NAPAKIAK, ALASKA
LOCAL HAZARD MITIGATION PLAN

Source: State of Alaska, 2002.

June 2011

FEMA Approved September 2011

Prepared for:

City of Napakiak
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Napakiak, Alaska 99634

and

Native Village of Napakiak
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Plan Administration

The City of Napakiak Local Hazard Mitigation Plan (LHMP), including appendices and annexes, will be reviewed annually and updated every five years, after a disaster response, or as appropriate in response to community mitigation activities. This LHMP initially will be submitted to the State of Alaska Division of Homeland Security and Emergency Management (DHS&EM) for review and approval. Then the State of Alaska will send the City of Napakiak LHMP to the Federal Emergency Management Agency (FEMA) for pre-approval. Following FEMA's pre-approval of the LHMP, the City will adopt the Plan. The updated LHMP will be formally re-promulgated by the City and sent to the State of Alaska and FEMA for approval once every five years.

Record of Plan Changes

All updates and revisions to the plan will be tracked and recorded in the following table. This process will ensure that the most recent version of the plan is disseminated and implemented as appropriate.

Date	Change No.	Purpose of Update
2011	Original Release	

Plan Distribution List

Copies of this plan have been provided to the following communities, agencies, and persons. Updates will be provided, when available. Recipients will be responsible for updating their respective LHMPs when changes are received. The City of Napakiak is ultimately responsible for dissemination of all plan updates.

Date	No. of Copies	Community/Agency/Person
		City of Napakiak
		Native Village of Napakiak
		Napakiak Corporation
		Napakiak Ircinraq Power Company
		Lower Kuskokwim School District

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1 Introduction

1.1 General

This Local Hazard Mitigation Plan establishes guidance for the City of Napakiak to mitigate hazards in order to reduce or eliminate the loss of life and property damage resulting from natural and human-caused hazards. Specifically, this LHMP describes the planning process and methodology used, discusses the profile of the community, identifies unique hazards to the community, assesses the vulnerability of the community, and puts forth a sustainable mitigation strategy to create a more resilient community.

1.1.1 Purpose

This LHMP forms the foundation for Napakiak's long-term strategy to reduce disaster losses and damage. The LHMP creates a framework for risk-based decision making to reduce damages to lives, property, and the economy from future disasters.

This plan is designed to fulfill the requirements set forth in the 44 Code of Federal Regulations (CFR) 201.4 Disaster Mitigation Act 2000 (DMA 2000) to identify hazards facing the community, to complete a risk assessment and vulnerability analysis, and to identify and coordinate mitigation efforts with State, Federal, and local partners.

1.1.2 Assumptions

The Alaska Hazard Mitigation Plan of October 2010 states the following assumptions, which apply to this LHMP:

> *A devastating naturally occurring event, technological incident, or terrorist attack, may occur without warning and at the worst possible time*
>
> *Mitigation financial assistance may be available for State, tribal and local governments and to communities through the disaster funded Hazard Mitigation Grant Program (HMGP), other FEMA Hazard Mitigation Assistance Grants (HMA), or other Federal, State, or local funds.*
>
> *Effective Mitigation results stem from a broad, cooperative effort among Federal, State, local, non-governmental organizations and the private sector.*
>
> *There are certain facilities in Alaska that are critical for the State's resilience. These critical facilities must be identified, risk*

assessments conducted, and vulnerability analysis completed to determine which actions should be taken to ensure their post-disaster operability.

Due to isolation from the lower-48 states and the challenges presented by Alaska's weather, Alaskans should expect to be self reliant for at least 72 hours following a disaster event.

Given the transportation distances involved in Alaskan commerce, the extreme weather, the limited construction season and the remoteness of many communities, mitigation projects in Alaska will be considerably more expensive than the lower-48 states and will often require customized mitigation approaches.

1.1.3 Authorities

Table 1-1 identifies applicable legal authorities that support the LHMP.

Table 1-1 Legal Authorities
Federal
– Disaster Mitigation Act2000, PL 106-390 – Robert T. Stafford Disaster Relief and Emergency Assistance Act, PL 100-707 – Code of Federal Regulations, Part 201. – National Flood Insurance Act of 1968, 42 USC 4104c, as amended by the National Flood Insurance Reform Act of 1944, Public Law 103-325 – the Bunning-Bereuter-Blumenauer Flood Insurance Reform Act of 2004, Public Law 108-264
State of Alaska
– State of Alaska Hazard Mitigation Plan, October, 2010 – Alaska Statute 26.23, Department of Military and Veterans Affairs, Disasters

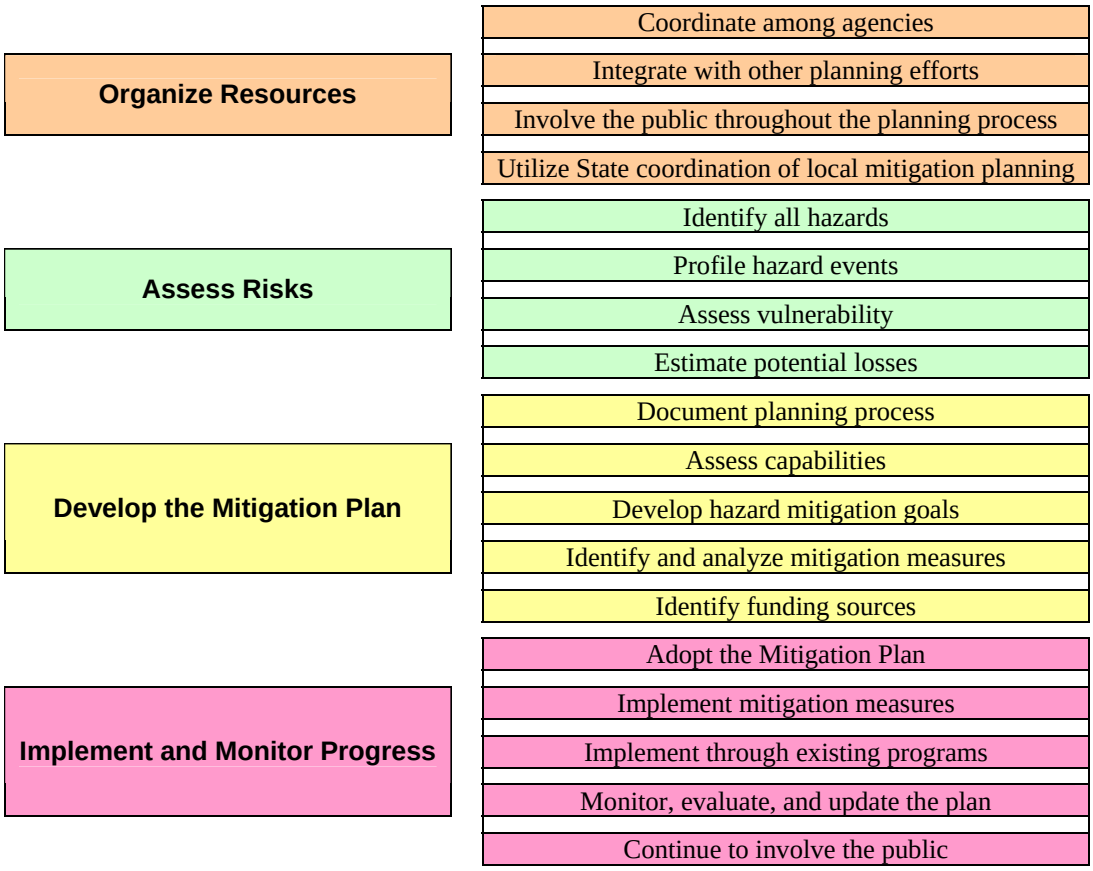
1.2 Planning Process

The DMA 2000 highlights the importance of mitigation planning and emphasizes planning for disasters before they occur. This act provides funding for mitigation planning and projects. Mitigation plans must demonstrate that their proposed measures are based on sound planning that accounts for the risk to and the capabilities of the individual communities.

1.2.1 Phases of the Planning Process

The hazard mitigation planning process for the community includes several phases: the organization of community and planning resources (staff, technical experts, and interested community members), assessing the community's risk to hazards, development of an LHMP (this document), and implementation the LHMP and monitoring future progress. Refer to Figure 1-1 as well as Sections 1.2.1.1 through 1.2.2.4 for additional information on the phases of hazard mitigation planning.

Figure 1.1 Phases of Hazard Mitigation Planning



1.2.1.1 Phase One: Organize Resources

From the beginning of the planning process, communities should focus on the resources needed for successful mitigation. Essential steps include identifying and organizing interested members of the community, including representatives from agencies, businesses, academia, nonprofits, and other interested parties and representatives from neighboring communities. Individuals or agencies with technical expertise on both the hazards that threaten a community and the potential mitigation strategies for the community should also be identified. Material references should be gathered. This includes community plans including, if available, emergency operations plans, economic development plans and comprehensive plans, hazard assessments, and reports from previous hazard events.

1.2.1.2 Phase Two: Assess Risks

Communities need to identify the characteristics and potential consequences of their local hazards. It is important to understand and evaluate which populations and facilities are most vulnerable to natural hazards and how these hazards would impact important community assets.

1.2.1.3 Phase Three: Develop a Mitigation Plan

Once they have developed an understanding of the risks posed by potential hazards, communities then need to determine their priorities and ways to avoid or minimize the hazards' undesirable effects. The result is a LHMP and strategy for its implementation.

1.2.1.4 Phase Four: Implement the Plan and Monitor Its Progress

Communities can activate the plan in a variety of ways, ranging from implementing specific mitigation projects to modifying the daily operations of the local government. To ensure the success of an ongoing program, it is important to conduct an annual or post-disaster review and to make revisions as needed.

1.2.2 Approval Process

Once created, the draft of the LHMP is submitted to the State for review. The State Hazard Mitigation Officer (SHMO) reviews the draft using FEMA's evaluation sheet (Crosswalk) developed from the DMA 2000 legislation. The SHMO will review and, if appropriate, submit the plan to FEMA Region X for their review and comment. When FEMA determines the LHMP meets the DMA 2000 minimum criteria, FEMA will return the LHMP to the State with pre-approval. Next, the SHMO advises the community of the pre-approval and the community formally adopts the plan. Once the community formally adopts the plan, the SHMO submits the adoption to FEMA Region X which provides for the plan's final approval.

The Alaska DHS&EM uses local mitigation plan information to enhance the State plan. DHS&EM will incorporate newly approved local mitigation plans into the State plan periodically, as described in the State planning process flowchart *(see State of Alaska's All-Hazard Mitigation Plan for more information).*

Refer to Appendix D for Adoption Resolution.

1.3 Planning Committee

The hazard mitigation planning committee is lead by Richard Jung with assistance from City council members and employees, native village council members and employees, private-sector stakeholders, and residents who have extensive experience in a variety of related fields. Ecology and Environment, Inc. (E & E), and DHS&EM also provided assistance to the hazard mitigation planning committee. Table 1-2 identifies the hazard mitigation planning committee members.

Table 1-2 Hazard Mitigation Planning Committee Members

Alexie Michael	Community member	Native Village of Napakiak	
Caryn Black	City Council Member	City of Napakiak	
Jacob N. Black	IRA Council President	Native Village of Napakiak	
Molly Black	City Mayor	City of Napakiak	
Christine Amos	IGAP Coordinator	Native Village of Napakiak	589-2140
Richard Jung	City Council Member	City of Napakiak	589-2511
Walter Nelson	City Council Member & Tribal Housing Administrator	City of Napakiak and Native Village of Napakiak	589-2526
Nicholas Paul	IRA Council Member	Native Village of Napakiak	

IRA – Indian Reorganization Act

1.4 Plan Research and Coordination

The hazard mitigation planning committee utilized a variety of resources to research applicable information for this LHMP, including existing plans, studies, and reports. The following existing plans, studies, reports and technical information were reviewed and incorporated into this Plan:

- Community Erosion Assessment, Napakiak, Alaska. U.S. Army Corps of Engineers. January 15, 2008.
- Alaska Baseline Erosion Assessment, Study Findings and Technical Report. Alaska District, U.S. Army Corps of Engineers. March 2009.
- Flood Hazard Data: Napakiak. Alaska District, U.S. Army Corps of Engineers, Floodplain Management Services. Available at http://www.poa.usace.army.mil/en/cw/fld_haz/napakiak.htm.
- High Water Elevation Identification: Napakiak. Alaska District, U.S. Army Corps of Engineers, Floodplain Management Services. February 1994.

- Napakiak 5-Year Community Comprehensive Plan. City of Napakiak, Napakiak IRA Council and Napakiak Corporation. April 2006.
- Napakiak Community Plan, 2010. City of Napakiak, Napakiak IRA Council and Napakiak Corporation, with support by the Rural Alaska Community Action Program. November 2010
- Trip Report, June 9th, 2009. U.S. Department of Agriculture, Natural Resources Conservation Service
- Trip Report, February 10th, 2006. U.S. Department of Agriculture, Natural Resources Conservation Service

Additional resources available for hazard mitigation planning and disaster preparedness can be found in Appendix A.

E&E contacted and consulted multiple organizations during the plan research and development. The organizations, agencies and business involved in the development of this plan are listed in Table 1-3.

Table 1-3 Organizations Consulted during Planning Process

Local Organizations
City of Napakiak
Native Village of Napakiak IRA Council
Napakiak Corporation
Regional or State-Wide Organizations
U.S. Army Corp of Engineers
Denali Commission/ RuralCAP
Natural Resources Conservation Service
Cowater Alaska, Inc.

1.5 Public Involvement

The first public meeting, held on May 25, 2010 at the Bingo Hall, introduced the hazard mitigation planning process. The City advertised through the City council, tribal council, on the community bulletin board, and prepared radio announcements. Seventeen community members attended, including seven who agreed to serve on the planning committee. Village resident Alexie Michaels provided the E & E planner with a tour of Napakiak, with an emphasis on the history of erosion and flooding in the village and the project completed to mitigate damages.

Local hazards to be addressed in the LHMP were identified by attendees, utilizing the hazards identified in the State and other local mitigation plans. The meeting participants decided that two natural hazards, flooding and riverine erosion would be addressed in this LHMP.

A draft of Sections 1-3 of this plan was provided to both the City and Indian Reorganization Act (IRA) councils. This draft was reviewed and discussed at the November City council meetings. The public was invited to both City council and IRA council meetings.

On December 21, 2010 the Napakiak Hazard Planning Committee held a teleconference to further review the draft plan. Seven community residents, two E & E planners and a representative from the DHS&EM participated in this call. Teleconference participants reviewed the critical facilities and essential infrastructure list and provided additional information on the history of flood and erosion events as described in Sections 2 and 3 of the LHMP. Mitigation goals and projects were also discussed by the planning committee members.

A final draft was provided to the community in May 2011. This plan was reviewed at the City and IRA council meetings. A teleconference was held with planning committee and City council members on May 27, 2011. The agenda of the teleconference was to review changes recommended by the councils and a final discussion of the mitigation strategy and priority of mitigation actions. The committee accepted the plan as complete and ready for state and federal review and approval.

Appendix C includes a list of meeting and teleconference participants.

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2 Community Profile

2.1 Introduction

Napakiak is a Yup'ik village on the Kuskokwim River near Bethel, Alaska. Most residents have a subsistence lifestyle with fishing and hunting and gathering of local foods a significant part of the local diet as well as critical to the culture of the community.

2.2 Community Overview

2.2.1 Location

Napakiak is located on the north bank of the Kuskokwim River, on an island between the Kuskokwim River and Johnson's Slough. It is 12 river miles from Bethel, or 8 miles southwest of Bethel and 407 miles west of Anchorage. The community is located at approximately 60° 41′ 36″ North Latitude and 161° 58′ 25″ West Longitude. (Sec. 17, T007N, R072W, Seward Meridian.)

2.2.2 Climate

Napakiak is influenced by storms in the Bering Sea and also by inland continental weather. The average annual precipitation is 16 inches, with 50 inches of snowfall. Summer high temperatures average in the 60-70° Fahrenheit (F), and winter highs average in the teens. Extremes from 86 to -46 °F have been recorded. The Kuskokwim River is typically ice-free from June through October. Wind speeds greater than 60 mph can occur during storms.

2.2.3 Demographics

Napakiak has population of 354 (2010 U.S. Census Population). Approximately 97% of the population identifies as Alaska Native or part Native, mostly Yup'ik Eskimo. In 2010, there were 575 enrolled members of the Native Village of Napakiak.

In the 2000 Census, over one-third of the population was under the age of 16. Twenty six (26) elders, 65 or older were living in the community. The average age is 26.2 years.

Most residents live a fishing and subsistence lifestyle, with 54% of adults not in the work force. The median household income was $28,750, per capita income was $7,319, and 20.18 percent of residents were living below the poverty level.

