability and safeguard critical water distribution lines against the potential destructive impacts of large-scale earthquakes and accompanying landslides.	Existing
9	Bank Protection and Vegetation Projects	Flood, Erosion	Develop mitigation initiatives such as: rip-rap (large rocks), sheet pilings, gabion baskets, articulated matting, concrete, asphalt, vegetation, or other armoring or protective materials to provide shoreline bank protection.	New and Existing
10	Flood Protection Ordinance/ Overlay Zone	Flood	Adopt a comprehensive flood protection ordinance/overlay zone for areas that are in the Special Flood Hazard Area or subject to flooding. Properties in this overlay are often subject to additional standards concerning development/land uses, building elevation, stream buffers, outdoor storage, building materials, and permitting procedures.	New and Existing
11	Passive Floodproofing Measures	Flood	Install passive floodproofing measures in existing critical facilities that cannot be elevated and are in the Special Flood Hazard Area, sea level rise hazard area, tsunami inundation area, and dam breach inundation area.	Existing
12	Creek Setback Requirements	Flood	Establish design standards, guidelines, and setback requirements for development on properties that abut creeks and waterways, and require the replanting and restoration of riparian vegetation as part of any discretionary permit.	New

Table 5-5: Recommended Mitigation Actions

No.	Project Name	Hazard Mitigated	Project Description	Type of Development
13	Watershed Management Program	Flood	Develop and implement a Watershed Management Program. Examples of watershed management to slow runoff include: small-scale green infrastructure projects designed to capture small volumes of runoff to be released over time through soil infiltration, and increasing the coverage of forested areas to improve the water retention capacity of the soil.	New and Existing
14	Culvert, storm drains, channels, and pump station installation and upgrades	Flood	Install and upgrade culverts, storm drains, channels, and pump stations to increase drainage capacity or efficiency for the passage of water in areas of repeat flooding. Such upgrades may include increasing size; implementing ice thawing capability; installing debris cribs over culvert inlets; and/or hardening culvert entrance bottoms with asphalt, concrete, or rock.	Existing
15	Revetment Walls	Flood	Install revetment walls (i.e., a permanent structure designed to prevent the types of subsidence that commonly occur adjacent to waterways and the ocean) along the waterfront (particularly in areas that have critical facilities) that are affected by wave attack and/or erosion (a coastal management study or plan may be necessary to implement additional structural waterfront protection).	Existing
16	Weatherization Assistance Program	Severe weather	Build a comprehensive database of interested homeowners for the Weatherization Assistance Program and assist them in pursuing funding. The Weatherization Assistance Program reduces the energy costs for low-income households by increasing the energy efficiency of their homes while ensuring health and safety. Typical weatherization measures include: mechanical; building shell; health and safety; electric and water; and client education.	Existing
17	Power Lines	Severe weather	Increase power line wire size and incorporate quick disconnects (breakaway devices) to reduce ice load and windstorm power line failure during severe wind or winter ice storm events.	New and Existing
18	High Wind Reinforcement	Severe weather	Reinforce critical facilities and homes against high winds.	Existing

