

# Near-Term Infrastructure Protection Plan

Alakanuk, Alaska



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## Executive Summary

Alakanuk, Alaska is a Yup'ik community of approximately 704 residents located at the east entrance of Alakanuk Pass, the major southern channel of the Yukon River, 15 miles from the Bering Sea in the Yukon-Kuskokwim Delta. According to the [Statewide Threat Assessment](#) (Denali Commission, 2019), Alakanuk is the sixth most threatened community in Alaska because the community faces a high level of risk to community infrastructure from erosion, flooding, and permafrost degradation. Erosion is an immediate threat. The Tribal Hall and ten homes are expected to be impacted in the next five years and up to 25 homes are expected to be impacted in the next 50 years. Alakanuk also has a history major flooding. The next major flood is expected to impact 17 buildings, the airport road, wastewater lagoon, and school fuel tanks.

This plan provides a summary of environmental threats, past progress made to address threats, and the community's infrastructure protection strategy. The infrastructure protection strategy has five major objectives: address imminent threats, build community capacity, complete site-specific risk assessments, develop long-term solutions to address risk, and implement long-term solutions. The current highest priority is to address imminent threats to infrastructure, including relocating 10 homes and the Tribal Hall away from the eroding river. In total, proactively mitigating near-term and mid-term environmental threats to infrastructure in Alakanuk—including constructing a new subdivision site and relocating and replacing threatened structures—is estimated to cost approximately \$23.25 million (Alaska Native Tribal Health Consortium, 2020). Planning, design and construction could take ten years. Increased availability of funding would significantly reduce the time required to protect families and community infrastructure.

## Introduction

### Purpose

This plan provides a roadmap for the community's efforts to mitigate the near-term threat of erosion, flooding, and permafrost degradation to infrastructure. This plan will provide a foundation for longer-term planning that aims to protect the life, health, and safety of community members and build a healthy and resilient future.

Hazard information has been based on local observations, basic field measurements, and previously-prepared reports and studies. No new data or hazard assessments have been prepared as part of this near-term effort. This plan includes information on climate impacts to infrastructure, past community actions, and strategic actions to protect infrastructure that incorporate near-term priorities, objectives, and estimated costs for implementation. This strategy does not address climate change impacts to food security, culture, transportation, and other areas. This plan is a living document will be updated and integrated into a long-term Infrastructure Protection Plan as progress is made.

### Planning Team

- Juanita Joseph, Tribal Administrator, Village of Alakanuk
- Thomas Alstrom, Mayor, City of Alakanuk
- Katie Lund, Community Resilience Specialist, Alaska Native Tribal Health Consortium (ANTHC)
- Max Neale, Senior Program Manager, ANTHC
- Sally Cox, State of Alaska Division of Community and Regional Affairs (DCRA)

## Planning Process

This plan was developed in collaboration between the Village of Alakanuk, City of Alakanuk, and ANTHC. ANTHC staff and representatives of the City of Alakanuk and the Village of Alakanuk reviewed the draft plan in April 2022. The final draft plan was presented to the community in a community meeting in May 2022. After community review, the core planning team implemented comments and suggestions received from community members. This plan has been approved and adopted by the City of Alakanuk and the Village of Alakanuk. A project charter is included in the appendix that describes the roles and responsibilities of planning partners.

## Intended Audience

This document is a community planning tool intended to support state and federal investments in the community. In order to protect community infrastructure, an all-hands-on-deck approach is needed. Alakanuk invites all agencies and organizations to review this plan and contact the community point of contact regarding potential support that their programs may provide.

This plan will also be used as a guiding document for City and Tribal staff, community residents, and community leadership to facilitate decision-making related to environmental threats to infrastructure.

## Existing Conditions

### Geographic Location



Figure 1: Alakanuk, Alaska is located five miles from the Bering Sea coast in the Yukon-Kuskokwim Delta in southwest Alaska (image left). The image on the right shows a zoomed in aerial image of the area surrounding Alakanuk. The community lies among a maze of waterways that feed into the Bering Sea. Image Credit: National Aeronautics and Space Administration.

Alakanuk is a traditional Yup'ik community located at the east entrance of Alakanuk Pass, the major southern channel of the Yukon River, 15 miles from the Bering Sea in the Yukon-Kuskokwim Delta. Alakanuk, which means “wrong way” in Yup'ik, is located among a maze of waterways, just a few feet above sea level (City of Alakanuk and Village of Alakanuk, 2021). The proximity to the Bering Sea coast exposes the community to tides and storm surge.

Alakanuk is located within the Yukon Delta National Wildlife Refuge, home to the country's most important shorebird nesting area. Only 15 miles from the Bering Sea coast, Alakanuk sits within the coastal plain, the most productive wildlife habitat in the entire refuge (Audubon Alaska, 2014). The community sits within the low-lying lands of the Yukon River Estuary. The Yukon River watershed deposits 225,000 cubic feet of freshwater per second into the estuary, transporting vast quantities of nutrients into the ecosystem, which supports an abundance of plant and animal life (Smith et al., 2017).

The plant and animal resources support a primarily subsistence-based economy in Alakanuk, including trapping, fishing, hunting, and gathering (City of Alakanuk and Village of Alakanuk, 2021). Some cash income is generated by commercial fishing in the Yukon River and the Bering Sea during the summer. Only a few full- or part-time year-round jobs are available. Primary employers include the government, the Village Safe Water facility, school utilities, and local businesses. Alakanuk is considered an economically distressed community according to the Denali Commission (Denali Commission 2020).