2.2.4 Culture

Napakiak is a Yup'ik Eskimo community and residents maintain a fishing and subsistence lifestyle. Subsistence foods provide an estimated 50% of the local diet. Most families have fish camps. Salmon, waterfowl, moose, caribou, ptarmigan and seals provide meat. Seasonal berries and plants are also harvested. Commercial fishing is also an important source of income.

2.2.4.1 Cultural Assets

No historic or cultural assets are located in community. Multiple fish camps are located in the surrounding area but these locations change regularly.

2.2.5 Natural Environment

Napakiak is located on the Kuskokwim River on a sandbar between the river and Johnson's Slough. This sand bar has been eroding at a rate of 25-50 feet per year since the 1960s. The average elevation is 6 feet. The airport is located on the highest ground, at 10 feet. The river bank is approximately 4 feet elevation, and 2 feet above the water level at average high tides. On the bluff north and west of Johnson's Slough is 25-75 feet above sea level. The substrate is predominately silt and sand.

The community is approximately 40 miles upstream of Kuskokwim Bay where the river enters the Bering Sea. The river level fluctuates with the tides, with tidal ranges of -2 to 5 feet, wind driven tidal surges may be even greater. The close proximity to the Bering Sea subjects the community to coastal storms, but Napakiak is also subject to inland continental weather.

The land is tundra and wetland interspersed with numerous ponds, lakes and streams. One of the world's largest water bird migration routes is to or through this area, which makes this region one of the most important shorebird nesting locations in North America.

The surrounding area is part of the Yukon Delta National Wildlife Refuge.

2.3 Built Environment

2.3.1 Land Use and Development Trends

For the past decade, Napakiak has been relocating buildings from the Kuskokwim River bank to an area west of the airport to prevent loss of property due to bank erosion. Between 1990 and 2010, the City has relocated 40 to 50 residences, housing over 200 people from the east side of town to the new subdivision west of the airport. The City also relocated the clinic and water treatment plant due to their proximity to the eroding river bank. However, a new community hall has not yet been reconstructed; the new clinic is not large enough to meet the needs of the community; and the current community water source (wellhead and treatment

facility) is located within the 400 feet of the riverbank (as of May 2010). A new clinic is planned with construction scheduled to begin in the summer of 2011. A new wellhead and pump is constructed, but not yet operational, and potentially requires extensive work to replace the existing well and treatment plant. When this new source and treatment plant is brought on line, the current water source will be decommissioned. The washeteria well will serve as an additional water supply source, however it is not yet approved for potable water and it is also located within the 50-year erosion profile.

Relocations have been funded by the U.S. Department of Agriculture, Natural Resources Conservation Service, Alaska Division of Community and Regional Affairs, and FEMA.

Many upgrades to public services and utilities have been completed within the past 10 years, or are in the process of design and construction. These projects include:

- A new tank farm was constructed in 2009 by the Napakiak Corporation. The community gas station is co-located with the tank farm;
- A flush tank and haul wastewater management system was constructed in 2003. This system currently serves 87 residences. The system is planned to expand to all private and public buildings, with the upgrades to provide service to the remaining homes scheduled in 2011;
- A new sewage lagoon was completed in 1998;
- A new landfill was completed Fall of 2010 and is operational. The old landfill is in the process of being closed out; and
- A new 3-phase electric transmission line to provide power from Bethel to Napakiak and a new 3-phase distribution system within the community was completed in 2010. A standby power generation module is also available.

2.3.2 Industry

Most residents are dependent on fishing and other subsistence activities. Commercial fishing provides an important source of cash income. Forty one (41) residents held commercial fishing permits in 2009, primarily for herring roe and salmon net fisheries. Most employment (66%) is in public administration (City and tribal government), education, health, and social services. Seasonal construction work is another source of employment.

Top Employers (ranked by number of workers)
Lower Kuskokwim School District
City of Napakiak
Native Village of Napakiak
Naparyalruar Corporation (Napakiak Corporation)
Jung's Trading Post
Bingo & Lucky Tabs
Yukon Kuskokwim Health Corp 90
AVCP Housing Authority
Association of Village Council Presidents
Coastal Villages Region Fund
Napakiak Bingo Club

2.4 Critical Facilities and Essential Infrastructure

A critical facility is defined as a local public- or private-sector facility that provides essential products or services to the public, such as preserving the quality of life in the community or fulfilling important public safety, emergency response, and disaster recovery functions such as providing temporary shelter for displaced individuals. Critical facilities are used to assess the vulnerability of the community to hazards and include essential facilities for the health and welfare of the whole population (e.g., schools, clinics, fire, and law enforcement facilities); transportation infrastructure; utility systems; facilities with a high potential loss (e.g., airports, roads, communications towers); and hazardous materials facilities (e.g., bulk fuel tank farms and fish processing facilities). Critical facilities and essential infrastructure for the community of Napakiak are provided in Table 2-1 and Figure 2-1, *Napakiak Base Map*.

Table 2-1 Critical Facilities and Essential Infrastructure

ID #	Facility	Location
Essential Facilities for Health and Welfare		
	City Offices/Washeteria	East side of village
	Fire Station (not currently in operation)	East side of village
	Napakiak Clinic	West side of village
	William N. Miller Memorial School	East side of village
	National Guard Armory	East side of village
	Post Office	West side of village
	Public Safety Office	East side of village

Table 2-1 Critical Facilities and Essential Infrastructure

ID #	Facility	Location
	Tribal Council Building	West side of village
Transportation Infrastructure		
NA	Napakiak Airport	
NA	Airport Maintenance Buildings	East side of runway.
NA		
Communications, Public Works and Utilities		
NA	Old Landfill, Class III	West side of village, end of "Dump Road"
NA	New Landfill, Class III	West side of village, west of lagoon
NA	Washeteria	Co-located in City offices building
NA	School Water Treatment Plant and Generator	Adjacent to school
	Water Treatment Plant and Pump House	East side of village
	Napakiak Water Supply, Central Well (*not currently operational*)	West side of village
	Village Corporation Power Plant Building	West side of village
	City Garage	
	School Sewage Lagoon	East side of village, south of City offices
	City Sewage Lagoon	West side of village, south of residences & businesses
	Electric Transmission Line from Bethel	Bethel to Napakiak
	United Utilities Building (communications utility)	West side of village
	United Utilities Satellite Dish	West side of village
	GCI Cellular Communications tower	West side of village
	School Satellite Dish	Co-located with school
Hazardous Materials Facilities		
	Fuel Storage Tanks	East of airport, near plane loading area
	Fuel Storage Tanks, School	Northeast of school building
	Fuel Storage Tanks, Corporation	East of School Tank Farm
	Gas Station	Co-located with airport tank farm.
Social and Cultural Facilities		
	Cemetery	East side of village, north of Bingo Hall
	Moravian Church	West side of village, end of
	Teachers' Quarters 1, 2, 3, 4 , 5 & 6	Adjacent to school
	Bingo Hall	East side of village
Business and Retail Facilities		
	Napakiak Corporation Store & Offices (Naparyalruar Store)	West side of village

Table 2-1 Critical Facilities and Essential Infrastructure		
ID #	**Facility**	**Location**
	Napakiak Corporation Warehouse	West side of village
	Coastal Villages Region Fund Building	East side of village
	Jung's Trading Post and storage buildings	East side of village
High Loss Facilities (Essential, Public Works and Utilities)		
	City Offices/Washeteria	Co-located in City offices building
	William N. Miller Memorial School	East side of village
	Water Treatment Plant and Pump House	East side of village
	Fuel Storage Tanks, Corporation	East of School Tank Farm
	Electric Transmission Line from Bethel	Bethel to Napakiak
	United Utilities Building (communications utility) and Satellite Dish	West side of village

Figure 2-1 Napakiak, Alaska

0 250 500 1,000 1,500 2,000 Feet

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3 Risk Assessment

3.1 Introduction

44 CFR § 201.6(c)(2) requires local jurisdictions to provide sufficient hazard and risk information from which to identify and prioritize appropriate mitigation actions to reduce losses from identified hazards.

Risk assessment is the process of measuring the potential loss of life, personal injury, economic injury, and property damage resulting from hazards. This process is accomplished using four steps.

Step 1: Identify Hazards

Step 2: Profile Hazard Events

Step 3: Inventory Assets (see Section 2 – Community Profile)

Step 4: Estimate losses

The following sections address the unique hazards faced by Napakiak and describe the community's risk based on vulnerability, exposure, and risk.

3.2 Federal Requirements

In accordance with 44 CFR §201.6, the Risk Assessment (Section 3) is the basis for the mitigation strategy (Section 4). Information in this section is used by the Planning Committee to identify and prioritize mitigation actions. 44 CFR §201.6 Risk Assessment criteria and applicable 44 CFR §78 Flood Mitigation Assistance criteria for profiling hazards and vulnerability assessments are provided in Table 3-1.

Table 3-1 Federal Requirements

44 CFR §201.6 Local Mitigation Plans *(c) Plan Content (2) Risk Assessment*
(i) *A description of the type, location, and extent of all natural hazards that can affect the jurisdiction. The plan shall include information on previous occurrences of hazard events and on the probability of future hazard events*
(ii) *A description of the jurisdiction's vulnerability to the hazards described in paragraph (c)(2)(i) of this section. This description shall include an overall summary of each hazard and its impact on the community. The plan should describe vulnerability in terms of:*

Table 3-1 Federal Requirements
44 CFR §201.6 Local Mitigation Plans *(c) Plan Content (2) Risk Assessment*
(A) *The types and numbers of existing and future buildings, infrastructure, and critical facilities located in the identified hazard areas;* ***(B)*** *An estimate of the potential dollar losses to vulnerable structures identified in paragraph (c)(2)(i)(A) of this section and a description of the methodology used to prepare the estimate;* ***(C)****Providing a general description of land uses and development trends within the community so that mitigation options can be considered in future land use decisions.* ***(iii)*** *For multi-jurisdictional plans, the risk assessment section must assess each jurisdiction's risks where they vary from the risks facing the entire planning area.*
44 CFR §78.5 Flood Mitigation Plan development
(b) *Description of the existing flood hazard and identification of the flood risk, including estimates of the number and type of structures at risk, repetitive loss properties, and the extent of flood depth and damage potential.*

3.3 Identification of Hazards

In accordance with 44 CFR §201.6(c)(2)(i) and §78.5(b) (see Table 4-1), this section identifies hazards that might affect the community of Napakiak. Historic records, newspapers, local and State plans, personal interviews, and the internet were utilized by the Planning Committee to identify two possible hazards (Table 3-2). The Planning Committee identified erosion and flood hazards that pose the greatest risk to the community; these hazards are profiled below (Section 3-4). Other identified hazards pose a lesser risk to human life and property. If future conditions increase the threat of specific hazards, then this LHMP will be updated to address those increased hazard-specific risks.

Table 3-2 Identification of Hazards

Hazard	Profile Justification
Flood	**Profiled in Section 3.4.1**
Erosion	**Profiled in Section 3.4.2**
Community Conflagration and Wildland Fire	Not Profiled. There is a potential for community conflagration, particularly in regards to the current lack of an active fire department, however, this hazard was not raised as a significant concern by community members. Tundra fires do not pose a significant threat to the community.
Earthquake	Not Profiled. Western Alaska is in a low seismic risk zone.

Table 3-2 Identification of Hazards

Hazard	Profile Justification
Volcano	Not Profiled. Wind blown volcanic ash may pose some problems for the community, but is not a significant hazard.
Snow Avalanche	Not Profiled. Risk of avalanche is generally low due to non-mountainous terrain.
Tsunami and Seiche	Not Profiled. Risk of tsunami is low due to inland location.
Weather	Not Profiled. Severe weather (extreme cold and high winds) is expected; however, it is not identified as posing a significant hazard by the community.
Ground Failure	Not Profiled. Any ground failure is likely due to erosion and/or flooding and is not identified as a separate hazard.
Technological	Not profiled. No technological hazards identified by planning team.
Economic	Not profiled. No economic hazards identified by planning team.

3.4 Hazard Profiles

In accordance with §44 CFR §201.6(c)(2)(i), (ii), and §78.5(b), this section profiles hazards that pose the greatest risk to the community of Napakiak (see Section 3.2). Specifically, this section identifies the nature of each hazard, including typical impacts, history of occurrences, probability of future events, the location, and extent of areas potentially affected. Land use and development trends within the community of Napakiak are provided in Section 2.3.1.

The following hazard summaries were taken from the *State of Alaska All-Hazard Risk Mitigation Plan*, dated October 2010.

3.4.1 Flood

3.4.1.1 Description

Flooding occurs when rain, snow, or glacial melt causes a waterway to exceed its capacity. While there are many different types of flooding, the community of Napakiak primarily experiences floods resulting from ice jams and coastal storms. Ice jam flooding typically occurs in the spring. Coastal storms usually occurs in the late summer and early fall.

3.4.1.1.1 Ice Jam Flooding Ice jam floods occur after an ice jam develops, causing water to rise upstream behind the jam. When the ice jam fails, it releases

the collected water and can send huge chunks of ice downstream causing significant, forceful destruction. When an ice jam forms, it restricts the flow in the river channel and causes water to rise upstream from the jam. Water collects upstream from a jam, flooding an area by creating a lake-like effect that has a large areal extent. The effect is analogous to a dam. Little damage typically occurs from the action of the current upstream of the jam, but significant damage can result from flooding and ballistic ice impacting structures once the water overtops the banks and flows into
the community. When the ice jam releases the water usually drains rapidly from behind the jam and can cause additional damage to structures as the water flows back into the channel. Not only does the downstream stage raise substantially once the ice jam releases, but there is substantial current strength combined with house sized blocks of ice, which can cause erosion and significant damage. The rising water causes the ice to float and the increased velocities move the ice further downstream. These fast moving large blocks of ice are often very destructive. During spring breakup, ice jams commonly dam water along big rivers. This type of flooding is exacerbated by snowmelt.

3.4.1.1.2 Coastal Storms Coastal storms can cause flooding from wind-driven water pushed up the Kuskokwim River from the Bering Sea and from heavy rains. Coastal storms and their associated flooding are also a significant contributing factor to the riverbank erosion Napakiak is experiencing.

Typical impacts from floods include water damage to buildings and their contents, structural damage from high-velocity water impact, erosion, and hazardous materials and waste water/sewage releases. In addition, floods can profoundly disrupt transportation to and from affected areas.

3.4.1.2 History of Events

The community of Napakiak has experienced several historic flood events. Table 3-3 provides information on past flood events, impacts, and estimated losses.

Table 3-3 History of Flood Events

Date	Location and Extent	Impact	Estimated Loss
1965?	Community-wide flooding	Entire population was evacuated to bluff north of Johnson's Slough by Army National Guard.	
1973?	Community-wide flooding	Entire population was evacuated to Bethel by Army National Guard.	

Table 3-3 History of Flood Events

Date	Location and Extent	Impact	Estimated Loss
October 1986	Severe Flooding (State Disaster Declaration #782)	Damage occurred to roads.	
May 24, 1988	Community-wide flooding. State Disaster Declaration	Damage occurred to roads.	State disaster funds of $200,000 were made available for public assistance to Napakiak and Napaskiak.
August 17, 1990	**Flood of Record.** A severe storm compounded by high tides caused extensive flooding in coastal communities of the Kuskokwim and Bristol Bay areas and along the lower Kuskokwim River. The flooding caused damage to both public and private property. Community records indicate flood waters as deep as 4 feet. The flood water elevation was recorded at 8.54 feet – or 2.54 feet above the average ground elevation.	Damage occurred to roads. Loss of fishing gear and boats. Majority of town flooded. 12 homes were flooded. Insulation on ~25 housing units and 5 privately owned homes damaged – housing authority elevated multiple units.	
May 1991	Record snowfalls in the interior combined with sudden Spring melt caused flooding all along the Yukon and Kuskokwim River Systems. Numerous State Declarations were combined into a single Presidential Declaration of Major Disaster. Community records indicate flood waters as deep as 3 feet. (**FEMA-0909-AK**)	12 homes were flooded. Damage occurred to roads.	
Sept. 22-26, 2005	2005 West Coast Storm. High winds combined with wind-driven tidal surges resulting in severe and widespread coastal flooding and a threat to life and property **Federally-declared disaster DR-1618.**	Damage occurred to roads.	

3.4.1.3 Probability of Future Events, Location and Extent of Impacts

Flooding occurs frequently in the spring due to ice jams and in the late summer and fall due to coastal storms. Although ice jams and coastal storms occur every year, flooding in Napakiak does not occur annually. The recent history (1985-2010) corresponds to a flood, on average, every five years. Therefore, the probability of a future flood disaster event is highly likely.

Napakiak is located on a low elevation island between the Kuskokwim River and Johnson's Slough. The average elevation is 6 feet, approximately 3 feet above the waterline of the Kuskokwim River (USACE 2008). Due to the low elevation of the community, flooding effects can occur throughout the community. The entire town, except for the airport runway and a few isolated high points are likely to flood.