Table 5-5: Recommended Mitigation Actions

No.	Project Name	Hazard Mitigated	Project Description	Type of Development
19	Red Flag Warning Public Outreach	Wildfire	Create an online and offline public outreach campaign for Red Flag Warnings. Include information about: what is a Red Flag Warning; what land may be closed; and what individuals should do to be prepared as well as what activities should be avoided. Tailor outreach material to various target groups, such as older populations and tourists.	Existing
20	Critical Facility Fireproof Coating and Auxiliary Power	Wildfire	Fireproof coat critical facilities in Very High FHSZs, which will extend structures' strength in the event of a fire. Determine which critical facilities require auxiliary power in order to remain functional during de-energization or public safety power shutoff and/or general loss of power and install auxiliary power systems. Auxiliary power systems may include backup generators, local Solar Photovoltaic plus storage, and microgrids.	Existing
21	Beyond Defensible Space Zone Program	Wildfire	Identify property owners that have properties large enough to encompass significant fuel loads and difficult to maintain adequately, yet small enough to fall below any existing efforts for prescribed fire support campaigns.	Existing
22	Wildland Urban Interface Ordinance/ Overlay Zone	Wildfire	Adopt a Wildland Urban Interface ordinance/overlay zone. Properties in this overlay area are often subject to additional standards concerning structure density and location, building materials and construction, vegetation management, emergency vehicle access, water supply, and fire protection.	New and Existing
23	Large-Scale Fuel Break Program and Water Storage Tanks	Wildfire	Develop a coordinated large-scale fuel break program that maps when and where fuel breaks have been developed and maintained and carry out fuel break measures where needed. This program can include installing more water storage tanks to be available for use during periods of prolonged droughts and also to be used for firefighting capabilities.	New and Existing
24	Air Quality Clean Building	Volcano, Wildfire	Identify a building or room to be a designated 'clean building' or 'clean room' for use during periods of poor air quality created from wildfires, volcanic ash, or other poor air quality event.	Existing

Table 5-5: Recommended Mitigation Actions

No.	Project Name	Hazard Mitigated	Project Description	Type of Development
25	Portable Water and Wastewater Plans Protection or Sustainability Plans	Volcano	Develop potable water and wastewater plants' protection or sustainability plans.	New and Existing

5.4 PRIORITIZED ACTION PLAN

A prioritized action plan is an itemized list of recommended mitigation actions that a community/agency hopes to put into practice to reduce its risks and vulnerabilities.

For 2022 THMP, the planning team created a two-tier prioritization process based on the following:

- High-priority mitigation actions, which are those that address hazards of immediate concern and are also cost-effective (positive cost-benefit ratio) and have an identified funding source.
- Medium-priority mitigation actions, which are those that address hazards that are not of immediate concern and/or those that are of immediate concern but are not cost effective or do not have an identified funding source.

Ninilchik determined the hazards and threats of immediate concern based on the 2022 THMP's hazard profiles, risk assessment, and capability assessment, as follows: earthquake, flood, erosion, severe weather, wildfire, and volcano.

The results of the above prioritization process are provided in Table 5-6. For each mitigation action listed, potential funding sources; responsible departments or agencies; and implementation timelines have been identified.

Table 5-6: Prioritized Action Plan

No.	Project Name	Priority	Potential Funding Source	Responsibility	Timing
1	Fuel storage capacity/contingency	High	Ninilchik Traditional Council	Ninilchik Traditional Council	0 to 5 years
2	Community Planning	High	Ninilchik Traditional Council	Ninilchik Traditional Council	0 to 5 years
3	Emergency Operations Plan and Centralized Emergency Response Location	High	Ninilchik Traditional Council	Ninilchik Traditional Council	0 to 5 years
4	Generators	High	FEMA BRIC/HMGP	Ninilchik Traditional Council	0 to 5 years
5	Seismic Retrofits	High	FEMA BRIC/HMGP	Ninilchik Traditional Council	0 to 5 years
6	Creek restoration	Medium	FEMA BRIC/HMGP	Ninilchik Traditional Council	0 to 5 years
7	Earthquake-resistant pipes replacement	Medium	FEMA BRIC/HMGP	Ninilchik Traditional Council	0 to 5 years
8	Bank Protection and Vegetation Projects	High	FEMA BRIC/HMGP	Ninilchik Traditional Council	0 to 5 years
9	Culvert, storm drains, channels, and pump station installation and upgrades	Medium	FEMA BRIC/HMGP	Ninilchik Traditional Council	0 to 5 years
10	Weatherization Assistance Program	High	FEMA BRIC/HMGP	Ninilchik Traditional Council	0 to 5 years
11	High Wind Reinforcement	High	FEMA BRIC/HMGP	Ninilchik Traditional Council	0 to 5 years
12	Critical Facility Fireproof Coating and Auxiliary Power	High	FEMA BRIC/HMGP	Ninilchik Traditional Council	0 to 5 years
13	Beyond Defensible Space Zone Program	High	Bureau of Indian Affairs Tribal Resilience Program	Ninilchik Traditional Council	0 to 5 years
14	Large-Scale Fuel Break Program and Water Storage Tanks	High	FEMA BRIC/HMGP	Ninilchik Traditional Council, Alaska Department of Natural Resources	0 to 5 years
15	Air Quality Clean Building	High	Ninilchik Traditional Council	Ninilchik Traditional Council	0 to 5 years
16	Portable Water and Wastewater Plans Protection or Sustainability Plans	High	Ninilchik Traditional Council	Ninilchik Traditional Council	0 to 5 years

