City of Kwethluk, Alaska

Local Multi-Hazard Mitigation Plan

August 2009

Prepared by:

City of Kwethluk

WHPacific

and

Bechtol Planning and Development

Acknowledgements

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

FEMA

February 23, 2010

Honorable Lucy W. Olick
City of Kwethluk, Mayor
11th Kwethluk Street
P.O. Box 50
Kwethluk, Alaska 99621

Dear Mayor Olick:

The U.S. Department of Homeland Security's Federal Emergency Management Agency (FEMA) has approved the ***City of Kwethluk, Alaska Multi-Hazard Mitigation Plan*** as a local plan as outlined in 44 CFR Part 201. With approval of this plan, the City of Kwethluk is now eligible to apply for the Robert T. Stafford Disaster Relief and Emergency Assistance Act's hazard mitigation project grants through February 23, 2015.

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 its monitoring and updating, 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, which coordinates and administers these efforts for local entities.

Sincerely,

Mark Carey

Mark Carey, Director
Mitigation Division

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

Enclosure

BH:bb

www.fema.gov

Table of Contents

Tables

Figures

Maps

Acronyms

AEIS	Alaska Earthquake Information System
AWCG	Alaska Wildfire Coordinating Group
BCA	Benefit- Cost Analysis
BCR	Benefit-Cost Review
BFE	Base Flood Elevation (100-year flood)
CDBG	Community Development Block Grant
CFR	Code of Federal Regulations
CMP	Coastal Management Plan
COE	U.S. Army Corps of Engineers
DCCED	(Alaska) Department of Commerce, Community and Economic Development
DCRA	(DCCED) Division of Community and Regional Affairs
DHS&EM	(Alaska) Division of Homeland Security and Emergency Management
FDIC	Federal Deposit Insurance Corporation
FEMA	Federal Emergency Management Agency
FHLBB	Federal Home Loan Bank Board
FIRM	Flood Insurance Rate Maps
FLD	Flood Projects
fps	feet per second
FLD	Flood Projects
HMP	Hazard Mitigation Plan
HMPG	Hazard Mitigation Planning Grant
HWE	High Water Elevation
IAW	Immediate Action Workgroup
MHMP	Local Hazard Mitigation Plan
NFIP	National Flood Insurance Program
NOAA	National Oceanographic and Atmospheric Administration
PDMG	Pre Disaster Mitigation Grant
REAA	Regional Educational Attendance Area
SBA	Small Business Administration
STIP	Statewide Transportation Improvement Program
T/S	Tsunami/Seiche Projects
USACE	United States Army Corps of Engineers
USGS	United States Geological Survey
UTM	Universal Transverse Mercator

Adoption Resolution

(907) 757-6022 PHONE

CITY OF KWETHLUK
11th Kwethluk Street
P.O. Box 50
Kwethluk, Alaska 99621

(907) 757-6497 FAX

Resolution Number 10-02-01

ADOPTION OF THE CITY OF KWETHLIL LOCAL MULTI-HAZARD MITIGATION PLAN

WHEREAS, the City of Kwethluk recognizes the threat that local natural hazardous pose to people and property; and

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

WHEREAS, an adopted Local Multi-Hazard Mitigation Plan is required as a condition of future grant funding for mitigation projects; and

WHEREAS, the Kwethluk Local Multi-Hazard Mitigation Plan has been sent to the Alaska Division of Homeland Security and Emergency Management and the Federal Emergency Management Agency for their pre-approval;

NOW, THEREFORE, BE IT RESOLVED, that the Kwethluk City Council, hereby adopts the City of Kwethluk Local Mitigation Plan as an official plan; and

BE IT FURTHER RESOLVED, that the City of Kwethluk will submit the adopted Local Multi-Hazard Mitigation Plan to the Alaska Division of Homeland Security and Emergency Management and the Federal Emergency Management Agency officials for final review and approval.

Passed and approved by a duly assembled body of the Kwethluk City Council, on the 10th day of February, 2010, with a vote of 7 For, 0 Against, 0 Absent, 0 Excused.

Certified by:

Lucy W. Olick
Lucy W. Olick, Mayor

ATTEST: Ruel McDalton
Ruel McDalton, City Clerk

Chapter 1. Planning Process and Methodology

Introduction

Hazard mitigation is any sustained action taken to reduce or eliminate long-term risk to human life and property from hazards. Mitigation activities may be implemented prior to, during, or after an incident. However, it has been demonstrated that hazard mitigation is most effective when based on an inclusive, comprehensive, long-term plan that is developed before a disaster occurs. (FEMA 386-8)

Local Mitigation Plan regulations are found in the Code of Federal Regulations at 44 CFR Part 201. This plan has been developed using the regulations to ensure compliance with federal criteria.

Federal regulations specify that local mitigation plans be designed to help jurisdictions identify specific actions to reduce loss of life and property from natural hazards. It is not intended to help jurisdictions establish procedures to respond to disasters or write an emergency operations plan. The goal of mitigation is to decrease the need for response as opposed to increasing response capability. (FEMA 386-8)

The scope of this plan is natural hazards present in the community: flooding, erosion, severe weather, and earthquake. However, some of the mitigation projects for natural hazards would also mitigate impacts from other hazards, such as technological and economic hazards.

The City of Kwethluk Multi-Hazards Mitigation Plan (MHMP) includes information to assist the city government and residents with planning to avoid potential future disaster losses. The plan provides information on natural hazards that affect Kwethluk, descriptions of past disasters, and lists projects that may help the community prevent disaster losses. The plan was developed to help the City make decisions regarding natural hazards that affect Kwethluk.

Plan Development

Location

Kwethluk is located in the Yukon-Kuskokwim Delta on the Kwethluk River near the Kuskokwim junction. Kwethluk is 12 miles east of Bethel and 338 miles west of Anchorage. The community lies within the Bethel Recording District. Kwethluk is located at approximately 60.812220° north latitude and -161.435830° west longitude. The area encompasses 10 square miles of land and 1.7 square miles of water.

Project Staff

The Kwethluk City Council, under Mayor David Epchook, had project oversight. Others who

assisted with the project included City Manager Margaret Fitka, former City Manager Alexie Morris, and George Guy of Kwethluk Incorporated.

WHPacific and Bechtol Planning & Development were hired to write the plan with the City. Ervin Petty and Mark Roberts of the Division of Homeland Security and Emergency Management (DHS&EM) provided technical assistance and reviewed the drafts of this plan.

Plan Research

The plan was developed from existing Kwethluk plans and studies as well as outside information and research. The following list contains the most significant of the plans, studies, and websites that were used in preparing this document. Additional sources are listed in the bibliography.

