HAZARD MITIGATION PLAN

CITY OF
KOTLIK, ALASKA

Adoption Date: December 19, 2007

Primary Point of Contact

The Point of Contact for information regarding this plan is:

The Honorable Mary Ann Mike
Grant Administrator
P.O. Box 20268
Kotlik, AK 99620
(907) 899-4313 (Office)
(907) 899-4825 (Fax)

Secondary Point of Contact:
Rose Cheemuk
(907) 899-4926 (Office)
(907) 899-4825 (Fax)
rcheemuk@yahoo.com
Planning Team Leader

Prepared with:

VisualRisk
MITIGATIONPLAN.COM

Prepared by:

URS

2700 Gambell, Suite 200
Anchorage, Alaska 99507
907-562-3366

This page intentionally left blank

Table of Contents

EXECUTIVE SUMMARY **1**

SECTION 1 PUBLIC PLANNING PROCESS **2**

1.1 NARRATIVE DESCRIPTION 2

1.2 PLANNING TEAM INFORMATION 3

1.3 PUBLIC INVOLVEMENT IN PLANNING PROCESS 3

1.4 OTHER INTERESTED PARTY INVOLVEMENT 4

1.5 REVIEW OF TECHNICAL AND FISCAL RESOURCES 4

1.6 REVIEW OF EXISTING PLANS 9

SECTION 2 JURISDICTION PARTICIPATION INFORMATION **11**

2.1 ADOPTION BY LOCAL GOVERNING BODY 11

2.1.1 Primary Point of Contact / Chairperson *11*

2.1.2 Promulgation Authority Information *11*

SECTION 3 JURISDICTION INFORMATION **12**

SECTION 4 RISK ASSESSMENT **15**

4.1 OVERALL HAZARD RANKING 15

4.2 HAZARD PROFILE 17

4.2.1 Earthquake *17*

4.2.2 Erosion *23*

4.2.3 Flooding *29*

4.2.4 Severe Winter Storm *34*

4.2.5 Tsunami *39*

4.2.5 Wildfires *43*

4.3 ASSET INVENTORY 49

4.3.1 Processes and Sources for Identifying Assets *49*

Table of Contents cont.

4.3.2 Critical Facilities List 49

4.3.3 Non-Critical Facilities 51

4.3.4 Facility Replacement Costs 52

4.3.5 Future Development 56

SECTION 5 MITIGATION STRATEGY 58

5.1 MITIGATION GOALS 58

5.2 MITIGATION ACTIONS / PROJECTS 59

5.3 EVALUATION AND PRIORITIZATION OF MITIGATION ACTIONS 63

5.4 IMPLEMENTATION STRATEGY AND ANALYSIS OF MITIGATION PROJECTS 65

5.5 CAPABILITY ASSESSMENT 67

SECTION 6 PLAN MAINTENANCE 69

6.1 MONITORING, EVALUATING, AND UPDATING THE PLAN 69

6.2 IMPLEMENTATION THROUGH EXISTING PROGRAMS 70

6.3 CONTINUED PUBLIC INVOLVEMENT 71

LIST OF TABLES

TABLE 1. KOTLIK HAZARD MITIGATION PLANNING TEAM 3

TABLE 2. HAZARD MITIGATION FUNDING RESOURCES 8

TABLE 3. HAZARD PROBABILITY CHARACTERISTICS 16

TABLE 4. HAZARD MAGNITUDE / SEVERITY CHARACTERISTICS 16

TABLE 5. CALCULATED PRIORITY RISK INDEX 17

TABLE 6. CALCULATED PRIORITY RISK INDEX BY HAZARD 17

TABLE 7. WILDLAND FIRES NEAR KOTLIK 44

TABLE 8. KOTLIK CRITICAL FACILITIES 50

TABLE 9. KOTLIK NON-CRITICAL FACILITIES 51

TABLE 10. KOTLIK LOSS ESTIMATES BY OCCUPANCY CLASS 52

TABLE 11. KOTLIK CRITICAL FACILITY LOSS ESTIMATES 52

TABLE 12. VULNERABILITY ASSESSMENT – POPULATION, RESIDENTIAL STRUCTURES, AND CRITICAL FACILITIES 55

TABLE 13. MITIGATION GOALS AND OBJECTIVES 58

TABLE 14. POTENTIAL MITIGATION ACTIONS 60

TABLE 15. EVALUATION CRITERIA FOR MITIGATION ACTIONS 63

TABLE 16. MITIGATION ACTION RANKING 64

TABLE 17. MITIGATION ACTION PLAN 65

LIST OF FIGURES

FIGURE 1. KOTLIK EARTHQUAKE PROBABILITY 19

FIGURE 2. WILDLAND FIRES NEAR KOTLIK 45

LIST OF ATTACHMENTS

Attachment A Project Mailing List
Attachment B FEMA Benefit Cost Analysis
Attachment C Annual Review Form
Attachment D FEMA Crosswalk
Attachment E Adoption Resolution & FEMA Final Approval Letter

List of Acronyms and Abbreviations

ºF	degrees Fahrenheit
AFG	Assistance to Firefighters Grant
AS	Alaska Statute
AVCP	Association of Village Council Presidents
CD	compact disc
CDBG	Community Development Block Grant
CHEMS	Community Health and Emergency Medical Services
DEC	Department of Environmental Conservation
DHS&EM	State of Alaska, Department of Homeland Security and Emergency Management
DHSS	Department of Health and Social Services
DHS	Department of Homeland Security
DMA2000	Disaster Mitigation Act of 2000
DNR	Department of Natural Resources
DOF	Department of Forestry
DOT&PF	Department of Transportation and Public Facilities
FMA	Flood Mitigation Assistance
FEMA	Federal Emergency Management Agency
GIS	Geographic Information Systems
HAZUS-MH	Hazards U.S. – Multi-Hazard
HMGP	Hazard Mitigation Grant Program
HMP	Hazard Mitigation Plan
KTC	Kotlik Traditional Council
LYSD	Lower Yukon School District
NFIP	National Flood Insurance Program
NOAA	National Oceanic and Atmospheric Administration
NWS	National Weather Service
PDM	Pre-Disaster Mitigation
STAPLE+E	Social, Technical, Administrative, Political, Legal, Economic and Environmental
URS	URS Corporation
U.S.	Unites States
USGS	U.S. Geological Survey

Executive Summary

Natural and human-made disasters have led to increased levels of injury, property damage, interruption of business and government services and even death throughout the years. The impact of disasters on families and individuals can be devastating, and damages to businesses can result in harsh economic consequences. The time, money, and effort to respond to and recover from these disasters divert public resources and attention from other important programs and problems.

In 2000, Congress passed the Disaster Mitigation Act (Public Law 106-390) (DMA2000) to reinforce the importance of mitigation planning and emphasize planning for disasters before they occur. States, tribes, and local communities must have an approved natural hazard mitigation plan in place prior to receiving both pre-disaster mitigation and post-disaster funds. These plans must demonstrate that proposed mitigation measures are based on a sound planning process that accounts for the risks to and the capabilities of the individual communities.

Applying this knowledge, the City of Kotlik has prepared a local natural hazard mitigation plan (HMP) that will guide the City of Kotlik toward greater disaster resistance in full accord with the character and needs of the community and federal requirements. The potential hazards identified and assessed in this version of the HMP include; erosion, flooding, earthquake, severe winter storm, tsunami, and earthquake. Mitigation actions include a range of specific actions and projects that reduce the effects of each hazard, with particular emphasis on protecting new and existing buildings and infrastructure.

The Kotlik HMP has been prepared to meet the Federal Emergency Management Agency's (FEMA's) requirements of the DMA2000 and the Interim Final Rule, thus making the City eligible for funding and technical assistance from State and federal hazard mitigation programs. Following each major disaster declaration, the City of Kotlik is required to review and update the mitigation strategy. Additionally, in compliance with FEMA regulations, this HMP must be reviewed, revised if appropriate, and resubmitted for approval every 5 years so the City of Kotlik may continue to be eligible for various hazard mitigation grant-funding sources. This HMP was adopted by the City of Kotlik on December 19, 2007, reviewed by the State of Alaska, Department of Homeland Security and Emergency Management, and approved by FEMA.

This page intentionally left blank

Section 1 Public Planning Process

1.1 Narrative Description

In May 2005, the City of Kotlik formalized a grant agreement with the Alaska Department of Homeland Security and Emergency Management (DHS&EM) that provided funds to develop a local hazard mitigation plan (HMP) using VRisk's MITIGATIONPLAN.com software. Shortly after the formalized grant agreement, the City of Kotlik retained URS Corporation (URS) as planning consultants to guide the City through the planning process and help develop the HMP.

The planning process began with a teleconference meeting between the Kotlik planning team, DHS&EM, and URS. During the meeting, URS familiarized the Kotlik planning team with the Disaster Mitigation Act of 2000 (DMA2000) requirements, the scope of this hazard mitigation planning project, and the estimated project schedule. The planning team scheduled the first of two required public meetings, where the planning team will present the project to the community and identify and screen potential hazards. In addition, the planning team identified its members and primary point of contact for the planning effort and the public.

The following five-step process took place during planning process from June 2006 through February 2007.

1. **Organize resources:** Members of the planning team identified staff, agencies, and local community members who could provide technical expertise and historical information needed in the development of the HMP.
2. **Assess risks:** The planning team identified hazards specific to Kotlik, and URS developed the risk assessment for the six identified hazards. The planning team reviewed the risk assessment, which included the vulnerability analysis, prior to and during the development of the mitigation strategy.
3. **Assess capabilities:** The planning team reviewed current administrative and technical, legal and regulatory, and fiscal capabilities to determine if existing provisions and requirements adequately address relevant hazards.
4. **Develop a mitigation strategy:** After reviewing the risks posed by each hazard, the planning team developed a comprehensive range of potential mitigation goals, objectives, and actions. Subsequently, the planning team held a public meeting to identify and prioritize the actions to be implemented.
5. **Monitor progress:** The planning team developed an implementation process to ensure the success of an ongoing program to minimize natural hazard impacts to Kotlik.

1.2 Planning Team Information

The planning team is led by Rose Cheemuk (previously Donna Kamkoff) with assistance from Joseph P. Mike. URS and DHS&EM also assisted the planning team. Table 1 identifies the members of the Kotlik Hazard Mitigation planning team who compiled and authored this HMP.

Table 1. Kotlik Hazard Mitigation Planning Team

Name	Title	Organization	Phone
April Brehm	Planner and Consultant	URS	(907) 562-3366
Rose Cheemuk	Utilities Manager	City of Kotlik	(907) 899-4926
Donna Kamkoff	City Manager	City of Kotlik	(907) 899-4313
Joseph Mike	Vice President Kotlik Joint Utility	City of Kotlik	
Brent Nichols	Mitigation Officer	Alaska Homeland Security & Emergency Management	(907) 428-7085
Ervin Petty	Mitigation Officer	Alaska Homeland Security & Emergency Management	(907) 428-7015
Scott Simmons	Mitigation Officer	Alaska Homeland Security & Emergency Management	(907) 428-7000
Laura Young	Planner and Consultant	URS	(907) 562-3366

1.3 Public Involvement in Planning Process

On July 12, 2006, the Kotlik Planning Team held a public meeting to introduce the hazard mitigation planning project to the community and other interested parties. An invitation was extended to all individuals and entities identified on the project mailing list via a project newsletter describing the planning process and announcing the upcoming public meeting. A newsletter was developed and was either faxed or emailed to each individual or entity on the mailing list. The newsletter was also posted on the DSH&EM website. Signs were also posted throughout the community announcing the public meeting. Twenty people attended the meeting.

During the meeting, URS led the attending public through a hazard identification and screening exercise. The attendees identified six potential hazards (erosion, flood, earthquake, wildland fire, severe winter storm, and tsunami).

Following the hazard screening process, URS described the specific information needed from the planning team and public to complete the risk assessment including the location, value, and population of residents and critical facilities in the community.

After the community asset data was collected by the planning team over the summer and fall of 2006, a risk assessment was completed that illustrated the assets that are vulnerable to specific hazards.

A second public meeting was held February 2, 2007 to discuss the mitigation strategy for the community. After discussion by everyone present at the meeting, the City Council voted for the mitigation actions that will be implemented in the next 5 years. Thirteen people attended the meeting.

1.4 Other Interested Party Involvement

This section describes the involvement of other interested parties throughout Plan development.

Members of the community including residents and businesses, neighboring communities, academia, nonprofits, and local, state, and federal agencies were invited to participate in the planning process by attending public meetings or commenting directly on the project. A copy of the Kotlik HMP mailing list is provided as Attachment A.

1.5 Review of Technical and Fiscal Resources

This section describes the review of technical and fiscal resources:

Local Capability Assessment

Federal Resources

The federal government requires local governments to have an HMP in place to be eligible for funding opportunities through the Federal Emergency Management Agency (FEMA) such as the Pre-Disaster Mitigation Assistance Program and the Hazard Mitigation Grant Program (HMGP). The Mitigation Technical Assistance programs available to local governments are also a valuable resource. FEMA may also provide temporary housing assistance through rental assistance, mobile homes, furniture rental, mortgage assistance, and emergency home repairs. The Disaster Preparedness Improvement Grant also promotes educational opportunities with respect to hazard awareness and mitigation.

FEMA, through its Emergency Management Institute, offers training in many aspects of emergency management, including hazard mitigation. FEMA has also developed several documents that address implementing hazard mitigation at the local level. Five key resource documents are available from FEMA Publication Warehouse (1-800-480-2520) and are briefly described here:

How-to Guides. FEMA has developed a series of how-to guides to assist states, communities, and tribes in enhancing their hazard mitigation planning capabilities. The first four guides describe the four major phases of hazard mitigation planning. The last five how-to guides address special topics that arise in hazard mitigation planning such as conducting cost-benefit analysis and preparing multi-jurisdictional plans. The use of worksheets, checklists, and tables make these guides a practical source of guidance to address all stages of the hazard mitigation planning process. They also include special tips on meeting DMA2000 requirements (http://www.fema.gov/fima/planhowto.shtm).

Post-Disaster Hazard Mitigation Planning Guidance for State and Local Governments. FEMA DAP-12, September 1990. This handbook explains the 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. The handbook focuses on approaches to mitigation, with an emphasis on multi-objective planning.

Mitigation Resources for Success compact disc (CD). FEMA 372, September 2001. This CD contains focused information about mitigation for state and local government planners and other stakeholders in the mitigation process. The handbook 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.

A Guide to Federal Aid in Disasters. FEMA 262, April 1995. When disasters exceed the capabilities of state and local governments, the President's disaster assistance program (administered by FEMA) is the primary source of federal assistance. This handbook discusses the procedures and process for obtaining this assistance, and provides a brief overview of each program.

The Emergency Management Guide for Business and Industry. FEMA 141, October 1993. This guide provides a step-by-step approach to emergency management planning, response, and recovery. The guide also details a planning process that businesses can follow to better prepare for a wide range of hazards and emergency events. This effort can enhance a business's ability to recover from financial losses, loss of market share, damages to equipment, and product or business interruptions. This guide could be of great assistance to a community's industries and businesses located in hazard prone areas.

Other federal resources include:

Department of Agriculture. Assistance provided includes: Emergency Conservation Program, Non-Insured Assistance, 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. This program minimizes the adverse effects of high energy costs on low-income, elderly, and handicapped citizens through client education activities and weatherization services such as an all-around safety check of major energy systems, including heating system modifications and insulation checks. Department of Housing and Urban Development, Office of Homes and Communities, Section 108 Loan Guarantee Programs. This program provides loan guarantees as security for federal loans for acquisition, rehabilitation, relocation, clearance, site preparation, special economic development activities, and construction of certain public facilities and housing.

Department of Housing and Urban Development, Community Development Block Grants (CDBG). Provides grant assistance and technical assistance to aid communities in planning activities that address issues detrimental to the health and safety of local residents, such as housing rehabilitation, public services, community facilities, and

infrastructure improvements that would primarily benefit low- and moderate-income persons.

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.

Internal Revenue Service, Tax Relief. Provides extensions to current year's tax return, allows deductions for disaster losses, and allows amendment of previous tax returns to reflect loss back to 3 years.

United States (U.S.) Small Business Administration (SBA). May provide low-interest disaster loans to individuals and businesses that have suffered a loss due to a disaster. Requests for SBA loan assistance should be submitted to the Alaska DHS&EM.

Other resources:

The following are web sites that provide focused access to valuable planning resources for communities interested in sustainable development activities.

Federal Emergency Management Agency, (http://www.fema.gov). – Includes links to information, resources, and grants that communities can use in planning and implementation of sustainable measures.

American Planning Association, (http://www.planning.org). – A non-profit professional association that serves as a resource for planners, elected officials, and citizens concerned with planning and growth initiatives.

Institute for Business and Home Safety, (http://ibhs.org). – An initiative of the insurance industry to reduce deaths, injuries, property damage, economic losses, and human suffering caused by natural disasters.

Online resources provide information on natural hazards, community land use, and ways citizens can protect their property from damage.

State Resources

DHS&EM. Responsible for coordinating all aspects of emergency management for the State of Alaska. Public education is one of its identified main categories for mitigation efforts. Improving hazard mitigation technical assistance for local governments is another high priority list item for the State of Alaska. Providing hazard mitigation training, current hazard information, and the facilitation of communication with other agencies would encourage local hazard mitigation efforts. DHS&EM provides resources for mitigation planning on their web site at http://www.ak-prepared.com.

Division of Senior Services. Provides special outreach services for seniors, including food, shelter, and clothing.

Division of Insurance. Provides assistance in obtaining copies of policies and provides information regarding filing claims.

Alaska Department of Military and Veteran's Affairs. Provides damage appraisals and settlements for VA-insured homes, and assists with the filing of survivor benefits.

The Community Health and Emergency Medical Services (CHEMS). A section within Division of Public Health within the Department of Health and Social Services (DHSS). DHSS is charged with promoting and protecting the public health and one of CHEMS' responsibilities is developing, implementing, and maintaining a statewide comprehensive emergency medical services system. The department's statutory mandate (Alaska Statute [AS] 18.08.010) requires it to:

- Coordinate public and private agencies engaged in the planning and delivery of emergency medical services, including trauma care, to plan an emergency medical services system.
- Assist public and private agencies to deliver emergency medical services, including trauma care, through the award of grants in aid.
- Conduct, encourage, and approve programs of education and training designed to upgrade the knowledge and skills of health personnel involved in emergency medical services, including trauma care.
- Establish and maintain a process under which hospitals and clinics can represent themselves to be trauma centers because they voluntarily meet criteria adopted by the department, which are based on an applicable national evaluation system.

In addition to these responsibilities, the section is heavily involved in planning and responding to bioterrorist events.

Alaska Department of Commerce, Community, and Economic Development (DCCED). DCCED administers the CDBG program funds and administers various flood mitigation projects, including the acquisition of flood-prone homes and businesses, throughout Alaska. This department also administers programs for "distressed" and "targeted" communities.

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

Alaska Department of Forestry (DOF). DOF participates in a statewide wildfire control program in cooperation with the forest industry, rural fire departments and other

agencies. Prescribed burning may increase the risks of fire hazards; however, prescribed burning reduces the availability of fire fuels and therefore the potential for future, more serious fires.

Alaska Department of Transportation and Public Facilities (DOT&PF). DOT&PF personnel provide technical assistance to the various emergency management programs, to include mitigation. This assistance is addressed in the DHS&EM-DOT&PF Memorandum of Agreement and includes, but is not limited to, environmental reviews, archaeological surveys, and historic preservation reviews.

In addition, DOT&PF and DHS&EM coordinate buyout projects to ensure there are no potential right-of-way conflicts with future land use for bridge and highway projects, and collaborate on earthquake mitigation.

DOT&PF provides safe, efficient, economical, and effective operation of the State's highways, harbors, and airports. DOT&PF uses its Planning, Design & Engineering, Maintenance & Operations and Intelligent Transportation Systems resources to identify the hazard, plan, and initiate mitigation activities to meet the transportation needs of Alaskans and make Alaska a better place to live and work. DOT&PF budgets for the temporary replacement bridges and materials necessary to make the multi-model transportation system operational following a natural disaster.

Alaska Department of Natural Resources (DNR). DNR 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. Within DNR, the Division of Geological and Geophysical Surveys is responsible for determining "the potential of Alaskan land for production of metals, minerals, fuels, and geothermal resources, the locations and supplies of groundwater and construction material, and the potential geologic hazards to buildings, roads, bridges, and other installations and structures" (AS 41.08.020).

Other Funding Sources and Resources

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 may be provided.

Crisis Counseling Program. Provides grants to state and borough mental health departments, which in turn provide training for screening, diagnosing and counseling techniques. This program also provides funds for counseling, outreach, and consultation for those affected by disaster.

Table 2 provides a summary of specific hazard mitigation funding resources.