### Community Infrastructure

The community is not on the road system, which means there are no roads connecting Alakanuk to other communities. The Yukon River is used as an ice road during freeze-up from November to May. The only year-round transportation is via a gravel airstrip, which is used to deliver mail. Alakanuk is easily accessible from the Yukon River and Bering Sea by barge and boat. Snow machines and boats are used by residents for local travel.

### **Housing**

The U.S. Census Bureau American Community Survey 2020 5-Year Estimate identified 228 occupied housing units in Alakanuk, 70% of which were occupied by four or more people (U.S. Census Bureau, 2020). Alakanuk has a population of approximately 704 residents, 99% of which identify as Alaska Native (DCCED/DCRA, 2022).

### **Infrastructure and Facilities**

Infrastructure and facilities in Alakanuk include a state-owned and -managed gravel airstrip and maintenance building; a barge landing; two churches and associated buildings; Alaska Village Electric Cooperative (AVEC) bulk fuel storage facility and associated buildings; health clinic; fire hall; police station; post office; City of Alakanuk, Village of Alakanuk, and Alakanuk Native Corporation offices and buildings; four grocery/general stores; a sewage lagoon; a water/sewer plant; a washeteria; a city-owned lodge; two National Guard Armory buildings; a K-12 School owned by the Lower Yukon School District (LYSD); a Head Start building; a public workshop; and a number of other public/ industrial buildings.

The Tribal Hall is one of the most important pieces of infrastructure in the community because it is used for a number of community and cultural purposes. For example, it is one of the only indoor spaces where large community gatherings can occur. The building is threatened by riverine erosion and it is a top community priority to relocate the facility. The building would likely have to be cut in to and moved in sections. Additional analysis and planning is needed in order to relocate the building.



Figure 2: The Tribal Hall (circled in red) is critical infrastructure in Alakanuk, Alaska and threatened by erosion. It is a top community priority to relocate the building to a safe location within the community. Source: Alaska ShoreZone.

### Capacity, Capability, and Collaboration

The Village of Alakanuk and the City of Alakanuk are leading the community’s efforts to address environmental threats to infrastructure. The Tribal Administrator and the City Administrator are the main points of contact for all projects related to erosion, flooding, and permafrost degradation. The Tribe and City meet every month in a joint entity community meeting to discuss community needs and priorities. Both entities have partnered with ANTHC’s Center for Environmentally Threatened Communities (CETC) since 2018 for assistance with community planning, project development, project management, grant writing, and grant management. CETC will continue to support the community.

## Threats to Infrastructure

### Summary of Environmental Threats

According to the Statewide Threat Assessment, Alakanuk is the sixth most threatened community in Alaska because the community faces a high level of risk to community infrastructure from erosion, flooding, and permafrost degradation (Denali Commission, 2019). Erosion is an immediate threat. The Tribal Hall and ten homes are expected to be impacted in the next five years and up to 25 homes in the next 50 years. Alakanuk also has a history major flooding. The 2021 Multi-Jurisdictional Hazard Mitigation Plan lists eight disaster declarations for flooding that apply to Alakanuk (City of Alakanuk and Village of Alakanuk, 2021). From 1952 to 2021, Alakanuk experienced at least 27 significant coastal flood events (Buzard et al., 2022). The next major flood is expected to impact 17 buildings, the airport road, wastewater lagoon, and school fuel tanks (Buzard et al., 2022). Permafrost degradation does not

pose an immediate threat to infrastructure, but the community aims to complete site-specific investigations to determine the long-term impacts.

### Expected Future Environmental Trends

Climate change driven increases in precipitation and air temperature are currently and will continue to exacerbate erosion, flooding, and permafrost degradation threats to the community. Alaska is warming twice as fast as the global average and air temperatures are projected to increase between 3.8-7 degrees Celsius by 2100 (Markon et al. 2018). Climate projections from the University of Alaska Fairbanks Scenarios Network for Action and Planning (SNAP) show that average monthly temperatures from 2030-2099 are expected to increase in every month as compared to historical values (University of Alaska Fairbanks). Precipitation in 2030-2099 is also expected to increase in every month as compared to historical values in Alakanuk. The most substantial forecasted increases in both temperature and precipitation are for the winter months from August to December.

In the last five years, Alakanuk community members have observed accelerating environmental changes. Residents have observed stronger and more frequent storms, warmer water temperatures, and decreased river and sea ice extent. Rivers are freezing later and ice is thinner, which makes overland travel in the winter more difficult and dangerous. Fishing and subsistence practices, which are essential to providing food and resources to supplement store-bought goods, have been particularly impacted by warmer temperatures, which has decreased the extent of winter sea ice and has contributed to fish die-offs in the summer (Markon et al. 2018). Environmental impacts to fishing and subsistence are expected to increase over time.

### Community Perspective on Environmental Change

Warmer and warmer seasons have caused many environmental changes in Alakanuk. Erosion has become more serious, river ice is not as thick as it used to be, snow and ice melts earlier in the spring, permafrost melts more rapidly, and our wet seasons are more extreme than in the past. The storm season is also changing. In the past, Alakanuk would experience only one coastal storm flood from fall and early winter storms. Now, however, there are several floods, which are more powerful and damaging.

Changing environmental conditions are causing many hardships and problems for the community. Accelerating erosion threatens homes and the Tribal Hall, which need to be relocated. Melting permafrost has caused more homes, subsistence camps, and other buildings to shift and sink. Community members are also concerned that erosion will worsen at our undeveloped and unprotected landing site for barges, which deliver gravel, fuel, and other critical resources for our community's school and water/sewer plant. If erosion worsens and barges cannot land, the health of the community will decline.