1. *Alaska All-Hazard Risk Mitigation Plan*. Prepared by and for DHS&EM. October 2007
2. *DCRA Community Information*: http://www.commerce.state.ak.us/dca/commdb/CF_BOCK.htm.
3. *It's a Disaster! And what are you gonna do about it?* Prepared by the Immediate Action Workgroup, March 4, 2008
4. Organized Village of Kwethluk Comprehensive Community Long Range Plan 1998-2003, Prepared by the Arcturus Group, February 2000
    a. *Kwethluk Economic Development Plan 2000-2004*, Prepared by The Arcturus Group, January 1998
5. FEMA How to Guides:
    a. Getting Started: Building Support For Mitigation Planning (FEMA 386-1)
    b. Local Multi-Hazard Mitigation Planning Guidance, July 1, 2008 (FEMA 386-8)
    c. Understanding Your Risks: Identifying Hazards and Estimating Losses (FEMA 386-2)
    d. Developing The Mitigation Plan: Identifying Mitigation Actions And Implementing Strategies (FEMA 386-3)
    e. Bringing the Plan to Life: Implementing the Hazard Mitigation Plan (FEMA 386-4)
    f. Using Benefit-Cost Review in Mitigation Planning (FEMA 386-5)
6. University of Alaska, Fairbanks, and Alaska Earthquake Information Center website at: http://www.giseis.alaska.edu/Seis/
7. USGS Earthquake Probability Mapping: http://www//eqint.cr.usgs.gov/eqprob/2002/index.php
8. West Coast and Alaska Tsunami Warning Center, NOAA, http://wcatwc.arh.noaa.gov/

General Hazard Planning Web Sites

American Planning Association:	http://www.planning.org
Association of State Floodplain Managers:	http://www.floods.org
Developing the Implementation Strategy:	http://www.pro.gov.uk
Federal Emergency Management Agency:	http://www.fema.gov/fima/planning.shtm
Community Rating System:	http://www.fema.gov/nfip/crs.htm

Flood Mitigation Assistance Program:	http://www.fema.gov/fima/planfma.shtm
Hazard Mitigation Grant Program:	http://www.fema.gov/fima/hmgp
Individual Assistance Programs:	http://www.fema.gov/rrr/inassist.shtm
Interim Final Rule:	http://www.access.gpo.govl
National Flood Insurance Program:	http://www.fema.gov/nfip
Public Assistance Program:	http://www.fema.gov/rrr/pa

Public Involvement

A public meeting was held on Tuesday, October 14, 2008 in conjunction with the regularly scheduled and advertised City Council meeting. Prior to the meeting, a newsletter was distributed in the community by the City and Tribe and posted at the post office and local stores. Contact information was provided so that all interested parties could submit comments. The meeting minutes and newsletter are contained in the public involvement appendix.

The draft MHMP was submitted to the City and Tribe for review in September 2009. Comments were incorporated into the document, prior to submission to the State and FEMA. The Kwethluk City Council will review and approve the plan after pre-approval by DHS&EM and FEMA.

A copy of the draft MHMP is available for public perusal at the City and Tribal Government Offices.

Plan Implementation

The City Council of Kwethluk will be responsible for adopting the Kwethluk MHMP and all future updates or changes. This governing body has the authority to promote sound public policy regarding hazards. The MHMP will be assimilated into other Kwethluk plans and documents as they come up for review according to each plan's review schedule.

Table 1 Kwethluk Plans

Document	Completed	Scheduled Review
Kwethluk Economic Development Plan	2000	As needed
Organized Village of Kwethluk Comprehensive Community Long Range Plan	1998	As needed

Monitoring, Evaluating and Updating the Plan

Section §201.6(c)(4)(i) of the mitigation planning regulation requires that 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.

Monitoring the Plan

The Kwethluk City Manager or his/her designee is responsible for monitoring the plan. On an annual basis the Administration will seek a report from the agencies and departments responsible for implementing the mitigation projects in Chapter 4 of the plan. The compiled report will be provided to the City Council as information and noticed to the public. Public comments will be sought. A report outlining all five years of the plan monitoring will be included in the plan update.

Evaluating the Plan

The Kwethluk City Manager or designee will evaluate the plan during its five-year cycle. On an annual basis, concurrent with the report above, the evaluation should assess, among other things, whether:

- The goals and objectives address current and expected conditions.
- The nature, magnitude and/or types of risks have changed.
- The current resources are appropriate for implementing the mitigation projects in Chapter 4.
- There are implementation problems, such as technical, political, legal or coordination issues with other agencies.
- The outcomes have occurred as expected (a demonstration of progress).
- The agencies and other partners participated as originally proposed.

Updating the Plan

The mitigation planning regulations at §201.6(d)(3) direct the update of Mitigation Plans.

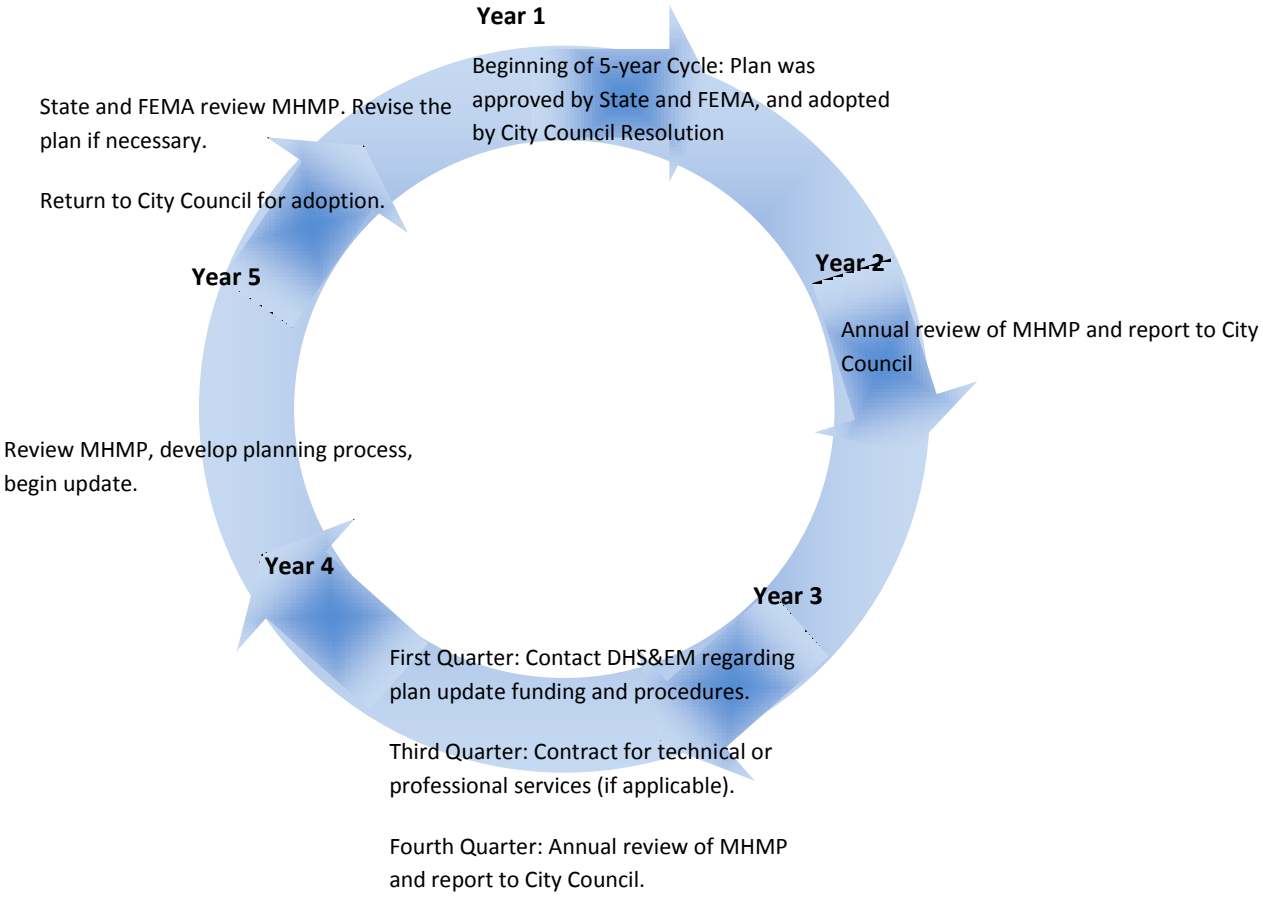
Plans must be updated and resubmitted to FEMA for approval every five years in order to continue eligibility for FEMA hazard mitigation assistance programs. Plan updates must demonstrate that progress has been made in the past five years to fulfill commitments outlined in the previously approved plan. This involves a comprehensive review and update of each section of the plan and a discussion of the results of evaluation and monitoring activities described above. Plan updates may validate the information in the previously approved plan or may involve a major plan rewrite. A plan update may not be an annex to this plan; it must stand on its own as a complete and current plan.