Table 2. Hazard Mitigation Funding Resources

Financial Resource	Effect on Hazard Mitigation
EPA's Brownfields Program	This program can mitigate the effects of hazardous materials by providing direct funding for Brownfield assessment, revolving loans, and environmental job training.
Administration for Native Americans Grant Programs	These discretionary funds can be used to fund a variety of environmental management programs, including the identification and assessment of human and natural hazards and their associated risks, and the development and implementation of plans, policies, and ordinances.
Department of Homeland Security (DHS) Preparedness Technical Assistance Program	This grant provides direct assistance to communities to improve their ability to prevent, protect against, respond to and recover from major events. A primary objective of the program is to enhance the capacity of the community to develop, plan and implement effective strategies for human-made preparedness.
Assistance to Firefighters Grant (AFG) Program's Fire Prevention and Safety Grant	AFG funds the Fire Prevention and Safety activity and the Firefighter Safety Research and Development activity. These grants are to be used for fire prevention or safety programs and activities.
FEMA HMGP, Flood Mitigation Assistance (FMA) grants, and Pre-Disaster Mitigation (PDM) grants	HMGP grant funding is available to state, tribal, and local communities after a Presidentially-declared disaster. It can be used to fund both pre- and post-disaster mitigation plans and projects. PDM funding is available on an annual basis. This grant can only be used to fund PDM plans and projects. FMA grant funding assists states, tribes and communities in implementing measures to reduce or eliminate the long-term risk of flood damage to structures insurable under the National Flood Insurance Program (NFIP).
National Flood Insurance Program	NFIP makes federally backed flood insurance available to homeowners, renters, and business owners in NFIP-participating states, tribes, and communities.
Lindbergh Grants Program	Annual grants program that provides $10,580 per project to balance the advance of technology and the preservation of the natural / human environment. Can be used for conservation of natural resources (e.g., sustainable development codes) and public outreach / education projects.

Local Resources

The City of Kotlik has the legal and regulatory capability to adopt and enforce land use and growth management ordinances and the fiscal capability to apply for funding. The City also has administrative and technical capacity to manage mitigation projects.

The Kotlik Traditional Council (KTC) also has staff and the ability to apply for funding, has geographic information system (GIS) capabilities, and the ability to manage mitigation projects. KTC funded the Kotlik Bank Protection Feasibility Study in 2003 that identified bank stabilization treatments to protect the integrity of the Apoon Pass, Kotlik and Little Kotlik River banks, and the structures susceptible to damage from future erosion.

1.6 Review of Existing Plans

This section describes the review and incorporation if appropriate of existing plans, policies, and ordinances.

This hazard mitigation plan was developed using existing community studies and plans as well as additional outside information and research. The following were reviewed and used as references for the jurisdiction information and hazard profiles in the risk assessment of the HMP for the City of Kotlik:

Kotlik Sanitation and Feasibility Study: Tryck, Nyman, Hayes and URS Corporation, 2003

Kotlik Bank Protection Feasibility Study: Rodney P. Kinney Associates and MWH, 2003

Kotlik Community Plan: Kotlik Traditional Council, 2006

This page intentionally left blank

Section 2 Jurisdiction Participation Information

2.1 Adoption by Local Governing Body

2.1.1 Primary Point of Contact / Chairperson

The Honorable Mary Ann Mike (*formerly the Honorable Laurie Prince*)
Grant Administrator
P.O. Box 20268
Kotlik, AK 99620
(907) 899-4313 (Office)
(907) 899-4826 (Fax)

Secondary Point of Contact
Rose Cheemuk (*formerly Donna Kamkoff)*
Planning Team Leader
(907) 899-4926 (Office)
(907) 899-4826 (Fax)
rcheemuk@yahoo.com

2.1.2 Promulgation Authority Information

This HMP was reviewed and approved by the following promulgation authorities:

Mary Ann Mike
Mayor
P.O. Box 20268
Kotlik, AK 99620
(907) 899-4313

and

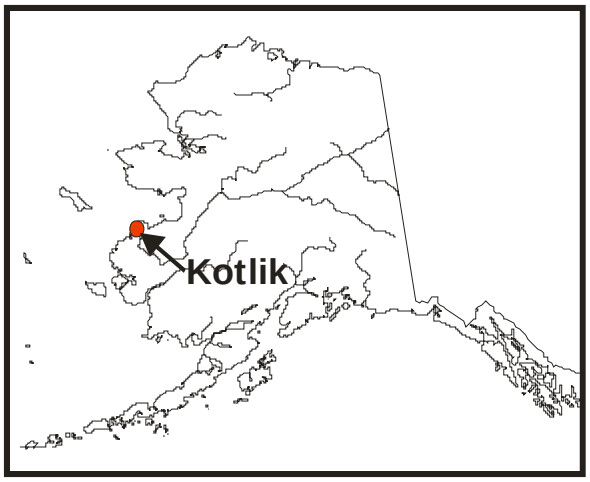
Kotlik City Council
P.O. Box 20268
Kotlik, AK 99620
(907) 899-4313

This page intentionally left blank

Section 3 Jurisdiction Information

This section provides a broad perspective, brief history, and describes the existing conditions and development of the community.

Latitude: 63.033333333
Longitude: -163.55



Topography: The City of Kotlik is located in the southern part of Norton Sound along the north tributary of the Yukon Delta fan. Kotlik is approximately 35 miles northeast of Emmonak, 165 air miles northwest of Bethel and about 115 miles south of Nome. The community covers 3.8 square miles of land and 0.8 square miles of water.

Climate: Situated south of the Arctic Circle, Kotlik has a typical subarctic climate. Consistent with these characteristics, Kotlik has a large temperature range of between -50 and 87 degrees Fahrenheit (ºF) with a short summer and a freeze free period of about 3 months. The surrounding bodies of water—Norton Sound and the Yukon River—are generally ice-free from mid-June through October. Annual precipitation totals approximately 16 inches, with 60 inches of snow annually. The area also experiences high winds coupled with poor visibility during fall and winter.

Kotlik is located near the boundary between continuous and discontinuous permafrost. Permafrost is defined as ground that has remained at a temperature below 32ºF for 2 or more years. Permafrost in this area is considered to be relatively warm and the permafrost will melt when there are modifications made above it.

Demographics: The population of Kotlik fluctuated between 8 and 83 between 1880 and 1960. The 1970 census recorded a 300 percent increase in population from 1970 with 228 individuals residing in Kotlik. This increase was largely due to the relocation of Channiliut and several other communities to Kotlik including: Hamilton, Bill Moore's Slough, and Pastolaik.

The 2000 census recorded 591 residents, of which the median age was 18.5 indicating an overall young population. The population of Kotlik is expected grow at the same or accelerated rate because nearly half of the population is 18 years of age and younger. Kotlik is identified as a Yupik Eskimo village, and 96 percent of residents recognize themselves as such. The male and female composition is approximately 53 and 47 percent respectively. The 2000 census revealed that there are 117 households with the average household having approximately 5 individuals. The current population of Kotlik is 569 according to City records.

Economy: The economy of Kotlik is similar to other rural Alaska communities and can be described as a mixed cash-subsistence economy. The economy relies on subsistence, government jobs, seasonal construction jobs, and to a lesser extent commercial fishing. Government jobs are provided through the City, federal agencies, federally funded tribal entities, and the school. Construction jobs are associated with new housing, the new school, and water and sewer improvements. Some Kotlik residents hold commercial salmon permits, although poor salmon runs in recent years have reduced income from this activity. In addition, Kotlik is a member of the Yukon Fisheries Development Association, a Community Development Quota corporation.

According to the 2000 census, the median household income in Kotlik was $37,750. Approximately 128 individuals (21.1 percent) and 19 families were estimated to be living below the poverty level. The potential work force (those aged 16 years or older) in Kotlik was estimated to be 354, of which 197 were actively employed. About 50 individuals were seeking work who were not part of the active labor force. In 2000 the unemployment rate was 24.4 percent; however, this rate included part-time and seasonal jobs, and practical unemployment or underemployment is likely to be significantly higher.

Government: The City of Kotlik was incorporated as a second-class city in 1970. The governing body of Kotlik is a Mayor and an elected seven-member City Council. The Mayor is appointed by the City Council members. As a second-class city, Kotlik is able to assume (by state statute) diverse powers and facilities including:

- Taxation
- Streets and sidewalks (boardwalks)
- Cemetery
- Police protection and jail facilities
- Light, power, and heat
- Community centers
- Garbage and solid waste collection and disposal
- Planning

The City of Kotlik is a participant in the State of Alaska's revenue sharing program, which makes the City eligible to receive financial assistance for certain public services.

There are three tribal councils with offices in Kotlik that provide additional programs and services: Kotlik, Hamilton, and Bill Moore Slough. KTC is governed by a five-member council and is the most active of the three. Village councils are recognized by the federal government as the official tribal governing body of the village. The village council is eligible to administer a wide variety of federal programs including local health care, employment assistance, college assistance, social services, and tribal operations. Assistance for many of these services is provided by regional corporations including the Yukon-Kuskokwim Health Corporation, and the Association of Village Council Presidents (ACVP). Kotlik is a member of the Calista Corporation, a regional native corporation.

Industry: Industry in Kotlik is addressed in Section 4.3.5 Future Development.

Major Rivers and Watersheds: The City of Kotlik is located at the confluence of the Kotlik and Little Kotlik Rivers at the northern edge of the Yukon-Kuskokwim delta and floodplain system, roughly 5 miles from the Bering Sea. The delta system forms a wide plain of moderate relief between 10 and 15 feet above sea level in southwestern Alaska. Low relief hills, remnants of dissected natural levees and sand dunes, are dispersed among flat-lying floodplain terraces and partially filled old river meanders. The region is primarily underlain by Pleistocene to recent fluvial deposits of dark gray silt and sandy silt, which are locally highly organic near the surface and typically become sandier with depth. These deposits appear to thicken westward; however, the thickness is not well defined. The region is relatively flat, poorly drained, and almost completely covered by tundra and numerous small lakes.

Section 4 Risk Assessment

The goal of mitigation is to reduce the future impacts of a hazard including property damage, disruption to local and regional economies, and the amount of public and private funds spent to assist with recovery; however, mitigation should be based on risk assessment.

A risk assessment is measuring the potential loss from a hazard event by assessing the vulnerability of buildings, infrastructure and people. It identifies the characteristics and potential consequences of hazards, how much of the community could be affected by a hazard, and the impact on community assets. A risk assessment consists of three components: hazard identification, vulnerability analysis, and risk analysis. Technically, these are three different items, but the terms are sometimes used interchangeably.

The first component of risk assessment is the hazard identification. As discussed in Section 1.3, URS facilitated a discussion at the first public meeting where the attendees where presented with a list of potential natural hazards present in Alaska and determined which hazards posed a risk to the City of Kotlik. All hazards that could potentially affect the area were considered even if a particular hazard had no history of occurrence in the study area.

4.1 Overall Hazard Ranking

Each hazard is assigned a likelihood rating based on the criteria and methods described below. This table gives the likelihood of event Probability "Rating" definitions. Based on history, using the definitions given, the likelihood of future events is "Quantified," which results in the classification within one of the four "Ranges" of likelihood.

Example: National Weather Service (NWS) - National Climatic Data Center records show that 38 tornados were reported in Cleveland County between 01/01/1950 and 12/31/2003. 38 events divided by 54 years=0.70 (70 percent), which would make future occurrences "Highly Likely" to happen. Table 3 defines the hazard probability characteristics.

Table 3. Hazard Probability Characteristics

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

Next, the magnitude of the hazard's effect is considered according to the severity associated with past events of the hazard. Table 4 provides four classifications of Magnitude / Severity.

Table 4. Hazard Magnitude / Severity Characteristics

Magnitude / Severity	Characteristics
4 - Catastrophic	Multiple deaths Complete shutdown of facilities for 30 or more days More than 50% of property is severely damaged
3 - Critical	Injuries and/or illnesses result in permanent disability Complete shutdown of critical facilities for at least 2 weeks More than 25% of property is severely damaged
2 - Limited	Injuries and/or illnesses do not result in permanent disability Complete shutdown of critical facilities for more than one week More than 10% of property is severely damaged
1 - Negligible	Injuries and / or illnesses are treatable with first aid Minor quality of life lost Shutdown of critical facilities and services for 24 hours or less Less than 10% of property is severely damaged

Warning Time and Duration are given four ranges each, as shown in Table 5. Also indicated is the "Weighting" factor for each of the four parts of the Calculated Priority Risk Index. The Probability factor is "Weighted" at 0.45, Magnitude / Severity at 0.30, Warning Time at 0.15, and Duration at 0.10. These "Weights" of significance are used to assign relative importance to each of these factors when combined to generate the Calculated Priority Risk Index value.

Table 5. Calculated Priority Risk Index

Calculated Priority Risk Index			
.45 Probability	.30 Magnitude / Severity	.15 Warning Time	.10 Duration
4 - Highly Likely	4 - Catastrophic	4 - Less Than 6 Hours	4 - More Than 1 Week
3 - Likely	3 - Critical	3 - 6-12 Hours	3 - Less Than 1 Week
2 - Possible	2 - Limited	2 - 12-24 Hours	2 - Less Than 1 Day
1 - Unlikely	1 - Negligible	1 - 24+ Hours	1 - Less Than 6 Hours

Table 6 represents the Calculated Priority Risk Index for each hazard facing the community:

Table 6. Calculated Priority Risk Index by Hazard

Hazard	Probability	Magnitude / Severity	Warning Time	Duration	Priority Risk Index
Earthquake	1 Unlikely	1 Negligible	4 < 6 Hours	1 < 6 Hours	1.45
Erosion	4 Highly Likely	3 Critical	1 24+ Hours	4 > One Week	3.25
Flooding	4 Highly Likely	3 Critical	2 12-24 Hours	3 < One Week	3.3
Severe Winter Storm	3 Likely	1 Negligible	1 24+ Hours	3 < One Week	2.1
Tsunami	- Not Specified -	- Not Specified -	4 < 6 Hours	1 < 6 Hours	0.7
Wildfires	2 Possible	1 Negligible	4 < 6 Hours	- Not Specified -	1.8

4.2 Hazard Profile

4.2.1 Earthquake

A. Hazard Definition for Earthquake

An earthquake is a sudden, rapid shaking of the Earth caused by the breaking and shifting of rock beneath the Earth's surface. For hundreds of millions of years, the forces of plate tectonics have shaped the Earth as the huge plates that form the Earth's surface move slowly over, under, and past each other. Sometimes the movement is gradual. At other times, the plates are locked together, unable to release the accumulating energy. When the accumulated energy grows strong enough, the plates break free causing the ground to shake. Most earthquakes occur at the boundaries where the plates meet; however, some earthquakes occur in the middle of plates.

Ground shaking from earthquakes can collapse buildings and bridges; disrupt gas, electric, and phone service; and sometimes trigger landslides, avalanches, flash floods, fires, and huge, destructive ocean waves (i.e., tsunamis). Buildings with foundations resting on unconsolidated land fill and other unstable soil, and trailers and homes not tied to their foundations are at risk because they can be shaken off their mountings during an earthquake. Deaths, injuries, and extensive property damage can result when an earthquake occurs in a populated area.

Earthquakes strike suddenly, without warning. Earthquakes can occur at any time of the year and at any time of the day or night. On a yearly basis, 70 to 75 damaging earthquakes occur throughout the world. Estimates of losses from a future earthquake in the U.S. approach $200 billion.

B. Previous Occurrences for Earthquake

On Good Friday, March 27, 1964, North America's strongest recorded earthquake, with a moment magnitude of 9.2, rocked central Alaska. On a global level, three of the ten strongest earthquakes ever recorded occurred in Alaska. No damaging earthquakes have occurred in Kotlik.

C. Geographic Location for Earthquake

The following information identifies the geographic area(s) affected by each specified hazard.

The entire geographic area of Alaska is prone to the effects of an earthquake. Figure 1 was generated using the U.S. Geologic Survey (USGS) Earthquake Mapping model and indicates a 3 percent probability of a 5.0 magnitude or greater earthquake occurring within 10 years in the vicinity of Kotlik.

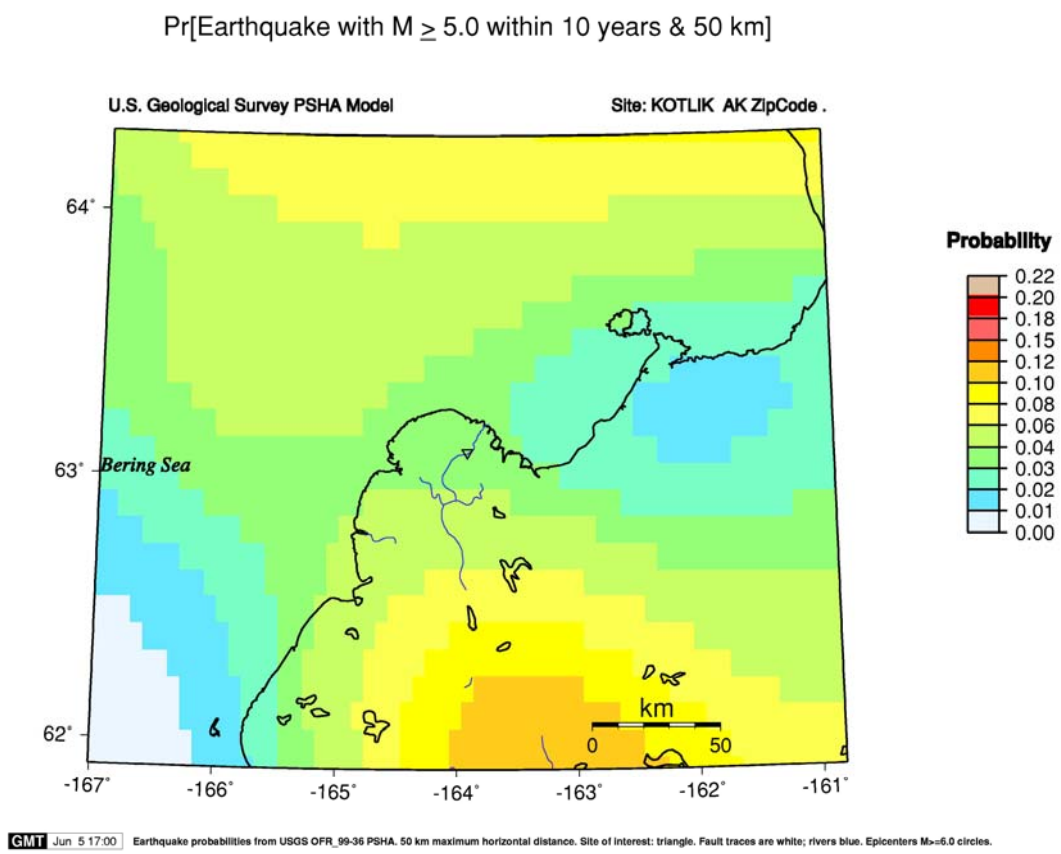


Figure 1. Kotlik Earthquake Probability

Source: USGS Earthquake Probability Mapping; 2006
http://eqint.cr.usgs.gov/eq-men/cgi-bin/neweqprob-06.cgi

D. Hazard Extent for Earthquake

The following information describes the magnitude and severity of each specified hazard.

Each year Alaska has approximately 5,000 earthquakes, including 1,000 that measure above 3.5 on the Richter scale. Alaska is vulnerable to three types of earthquakes. One type is called a **subduction zone earthquake**, which is caused by one crustal plate moving beneath another plate. This is the case in southcentral Alaska and along the Aleutian Islands, where the Pacific Plate dives beneath the North American Plate. This type of action usually leads to the Earth's largest earthquakes, such as the Good Friday earthquake.

Another type of earthquake common in Alaska is the **transform fault earthquake**. These earthquakes occur when crustal plates slide by each other. This is the geologic setting offshore of southeastern Alaska, where the North American Plate and the Pacific

Plate slide past each other on the Fairweather Queen Charlotte Fault. This is the same type of movement that occurs along the San Andreas Fault in California.

Lastly, **intraplate earthquakes** occur within a tectonic plate, sometimes at great distance from the plate boundaries. These types of earthquakes can have magnitudes of 7.0 and greater. Shallow earthquakes in the Fairbanks area are an example of intraplate earthquakes.

E. Hazard Summary for Earthquake

The following provides information on the probability of future events. In addition, the data provides an overall summary of Kotlik's vulnerability and impact of each hazard.

Earthquakes occur on different parts, or segments, of faults at different times. The places on major faults with the highest potential earthquake hazard are where there have not been any recent large earthquakes; these are called "seismic gaps." The Yakataga seismic gap (located between Cordova and Yakatat) is one place in Alaska that is considered to have a very high probability of a major earthquake in the next few decades. Kotlik is located in an area that is less active than others in the state, although the effects of earthquakes cantered elsewhere are expected to be felt in Kotlik. The magnitude of impacts to the community would be considered negligible with minor injuries, less than 10 percent of property damaged, and little to no permanent damage to transportation, infrastructure, or the economy.

Table 6 records the probability for each identified hazard. This level of probability is based on Table 3, which details the characteristics associated with each level. In short, there are four probability ratings with associated criteria that address the likelihood of future earthquake events within a specific period of time.