Denis Shelden, Alakanuk Former Tribal Council Member

- Denis Shelden, Alakanuk Tribal Council Member

## Erosion

Erosion is the most immediate environmental threat facing Alakanuk and occurs along the entire riverbank. It is highly likely that all structures located along the banks of Alakanuk Pass will be impacted by erosion. This section includes a description of the erosion hazard, past efforts to mitigate erosion, and threatened infrastructure.

### Erosion Hazard

Erosion occurs primarily during spring break-up and fall storm season. During break-up, the Yukon River experiences high flows due to thawing snow and ice as well as surges caused by ice jams upriver. The higher flows increase the hydraulic friction of water against the soil of the bank, increasing erosion (United States Army Corps of Engineers, 2009). Erosion analyses using historical shoreline change data have been completed by United States Army Corps of Engineers (USACE) and the State of Alaska Division of Geological and Geophysical Surveys (DGGs) that demonstrate that erosion threatens homes and other critical infrastructure in the next fifty years.



Figure 3: All structures on both sides of the riverbank in Alakanuk are expected to be impacted by erosion. Storm surge and spring break up flooding are common due to Alakanuk's proximity to the Bering Sea Coast and Yukon River and can cause catastrophic damage. Source: State of Alaska Division of Geological and Geophysical Surveys.





Figure 4: The image above shows the eroding shoreline near the barge landing and the water intake. This is the area with the highest erosion rate.

According to the Shoreline Change analysis completed by DGGs, the Alakanuk Pass Slough both widened and straightened between 1951 and 2015, resulting in non-linear erosion and accretion rates up to 13.8 feet per year (Overbeck et al. 2020). The slough changed course over the years; several meanders in the river straightened into the single large bend that exists today. This resulted in both erosion and accretion along the shoreline as shown in Figure 5 below. In 1951, the Pass was approximately 230 feet wide. By 2015, it had expanded to 600 feet with as much as 600 feet of erosion or accretion along various bends (Buzard et al. 2021).

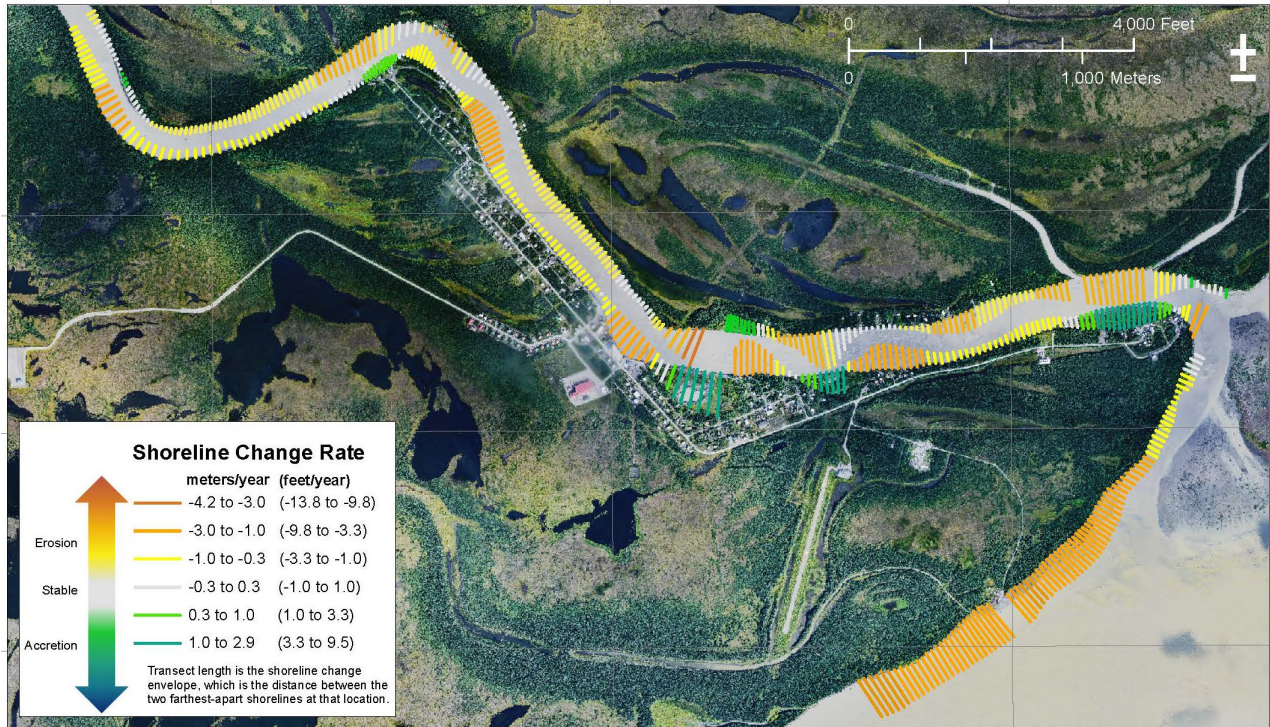


Figure 5: Map of historical shoreline change in Alakanuk, Alaska from 1951-2015. The lines perpendicular to the river indicate the rate of shoreline change (orange/yellow = erosion, grey = no change, green = accretion) and demonstrate that majority of the shoreline in Alakanuk is threatened by erosion. Source: State of Alaska Division of Geological and Geophysical Surveys.