The tasks required to monitor, evaluate and update the MHMP are illustrated in Figure 1.

Continued Public Involvement

A copy of the MHMP will be kept at City and Tribal offices and will be available for public review. On an annual basis the City Council will review the plan, which will be advertised to the public using the same methods established in the public involvement section of this plan.

Figure 1. Hazard Mitigation Planning Cycle



Chapter 2: Community Profile

Community Overview

Current Population: 764 (2008 DCCED Certified Population)
Pronunciation: KWEETH-luk
Incorporation Type: 2nd Class City
Borough: Unorganized
Census Area: Bethel

Table 2 provides local and regional contact information for Kwethluk.

Table 2. Community Information

Community Information	Contact Information
City of Kwethluk	City of Kwethluk David Epchook, Mayor P.O. Box 50 Kwethluk, AK 99621 Phone: (907) 757-6022 Fax: (907) 757-6497 E-mail: kwtocity@unicom-alaska.com
Borough Located In:	Unorganized
Village Council	Organized Village of Kwethluk Martin Andrew, President P.O. Box 129 Kwethluk, AK 99621 Phone: (907) 757-6714 Fax: (907) 757-6328 Email: kwtira@unicom-alaska.com
Electric Utility	Kuiggluum Kallugiva P.O. Box 110 Kwethluk, AK 99621 Phone: (907) 757-6613 Fax: (907) 757-6212

Community Information	Contact Information
Regional Native Corporation	Calista Corporation 301 Calista Court, Suite A Anchorage, AK 99518 Phone: (907) 279-5516 Fax: (907) 272-5060 E-mail: Calista@calistacorp.com Web: http://www.calistacorp.com
School District	Lower Kuskokwim School P.O. Box 305 Bethel, AK 99559 Phone: (907) 543-4800 Fax: (907) 543-4954 Web : http://www.lksd.org
Village Corporation	Kwethluk Incorporated James M. Nicori, President George Guy, Business Manager P.O. Box 109 Kwethluk, AK 99621 Phone: (907) 757-6613 Fax: (907) 757-6212

History

The Yukon-Kuskokwim Delta has been occupied since prehistoric times. The name Kwethluk is derived from the Yup'ik work "Kwikli," meaning "river." In the late 1800s, families from four villages on the Kwethluk River joined living sites. A Moravian Church was constructed in 1896. Two epidemics drastically reduced Kwethluk's population. The first, a measles epidemic, hit in the late 1890s and the second, a tuberculosis epidemic, hit in the 1930s.

Gold was discovered in nearby creeks in 1909; however, prospectors' finds were disappointing and most left the area by 1911. A placer deposit discovered on the upper Kwethluk River yielded small amounts of gold and was active until World War II.

The BIA built a school and teachers' quarters in 1924. In 1939, the villagers owned 31,000 reindeer, used for food and skins. A post office was established in 1947, and a Native-owned store opened in 1948. An airstrip was established in 1956. The City was incorporated in 1975.

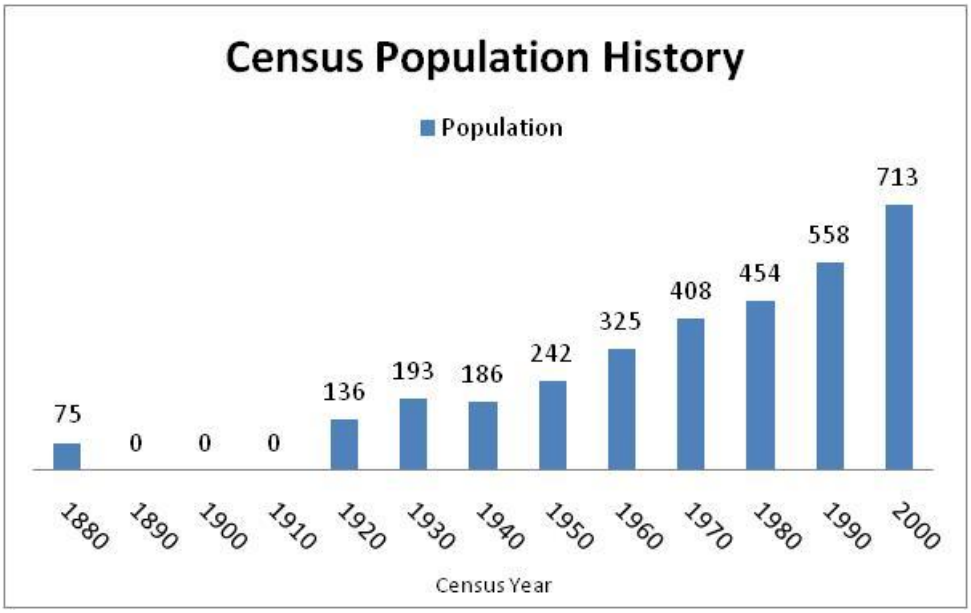
Culture

Kwethluk is a Yup'ik Eskimo village. Kwethluk's residents rely heavily on subsistence hunting and gathering. Fish, terrestrial and non-terrestrial mammals, waterfowl and vegetation are harvested year round.

Population

The 2008 DCCED-certified population for Kwethluk is 764, while the 2000 US Census figure was 713, showing a continuation of the growth trend indicated in Figure 2. The earliest recorded census occurred in 1880 when 75 people lived in the community. Kwethluk is the second largest community on the lower Kuskokwim. Approximately 96% of Kwethluk's population is Alaska Native. The average age of community members is 24 years old. The total housing units in Kwethluk is 199; 153 units are occupied and 46 units are vacant. Units vacant due to seasonal use totals 33.

Figure 2. Historic Population Graph



Economy

Kwethluk's economy is heavily dependent on the subsistence lifestyle. The largest employers are the school district, Village Corporation, store and health clinic. 61 residents hold commercial fishing permits. There is a 5% sales tax. The total potential work force in Kwethluk is 384. A total of 175 residents are employed, 177 adult residents are not in the labor force. The median household income is $25,417. The per capita income is $6,503. Nearly 30% of community residents live below the poverty line.

Facilities

The City and Village provide water treatment, honeybucket, washeteria and refuse services through Kwethluk Utilities Commission. Water is drawn from both a surface source and a well source. Water is

filtered and chlorinated. The school and teachers' housing have individual water and waste water systems. None of the 147 occupied homes have complete plumbing. The washeteria houses coin-operated washers and dryers along with two showers. Residents haul water, and sewage is hauled three-quarters of a mile to the sewage lagoon. The City operates a class three landfill that is not DEC permitted. A City-owned electric utility, Kwethluk, Inc, operates a diesel generator. The three-generator system has total kilowatt capacity of 747 kilowatt hours. The washeteria and water treatment plant are being rehabilitated.

The Kwethluk health clinic is leased by the Yukon-Kuskokwim Health Corporation. Health aides provide preventative and primary health care. Doctors and dentists make regular trips to the community.

Transportation

Year-round freight and passenger service is available to and from Kwethluk. A State-owned 1,750-foot-long by 35-foot-wide gravel airstrip and a seaplane base are available. Seasonal barge services deliver cargo during the summer. There are no docking facilities. Snow machines, ATVs, and skiffs are used for local travel. The river becomes an ice road during the winter. Winter trails are marked to Eek (45 miles), Three Step Mountain (55 miles), and Columbia Creek (49 miles). Kwethluk has one conventional road nearly a mile long and 9,400 feet of boardwalk.