High Water Elevation Sign (located on lower left corner of building). The community water source well and water treatment is located in this building. The high water elevation is approximately 2 feet above ground elevation. *Photo courtesy of Alaska District, U.S. Army Corps of Engineers.*

Most flood events result in damage to the roads and boardwalks. Many of the boardwalks are subject to floating away during floods. Most roads will be inundated in places during floods. The roads are not paved and few are hardened with gravel. The sandy-silty substrate is subject to washing away as flood waters rise and later recede.

The community water source wellhead is at a low elevation and is subject to contamination during flooding, as is shown in the above photograph. Most, if not all residences and other occupied buildings are elevated above the average flood elevations; however, some outbuildings and heating oil tanks are not adequately

elevated. Boats, vehicles, and fishing boats also must be tethered or otherwise secured to the buildings to prevent loss during flood events.

A related flood concern expressed by the community is the locally flooded or ponded areas. These areas often are located along the roads and foot paths. The ground surface is primarily silt and sand and is readily washed away by water and worn-away by foot and vehicle traffic. During spring breakup, heavy rains, and riverine flood events, some low-lying areas are prone to flooding as the water pools. These pools persist after the water drains or recedes elsewhere. This is exacerbated by the lack of drainage ditches and culverts to direct the flow of water to the river. Once these locally flooded "mud puddles" form, the size of the flooded area increases as the low spot widens, because people walk around the pooled water and mud. These actions further damage and erode the surface soils. Additionally, as ATVs drive through the water, soils are displaced or eroded and the pools increase in depth.

Previous efforts to mitigate this problem include following actions:

- Construction of boardwalks to elevate traffic above the ponded water;
- Elevation of road surface elevation with associated ditches and culverts to facilitate draining; and
- Road surface hardening with gravel.

In addition to the damage to roadways, these large puddles are a safety concern. The water depth can be several inches and poses a potential drowning risk to young children that walk through or play in the puddles.

An ATV drives through a deep "mud puddle." A fire hose is attached to a pump in an attempt to drain the ponded water. Attempts to bypass the water have resulted in the puddle becoming twice as wide as the original road, extending to just under the house on the left.

Road damage due to poorly drained water.

Children play on a damaged boardwalk. The boardwalk has collapsed lower than the road elevation and now sits in, rather than above the water in this low-lying area. Also, some boards are missing from the boardwalk.

Figure 3-1 Flood Hazard Areas

Flood water elevation, flood of record (8.54 ft)

The flood water elevation during the 1990 'Flood of Record' was measured at 8.54 feet by the Army Corp of Engineers. This elevation is depicted on this figure by the blue line. All areas of town, except those within the blue lines would be inundated in a similar flood. The average elevation of Napakiak is 6 feet. Most buildings are elevated at least 2 feet above ground. (Figure prepared by Ecology and Environment, Inc., 2011)

3.4.2 Erosion

3.4.2.1 Description

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

Erosion is a problem in developed areas where the disappearing land threatens development and infrastructure. In Alaska, coastal erosion by waves and bank erosion by rivers and streams are incredibly destructive. Erosion by wind is also destructive. Erosion rarely causes death or injury, but it damages property, development, and infrastructure. The community of Napakiak is threatened by riverbank erosion (also called riverine erosion, stream erosion, or bank erosion)

3.4.2.1.1 Riverine Erosion Riverine erosion results from the force of flowing water in and adjacent to river channels. This type of erosion affects the bed and banks of the channel and can alter or preclude any channel navigation or riverbank development. In less stable braided-channel reaches, erosion and deposition of material are a constant issue.

Riverine erosion is the process whereby rivers erode the land through which they flow. This process can be described as a combination of a river's tendency for constant course alteration, shape and depth change, and the balancing act between the water's sediment transport capability and its sediment supply. Erosion processes need not be long-term; often river erosion occurs very rapidly. Variables that can impact river erosion rates and impacts include earthquakes, floods, loss of bank vegetation, urbanization, and waterway construction projects.

Fast-flowing rivers will erode their banks downstream, further increasing their sediment load. Eventually the river becomes overloaded and/or velocity is reduced, leading to sediment deposition further downstream or behind dams and in reservoirs. Erosion and deposition often lead to the river developing a new channel. Outside bend banks in a meandering river "cut" or erode more quickly due to higher water velocities; Napakiak is situated on such a bend.

In Napakiak, bank erosion is a persistent problem and ongoing process. During and after large storms or breakup events, a substantial amount of erosion may occur very quickly. More often, the Kuskokwim River gradually erodes the riverbank over the course of summer and fall. In spring, erosion occurs after the ice goes out. The fast-moving water undercuts the bank and when the water levels recede, the over-hanging bank collapses, as shown in the following images. The most significant erosion events occur during powerful fall storms when south

winds create waves that pound against the bank. Wind-driven water and tidal surges raise the water level, which undercuts and then collapses the bank.

Riverbank erosion along the Kuskokwim River.

Riverbank erosion along the Kuskokwim River. The blue building is the school. *Photos courtesy of USDA Natural Resources Conservation Service, Alaska*

3.4.2.2 History of Events

Erosion along the Kuskokwim River at Napakiak is ongoing. The U.S. Army Corps of Engineers (USACE) has measured erosion rates of approximately 40 feet per year in the 1960s and 1970s. Further, they have estimated continued erosion rates at 25-50 feet per year for the next 50 years. Table 3-4 provides information on past erosion events, impacts, and estimated losses.

Table 3-4 History of Erosion Events

Date	Location and Extent	Impact	Estimated Loss
May 15, 1986	Severe bank erosion of the Kuskokwim River had reached a point where homes in Napakiak were in danger of falling in the river. The Governor's disaster declaration provided funds to move seven houses to a safe location.		
Sept. 22-26, 2005	**2005 West Coast Storm.** High winds combined with wind-driven tidal surges resulted in severe and widespread coastal flooding and a threat to life and property **Federally-declared disaster DR-1618.**	Loss of 75 feet of riverbank.	

The City of Napakiak began community and building relocation projects in 1986 due to erosion of land. These projects have been funded by the State of Alaska and U.S. Department of Agriculture, Natural Resource Conservation Service and FEMA. Between 1990 and 2010, the City has relocated 40 to 50 homes and over 200 people, from the east side of town to the new subdivision west of the airport. The old clinic, community hall and water treatment plant have been demolished or relocated due to their proximity to the eroding river bank.

In the 2006 Community Comprehensive Plan and 2010 Community Plan for Napakiak, the community identified the relocation of the village to the bluff, north of Johnson’s Slough as one of its primary objectives. This project entails the construction of a bridge across the slough to connect the village’s present location with the new location. The community is currently seeking funding opportunities for the village relocation.

3.4.2.3 Probability of Future Events, Location and Extent of Impacts

Erosion is an ongoing process on the Kuskokwim River bank at Napakiak. An obvious and visible loss of shoreline and ground is evident after every storm occurring in summer and fall. The USACE predicts that with their estimated erosion rate of 35 feet per year, the entire community will be impacted by erosion by 2057. The predicted shoreline in 2057 extended to the airport, with nearly the entire community east of the airport a total loss as the land is eroded by and lost to the river. Residents who are not directly affected by loss of their homes will be affected by the loss of multiple services and facilities, such as the school and City offices, if these buildings are not relocated.

As of May 2010, the riverbank had eroded to the predicted 2017 riverbank (USACE 2008). Table 3-5 shows the distance from the May 2010 riverbank to some critical facilities and essential infrastructure in Napakiak:

Table 3-5 May 2010 Distance from Riverbank Shoreline to Nearest Critical Facilities and Essential Infrastructure

Description	Distance from Riverbank Shoreline
National Guard Readiness Center (Armory)	200 feet
School Tank Farm	300 feet
School	375 feet
Community Water Source & Treatment Plant	400 feet

Section 3-5 has additional details on the buildings and infrastructure vulnerable to damage or loss due to erosion.

The following figures illustrate the extent of erosion that has occurred since 1990 and that is predicted by 2057.

- Figure 3-2 is the Predicted and Historical Shorelines as determined by the U.S. Army Corp of Engineers in the 2008 Community Erosion Assessment, with the recent actual shorelines and essential facilities and critical infrastructure expected to be lost due to erosion.
- Figure 3-3 is an excerpt from the Napakiak Community Map, 1991, produced the Alaska Department of Community and Regional Affairs. It shows the east side of the community in 1990 – it shows the land and building locations lost as the riverbank has eroded over 1,000 feet to the west. Buildings that were lost or relocated include a gas station located on

Johnson Slough, the old clinic, old water treatment facility, community hall, recreation building, old United Utilities building, old Moravian church, and a marina building.

- Figure 3-4 shows the USACE predicted shorelines along with the recent actual shorelines and essential facilities and critical infrastructure expected to be lost due to erosion.

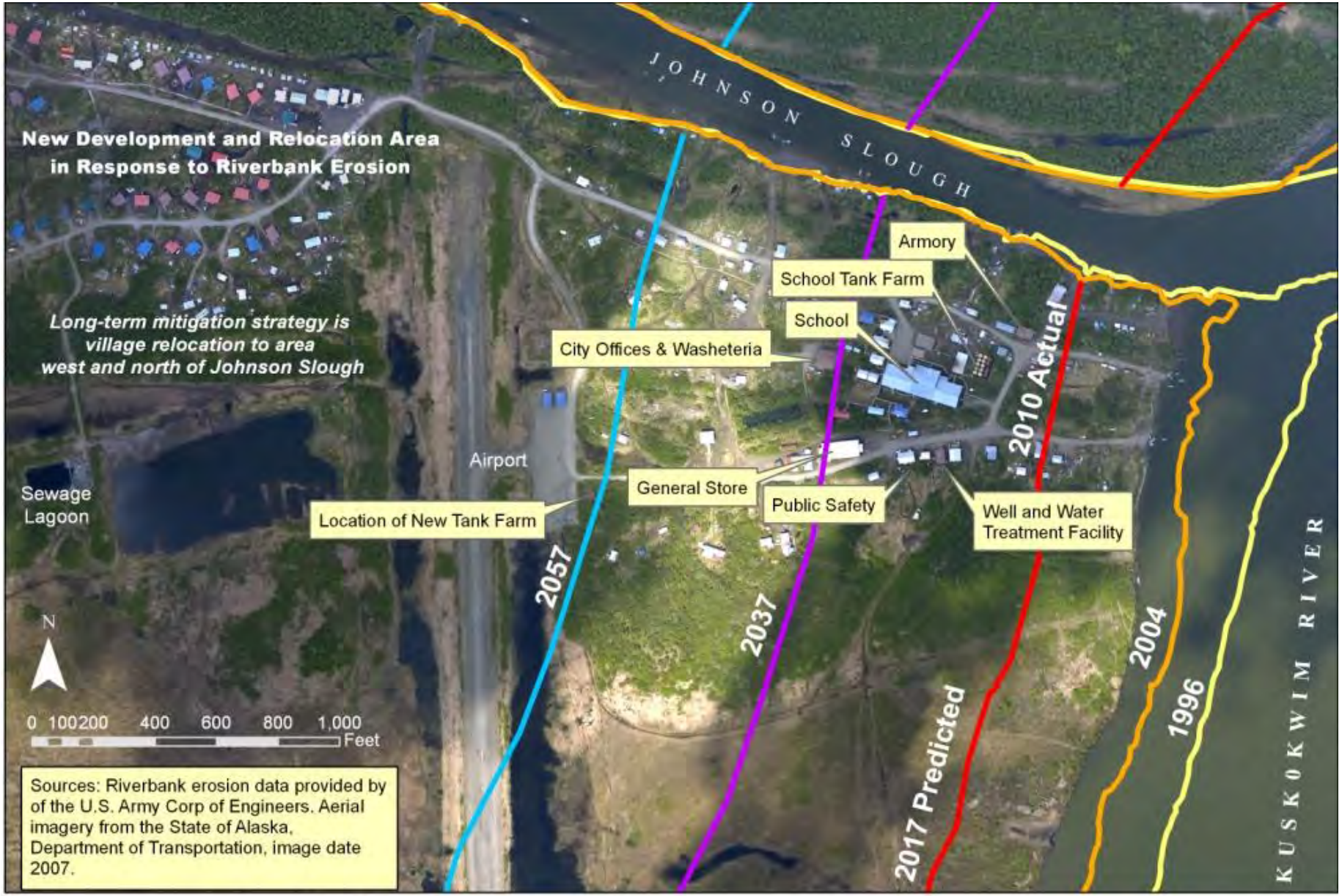

Figure 3-2 Erosion Hazard Area, Napakiak, Alaska

Riverbank erosion predictions by the U.S. Army Corp of Engineers, calculated in 2004. Key essential facilities are identified, a complete list of the critical facilities located in the hazard area is in Table 3-9. Predicted shorelines are shown on an 2007 air photo. Note that by June 2010, the shoreline had eroded to the location predicted for 2017. USACE forecast rate of erosion is 35 feet per year (USACE 2008). Actual rate of erosion from 2004-2010 was approximately 75 feet per year. (Figure prepared by Ecology and Environment, Inc., 2011)

Figure 2-1 Napakiak, Alaska, 1990
Land Lost to Erosion, 1990-2010

Area lost to erosion between 1990-2010

Figure prepared by Ecology and Environment, Inc., 2011

3.5 Vulnerability Assessment

This overview of the community's vulnerability provides a summary of the impact the hazard's described above may have on the community and its vulnerable structures.

3.5.1 Community Assets

This section identifies the City of Napakiak assets that could impact public safety, environmental or the economic stability of Napakiak, if damaged. These assets include critical facilities and essential infrastructure, the population, built environment, and other community resources.

3.5.1.1 Critical Facilities and Essential Infrastructure

Critical facilities and essential infrastructure for the community of Napakiak is provided in Section 2.4 and Figure 2-1. Additionally, critical facilities affected by hazard type are identified in Section 3.4. Table 3-6 provides a loss estimate for each critical facility or essential infrastructure. Loss estimates are evaluated based on the cost of the structure well as costs associated with the structure's contents and its function within the community.

3.5.1.2 Population and Buildings

As identified in Section 2.2.3, the community of Napakiak has an estimated population of 354 (2010 US Census). There are approximately 100 residential (including six teacher housing units), eleven commercial, one industrial, two religious, five government, and eight education buildings in the community of Napakiak (identified in Section 2.3.1).

Loss estimates for these facilities are not readily available due to the lack of a local property tax assessment program; therefore, these columns have been left blank in the Tables 3-6 and 3-7 for completion at a later date when data is available. Some structures are privately insured and in the event of an opportunity to apply for a hazard mitigation grant, losses may be based on private records or on square footage of the building.

In regards to the economic cost of due to erosion, the USACE estimated the following losses due to erosion over the next 50 years (USACE 2008).

- 164 acres land…corresponding value of $1.6 million and a net present value of $655,000.
- Expected structural damages: $30 million with a net present value of $10.5 million.
- Infrastructure damages: $44.8 million with a net present value of $12 million.
- Environmental damages, environmental remediation, and grave relocation costs: In excess of $4.2 million with a net present value in excess of $1.8 million and an average annual cost in excess of $93,800.

Table 3-7 provides the vulnerability analysis for the community of Napakiak. It identifies populations affected by hazards, as well as estimates of critical infrastructure loss and building stock loss.

3.5.1.3 Repetitive Loss Properties

As defined by FEMA, Repetitive Loss Properties are: *Any property for which two or more flood insurance claims have been paid for more than $1,000 within any rolling 10-year period since January 1, 1978. Severe Repetitive Loss Properties are defined under the NFIP as any property for which have at least four NFIP claim payments over $5,000 each, when at least two such claims have occurred within any 10-year period, and the cumulative amount of such claim payments exceeds $20,000.*

Napakiak does not participate in the NFIP; therefore, no Repetitive Loss Properties are located in the community.

3.5.2 Community Resources

A number of Federal, State, and local resources provide hazard mitigation planning and disaster preparedness assistance. See Appendix A for more information.

3.5.3 Methodology

The vulnerability assessment estimated expected losses "damage" from single hazard events based on information provided in Section 3.4 Hazard Profiles and Section 3.5.1 Community Assets. Expected losses are expressed in dollar amounts and account for percent damage to structures and population identified in high hazard areas, as well as estimates of the cost of the functional loss and displacement of structures and services. Percent damage reflects the different losses expected per hazard (e.g., a flood may cause structural damage valued at 20% of the cost of the building, whereas a fire may cause 100% structural damage). Percent damages are based on insurance estimates, historical occurrences, and Planning Committee assessments. See Figure 3-3, below, for an example of how loss calculations are estimated for a single structure due to a single hazard event. The estimated loss calculation for each hazard will account for all affected structures and population.

3.5.4 Analysis

3.5.4.1 Vulnerability to Flooding

The entire community of Napakiak is vulnerable to flooding. Only the airport runway is completely above expected flood water elevations. Nearly all occupied buildings are elevated above expected flood water elevations; however they are still susceptible to damage caused by swift moving water, debris, and damage to part of the structure which remain below the elevated grade. Many storage buildings, fish camp structures and smokehouses are not elevated.