Highly Likely: Event is probable within the calendar year

Likely: Event is probable within the next 3 years

Possible: Event is probable within the next 5 years

Unlikely: Event is possible within the next 10 years

Based on the geographic location of Kotlik as well as Figure 1, it is unlikely that an earthquake would be centered in an area around Kotlik. Figure 1 was generated using the USGS Earthquake probability mapping model and indicates a 3 percent probability of a 5.0 magnitude or greater earthquake occurring within 10 years near Kotlik.

Data Limitations

The vulnerability estimates provided herein use the best data currently available, and the methodologies applied result in an approximation of risk. These estimates may be used to

understand relative risk from hazards and potential losses. However, uncertainties are inherent in any loss estimation methodology, arising in part from incomplete scientific knowledge concerning hazards and their effects on the built environment, as well as approximations and simplifications that are necessary for a comprehensive analysis.

F. Vulnerability Analysis for Earthquake

This section serves to identify each hazard confronting the community and its vulnerabilities to that hazard. The criteria adopted to address the community's level of vulnerability to the hazard examine the percentage of population or assets likely to be affected by earthquake:

High: < 10 percent affected

Moderate: 1 to 10 percent affected

Low: > 1 percent affected

a. Population

Approximately **100** percent of the community's population is vulnerable.

b. Critical Facilities

(1) Approximately **100** percent of the community's critical facilities are vulnerable.

(2) The specific critical facilities vulnerable are:

All critical facilities are equally at risk from the effects of an earthquake.

c. Non-Critical Facilities

(1) Approximately **100** percent of the community's non-critical facilities are vulnerable.

(2) The specific non-critical facilities vulnerable are:

All non-critical facilities are equally at risk from the effects of an earthquake.

The entire population as well as all critical and non-critical facilities are likely to be affected by an earthquake event, thus Kotlik is highly vulnerable to the effects of an earthquake.

G. Hazard Economic Loss Estimation for Earthquake

This section describes the potential economic losses due to each hazard confronting the community.

a. Economic Loss

The economic loss resulting from this hazard is approximately **$103,772,435**.

b. Structure Loss

The loss from damage to structures from this hazard is approximately **$55,321,634**.

c. Methodology for estimating losses

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

Replacement values, or insurance coverage, were developed for critical and residential facilities. These values were obtained from the Kotlik planning team and Hazards U.S. – Multi-Hazard (HAZUS-MH), which is a FEMA hazard modeling program used for estimating potential losses from natural hazards. For each residential structure and critical facility located within the earthquake hazard area, exposure was calculated by assuming the worst-case scenario (i.e., the asset would be completely destroyed and need replacement). Finally, the aggregate exposure, in terms of replacement value or insurance coverage for each category of structure or facility was calculated. A similar analysis was used to evaluate the proportion of the population at risk. However, the analysis simply represents the number of people at risk; no estimate of the number of potential injuries or deaths was prepared.

H. Hazard Human Loss Estimation for Earthquake

As previously discussed, human loss estimates (death and injuries) were not completed as part of this assessment; however, the analysis does identify the number and percentage of the population at risk in Kotlik.

a. Total Affected

The estimated total number of people affected by this hazard is approximately **569**.

b. Percentage of Population

The estimated total percentage of the community's population at risk associated with this hazard is approximately **100** percent.

I. Vulnerability to Future Assets / Infrastructure for Earthquake

All future critical facilities and infrastructure are at risk from the effects of an earthquake.

4.2.2 Erosion

A. Hazard Definition for Erosion

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. Erosion is a natural process but its effects can be exacerbated by human activity.

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

- Coastal erosion
- Riverine erosion
- Wind erosion

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

B. Previous Occurrences for Erosion

A 1971 U.S. Army Corps of Engineers study showed that just less than 11 percent of Alaska's coastline was undergoing "significant" erosion.

Examples of riverine erosion are found throughout Alaska that threatens both public and private property. Riverine erosion problems also exist on other rivers including the Yukon, Kuskokwim, and Kenai Rivers. Attempts to control erosion have met with very limited success. For example, armored dikes have helped control erosion for a short period of time, but eventually fail in most circumstances.

In Kotlik, some houses have been moved because of threats from erosion. The AC Store is so close to a bank experiencing effects from erosion that the store is now slanted.

C. Geographic Location for Erosion

The following information identifies the geographic area(s) affected by each specified hazard.

Approximately 5 miles upstream from the mouth of the Yukon River, the community of Kotlik is situated where the Kotlik River, Little Kotlik River, and Apoon Pass meet. A large amount of the community's development is located along the south bank of the Kotlik River. Some homes are also located along the north bank of the river on East Island, and on the peninsula (i.e., West Island) between the Kotlik and Little Kotlik rivers. All development located along the banks of the river are susceptible to erosion.

D. Hazard Extent for Erosion

The following information describes the magnitude and severity of each specified hazard.

Erosion rarely causes death or injury. However, erosion causes the destruction of property, development, and infrastructure. In Alaska, coastal erosion is the most destructive, riverine erosion a close second, and wind erosion a distant third.

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

Riverine erosion is often initiated by failure of a riverbank causing high sediment loads or heavy rainfall. This generates high volume and velocity run-off, which will concentrate in the lower drainages within the river's catchment area. When the stress applied by these forces cause river flows to exceed the resistance of the riverbank material, erosion occurs. As the sediment load increases, fast-flowing rivers will erode their banks downstream. Eventually, the river becomes overloaded or velocity is reduced, leading to the deposition of sediment further downstream or in dams and reservoirs. The deposition may eventually lead to the river developing a new channel.

While all rivers change over time, short-term rates of change vary significantly. In less stable braided channel reaches, erosion and deposition of material are a constant issue. In more stable meandering channels, episodes of erosion may only occur occasionally. The erosion rate depends on the sediment supply and amount of run-off reaching the river. These variables are affected by many things including earthquakes, floods, climatic changes, loss of bank vegetation, urbanization, and the construction of civil works in the waterway.

Riverine erosion has many consequences including the loss of land and any development on that land. Other problems include reduction in water quality due to high sediment loads, loss of native aquatic habitats, damage to public utilities and maintenance costs associated with trying to prevent or control erosion sites.

Erosion along the banks of the Kotlik and Little Kotlik rivers and Apoon Pass results from several simultaneous elements. Bank slumping (also known as slab failure) is one of the most obvious elements of erosion on the riverbanks in Kotlik. Bank slumping indicates the degree of riverbank erosion and is a natural and inevitable process that occurs when the riverbank becomes undercut to a degree that gravity pulls the overhanging material downward. The slumping may happen gradually or suddenly; after the initial slump occurs, waves and currents can wash away the soil. Additional riverbank failures generally occur as more riverbank is exposed in this manner.

According to the 2003 Kotlik Bank Protection Feasibility Study, there are six primary factors that have led to bank slumping in the area including:

1) *Fine bank material and silty soil* are easily carried away by water even when armored by boulders or other large rip-rap. As the fine material is washed away from underneath the larger material, the larger material gives way and erodes.

2) *Wave action and currents* also contribute to erosion. Currents generally exert more erosion forces on the bottom of the river because as the depth of water increases, so does the force of the water. Waves exert more erosion forces on the riverbanks, weakening the soil structure and removing loose soil. Waves can be created by boat wakes or naturally by wind.

3) *High water* increases the erosive forces of currents and waves because the higher water level increases exposure to the riverbank. Also, as water levels fall, the saturated soil has less cohesion and the susceptible soils can be overcome by gravitational forces, especially if a rainfall or snowfall event occurs.

4) The annual *freeze-thaw cycle* that occurs in the upper 3 to 5 feet of riverbank soil also has a role in riverine erosion processes. The freeze-thaw cycle affects soil strength because soil structure, water content, and soil cohesion are changed in the cycle.

5) *Break-up ice flows* are another source of erosion. River level fluctuations (e.g., by rapid temperature change) when shore-fast ice is present can lead to erosion by abrasion of rafting ice, or by the shear weight of the exposed and unsupported shore-fast ice. When shore-fast ice is absent, rafting ice traveling through the river can strike the bank and cause damaging effects from erosion.

6) *Foot traffic* on riverbanks can destroy the integrity of the riverbanks by destroying vegetation and preventing the establishment of new vegetation, and by establishing pathways that can become depressions that collect water and become new paths for drainage, which can weaken soil structures.

E. Hazard Summary for Erosion

The following provides information on the probability of future events. In addition, the data provides an overall summary of the Kotlik's vulnerability and impact of each hazard.

Table 6 records the probability for each identified hazard. This level of probability is based on Table 3, which details the characteristics associated with each level. In short, there are four probability ratings with associated criteria that address the likelihood of future erosion events within a specific period of time.

Highly Likely: Event is probable within the calendar year

Likely: Event is probable within the next 3 years

Possible: Event is probable within the next 5 years

Unlikely: Event is possible within the next 10 years

Historical information provided in the 2003 Bank Protection Feasibility Study and by the community indicates that erosion of the Kotlik River has been actively occurring each year since at least the early 1980s. Based on this recurrence level, the probability of erosion occurring in Kotlik is highly likely.

Critical impacts to the community can result from erosion including injuries and/or illnesses resulting in permanent disability, complete shutdown of critical facilities for at least 2 weeks, and more than 25 percent of property could be severely damaged. Other specific impacts include loss of land and development on that land such as businesses or residences. Erosion can cause increased sedimentation of the river and can hinder channel navigation, affecting riverine transportation. Additional problems include reduction in water quality due to high sediment loads, loss of native aquatic habitats, damage to public utilities (roads, bridges, and dams) and maintenance costs associated with trying to prevent or control erosion sites.

Data Limitations

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

F. Vulnerability Analysis for Erosion

This section serves to identify each hazard confronting the community and its vulnerabilities to that hazard. The criteria adopted to address the community’s level of

vulnerability to the hazard examine the percentage of population or assets likely to be affected by erosion:

High: < 10 percent affected

Moderate: 1 to 10 percent affected

Low: > 1 percent affected

a. Population

Approximately **59.4** percent of the community's population is vulnerable.

b. Critical Facilities

(1) Approximately **17** percent of the community's critical facilities are vulnerable.

(2) The specific critical facilities vulnerable are:

- AC Store
- Head Start Preschool
- City Office
- Assembly of God Church
- Catholic Church
- Municipal Landfill

c. Non-Critical Facilities

(1) Approximately **62** percent of the community's non-critical facilities are vulnerable.

(2) There are **82** non-critical facilities at risk of damage from erosion, 77 of which are residential structures and the remaining 5 include the Kotlik Yupik Enterprises building, the old high school, the old special education building, the old shop, and the shop (tank).

Based on the percentages of residents, and non-critical and critical facilities that are likely to be affected by erosion, Kotlik is highly vulnerable to the effects of erosion.

G. Hazard Economic Loss Estimation for Erosion

This section describes the potential economic losses due to each hazard confronting the community.

a. Economic Loss

The economic loss resulting from this hazard is approximately **$12,692,250**.

b. Structure Loss

The loss from damage to structures from this hazard is approximately **$8,082,500**.

c. Methodology for Estimating Losses

Replacement values, or insurance coverage, were developed for critical and residential facilities. These values were obtained from HAZUS-MH and the Kotlik planning team. For each residential structure and critical facility located within the erosion hazard area, exposure was calculated by assuming the worst-case scenario (i.e., the asset would be completely destroyed and would have to be replaced). Finally, the aggregate exposure, in terms of replacement value or insurance coverage, for each category of structure or facility was calculated. A similar analysis was used to evaluate the proportion of the population at risk. However, the analysis simply represents the number of people at risk; no estimate of the number of potential injuries or deaths was prepared.

H. Hazard Human Loss Estimation for Erosion

As previously mentioned, human loss estimates (death and injuries) were not completed as part of this assessment, however the analysis does identify the number and percentage of the population at risk in Kotlik.

a. Total Affected

The estimated total number of people affected by this hazard is approximately **338**.

b. Percentage of Population

The estimated total percentage of the community's population at risk associated with this hazard is approximately **59.4** percent.

I. Vulnerability to Future Assets / Infrastructure for Erosion

Based on estimates of potential erosion in 50 years from the Kotlik Bank Protection Feasibility Study completed in 2003, any future assets and infrastructure constructed within 300 feet of the riverbank would likely be vulnerable to the effects of erosion.

4.2.3 Flooding

A. Hazard Definition for Flooding

Flooding is a natural event that no state in this country is immune from. Flooding occurs when rain, snow, or glacial melt causes a waterway to exceed capacity. It is of great concern in Alaska because there are more than 3,000 rivers, 3 million lakes, and over 5 percent (29,000 square miles) of Alaska is covered in glaciers. The Yukon River is almost 2,000 miles long and the third longest river in the U.S. These sources provide a multitude of opportunities for flooding.

Several types of flooding can occur. Three primary types of flooding occur in Kotlik including: 1) rainfall-runoff floods; 2) snowmelt floods; and 3) ice jam floods.

Rainfall-runoff flooding is the most common type of flooding and occurs in late summer and early fall. A typical rainfall event occurs in mid to late summer. The rainfall intensity, duration, distribution, and geomorphic characteristics of the watershed all play a role in determining the magnitude of the flood. Rainfall runoff flooding is the most common type of flood. This type of flood event generally results from weather systems that have associated prolonged rainfall.

Conversely, **snowmelt flooding** occurs in the spring. Snowmelt floods typically occur in spring or early summer. The depths of the snow pack and spring weather patterns influence the magnitude of flooding.

Ice jam floods occur after an ice jam develops; thus, this type of flood can occur any time of the year that a river has ice on it. Ice jams can form during fall freeze up, in midwinter when stream channels freeze forming anchor ice and during spring breakup when the existing ice cover gets broken into pieces and the pieces get stuck at bridges or other constrictions. Ice jams restrict water flow on a river or stream and form during the following three situations:

- fall freeze up
- spring breakup (i.e., when the existing ice cover is broken into pieces that block flowing water at bridges or other constrictions)
- midwinter (i.e., when stream channels freeze forming anchor ice)

Ice jams commonly develop in areas where the channel slope decreases, becomes shallower, or where constrictions occur such as at bridges, bends in the river, headwaters, and reservoirs. Ice jams frequently impede water along big rivers during spring breakup.

Water levels increase upstream behind the location of the ice jam. The result is flooding of an area by creating a lake-like effect covering a large area. Little damage typically occurs from the water current upstream of the ice jam, but significant damage can result from flooding. However, the downstream effect is very different. As soon as the ice jam is breached there is usually rapid draining of the dammed water. Downstream water

levels rise substantially after the ice jam is breached and strong water currents are created, which can cause erosion and other significant damages. Additionally, the rising water causes the ice to float while increased velocities of water move the ice further downstream. The motion of large solid ice blocks is often destructive to natural and material property in the vicinities. When ice jams cause flood events during spring breakup, snowmelt can contribute to the flood. Notable large floods in recent years on the Kenai, Susitna, Kuskokwim, and Yukon rivers were all caused by ice jams and snow melt.

Flash floods are characterized by a rapid rise in water. They are often caused by heavy rain on small stream basins, ice jam formation or by dam failure. They are usually swift moving and debris filled, causing them to be very powerful and destructive. Steep coastal areas in general are subject to flash floods. Debris slides are often associated with heavy rains. The Kodiak and Seward areas, as well as Southeast Alaska, are prone to flash floods.

Problems related to flooding are deposition and stream bank erosion. Deposition is the accumulation of soil, silt, and other particles on a river bottom or delta. For example, 4-foot diameter boulders were found after flood events in Lowell Creek in Seward and in Gold Creek in Juneau. Deposition leads to the destruction of fish habitat and presents a challenge for navigational purposes. Deposition also reduces channel capacity, resulting in increased flooding or bank erosion. Stream bank erosion involves the removal of material from the stream bank. When bank erosion is excessive, it becomes a concern because it results in loss of streamside vegetation, loss of fish habitat, and loss of land and property. For example, the lower Matanuska River has had excessive bank erosion that resulted in loss of homes and property. Many Alaskan villages have had bank erosion threats that led to constructing expensive bank protection structures.

Timing of events

Many floods are predictable based on rainfall patterns. For coastal areas of Alaska, most of the annual precipitation is received from September through February with October being the wettest. This rainfall leads to flooding in late summer and fall. Spring snowmelt increases runoff, which can cause flooding. It also breaks the winter ice cover, which causes localized ice-jam floods.

B. Previous Occurrences for Flooding

The following is a list of previous flood events in Kotlik:

- 1974 – This record rainfall flood is the most severe the community ever experienced. The entire village was inundated to a depth of 4 feet.
- 1987 – This flood was the result of stream overflow and inundated the village to a depth of 2 feet. Almost all houses were affected, in particular the Teen Center and several public buildings. The old and new runways were the only parts of town to not be affected by the flood.

- October 7, 1989 – 50-year flood, 58 people were evacuated and $195,000 in damages occurred to 16 homes.
- August 18, 1992 – The level of water was 2 feet above the average first floor of the affected homes, 108 people were evacuated, and 23 homes suffered damages totaling nearly $1.9 million.

A historic flood insurance rate map (FIRM) exists from 1977 for the Kotlik area; however, there is not a current FIRM.

C. Geographic Location for Flooding

The following information identifies the geographic area(s) affected by each specified hazard.

The entire community of Kotlik is vulnerable to the effects of flooding.

D. Hazard Extent for Flooding

The following information describes the magnitude and severity of each specified hazard.

Flooding is a natural event and damages can occur when humans interfere with the natural process. Items that can cause problems include altering the waterway and developing watersheds. An additional hazard that does not directly alter the water path is development. Building inappropriately within the floodplain can cause hazardous affects. Most of Alaska's communities and transportation facilities are located along large rivers and are subject to flooding. This flooding threatens life, safety and health; causes extensive property loss; and results in damage in excess of $750,000 annually throughout Alaska.

E. Hazard Summary for Flooding

The following provides information on the probability of future events. In addition, the data provides an overall summary of Kotlik's vulnerability and impact of each hazard.

Table 6 records the probability for each identified hazard. This level of probability is based on Table 3, which details the characteristics associated with each level. In short, there are four probability ratings with associated criteria that address the likelihood of future flooding events within a specific period of time.

Highly Likely: Event is probable within the calendar year

Likely: Event is probable within the next 3 years

Possible: Event is probable within the next 5 years

Unlikely: Event is possible within the next 10 years

Recorded historical flooding information indicates that Kotlik experiences flooding every 2 to 13 years, and it is expected these intervals of flood events will continue. Based on this historical recurrence level, the probability of a flooding event occurring in Kotlik is likely. Critical impacts to the community from flooding events could occur including injuries and/or illnesses resulting in permanent disability, complete shutdown of critical facilities for at least 2 weeks, and more than 25 percent of property could be severely damaged. Specific impacts resulting from floods include water damage to boardwalks, infrastructure, and buildings (both critical and non-critical facilities) and structural damage to buildings caused by floating debris and/or ice that is carried by the flood waters in the river.

Data Limitations

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

F. Vulnerability Analysis for Flooding

This section serves to identify each hazard confronting the community and its vulnerabilities to that hazard. The criteria adopted to address the community's level of vulnerability to the hazard examine the percentage of population or assets likely to be affected by flooding:

High: < 10 percent affected

Moderate: 1 to 10 percent affected

Low: > 1 percent affected

a. Population

Approximately **100** percent of the community's population is vulnerable.

b. Critical Facilities

(1) Approximately **100** percent of the community's critical facilities are vulnerable.

(2) The specific critical facilities vulnerable are:

The entire community of Kotlik including all critical facilities is vulnerable to flood impacts.

c. Non-Critical Facilities

(1) Approximately **100** percent of the community's non-critical facilities are vulnerable.

(2) The specific non-critical facilities vulnerable are:

All residents and critical and non-critical facilities are vulnerable to flood impacts, thus Kotlik is highly vulnerable to flooding impacts.

G. Hazard Economic Loss Estimation for Flooding

This section describes the potential economic losses due to each hazard confronting the community.

a. Economic Loss

The economic loss resulting from this hazard is approximately **$103,772,435**.

b. Structure Loss

The loss from damage to structures from this hazard is approximately **$55,321,634**.

c. Following is the methodology for estimating losses

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

Replacement values, or insurance coverage, were developed for critical and residential facilities. These values were obtained from HAZUS-MH and the Kotlik planning team. For each residential structure and critical facility located within the flood hazard area, exposure was calculated by assuming the worst-case scenario (i.e., the asset would be completely destroyed and would have to be replaced). Finally, the aggregate exposure, in terms of replacement value or insurance coverage, for each category of structure or facility was calculated. A similar analysis was used to evaluate the proportion of the population at risk. However, the analysis simply represents the number of people at risk; no estimate of the number of potential injuries or deaths was prepared.

H. Hazard Human Loss Estimation for Flooding

This section describes the potential human loss due to each hazard confronting the community.

A. Total Affected

The estimated total number of people affected by this hazard is approximately **569**.

B. Percentage of Population

The estimated total percentage of the community's population at risk associated with this hazard is approximately **100** percent.

I. Vulnerability to Future Assets / Infrastructure for Flooding

Future assets and infrastructure are vulnerable to flood impacts.