Climate

Kwethluk lies in a transitional climatic zone. Winter weather is strongly influenced by the Bering Sea. The mean January temperature is 6 degrees Fahrenheit (°F); winter averages range from 19F° to -2°F. Inland weather influences result in mild summers. The mean July temperature is 56°F; summer temperatures range from 62° to 42° F. Extremes have been recorded from 86° F to -46°F. The Kuskokwim is typically ice-free from June through October. An average of 16 inches precipitation falls between July and October. An average of 50 inches of snowfall occurs from November to March.

Vegetation and Soils

Area vegetation is characterized by low shrubs such as willow and alder. Wet tundra houses sedges and grasses. Higher elevations are covered with mosses and lichens. Areas outside the floodplains are characterized by deep permafrost which supports the growth of white spruce, balsam poplars and paper birch trees.

Kwethluk sits atop floodplain deposits from the Kuskokwim and Kwethluk Rivers. Soils are stratified deposits of sands, silty sands and fine silt overlain with layers of sandy silt and organic materials. The soil is characterized by poor drainage and susceptibility to erosion. The average elevation is 20 feet above sea level.

Wildlife

The Yukon-Kuskokwim Delta is home to important nesting and migratory habitat. 19 species of waterfowl and 30 shorebird species utilize the Yukon-Kuskokwim Delta habitat. Species such as geese,

whistling swans, white-fronted geese and various sea ducks visit the area each spring. Four species of hair seals commonly migrate through the area from May through November. Walrus and Steller sea lions are also found in area coastal waters.

Kwethluk Capability Assessment

Government

The City of Kwethluk was incorporated as a second class city in 1975. The City government is composed of a strong mayor and seven City Council members. The City employs a city administrator, clerk, two policemen, two laundromat attendants, a maintenance person and a sanitation operator. There is a five percent sales tax. The community also has an IRA Council which governs tribal affairs. The Kwethluk IRA Council is composed of five council members. The council oversees tribal administration, enrollment, advocacy and social services programs. The council also oversees the Kwethluk Tribal Courts and collaborates regularly with the City Council.

Community Maps

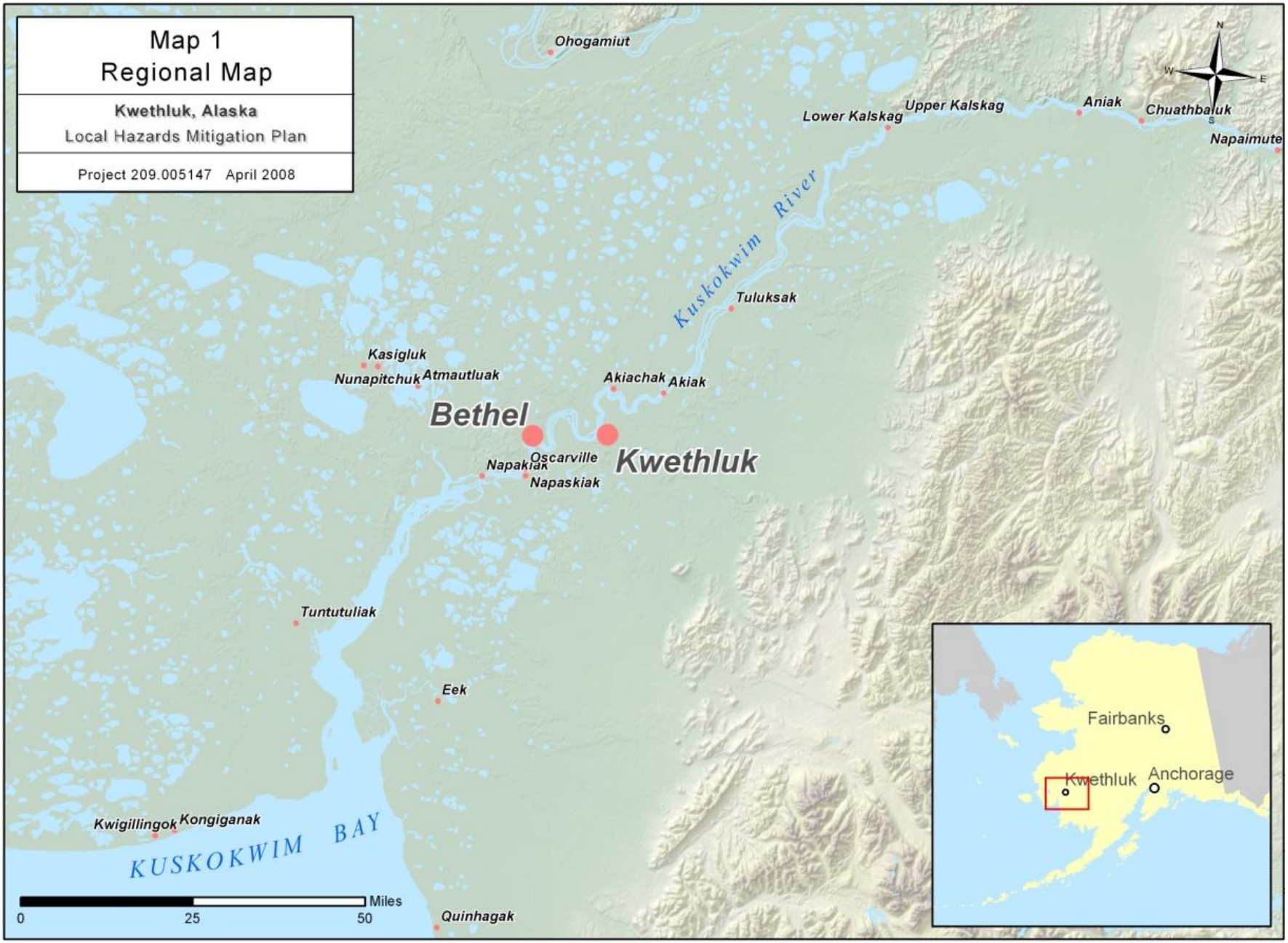
Community maps were developed using data from the DCRA website, Flood Insurance Rate Maps (FIRM), maps from the Corps of Engineers study, and input from residents. Map 1, on page 11 provides a regional view of Kwethluk.

Infrastructure

Every jurisdiction is unique. The list of assets that are most important to protect, as well as the criticality of any given facility, can vary widely from community to community. For planning purposes, a jurisdiction should determine criticality based on the relative importance of its various assets for the delivery of vital services, the protection of special populations, and other important functions. Infrastructure may be considered critical for a variety of reasons. Examples of these types of facilities are listed on below and shown in Map 2 on page 12.