Table 3-8 summarizes the number of structures vulnerable to flooding and erosion.

3.5.4.2 Vulnerability to Erosion

The riverbank erosion is ongoing and not expected to stop or slow in the foreseeable future. The area east of the airport runway is vulnerable to erosion. This half of the community is within the 50-year erosion profile calculated by the USACE. The USACE predicts the land in this area to

be lost to erosion by 2057. The loss of this land will impact the entire community as critical services and facilities are lost to the river, unless the buildings located in this area are relocated outside of the immediate hazard area. The City offices, the school, one of the two general stores, the washeteria and community water supply and treatment plant are among the facilities at risk which serve the entire population. In addition to critical facilities, 47 residential buildings and 45 residential outbuildings are in the area expected to be lost to erosion.

Table 3-9 and 3-10 are inventories of structures and other assets located with the 50-year erosion profile and at risk of damage and/or destruction (USACE 2008). Table 3-11 is a list of some recent building relocation projects, including project costs.

Table 3-6 Critical Facility Loss Estimate

Type	Facility	Loss Estimate		
		Structure	Contents	Total
EF	Napakiak Community Center (City Offices, Washeteria and washeteria water supply)			
EF	Fire Station (not currently in operation)			
EF	Napakiak Clinic			
EF	Napakiak School			
EF	National Guard Armory			
EF	Post Office			
EF	Public Safety Office			
EF	Tribal Council Building			
TI	Napakiak Airport			
TI	Airport Maintenance Buildings			
U, HM	Old Landfill, Class III			
U, HM	New Landfill, Class III			
U	School Water Treatment Plant and			
U	Water Treatment Plant and Pump House			
U	Napakiak Water Supply, Central Well (*not currently operational*)			
U	Village Corporation Power Plant Building			
TI	City Garage			
U	Sewage Lagoon, school			
U	Sewage Lagoon			
U	United Utilities Building (communications			
U	United Utilities Satellite Dish			
U	GCI Cellular Communications tower			
U	School Satellite Dish			
HM	Fuel Storage Tanks, Corporation/			
HM	Fuel Storage Tanks, School			
EF	Cemetery			
EF	Moravian Church			
EF	Teachers' Quarters 1, 2, 3, 4 , 5 & 6			

EF	Bingo Hall			
EF	Napakiak Corporation Store & Offices (Naparyalruar Store)			
EF	Napakiak Corporation Warehouse			
EF	Coastal Villages Region Fund Building			
EF	Jung's Trading Post and Storage Buildings			

Notes: *The loss estimate values are not available at this time. This table has been included so that the information can be entered into the plan when it is available.*
EF- Essential Facility for Health and Welfare
TI- Transportation Infrastructure
U- Utilities
HM- Hazardous Materials Facilities

Table 3-7 Building Loss Estimate

#	Occupancy Class	Loss Estimate				
		Building Value	Building total	Contents % Value	Contents Total	Total
100	Residential	$205,000[1]	$20,500,00	50%	$10,250,000	$30,750,000
11	Commercial			100%		
1	Industrial			150%		
2	Religious			100%		
5	Government			150%		
8	Education			100%		

[1] USACE estimated in its 2008 report that the average house value was $205,000.
Note: Due to lack of local data, including no property tax assessment information, the building values are not available at this time.

Figure 3-3 School Power Plant and Water Treatment Building Estimated Loss due to Erosion

Loss Estimate= $325,960

Facility	Structure Loss Estimate	X	Percent Damage	=	Loss to Structure
School Power Plant & Water Treatment Building	$100,000	X	100%	=	$100,000

Facility	Contents Loss Estimate	X	Percent Damage	=	Loss to Contents
School Power Plant & Water Treatment Building	$450,000	X	50%	=	$225,000

Facility	Daily Operating Budget	X	Functional Downtime	+	Displacement costs per day	X	Displacement Time	=	Structural Use and Function Loss
School Power Plant & Water Treatment Building	$500	X	2 day	+	500	X	10 days	=	6000

Table 3-8 Vulnerability Analysis

Hazard	Population	Critical Facilities and Essential Infrastructure	Building Stock
		# of Structures	# of Structures
Flood	353	36	~250
Erosion	143[3]	13	107

[1] Total of Structure, Contents, Function and Displacement Loss Estimates
[2] Total of Structure and Contents Loss Estimates
[3] Population is estimate, based on average of 3.5 residents per residential structure.

Table 3-9 Non-Residential Structures within 50-Year Erosion Risk Profile	
Name or Description	**Size (sq. feet)**
Coastal Villages Region Fund Building	
Fire Station	500
Jung's Trading Post	2145
Jung's Trading Post, Storage Buildings (5 total)	
Lower Kuskokwim School District (LKSD) Power Building	
LKSD School Storage Buildings (7)	
LKSD William N. Miller Memorial School	
Motor Vehicle Building, aka Bingo Hall	875
Napakiak City Garage	
Napakiak Community Center	3500
National Guard Armory	575 +
Public Safety Building	500
Quonset Hut	
Retail Store #2 and Outbuilding	
Village Power Plant	

Table 3-10 Residential Structures within 50-Year Erosion Risk Profile		
Description	**Number of Structures**	**Population**
Single Family Dwelling	41	
Multi-Family Dwelling (Teacher Housing; Lower Kuskokwim School District)	6	
Residential, outbuildings (unoccupied)	45	0

Table 3-11 Recent Community and Building Relocation Projects			
Date	**Project Description**	**Funding Source**	**Cost**
FY 2006	Relocation of Houses	DCCED	$65,000
FY 1997	Community Relocation Planning and Building Relocation	DCCED	$20,043
FY 1988	Community Relocation, Phase II	DCCED	$12,476
FY 1986	Community Relocation Study	DCCED	$50,600
2009	Relocation of two residences	FEMA	$25,000
2010	Relocation of two residences	USDA/NRCS	

4 Mitigation Strategy

4.1 Introduction

In accordance with 44 CFR §201.6, the Mitigation Strategy is a plan for reducing damages and losses identified by the Risk Assessment (Chapter 3). Information in this chapter is based on existing resources, programs, polices, and authorities, as well as the City's ability to improve and expand on existing tools.

4.2 Federal Requirements

In accordance with 44 CFR §201.6, the Mitigation Strategy is a plan for reducing damages losses identified by the Risk Assessment (Section 3). Information in this section is based on existing resources, programs, polices, and authorities, as well as its ability to improve and expand on existing tools. 44 CFR §201.6 Mitigation Strategy criteria and applicable 44 CFR §78 Flood Mitigation Assistance criteria for mitigating risks are provided in Table 4-1.

Table 4-1 Federal Mitigation Strategy Requirements

44 CFR §201.6 Local Mitigation Plans *(c) Plan Content (3) Mitigation Strategy*
(i) *A description of mitigation goals to reduce or avoid long-term vulnerabilities to the identified hazards.* ***(ii)*** *A section that identifies and analyzes a comprehensive range of specific mitigation actions and projects being considered to reduce the effects of each hazard, with particular emphasis on new and existing buildings and infrastructure.* ***(iii)*** *An action plan describing how the actions identified in paragraph (c)(2)(ii) of this section will be prioritized, implemented, and administered by the local jurisdiction. Prioritization shall include a special emphasis on the extent to which benefits are maximized according to a cost benefit review of the proposed projects and their associated costs..* ***(iv)*** *For multi-jurisdictional plans, there must be identifiable action items specific to the jurisdiction requesting FEMA approval or credit of the plan.*
44 CFR §78.5 Flood Mitigation Plan development
(c) *The applicant's floodplain management goals for the area covered by the plan.* ***(d)*** *Identification and evaluation of cost-effective and technically feasible mitigation actions considered.* ***(e)*** *Presentation of the strategy for reducing flood risks and continued compliance with the NFIP, and procedures for ensuring implementation, reviewing progress, and recommending revisions to the plan.* ***(f)*** *Documentation of formal plan adoption by the legal entity submitting the plan (e.g., Governor, Mayor, County Executive).*

4.3 Mitigation Strategy Development

By utilizing the Risk Assessment (Section 3), the Planning Committee identified ways to reduce damages from future hazards in accordance with FEMA criteria for local mitigation plans (44 CFR §201.6(c)(3)).

4.3.1 Mitigation Goals

The Planning Committee identified four goals to address the primary hazards profiled (Section 3-4) and vulnerability analysis (Section 3-5). Mitigation goals identified in Table 4-2 are long-term policy objectives to reduce the costs of disaster response and recovery and to minimize disruption to the community following a disaster. Section 4.3.2 and Table 4-3 identify specific mitigation actions that stem from these mitigation goals. Through this planning process, the Planning Committee intends to reduce the overall vulnerability of the community of Napakiak to all hazards.

Table 4-2 Mitigation Goals

Goal	Description	Hazards Mitigated
1	Prevent loss of buildings and infrastructure to riverbank erosion	Erosion
2	Protect community water supply	Flooding and Erosion
3	Protect village roads	Flooding
4	Facilitate draining of low-lying, locally flooded areas.	Flooding

4.3.2 Identification and Analysis of Mitigation Actions

From the mitigation goals identified in Table 4-2, the Planning Committee identified seven mitigation actions (Table 4-3) focusing on reducing hazard impacts to existing and new development. Mitigation actions are practical and achievable actions that the community of Napakiak can undergo to reduce its vulnerability to hazards. Mitigation actions strive to achieve the following.

- Prevent development that is vulnerable to hazards. Examples include planning and zoning, building codes, and capital improvement programs. [Note: This community does not have planning and zoning regulations or building codes, however, recent construction has been completed with the objective of minimizing flood damage.]
- Protect current critical infrastructure and buildings from hazard damages. Examples include acquisition, elevation, relocation, and structural retrofits.
- Educate the public on hazard mitigation and ways they can support planning efforts. These actions include outreach projects, and school-age and adult education programs.

- Protect emergency services against hazard damages. Services include warning systems, emergency response services, and protection of critical facilities.

Table 4-3	Mitigation Actions
1	**Prevent loss of buildings and infrastructure to riverbank erosion**
a	Relocate buildings subject to loss due to erosion within next 50 years.
b	Relocate village to bluff north of Johnson's Slough. Construct bridge across Johnson's Slough to facilitate relocation of village to bluff.
2	**Protect Community Water Supply**
a	Transfer community water source to "New Well" and relocate or construct new water treatment plant at new well. Decommission "Old Well."
b	Public education and assistance program to elevate and secure heating oil tanks at residences and other buildings.
3	**Protect village roads and walkways**
a	Elevate roads above expected floodwater elevations. *(Most roads on east side of town require an additional 2-4 feet of elevation. Localized elevation required on west side).*
b	Install or improve ditches and culverts to facilitate drainage alongside and under roads.
c	Install or improve boardwalks on common walkways to protect ground surface. Boardwalks will further reduce formation of depressions ("mud puddles") that inhibit draining of ponded water.
4	**Facilitate draining of low-lying, locally flooded areas.**
a	See "Mitigation Action 3b" Install or improve ditches and culverts to facilitate drainage to slough or river.
b	See "Mitigation Action 3c" Install or improve boardwalks on common walkways to protect ground surface. Boardwalks will further reduce formation of depressions ("mud puddles") that inhibit draining of ponded water.

4.3.3 Benefit Cost Review

Benefit Cost Review was utilized to prioritize mitigation actions. Actions are evaluated to determine a community's vulnerability before and after the implementation of each mitigation action. The difference in vulnerability from before to after a mitigation action is implemented, as well as benefits (pros) and costs (cons), is utilized to review mitigation actions (Table 4-3).

Based on this review, the Planning Committee used a Simple Listing Benefit Cost Review method to assign priority to each of the mitigation actions (Table 4-3). Mitigation actions prioritized as *high* are actions that, once implemented, will substantially reduce the community's vulnerability to hazards that occur frequently. Mitigation actions that substantially reduce the community's vulnerability to hazards that occur less frequently are prioritized as *medium*, and finally, *low* priority actions are mitigation actions that do not substantially reduce the community's vulnerability and/or mitigate rare hazards.

Table 4-4 Benefit Cost Review

Action	Vulnerability - Before Action is Implemented	Vulnerability - After Action is Implemented	Vulnerability - Difference	Benefit (Pro)	Cost (Cons)	Priority
1a	**ACTION DESCRIPTION: Relocate buildings subject to loss due to erosion within next 50 years.**					
1a	Within the 50 Year Erosion profile losses predicted for 122 buildings, 2 public water wells, 2 bulk fuel tank farms, the school sewage lagoon, the cemetery, and part of the airstrip, situated on approximately 164 acres of land. All buildings and infrastructure are expected to be lost (100% loss) to erosion if they are not relocated. The erosion is continuous and losses are expected to occur between 2011 and 2057. Engineering options to reduce the erosion are extremely costly and may not be successful at stopping or reducing erosion.	After relocation of the structures (or relocation of the function to new structures west of the airport), the structures will no longer be at risk to destruction by loss of land to erosion. However, the riverbank is dynamic and over time, erosion may continue to the land west of the airport. Relocated buildings or new construction will be built or elevated above the expected flood water levels.	The buildings and their functions would be maintained.	Relocation of buildings (or the relocation of functions to new buildings) out of the erosion profile area will prevent their losses to erosion. Buildings such as the school are essential to the existence of the community.	Relocation of residences costs $12-15,000 per home. Large buildings such as the school and the City offices may have to be reconstructed rather than relocated. Building relocation will not stop erosion. Additional parts of town may continue to be threatened. Total cost for relocation in excess of $2 million.	High

Table 4-4 Benefit Cost Review

Action	Vulnerability - Before Action is Implemented	Vulnerability - After Action is Implemented	Vulnerability - Difference	Benefit (Pro)	Cost (Cons)	Priority
1b	**ACTION DESCRIPTION: Relocate village to bluff north of Johnson's Slough. Construct bridge across Johnson's Slough and road to Bethel to facilitate relocation of village to bluff.**					
1b	Entire village is subject to flooding. Approximately half the community is at risk of losing land to erosion, with a total loss to buildings and property if not relocated.	Community is relocated to an area not subject to flooding and erosion. Relocated buildings or new construction will be built or elevated above the expected flood water level to prevent future damages.	Community is no longer at risk of flood and erosion.	Community is no longer at risk of flood and erosion. Cohesiveness of the community is maintained because the entire community is moved, rather than gradual population losses as residents relocate to communities with suitable, lower risk land to develop. Total erosion damages in Napakiak over the 50-year period of analysis are $80.6 million (USACE 2008). Flood losses would be additional.\ Road to Bethel will reduce construction and relocation costs and provide additional education and employment opportunities for residents.	Extremely expensive. Access to river would be limited to high tides due to low water depth of Johnson's Slough. Total Costs: In excess of $65 million. The road from Bethel and the bridge across Johnson's Slough to facilitate move are estimated to cost $63.6 million (USACE 2008)	High

Table 4-4 Benefit Cost Review

Action	Vulnerability - Before Action is Implemented	Vulnerability - After Action is Implemented	Vulnerability - Difference	Benefit (Pro)	Cost (Cons)	Priority
2a	**ACTION DESCRIPTION: Transfer community water source to "New Well" and relocate or construct new water treatment plant at new well, ensuring that wellhead and building are built above record flood line elevations. Decommission "Old Well."**					
2a	As of May 2010, the current well is located 400 feet from riverbank and within USACE 50 Year Erosion Profile. Washeteria water source (not certified for potable water) is also within the USACE 50 year Erosion Profile.	Community water supply and treatment facility is no longer at risk of loss due to erosion.	Community maintains water supply and water treatment facility.	Community maintains water supply and water treatment facility, critical for public health and quality of life.	Cost Estimate: >$250,000. Cost will be dependent on condition and capacity of existing but out-of-commission "new" well. If Washeteria well no longer available as back-up water supply, or if water producing capacity of the well is insufficient to serve as primary water source, additional new water sources (wells) will be required.	High

Table 4-4 Benefit Cost Review

Action	Vulnerability - Before Action is Implemented	Vulnerability - After Action is Implemented	Vulnerability - Difference	Benefit (Pro)	Cost (Cons)	Priority
2b	**ACTION DESCRIPTION: Public education and assistance program to elevate and secure heating oil tanks at residences and businesses.**					
2b	Heating oil tanks that are not elevated and secured are potential sources for oil spills during flood events if inundated by flood water or damaged due to tanks becoming unsecured.	Heating oil fuel tanks are secured to structures and elevated above anticipated flood elevations reducing potential for oil spills resulting from floods.	Potential oil spills are reduced in volume and/or probability.	Potential oil spills are reduced in volume and/or probability. Spill response costs are minimized. Impacts to drinking water supply and the environment are reduced. Economic cost of lost fuel is minimized, which could range from $4-$7 per gallon.	Cost: Low. Public education information on securing tanks available at no cost from Alaska Department of Environmental Conservation. Cost of materials estimated less than $100 per tank requiring attention.	High