4.2.4 Severe Winter Storm

A. Hazard Definition for Severe Winter Storm

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

Heavy Snow generally means:

- Snowfall accumulating to 4 inches or more in depth in 12 hours or less
- Snowfall accumulating to 6 inches or more in depth in 24 hours or less

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

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

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

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

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

A **Blizzard** means that the following conditions are expected to prevail for a period of 3 hours or longer:

- Sustained wind or frequent gusts to 35 miles per hour or greater
- Considerable falling and / or blowing snow reducing visibility to less than 1/4 mile

Freezing Rain or **Drizzle** occurs when rain or drizzle freezes on surfaces such as the ground, trees, power lines, motor vehicles, streets, highways, etc. generally more than 12 inches of accumulation in less than 24 hours, can immobilize a community by bringing transportation to a halt.

Extreme Cold varies according to the normal climate of a region. In areas unaccustomed to winter weather, near freezing temperatures are considered "extreme cold." In Alaska, extreme cold usually involves temperatures less than -40ºF. Excessive cold may accompany winter storms, be left in their wake, or can occur without storm activity.

Ice Storms The term ice storm is used to describe occasions when damaging accumulations of ice are expected during freezing rain situations. Ice storms result from the accumulation of freezing rain, which is rain that becomes super cooled and freezes upon impact with cold surfaces. Freezing rain most commonly occurs in a narrow band within a winter storm that is also producing heavy amounts of snow and sleet in other locations.

B. Previous Occurrences for Severe Winter Storm

A series of storms struck the west coast of Alaska causing major coastal flooding November 11 through 13, 1974. Significant damage occurred in the communities of Deering, Shishmaref, Nome, Wales, Brevig Mission, Teller, Golovin, Elim, Koyuk, Shaktoolik, Unalakleet, St. Michael, Stebbins, Kotlik, Alakanuk, Scammon Bay, Sheldon Point, Hooper Bay and Kotzebue. Unalakleet was the hardest hit due to a combination of flooding and wind damage. Some portions of the community of Nome were submerged in 10 feet of water during the brunt of the storm.

C. Geographic Location for Severe Winter Storm

The following information identifies the geographic area(s) affected by each specified hazard.

The entire community of Kotlik is vulnerable to the effects of severe winter storm.

D. Hazard Extent for Severe Winter Storm

The following information describes the magnitude and severity of each specified hazard.

Heavy snow can immobilize a community by bringing transportation to a halt. Until the snow can be removed, airports and major roadways are impacted, even closed completely, stopping the flow of supplies and disrupting emergency and medical services. Accumulations of snow can cause roofs to collapse and knock down trees and power lines. Heavy snow can also damage light aircraft and sink small boats. A quick thaw after a heavy snow can cause substantial flooding, especially along small streams. The cost of snow removal, repairing damages, and the loss of business can have severe economic impacts on cities and towns. Injuries and deaths related to heavy snow usually

occur as a result of vehicle accidents. Casualties also occur due to overexertion while shoveling snow and hypothermia caused by overexposure to the cold weather.

Extreme cold, can bring transportation to a halt across interior Alaska for days or sometimes weeks at a time. Aircraft may be grounded due to extreme cold and ice fog conditions, cutting off access as well as the flow of supplies northern villages. Long cold spells can cause rivers to freeze, disrupting shipping and increases the likelihood of ice jams and associated flooding. Extreme cold also interferes with a community's infrastructure. It causes fuel to congeal in storage tanks and supply lines, stopping electric generation. Without electricity, heaters do not work, causing water and sewer pipes to freeze or rupture. If extreme cold conditions are combined with low or no snow cover, the ground's frost depth can increase disturbing buried pipes. The greatest danger from extreme cold is its effect on people. Prolonged exposure to the cold can cause frostbite or hypothermia and become life-threatening. Infants and elderly people are most susceptible. The risk of hypothermia due to exposure greatly increases during episodes of extreme cold, and carbon monoxide poisoning is possible as people use supplemental heating devices.

Ice storms can be the most devastating of winter weather phenomena and are often the cause of automobile accidents, power outages and personal injury. Ice storms result from the accumulation of freezing rain, which is rain that becomes super-cooled and freezes upon impact with cold surfaces.

High winds occur in Alaska when there are winter low-pressure systems in the North Pacific Ocean and the Gulf of Alaska. Alaska's high wind can equal hurricane force but fall under a different classification because they are not cyclonic nor possess other characteristics of hurricanes. In Alaska, high winds (winds in excess of 60 miles per hour) occur rather frequently over the coastal areas along the Bering Sea and the Gulf of Alaska due to coastal storms.

E. Hazard Summary for Severe Winter Storm

The following provides information on the probability of future events. In addition, the data provides an overall summary of Kotlik's vulnerability and impact of each hazard.

Table 6 records the probability for each identified hazard. This level of probability is based on Table 3, which details the characteristics associated with each level. In short, there are four probability ratings with associated criteria that address the likelihood of future winter storm events within a specific period of time.

Highly Likely: Event is probable within the calendar year

Likely: Event is probable within the next 3 years

Possible: Event is probable within the next 5 years

Unlikely: Event is possible within the next 10 years

Severe winter storms occur annually along the western coast of Alaska and based on this recurrence level, the probability of a severe winter storm occurring in Kotlik is highly likely. The magnitude of impacts to the community resulting from severe winter storm is considered negligible. Structures and infrastructure have largely been constructed to withstand annual occurrences of severe winter storms. Thus, there is a small potential for injuries, less than 10 percent of property would be damaged, quality of life would only be lost to a minor degree, and the shutdown of critical facilities and services would occur for less than 24 hours. High winds resulting from the storms would pose the greatest risk. They can combine with loose snow to produce blinding blizzard conditions and dangerous wind chills. In addition, high winds have the potential to reach hurricane force. Such winds can seriously damage community facilities and infrastructure (especially above ground utility lines).

Data Limitations

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

F. Vulnerability Analysis for Severe Winter Storm

This section serves to identify each hazard confronting the community and its vulnerabilities to that hazard. For vulnerability, the criteria address the percentage of population or assets likely to be affected by a severe winter storm event:

High: < 10 percent affected

Moderate: 1 to 10 percent affected

Low: > 1 percent affected

a. Population

Approximately **100** percent of the community's population is vulnerable.

b. Critical Facilities

(1) Approximately **100** percent of the community's critical facilities are vulnerable.

(2) The specific critical facilities vulnerable are:

All critical facilities in Kotlik are at risk from the impacts of a severe winter storm.

c. Non-Critical Facilities

(1) Approximately **100** percent of the community's non-critical facilities are vulnerable.

(2) The specific non-critical facilities vulnerable are:

All residents, residences, and critical facilities are likely to be affected by a severe winter storm event, thus Kotlik is highly vulnerable to the effects of a severe winter storm.

G. Hazard Economic Loss Estimation for Severe Winter Storm

This section describes the potential economic losses due to each hazard confronting the community.

a. Economic Loss

The economic loss resulting from this hazard is approximately **$103,772,435**.

b. Structure Loss

The loss from damage to structures from this hazard is approximately **$55,321,634**.

c. Following is the methodology for estimating losses

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

Replacement values, or insurance coverage, were developed for critical and residential facilities. These values were obtained from HAZUS-MH and the Kotlik planning team. For each residential structure and critical facility located within the severe winter storm hazard area, exposure was calculated by assuming the worst-case scenario (i.e., the asset would be completely destroyed and would have to be replaced). Finally, the aggregate exposure, in terms of replacement value or insurance coverage, for each category of structure or facility was calculated. A similar analysis was used to evaluate the proportion of the population at risk. However, the analysis simply represents the number of people at risk; no estimate of the number of potential injuries or deaths was prepared.

H. Hazard Human Loss Estimation for Severe Winter Storm

As previously discussed, human loss estimates (death and injuries) were not completed as part of this assessment; however, the analysis does identify the number and percentage of the population at risk in Kotlik.

a. Total Affected

The estimated total number of people affected by this hazard is approximately **569**.

b. Percentage of Population

The estimated total percentage of the community's population at risk associated with this hazard is approximately **100** percent.

I. Vulnerability to Future Assets / Infrastructure for Severe Winter Storm

All future residents, structures, and critical facilities in Kotlik are at risk from the impacts of a severe winter storm.

4.2.5 Tsunami

A. Hazard Definition for Tsunami

Tsunamis are large ocean waves that are generally triggered by vertical motion of the sea floor during major earthquakes. Near ocean or undersea landslides or volcanic eruptions can also generate tsunamis. They can be generated locally or a great distance from where they landfall. Warning time can be limited when the tsunami is triggered close to the impacted coastline.

B. Previous Occurrences for Tsunami

Tsunami events have not been officially documented in Kotlik; however, during the hazard screening process, a community elder reported that tsunami events have previously occurred on two occasions. The first account is of a tsunami occurring on November 10, 1952, approximately 6 miles below Kotlik. The day was very calm and then all of a sudden someone noticed water coming to land. Suddenly the ice burst, water rolled inside the slough, and water reached knee deep outside houses. Gasoline tanks drifted away with various other belongings. All homes in the community were affected by water saturating the floors. The entire population (approximately 200) stayed in the Catholic Church for a couple of nights until water drained from the homes.

The second account of a tsunami event occurred in January 2005. Water remained in low-lying areas of town for about 6 to 7 hours.

C. Geographic Location for Tsunami

The following information identifies the geographic area(s) affected by each specified hazard.

A tsunami would affect the entire community of Kotlik.

D. Hazard Extent for Tsunami

The following information describes the magnitude and severity of each specified hazard.

The most vulnerable areas of the State are the low-lying coastal areas in the Gulf of Alaska and those areas bordering the Pacific Ocean. Tsunami events usually occur in the heavily glaciated areas of Prince William Sound and the part of Southeast Alaska. Volcano-generated tsunamis are rare; however, they are a threat to the Aleutian Chain and parts of Cook Inlet. Landslide-generated tsunamis are responsible for most of the tsunami deaths in Alaska because they allow virtually no warning time. Tsunamis generated by landslides in lakes occur more in Alaska than any other part of the U.S. They are associated with the collapse of deltas in glacial lakes having great depths. They may also be associated with delta deposits from rapidly flowing streams and rivers carrying glacial debris.

E. Hazard Summary for Tsunami

The following provides information on the probability of future events. In addition, the data provides an overall summary of Kotlik's vulnerability and impact of each hazard.

Table 6 records the probability for each identified hazard. This level of probability is based on Table 3, which details the characteristics associated with each level. In short, there are four probability ratings with associated criteria that address the likelihood of future tsunami events within a specific period of time.

Highly Likely: Event is probable within the calendar year

Likely: Event is probable within the next 3 years

Possible: Event is probable within the next 5 years

Unlikely: Event is possible within the next 10 years

Historical information provided by community elders indicates that tsunami events are rare occurrences, and it is unlikely that a tsunami will impact Kotlik. Impacts to the community are considered negligible with the potential for little or no injuries, less that 10 percent of property damaged, minor quality of life lost, and shutdown of critical facilities and services for 24 hours or less. Specific impacts from a tsunami are similar to those resulting from flood events, including water damage to boardwalks, infrastructure,

and buildings (both critical and non-critical facilities) and structural damage to buildings caused by floating debris and/or ice that is carried by the tsunami flood waters onto land.

Data Limitations

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

F. Vulnerability Analysis for Tsunami

This section serves to identify each hazard confronting the community and its vulnerabilities to that hazard. The criteria adopted to address the community's level of vulnerability to the hazard examine the percentage of population or assets likely to be affected by tsunami:

High: < 10 percent affected

Moderate: 1 to 10 percent affected

Low: > 1 percent affected

a. Population

Approximately **100** percent of the community's population is vulnerable.

b. Critical Facilities

(1) Approximately **100** percent of the community's critical facilities are vulnerable.

(2) The specific critical facilities vulnerable are:

All critical facilities are at risk.

c. Non-Critical Facilities

(1) Approximately **100** percent of the community's non-critical facilities are vulnerable.

(2) The specific non-critical facilities vulnerable are:

All residents and critical and non-critical facilities are at risk of being impacted by a tsunami event, thus Kotlik is highly vulnerable to tsunami events.

G. Hazard Economic Loss Estimation for Tsunami

This section describes the potential economic losses due to each hazard confronting the community.

a. Economic Loss

The economic loss resulting from this hazard is approximately **$103,772,435**.

b. Structure Loss

The loss from damage to structures from this hazard is approximately **$55,321,634**.

c. Following is the methodology for estimating losses

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

Replacement values, or insurance coverage, were developed for critical and residential facilities. These values were obtained from HAZUS-MH and the Kotlik planning team. For each residential structure and critical facility located within the severe winter storm hazard area, exposure was calculated by assuming the worst-case scenario (i.e., the asset would be completely destroyed and would have to be replaced). Finally, the aggregate exposure, in terms of replacement value or insurance coverage, for each category of structure or facility was calculated. A similar analysis was used to evaluate the proportion of the population at risk. However, the analysis simply represents the number of people at risk; no estimate of the number of potential injuries or deaths was prepared.

H. Hazard Human Loss Estimation for Tsunami

As previously discussed, human loss estimates (death and injuries) were not completed as part of this assessment; however, the analysis does identify the number and percentage of the population at risk in Kotlik.

a. Total Affected

The estimated total number of people affected by this hazard is approximately **569**.

b. Percentage of Population

The estimated total percentage of the community's population at risk associated with this hazard is approximately **100** percent.

I. Vulnerability to Future Assets/Infrastructure for Tsunami

All future residents, structures, and critical facilities in Kotlik are at risk from the impacts of a tsunami.

4.2.5 Wildfires

A. Hazard Definition for Wildfires

Fires can be divided into the following categories:

Structure Fires – originate in and burn a building, shelter or other structure.

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

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

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

Wildland-Urban Interface Fires – fires that burn within the line, area, or zone where structures and other human development meet or intermingle with undeveloped wildland or vegetative fuels. The potential exists in areas of wildland-urban interface for extremely dangerous and complex fire burning conditions, which pose a tremendous threat to public and firefighter safety.

B. Previous Occurrences for Wildfires

Wildland fires have not been documented within the boundaries of Kotlik; however, wildland fires have occurred in the vicinity.

Table 7 identifies wildland fires that have occurred within 60 miles of Kotlik in the past 50 years.

Table 7. Wildland Fires near Kotlik

Fire Year	Fire Name/Number	Acres Burned
1959	91	15,290
1962	32	1,300
1962	30	2,000
1973	7718	914
1974	7788	2,700
1991	b239	1,770
1991	b242	10,181
1993	b221	335
1994	a204	569
1997	b610	324
1997	b609	257
1997	b615	412
2000	a383	12,891
2002	a301	100

Source: Alaska Fire Service, 2007

C. Geographic Location for Wildfires

The following information identifies the geographic area(s) affected by each specified hazard.

There are not wooded or wildland-urban interface areas within Kotlik. However, secondary effects of wildland fires, such as poor air quality, can be found throughout the community. Over the past 50 years, 14 significant fire events have occurred within 60 miles of Kotlik (Figure 2).

D. Hazard Extent for Wildfires

The following information describes the magnitude and severity of each specified hazard.

Fuel, weather, and topography influence wildland fire patterns. Wildland fire patterns can be erratic and extreme causing firewhirls and firestorms that can endanger the lives of the firefighters trying to suppress the blaze. Fuel determines how much energy the fire

Figure 2. Wildland Fires near Kotlik

releases; how quickly the fire spreads; and how much effort is needed to contain the fire. Weather is the most variable factor. Temperature and humidity also affect fire patterns. High temperatures and low humidity encourage fire activity, while low temperatures and high humidity help retard fire behavior. Wind affects the speed and direction of a fire. Topography directs the movement of air, which can also affect fire patterns. When the terrain funnels air, similar to what happens in a canyon, it can lead to faster spreading. Fire can also travel up slope quicker than it goes down.

E. Hazard Summary for Wildfires

The following provides information on the probability of future events. In addition, the data provides an overall summary of Kotlik's vulnerability and impact of each hazard.

Fire is recognized as a critical feature of the natural history of many ecosystems. It is essential to maintain the biodiversity and long-term ecological health of the land. The role of wildland fire as an essential ecological process and natural change agent has been incorporated into the fire management planning process and the full range of fire management activities is exercised in Alaska to help achieve ecosystem sustainability, including its interrelated ecological, economic, and social consequences on firefighter and public safety and welfare, natural and cultural resources threatened, and the other values to be protected dictate the appropriate management response to the fire. In Alaska, the natural fire regime is characterized by a return interval of 50 to 200 years, depending on the vegetation type, topography, and location. Recorded wildland fires occurring within 60 miles of Kotlik recur approximately every 5 years.

Table 6 records the probability for each identified hazard. This level of probability is based on Table 3, which details the characteristics associated with each level. In short, there are four probability ratings with associated criteria that address the likelihood of future wildland fire events within a specific period of time.

Highly Likely: Event is probable within the calendar year

Likely: Event is probable within the next 3 years

Possible: Event is probable within the next 5 years

Unlikely: Event is possible within the next 10 years

Given the history of wildland fires near Kotlik, it is possible future wildland fire events will occur around Kotlik. While conditions in Kotlik are generally wet, the possibility of a dry season combined with high winds could lead to a catastrophic wildland fire event. Impacts to the community are considered catastrophic with the potential for multiple deaths, complete shutdown of facilities for 30 or more days, and more than 50 percent of property severely damaged. Kotlik is considered a Level I Isolated village with no organized fire department or brigade, depending on Rural Basic Firefighter training within the volunteer fire department. The community has limited air and marine access to

a larger hub community and would be required to rely on its own resources for a significant period of time in the event of a wildland fire event.

Data Limitations

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

F. Vulnerability Analysis for Wildfires

This section serves to identify each hazard confronting the community and its vulnerabilities to that hazard. The criteria adopted to address the community's level of vulnerability to the hazard examine the percentage of population or assets likely to be affected by wildland fire:

High: < 10 percent affected

Moderate: 1 to 10 percent affected

Low: > 1 percent affected

a. Population

Approximately **100** percent of the community's population is vulnerable.

b. Critical Facilities

(1) Approximately **100** percent of the community's critical facilities is vulnerable.

(2) The specific critical facilities vulnerable are:

All critical facilities in Kotlik are at risk of damage from a wildfire event.

c. Non-Critical Facilities

(1) Approximately **100** percent of the community's non-critical facilities is vulnerable.

(2) The specific non-critical facilities vulnerable are:

All non-critical facilities in Kotlik are at risk of damage from a wildfire event.

The entire population as well as all critical and non-critical facilities are likely to be affected by wildland fire events, thus Kotlik is highly vulnerable to the effects of wildland fire.

G. Hazard Economic Loss Estimation for Wildfires

This section describes the potential economic losses due to each hazard confronting the community.

a. Economic Loss

The economic loss resulting from this hazard is approximately **$103,772,435**.

b. Structure Loss

The loss from damage to structures from this hazard is approximately **$55,321,634.**

c. Following is the methodology for estimating losses

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

Replacement values, or insurance coverage, were developed for critical and residential facilities. These values were obtained from HAZUS-MH and the Kotlik planning team. For each residential structure and critical facility located within the wildland fire hazard area, exposure was calculated by assuming the worst-case scenario (i.e., the asset would be completely destroyed and would have to be replaced). Finally, the aggregate exposure, in terms of replacement value or insurance coverage, for each category of structure or facility was calculated. A similar analysis was used to evaluate the proportion of the population at risk. However, the analysis simply represents the number of people at risk; no estimate of the number of potential injuries or deaths was prepared.

H. Hazard Human Loss Estimation for Wildfires

This section describes the potential human loss due to each hazard confronting the community.

a. Total Affected

The estimated total number of people affected by this hazard is approximately **569**.

b. Percentage of Population

The estimated total percentage of the community's population at risk associated with this hazard is approximately **100** percent.

I. Vulnerability to Future Assets / Infrastructure for Wildfires

All of the future residents, structures, and critical and non-critical facilities in Kotlik are equally at risk to a wildland fire event.

4.3 Asset Inventory

4.3.1 Processes and Sources for Identifying Assets

The planning team identified residential structures and critical facilities in the community using the 2003 Kotlik Sanitation Feasibility Plan. Current population residing in existing structures was provided by the planning team based on existing community records. Each residential structure was identified by the household name, the number of occupants, value of the structure, and whether the structure was located within an area that the community has identified as at risk to erosion. Critical facilities were identified by name, value of the facility, and whether the structure was located within an area that the community has identified as at risk to erosion.

Data Limitations

All residential structure values (vacant included) were based on average residential structure values from the 2006 Alakanuk HMP. The Laufkak, KYE, Lodge, AC Store Complex, Shop Tank, Principal's house, Community Hall, Old Electric Plant, New Electric Plant, Tanks, Water Tank, and Water Treatment Plant values were estimated based on values from the 2006 Alakanuk HMP. Teacher housing and duplexes were estimated based on known values for existing teacher's quarters, and the old school and the special education building were estimated based on known values for the new school and the Head Start building. When this information becomes available it will be incorporated as part of the update to this plan.

4.3.2 Critical Facilities List

A critical facility is defined as a facility in either the public or private sector that provides essential products and services to the general public, such as preserving the quality of life in the community and fulfilling important public safety, emergency response, and disaster recovery functions. Table 8 identifies critical facilities in Kotlik.