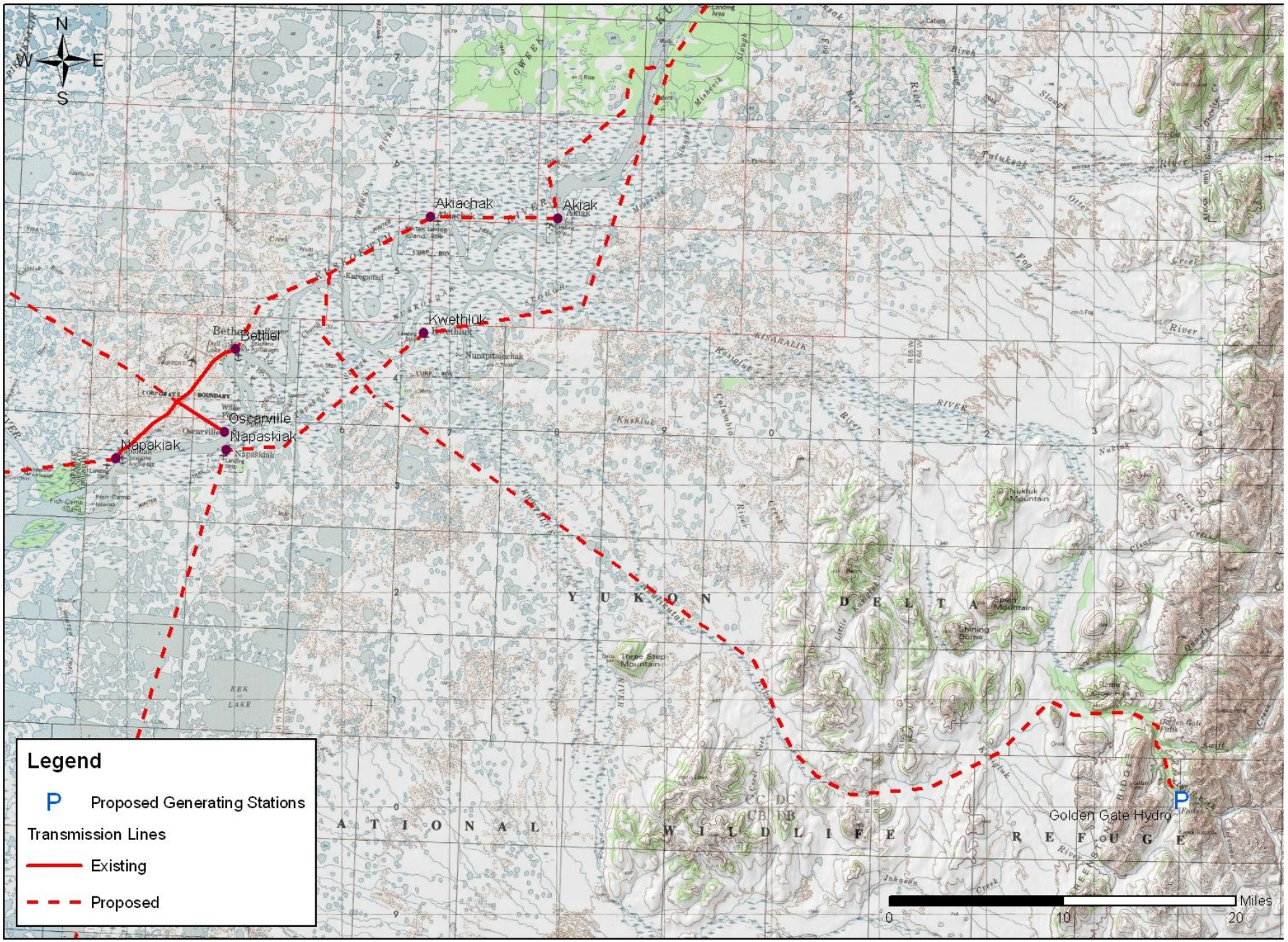
Map 3, on page 13, shows the location of existing power transmission lines in the region. A power line has been proposed to link Kwethluk to power from the proposed Golden Gate Hydroelectric facility.

Map 1. Regional Map



Map 2. Critical Infrastructure

Map 3. Regional Infrastructure



Critical Facilities

Critical facilities are those facilities and infrastructure necessary for emergency response efforts and whose loss of function would present an immediate threat to life, public health, and safety. In Kwethluk, they include:

- Landing Strip
- Health Clinic
- Public Safety Building
- Water Pumphouse and Treatment Plant

Essential Facilities

Essential facilities are those facilities and infrastructure that supplement response efforts and whose loss of function would present an immediate threat to life, public health, and safety, including:

- Designated shelters
- City government buildings
- Bulk fuel storage tank farms

Critical Infrastructure

Critical infrastructure consists of the various service networks in Kwethluk, including:

- Utility lines
- Transportation networks
- Wastewater collection
- Water transmission lines

Vulnerable Populations

Locations within Kwethluk that serve populations with special needs or requiring special consideration include:

- Kwethluk Community School
- Kwethluk Health Clinic
- Headstart

Cultural and Historical Assets

Cultural and historical assets include those facilities that augment or help define community character that, if lost, would represent a significant loss to the community. These include:

- Community Hall
- Old Russian Orthodox Church

- New Russian Orthodox Church
- Moravian Church

Federal Resources

The federal government requires local governments to have a hazard mitigation plan in place to be eligible for funding opportunities through FEMA, such as through the Pre-Disaster Mitigation Assistance Program and the Hazard Mitigation Grant Program. 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 a large number of documents that address implementing hazard mitigation at the local level. Five key resource documents are available from the FEMA Publication Warehouse (1-800-480-2520) and are briefly described below:

- **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 mirror the four major phases of hazard mitigation planning used in the development of the Kwethluk Hazard Mitigation Plan. 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 Disaster Mitigation Act (DMA) 2000 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 CD.** FEMA 372, September 2001. This CD contains information about mitigation and is useful for state and local government planners and other stakeholders in the mitigation process. It 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 processes 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. It 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 Kwethluk businesses.

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.** Administered by the Alaska Department of Commerce, Community and Economic Development (DCCED) DCRA. Provides grant assistance and technical assistance to aid communities in planning activities that address issues detrimental to the health and safety of local residents, such as housing rehabilitation, public services, community facilities, and infrastructure improvements that would primarily benefit low-and moderate-income persons.

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

- **Federal Financial Institutions.** Member banks of the Federal Deposit Insurance Corporation (FDIC) or Federal Home Loan Bank Board (FHLBB) may be permitted to waive early withdrawal penalties for Certificates of Deposit and Individual Retirement Accounts.

- **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 three years.

- **United States 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.

The following are websites 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 – is 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

- **Alaska DHS&EM** is 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 a high priority 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 website at http://www.ak-prepared.com.

- **DCCED DCRA:** Provides training and technical assistance on all aspects of the National Flood Insurance Program (NFIP) and flood mitigation.

- **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.

- **Department of Military and Veteran's Affairs:** Provides damage appraisals and settlements for Veterans Administration (VA)-insured homes, and assists with filing for survivor benefits.

Other Funding Sources and Resources

- **Real Estate Business.** Real estate disclosure is required by state law for properties within flood plains.

- **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. Also provides funds for counseling, outreach, and consultation for those affected by disaster.

Local Resources

Kwethluk is a small community with a limited number of planning and land management tools. The resources available in these areas have been assessed by the City, and are summarized in the following tables.