Table 4-4 Benefit Cost Review

Action	Vulnerability - Before Action is Implemented	Vulnerability - After Action is Implemented	Vulnerability - Difference	Benefit (Pro)	Cost (Cons)	Priority
3a	**ACTION DESCRIPTION: Elevate roads above flood of record flood line elevation of 8.54 feet.** ***Most roads need an additional 2-4 feet of elevation.***					
3a	Nearly all roads are below the flood of record flood line elevation (8.54 feet). Safe travel is compromised during flood events and inundated dirt roads are subject to damage and washout.	Roads are built up to an elevation greater than the flood of record. Road construction will be analyzed to determine potential impacts on water flow and drainage and designed to prevent future damage to the road nearby structures.	Safe travel is maintained during flood events and damage to roads is minimized.	Safe travel is maintained during flood events, including safe access routes to the airport runway which is the high point of the community. Evacuation from Napakiak during flood events would be from the airport. Road repair costs would be reduced.	Cost: High >$1,000,000 for all roads. Smaller, critical low spots may be elevated for considerably less money. Road elevation will be higher than surrounding areas which could create unforeseen and unintended consequences *(Examples: 1-Road elevations might be higher than nearby buildings, complicating access. 2-Steep road embankments or road edges can be hazardous to travel, particularly during periods of compromised visibility and can hinder water drainage)*	High

Table 4-4 Benefit Cost Review

Action	Vulnerability - Before Action is Implemented	Vulnerability - After Action is Implemented	Vulnerability - Difference	Benefit (Pro)	Cost (Cons)	Priority
3b/4a	**ACTION DESCRIPTION: Install or improve ditches and culverts to facilitate drainage alongside and under roads to Johnson's Slough or to Kuskokwim River**					
3b/4a	Roads impede flow and drainage of water annually resulting in damage to roads and ponding of water unable to drain to Johnson's Slough or Kuskokwim River.	Ditches and culverts direct water to facilitate water drainage.	Road damage is reduced. Storm water and snow melt ponds are reduced.	Road damage is reduced resulting in cost savings. Storm water and snow melt ponds are reduced, increasing usable land that was subject to localized flooding by water unable to drain to the river. These flooded spots often form along foot paths, inhibiting use of the pathways.	Cost: >$150,000	High

Table 4-4 Benefit Cost Review

Action	Vulnerability - Before Action is Implemented	Vulnerability - After Action is Implemented	Vulnerability - Difference	Benefit (Pro)	Cost (Cons)	Priority
3c/4b	**ACTION DESCRIPTION: Install or improve boardwalks on common walkways to protect ground surface and reduce formation of flooded depressions (mud puddles) which inhibit draining of water.**					
3c/4b	Many boardwalks are in need of repair or replacement. Additional areas would benefit from the construction of new boardwalks. Ponds, mud puddles, or mud holes often occurs in low-spots that are made larger by persons walking around the standing water and/or mud creating a larger area that is subject to the ponding. Boardwalks elevate the traffic above the wet areas. Unsecured boardwalks are subject to damage, destruction or may float away during flood events.	Boardwalks elevate traffic above the ground surface, keeping pedestrians dry and protecting the ground surface from wear and erosion.	Safe and dry routes are available for foot travel and ATV use. Boardwalks protect ground surface and vegetation, which minimizes formation of mud holes and ponds, and reduces compaction and erosion of surface materials.	Safe and dry routes are available for foot travel and ATV use. Costs to fill depressions and ponds pathways are reduced. Risks to public safety are reduced from poor condition of boardwalks.	Cost: $10,000-$50,000 (depending on extent of boardwalk repair, replacement or new construction)	High

4.4 Mitigation Action Plan

Table 4-5 provides the mitigation action plan matrix. Projects are listed by the priority ranked during the benefit cost review process (Section 4.3). Additionally, Table 4-5 identifies agencies that will be responsible for implementing high priority mitigation actions, coordinating departments, identifying available funding sources, and developing a time frame for completion and initial estimated costs. Mitigation actions currently prioritized by the planning committee as low during the benefit cost review were eliminated from the mitigation action plan. All mitigation actions will be re-evaluated during subsequent plan updates.

The City will be the responsible agency for coordinating mitigation actions. Some actions may be delegated to the Native Village of Napakiak for oversight, depending on funding sources and availability of personnel. The small size of both agencies does not accommodate for departments within them; therefore, a responsible department has not been assigned. .

Table 4-5 Mitigation Actions

Project	Priority	Funding Sources	Time-frame	Cost
1a. Relocate buildings subject to loss due to erosion within next 50 years.	First priority for relocation area.	State, Federal, Local	25 Years	$100-150 Million (including road to Bethel and bridge across Johnson's Slough)
1b. Relocate village to bluff north of Johnson's Slough. Construct bridge across Johnson's Slough and road to Bethel to facilitate relocation of village to bluff.	*Ultimate Community Goal*			
Relocation of the Community is the top mitigation action priority, with buildings in the 50-Year Erosion Profile being the highest priority for relocation. *Other actions are precluded if this completed in a timely manner, however the community recognizes relocation of the entire village may take multiple years and other interim actions will need to be taken to maintain the welfare of the community. The following actions are priorities for mitigation actions prior to village relocation.*				

Table 4-5 Mitigation Actions

Project	Priority	Funding Sources	Time-frame	Cost
2a. Transfer community water source to "New Well" and relocate or construct new water treatment plant at new well, ensuring that wellhead and building are constructed above record flood line elevations. Decommission "Old Well."	1	State, Federal	2-5 Years	>$250,000
3b/4a. Install or improve ditches and culverts to facilitate drainage alongside and under roads to slough or river	2	State, Federal	5-10 Years	>$150,000
3a. Elevate roads above flood of record flood line elevation of 8.54 feet. *Most roads an additional 2-4 feet of elevation.*	3	State, Federal	1-15 years	>$1,000,000
3c/4b. Install or improve boardwalks on common walkways to protect ground surface. Boardwalks will further reduce formation of depressions (mud puddles) that inhibit draining of ponded water.	4	State, Federal	1-10 Years	$50,000
2b. Public education and assistance program to elevate and secure heating oil tanks.	5	State, Federal	1-10 Years	$10,000

5 Plan Implementation and Maintenance

5.1 Introduction

The DMA 2000 regulations require proof of formal adoption of the LHMP. The adoption of the plan is necessary because:

- It lends authority to the plan to serve as a guiding document for all local and State government officials;
- It gives legal status to the plan in the event it is challenged in court;
- It certifies to program and grant administrators that the plan's recommendations have been properly considered and approved by the governing authority and the jurisdiction's citizens; and
- It helps ensure the continuity of mitigation programs and policies over time because elected officials, staff, and other community decision-makers can refer to the official document when making decisions about the community's future.

5.2 Plan Implementation

After the adoption of the LHMP, each hazard mitigation planning committee member will ensure that the LHMP, in particular each Mitigation Action Project, is incorporated into existing planning mechanisms. Each member of the hazard mitigation planning committee will achieve this incorporation by undertaking the following activities.

- Conduct a review of the community-specific regulatory tools to assess the integration of the mitigation strategy. These regulatory tools are identified in the following capability assessment section.
- Work with pertinent community departments to increase awareness of the LHMP and provide assistance in integrating the mitigation strategy (including the mitigation action plan) into relevant planning mechanisms. Implementation of these requirements may require updating or amending specific planning mechanisms.

5.3 Plan Maintenance

A formal plan maintenance process ensures that the LHMP remains relevant to the community. The following sections explain how the City of Napakiak hazard mitigation planning committee will ensure that improvements and revisions of the LHMP occur in an efficient and coordinated manner.

5.3.1 Monitoring, Evaluating and Updating

Prepared as a collaborative effort between the hazard mitigation planning committee and the State, the LHMP will be monitored, evaluated, and updated by the hazard mitigation planning committee, as appropriate. The Mayor, or designee, will serve as the primary point of contact and coordinator for this LHMP. The planning team should include an assessment of the planning process itself.

The community has a five-year comprehensive plan, the *Napakiak Community Plan*, last updated in 2010. This plan identifies major goals of the community, including many projects which are also in this LHMP or parallel projects in this plan such as village relocation or improvements to village roads and water supply system. The planning team will review other community plans, such as the *Napakiak Community Plan*, as they are developed or updated for consistency with this plan and the identified mitigation strategies. Equally important, the planning team will identify necessary changes to this plan to reflect changing conditions or priorities set by the community and/or addressed other plans as they are produced or updated. Assisting this effort to incorporate the mitigation strategies into other community plans is the collaborative manner in which all community plans, including this one, have been produced with involvement from the City and tribal governments and as well as community residents.

5.3.1.1 Monitoring

The Mayor, or designee will schedule and conduct an annual review to monitor the implementation progress and consider new data, paying close attention to the mitigation action plan.

The mayor will initiate the annual review two months prior to the scheduled planning meeting to ensure that all data, such as project status reports, are assembled for discussion. The findings from these reviews will be presented at the annual hazard mitigation planning committee meeting. This meeting agenda should include:

- Participation of authorities and others in the LHMP implementation;
- Notable changes in the risk of natural or human-caused hazards;
- Impacts of land development activities and related programs on hazard mitigation;

- Progress made with the mitigation action plan (identify problems and suggest improvements as necessary);and
- The adequacy of local resources for implementation of the LHMP.

5.3.1.2 Evaluation

During the annual review, each authority administering a mitigation project will submit input to a Progress Report to the hazard mitigation planning committee. This combined report should state the current status of the mitigation project, including any changes made to the project, the identification of implementation problems and appropriate strategies to overcome them, and whether the project has helped achieved the appropriate goals identified in the plan.

The Progress Report will be distributed to all hazard mitigation planning committee members, City Council members, IRA Council members and other interested agencies, departments, and persons for review and evaluation.

5.3.1.3 Updating

The plan will be updated every five years after its initial adoption, if needed following a Federally Declared Disaster, or as required by DHS&EM. Six months prior to the five-year plan review, the hazard mitigation planning committee will undertake the following activities to evaluate the plan and ensure that it is adequately updated, submitted for State and Federal review and approval, and adopted in the fifth year:

- Thoroughly analyze and update the risk of natural and human-made hazards;
- Provide a new annual review (as noted above), including a review of the three previous annual reviews;
- Provide a detailed review and revision of the mitigation strategy;
- Prepare a new mitigation action plan for the community;
- Prepare a new draft LHMP;
- Submit an updated LHMP to the DH&EM and FEMA for approval; and
- Submit the FEMA-approved plan for adoption by the City of Napakiak and Native Village of Napakiak.

5.3.1.4 Monitoring Mitigation Project Implementation

The City will be responsible for monitoring mitigation project implementation and closeout. If more than one department or agency is identified for a mitigation project, the mayor, or a designee, will work with the City Council and IRA

Council to identify a primary contact to monitor the mitigation project implementation and closeout. The designated contact will monitor the status of project implementation using the annual review form. The status of the project implementation and closeout will be included with each annual review. The annual review form will include the current status of the mitigation project, including any changes made to the project, total project costs and expected overruns, the identification of implementation problems and appropriate strategies to overcome them, and whether the project has helped to achieve the related goals identified in the plan.

Each overseeing organization and/or department will complete the report on a quarterly basis as a way to monitor and, if necessary, revise the project's implementation. Prior to each annual review, the overseeing agency and/or department will summarize the quarterly reports into one report and submit this report to the City and IRA Councils for review. The City and IRA Councils will review each report to determine whether progress has been made toward achieving the completion of each mitigation project, as well as the overall goals identified in the Mitigation Strategy.

Additionally, the report will be submitted annually to the Mayor, or a designee, who will oversee all of the grants associated with this plan. Finally, each overseeing agency will be required to submit a closeout report to the mayor or a designee, at the conclusion of any mitigation project.

5.3.2 Continued Public Involvement

Napakiak is dedicated to involving the public directly in the continual reshaping and updating of the LHMP. A downloadable copy of the LHMP and any proposed changes will be posted on DHS&EM website at http://www.ak-prepared.com/. This site will also list an e-mail address and telephone number that people can use to submit their comments or concerns.

The hazard mitigation planning committee will also identify opportunities to raise community awareness of the LHMP and the hazards that affect the area. This effort could include attendance and provision of materials at community-sponsored events, outreach programs, and public mailings. Any public comments received regarding the LHMP will be collected by the hazard mitigation planning committee leader, included in the annual report, and considered during future LHMP updates.

During the annual review process, the hazard mitigation planning committee will review the progress toward achievement of Mitigation Strategy goals and the implementation of mitigation projects. To assist this review, any organization or agency overseeing or implementing a mitigation project will submit a progress report to the hazard mitigation planning committee. The report will address the current project status including the following:

- Any changes made to the project.

- The identification of implementation problems and appropriate strategies to overcome them.
- Whether the project has helped achieve the related goals identified in the plan.

Finally, the hazard mitigation planning committee will review each progress report, as well as other relevant local, State, and Federal mitigation activities to determine if progress has been made toward achieving each goal identified in the mitigation strategy. A summary of the status of all mitigation projects will be presented to all interested parties and project stakeholders identified on the project mailing list during an annual LHMP update public meeting.

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Hazard Mitigation Planning and Disaster Preparedness Resources

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A.1 Federal Resources

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

- FEMA
  - Pre-Disaster Mitigation Assistance Program (PDM). Provides funds to state, tribes, and local entities, including universities, for hazard mitigation planning and implementation of mitigation projects prior to a disaster event. The total amount of PDM funding available is appropriated by Congress on an annual basis.
  - Hazard Mitigation Grant Program. Provides grants to states and local governments to implement long-term hazard mitigation measures after a major disaster declaration. http://www.fema.gov/government/grant/hmgp/
  - Mitigation Technical Assistance Program. Provides hazard mitigation technical assistance to local/tribal jurisdictions via the State of Alaska, which would be the eligible Applicant with FEMA. The State would then provide subgrants to local jurisdictions.
  - Flood Mitigation Assistance (FMA) Program assists States and communities implement measures that reduce or eliminate the long-term risk of flood damage to buildings, manufactured homes, and other structures insured under the National Flood Insurance Program (NFIP). http://www.fema.gov/government/grant/fma/index.shtm
  - Severe Repetitive Loss (SRL) Program provides provide funding to reduce or eliminate the long-term risk of flood damage to severe repetitive loss structures insured under the NFIP. http://www.fema.gov/government/grant/srl/index.shtm
  - Repetitive Flood Claims (RFC) Program provides funds to assist States and communities reduce flood damages to insured properties that have had one or more claims to the NFIP.
  - Emergency Management Institute. Offers various emergency management trainings, including hazard mitigation. http://training.fema.gov/
  - Disaster Assistance Available from FEMA. Discusses the procedures and process for obtaining Federal disaster

assistance and provides a brief overview of each program. http://www.fema.gov/assistance/process/assistance.shtm

- Publications
  - How-to Guides. A series of how-to guides to assist states, communities, and tribes in enhancing their hazard mitigation planning capabilities. (www.fema.gov/plan/mitplanning/resources.shtm#1).
  - FEMA DAP-12 "Post-Disaster Hazard Mitigation Planning Guidance for State and Local Government" (FEMA DAP-12, September 1990). Explains basic concepts of hazard mitigation and shows state and local governments how they can develop and achieve mitigation goals within the context of FEMA's post-disaster hazard mitigation planning requirements.
  - FEMA 372 "Mitigation Resources for Success CD" (FEMA 372, September 2001). Provides mitigation case studies, success stories, information about Federal mitigation programs, suggestions for mitigation measures to homes and businesses, appropriate relevant mitigation publications, and contact information.
  - FEMA 141 "The Emergency Management Guide for Businesses and Industry" (FEMA 141, October 1993.). Provides a step-by-step approach to emergency management planning, response, and recovery. It also details a planning process that businesses can follow to better prepare for a wide range of hazards and emergency events.
  - FEMA's Hazard Mitigation Assistance Unified Guidance. Guidance for FEMA's Hazard Mitigation Assistance (HMA) grant applications submitted during the FY 2012 grant cycle and for disasters occurring on or after June 1, 2010. FEMA's HMA grant programs provide funding for eligible mitigation activities that reduce disaster losses and protect life and property from future disaster damages including the Hazard Mitigation Grant Program (HMGP), Pre-Disaster Mitigation (PDM), Flood Mitigation Assistance (FMA), Repetitive Flood Claims (RFC), and Severe Repetitive Loss (SRL). (www.fema.gov/library/viewRecord.do?id=4225)

- Department of Agriculture. Programs include the Emergency Conservation Program, Non-insured Crop Disaster Assistance Program, Emergency Watershed Protection, Rural Housing Service, Rural Utilities Service, and Rural Business and Cooperative Service.

- Department of Energy (Office of Energy Efficiency and Renewable Energy). Weatherization Assistance Program helps minimize the adverse effects of high energy costs on low income, elderly, and handicapped citizens through client education activities and weatherization services.