Table 8. Kotlik Critical Facilities

Facility Name	Facility Type	Latitude	Longitude
New Airport	Airport	63.03017	-163.53136
Cemetery (new)	Cemetery		
Cemetery (old)	Cemetery2		
Assembly of God	Church	63.03408	-163.55146
Catholic Church	Church	63.03407	-163.54897
Community Center	Community Hall	63.03368	-163.551
Fire Station	Fire Station	63.03329	-163.54942
Fuel Storage SE of Power Plant	Fuel Storage Tanks (>500gal)	63.03296	-163.54993
Kotlik Yupik Corp Fuel Farm	Fuel Storage Tanks (>500gal)	63.03727	-163.52921
Kotlik Yupik Corp Fuel Farm (2)	Fuel Storage Tanks (>500gal)		
Kotlik Yupik Corp Fuel Farm (3)	Fuel Storage Tanks (>500gal)		
Kotlik Yupik Corp Fuel Farm (4)	Fuel Storage Tanks (>500gal)		
Utility Fuel Tank (1)	Fuel Storage Tanks (>500gal)		
Utility Fuel Tank (2)	Fuel Storage Tanks (>500gal)		
Utility Fuel Tank (3)	Fuel Storage Tanks (>500gal)		
Utility Fuel Tank (5)	Fuel Storage Tanks (>500gal)		
Utility Fuel Tank (4)	Fuel Storage Tanks (>500gal)		
Electric Plant/generator (New)	Generator		
School generator	Generator	63.03353	-163.55272
Health Clinic	Hospital/Clinic/ER	63.0333	-163.54879
Municipal Landfill	Landfill/Incinerator	63.03978	-163.56027
Armory	National Guard	63.03357	-163.55403
City Office	Offices	63.03384	-163.55414
Police Department	Police Station		
Post Office	Post Office	63.03384	-163.55414
Power Plant	Power Generation Facility	63.03322	-163.55092
Washeteria	Reservoir/Water Supply	63.03423	-163.56599
Water Plant	Reservoir/Water Supply	63.03365	-163.55232
Water Tank	Reservoir/Water Supply		
Cable Building	Satellite		
Head Start Pre-school	School	63.03268	-163.55823
LYSD School (Elementary & High)	School	63.03408	-163.55238
City Sewage Lagoon	Sewage Lagoon	63.03225	-163.55172
Sanitation Garage	Sewage Lagoon		
A.C. Store Complex	Store	63.03511	-163.53982
City Lodge/Hotel	Store	63.03392	-163.551
Laufkak	Store	63.03345	-163.55456
Duplex (1)	Teachers Quarters		
Duplex (2)	Teachers Quarters		
Duplex (3)	Teachers Quarters		
Principal's House	Teachers Quarters		
Teacher Housing (1)	Teachers Quarters	63.0332	-163.55343
Teachers Housing (2)	Teachers Quarters		
Teachers Housing (3)	Teachers Quarters		
United Utilities Telephone	Telephone	63.03379	-163.55105

4.3.3 Non-Critical Facilities

Population and residential structures data were collected by the planning team during preparation of this plan. A total of 119 residential buildings are located in Kotlik, and the estimated median value is $95,000. Table 9 identifies each residential household and the population of the household for year 2006.

Table 9. Kotlik Non-Critical Facilities

Household / Facility Name	Occupants	Household / Facility Name	Occupants
Mr. Anthony Akaran	5	Mr. David Mike	5
Mr. Ignatius Akaran	5	Mr. Ignatius Mike	5
Mr. Michael Akaran	1	Mr. Joseph Mike	2
Mr. Pius Akaran	2	Mr. Simeon Mike	4
Mr. Richie Akaran	5	Ms. Mary Ann Mike	9
Mr. Theodore Akaran	8	Ms. Lena Moses	5
Ms. Irene Akaran	1	Ms. Alvina Murphy	4
Mr. Anthony Aketachunak	4	Mr. William Murphy Sr.	7
Mr. Felix Aketachunak	0	Mr. Danny Odinzoff	6
Mr. Gregory Aketachunak	9	Mr. Joseph Odinzoff	6
Ms. Mary Rose Aketachunak	0	Mr. William Odinzoff Jr.	6
Ms. Mollie Aketachunak	2	Mr. Benedict Okitkun	3
Mr. Alfred Andrews	4	Mr. Darryl Okitkun	6
Mr. Brian Andrews	6	Mr. Harold Okitkun	5
Mr. Cyril Andrews	6	Mr. John Okitkun	9
Mr. Phillip Andrews	5	Mr. Marvin Okitkun	3
Mr. Ronald Andrews	9	Mr. Peter Okitkun	7
Ms. Clara Andrews	4	Mr. Reynold Okitkun	5
Ms. Margaret Andrews	2	Mr. Robert Okitkun	7
Mr. Hermes Aparezuk	6	Mr. Wayne Okitkun	5
Mr. Joe Aparezuk	3	Ms. Adela Okitkun	3
Mr. Robin Bender	1	Ms. Linda Okitkun	5
Ms. Rose Cheemuk	6	Ms. Maggie Okitkun	5
Ms. Felicity Demers	2	Mr. Jack Okitkun Sr.	6
Mr. Leonard Elachik	1	Mr. Martin Okitkun Sr.	7
Mr. Peter Elachik	10	Mr. Stan Paulson	1
Mr. James Fancyboy	8	Mr. Rodrick Pete	3
Ms. Martha Hootch	9	Mr. David Prince	0
Mr. Bernard Hunt	5	Mr. Ephrim Prince	0
Mr. Cyril Hunt	6	Mr. Joseph Prince	4
Mr. Hermus Hunt	1	Mr. Michael Prince	7
Mr. Isadore Hunt	3	Mr. Thomas Prince	6
Mr. Martin Hunt	6	Ms. Angela Prince	8
Ms. Darlene Hunt	4	Ms. Francis Prince	0
Ms. Francis Hunt	3	Ms. Laurie Prince	7
Ms. Maggie Hunt	1	Ms. Lorrena Prince	2
Ms. Marie Hunt	5	Ms. Sara Prince	6
Ms. Pauline Hunt	1	Ms. Elaine Savetilik	6
Mr. Andy Hunt Jr.	8	Mr. Ike Seton Sr.	4
Mr. Michael Hunt Sr.	7	Mr. Thomas Sinka	3
Ms. Martina Jack	8	Ms. Laurentia Sinka	5
Mr. Joe Johnson	6	Mr. Abraham Teeluk	7
Mr. Pat Kameroff	2	Mr. Alfred Teeluk	1
Mr. Benny Kamkoff	5	Mr. Billy Teeluk	6
Mr. Clifford Kamkoff	7	Mr. Raymond Teeluk	8
Ms. Anna Kamkoff	4	Mr. Robert Teeluk	1
Mr. Emmanuel Keyes	5	Ms. Agnes Teeluk	9
Ms. Alma Keyes	1	Mr. Morris Teeluk Sr.	7
Mr. Mathew Kitsick	6	Mr. Edward Tom	1
Mr. Harold Kitsick Sr.	5	Mr. John A Tonuchuk	4
Mr. Ralph Martin	4	Mr. Victor Tonuchuk	7
Mr. Clement Matthias	6	Mr. Walter Tonuchuk	0

Household / Facility Name	Occupants	Household / Facility Name	Occupants
Mr. Wilbur Tonuchuk	8	Mr. George Williams	1
Ms. Theresa Tonuchuk	4	Mr. Rudy Williams Jr.	8
Mr. Joe Uisok	10	Mr. Percy Yunak	1
Mr. Al Unok	13	Mr. Peter Yunak	5
Mr. William Unok	3	Ms. Louise Yunak	4
Ms. Mildred Unok	6	Kotlik Yupik Enterprises	0
Mr. Ralph Waska	7	Old High School	0
Mr. Vincent Waska	2	Old Special Education	0
Mr. Thomas Wasuli	2	Old Shop (Old Electric Plant)	0
Ms. Liz Wasuli	2	Shop (Tank)	0

4.3.4 Facility Replacement Costs

Table 10 provides an estimated replacement value for residential and critical facilities in Kotlik. Structure values were obtained during the asset data inventory during the summer and fall of 2006. The estimated contents values were calculated after each structure was classified by occupancy class using HAZUS-MH.

Table 10. Kotlik Loss Estimates by Occupancy Class

Type of Structure (Occupancy Class)	# in Hazard Area	Estimated Value of Structure	Contents	
			HAZUS Contents Value (%) by Occupancy Class	Estimated Value of Contents
Residential	**119**	$ 11,305,000.00	50%	$ 5,652,500.00
Commercial	**4**	$ 8,228,600.00	150%	$ 12,342,900.00
****Industrial**	**0**	$ -	150%	$ -
Religious/Non-Profit	**2**	$ 190,000.00	100%	$ 190,000.00
Government	**11**	$ 855,000.00	150%	$ 1,282,500.00
Education**	**11**	$ 987,500.00	150%	$ 1,481,250.00
Utilities	**15**	$ 3,365,334.00	NA	$ 3,365,334.00
Total	**162**			**$ 24,314,484.00**

Note: Estimated value of contents does not include values for utilities category (not available in HAZUS-MH)

The functional value is calculated by adding the structure value to the contents value. Displace values were unable to be provided. When these figures become available they will be included in the plan. Table 11 provides the loss estimates for critical facilities in Kotlik based on structure value and content value (when available). The functional value is the sum of structure and content value.

Table 11. Kotlik Critical Facility Loss Estimates

Name	Functional	Displace	Structure	Content	Other
Airport					
New Airport	$15,000,000	$0	$15,000,000	$0	$0
Cemetery					
Cemetery (new)	$0	$0	$0	$0	$0
Cemetery2					
Cemetery (old)	$0	$0	$0	$0	$0
Church					
Assembly of God	$400,000	$0	$200,000	$200,000	$0
Catholic Church	$400,000	$0	$200,000	$200,000	$0
Community Hall					

Community Center	$2,187,500	$0	$875,000	$1,312,500	$0
Fire Station					
Fire Station	$300,000	$0	$120,000	$0	$0
Fuel Storage Tanks (>500gal)					
Fuel Storage SE of Power Plant	$3,000,000	$0	$0	$0	$0
Kotlik Yupik Corp Fuel Farm	$0	$0	$0	$0	$0
Kotlik Yupik Corp Fuel Farm (2)	$0	$0	$0	$0	$0
Kotlik Yupik Corp Fuel Farm (3)	$0	$0	$0	$0	$0
Kotlik Yupik Corp Fuel Farm (4)	$0	$0	$0	$0	$0
Utility Fuel Tank (1)	$0	$0	$0	$0	$0
Utility Fuel Tank (2)	$0	$0	$0	$0	$0
Utility Fuel Tank (3)	$0	$0	$0	$0	$0
Utility Fuel Tank (5)	$0	$0	$0	$0	$0
Utility Fuel Tank (4)	$0	$0	$0	$0	$0
Generator					
Electric Plant/generator (New)	$2,500,000	$0	$1,000,000	$1,500,000	$0
School generator	$0	$0	$0	$0	$0
Hospital/Clinic/ER					
Health Clinic	$500,000	$0	$200,000	$300,000	$0
Landfill/Incinerator					
Municipal Landfill	$0	$0	$0	$0	$0
National Guard					
Armory	$2,750,000	$0	$1,100,000	$1,650,000	$0
Offices					
City Office	$200,000	$0	$80,000	$120,000	$0
Police Station					
Police Department	$300,000	$0	$120,000	$180,000	$0
Post Office					
Post Office	$212,500	$0	$85,000	$127,500	$0
Power Generation Facility					
Power Plant	$5,150,000	$0	$2,060,000	$3,090,000	$0
Reservoir/Water Supply					
Washeteria	$741,835	$0	$296,734	$445,101	$0
Water Plant	$32,500,000	$0	$13,000,000	$19,500,000	$0
Water Tank	$2,000,000	$0	$800,000	$1,200,000	$0
Satellite					
Cable Building	$15,000	$0	$15,000	$0	$0
School					
Head Start Pre-school	$500,000	$0	$200,000	$300,000	$0
LYSD School (Elementary & High)	$17,352,750	$0	$6,941,100	$10,411,650	$0
Sewage Lagoon					
City Sewage Lagoon	$0	$0	$0	$0	$0
Sanitation Garage	$36,100	$0	$36,100	$0	$0
Store					
A.C. Store Complex	$218,750	$0	$87,500	$131,250	$0
City Lodge/Hotel	$343,750	$0	$137,500	$206,250	$0
Laufkak	$218,750	$0	$87,500	$0	$0
Teachers Quarters					
Duplex (1)	$384,000	$0	$153,600	$230,400	$0
Duplex (2)	$384,000	$0	$153,600	$230,400	$0
Duplex (3)	$384,000	$0	$153,600	$230,400	$0
Principal's House	$384,000	$0	$153,600	$230,400	$0
Teacher Housing (1)	$384,000	$0	$153,600	$230,400	$0
Teachers Housing (2)	$384,000	$0	$153,600	$230,400	$0
Teachers Housing (3)	$384,000	$0	$153,600	$230,400	$0
Telephone					
United Utilities Telephone	$0	$0	$0	$0	$0
Totals	$89,514,935	$0	$43,716,634	$42,487,051	$0

Table 12 illustrates the vulnerability assessment, which includes the population and the number of residential and critical facility structures affected for each identified hazard.

Table 12. Vulnerability Assessment – Population, Residential Structures, and Critical Facilities

		Residential Structures				Critical Facilities				Total			
Hazard	**Pop.**	**No.**	**Structure Value**	**Contents Value**	**Total Value**	**No.**	**Structure Value**	**Contents Value**	**Value**	**No.**	**Structure Value**	**Contents Value**	**Value**
Earthquake	569	119	$11,305,000	$5,652,500	$16,957,500	35	$44,016,634	$42,798,301	$86,514,935	154	$55,321,634	$48,450,801	$103,772,435
Erosion	338	77	$7,315,000	$3,657,500	$10,972,500	6	$767,500	$951,250	$1,718,750	83	$8,082,500	$4,608,750	$12,691,250
Flooding	569	119	$11,305,000	$5,652,500	$16,957,500	35	$44,016,634	$42,798,301	$86,514,935	154	$55,321,634	$48,450,801	$103,772,435
Sever Winter Weather	569	119	$11,305,000	$5,652,500	$16,957,500	35	$44,016,634	$42,798,301	$86,514,935	154	$55,321,634	$48,450,801	$103,772,435
Wildfire	569	119	$11,305,000	$5,652,500	$16,957,500	35	$44,016,634	$42,798,301	$86,514,935	154	$55,321,634	$48,450,801	$103,772,435
Tsunami	569	119	$11,305,000	$5,652,500	$16,957,500	35	$44,016,634	$42,798,301	$86,514,935	154	$55,321,634	$48,450,801	$103,772,435

4.3.5 Future Development

A. Analysis of Community Development Trends

Current Land Use

Land use in Kotlik is predominately residential with several areas of commercial and services, light industrial, and community facilitites (or institutional). Suitable developable vacant land is in short supply within the boundaries of Kotlik, and open space and various hydrological bodies surround the community. Two areas of town are classified as airport land use.

Although the City of Kotlik has no formal zoning or other land use controls, the Community Plan provides a framework for future land use classifications. The following identifies existing structures in the community and places them in land use categories that are generally accepted in planning and in accordance with the Kotlik Community Plan.

Commercial land uses within Kotlik include the KYE building as well as some critical facilities such as: the AC Store, washeteria, and City Lodge.

Industrial land use exists in Kotlik in what is generally accepted as 'light industrial.' Light industrial land use typically includes light manufacturing and assembly, and can also include some office space. Industrial land uses in Kotlik includes occupancy classes such as government, utilities, and educational facilities. Industrial land uses are generally kept a safe distance from residential development due to pollution or other potentially hazardous or dangerous byproducts that can develop and occur with industrial activity. As with commercial land use, many light industrial land uses include critical facilities. The following list identifies the structures located in Kotlik that can be classified as light industrial land uses:

- Kotlik Yupik Corp. Fuel Farm
- Fuel Storage
- School (new and old) Generator
- Kotlik Landfill
- Power Plant
- Water Plant and Tank
- Honey Bucket Lagoon
- School Sewage Lagoon

Community facilities are classified under institutional land uses such as schools and government facilities. Again, many critical facilities are classified under community facilities and institutional land uses. They include:

- Baptist Church
- Catholic Church
- Community Center
- Assembly of God
- Public Safety Building
- Health Clinic
- Armory
- Post Office
- High School
- Elementary School
- Head Start Pre-School
- Teen Center
- Cemetery

Development Trends

Development trends in Kotlik will likely attempt to keep pace with the growing population. Currently, residential development is a priority. Fourteen families have applied for homes with the AVCP. Construction has been completed on three homes in 2006; however, construction of the remaining 14 will be staggered over the next 2 to 3 years.

Section 5 Mitigation Strategy

5.1 Mitigation Goals

Based on the hazards, and the assets at risk from those hazards, goals, objectives, and projects were developed as the foundation of the mitigation strategy. Mitigation goals are defined as general guidelines that explain what a community wants to achieve in terms of hazard and loss prevention. Goals are positively stated future situations that are typically long-range, policy-oriented statements representing community-wide visions. Objectives are derived from goals and are desired outcomes that have specific measurable results within a specified period.

The planning team developed 11 goals and associated objectives to reduce or avoid long-term vulnerabilities to the identified hazards (Table 13).

Table 13. Mitigation Goals and Objectives

Goal Number	Goal	Objective
1	Reduce possibility of damage and losses from erosion.	Identify buildings that are at risk of impact from erosion.
		Work with agencies, Native corporations, and organizations to identify new and emerging riverbank protection methods and grants (or other type of funding mechanism) that are available for these strategies.
2	Increase public awareness of erosion and the problems it can cause and how to prevent and mitigate riverbank erosion.	Research information regarding riverbank erosion problems, prevention, and mitigation.
3	Reduce the possibility of damage and losses from flooding.	Adopt and enforce floodplain management ordinances.
		Identify and assess repetitively flooded properties.
		Enhance warning and response activities to increase warning time for the community.
4	Promote recognition of wildland fire and preparation for impacts from wildland fire.	Identify impacts that can result from excessive wildland fire smoke and the ways to guard yourself against those impacts.
5	Reduce possibility of damage and losses from wildland fires.	Identify methods of alerting the community if wildfire threat develops.
		Develop an evacuation plan for the community.
		Maintain Project Code Red Equipment.
		Promote FireWise building design, siting, and materials for construction.
6	Reduce vulnerability of structures to earthquake damage.	Encourage use of earthquake resistant materials and construction practices.

Goal Number	Goal	Objective
		Ensure that all future development meets all requirements for seismic protection.
7	Promote public education regarding earthquake hazards.	Educate community about what do to in the event of an earthquake.
		Educate community about ways to mitigate damages (structural [buildings / fuel tanks] and non structural [book cases & filing cabinets]).
8	Promote public access to emergency advisory information.	Provide access to a current weather watch and advisory information.
		Investigate emergency broadcast capabilities in western Alaska.
		Investigate opportunities to participate in National Warning System to receive weather warning information from the NWS.
		Obtain more accurate flood warning information.
9	Promote public education regarding severe winter storm hazards.	Participate in winter weather awareness week and flood awareness week.
		Conduct community alert tests for National Oceanic and Atmospheric Administration (NOAA) warning tones.
10	Reduce vulnerability of structures to severe winter storm damage.	Encourage use of weather resistant materials and construction practices.
11	Promote public education regarding tsunami hazards.	Educate community about what do to in the event of an earthquake.

5.2 Mitigation Actions / Projects

In addition to developing goals, the planning team created a list of potential mitigation actions. Mitigation actions are measures or projects undertaken in order to achieve your stated objectives. Mitigation actions are usually grouped into six broad categories: prevention, property protection, public education and awareness, natural resource protection, emergency services and structural projects. The planning team also identified the duration of each potential mitigation action. A mitigation action is considered short-term if the action can be completed within 5 years and does not require ongoing maintenance. A mitigation action is considered long-term if the action will require ongoing maintenance, last more than 5 years.

The planning team reviewed their local capabilities and risk assessment, which was used as a basis for developing potential mitigation actions. A detailed cost benefit analysis has not been completed for those projects selected for implementation by the City. However, cost-benefit was discussed during prioritization in a public forum for all mitigation actions and is summarized in Table 15 for those mitigation actions considered the highest priority by the community.

Table 14 identifies Kotlik's hazard mitigation goals, objectives, and related potential actions. The planning team identified a range of cost-effective, environmentally sound, and technically feasible mitigation actions to achieve each goal.