In 2021, DGGs completed an Erosion Exposure Assessment for Alakanuk to forecast erosion through the year 2075. Due to the complex shoreline history of Alakanuk Pass, DGGs used the average erosion rate for the entire slough, instead of more precise linear regression for specific sections of the river. This analysis assumes the entire channel will widen at a rate of 1.4 feet per year (Buzard et al. 2021). Due to the complexity of the river system at Alakanuk, there is a large amount of uncertainty in future erosion projections.

The Erosion Exposure map shown in Figure 6 below identifies infrastructure expected to be impacted by erosion at 20-year intervals. In total, 19 homes, the barge landing, the retail store, and the Tribal Hall are within the 2075 erosion forecast area (Buzard et al. 2021). The total estimated replacement cost of infrastructure exposed to erosion is \$18.2 million through 2075 (Buzard et al. 2021).

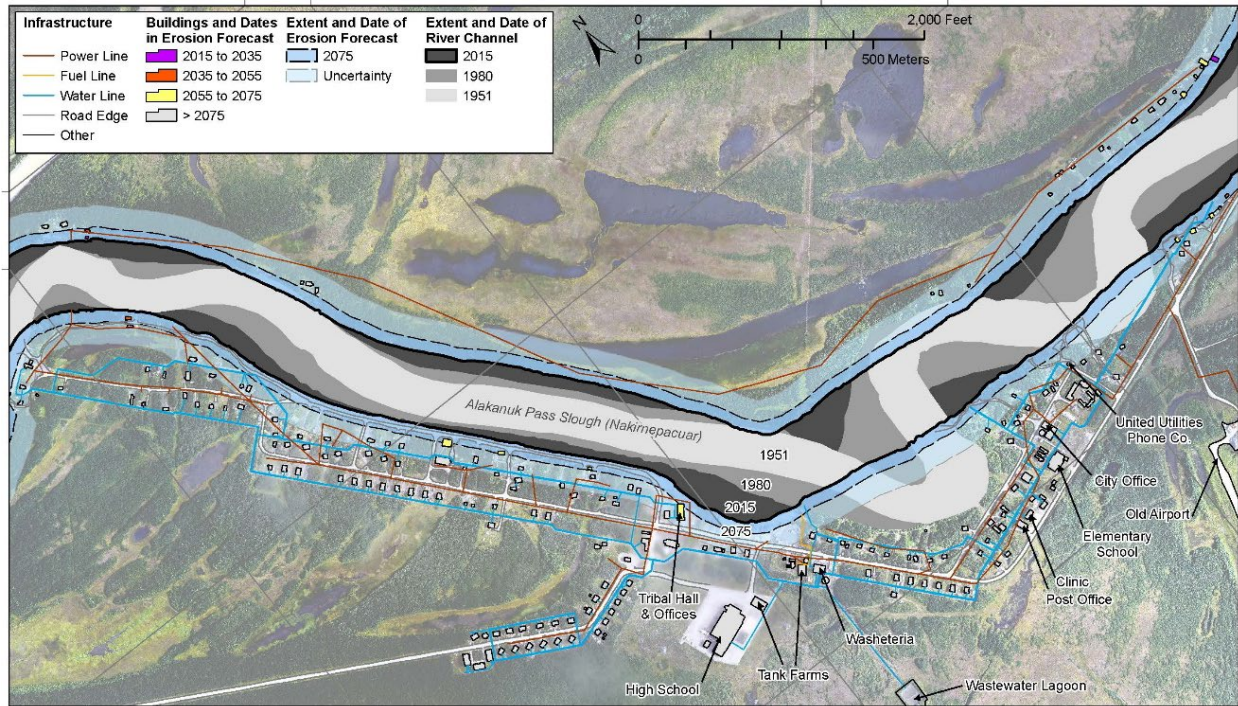


Figure 6: Erosion Exposure map of Alakanuk, Alaska. Buildings marked in purple are expected to be impacted within the next 15 years (expected impact 2015-2035). Source: State of Alaska Division of Geological and Geophysical Surveys.

According to community knowledge and observations, ten residential structures and the Tribal Hall are threatened in the near-term and must be relocated in the next two to five years.



Figure 7: The 10 most threatened homes and the Tribal Hall in Alakanuk are marked with red circles. Source: CRW Riverine Erosion Hazard Assessment Data Collection.



Figure 8: The home above is the most imminently threatened structure in Alakanuk and is approximately 12 feet away from the shoreline. Source: ANTHC.



Figure 9: Aerial image of the most imminently threatened homes in Alakanuk. The home in figure 8 is located on the top of the image with a blue roof. Source: Village of Alakanuk.

### Past Actions to Mitigate Erosion

Alakanuk has relocated erosion-threatened homes in the past using local labor and equipment. Homes were moved using a dozer and a metal skid and sled system that was built locally. However, currently there is not operable equipment in the community needed to relocate homes. Alakanuk will need to procure new equipment, materials, and construct a new skid or sled system for future home relocation projects. The community plans to partner with an engineering firm to create a structure relocation plan that will include a detailed description of recommended best practices to relocate each threatened structure.

## **Flooding**

This section includes a summary of past flood events in the community, past efforts to mitigate flooding, and infrastructure that is threatened by flooding.

### History of Flood Events

Alakanuk has a history of significant flooding. There have been eight state or federal disaster declarations for flooding that apply to Alakanuk in 1984, 1991, 1995, 2002, 2005, 2006, 2009, and 2013 (City of Alakanuk and Village of Alakanuk, 2021). According to community residents, the severity of flooding has increased in recent years. Residents have observed that while previously high water would come into Alakanuk once per year due to storms and break-up, recently flooding has occurred several times per year.