- Department of Housing and Urban Development.

  - Section 108 Loan Guarantee Program. Provides loan guarantees as security for federal loans for acquisition, rehabilitation, relocation, clearance, site preparation, special economic development activities, and construction of certain public facilities and housing.

  - Community Development Block Grants Program (CDBG). Provides grant assistance and technical assistance to aid communities in planning activities that address issues detrimental to the health and safety of local residents, such as housing rehabilitation, public services, community facilities, and infrastructure improvements that would primarily benefit low-and moderate-income persons.

- Department of Labor (Employment and Training Administration). Disaster Unemployment Assistance provides weekly unemployment subsistence grants for those who become unemployed because of a major disaster or emergency. Applicants must have exhausted all benefits for which they would normally be eligible.

- Federal Financial Institutions. May waive Certificate of Deposit and retirement early withdrawal penalties if funds are used for disaster recovery.

- Internal Revenue Service. Provides tax relief by providing extensions to current year's tax returns, allows deductions for disaster losses and allows amendments of previous tax returns to reflect loss back to three years.

- Small Business Administration. May provide disaster loans to individuals and businesses that have suffered a loss due to a disaster.

- American Planning Association. Serves as a resource for planners, elected officials, and citizens concerned with planning and growth initiatives.

- Institute for Business and Home safety. Provides information on hazards and ways to protect property from damage.

A.2 State Resources

- Alaska Department of Military and Veteran's Affairs, Division of Homeland Security and Emergency Management (DHS&EM). Responsible for improving hazard mitigation technical assistance for local governments in Alaska. Provides hazard mitigation training, provides current hazard information, and facilitates communication with other agencies to enhance local hazard mitigation efforts. Website: http://ready.alaska.gov/plans/mitigation/mitigati.htm

- Alaska Department of Commerce, Community, and Economic Development, Division of Community and Regional Affairs, Floodplain Management Program. Provides coordination, funding, and technical assistance to National Flood Insurance Program (NFIP) communities to reduce public and private sector losses and damage caused by flooding and erosion. Website: http://www.commerce.state.ak.us/dca/planning/nfip/nfip.htm

- Alaska Department of Commerce, Community, and Economic Development, Division of Insurance. Provides assistance in obtaining copies of policies and provides information regarding filing claims. Website: http://www.dced.state.ak.us/insurance/

- Alaska Department of Commerce, Community, and Economic Development, Division of Community and Regional Affairs, CDBG Program. The goals of the Alaska CDBG are to provide financial resources to Alaskan communities for public facilities and planning activities that address issues detrimental to the health and safety of local residents and to reduce the costs of essential community services. The program may also fund Special Economic Development activities that result in the creation of jobs for low and moderate income persons. Website: http://www.commerce.state.ak.us/dcra/grt/blockgrants.htm

- Alaska Department of Health and Social Services, Division of Senior and Disabilities Services. Provides resources for seniors, including food, shelter and clothing. Website: http://www.hss.state.ak.us/dsds/

- Department of Health and Social Services, Section of Injury Prevention and Emergency Medical Services (EMS) Program. The mission of the EMS program in Alaska provides leadership in EMS by consensus building, developing and administering guidelines and regulations, and by developing and distributing publications for planning, treatment, and evaluation. The overall goal of the EMS program is to prevent life-threatening and disabling injuries whenever possible and to establish a comprehensive, coordinated system of emergency medical services.

- Department of Environmental Conservation. Primary roles and responsibilities concerning hazard mitigation are ensuring safe food and safe water, and pollution prevention and pollution response. Ensures water treatment plants, landfills, and bulk fuel storage tank farms are safely constructed and operated in communities. Agency and facility response plans include hazards identification and pollution prevention and response strategies.

- Department of Forestry. Participates in a statewide wildfire control programs in cooperation with the forest industry, rural fire departments and other agencies.

- Department of Transportation and Public Facilities. Provides technical assistance to various emergency management programs, to include mitigation. Assistance includes, but is not limited to: environmental reviews, archaeological surveys, historic preservation reviews, and coordination of buyout projects.

- Alaska Department of Natural Resources. Administers various projects designed to reduce stream bank erosion, reduce localized flooding, improve drainage, and improve discharge water quality through the storm water grant program funds.

A.3 Other Funding Sources and Resources

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

- American Red Cross. Provides for the critical needs of individuals such as food, clothing, shelter, and supplemental medical needs. Provides recovery needs such as furniture, home repair, home purchasing, essential tools, and some bill payment.

- Crisis Counseling Program. Provides grants to state and borough mental health departments, which in turn provide training for screening, diagnosing, and counseling techniques. Also provides

funds for counseling, outreach, and consultation for those affected by disaster.

A.4 Local Resources

- Napakiak Community Plan, 2010.
- Napakiak 5-Year Comprehensive Community Plan, 2006.
- Napakiak Local Hazard Mitigation Plan, 2011.

B Materials Consulted and Cited

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Local

Napakiak Community Plan, 2010.

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State

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C Public Involvement

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You are invited

to attend an informational meeting regarding planning activities for the Napakiak All-Hazard Mitigation Plan

Location: Bingo Hall

Tuesday, May 25, 2010
at 2:00 p.m.

Learn about

the planning efforts that are underway and how you can participate in developing this local all-hazard mitigation plan for the Napakiak community. The focus of this planning process is to identify natural hazards, risks to life safety and protection of property and critical facilities, and any actions that can reduce or eliminate long-term risk to life and property from a hazard event.

This community based planning process can only happen with your participation. Attend the meeting and volunteer as a member of the Hazard Mitigation Planning Group. Share your disaster experience and assist in this community planning effort.

The goal of mitigation is to save lives and reduce property damage — before disaster strikes.

By Dave Saville/FEMA News Photo

By Alaska DOTPF

By Alaska State DEC

By Ben Brennan/FEMA

Background Photo By State of Alaska

Local Hazard Mitigation Planning Involves *You*

The State of Alaska Division of Homeland Security and Emergency Management (DHS&EM) is tasked with developing local and tribal government All-Hazard Mitigation Plans that comply with the Robert T. Stafford Disaster Relief and Emergency Assistance Act of 1988, as amended with the Disaster Mitigation Act of 2000 (DMA 2000). These mitigation plans ensure direct involvement of communities to identify all potential hazards, to assess the risk to their populations, to analyze the vulnerability of their infrastructure, and to allow them to develop strategies to address all aspects of the hazards affecting their communities. Your community is one of 10 communities selected by the state to receive technical assistance in developing a Local Hazard Mitigation Plan (LHMP).

Project Background

The Alaska DHS&EM selected your community for a Hazard Mitigation Planning project. The project is funded through Federal Emergency Management Agency (FEMA) Federal Fiscal Year 2009 Pre-Disaster Mitigation Competitive Grant Program. The state hired Ecology and Environment, Inc., (E & E) to assist in preparing an LHMP that will:

- Identify natural hazards that affect your community including erosion, flood, severe weather, and wildland fire.
- Identify people and facilities that are at risk from hazards that could cause injury, property damage, or environmental harm.
- Identify projects and activities to reduce the impact of hazards on the community that are focused on saving lives and reducing property damage.

What is Hazard Mitigation?

Hazard Mitigation: Mitigation, also known as prevention, encourages long-term reduction of the community's vulnerability to natural hazards. Sustained mitigation actions or strategies are taken by communities to reduce or eliminate the long-term risk to human life and property from natural hazards.

Hazard Mitigation Requirement: Under the Stafford Act and DMA 2000, local, tribal, and state governments are required to take a risk-based approach to develop hazard mitigation plans. These plans identify specific mitigation needs and projects to reduce hazards, reduce exposure to hazards, or reduce the effects of hazards.

Hazard Mitigation Grant Program (HMGP): The HMGP is funded through the FEMA with matching funds from the State of Alaska. The HMGP helps local communities implement long-term hazard mitigation measures after a major disaster declaration.

Pre-Disaster Mitigation (PDM): This grant provides funds on an annual basis for hazard mitigation planning and implementation of mitigation projects prior to a disaster. The goal is to reduce overall risk to the population and structures while reducing reliance on federal disaster declarations.

What is the Local Hazard Mitigation Planning Process?

To plan for hazard mitigation, community members collaborate with state representatives to evaluate hazards and figure out how to reduce or eliminate life and property loss. The planning process happens at a community level through a 4-step process.

Step 1: Organize Resources

- Get involved with efforts to coordinate local community with state efforts.
- Engage the community to assist in the planning effort.

Step 2: Assess Risks

- Identify and evaluate natural hazards based on past emergency incidents.
- Identify critical facilities and vulnerabilities within the community.
- Compile hazard profiles to conduct a risk assessment and prepare damage loss estimates.

Step 3: Make the Local Hazard Mitigation Plan

- Develop the LHMP including a mitigation strategy and action plan based on the risk assessment and community mitigation goals.
- Determine mitigation goals for what the community wants to achieve in terms of hazard and loss prevention.

Step 4: Execute and Monitor Plan

- Formally adopt the LHMP and provide the document to the DHS&EM and FEMA for review and approval.
- Execute recommendations, evaluate and update plan periodically or after a disaster event.

Why Are You Attending the Public Meeting?

Tonight's meeting is the first step in the process to establish a local planning workgroup and to gather public comments and concerns. We will:

- Review the list of hazards in the State Hazard Mitigation Plan that apply to this community.
- Identify other hazards your community would like to address including permafrost erosion, flood, severe weather, and wildland fires.
- Sign-up community members to form a Hazard Mitigation Planning Group.

What is the Hazard Mitigation Planning Group?

The Hazard Mitigation Planning Group will work with E & E to develop the LHMP that represents the community-wide vision for mitigation goals, actions, and projects. The planning group will meet periodically to review documents and to provide valuable input on local issues of hazards, risks, mitigation strategies, and implementation.

For More Information

We encourage your participation and your thoughts on this important project. If you have any questions, comments, or requests for more information, please contact:

Vivian Melde, E & E Project Manager, 3301 C Street, Suite 209, Anchorage, AK 99503
Email: vmelde@ene.com
Telephone: (907) 257-5000, Ext. 3305; Fax: (907) 257-5007

Additional Resources

State of Alaska Division of Homeland Security and Emergency Management: http://www.ak-prepared.com
Federal Emergency Management Agency: http://www.fema.gov/
Hazard Mitigation Assistance Grants: http://www.fema.gov/government/grant/hma/index.shtm

The E & E team looks forward to working with you and your community on this Local Hazard Mitigation Plan Project!

Insert E&E logo

5/25/2010

PLEASE SIGN IN

[redacted]

[redacted]

First Name	Last Name	Address	Email
Lawrence	Black	Box 34069 Napakiak AK 99634	napakiak@unicom-alaska.com
RICHARD	Jung	P.O. BOX 34029 NAPAKIAK AK 99634	
WALTER	NELSON	PO BOX 34013 NAPAKIAK	
Paulette	Denkins	P.O. BOX 34075 Napakiak, AK	napakiakepa@yahoo.com
Ivy Alushak	Alushak	P.O. Box 34005 Napakiak AK 99634	
Nora Rickteroff		P.O. 45 Napakiak AK 99634	
Nicholas	Paul	Box 82 Napakiak, AK	

Insert E&E logo

5/25/2010

PLEASE SIGN IN

[redacted]

[redacted]

First Name	Last Name	Address	Email
Canyn ~~Black~~	Black	Napakiak	
Jacob N. Black	Black	NAPAKIAK	
Tony ~~Larson~~	Larson	Napakiak	
Gordon Nelson		Napakiak	
Alexie	Michael	[redacted] Napakiak	
AYAGALRIA	Robert Sr	[redacted] Napakiak	
Billy	Molly M	[redacted] Napakiak AK 99634	

Insert E&E logo

5/25/2010

PLEASE SIGN IN

[Sign in Sheet for Napakiak

Date of Meeting: 05-25-10

First Name	Last Name	Address	Email
Mary	Billy	[redacted] Napakiak AK 99634	
Ole E Ayagalri			

Yes! I'm interested in participating in the Local Hazard Mitigation Planning Team

Name	Contact Information (phone and email)
Molly M Billy	[redacted]
Richard Jung	[redacted]
Molly Black	[redacted]
Paulella Jenkins	[redacted]
Walter Nelson	[redacted]
Alexie Michael	[redacted]
Jacob N. Black	[redacted]

5/25/2010

Napakiak LHMP Planning Meeting/Teleconference

December 21, 2010

Napakiak Community Members:
Caryn Black
Jacob N. Black
Molly Black
Christine Amos
Richard Jung
Walter Nelson
Nicholas Paul

Ecology and Environment, Inc.
Liza Sanden, Planner
Vivian Melde, Planner

Alaska Department of Military and Veterans Affairs,
Division of Homeland Security and Emergency Management
Jennifer Adleman, Planner

Meeting Summary: Meeting participants discussed the Sections 1-3 of the Napakiak LHMP. Prior to this call, the City Council and Tribal Council reviewed the draft plan during their November council meetings. Both councils recommended additions and changes; these were discussed and addressed in the LHMP. There was further discussion on the history of flooding and erosion; the extent of erosion during the 2010 Summer/Fall season; and previous mitigation projects – primarily building relocations.

Napakiak LHMP Planning Meeting/Teleconference

May 20, 2011

Napakiak Community Members:
Mary Frye
Molly Black
Richard Jung
Daniel Nelson
Caryn Black
Leo Kusayak

Ecology and Environment, Inc.
Liza Sanden, Planner

Alaska Department of Military and Veterans Affairs,
Division of Homeland Security and Emergency Management
Chris Tomsen, Planner

Meeting Summary: Meeting participants discussed the mitigation strategy in the Napakiak LHMP. Prior to this call, the City Council and Tribal Council reviewed the plan during their monthly public meetings on May 10, 2011 and May 12, 2011, respectively. The City Council made some additions and corrections to the plan which were discussed during this meeting and included in the plan.

Community Local Hazard Mitigation Plan Survey

The Federal Emergency Management Agency (FEMA) awarded the State of Alaska, Department of Military and Veterans Affairs (DMVA), Division of Homeland Security and Emergency Management (DHS&EM), a Pre-Disaster Mitigation Program grant to prepare Hazard Mitigation Plans for ten communities in Alaska, which includes a plan for Napakiak. The federal requirements under the Disaster Mitigation Act of 2000 (DMA 2000), which amends Section 322 of the Robert P. Stafford Disaster Relief and Emergency Assistance Act, provides for States, Tribes, and local governments to undertake a risk-based approach to reducing risks to natural hazards through mitigation planning. Under Title 44 of the Code of Federal Regulations, § 201.6, local governments must have an approved Local Hazard Mitigation Plan (LHMP) in order to apply for and receive project grants under the following hazard mitigation assistance programs:

- Hazard Mitigation Grant Program – A disaster related assistance program in which applicants typically compete on a statewide basis; and
- Pre-Disaster Mitigation Grant Program – A hazard mitigation planning program grant available for States, Territories, Indian Tribal governments, and local communities to implement a sustained pre-disaster natural hazard mitigation planning and mitigation projects to reduce overall risk to the population and structures from future hazard events.

One of the essential requirements during the development of this plan is an open public involvement process that provides community members an opportunity to participate throughout the life of the plan. This Community LHMP Survey provides you with an opportunity to participate in this community-based planning process. The purpose of the LHMP is to identify and assess your community's natural hazard risks and to determine how to best minimize or manage those risks.

This survey is an opportunity for you to share your opinions and participate in the mitigation planning process. The information that you provide will help us better understand your concerns for hazards and risks, which could lead to mitigation activities that will help reduce those risks and the impacts of future hazard events.

The hazard identification process is not complete without your feedback. All individual responses are strictly confidential and will be used for mitigation planning purposes only.