Table 14. Potential Mitigation Actions

Hazard	Goal	Objective	Action Number and Action	Potential Funding Source	Action Category	Duration	Potential Participants
Erosion	Reduce possibility of damage and losses from erosion.	Identify buildings that are at risk of impact from erosion.	ER1 – Create erosion hazard mapping.	PDM, HMGP	Public education / awareness	Short-term	KTC
			ER2 – Relocate buildings that are at risk of being affected by erosion.	PDM, HMGP, DHS&EM Preparedness Technical Assistance Program	Emergency services / structural projects	Short-term	City Council KTC
		Work with agencies, Native corporations, and organizations to identify new and emerging riverbank protection methods and grants (or other type of funding mechanism) that are available for these strategies.	ER3 – Apply for grants and other funding mechanisms to implement riverbank protection methods.	PDM, HMGP	Prevention	Long-term	KTC
	Increase public awareness of erosion and the problems it can cause and how to prevent and mitigate riverbank erosion.	Research information regarding riverbank erosion problems, prevention, and mitigation.	ER4 – Hold a series of community meetings to provide information to residents.	PDM, HMGP	Public education / awareness	Short-term	City Council KTC
			ER5 – Provide information on riverbank erosion and ways to halt and prevent it in a format that can be distributed to all residents.	PDM, Lindbergh Grants Program			
Flooding	Reduce the possibility of damage and losses from flooding.	Adopt and enforce floodplain management ordinances.	F1 – Join the NFIP, which regulates development in floodplains and provides federally backed insurance to individuals who live in communities that have joined the program.	Funding not required	Property Protection	Long-term	City Council
		Identify and assess repetitively flooded properties.	F2 – Acquire, elevate, or otherwise flood-proof identified properties and critical facilities.	PDM, HMGP	Property protection	Long-term	KTC
			F3 – Complete a detailed inventory of community structures and infrastructure, including all critical facilities that are susceptible to flooding in GIS.	PDM, HMGP	Public education / awareness	Short-term	

Hazard	Goal	Objective	Action Number and Action	Potential Funding Source	Action Category	Duration	Potential Participants
		Enhance warning and response activities to increase warning time for the community.	F4 – Install streamflow and rainfall measuring gauges.	PDM, HMGP	Emergency services / structural projects	Short-term	City Council USGS State of Alaska
			F5 – Develop "real-time" internet access and interagency cooperation to speed flood warning times.	PDM, HMGP			
Wildfire	Promote recognition of wildland fire and preparation for impacts from wildland fire.	Identify impacts that can result from excessive wildland fire smoke and the ways to guard yourself against those impacts.	W1 – Provide information in a format that can be distributed to residents.	PDM, HMGP, Lindbergh Grants Program, AFG Program's Fire Prevention and Safety Grant	Public education / awareness	Short-term	Lower Yukon School District (LYSD)
	Reduce possibility of damage and losses from wildland fires.	Identify methods of alerting the community if wildfire threat develops.	W2 – Schedule and perform "fire drills" at least twice per year.	PDM, HMGP, Lindbergh Grants Program, AFG Program's Fire Prevention and Safety Grant	Public education / awareness	Long-term	City Council State Fire Marshall
		Develop an evacuation plan for the community.					
		Maintain Project Code Red Equipment.					
		Promote FireWise building design, siting, and materials for construction.	W3 – Develop a workshop for builders.	PDM, HMGP, Lindbergh Grants Program, AFG Program's Fire Prevention and Safety Grant	Public education / awareness	Long-term	City Council
			W4 – Retrofit structures with FireWise building design materials.	PDM, HMGP, Lindbergh Grants Program, AFG Program's Fire Prevention and Safety Grant	Emergency services / structural projects		
Earthquake	Reduce vulnerability of structures to earthquake damage.	Encourage use of earthquake resistant materials and construction practices.	EQ1 – Implement Uniform International and State Building Codes.	PDM, Lindbergh Grants Program	Property protection	Short-term	City Council
		Ensure that all future development meets all requirements for seismic protection.	EQ2 – Have all new construction inspected and certified.	PDM, Lindbergh Grants Program		Long-term	

Hazard	Goal	Objective	Action Number and Action	Potential Funding Source	Action Category	Duration	Potential Participants
	Promote public education regarding earthquake hazards.	Educate community about what do to in the event of an earthquake.	EQ3 – Hold a series of community meetings to train on earthquake safety and hold drills at schools.	PDM, Lindbergh Grants Program	Public education / awareness	Long-term	City Council LYSD
		Educate community about ways to mitigate damages (structural [buildings / fuel tanks] & non structural [book cases & filing cabinets]).	EQ4 – Hold workshop to identify household mitigation measures.	PDM, Lindbergh Grants Program	Public education / awareness	Long-term	KTC
Severe Winter Storm	Promote public access to emergency advisory information.	Provide access to current weather watch and advisory information.	SWS1 – Purchase NOAA radios and develop web portal (NWS, FEMA, The Weather Channel).	PDM, Lindbergh Grants Program	Emergency services / structural projects	Short-term	City Council KTC
		Investigate opportunities to participate in National Warning System to receive weather warning information from the NWS.	SWS2 – Send at least two volunteers to NWS storm spotter training.	PDM, Lindbergh Grants Program	Public education / awareness	Short-term	City Council KTC
		Obtain more accurate flood warning information.	SWS3 – Contact USGS and request meeting to discuss installation and maintenance of real-time stream and precipitation gage.	HMGP, PDM Grants	Emergency services / structural projects	Short-term	City Council
	Promote public education regarding severe winter storm hazards.	Participate in winter weather awareness week and flood awareness week.	SWS4 – Develop workshop at school and have students display mitigation projects.	PDM, Lindbergh Grants Program	Public education / awareness	Short-term	City Council LYSD
		Conduct community alert tests for NOAA warning tones.	SWS5 – Contact NOAA, City Police and Fire Departments, and Volunteer Fire Department and to coordinate test.	PDM, Lindbergh Grants Program	Public education / awareness	Long-term	KTC NOAA
	Reduce vulnerability of structures to severe winter storm damage.	Encourage use of weather resistant materials and construction practices.	SWS6 – Implement Uniform International and State Building Codes.	PDM, Lindbergh Grants Program	Property protection	Short-term	City Council
Tsunami	Promote public education regarding tsunami hazards.	Educate community about what do to in the event of an earthquake.	T1 – Conduct a series of community meetings to train on earthquake safety and hold drills at schools.	PDM, Lindbergh Grants Program	Public education / awareness	Long-term	City Council LYSD

5.3 Evaluation and Prioritization of Mitigation Actions

The planning team evaluated and ranked each of the mitigation actions to determine the actions that would best help the community of Kotlik fulfill its mitigation goals, thus reducing or avoiding long-term vulnerabilities to the identified hazards. To complete this task, the planning team members reviewed the capability assessment and applied simplified Social, Technical, Administrative, Political, Legal, Economic and Environmental (STAPLE+E) evaluation criteria (Table 15) to consider the opportunities and constraints of implementing a particular mitigation action.

Table 15. Evaluation Criteria for Mitigation Actions

Evaluation Category	Discussion "It is important to consider…"	Considerations
Social	The public support for the overall mitigation strategy and specific mitigation actions.	Community acceptance Adversely affects segment of population
Technical	If the mitigation action is technically feasible and if it is the whole or partial solution.	Technical feasibility Long-term solutions Secondary impacts
Administrative	If the City of Kotlik has the personnel and administrative capabilities necessary to implement the action or whether outside help will be necessary.	Staffing Funding allocation Maintenance / operations
Political	What the community feels about issues related to the environment, economic development, safety and emergency management.	Political support Local champion Public support
Legal	Whether the City of Kotlik has the legal authority to implement the action, or whether they must pass new laws and regulations.	Local authority Federal authority Potential legal challenge
Economic	If the action can be funded with current or future internal and external sources of funding, if the costs seem reasonable for the size of the project, and if enough information is available to complete a FEMA Benefit-Cost Analysis (See Attachment B).	Benefit of action Cost of action Contributes to other economic goals Outside funding required FEMA benefit-cost analysis
Environmental	The impact on the environment because of public desire for sustainable and environmentally healthy communities.	Effect on land / water Effect on endangered species Effect on culturally sensitive areas Consistent with community environmental goals Consistent with local & federal laws

The planning team considered the STAPLE+E evaluation criteria and ranked each goal *high*, *medium*, or *low* associated with the mitigation actions. *High* rankings are associated with actions for hazards that impact the community on an annual or near annual basis and generate impacts to critical facilities and/or people. *Medium* rankings are associated with actions for hazards that impact the community less frequently, and do not typically generate impacts to critical facilities or people. *Low* rankings are associated with actions for hazards that rarely impact the community and have never generated documented impacts to critical facilities or people. Table 16 provides a summary of the mitigation action ranking.

Table 16. Mitigation Action Ranking

Goals		Rank	Action Number and Action
1	Reduce possibility of damage and losses from erosion.	HIGH	ER1 – Create erosion hazard mapping.
			ER2 – Relocate buildings that are at risk of being affected by erosion.
			ER3 – Apply for grants and other funding mechanisms to implement riverbank protection methods.
2	Promote erosion prevention education.		ER4 – Hold a series of community meetings to provide information to residents.
			ER5 – Provide information on riverbank erosion and ways to halt and prevent it in a format that can be distributed to all residents.
3	Reduce the possibility of damage and losses from flooding.	HIGH	F1 – Join the NFIP, which regulates development in floodplains and provides federally-backed insurance to individuals who live in communities that have joined the program.
			F2 – Relocate, acquire, elevate, or otherwise flood-proof identified properties and critical facilities.
			F3 – Complete a detailed inventory of community structures and infrastructure, including all critical facilities that are susceptible to flooding in GIS.
			F4 – Install streamflow and rainfall measuring gauges.
			F5 – Develop “real-time” internet access and interagency cooperation to speed flood warning times.
4	Promote recognition of wildland fire and preparation for impacts from wildland fire.	MEDIUM	W1 – Provide information in a format that can be distributed to residents.
5	Reduce possibility of damage and losses from wildland fires.		W2 – Schedule and perform “fire drills” at least twice per year.
			W3 – Develop a workshop for builders.
			W4 – Retrofit structures with FireWise building design materials.
6	Reduce vulnerability of structures to earthquake damage.	MEDIUM	EQ1 – Implement Uniform International and State Building Codes.
			EQ2 – Have all new construction inspected and certified.
7	Promote public education regarding earthquake hazards.		EQ3 – Hold a series of community meetings to train on earthquake safety and hold drills at schools.
			EQ4 – Hold workshop to identify household mitigation measures.
8	Promote public access to emergency advisory information.	HIGH	SWS1 – Purchase NOAA radios and develop web portal (NWS, FEMA, The Weather Channel).
			SWS2 – Send at least two volunteers to NWS storm spotter training.

Goals		Rank	Action Number and Action
			SWS3 – Contact USGS and request meeting to discuss installation and maintenance of real-time stream and precipitation gage.
9	Promote public education regarding severe winter storm hazards.		SWS4 – Develop workshop at school and have students display mitigation projects.
			SWS5 – Contact NOAA, City Police and Fire Departments, and Volunteer Fire Department and to coordinate test.
10	Reduce vulnerability of structures to severe winter storm damage.		SWS6 – Implement Uniform International and State Building Codes.
11	Promote public education regarding tsunami hazards.	LOW	T1 – Conduct a series of community meetings to train on tsunami safety and hold drills at schools.

5.4 Implementation Strategy and Analysis of Mitigation Projects

After mitigation actions were ranked, members of the planning team and the Mayor reviewed the entire list, and voted for six mitigation actions to be included in the mitigation action plan. The ranking, how each mitigation action will be implemented and administered (including the departments or agencies will be responsible for implementation), existing and potential funding sources, overall cost benefits and time frame are outlined in Table 17.

Table 17. Mitigation Action Plan

ER2	Action Item	Relocate buildings that are at risk of being affected by erosion.
	Ranking	High
	Department / Agency	City Council; KTC
	Potential Funding Source	DHS Preparedness Technical Assistance Program; PDM Grants
	Implementation Timeline	1 to 5 years
	Benefit-Costs	This mitigation action addresses high-risk situations because it is imperative that at-risk buildings can function during and after a dsaster.
ER3	Action Item	Apply for grants and other funding mechanisms to implement riverbank protection methods.
	Ranking	High
	Department / Agency	City Council; KTC
	Potential Funding Source	DHS Preparedness Technical Assistance Program; HMGP; PDM Grants
	Implementation Timeline	1 to 2 years

	Benefit-Costs	This mitigation action has a relatively low cost to implement; however, has the potential to prevent, curb, and mitigate future development in hazard-prone areas. Also, this mitigation action can potentially provide funding for mitigation action ER2.
F1	Action Item	Join NFIP, which regulates development in floodplains and provides federally backed insurance to individuals who live in communities that have joined the program.
	Ranking	High
	Department / Agency	City Council
	Potential Funding Source	DHS Preparedness Technical Assistance Program; HMGP; PDM Grants
	Implementation Timeline	1 to 5 years
	Benefit-Costs	Joining NFIP will provide the opportunity to all residents of Kotlik to be insured against the devastating financial losses of flood damage, as well as reducing future flood damage by encouraging and requiring sound floodplain management practices.
EQ3	Action Item	Hold a series of community meetings to train on earthquake safety and hold drills at schools.
	Ranking	Medium
	Department / Agency	City Council; LYSD
	Potential Funding Source	Lindbergh Grants Program
	Implementation Timeline	1 to 5 years
	Benefit-Costs	This education based on-going mitigation action that will improve earthquake safety in the community, as well as provide skills and safety behaviors to residents that they can use when traveling to earthquake prone areas.
SWS4	Action Item	Develop a workshop at school and have students display mitigation projects.
	Ranking	High
	Department / Agency	City Council; LYSD
	Potential Funding Source	Lindbergh Grants Program
	Implementation Timeline	1 to 5 years
	Benefit-Costs	This education based on-going mitigation action that will improve severe winter storm safety in the community, as well as provide skills and safety behaviors to residents that they can use when traveling to areas with severe winter storms.
T1	Action Item	Conduct a series of community meetings to train on tsunami safety and hold drills at schools.
	Ranking	Low
	Department / Agency	City Council; LYSD
	Potential Funding Source	Lindbergh Grants Program
	Implementation Timeline	1 to 5 years
	Benefit-Costs	This education based on-going mitigation action that will improve tsunami safety in the community, as well as provide skills and safety behaviors to residents that they can use when traveling to tsunami prone areas.

5.5 Capability Assessment

Storm Water Management Ordinances: **No**

Stream Maintenance Ordinances: **No**

Zoning Management Ordinances: **No**

Subdivision Management Ordinances: **No**

Erosion Management Ordinances: **No**

Floodplain Management Ordinances: **No**

Fire Insurance Rating: **N/A**

Floodplain Management Plan Published Date: **N/A**

Floodplain Management Last Delineation Date: **N/A**

Elevation Certificates Maintained: **No**

National Flood Insurance Program Community: **No**

National Flood Insurance Program Join Date: **N/A**

National Flood Insurance Program Number: **N/A**

National Flood Insurance Program Rating: **N/A**

National Flood Insurance Program Rating Date: **N/A**

Flood Insurance Claims: **N/A**

Land Use Plan: **No**

Land Use Plan Last Update: **N/A**

Community Zoned: **No**

Zoned Date: **N/A**

Established Building Codes: **No**

Building Codes Last Updated: **N/A**

Type of Building Codes: **N/A**

Local Electric Utilities: **Kotlik Electric Service**

Local Water Utilities: **City of Kotlik**

Local Sewage Treatment Utilities: **City of Kotlik; Individuals**

Local Natural Gas Utilities: **N/A**

Local Telephone Utilities: **United Utilities Telephone**

Section 6 Plan Maintenance

6.1 Monitoring, Evaluating, and Updating the Plan

Plan Last Updated On: **N/A**

The Kotlik HMP was prepared as a collaborative effort among the planning team. To maintain momentum and build on this hazard mitigation planning effort, the City of Kotlik will use the planning team to monitor, evaluate, and update the plan. In addition to the original members of the planning team, other interested parties can participate in this process. Rose Cheemuk (Planning Team Leader) will serve as the primary point of contact and will coordinate all local efforts to monitor, evaluate, and revise the plan.

Monitoring

Following the first, second, third, and fourth year of adoption, the planning team will conduct an annual review to monitor progress in implementing the plan, particularly the Mitigation Action Plan. As shown on the attached annual review form (Attachment C), the annual review will provide the basis for possible changes in the Mitigation Action Plan by refocusing on new or more threatening hazards, adjusting to changes to or increases in resource allocations, and engaging additional support for the plan implementation. The planning team leader will initiate an annual review by questionnaire 1 month prior to the next date of consideration of adoption.

Evaluation

The planning team leader will collect the questionnaire and summarize the results into an annual report. This report will be distributed to all planning team members, City Council members and other interested agencies, departments, and persons for review and evaluation.

Updating

The plan will be updated every 5 years after the first adoption. Six months prior to the fifth year of adoption (or readoption), the planning team will undertake the following activities to evaluate the plan and ensure that the plan is adequately updated and readopted in the fifth year.

- Thoroughly analyze and update the risk of natural hazards.
- Review the previous annual reviews, including the mitigation activities progress reports.
- Provide a detailed review and revision of the Mitigation Strategy.
- Prepare a new Mitigation Action Plan with prioritized actions, responsible parties and resources.
- Prepare a new draft HMP and submit it to the City Council for adoption.
- Submit an updated HMP to DHS&EM and FEMA for approval.

Monitoring Mitigation Project Implementation

Each department and agency identified as the responsible party for a mitigation project will specifically be responsible for monitoring mitigation project implementation and closeout. If more than one department and / or agency are identified for a mitigation project, Rose Cheemuk (or the current point-of-contact) will work with the City Council to identify a single department and / or agency to monitor the mitigation project implementation and closeout. The chosen department 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 or not the project has helped to achieve the appropriate goals identified in the plan.

Each overseeing agency and / or department will complete the report on a quarterly basis as a way to monitor and, if necessary, revise the project 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 Council and Mayor for review. The City Council and Mayor will review each report to determine if 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 Rose Cheemuk (or the current HMP point-of-contact), who will oversee all of the grants associated with this plan. Rose Cheemuk (or the current HMP point-of-contact) may also request that these reports be submitted quarterly, if necessary, for grant management purposes. Finally, each overseeing agency and / or department will be required to submit a closeout report to Rose Cheemuk (or the current HMP point-of-contact) at the conclusion of any mitigation project.

6.2 Implementation through Existing Programs

The regulatory documents that allow the City of Kotlik to function as a community are also those that will ensure a successful outcome due to a natural hazard event. The following procedures describe how this HMP will be implemented through existing programs.

Within 2 years of adoption of the plan, the City of Kotlik will incorporate into existing planning mechanisms any local policies recommended by the Planning Team. The City of Kotlik utilizes recommendations from the Planning Board, land use requirements, and other regulatory mechanisms to control development in the community. Because the City has control over these various tools, they also have the opportunity to enhance them as necessary to address hazard mitigation requirements. As a good neighbor, they will also

ensure that by altering any of these standards, they do not negatively affect neighboring communities by collaborating with them regarding similar regulatory documents.

After adoption, the Planning Team Leader will coordinate with the City Council and Planning Board to ensure that they are aware of the hazards that are affected by the planning and development decisions the City Council may make and implement. The Planning Team Leader will work with City staff, City Council, Kotlik Tribal Council, the Planning Board, and any other potential participant who would help implement mitigation strategies to inform them of the Plan's hazard mitigation strategies. They will assist in identifying areas where incorporation of those strategies into new planning mechanisms is applicable. At least every 5 years, the City will conduct reviews of planning documents, development guidelines, and land use policies. The Planning Team will use these reviews to ensure that this Plan's Mitigation Action Plan complies with any updates or amendments made to the City's regulatory documents.

6.3 Continued Public Involvement

The following is a description of opportunities and mechanisms for on-going public involvement.

Progress review on achievement of goals and implementation of activities and projects of the Mitigation Strategy will also be accomplished during the annual review process. During each annual review, the entity currently administering a mitigation project will submit a progress report to the planning team. The report will include 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 or not the project has helped achieve the respective goals identified in the plan. Finally, the planning team 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 HMP update public meeting.