DGGS completed a Coastal Flood Impact Assessment for Alakanuk, which provides an assessment of the historical flood record and flood impact levels for the community. The assessment found that from 1952 to 2021, Alakanuk experienced at least 27 significant coastal flood events (Buzard et al. 2022). DGGS estimated the peak still water elevation for 26 historical floods (22 ice jams and four storm surge floods), which caused 16 minor and 10 major floods. Major flooding indicates extensive inundation of structures and roads occur and significant evacuations of people and property to higher elevations are necessary and minor indicates minimal or no property damage, but possible some public threat. Ice jam floods commonly persist for one or more days, which allows the flooding to reach all land in the area (Buzard et al., 2022). According to community members, storm surge flooding can overtop the riverbank and typically impacts the new airport and residences on the west side of the community first. Storm surge is less common and has resulted in only minor flooding in Alakanuk because most infrastructure is elevated above the ground level.

The DGGS assessment found that community infrastructure in Alakanuk is vulnerable to future flood impacts. Using data on the first floor elevation of all infrastructure in the community, the assessment provided information on what pieces of infrastructure would be impacted at each flood impact level – major, moderate, and minor. Minor flooding would impact the structures that are not elevated off of the ground, which includes fish drying racks or sheds, but no residential homes. Minor flooding would also reach the lowest part of the main road, which connects the entire community and access to the airport. Major flooding would reach the first floor of 19 buildings and flood 11 with at least one foot of water. Major flooding may also impact the wastewater lagoon, school fuel tanks, and the airport road. In June 2013, the road flooded two to three feet and was not drivable by four-wheeler.

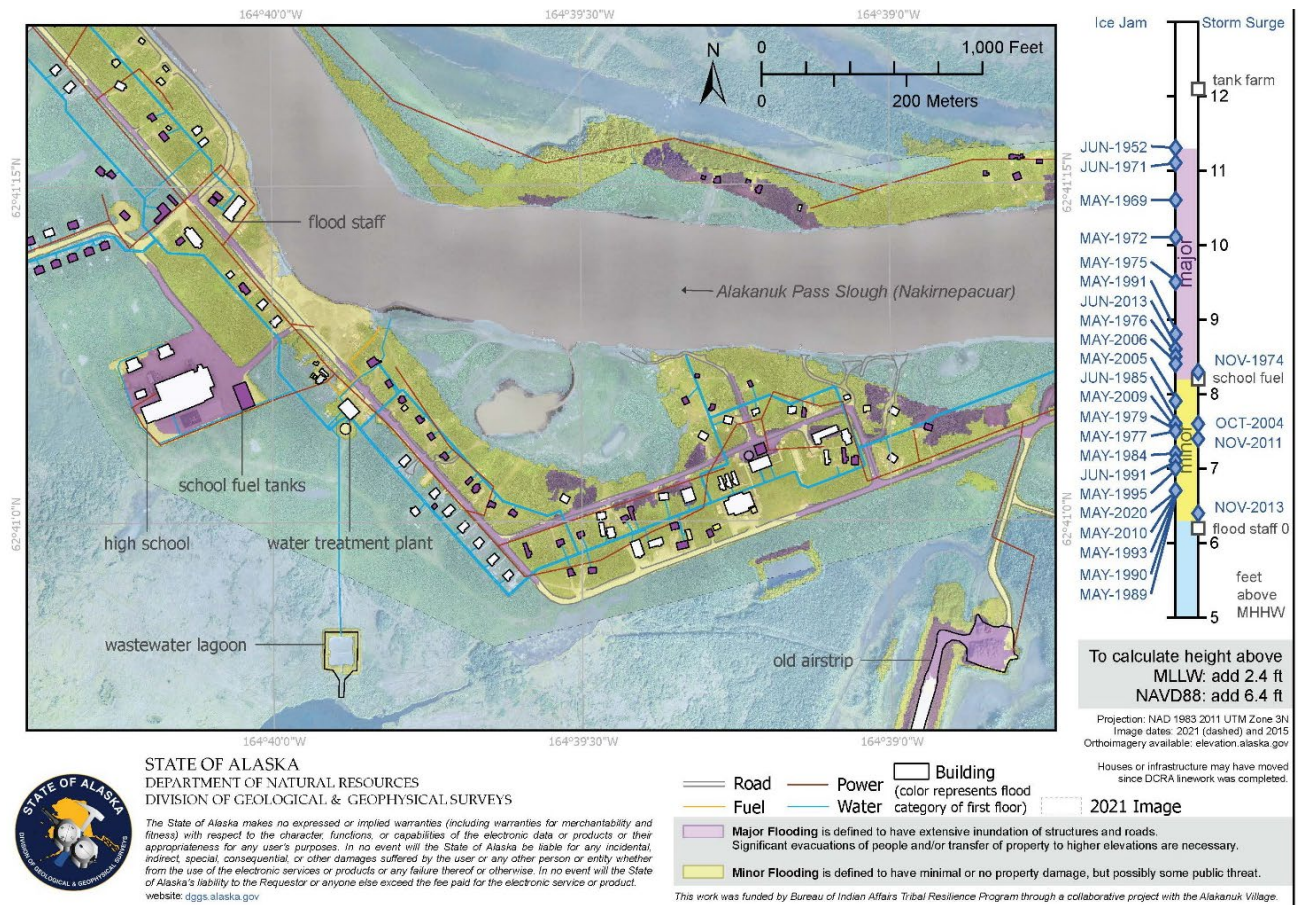


Figure 10: Yellow shaded areas have experienced minor flooding. Purple shaded areas have experienced major flooding. Buildings are shaded with the corresponding colors. Buildings shaded in white are not vulnerable to flooding. Source: DGGS Coastal Flood Impact Assessment.