Please help us by taking a few minutes to complete this survey and return it by

June 11, 2010 to:

Tina Wassillie, City of Napakiak –or-

Liza Sanden Ecology and Environment, Inc.
3301 C Street #209 Anchorage, AK 99508

Vulnerability Assessment

The following questions focus on how vulnerable the community or its facilities are to damage from a particular hazard type using the following vulnerability scale:

0= Don't Know 1=Minimally Vulnerable 2=Moderately Vulnerable 3=Severely Vulnerable

1. How vulnerable to damage are the structures in the community:
   a. Flooding? 0 1 2 3
   b. Wildfire? 0 1 2 3
   c. Earthquakes? 0 1 2 3
   d. Volcanoes? 0 1 2 3
   e. Snow Avalanche? 0 1 2 3
   f. Tsunami/Seiches? 0 1 2 3
   g. Severe weather storms? 0 1 2 3
   h. Ground failure (landslide, permafrost)? 0 1 2 3
   i. Coastal erosion? 0 1 2 3
   j. Other hazards? 0 1 2 3
   Please specify:

2. How vulnerable to damage are the critical facilities within your community to: [Critical facilities include airport, community shelter, bulk fuel storage tanks, generators, health clinic, law enforcement office (VPO, VPSO, police department), school, public works, e.g. washeteria,/water treatment, reservoir/water supply, satellite dish, communications tower, landfills, sewage lagoons, and stores.]
   a. Flooding? 0 1 2 3
   b. Wildfire? 0 1 2 3
   c. Earthquakes? 0 1 2 3
   d. Volcanoes? 0 1 2 3
   e. Snow Avalanche? 0 1 2 3
   f. Tsunami/Seiches? 0 1 2 3
   g. Severe weather storms? 0 1 2 3
   h. Ground failure (landslide, permafrost)? 0 1 2 3
   i. Coastal erosion? 0 1 2 3
   j. Other hazards? 0 1 2 3
   Please specify:

3. How vulnerable to displacement, evacuation or life-safety of the community to:
   a. Flooding? 0 1 2 3
   b. Wildfire? 0 1 2 3
   c. Earthquakes? 0 1 2 3
   d. Volcanoes? 0 1 2 3
   e. Snow Avalanche? 0 1 2 3
   f. Tsunami/Seiches? 0 1 2 3
   g. Severe weather storms? 0 1 2 3

h. Ground failure (landslide, permafrost)? 0 1 2 3
i. Coastal erosion? 0 1 2 3
j. Other hazards? 0 1 2 3
Please specify:

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

If yes, please describe:_____

_____

_____

Preparedness

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

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

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

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

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

❑	Less than $100	❑	Desire to relocate for protection
❑	$100 - $499	❑	Other, please explain
❑	$500 and above		
❑	Nothing / Don't know		
❑	Whatever it takes		

Mitigation Activities

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

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

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

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

_____

_____

_____

_____

_____

General Household Information

9. Please indicate your age:_____ Gender: ❑ Male ❑ Female

10. Please indicate your level of education:

❑	Grade school/no schooling	❑	College degree
❑	Some high school	❑	Postgraduate degree
❑	High school graduate/GED	❑	Other, please specify
❑	Some college/trade school		

11. How long have you lived in Napakiak?

❑ Less than 5 years ❑ 10 - 20 years

❑ 5 - 10 years ❑ Entire Life

12. Do you have access to the Internet? ❑ Yes ❑ No

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

If you have any questions regarding this survey or would like to learn about other ways that you can participate in the development of the Local Hazard Mitigation Plan, please contact the City of Napakiak offices.

Thank You For Your Participation!

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

Name:_____

Address:_____

Phone:_____

Hazard Identification and Risk Assessment Background

The hazard analysis is one of the requirements within the hazard mitigation planning process and the basis for both emergency planning and mitigation planning. For mitigation planning purposes, this first step within the process is to determine which hazards potentially threaten a community and assess how vulnerable a community is to those risks. Risk Assessment is the process of measuring the potential loss of life, personal injury, economic injury, and property damage resulting from hazards. Four steps help communities accomplish this risk assessment process: 1) Identify hazards; 2) profile hazard events; 3) inventory assets; and 4) estimate losses.

The Local Hazard Mitigation Plan (LHMP) Survey will gather the initial hazard information to help develop mitigation actions and strategies that reduce the impacts of natural hazards on the community. The LHMP Survey consists of two parts: 1) The *Hazard Analysis Worksheet* focuses on the Hazard Mitigation Planning Group gathering information about hazards affecting the community. 2) The *Community LHMP Survey* focuses on gathering community input for hazard vulnerability risks.

The *Hazard Analysis Worksheet* looks at natural hazards and their potential impacts on the community, and measures potential loss of life, personal injury, economic impacts, and property damage. This information helps to create a hazard profile for the most likely and threatening hazards affecting the community. Using this worksheet, the Hazard Mitigation Planning Group will go through the types of hazards, describe each hazard based on historical accounts of past events, and assign a numeric score for each criterion. The worksheet provides a risk-based analysis to determine potential costs associated with hazards and to focus areas on realistic and feasible mitigation strategies. While there are many different natural hazards that may affect the community, some hazards are more likely to cause significant impacts and damages than others. Other vulnerabilities and risks may affect the community because of the geographic location and population density of the community.

The *Community LHMP Survey* provides an opportunity for community participants to consider how vulnerable people, facilities, structures, and properties may be to natural hazards. Community members respond to the questions based on their knowledge and observations from past events to provide their evaluation of all hazards. This survey also collects suggestions from community members on mitigation activities that help prioritize mitigation goals and strategies.

Mitigation Planning Group members should complete the Hazard Analysis Worksheet first individually and then review as a group during a follow-up teleconference meeting with an E & E planner. The Mitigation Planning Group leader should distribute the Community LHMP Survey to members of the community. We recommend providing two weeks for community members to complete and return the survey. The completed worksheets and surveys should be returned to the Mitigation Planning Group lead or to:

Vivian Melde, E & E Project Manager, 3301 C Street, Suite 209, Anchorage, AK 99503
Email: vmelde@ene.com, Telephone: (907) 257-5000, Ext. 3305, Fax: (907) 257-5007

Next Step: Once hazards have been identified and profiled, the Mitigation Planning Group and E & E will work on evaluating potential losses to structures and property due to these hazards for the community. If you have any questions, comments, or concerns please contact Ms. Melde.

Hazard Analysis Worksheet

The Alaska State All-Hazard Risk Mitigation Plan (October 2007) identifies the following natural hazards to which the state is specifically vulnerable. Our research and community surveys may reveal additional hazards to be considered, which are not listed below. E & E will evaluate the following hazards to determine which hazards pose the most significant risks to your community. This evaluation will be based on the information provided by the Mitigation Planning Group via survey responses, documented past hazards, and local knowledge:

- **Flooding** – A general and temporary condition of partial or complete flooding of normally dry land from the following: (a) rainfall-runoff; (b) snowmelt; (c) buildup of ice/ice jams; and (d) glacial outbursts (jökulhlaup).
- **Wildfire** – May be a wildland fire, urban interface fire, firestorm, prescribed fire, or prescribed natural fire.
- **Earthquake** – A sudden motion of the ground due to plate tectonics, resulting in ground rupture, ground shaking, or ground failure (collapse).
- **Volcanoes** – A solid structure created when lava, gases, and hot particles escape to the Earth's surface. Category includes active and dormant volcanoes only.
- **Snow Avalanche** – A slope failure caused when a mass of snow slides down a hillside.
- **Tsunami/Seiches** – An ocean wave produced by a sub-marine earthquake, landslide, or volcanic eruption. These waves may reach enormous dimensions and travel across entire oceans.
- **Severe Weather Storms** – Severe weather includes winter weather, thunder and lightning, hail, high wind, storm surge, coastal storms, and drought.
- **Ground Failure** – Includes ground failure caused by melting permafrost, land subsidence (sink holes), and landslides of fast moving soil, rock and other material as well as rock breaking free from a cliff or slope.
- **Erosion** – The transportation and movement of land. Can be, but is not always, gradual. Flash flood, coastal storms, or other events may result in quick erosion.
- **Other**- Identification of additional hazards that are important to the community

The Hazard Analysis Worksheet scores each of the hazards listed above based on frequency, onset, duration, affected structures, structural impact, community impact, recovery time, and mitigation options. Below is the description of how each component is defined and how it will be scored.

Probability

- How often the hazard has occurred based on recent and past events?

Level

1 **Unlikely:** No hazard event in the last 100 years
2 **Likely:** 1 - 10 hazard events in the last 100 years
3 **Highly Likely:** 11 or more hazard events in the last 100 years

---

Onset

- How much warning does the community receive to prepare for the hazard?

Level

0 More than 1 week
1 Several days warning
2 1 day warning
3 Several hours warning
4 No warning

Duration

- How long does the hazard actively impact the community?

Level

0 Less than 1 day
1 1 day
2 2 - 3 days
3 4 or more days
4 Longer than 1 week

Affected Structures

- Number of structures that are affected by the hazard?

Level

0 **None**
1 **Small**: 1 building
2 **Medium**: 2 - 10 buildings
3 **Large**: more than 10 buildings

Structural Impact

- How much damage is caused to building structures or property in the community?

Level

0 **None**
1 **Negligible**: Little damage to buildings or property
2 **Moderate**: Some damage to building or property
3 **Critical**: Severe damage to buildings or property

Community Impact

- How does the hazard impact the ability of the community to function because of displacement or evacuation, or life safety issues?

Level

0 **None**
1 **Negligible:** No displacement time or evacuation. Serious injury or death unlikely.
2 **Limited:** Some displacement time or evacuation. Serious injury or death likely in small numbers of people (less than 10).
3 **Moderate:** Serious loss of function, displacement, or evacuation. Serious injury or death likely to large numbers of people (10-20).
4 **Critical:** Major loss of function, displacement, or evacuation. Serious injury or death to extremely large numbers of people (more than 20).

Recovery Time

- How long does it take the community to recovery, or return to normal functions, after the hazard?

Level

0 Less than 1 day
1 1 - 2 days
2 3 days to 1 week
3 1 - 2 weeks
4 more than 2 weeks

Mitigation Options

- What type of cost-effective mitigation options are available to reduce impact of hazard?

Level

0 **None**
1 **Many**: Over 3 mitigation options
2 **Several**: 2 - 3 mitigation options
3 **Few:** 1 mitigation option

Hazard Analysis Worksheet

HAZARD TYPE	PROBABILITY	ONSET	DURATION	AFFECTED STRUCTURES	STRUCTURAL IMPACT	COMMUNITY IMPACT	RECOVERY TIME	MITIGATION OPTIONS
	Likelihood hazard will occur	*Advance hazard warning*	*Length of hazard activity*	*Number of structures affected*	*Damage to buildings or property in community*	*Impact community functions and life-safety*	*Time to return to normal operations*	*Preplanning*
Score	1=Unlikely 2= Likely 3= Highly Likely	0= >1 week 1= Several days 2= 24 hours 3= Several hours 4= No Warning	0= < 24 hrs 1= 24 hours 2= 2 - 3 days 3= 4 - 7 days 4= > 1 week	0= None 1= Small 2= Medium 3= Large	0= None 1= Negligible 2= Moderate 3= Critical	0= None 1= Negligible 2= Limited 3= Moderate 4= Critical	0= < 24 hrs 1= 1 - 2 days 2= 3 - 7 days 3= 1 - 2 weeks 4= >2 weeks	0= None 1= Many 2= Several 3= Few
Flooding								
Wildfire								
Earthquake								
Volcanoes								
Snow Avalanche								
Tsunami/Seiches								
Severe Weather Storms								
Ground Failure (landslides, subsidence, permafrost)								
Erosion								
Other:								
Other:								
Other:								

D Adoption Resolution

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CITY OF NAPAKIAK
P.O Box 34009
Napakiak, Alaska 99634
Ph.(907) 589-2611 Fax (907) 589-2612

ADOPTION RESOLUTION 2011-04

Adopting the Napakiak Local Hazard Mitigation Plan

WHEREAS, the City of Napakiak, with the assistance from Ecology and Environment, Inc., has gathered information and prepared the Napakiak Local Hazard Mitigation Plan; and

WHEREAS, the Napakiak Local Hazard Mitigation Plan has been prepared in accordance with the Disaster Mitigation Act of 2000; and

WHEREAS, the City of Napakiak is a local unit of government that has afforded the citizens an opportunity to comment and provide input in the Plan and the actions in the Plan; and

WHEREAS, the City of Napakiak has reviewed the Plan and affirms that the Plan will be updated no less than every five years; and

WHEREAS, the citizens recognize the threat that local hazards pose to people and property; and

WHEREAS, undertaking hazard mitigation projects before disasters occur will reduce the potential for harm to people and property and save taxpayer dollars; and

NOW THEREFORE BE IT RESOLVED by the City Council that the City of Napakiak adopts the Napakiak Local Hazard Mitigation Plan as this jurisdiction's Natural Hazard Mitigation Plan, and resolves to execute the actions in the Plan.

This resolution was adopted at the meeting in which a quorum of the City Council of the City of Napakiak was present. Pass and Approved on this 22nd day of August, 2011. With a vote of 6 ayes, 0 nays, 1, excused, 0 abstain, 0 absent.

(JUNG)
(City Mayor)

(Clerk)

NATIVE VILLAGE OF NAPAKIAK
IRA COUNCIL
P.O Box 34069
Napakiak, Alaska 99634
Ph.(907) 589-2135 Fax (907) 589-2136

ADOPTION RESOLUTION 2011-22

Adopting the Napakiak Local Hazard Mitigation Plan

WHEREAS, the Native of Village Napakiak, with the assistance from Ecology and Environment, Inc., has gathered information and prepared the Napakiak Local Hazard Mitigation Plan; and

WHEREAS, the Napakiak Local Hazard Mitigation Plan has been prepared in accordance with the Disaster Mitigation Act of 2000; and

WHEREAS, the Native Village of Napakiak is a local unit of government that has afforded the citizens an opportunity to comment and provide input in the Plan and the actions in the Plan; and

WHEREAS, the Native Village of Napakiak has reviewed the Plan and affirms that the Plan will be updated no less than every five years; and

WHEREAS, the citizens recognize the threat that local hazards pose to people and property; and

WHEREAS, undertaking hazard mitigation projects before disasters occur will reduce the potential for harm to people and property and save taxpayer dollars; and

NOW THEREFORE BE IT RESOLVED by the IRA Council that the Native Village of Napakiak adopts the Napakiak Local Hazard Mitigation Plan as this jurisdiction's Natural Hazard Mitigation Plan, and resolves to execute the actions in the Plan.

This resolution was adopted at the meeting in which a quorum of the Native Village of Napakiak IRA Council was present. Pass and Approved on this 22nd day of August, 2011. With a vote of 5 ayes, 0 nays, 2 excused, 0 abstain, 0 absent.

Jacob N. Black (BLACK)
(IRA Tribal Council President)

Louise Andrew
(Secretary)

E Hazard Analysis

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In the Hazard Analysis, each of the hazards and threats described in the LHMP is scored using a formula that incorporates four independently weighted rating criteria (history, vulnerability, maximum threat, probability) and three levels of severity (low, moderate, and high). For each hazard, the score for a given rating criterion is determined by multiplying the criterion's severity rating by its weight factor. The four rating criteria scores for the hazard are then summed to provide a total risk score for that hazard. Note that while many hazards may occur together or as a consequence of others (e.g., dam failures cause flooding, and earthquakes may cause landslides), this analysis considers each hazard as a singular event.

Table 4-1 City Hazard Analysis Matrix

Hazard	Rating Criteria with Weight Factors				Total Score
	History [1] (WF=2)	Vulnerability [2] (WF=5)	Max Threat [3] (WF=10)	Probability [4] (WF=7)	
Score for each rating criteria = Rating Factor (High = 10 points; Moderate = 5 points; Low = 1 point) X Weight Factor (WF)					
Drought	Low - 1	Low - 1	Low - 1	Low - 1	**24**
Earthquake	Low - 1	Moderate - 5	Moderate - 5	Low - 1	**84**
Erosion	High - 10	High - 10	High - 10	High - 10	**222**
Flood	High - 10	High - 10	High - 10	High - 10	**222**
Food and Agriculture	Moderate - 5	High - 10	Moderate - 5	Moderate - 5	**145**
Oil and Hazardous Materials	Moderate - 5	Moderate - 5	Moderate - 5	Moderate - 5	**120**
Public Health	Moderate - 5	Moderate - 5	Moderate - 5	Moderate - 5	**120**
Severe Weather	Moderate - 5	Low - 1	Moderate - 5	High - 10	**135**
Terrorism	Low - 1	Low - 1	Low - 1	Low - 1	**24**
Tsunami	Very Low Risk	Very Low Risk	Very Low Risk	Very Low Risk	**0**
Volcano	Low - 1	Low - 1	Moderate - 5	Low - 1	**64**
Wildfire	Low - 1	Low - 1	Moderate - 5	Low - 1	**64**

Notes:
1. History addresses the record of previous major emergencies or disasters. Weight Factor is 2. Rating factors: high = 4 or more events in last 100 years; moderate = 3 events in last 100 years; low = 1 or 0 events in last 100 years.
2. Vulnerability addresses the percentage of population or property likely to be affected by a major emergency or disaster. Weight Factor is 5. Rating factors: high = more than 10% affected; moderate = 1%–10% affected; low = less than 1% affected.
3. Maximum Threat addresses the percentage of population or property that could be affected in a worst case incident. Weight Factor is 10. Rating factors: high = more than 25% could be affected; moderate = 5%–25% could be affected; low = less than 5% could be affected.
4. Probability addresses the likelihood of a future major emergency or disaster within a specified period of time. Weight Factor is 7. Rating factors: high = one incident within a 10-year period; moderate = one incident within a 50-year period; low = one incident within a 100-year period.