-End of Mitigation Plan-

Attachment A

Project Mailing List

This page intentionally left blank

Laurie Prince
PO Box 20268
Kotlik, AK 99620-0268

Mary Ann Mike
PO Box 20268
Kotlik, AK 99620-0268

Joseph Mike
PO Box 20269
Kotlik, AK 99620-0269

Stella Unok
PO Box 20268
Kotlik, AK 99620-0268

Martin Okitkun, Sr.
PO Box 20268
Kotlik, AK 99620-0268

Martina Jack
PO Box 20268
Kotlik, AK 99620-0268

Victor Tonuchuk, Sr.
PO Box 20268
Kotlik, AK 99620-0268

Fredrinka Prince
PO Box 20268
Kotlik, AK 99620-0268

Josephine Murphy
PO Box 20268
Kotlik, AK 99620-0268

Winnifred K. Hunt
PO Box 20268
Kotlik, AK 99620-0268

Rose Cheemuk
PO Box 20268
Kotlik, AK 99620-0268

Victor Tonuchuk, Sr.
PO Box 20268
Kotlik, AK 99620-0268

Jack Okitkun, Jr.
PO Box 20268
Kotlik, AK 99620-0268

Brooks Chandler
PO Box 20268
Kotlik, AK 99620-0268

Francis Hunt
PO Box 20268
Kotlik, AK 99620-0268

Flora Tonuchuk
PO Box 20268
Kotlik, AK 99620-0268

Andrew Aketachunak
PO Box 20268
Kotlik, AK 99620-0268

Stacey Okitkun
PO Box 20268
Kotlik, AK 99620-0268

Teresa Unok
PO Box 20268
Kotlik, AK 99620-0268

Phyllis Andrews
PO Box 20268
Kotlik, AK 99620-0268

Isaac Seton, Sr.
PO Box 20268
Kotlik, AK 99620-0268

Chris Hunt
PO Box 20268
Kotlik, AK 99620-0268

Francis Hunt
PO Box 20268
Kotlik, AK 99620-0268

Harry Okitkun
PO Box 20268
Kotlik, AK 99620-0268

Josephine Murphy
PO Box 20268
Kotlik, AK 99620-0268

Miguil K. Bordeay
PO Box 20268
Kotlik, AK 99620-0268

Ben Andrews
PO Box 20268
Kotlik, AK 99620-0268

Gyril P. Okitkun
PO Box 20268
Kotlik, AK 99620-0268

Donna Kamkoff
PO Box 20268
Kotlik, AK 99620-0268

Niles Cesar
Bureau of Indian Affairs
PO Box 25520
Juneau, AK 99802-5520

Peter Elachik
Kotlik Yupik Corporation
PO Box 20207
Kotlik, AK 99620

Reynold Okitkun
Kotlik Traditional Council
PO Box 20210
Kotlik, AK 99620

Calista Corporation
301 Calista Ct., Ste. A
Anchorage, AK 99518-3028

Mike Wolski
TNH
911 W. 8th Avenue, Suite 300
Anchorage, AK 99501

Alaska Native Medical Center
4315 Diplomacy Drive
Anchorage, AK 99508

Steve Clautice
ADNR, Forestry
550 West 7th Avenue, Suite 900B
Anchorage, AK 99501

Patty Burns
ADNR, Geological & Geophysical Surveys
550 West 7th Avenue, Suite 900B
Anchorage, AK 99501

Mac McLean
ADNR, OHMP
550 West 7th Avenue, Suite 900B
Anchorage, AK 99501

Steve McGroarty
ADNR
550 West 7th Avenue, Suite 900B
Anchorage, AK 99501

Anna Plager
ADNR, Activities on State Park Lands
550 West 7th Avenue, Suite 900B
Anchorage, AK 99501

Margie Goatley
ADNR, SHPO
550 West 7th Avenue, Suite 900B
Anchorage, AK 99501

Kellie Westphal
ADNR/Water- Water Use Activities
550 West 7th Avenue, Suite 900B
Anchorage, AK 99501

Kerry Walsh
ADNR, All Other Activities
550 West 7th Avenue, Suite 900B
Anchorage, AK 99501

Sara Hunt
Division of Governmental Coordination
P.O. Box 110030
Juneau, AK 99811

Division of Governmental Coordination
550 W. 7th Ave., Ste. 1660
Anchorage, AK 99501

Alaska Coastal Management Program
550 W.7th Ave., Ste. 1660
Anchorage, AK 99501

Ed Christian
Coastal Impact Assistance Program
P.O. Box 110030
Juneau, AK 99811

Department of Administration
P.O. Box 110208
Juneau, AK 99811

Division of Risk Management
P.O. Box 110218
Juneau, AK 99811

Dept of Commerce, Community &
Economic Development
P.O. Box 110800
Juneau, AK 99811

Christy Miller
Division of Community Advocacy
550 W 7th Ave., Ste. 1770
Anchorage, AK 99501

Division of Insurance
550 W. 7th Ave., Ste.1560
Anchorage, AK 99501

Department of Education and Early
Development
801 W. 10th St., Ste. 200
Juneau, AK 99801

Department of Environmental Conservation
410 Willoughby Ave., Ste. 303
Juneau, AK 99801

Division of Air Quality
555 Cordova St.
Anchorage, AK 99501

Division of Water Quality
555 Cordova St.
Anchorage, AK 99501

SR Airman Sara Howard
Alaska National Guard
PO Box 5800
Fort Richardson, AK 99505-5800

Division of Spill Prevention and Response
555 Cordova St.
Anchorage, AK 99501

Department of Fish & Game
P.O. Box 25526
Juneau, AK 99802

Division of Wildlife Conservation
333 Raspberry Rd.
Anchorage, AK 99518

Department of Health and Human Services
P.O. Box 110601
Juneau, AK 99811

Division of State Health Planning and Development
3601 C St., 9th floor
Anchorage, AK 99503

Department of Law
P.O. Box 110300
Juneau, AK 99811

Department of Military and Veterans Affairs
P.O. Box 5800, Camp Denali
Fort Richardson, AK 99505

Division of Homeland Security & Emergency Management
P.O. Box 5750
Fort Richardson, AK 99505

Charles Cobb
ADNR, Dam Safety Program
550 W. 7th Ave., Ste. 1020
Anchorage, AK 99501

Department of Public Safety
P.O. Box 111200
Juneau, AK 99811

William Bettac
Division of Fire Prevention
5700 E. Tudor Rd.
Anchorage, AK 99507

Division of Fish and Wildlife Protection
5700 E. Tudor Rd.
Anchorage, AK 99507

ADOT&PF
4111 Aviation Ave.
Anchorage, AK 99519

Division of Statewide Design and Engineering Services
3132 Channel Dr.
Juneau, AK 99801

Chuck Kuhns
UAF
P.O. Box 758120
Fairbanks, AK 99775

Alaska Earthquake Information Center/UAF/GI
P.O. Box 757320
Fairbanks, AK 99775

State Emergency Response Commission
P.O. Box 5750
Fort Richardson, AK 99505

FEMA
130 228th St., SW
Bothell, WA 98021

USGS
1011 E. Tudor Rd., MS 701
Anchorage, AK 99503

USGS
4230 University Dr., Ste. 201
Anchorage, AK 99508

Alaska Volcano Observatory
4200 University Dr.
Anchorage, AK 99508

Emergency Mgmt.
U.S. Army Corps Of Engineers
CO-OR, P.O. Box 6898
Anchorage, AK 99506

Environmental Protection Agency
222 W. 7th Ave., #19
Anchorage, AK 99513

Federal Aviation Administration
222 W. 7th Ave.
Anchorage, AK 99513

Stan Pruszenski
US Fish & Wildlife Service
1011 E. Tudor Rd., MS 151
Anchorage, AK 99503

US Forest Service
3301 C St., Ste. 300
Anchorage, AK 99503

Yukon Kuskokwim Health Corporation
Box 528
Bethel, AK 99559

US Coast Guard, Seventeenth Coast Guard District
510 L Street, Suite 100
Anchorage, AK 99501

US Department of Housing and Urban Development
3000 C St., Ste. 401
Anchorage, AK 99503

Bureau of Land Management
6881 Abbott Loop Rd.
Anchorage, AK 99507

National Marine Fisheries Service
222 West 7th #43
Anchorage, AK 99513

National Park Service
4230 University Dr., Ste. 311
Anchorage, AK 99508

Natural Resources Conservation Service
510 L St., Ste. 280
Anchorage, AK 99501

National Weather Service
222 W. 7th Ave., #23
Anchorage, AK 99513

West Coast/Alaska Tsunami Warning Center
910 S. Felton St.
Palmer, AK 99645

Rural Development USDA
800 W. Evergreen, St. 201
Palmer, AK 99645

Small Business Administration
510 L St., Ste. 310
Anchorage, AK 99501

Advanced National Seismic System
215 McCone Hall, UC Berkley
Berkley, CA 94720

Dave Tremont
Anchorage Geotechnical Advisory Commission
P.O. Box 196650
Anchorage, AK 99519

Alaska Air Carriers Association
2301 Merrill Field Dr., Ste. A-3
Anchorage, AK 99501

Alaska Inter-tribal Conference
750 W. 2nd Ave., Ste. 215
Anchorage, AK 99501

George Cannelos
Denali Commission
510 L St., Ste. 410
Anchorage, AK 99501

American Red Cross
235 E. 8th Ave., Ste. 200
Anchorage, AK 99501

Alaska Municipal League
217 Second St., Ste. 200
Juneau, AK 99801

Air Transport Association
1301 Pennsylvania Ave., NW, Ste. 1100
Washington, D.C. 20004

Kamchatkan Volcanic Eruption Response Team
4200 University Dr.
Anchorage, AK 99508

Woody Richardson
Grant Aviation
PO Box 92200
Anchorage, AK 99509

Hugh Denny
ANTHC
4000 Ambassador Drive
Anchorage, AK 99508

AEROMed International
4700 Business Park Blvd - E25
Anchorage, AK 99503

Trudy Young
Providence Alaska - Lifeguard
PO Box 196604
Anchorage, AK 99519

Alaska Regional
2801 Debarr Road
Anchorage, AK 99508

Alaska Native Medical Center
4315 Diplomacy Drive
Anchorage, AK 99508

Attachment B

FEMA Benefit-Cost Analysis Fact Sheet

This page intentionally left blank

Benefit-Cost Analysis Fact Sheet

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

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

All Benefit-Costs must be:

- Credible and well documented
- Prepared in accordance with accepted BCA practices
- Cost-effective (BCR $\geq$ 1.0)

General Data Requirements:

- All data entries (other than FEMA standard or default values) MUST be documented in the application
- Data MUST be from a credible source
- Provide complete copies of reports and engineering analyses
- Detailed cost estimate
- Identify the hazard (flood, wind, seismic, etc.)
- Discuss how the proposed measure will mitigate against future damages
- Document the Project Useful Life
- Document the proposed Level of Protection
- The Very Limited Data (VLD) BCA module <u>cannot</u> be used to support cost-effectiveness (screening purposes only)
- Alternative BCA software MUST be approved in writing by FEMA HQ and the Region <u>prior</u> to submittal of the application

Damage and Benefit Data

- Well documented for each damage event
- Include estimated frequency and method of determination per damage event
- Data used in place of FEMA standard or default values MUST be documented <u>and</u> justified
- The Level of Protection MUST be documented and readily apparent

- When using the Limited Data (LD) BCA module, users cannot extrapolate data for higher frequency events for unknown lower frequency events

Building Data

- Should include FEMA Elevation Certificates for elevation projects or projects using First Floor Elevations (FFEs)
- Include data for building type (tax records or photos)
- Contents claims that exceed 30% of building replacement value (BRV) MUST be fully documented
- Method for determining BRVs MUST be documented. BRVs based on tax records MUST include the multiplier from the County Tax Assessor
- Identify the amount of damage that will result in demolition of the structure (FEMA standard is 50% of pre-damage structure value)
- Include the site location (i.e., miles inland) for the Hurricane module

Use correct occupancy data:

- *Design occupancy* for Hurricane shelter portion of Tornado module
- *Average occupancy per hour* for the Tornado shelter portion of the Tornado module
- *Average occupancy* for Seismic modules

Questions to Be Answered

- Has the level of risk been identified?
- Are all hazards identified?
- Is the BCA fully documented and accompanied by technical support data?
- Will there be residual risk after the mitigation project is implemented?

Common Shortcomings

- Incomplete documentation
- Inconsistencies between data in the application, BCA module runs, and the technical support data
- Lack of technical support data
- Lack of a detailed cost estimate
- Use of discount rate other than FEMA required amount of 7%
- Overriding FEMA default values without providing documentation and justification
- Lack of information on building type, size, number of stories and value
- Lack of documentation and credibility for first floor elevations (FFEs)
- Use of incorrect Project Useful Life (not every mitigation measure = 100 years)

Attachment C

Plan Maintenance Documents (Annual Review Form)

This page intentionally left blank

Mitigation Action Progress Report

Progress Report Period:_____ to_____
(date) (date)

Project Title: _____ Project ID# _____

Responsible Agency: _____

Address: _____

City: _____

Contact Person: _____ Title: _____

Phone #(s): _____ email address: _____

List Supporting Agencies and Contacts:

_____

_____

Total Project Cost: _____

Anticipated Cost Overrun/Underrun: _____

Date of Project Approval: _____ Start date of the project: _____

Anticipated completion date: _____

Description of the Project (include a description of each phase, if applicable, and the time frame for completing each phase): _____

_____

_____

_____

Milestones	Complete	Projected Date of Completion

Plan Goal (s) Addressed:

Goal: _____

Indicator of Success: _____

_____

_____

_____

Project Status

☐ Project on schedule

☐ Project completed

☐ Project delayed*

*explain: _____

_____

☐ Project canceled

Project Cost Status

☐ Cost unchanged

☐ Cost overrun*

*explain: _____

_____

☐ Cost underrun*

*explain: _____

_____

Summary of progress on project for this report:

A. What was accomplished during this reporting period?

_____

_____

_____

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

_____

_____

_____

_____

C. How was each problem resolved?

_____

_____

_____

_____

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

Other Comments:

Annual Review Questionnaire

PLAN SECTION	QUESTIONS	YES	NO	COMMENTS
PLANNING PROCESS	Are there internal or external organizations and agencies that have been invaluable to the planning process or to mitigation action project implementation that should be represented on the Steering Committee?			
	Are there procedures (e.g., meeting announcements, plan updates) that can be done more efficiently?			
	Has the Steering Committee undertaken any public outreach activities regarding the HMP or implementation of mitigation actions?			
RISK ASSESSMENT	Has a natural and/or human-caused disaster occurred in this reporting period?			
	Are there natural and/or human-caused hazards that have not been addressed in this HMP and should be?			
	Are additional maps or new hazard studies available? If so, what have they revealed?			
	Has the critical facilities list changed?			
	Have there been changes in development patterns that could influence the effects of hazards or create additional risks?			
MITIGATION STRATEGY	Are there different or additional resources (financial, technical, and human) that are now available for mitigation planning?			
	Are the goals still applicable?			
	Should new mitigation actions be added to the Action Plan?			
	Do existing mitigation actions need to be reprioritized?			
	Are the mitigation actions appropriate for available resources?			

Attachment D

Final FEMA Crosswalk

This page intentionally left blank

Local Mitigation Plan Review and Approval Status

Jurisdiction: City of Kotlik, Alaska	**Title of Plan:** Hazard Mitigation Plan City of Kotlik	**Date of Plan:** September 2007
Local Point of Contact: Mary Ann Mike	**Address:** P.O. Box 20268 Kotlik, Alaska 99620	
Title: Mayor		
Agency: City of Kotlik, Alaska		
Phone Number: (907) 899-4313	**E-Mail:**	

State Reviewer:	**Title:**	**Date:**

FEMA Reviewer: Bruce Fyfe Kristen Meyers	**Title:** Mitigation Specialist Mitigation Planning Manager	**Date:** October 10, 2007 October 18, 2007
Date Received in FEMA Region X	9-26-07	
Plan Not Approved		
Plan Approved	Pending Adoption	
Date Approved		

	NFIP Status*			
Jurisdiction:	**Y**	**N**	**N/A**	**CRS Class**
1. City of Kotlik, Alaska			X	

*** Notes:** **Y = Participating** **N = Not Participating** **N/A = Not Mapped**

LOCAL MITIGATION PLAN REVIEW SUMMARY

The plan cannot be approved if the plan has not been formally adopted.

Each requirement includes separate elements. All elements of the requirement must be rated "Satisfactory" in order for the requirement to be fulfilled and receive a score of "Satisfactory." Elements of each requirement are listed on the following pages of the Plan Review Crosswalk. A "Needs Improvement" score on elements shaded in gray (recommended but not required) will not preclude the plan from passing. Reviewer's comments must be provided for requirements receiving a **"Needs Improvement"** score.

SCORING SYSTEM

Please check one of the following for each requirement.

N – Needs Improvement: The plan does not meet the minimum for the requirement. Reviewer's comments must be provided.
S – Satisfactory: The plan meets the minimum for the requirement. Reviewer's comments are encouraged, but not required.

Prerequisite(s) (Check Applicable Box)	STAFFORD NOT MET	STAFFORD MET	FMA NOT MET	FMA MET
Adoption by the Local Governing Body: §201.6(c)(5) and §78.5(f)		X		
OR				
Multi-Jurisdictional Plan Adoption: §201.6(c)(5) and §78.5(f) **AND**		N/A		
Multi-Jurisdictional Planning Participation: §201.6(a)(3) and §78.5(a)		N/A		

Planning Process	N	S	N	S
Documentation of the Planning Process: §201.6(b) and §201.6(c)(1) and §78.5(a)		X		

Risk Assessment	N	S	N	S
Identifying Hazards: §201.6(c)(2)(i) and §78.5(b)		X		
Profiling Hazards: §201.6(c)(2)(i) and §78.5(b)		X		
Assessing Vulnerability: Overview: §201.6(c)(2)(ii) and §78.5(b)		X		
Assessing Vulnerability: Identifying Structures: §201.6(c)(2)(ii)(A) and §78.5(b)		N/A		
Assessing Vulnerability: Estimating Potential Losses: §201.6(c)(2)(ii)(B)		X		
Assessing Vulnerability: Analyzing Development Trends: §201.6(c)(2)(ii)(C)		X		
Multi-Jurisdictional Risk Assessment: §201.6(c)(2)(iii) and FEMA 299		N/A		

Mitigation Strategy	STAFFORD N	STAFFORD S	FMA N	FMA S
Local Hazard Mitigation Goals: §201.6(c)(3)(i) and §78.5(c)		X		
Identification and Analysis of Mitigation Actions: §201.6(c)(3)(ii) and §78.5(d)		X		
Implementation of Mitigation Actions: §201.6(c)(3)(iii) and §78.5(d) and (e)		X		
Multi-Jurisdictional Mitigation Actions: §201.6(c)(3)(iv) and FEMA 299		N/A		

Plan Maintenance Process	STAFFORD N	STAFFORD S	FMA N	FMA S
Monitoring, Evaluating, and Updating the Plan: §201.6(c)(4)(i) and §78.5(e)		X		
Incorporation into Existing Planning Mechanisms: §201.6(c)(4)(ii)		X		
Continued Public Involvement: §201.6(c)(4)(iii)		X		

Additional State Requirements*	STAFFORD N	STAFFORD S	FMA N	FMA S
Insert State Requirement		N/A		
Insert State Requirement		N/A		
Insert State Requirement		N/A		

LOCAL MITIGATION PLAN APPROVAL STATUS	STAFFORD	FMA
PLAN NOT APPROVED		
PLAN APPROVED	X	

*States that have additional requirements can add them in the appropriate sections of the *Multi-Hazard Mitigation Planning Guidance* or create a new section and modify this Plan Review Crosswalk to record the score for those requirements.