### Past Efforts to Mitigate Flooding

In 2005, eight homes and the City of Alakanuk office building were relocated to available sites within the community and all but one home was elevated to protect from flooding. All of the structures were threatened by erosion and flooding in their previous locations. The relocation and elevation project was funded by the Federal Emergency Management Agency's Hazard Mitigation Grant Program (HMGP) in response to a spring flood disaster in 2002.

### Permafrost Degradation

According to the Denali Commission, Alakanuk faces a moderate risk of damage to community infrastructure due to permafrost degradation (Denali Commission, 2019). The Statewide Threat Assessment evaluated the potential impact of permafrost to community infrastructure by assessing the ice content within the soil, the likely distribution of permafrost within the community, the temperature of the permafrost, anticipated thaw settlement, and known problems. The evaluation found that while the soils in Alakanuk are mostly unfrozen with isolated patches of permafrost, the permafrost temperature is high, which makes it more susceptible to thaw (Kanevskiy, Mikhail, et al). Alakanuk community members have observed within the past five years that home foundations are beginning to

sink and tilt, likely due to permafrost degradation. There is concern that the impacts to the foundations of residential homes and buildings will increase in severity in the next twenty to thirty years. The Denali Commission Statewide Threat Assessment recommends completing a permafrost vulnerability assessment in order to better understand the permafrost degradation threat and develop mitigation solutions.

## Past Actions to Mitigate Erosion, Flooding, and Permafrost Degradation

### Past Community Planning Activities

Addressing erosion, flooding, and permafrost impacts to infrastructure is a high community priority for the City of Alakanuk and the Village of Alakanuk and has been prioritized in local community plans including the 2021 Multi-Jurisdictional Hazard Mitigation Plan (MJHMP). As part of the MJHMP planning process, Alakanuk develop a mitigation action plan and identified completing the following relevant mitigation actions as “high importance” to the community: 1) Complete erosion, flooding, and permafrost risk assessments; 2) Relocate or elevate buildings at risk of being affected by erosion and flooding; and 3) Relocate, acquire, elevate, or otherwise flood-proof critical facilities. The MJHMP did not provide concrete next steps or developed projects to advance the mitigation actions. The infrastructure protection strategy in this plan includes recommended next steps to address these actions.

### Funding

Since 2019, Alakanuk has submitted six funding applications to address environmental threats. The Village of Alakanuk has received \$579,262 for risk assessments and travel funding to receive in-person training and technical assistance. Completed risk assessments are summarized in the preceding Threats to Infrastructure section of this plan. The table below summarizes awarded projects.

<b>Awarded Funding to Address Environmental Threats Since 2019</b>				
<b>Funder</b>	<b>Status</b>	<b>Project Purpose</b>	<b>Cost</b>	<b>Project Manager</b>
United States Army Corps of Engineers	In Progress	Collect data to inform the assessment of long-term flood risk including a tidal datum and a channel survey.	\$254,000	Village of Alakanuk
Bureau of the Indian Affairs (BIA)	Complete	Complete a Multi-Jurisdictional Hazard Mitigation Plan	\$17,000	Village of Alakanuk
BIA	Complete	Complete a historical flood assessment, collect aerial orthoimagery, and install community-based erosion and flood monitoring (see pg. 11 for results of this project)	\$57,500	Village of Alakanuk
BIA	Complete	Complete structural assessments and collection site information on the ten most threatened homes and Tribal Hall to support a home	\$65,250	Village of Alakanuk

		relocation project (see pg. 9-10 for the results of this project)		
BIA	In Progress	Complete a comprehensive riverine erosion assessment to forecast impacts and develop solutions	\$149,471	Village of Alakanuk
BIA	In Progress	Travel to training and local conferences to build Tribal capacity to address environmental threats	\$25,791	Village of Alakanuk

### Baseline Data and Risk Assessments

The table below summarizes the baseline data and risk assessment activities that have been completed for Alakanuk. This information and links to completed products can be found at the State of Alaska [Community Dashboard](#).

<b>Baseline Data/Risk Assessment</b>	<b>Completion Date</b>	<b>Source</b>
Historical Orthoimagery	2020	DGGS
Modern Orthoimagery	2015	
Topography	2016	
Elevation (lidar)	2021	
Bathymetry (multi-beam)	2021	USACE
Tidal Datum	2019	NOAA
First Floor Elevation Survey	2022	BIA
Historical Shoreline Change Assessment	2020	DGGS
Erosion Exposure Assessment	2021	
Historical Flood Assessment	2022	
Erosion and Flood Modeling	2021	CRW/Herrera

## Infrastructure Protection Strategy

Alakanuk's infrastructure protection strategy has five major objectives: address imminent threats, build community capacity, complete site-specific risk assessments, develop long-term solutions to address risk, and implement long-term solutions. According to an estimate from the Alaska Native Tribal Health Consortium, proactively mitigating near-term and mid-term environmental threats to infrastructure in Alakanuk—including constructing a new subdivision site and relocating and replacing threatened structures—is estimated to cost approximately \$23.25 million (Alaska Native Tribal Health Consortium, 2020). Below is a summary of the major objectives, progress made to date, and next steps.