Table 3. Legal and Technical Capability

Regulatory Tools (ordinances, codes, plans)	Local Authority (Yes/No)	Comments (Year of most recent update; problems administering it, etc)
Building code	No	
Zoning ordinance	Yes	
Subdivision ordinance or regulations	No	
Special purpose ordinances (floodplain management, stormwater management, hillside or steep slope ordinances, wildfire ordinances, hazard setback requirements)	Yes	1998
Growth management ordinances (also called "smart growth" or anti-sprawl programs)	No	
Site plan review requirements	Yes	1998
Comprehensive plan	No	2003
A capital improvements plan	Yes	2008 Admin & Finance Staff, City Council

Regulatory Tools (ordinances, codes, plans)	Local Authority (Yes/No)	Comments (Year of most recent update; problems administering it, etc)
An economic development plan	No	
An emergency response plan	Yes	2007
A post-disaster recovery plan	No	
Real estate disclosure requirements	No	

Table 4. Administrative and Technical Capability

Staff/Personnel Resources	Y/N	Department/Agency and Position
City Manager	No	City Manager, Admin & Finance
City Clerk	Yes	Admin & Finance, City Clerk
Fire Chief	Yes	Kwethluk Volunteer Fire Department, Fire Chief is a volunteer position
City Planner	Yes	City Manager
Public Works Director	Yes	City Manager
Public Safety VPO	Yes	City Manager
Librarian	No	
Fire Department	Yes	Volunteer Fire Department
Engineer(s) or professional(s) trained in construction practices related to buildings and/or infrastructure	No	
Planners or Engineer(s) with an understanding of natural and/or human-caused hazards	No	
Floodplain manager	Yes	City Manager, Admin & Finance
Surveyors	No	
Staff with education or expertise to assess the community's vulnerability to hazards	Yes	Mayor, City Council
Personnel skilled in GIS and/or HAZUS	No	

Table 5. Fiscal Capability

Financial Resources	Accessible or Eligible to Use (Yes or No)
Community Development Block Grants (CDBG)	Yes
Capital improvements project funding	Yes
Authority to levy taxes for specific purposes	Yes
Fees for sewer	Yes
Impact fees for homebuyers or developers for new developments/homes	No
Incur debt through general obligation bonds	Yes
Incur debt through special tax and revenue bonds	Yes
Incur debt through private activity bonds	Yes
Withhold spending in hazard-prone areas	Yes

Chapter 3: Hazards

Requirements

> Section 201.6(c)(2) of the mitigation planning regulation requires local jurisdictions to provide sufficient hazard and risk information from which to identify and prioritize appropriate mitigation actions to reduce losses from identified hazards. (FEMA 386-8)

The goal of mitigation is to reduce the future impacts of a hazard including loss of life, property damage, and disruption to local and regional economies, environmental damage and disruption, and the amount of public and private funds spent to assist with recovery.

Mitigation efforts begin with a comprehensive risk assessment. A risk assessment measures the potential loss from a disaster event caused by an existing hazard by evaluating the vulnerability of buildings, infrastructure, and people. It identifies the characteristics and potential consequences of hazards and their impact on community assets.

Federal Requirements for Risk Assessment

Federal regulations for hazard mitigation plans outlined in 44 CFR Section §201.6(c)(2) include a requirement for a risk assessment. This risk assessment requirement is intended to provide information that will help the community identify and prioritize mitigation activities that will prevent or reduce losses from the identified hazards. The federal criteria for risk assessments and information on how the Kwethluk MHMP meets those criteria are outlined below:

Table 6. Risk Assessment - Federal Requirements

Section §201.6(c)(2) Requirement	Where requirement is addressed in Kwethluk Multi-Hazard Mitigation Plan
Identifying Hazards §201.6(c)(2)(i) The risk assessment *shall* include a description of the type . . . of all natural hazards that can affect the jurisdiction . . .	Chapter 3, Section 1 identifies flood/erosion, earthquake, severe weather, and wildland fire as natural hazards in Kwethluk.

Section §201.6(c)(2) Requirement	Where requirement is addressed in Kwethluk Multi-Hazard Mitigation Plan
Profiling Hazards §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.	Chapter 3, Sections 3-6 includes hazard-specific sections of the Kwethluk MHMP profile the natural hazards that may affect the community. The Plan includes **location, extent, impact** and **probability** for each natural hazard identified. The MHMP also provides hazard specific information on **past occurrences** of hazards events.
Assessing Vulnerability: Overview §201.6(c)(2)(i) 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.	Chapter 3, Sections 3-6 contain overall summaries of each hazard and its impact on the community. Summaries are contained in hazard-specific section in Chapter 3.
Assessing Vulnerability: Addressing Repetitive Loss Properties §201.6(c)(2)(ii) The risk assessment in all plans approved after October 1, 2008 must also address National Flood Insurance Program (NFIP) insured structures that have been repetitively damaged floods.	Kwethluk there has been ***one*** property that meets the FEMA definition of repetitive loss. Section 3 Flood/Erosion explains this requirement in more detail.
Assessing Vulnerability: Identifying Structures §201.6(c)(2)(ii)(A) The plan *should* describe vulnerability in terms of the types and number of existing and future buildings, infrastructure, and critical facilities located in the identified hazard areas.	Chapter 3, Section 1, Table 12 lists structures, infrastructure and critical facilities located in the identified hazard areas.
Assessing Vulnerability: Estimating Potential Losses §201.6(c)(2)(ii)(B) The plan *should* describe vulnerability in terms of an estimate of the potential dollar losses to vulnerable structures identified in paragraph (c)(2)(ii)(A) of this section and a description of the methodology used to prepare the estimate.	Chapter 3, Section 2, Table 13 estimates potential dollar losses to municipal-owned facilities. This information was derived from insurance values provided by the City.

Vulnerability Assessment Methodology

The purpose of a vulnerability assessment is to identify the assets of a community that are susceptible to damage should a hazard incident occur.

Critical facilities are described in the Community Profile Section of this hazard plan. A vulnerability matrix table of critical facilities as affected by each hazard is provided in Section 2 of this chapter.

Facilities were designated as critical if they are: (1) vulnerable due to the type of occupant (children or elderly for example); (2) critical to the community's ability to function (roads, power generation facilities, water treatment facilities, etc.); (3) have a historic value to the community (cemetery); or (4) critical to the community in the event of a hazard occurring (emergency shelter, etc.).

This hazard plan includes an inventory of critical facilities from Kwethluk records and land use map.

The following assessment includes the following seven sections:

Section 1. Identifying Hazards
Section 2. Assessing Vulnerability: Overview and Potential Losses
Section 3. Flood/Erosion
Section 4. Severe Weather
Section 5. Wildland Fire
Section 6. Earthquake
Section 7. Hazards Not Present in Kwethluk

The description of each of the identified hazards includes a narrative and in some cases a map of the following information:

The **location** or geographical areas in the community that would be affected. The location of identified hazards is described by a map wherever appropriate or in some cases with a narrative statement.

The **extent** (i.e. magnitude or severity) of potential hazard events is determined. The following table is used to rank the extent of each hazard. Sources of information to determine the extent include the *Alaska All-Hazard Risk Mitigation Plan,* historical or past occurrences and information from experts and local residents.

Table 7. Extent of Hazard Ranking

Magnitude/Severity	Criteria to Determine Extent
Catastrophic	Multiple deaths Complete shutdown of facilities for 30 or more days More than 50% of property severely damaged
Critical	Injuries and/or illnesses result in permanent disability Complete shutdown of critical facilities for at least 2 week More than 25% of property is severely damaged
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
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 more Less than 10% of property is severely damaged

The **probability** of the likelihood that the hazard event would occur in an area. The following table, taken from the *Alaska All-Hazard Risk Mitigation Plan* categorizes the probability of a hazard occurring. Sources of information to determine the probability include the *Alaska All-Hazard Risk Mitigation Plan*, historical or past occurrences and information from local residents and other experts.

Table 8. Probability Criteria Table

Probability	Criteria Used to Determine Probability
Low	Hazard is present with a low probability of occurrence within the next ten years. Event has up to 1 in 10 year's chance of occurring.
Medium	Hazard is present with a moderate probability of occurrence with the next three years. Event has up to 1 in 3 year's chance of occurring.
High	Hazard is present with a high probability of occurrence within the calendar year. Event has up to 1 in 1 year chance of occurring.

Past occurrences of hazard events. The past occurrences of natural events are described for identified natural hazards. The information was obtained from the *Alaska All-Hazard Risk Mitigation Plan,* State Disaster Cost Index, City records, other state and federal agency reports, newspaper articles, web searches, etc.

Impact of hazard events. This describes the potential result of a hazard occurrence.