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F Acronyms and Glossary

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Acronyms

CDBG	Community Development Block Grant
CFR	Code of Federal Regulations
DHS&EM	State of Alaska, Division of Homeland Security and Emergency Management
DMA 2000	Disaster Mitigation Act of 2000
DOF	Division of Forestry
DOT&PF	Department of Transportation and Public Facilities
E & E	Ecology and Environment, Inc.
EMS	Emergency Medical Service
FMA	Flood Mitigation Assistance (Grant Program)
FEMA	Federal Emergency Management Agency
FIRM	Flood Insurance Rate Map
HMGP	Hazard Mitigation Grant Program
IRA	Indian Reorganization Act of 1934
LHMP	Local Hazard Mitigation Plan
NRCS	Natural Resources Conservation Service
PDM	Pre-Disaster Mitigation Program
SHMO	State Hazard Mitigation Officer
U.S.	United States
USACE	U.S. Army Corps of Engineers
USGS	U.S. Geological Survey

Glossary of Key Terms

Acquisition: Local governments can acquire lands in high hazard areas through conservation easements, purchase of development rights, or outright purchase of property.

All Hazards: Any incident caused by terrorism, natural disasters, or any CBRNE accident. Such incidents require a multi-jurisdictional and multi-functional response and recovery effort.

Asset: Any manmade or natural feature that has value, including, but not limited to people; buildings; infrastructure like bridges, roads, and sewer and water systems; lifelines like electricity and communication resources; or environmental, cultural, or recreational features like parks, dunes, wetlands, or landmarks.

Borough: The basic unit of local government in Alaska.

Building: A structure that is walled and roofed, principally above ground and permanently affixed to a site. The term includes a manufactured home on a permanent foundation on which the wheels and axles carry no weight

Building Code: The regulations adopted by a local governing body setting forth standards for the construction, addition, modification, and repair of buildings and other structures for the purpose of protecting the health, safety, and general welfare of the public

Community: Any state, area or political subdivision thereof, or any Indian tribe or tribal entity that has the authority to adopt and enforce statutes for areas within its jurisdiction.

Community Rating System (CRS): The Community Rating System is a voluntary program that each municipality or county government can choose to participate in. The activities that are undertaken through CRS are awarded points. A community's points can earn people in their community a discount on their flood insurance premiums.

Critical Facility: Facilities that are critical to the health and welfare of the population and that are especially important during and after a hazard event. Critical facilities include, but are not limited to, shelters, hospitals, and fire stations.

DHS&EM: Alaska Division of Homeland Security and Emergency Management provides critical services to the State of Alaska to protect lives and property from terrorism and all other hazards, as well as to provide rapid recovery from all disasters.

DMVA: Alaska Department of Military and Veterans Affairs is in charge of the State's military resources, including Alaska Army and Air National Guard, 103rd

Civil Support Team, DHS&EM, Alaska Military Youth Academy, Alaska Space & Missile Defense, Alaska State Defense Force, State Veterans Affairs Office, and Commander Alaska Naval Militia.

Development: Any man-made change to improved or unimproved real estate, including but not limited to buildings or other structures, mining, dredging, filling, grading, paving, excavation or drilling operations or of equipment or materials.

Digitize: To convert electronically points, lines, and area boundaries shown on maps into x, y coordinates (e.g., latitude and longitude, universal transverse mercator (UTM), or table coordinates) for use in computer applications.

Disaster Mitigation Act: DMA 2000 (public Law 106-390) is the latest legislation of 2000 (DMA 2000) to improve the planning process. It was signed into law on October 10, 2000. This new legislation reinforces the importance of mitigation planning and emphasizes planning for disasters before they occur.

Earthquake: A sudden motion or trembling that is caused by a release of strain accumulated within or along the edge of the earth's tectonic plates.

Emergency Operations Plan: A document that: describes how people and property will be protected in disaster and disaster threat situations; details who is responsible for carrying out specific actions; identifies the personnel, equipment, facilities, supplies, and other resources available for use in the disaster; and outlines how all actions will be coordinated.

Federal Disaster Declaration: The formal action by the President to make a State eligible for major disaster or emergency assistance under the Robert T. Stafford Relief and Emergency Assistance Act, Public Law 93-288, as amended. Same meaning as a Presidential Disaster Declaration

Federal Emergency Management Agency (FEMA): A federal agency created in 1979 to provide a single point of accountability for all federal activities related to hazard mitigation, preparedness, response, and recovery.

Flood Insurance Rate Map: Flood Insurance Rate Map (FIRM) means an official map of a community, on which the Administrator has delineated both the special hazard areas and the risk premium zones applicable to the community.

Geographic Information System: A computer software application that relates physical features of the earth to a database that can be used for mapping and analysis.

Governing Body: The legislative body of a municipality that is the assembly of a borough or the council of a city.

Hazard: A source of potential danger or adverse condition. Hazards in the context of this plan will include naturally occurring events such as floods,

earthquakes, tsunami, coastal storms, landslides, and wildfires that strike populated areas. A natural event is a hazard when it has the potential to harm people or property.

Hazard Event: A specific occurrence of a particular type of hazard.

Hazard Identification: The process of identifying hazards that threaten an area.

Hazard Mitigation: Any action taken to reduce or eliminate the long-term risk to human life and property from natural hazards. (44 CFR Subpart M 206.401)

Hazard Mitigation Grant Program: The program authorized under Section 404 of the Stafford Act, which may provide funding for mitigation measures identified through the evaluation of natural hazards conducted under §322 of the Disaster Mitigation Act 2000.

Hazard Profile: A description of the physical characteristics of hazards and a determination of various descriptors including magnitude, duration, frequency, probability, and extent. In most cases, a community can most easily use these descriptors when they are recorded and displayed as maps.

Hazard and Vulnerability Analysis: The identification and evaluation of all the hazards that potentially threaten a jurisdiction and analyzing them in the context of the jurisdiction to determine the degree of threat that is posed by each.

Infrastructure: The public services of a community that have a direct impact to the quality of life. Infrastructure refers to communication technology such as telephone lines or Internet access, vital services such as public water supply and sewer treatment facilities, and includes an area's transportation system, regional dams or bridges, etc.

Intensity: A measure of the effects of a hazard event at a particular place.

Interferometer: A method employing the interference of electromagnetic radiation to make highly precise measurements of the angle between the two rays of light.

IRA Council: A federally recognized tribal council. IRA refers to the Indian Reorganization Act of June 18, 1934 was U.S. federal legislation that secured certain rights to Native Americans, including Alaska Natives and established legal requirements and rights of tribal councils.

Liquefaction: The phenomenon that occurs when ground shaking causes loose soils to lose strength and act like a thick or viscous fluid. Liquefaction causes two types of ground failure: lateral spread and loss of bearing strength.

Local Emergency Planning Committee (LEPC): LEPCs consist of community representatives and are appointed by the State Emergency Response Commissions (SERCs), as required by Superfund Amendments and Reauthorization Act

(SARA), Title III. They develop an emergency plan to prepare for and respond to a chemical emergency. They are also responsible for coordinating with local facilities to find out what they are doing to reduce hazards, prepare for accidents, and reduce hazardous inventories and releases. The LEPC serves as a focal point in the community for information and discussion about hazardous substances, emergency planning, and health and environmental risks.

Local Government: Any county, borough, municipality, city, township, public authority, school district, intrastate district, council of governments (regardless of whether the council of governments is incorporated as a nonprofit corporation under State law), regional or interstate government entity, or agency, or instrumentality of a local government; any Indian tribe or authorized tribal organization, or Alaska Native village or organization; and any rural community, unincorporated town or village, or other public entity, for which an application for assistance is made by a State or political subdivision of a State.

Magnitude: A measure of the strength of a hazard event. The magnitude (also referred to as severity) of a given hazard event is usually determined using technical measures specific to the hazard.

Mitigate: To cause something to become less harsh or hostile, to make less severe or painful

Mitigation Plan: A systematic evaluation of the nature and extent of vulnerability to the effects of natural hazards typically present in the State and includes a description of actions to minimize future vulnerability to hazards.

Municipality: A political subdivision incorporated under the laws of the State that is a home rule or general law city, a home rule or general law borough, or a unified municipality.

Natural Disaster: Any natural catastrophe, including any hurricane, tornado, storm, high water, wind, driven water… tsunami, earthquake, volcanic eruption, landslide, snowstorm, fire, or drought. (44 CFR Subpart M 206.401)

New Construction: New construction means structures for which the “start of construction” on or after the effective date of a floodplain management regulation adopted by a community and includes any subsequent improvement to such structures.

Overlay Zone: Overlay zones (overlay districts) create a framework for conservation or development of special geographical areas. In a special resource overlay district, overlay provisions typically impose greater restrictions on the development of land, but only regarding those parcels whose development, as permitted under the zoning, may threaten the viability of the natural resource. In a development area overlay district, the provisions may impose restrictions as well, but also may provide zoning incentives and waivers to encourage certain types and styles of development. Overlay zone provisions are often complemented by

the adoption of other innovative zoning techniques, such as floating zones, special permits, incentive zoning, cluster development and special site plan or subdivision regulations, to name a few.

Period: The length of time between two successive peaks or troughs of a wave. The Period may vary due to complex interferences of waves. Tsunami wave periods generally range from 5 to 60 minutes apart.

Permeability: The property of soil or rock that allows water to pass through it.

Planning: The act or process of making or carrying out plans; the establishment of goals, policies, and procedures for a social or economic unit.

Preparedness: The steps taken to decide what to do if essential services break down, developing a plan for contingencies, and practicing the plan. Preparedness ensures that people are ready for a disaster and will respond to it effectively. Actions that strengthen the capabilities of government, citizens, and communities to respond to disasters.

Prescribed Fire: Any fire ignited by management actions to meet specific objectives. Prior to ignition, a written, approved prescribed fire plan must exist, and National Environmental Protection Act requirements must be met (National Park Service and others 1998).

Prescribed Natural Fire: Naturally ignited wildland fire that burns under specified conditions where the fire is confined to a predetermined area and produce the fire behavior and fire characteristics required to attain planned fire treatment and resource management objectives (National Wildfire Coordinating Group, Incident Operations Standards Working Team 1996).

Presidential Disaster Declaration: The formal action by the President to make a State eligible for major disaster or emergency assistance under the Robert T. Stafford Relief and Emergency Assistance Act, Public Law 93-288, as amended.

Probability: A statistical measure of the likelihood that a hazard event will occur.

Recovery: The actions taken by an individual or community after a catastrophic event to restore order and lifelines in a community.

Regulatory Power: Local jurisdictions have the authority to regulate certain activities in their jurisdiction. With respect to mitigation planning, the focus is on such things as regulating land use, development, and construction through zoning, subdivision regulations, design standards, and floodplain regulations.

Relocation: The moving of a structure from a flood area to a new location, normally to one where there is no threat of flooding.

Repetitive Loss Property: A property that is currently insured for which two or more National Flood Insurance Program losses (occurring more than ten days apart) of at least $1000 each have been paid within any 10-year period since 1978.

Response: Those activities and programs designed to address the immediate and short-term effects of the onset of an emergency or disaster.

Retrofit: The strengthening of structures to reduce or eliminate (mitigate) future disaster risks.

Richter Scale: A numerical scale of earthquake magnitude devised by seismologist C.F. Richter in 1935.

Rift Zone: A rift zone is an elongated system of crustal fractures associated with an area that has undergone extension (the ground has spread apart).

Risk: The estimated impact that a hazard would have on people, services, facilities, and structures in a community; the likelihood of a hazard event resulting in an adverse condition that causes injury or damage. Risk is often expressed in relative terms such as a high, moderate, or low likelihood of sustaining damage above a particular threshold due to a specific type of hazard event. It can also be expressed in terms of potential monetary losses associated with the intensity of the hazard.

Scale: A proportion used in determining a dimensional relationship; the ratio of the distance between two points on a map and the actual distance between the two points on the earth's surface.

Seiche: An oscillating wave (also referred to as a seismic sea wave) in a partially or fully enclosed body of water. May be initiated by landslides, undersea landslides, long period seismic waves, wind and water waves, or a tsunami.

Seismicity: Describes the likelihood of an area being subject to earthquakes.

Special Hazard Area: Special Hazard Area means an area having special flood, mudslide (i.e., mudflow) and/or flood-related erosion hazards, as shown on a FHBM or FIRM as Zone A, AOA, A1-30, AE, A99, AH, VO, V1-30, VE, V, M, or E.

Stafford Act: 1) The Robert T. Stafford Disaster Relief and Emergency Assistance Act, Public Law 93-288, as amended. 2) The Stafford Act provides an orderly and continuing means of assistance by the Federal Government to State, local and tribal governments in carrying out their responsibilities to alleviate the suffering and damage which result from disaster.

Stakeholder: Individual or group that will be affected in any way by an action or policy. They include businesses, private organizations, and citizens.

State Coordinating Agency: State Coordinating Agency means the agency of the State government, or other office designated by the Governor of the State or by State Statute at the request of the Administrator to assist in the implementation of the National Flood Insurance Program in that State.

State Disaster Declaration: A disaster emergency shall be declared by executive order or proclamation of the Governor upon finding that a disaster has occurred or that the occurrence or the threat of a disaster is imminent. The state of disaster emergency shall continue until the governor finds that the threat or danger has passed or that the disaster has been dealt with to the extent that emergency conditions no longer exist and terminates the state of disaster emergency by executive order or proclamation.

Along with other provisions, this declaration allows the governor to utilize all available resources of the State as reasonably necessary, direct and compel the evacuation of all or part of the population from any stricken or threatened area if necessary, prescribe routes, modes of transportation and destinations in connection with evacuation and control ingress and egress to and from disaster areas.

It is required before a Presidential Disaster Declaration can be requested.

State Hazard Mitigation Officer (SHMO): The SHMO is the representative of State government who is the primary point of contact with FEMA, other State and Federal agencies, and local units of government in the planning and implementation of pre- and post-disaster mitigation activities.

Structural Mat Slab: The concrete slab of a building that includes structural reinforcement to help support the building's structure.

Structure: A walled and roofed building, including a gas or liquid storage tank that is principally above ground and mounted to a permanent site, as well as a manufactured home.

Subdivision Regulations: Ordinances or regulations governing the subdivision of land with respect to things such as adequacy and suitability of building sites and utilities and public facilities.

Subsidence: Sinking of the land surface, usually due to withdrawals of underground water, oil, or minerals.

Subsidized Rates: Subsidized rates mean the rules established by the Administrator involving in the aggregate subsidization by the Federal Government.

Substantial Damage: Damage of any origin sustained by a structure in a Special Flood Hazard Area whereby the cost of restoring the structure to its before-

damaged condition would equal or exceeds 50 recent of the market value of the structure before the damage.

Substantial Improvement: Substantial improvement means any reconstruction, rehabilitation, addition, or other improvement of a structure, the cost of which equals or exceeds 50 percent of the market value of the structure before the "start of construction" of the improvement. This term includes structures, which have incurred "substantial damage," regardless of the actual repair work performed. The term does not, however, include either: (1) Any project for improvement of a structure to correct existing violations of state or local health, sanitary, or safety code specifications which have been identified by the local code enforcement official and which are the minimum necessary to assure safe living conditions or (2) Any alteration of a "historic structure," provided that the alteration will not preclude the structure's continued designation as a "historic structure."

Tectonic Plate: Torsionally rigid, thin segments of the earth's lithosphere that may be assumed to move horizontally and adjoin other plates. It is the friction between plate boundaries that cause seismic activity.

Topography: The contour of the land surface. The technique of graphically representing the exact physical features of a place or region on a map.

Tribal Government: A Federally recognized governing body of an Indian or Alaska Native Tribe, band, nation, pueblo, village or community that the Secretary of the Interior acknowledges to exist as an Indian tribe under the Federally Recognized Tribe List Act of 1994, 25 U.S.C. 479a. This does not include Alaska Native corporations, the ownership of which is vested in private individuals.

Tsunami: A sea wave produced by submarine earth movement or volcanic eruption with a sudden rise or fall of a section of the earth's crust under or near the ocean. A seismic disturbance or land slide can displace the water column, creating a rise or fall in the level of the ocean above. This rise or fall in sea level is the initial formation of a tsunami wave.

Variance: Variance means a grant of relief by a community from the terms of a floodplain management regulation.

Vulnerability: Describes how exposed or susceptible to damage an asset it. Vulnerability depends on an asset's construction, contents, and the economic value of its functions. The vulnerability of one element of the community is often related to the vulnerability of another. For example, many businesses depend on uninterrupted electrical power – if an electrical substation is flooded, it will affect not only the substation itself, but a number of businesses as well. Other, indirect effects can be much more widespread and damaging than direct ones.

Vulnerability Assessment: The extent of injury and damage that may result from hazard event of a given intensity in a given area. The vulnerability assessment

should address impacts of hazard events on the existing and future built environment.

Wildfire: An uncontrolled fire spreading through vegetative fuels, exposing and possibly consuming structures.

Zoning Ordinance: An ordinance under the State or local government's police powers that divides an area into districts and, within each district, regulates the use of land and buildings, height, and bulk of buildings or other structures, and the density of population.