See Reviewer's Comments

PREREQUISITE(S)

Adoption by the Local Governing Body

- **Multihazard Requirement §201.6(c)(5):** *[The local hazard mitigation plan **shall** include] documentation that the plan has been formally adopted by the governing body of the jurisdiction requesting approval of the plan (e.g., City Council, County Commissioner, Tribal Council).*
- **FMA Requirement §78.5(f):** *Documentation of formal plan adoption by the legal entity submitting the plan (e.g., Governor, Mayor, County Executive).*

Element	Location in the Plan (section or annex and page #)	Reviewer's Comments	SCORE			
			STAFFORD		FMA	
			NOT MET	MET	NOT MET	MET
A. Has the local governing body adopted the plan?	Para 2.1.2	Plan adopted via resolution on Dec 19, 2007		X		
B. Is supporting documentation, such as a resolution, included?		Resolution included		X		
		SUMMARY SCORE		X		

Multi-Jurisdictional Plan Adoption

- **Multihazard Requirement §201.6(c)(5):** *For multi-jurisdictional plans, each jurisdiction requesting approval of the plan **must** document that it has been formally adopted.*
- **FMA Requirement §78.5(f):** *Documentation of formal plan adoption by the legal entity submitting the plan (e.g., Governor, Mayor, County Executive).*

Element	Location in the Plan (section or annex and page #)	Reviewer's Comments	SCORE			
			STAFFORD		FMA	
			NOT MET	MET	NOT MET	MET
A. Does the plan indicate the specific jurisdictions represented in the plan?		N/A		N/A		
B. For each jurisdiction, has the local governing body adopted the plan?		N/A		N/A		
C. Is supporting documentation, such as a resolution, included for each participating jurisdiction?		N/A		N/A		
		SUMMARY SCORE		N/A		

Multi-Jurisdictional Planning Participation

- **Multihazard Requirement §201.6(a)(3):** *Multi-jurisdictional plans (e.g., watershed plans) may be accepted, as appropriate, as long as each jurisdiction has participated in the process … Statewide plans will not be accepted as multi-jurisdictional plans.*
- **FMA Requirement §78.5(a):** *Description of the planning process and public involvement. Public involvement **may** include workshops, public meetings, or public hearings.*

Element	Location in the Plan (section or annex and page #)	Reviewer's Comments	SCORE			
			STAFFORD		FMA	
			NOT MET	MET	NOT MET	MET
A. Does the plan describe **how** each jurisdiction participated in the plan's development?		N/A		N/A		
		SUMMARY SCORE		N/A		

PLANNING PROCESS:

Documentation of the Planning Process

- **Multihazard Requirement §201.6(b):** *An open public involvement process is essential to the development of an effective plan. In order to develop a more comprehensive approach to reducing the effects of natural disasters, the planning process **shall** include:*
  (1) An opportunity for the public to comment on the plan during the drafting stage and prior to plan approval;
  (2) An opportunity for neighboring communities, local and regional agencies involved in hazard mitigation activities, and agencies that have the authority to regulate development, as well as businesses, academia and other private and non-profit interests to be involved in the planning process; and
  (3) Review and incorporation, if appropriate, of existing plans, studies, reports, and technical information.
- **Multihazard Requirement §201.6(c)(1):** *[The plan **shall** document] the planning process used to develop the plan, including how it was prepared, who was involved in the process, and how the public was involved.*
- **FMA Requirement §78.5(a):** *Description of the planning process and public involvement. Public involvement **may** include workshops, public meetings, or public hearings.*

Element	Location in the Plan (section or annex and page #)	Reviewer's Comments	SCORE			
			STAFFORD		FMA	
			N	S	N	S
A. Does the plan provide a narrative description of the process followed to prepare the plan?	Para 1.1 Page 2	Plan describes 5 step process used to develop the plan.		X		

Element	Location in the Plan (section or annex and page #)	Reviewer's Comments	SCORE STAFFORD N	SCORE STAFFORD S	SCORE FMA N	SCORE FMA S
B. Does the plan indicate who was involved in the planning process? (For example, who led the development at the staff level and were there any external contributors such as contractors? Who participated on the plan committee, provided information, reviewed drafts, etc.?)	Para 1.2 Page 3	Table 1 identifies people involved in plan preparation from City, State, and contractor.		X		
C. Does the plan indicate how the public was involved? (Was the public provided an opportunity to comment on the plan during the drafting stage and prior to the plan approval?)	Para 1.3 Page 3	Yes – Notices were posted in the village and E-mails were sent to area residents. 2 meetings were held, one to discuss risk assessment and another to cover mitigation strategy.		X		
D. Was there an opportunity for neighboring communities, agencies, businesses, academia, nonprofits, and other interested parties to be involved in the planning process?	Para 1.3 Page 3	There are no real neighborhood communities because of the remoteness of the town. Meeting notices were posted locally and on state website. Meeting invitations we sent to a variety of stakeholders.		X		
E. Does the planning process describe the review and incorporation, if appropriate, of existing plans, studies, reports, and technical information?	Para 1.6 Page 9	Existing plans from the community and town were recognized and incorporated.		X		
		SUMMARY SCORE		X		

RISK ASSESSMENT: *§201.6(c)(2): The plan shall include a risk assessment that provides the factual basis for activities proposed in the strategy to reduce losses from identified hazards. Local risk assessments must provide sufficient information to enable the jurisdiction to identify and prioritize appropriate mitigation actions to reduce losses from identified hazards.*

Identifying Hazards

- **Multihazard Requirement §201.6(c)(2)(i):** *[The risk assessment **shall** include a] description of the type … of all natural hazards that can affect the jurisdiction.*
- **FMA Requirement §78.5(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.*

Element	Location in the Plan (section or annex and page #)	Reviewer's Comments	SCORE STAFFORD N	SCORE STAFFORD S	SCORE FMA N	SCORE FMA S
A. Does the plan include **a description** of the types of **all natural hazards** that affect the jurisdiction? If the hazard identification omits (without explanation) any hazards commonly recognized as threats to the jurisdiction, this part of the plan cannot receive a Satisfactory score. Consult with the State Hazard Mitigation Officer to identify applicable hazards that may occur in the planning area.	Para 4.1 Tables 3-4-5-6	Six hazards identified – earthquake, erosion, flooding, severe winter storm , tsunami & wildfires		X		
		SUMMARY SCORE		X		

Profiling Hazards

- **Multihazard Requirement §201.6(c)(2)(i):** *[The risk assessment **shall** include a] description of the … 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.*
- **FMA Requirement §78.5(b):** ***Description of the existing flood hazard and identification of the flood risk**, …..,* ***and the extent of flood depth*** *and damage potential.*

Element	Location in the Plan (section or annex and page #)	Reviewer's Comments	SCORE STAFFORD N	SCORE STAFFORD S	SCORE FMA N	SCORE FMA S
A. Does the risk assessment identify the **location** (i.e., geographic area affected) of each natural hazard addressed in the plan?	Para 4.2.1-4.2.5c Page 17-49	The location for each hazard is identified.		X		
B. Does the risk assessment identify the **extent** (i.e., magnitude or severity) of each hazard addressed in the plan?	Para 4.2.1-4.2.5d Page 17 -49	The extent of each hazard is discussed.		X		
C. Does the plan provide information on **previous occurrences** of each hazard addressed in the plan?	Para 4.2.1-4.2.5b Page 17-49	List of previous events is given if available – tsunamis are recollections from Elders.		X		
D. Does the plan include the **probability of future events** (i.e., chance of occurrence) for each hazard addressed in the plan?	Para 4.2.1-4.2.5i Page 17-49	See Table 6, and each hazard profile includes probability of future events.		X		
		SUMMARY SCORE		X		

Assessing Vulnerability: Overview

- **Multihazard Requirement §201.6(c)(2)(ii):** *[The risk assessment **shall** include a] description of the jurisdiction's vulnerability to the hazards described in paragraph (c)(2)(i) of this section. This description **shall** include an overall summary of each hazard and its impact on the community.*
- **FMA Requirement §78.5(b):** ***Description of the existing flood hazard and identification of the flood risk… and the extent of flood depth and damage potential.***

Element	Location in the Plan (section or annex and page #)	Reviewer's Comments	SCORE STAFFORD N	SCORE STAFFORD S	SCORE FMA N	SCORE FMA S
A. Does the plan include an **overall summary** description of the jurisdiction's **vulnerability** to each hazard?	Para 4.2.2-4.2.5f-i Page 17-49	Vulnerability Analysis for each hazard is included in each hazard profile.		X		
B. Does the plan address the **impact** of each hazard on the jurisdiction?	Para 4.2.2-4.2.5 g&h Page 17-49	Impact of each hazard on Kotlik is addressed.		X		
		SUMMARY SCORE		X		

Assessing Vulnerability: Identifying Structures

- **Multihazard Requirement §201.6(c)(2)(ii)(A):** *The plan **should** describe vulnerability in terms of the types and numbers of existing and future buildings, infrastructure, and critical facilities located in the identified hazard area … .*
- **FMA Requirement §78.5(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**,….*

Element	Location in the Plan (section or annex and page #)	Reviewer's Comments	SCORE STAFFORD N	SCORE STAFFORD S	SCORE FMA N	SCORE FMA S
A. Does the plan describe vulnerability in terms of the **types and numbers** of **existing** buildings **(including repetitive loss structures)**, infrastructure, and critical facilities located in the identified hazard areas?	Para 4.3.2 Page 50	Each hazard profile provides information on the amount of critical and non-critical facilities vulnerable to each hazard.		X		
B. Does the plan describe vulnerability in terms of the **types and numbers** of **future** buildings, infrastructure, and critical facilities located in the identified hazard areas?	N/A	N/A		N/A		
		SUMMARY SCORE		N/A		

Assessing Vulnerability: Estimating Potential Losses

- **Multihazard Requirement §201.6(c)(2)(ii)(B):** *[The plan **should** describe vulnerability in terms of an] estimate of the potential dollar losses to vulnerable structures identified in paragraph (c)(2)(i)(A) of this section and a description of the methodology used to prepare the estimate … .*

Element	Location in the Plan (section or annex and page #)	Reviewer's Comments	SCORE STAFFORD N	SCORE STAFFORD S	SCORE FMA N	SCORE FMA S
A. Does the plan estimate **potential dollar losses** to vulnerable structures?	Para 4.2.6a Page 22	For each hazard the estimated loss is listed based in percent of city exposed to the hazard.		X		
B. Does the plan describe the **methodology** used to prepare the estimate?	Para 4.2.6c Page 22	Methodology explained for potential loss estimates		X		
		SUMMARY SCORE		X		

Assessing Vulnerability: Analyzing Development Trends

- **Multihazard Requirement §201.6(c)(2)(ii)(C):** *[The plan **should** describe vulnerability in terms of] providing a general description of land uses and development trends within the community so that mitigation options can be considered in future land use decisions.*

Element	Location in the Plan (section or annex and page #)	Reviewer's Comments	SCORE STAFFORD N	SCORE STAFFORD S	SCORE FMA N	SCORE FMA S
A. Does the plan describe land uses and development trends?	Para 4.3.5 Page 56	Plan discusses both residential & commercial properties.		X		
		SUMMARY SCORE		X		

Multi-Jurisdictional Risk Assessment

- **Multihazard Requirement §201.6(c)(2)(iii):** *For multi-jurisdictional plans, the risk assessment **must** assess each jurisdiction's risks where they vary from the risks facing the entire planning area.*
- **FMA FEMA 299 Guidance:** *The Plan should be coordinated with, and ideally developed in cooperation with, all of the local jurisdictions within the geographical area.*

Element	Location in the Plan (section or annex and page #)	Reviewer's Comments	SCORE STAFFORD N	SCORE STAFFORD S	SCORE FMA N	SCORE FMA S
A. Does the plan include a risk assessment for each participating jurisdiction as needed to reflect unique or varied risks?	N/A			N/A		
		SUMMARY SCORE		N/A		

MITIGATION STRATEGY: *§201.6(c)(3): The plan shall include a mitigation strategy that provides the jurisdiction's blueprint for reducing the potential losses identified in the risk assessment, based on existing authorities, policies, programs and resources, and its ability to expand on and improve these existing tools.*

Local Hazard Mitigation Goals

- **Multihazard Requirement §201.6(c)(3)(i):** *[The hazard mitigation strategy **shall** include a] description of mitigation goals to reduce or avoid long-term vulnerabilities to the identified hazards.*
- **FMA Requirement §78.5(c):** *The applicant's floodplain management goals for the area covered by the plan.*

Element	Location in the Plan (section or annex and page #)	Reviewer's Comments	SCORE			
			STAFFORD		FMA	
			N	S	N	S
A Does the plan include a description of mitigation **goals** to reduce or avoid long-term vulnerabilities to the identified hazards? (**GOALS** are long-term; represent what the community wants to achieve, such as "eliminate flood damage"; and are based on the risk assessment findings.)	Para 5.1 Page 58-59	Table 13 sets 11 goals & objectives for the identified hazards.		X		
		SUMMARY SCORE		X		

Identification and Analysis of Mitigation Actions

- **Multihazard Requirement §201.6(c)(3)(ii):** *[The mitigation strategy **shall** include a] section that identifies and analyzes a comprehensive range of specific mitigation actions and projects being considered to reduce the effects of each hazard, with particular emphasis on new and existing buildings and infrastructure.*
- **FMA Requirement §78.5(d):** *Identification and evaluation of cost-effective and technically feasible mitigation actions considered.*

Element	Location in the Plan (section or annex and page #)	Reviewer's Comments	SCORE			
			STAFFORD		FMA	
			N	S	N	S
A. Does the plan identify and analyze a **comprehensive range** of specific mitigation actions and projects for each hazard?	Para 5.2 Page 59	See Table 14. mitigation actions are listed for each hazard.		X		
B Do the identified actions and projects address reducing the effects of hazards on **new** buildings and infrastructure?	Para 5.2 Page 59	Plan & design new "codes" & processes for new bldgs, joining the NFIP, builder courses are all identified as actions.		X		

C. Do the identified actions and projects address reducing the effects of hazards on **existing** buildings and infrastructure?	Para 5.2 Page 59-62	Retrofit, acquisition, elevation, etc actions are identified for a variety of havards.		X		
		SUMMARY SCORE		X		

Implementation of Mitigation Actions

- **Multihazard Requirement: §201.6(c)(3)(iii):** *[The mitigation strategy section **shall** include] an action plan describing how the actions identified in section (c)(3)(ii) 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.*
- **FMA Requirement §78.5(d):** *Identification and evaluation of cost-effective and technically feasible mitigation actions considered; and*
- **FMA Requirement §78.5(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.*

Element	Location in the Plan (section or annex and page #)	Reviewer's Comments	SCORE			
			STAFFORD		FMA	
			N	S	N	S
A. Does the mitigation strategy include how the actions are **prioritized**? (For example, is there a discussion of the process and criteria used?)	Para 5.3 Page 63	Planning team evaluated & ranked each of the mitigation actions based on STAPLE+E criteria.		X		
B. Does the mitigation strategy address how the actions will be **implemented and administered**? (For example, does it identify the responsible department, existing and potential resources, and timeframe?)	Para 5.4 Page 65-66	Six priority actions are listed with lead agency, funding sources and timeline.		X		
B.1. Does the mitigation strategy address continued compliance with the NFIP?	N/A	N/A – FMA criteria		N/A		
C. Does the prioritization process include an emphasis on the use of a **cost-benefit review** (see page 3-36 of *Multi-Hazard Mitigation Planning Guidance*) to maximize benefits?	Attachment B	As part of STAPLE+E review, benefit/cost of each action was considered. For six priority actions, BC information is discussed in more detail.		X		
C.1. Does the mitigation strategy emphasize cost-effective and technically feasible mitigation actions?	N/A	N/A – FMA criteria		N/A		
		SUMMARY SCORE		X		

Multi-Jurisdictional Mitigation Actions

- **Multihazard Requirement §201.6(c)(3)(iv):** *For multi-jurisdictional plans, there **must** be identifiable action items specific to the jurisdiction requesting FEMA approval or credit of the plan.*
- **FMA FEMA 299 Guidance:** *The Plan should be coordinated with, and ideally developed in cooperation with, all of the local jurisdictions within the geographical area.*

Element	Location in the Plan (section or annex and page #)	Reviewer's Comments	SCORE			
			STAFFORD		FMA	
			N	S	N	S
A Does the plan include at least one identifiable **action item** for each jurisdiction requesting FEMA approval of the plan?	N/A	N/A		N/A		
		SUMMARY SCORE		N/A		

PLAN MAINTENANCE PROCESS

Monitoring, Evaluating, and Updating the Plan

- **Multihazard Requirement §201.6(c)(4)(i):** [*The plan maintenance process **shall** include a] section describing the method and schedule of monitoring, evaluating, and updating the mitigation plan within a five-year cycle.*
- **FMA Requirement §78.5(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.*

Element	Location in the Plan (section or annex and page #)	Reviewer's Comments	SCORE			
			STAFFORD		FMA	
			N	S	N	S
A. Does the plan describe the method and schedule for **monitoring** the plan? (For example, does it identify the party responsible for monitoring and include a schedule for reports, site visits, phone calls, and meetings?)	Para 6.1 Page 69	Planning team will conduct an annual review of the plan via questionnaire.		X		
B. Does the plan describe the method and schedule for **evaluating** the plan? (For example, does it identify the party responsible for evaluating the plan and include the criteria used to evaluate the plan?)	Para 6.1 Page 69	Annual review questionnaire will be used to evaluate plan.		X		
C. Does the plan describe the method and schedule for **updating** the plan within the five-year cycle?	Para 6.1 Page 69	Plan will be updated on the 5 year cycle by the planning team.		X		
		SUMMARY SCORE		X		

Incorporation into Existing Planning Mechanisms

- **Multihazard Requirement §201.6(c)(4)(ii):** *[The plan **shall** include a] process by which local governments incorporate the requirements of the mitigation plan into other planning mechanisms such as comprehensive or capital improvement plans, when appropriate.*

Element	Location in the Plan (section or annex and page #)	Reviewer's Comments	SCORE			
			STAFFORD		FMA	
			N	S	N	S
A. Does the plan identify other local planning mechanisms available for incorporating the requirements of the mitigation plan?	Para 5.5 Page 67-68	Local planning is limited to the community plan. Mitigation plan will be incorporated in to local planning.		X		
B. Does the plan include a process by which the local government will incorporate the requirements in other plans, when appropriate?	Para 6.2 Page 70	Planning team to incorporate existing or recommended policies.		X		
		SUMMARY SCORE		X		

Continued Public Involvement

- **Multihazard Requirement §201.6(c)(4)(iii):** *[The plan maintenance process **shall** include a] discussion on how the community will continue public participation in the plan maintenance process.*

Element	Location in the Plan (section or annex and page #)	Reviewer's Comments	SCORE			
			STAFFORD		FMA	
			N	S	N	S
A. Does the plan explain how **continued public participation** will be obtained? (For example, will there be public notices, an on-going mitigation plan committee, or annual review meetings with stakeholders?)	Para 6.3 Page 71	Annual HMP update meeting is to produce a report from the planning team.		X		
		SUMMARY SCORE		X		

-- END OF REVIEW --

Attachment E

Adoption Resolution and FEMA Final Approval Letter

This page intentionally left blank

Kotlik City Council
P.O. Box 20268
Kotlik, Alaska 99620-0268
(907) 899-4313
Fax (907) 899-4826

Copy

City of Kotlik Hazard Mitigation Plan
Adoption Resolution
Resolution # 07-11

Whereas, the City of Kotlik, Alaska has experienced repetitive disasters that have damaged commercial, residential and public properties, displaced citizens and business, and presented general pubic health and safety concerns; and

Whereas, the community has prepared a Hazard Mitigation Plan that outlines the community's options to reduce overall damage and impact from natural hazards, and

Whereas, the Hazard Mitigation Plan has been reviewed by community residents, business owners, and federal, state and local agencies, and has been revised to reflect their concerns;

Therefore, Be It Resolved that:

1. The Hazard Mitigation Plan is hereby adopted as an official plan of the City of Kotlik.
2. A Hazard Mitigation Planning Group is hereby established as a permanent community advisory body. The Hazard Mitigation Planning Team Leader shall designate its members, subject to the approval of the City of Kotlik. They shall serve one (1) year terms. The group's duties shall be as designated in the Hazard Mitigation Plan.
3. The Hazard Mitigation Planning Team Leader is charged with supervising the implementation of the Plan's recommendations within the funding limitations as provided by the City of Kotlik or other sources.
4. The Hazard Mitigation Planning Team Leader shall give priority attention to the following action items recommended by the Hazard Mitigation Plan:

    a. **Relocate buildings that are at risk of being affected by erosion.**
    b. **Apply for grants or other funding mechanisms to implement riverbank protection methods.**
    c. **Join the National Flood Insurance Program, which regulated development in floodplains and provides federally backed insurance to individuals who live in communities that have joined the program.**
    d. **Hold a series of community meetings to train on earthquake safety and hold drills at schools.**

e. **Develop a workshop at school and have students display mitigation projects.**
f. **Conduct a series of community meetings to train on tsunami safety and hold drills at schools.**

5. The Hazard Mitigation Planning Team Leader shall convene the hazard mitigation planning group quarterly. The planning group shall monitor implementation of the plan and shall submit a written progress report to the City of Kotlik in accordance with the following format:

   a. A review of the original plan.
   b. A review of any disasters or emergencies that occurred during the previous calendar year.
   c. A review of the actions taken, including what was accomplished during the previous year.
   d. A discussion of any implementation problems.
   e. Recommendations for new projects or revised action items. Such recommendations shall be subject to approval by the City of Kotlik.

PASSED AND APPROVED THIS 19th DAY OF DECEMBER, 2007

Mary Ann Mike

Mary Ann Mike
Mayor, City of Kotlik

ATTEST:

Flora

Flora Tonuchuk, City Clerk

U.S. Department of Homeland Security
Region X
130 228th Street, SW
Bothell, WA 98021-9796

FEMA

December 31, 2007

Honorable Mary Ann Mike
Mayor, City of Kotlik
P.O. Box 20268
Kotlik, Alaska 99620-0268

Dear Mayor Mike:

The U.S. Department of Homeland Security's Federal Emergency Management Agency (FEMA) has approved the ***City of Kotlik Hazard Mitigation Plan*** as a local plan as outlined in 44 CFR Part 201. With approval of this plan, the City of Kotlik is now eligible to apply for the Robert T. Stafford Disaster Relief and Emergency Assistance Act's hazard mitigation project grants through December 31, 2012.

The plan's approval provides eligibility to apply for hazard mitigation projects through your state. All requests for funding will be evaluated individually according to the specific eligibility and other requirements of the particular program under which the application is submitted. For example, a specific mitigation activity or project identified in the plan may not meet the eligibility requirements for FEMA funding, and even eligible mitigation activities are not automatically approved for FEMA funding under any of the aforementioned programs.

Over the next five years, we encourage your community to follow the plan's schedule for monitoring and updating the plan, and to develop further mitigation actions. The plan must be reviewed, revised as appropriate, and resubmitted for approval within five years in order to continue project grant eligibility.

If you have questions regarding your plan's approval or FEMA's mitigation grant programs, please contact our state counterpart, Alaska Division of Homeland Security and Emergency Management, who coordinates and administers these efforts for local entities.

Sincerely,

for

Mark Carey, Director
Mitigation Division

cc: Mark Roberts, Alaska Division of Homeland Security and Emergency Management

Enclosure

KM:bb