Section 1. Identifying Hazards

This section identifies and describes the hazards likely to affect Kwethluk. The community used the following sources to identify the hazards present in community: the *Alaska All-Hazard Risk Mitigation Plan*, interviews with experts and long-time residents, and past occurrences of events.

Alaska All-Hazard Risk Mitigation Plan, 2007 Matrices – Lower Kuskokwim (REAA)

Table 9 is taken from the *Alaska All-Hazard Risk Mitigation Plan* of October 2007. Data for Table 10 comes from the DHS&EM Disaster Cost Index, including data from 1978 to the 2007 and major events such as the 1964 earthquake. It may not include events known to the community or from other sources discussed in the sections describing specific hazards.

Table 9. Hazard Matrix

Hazard Matrix – City of Kwethluk Lower Kuskokwim (REAA)				
Flood	**Wildland Fire**	**Earthquake**	**Volcano**	**Avalanche**
Y - H	Y	Y - M	N	N
Tsunami & Seiche	**Severe Weather**	**Landslides**	**Erosion**	**Drought**
N	Y - H	N	Y - L	U

Hazard Identification:

Y: Hazard is present in jurisdiction but probability unknown

Y-L: Hazard is present with a low probability of occurrence within the next ten years. Event has up to 1 in 10 year's chance of occurring.

Y-M: Hazard is present with a moderate probability of occurrence within the next three years. Event has up to 1 in 3 year's chance of occurring.

Y-H: Hazard is present with a high probability of occurrence within the next one year. Event has up to 1 in 1 year chance of occurring.

N: Hazard is not present

U: Unknown if the hazard occurs in the jurisdiction

Table 10. Previous Occurrences from 1978 to Present

Previous Occurrences - City of Kwethluk Lower Kuskokwim (REAA)				
Flood	**Wildland Fire**	**Earthquake**	**Volcano**	**Avalanche**
9 - L	1 - L	None	None	None
Tsunami & Seiche	**Severe Weather**	**Ground Failure**	**Erosion**	**Drought**
0	4 - L	None	2-L	None

Extent
Z - Zero - Used for historical information. An event occurred but may not have caused damage or loss.
L - Limited – Minimal through maximum impact to part of community. *Falls short of the definition for total extent*.
T - Total – Impact encompasses the entire community.
Number:
Number of occurrences

Source: ***Alaska All-Hazard Risk Mitigation Plan*****, 2007**

Identification of Natural Hazards Present in Kwethluk

Based on consultation with the Alaska DHS&EM, Table 9. Hazard Matrix and Table 10. Previous Occurrences from 1978 to Present from the *Alaska All-Hazard Risk Mitigation Plan*, Kwethluk plans and reports, and interviews Kwethluk identified the following hazards to be profiled.

Table 11. Hazards Identification and Decision to Profile

Hazard	Yes/No	Decision to Profile Hazard
Flood/Erosion	Yes	Designated as a hazard in *Alaska All-Hazard Risk Mitigation Plan*. The Kwethluk Community Long Range Plan states, "Erosion is a serious problem and ongoing concern for Kwethluk. The riverbank in the eastern and central portion of the village lost 15 feet during a recent three-year period. Some homes are in danger and the bank loss is causing a pollution problem by exposing old sewage pits."
Wildland Fire	Yes	Designated as a hazard in *Alaska All-Hazard Risk Mitigation Plan*.
Earthquake	Yes	Designated as a hazard in *Alaska All-Hazard Risk Mitigation Plan* and present as a risk throughout the state of Alaska.

Hazard	Yes/No	Decision to Profile Hazard
Volcano	No	Not designated as a hazard in *Alaska All-Hazard Risk Mitigation Plan*. The Alaska Volcano Observatory website database indicates that no active volcanoes exist within a 150-mile radius of Kwethluk.
Avalanche	No	Kwethluk's topography is not one conducive to avalanches.
Tsunami	No	Not designated as a hazard in *Alaska All-Hazard Risk Mitigation Plan*. Kwethluk is located inland and no bodies of water likely subject to tsunami or seiche are in the vicinity.
Severe Weather	Yes	Designated as a hazard in *Alaska All-Hazard Risk Mitigation Plan*.
Ground Failure	No	Not designated as a hazard in *Alaska All-Hazard Risk Mitigation Plan*. No previous occurrences are documented or reported in the community.

See Section 7, Hazards not present in Kwethluk, for more information on the hazards not present in the community. Each hazard that is present in the community is profiled in hazard-specific sections.

Section 2. Assessing Vulnerability

Overview

The vulnerability overview section is a summary of Kwethluk's vulnerability to the hazards identified in Table 11. The summary includes type of hazard, the types of structures, infrastructures and critical facilities affected by the hazards.

Identification of Assets

Because Kwethluk is a small community of 741 residents, every structure is essential to the sustainability and survivability of Kwethluk residents. The Assests Matrix in Table 12 includes a list of facilities, utilities and businesses and their vulnerability to natural hazards.

Table 12. City of Kwethluk Asset Matrix – Structures and Infrastructure

Structure	Flood/ Erosion	Wildland Fire	Earthquake	Severe Weather
ANTHC Housing	M		M	H
BIA Power Plant	M		M	H
City Building	M		M	H
City Office	M		M	H
Clinic	M		M	H
Community Hall			M	H
Dept. Public Safety			M	H
Fire Equipment Storage			M	H
KRTC Building			M	H
Kwethluk Inc. Bulk Fuel Tanks			M	H
Kwethluk Inc. Gas Station			M	H
LKSD School			M	H
LKSD Tank Farm			M	H
LKSD Water Plant			M	H
National Guard Armory			M	H
Native Store			M	H
Post Office			M	H
Power Plant			M	H
Public Safety Building			M	H
Pump Station			M	H
Sports Store/Propane Storage			M	H
United Utilities			M	H

Only limited information was available at this time. Additional data will be added in future plan updates.

Table 13 lists the critical facilities owned by the City and the replacement value of buildings and contents. Both of these values were provided by the City and were based on insurance assessments. Only limited information was available at this time. Additional data will be added in future plan updates.

Table 13. City-owned Critical Facilities with Replacement Value

Structure	Construction type	Year Built	Sq Ft	Building Value	Contents Value
ANTHC Housing					
BIA Power Plant					
City Building					
City Office	D	1982	768	$163,884	$10,830
Clinic	D	1992	1800	$352,332	$10,830
Community Hall					
Dept. Public Safety					
Fire Station (Volunteer)	D	1981	960	$18,297	$10,830
KRTC Building					
Kwethluk Inc. Bulk Fuel Tanks					
Kwethluk Inc. Gas Station					
LKSD School					
LKSD Tank Farm					
LKSD Water Plant					
National Guard Armory					
Native Store					
Old Headstart Building	D	1980	2400	$411,984	$10,830
Post Office					
Power Plant					
Public Safety Building	D	1970	576	$148,297	$10,200
Pump Station					
Sports Store/Propane Storage					
United Utilities					
Washeteria	D	1985	1800	$1,988,000	$541,476
Water Plant					

Current projects include water and sewer upgrades and a planned Teen Center and playground. Sites under consideration for the Teen Center and playground were ranked with vulnerability to flooding carefully considered.

Section 3. Floods and Erosion

The following flood/erosion hazard profile includes a description of the hazard, the location, extent, impact and probability of the hazard and past occurrences of flooding/erosion in Kwethluk.