### Key Objectives

- Objective 1: Address Immediate Threats as Soon as Possible
- Objective 2: Build Community Capacity to Address Environmental Threats
- Objective 3: Complete Site-Specific Risk Assessments
- Objective 4: Develop Long-Term Solutions to Address Risk
- Objective 5: Implement Long-Term Solutions



## Objective 1: Address Immediate Threats as Soon as Possible

Erosion poses the greatest near-term threat to community infrastructure in Alakanuk. Ten residences and the Tribal Hall must be relocated in the next two to three years. Structural assessments have been completed for all threatened structures. The table below describes projects that have been currently identified to mitigate the erosion threat. Additional projects will be added here in the future.

Address Immediate Threats as Soon as Possible				
Project	Status	Cost	Responsible Party	Next Steps
Develop a structure relocation plan that can be implemented locally to relocate the ten most threatened homes to a safe location within the community	Intend to Apply	TBD	Village of Alakanuk and City of Alakanuk	Apply to funding to complete project
Relocate ten residential structures and the Tribal Hall to available sites within the community and hookup homes to utilities.	Intend to Apply	Approximately \$1,000,000	Village of Alakanuk	After structure relocation plan is complete; apply to funding to complete project

*Total Estimated Cost: \$1,000,000*

## Objective 2: Build Community Capacity to Address Environmental Threats

The Village of Alakanuk Tribal Administrator acts as the main point of contact for external entities and coordinates all projects related to environmental threats. The community also partners with ANTHC for technical assistance, planning, and project development support to implement priorities. As the number of mitigation projects increases in Alakanuk, it is expected that a new staff position will be needed to lead and manage projects. Increased community capacity will enable Alakanuk to be engaged and effective partners with external organizations working to address environmental threats in the community. The table below summarizes current and future needs in this area.

Build Community Capacity to Address Environmental Threats				
Project	Status	Cost	Responsible Party	Next Steps
Fund a part-time Resilience Coordinator to coordinate all projects related to environmental threats	Intend to Apply	\$60,000 annually	Village of Alakanuk	Apply to the BIA Tribal Climate Resilience program for funding
Complete a competitive	Planned	Technical	Village of Alakanuk and	Request technical

solicitation process to select an Indefinite Delivery Indefinite Quantity (IDIQ) contractor to act as a community partner to plan and implement mitigation solutions		assistance will be provided at no-cost by ANTHC	City of Alakanuk with technical assistance from ANTHC	assistance from ANTHC to complete competitive solicitation process
After an IDIQ contractor has been chosen, they will provide on-call engineering technical assistance for planning, project development, and project implementation	Planned	\$45,000 annually	Selected IDIQ contractor	Apply to the BIA Tribal Climate Resilience program for funding
ANTHC provides .2 FTE staff free of charge to support project planning, development, implementation, and grant writing	Active	N/A	ANTHC	N/A

*Total Estimated Cost: \$105,000 annually*

### **Objective 3: Complete Site-Specific Risk Assessments**

Alakanuk will complete erosion, flood, and permafrost risk assessments that will enable informed adaptation decisions to protect the community over the long-term. Community entities aim to secure funding for all risks assessments by the end of 2022. Through these assessments the community is exploring whether protect-in-place, managed retreat, or a combination of both strategies is the most viable adaptation strategy. A majority of erosion and flooding risk assessments have already been completed or are in progress. The status of all risk assessments for Alakanuk can be viewed at the State of Alaska’s [Environmentally Threatened Communities Data and Risk Assessment Status Dashboard](#). The table below summarizes current unfunded projects.

<b>Complete Site-Specific Risk Assessments</b>				
<b>Project</b>	<b>Status</b>	<b>Cost</b>	<b>Responsible Party</b>	<b>Next Steps</b>
Complete a permafrost risk assessment to forecast impacts and develop solutions	Intend to Apply	\$150,000	Village of Alakanuk	Apply to the BIA Tribal Climate Resilience program for funding
Complete hydrodynamic flood modeling to forecast future flooding impacts	Intend to Apply	\$150,000	Village of Alakanuk	Apply to the Tribal Climate Resilience program for funding

to community infrastructure				
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*Total Estimated Cost: \$300,000*

**Objective 4: Develop Long-Term Solutions to Address Risk**

Extensive community-specific data collection and analysis are required for Alakanuk’s informed long-term planning. Once all site-specific risk assessments have been completed, Alakanuk can consider the results of these assessments to assess the technical and financial feasibility of solutions, to make an informed decision about a preferred solution, to determine and communicate community priorities resources and technical assistance needs, and to develop a long-term resilience strategy that is presented in a long-term strategic management plan. The plan will summarize risk, community priorities, and develop a funding and implementation strategy for risk reduction projects. The planning process will involve all community entities and external partners.

<b>Develop Long-Term Solutions to Address Risk</b>				
<b>Project</b>	<b>Status</b>	<b>Cost</b>	<b>Responsible Party</b>	<b>Next Steps</b>
Complete a long-term Managed Retreat Master plan to address erosion and flooding threats to infrastructure through 2100, including designing a new subdivision site for threatened homes.	Intend to Apply	\$515,413	Village of Alakanuk	Apply to the National Coastal Resilience Fund for funding
Organize an inter-agency meeting with relevant agencies to discuss the community’s decision and needed resources	Future Project	N/A	State of Alaska in coordination with Village of Alakanuk and ANTHC	Request assistance from the State of Alaska
Complete Long-Term Infrastructure Protection Plan, including draft review and final phases	Future Project	N/A	State of Alaska in coordination with Village of Alakanuk and ANTHC	Request assistance from the State of Alaska

*Total Estimated Cost: \$513,413*

**Objective 5: Implement Long-Term Solutions**

Once all site-specific risk assessments have been completed and the Managed Retreat Master Plan is completed, Alakanuk will pursue funding to implement long-term mitigation projects. It is expected that the long-term solutions will include a large-scale managed retreat of all structures expected to be impacted by erosion and flooding through approximately 2075. Additionally, after the completion of a flood risk assessment, the community will identify projects to mitigate the risk of flooding such as elevating structures. Additional risk assessments, including permafrost degradation, will identify other

projects not listed below. Alakanuk intends to use the best available science to develop long-term solutions to environmental threats. Therefore, as additional information becomes available, Alakanuk may make changes to their long-term infrastructure protection strategy.