5.5 PLAN INTEGRATION

Information about how the 2022 THMP will be integrated into Ninilchik's future plans and programs moving forward is provided in Table 5-7.

Table 5-7: Integration of 2022 THMP into Future Plans and Programs

THMP Section	Existing or Fture Plan/Policy/Program	Process/Timeframe
Section 3—Hazard Identification	Ninilchik Village Area Plan	Using the hazard profiles section of the THMP, develop a General Plan or Area Plan.
Section 4—Risk Assessment	Ninilchik Village Emergency Operations Plan	Using the risk assessment findings, develop an Emergency Operations Plan, Emergency Response Plan, or Continuity of Operations Plan to help identify and ensure critical resources to maintain operations internally and externally.
Section 5—Mitigation Strategy	Ninilchik Capital Improvement Plan	Using the mitigation actions provided in **Table 5-5**, develop a Capital Improvement Plan/Program by further studying and evaluating the underlying problems or if studies exist that outline potential solutions. Begin the design stage to develop a plan for each identified project; the actions to be taken; engineering and construction required; schedule; and estimated costs.

5.6 MONITORING MITIGATION GOALS AND ACTIONS

Mitigation goals and actions identified in this THMP will be monitored during the annual review. This process is described in detail in Section 2.6.

In general, during each annual review, each department or agency currently administering a mitigation project will need to submit required documentation to the THMP project manager for review. FEMA-provided quarterly reports are most commonly used because they provide information on the status of the mitigation project, detail any changes made to the project, and describe implementation problems and the appropriate strategies to overcome them. Other reporting forms that may be used include administration plans or agency-specific reporting tools.

6.0 PLAN ADOPTION

This section addresses Element E of the Tribal Mitigation Plan Regulation Checklist.

Regulation Checklist – 44 CFR 201.7 Tribal Mitigation Plans
Element E: Plan Adoption
E1. Does the plan include assurances that the tribal government will comply with all applicable Federal statutes and regulations in effect with respect to the periods for which it receives grant funding, including 2 CFR Parts 200 and 3002, and will amend its plan whenever necessary to reflect changes in tribal or Federal laws and statutes? (Requirement 44 CFR § 201.7(c)(6)) E2. Does the plan include documentation that it has been formally adopted by the governing body of the tribal government requesting approval? (Requirement 44 CFR § 201.7(c)(5))

6.1 ASSURANCES AND FORMAL ADOPTION

The 2022 THMP's adoption resolution includes assurances that Ninilchik Village and the tribal council will comply with 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.

6.2 ADOPTION RESOLUTION

The 2022 THMP was formally adopted on [date] by Ninilchik Village Tribe. A copy of the adoption resolution in on file with the community and the Alaska Division of Homeland Security and Emergency Management.

7.0 APPENDICES

APPENDIX A—FEMA DOCUMENTATION

APPENDIX B—PLANNING PROCESS

APPENDIX C—FIGURES

Figure 1: Overview Map

Figure 2: Kenai Peninsula Borough, Fault Lines

Figure 3: Alaska Earthquake Center ShakeMap: 9 Miles North of Ninilchik

Figure 4: Alaska Earthquake Center ShakeMap: 30 Miles Northwest of Ninilchik

Figure 5: Earthquake Hazard Area

Figure 6: Landslide Hazard Area

Figure 7: Volcanic Ash Fall Hazard

Figure 8: Wildfire Hazard Area

Figure 9: Critical Facilities