<b>Implement Long-Term Solutions</b>				
<b>Project</b>	<b>Status</b>	<b>Cost</b>	<b>Responsible Party</b>	<b>Next Steps</b>
Develop new subdivision site and relocate 15 structures expected to be impacted by erosion through 2075	Future project	To Be Determined, Expected cost is approximately \$14 million	Village of Alakanuk/City of Alakanuk	Complete managed retreat master planning project, develop project scope, and then apply for funding
Plan and implement relocation of power, fuel, and water lines and roads expected to be impacted by erosion through 2075	Future project	To Be Determined, Expected cost is approximately \$4 million	Village of Alakanuk/City of Alakanuk	Complete managed retreat master planning project, develop project scope, and then apply for funding
Repair or replace barge landing due to erosion impact	Future project	To Be Determined, Expected cost is approximately \$2 million	Village of Alakanuk/City of Alakanuk	Complete managed retreat master planning project, develop project scope, and then apply for funding

*Total Estimated Cost: \$20 million*

\*Note: The costs used in the table above are preliminary estimates based on similar work in other communities in the Yukon-Kuskokwim Delta. The cost estimates may change as more information becomes available.

## Roles and Responsibilities of Key Partners

Village of Alakanuk: Provides primary community contact for external partners and facilitates community coordination. Responsible for procuring funding and implementing mitigation projects.

- Juanita Joseph, Tribal Administrator: Acts as a central point of contact for all external partners regarding erosion, flooding, and permafrost projects; participates in all planning and coordination meetings; and is responsible for project and grant management of awarded projects

City of Alakanuk: Key project stakeholder and responsible for procuring funding and implementing mitigation projects.

- Thomas Alstrom, Mayor: Participates in planning and coordination of mitigation projects.

Alakanuk Native Corporation: Key project stakeholder and responsible for coordinating involvement of Corporation interests and land use/status issues for Corporation owned lands.

Alaska Native Tribal Health Consortium (ANTHC): ANTHC's role is to provide technical assistance, project planning and project development support, and grant writing support to the community.

- Katie Lund, Community Resilience Specialist (CETC): Lead CETC representative for Alakanuk; participates in all planning meetings; and provides project planning and development support.
- Max Neale, Senior Program Manager (CETC): Alternative CETC representative for Alakanuk.

State of Alaska Division for Community and Regional Affairs: Alakanuk will continue to coordinate with Sally Cox, State of Alaska Risk MAP Coordinator, on technical assistance and planning support related to Alakanuk's infrastructure protection strategy.

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## Appendix

### 1: Alakanuk Infrastructure Protection Strategy Project Charters



# Infrastructure Protection Project Charter

Alakanuk, Alaska

## Overview

Alakanuk, Alaska is a Yup'ik community of approximately 704 residents located at the east entrance of Alakanuk Pass, the major southern channel of the Yukon River, 15 miles from the Bering Sea in the Yukon-Kuskokwim Delta. The community faces a high level of risk to community infrastructure from the combined threat of erosion, flooding, and permafrost degradation. All Alakanuk community entities have adopted the Alakanuk Infrastructure Protection Plan and support the infrastructure protection strategy. The strategy has four major objectives: address imminent threats, build community capacity, complete site-specific risk assessments, and implement long-term solutions. In total, implementing the objectives will cost an estimated \$23 million and take approximately five to ten years.

## Objective

This charter was created to outline the roles and responsibilities of partners working towards mitigation environmental threats to infrastructure in our community. Due to the complexity of implementing our infrastructure protection strategy, effective collaboration between all project partners is critical for success. This project charter authorizes the project partners listed below to coordinate and communicate with agencies and organizations on our community's behalf with the goal of implementing our infrastructure protection strategy. No decisions or changes to the infrastructure protection strategy or projects will be made without the approval of our community representatives.

## Project Partners, Roles, and Responsibilities

Village of Alakanuk: Provides primary community contact for external partners and facilitates community coordination. Responsible for procuring funding and implementing mitigation projects.

- Juanita Joseph, Tribal Administrator: Acts as a central point of contact for all external partners regarding erosion, flooding, and permafrost projects; participates in all planning and coordination meetings; and is responsible for project and grant management of awarded projects

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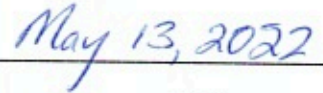
- Katie Lund, Community Resilience Specialist (CETC): Lead CETC representative for Alakanuk; participates in all planning meetings; and provides project planning and development support.
- Max Neale, Senior Program Manager (CETC): Alternative CETC representative for Alakanuk.

**Certification**

We certify that the Infrastructure Protection Project Charter was approved and passed by the following parties.



City of Alakanuk Mayor



Date

# Infrastructure Protection Project Charter

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## Certification

We certify that the Infrastructure Protection Project Charter was approved and passed by the following parties.

  
\_\_\_\_\_  
Village of Alakanuk Tribal President

5/24/22  
\_\_\_\_\_  
Date