Hazard Description

Erosion is a serious problem and ongoing concern for Kwethluk. According to the 1998 *Comprehensive Community Long Range Plan 1998-2003*, the riverbank in the eastern and central portion of the village lost 15 feet over a three-year period. Erosion is caused by several factors: waves generated by storms and boat traffic on the river, melting permafrost creating saturated soil that is susceptible to slumping, and ice gouging during breakup. The community reports that the majority of erosion occurs during the spring river breakup when waters are high, at other periods of high water in summer, and during late summer storms. (*Comprehensive Community Long Range Plan 1998-2003)*

While there are many different types of flooding, Alaska primarily experiences ice jams and snowmelt in the spring and rainfall runoff flooding in the late summer and early fall.

Ice Jam: Ice jam floods occur commonly during spring break-up, after ice creates a temporary jam restricting stream flow and causing water levels to rise upstream. When the jam releases the stored water causes downsteam flooding; this is usually exacerbated by snowmelt runoff. Ice jams tend to develop where the river channel slope decreases, gets shallower, or where constrictions such as bridges, bends in the river, headwaters and reservoirs occur. Ice jam floods are typically worse than rainfall-runoff or snowmelt floods because these floods tend to be deeper, occur rapidly, and the ice causes physical damage.

Rain/Snow Melt Runoff: Rain and snow melt runoff floods occur when rain and snow melt runoff causes a waterway to exceed its capacity. Snow melt flooding typically occurs during spring break-up while rain runoff flooding occurs in the late summer and early fall.

The primary erosion hazard in Kwethluk is riverine erosion. Erosion is the wearing way, transportation and movement of land. Erosion can occur both gradually and quickly as the result of a flash flood, coastal storm, or other event. It is a natural process that can be exacerbated by human activities.

Riverine Erosion: Riverine erosion 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.

Location

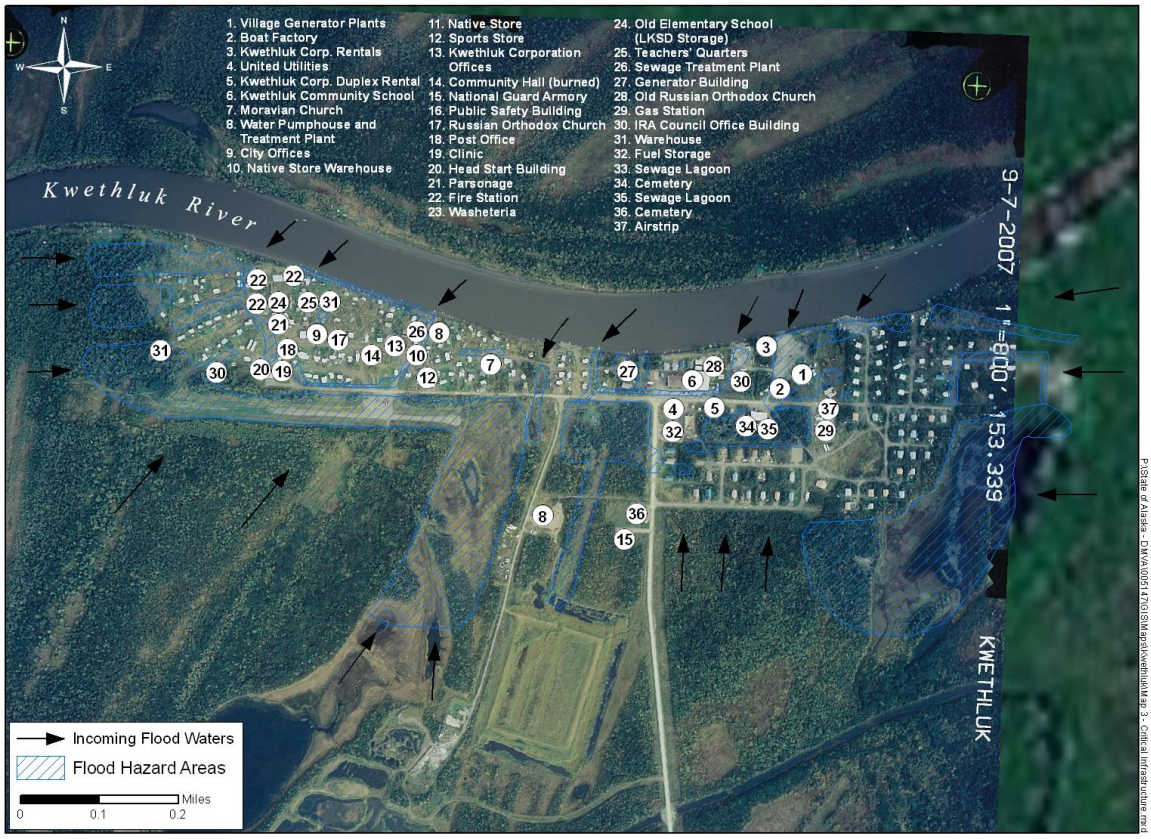
According to the U.S. Army Corps of Engineers (COE) Flood Plain Management Branch, the entire community of Kwethluk is within the 100-year flood plain of both the Kuskokwim and Kwethluk Rivers.

The community is built atop low wetlands with numerous lakes, sloughs, and old river channels. Elevations within the community and the surrounding areas range from less than ten feet to more than 25 feet above mean sea level. Several critical public buildings, including the school, water pump house and water treatment plant are located along the shore of the Kwethluk River.

Kwethluk is located on the outside bend of a gently curving section of the Kwethluk River, and is therefore susceptible to continued bank erosion. Erosion occurs along the entire bank but the most significant erosion has occurred along the eastern and central portion of the community. This erosion is the result of waves generated by storms and boat traffic; melting permafrost creating saturated soil which slump; and ice gouging during spring break-up. The majority of erosion occurs during high water periods including: spring break-up, summer and late summer storm season.

Error! Reference source not found. shows the areas of the community prone to flooding as described by long-term Kwethluk residents. Arrows indicate direction from which waters come.

Map 4. Community Identified Flood Prone Areas



Extent

The extent (i.e. magnitude or severity) of the flood/erosion hazard is measured in this plan by using historical past events and the *Alaska All-Hazard Risk Mitigation Plan*. Some flooding occurs annually but

depths seldom exceed three to four feet. Annual flooding and erosion occurs with **limited** extent, which is defined in Section 5.

Larger flood events occur less frequently but could have a **catastrophic** extent.

Impact

Most of the community's public and private buildings are built on pilings to mitigate the impacts of smaller annual floods. The recommended building elevation is 28.55 feet above sea level. Four high water marks were placed at the elevation, 26.55 feet, of the 1989 flood. The State floodplain manager reports that the 2006 flood exceeded the previous high water mark by approximately one foot.

Larger flood events occur less frequently and would impact the entire community as even those properties or residents unaffected directly, will suffer due to road closures, impacts to public safety (access and response capabilities), limited availability of perishable commodities, and isolation.

Probability

Based on the *Alaska All-Hazard Risk Mitigation Plan*, City records and past historical events Kwethluk has a **high** probability of flooding, Table 8 defines criteria used for determining high probability, as the hazard is present with a high probability of occurrence within the next years. Event has up to 1 in 1 year's chance of occurring.

The *Alaska All-Hazard Risk Mitigation Plan* lists Kwethluk as having flood/erosion hazard present with a high probability.

Appendix B, Additional Maps, contains maps depicting historical erosion in Kwethluk.

Previous Occurrences

Previous Occurrences of Flooding and Erosion

Flood of 1972 Flood waters reached a reported 28.55 feet, according to the COE.

Flood of 1975 90% of runway flooded.

Flood of 1976 No data reported.

Flood of 1977 Water in three homes, 50 to 60 yards or 8 percent of runway flooded.

Flood of 1980 100 feet of runway flooded.

Flood of 1989 In 1989 flood waters reached 26.55 feet and flooded 30 to 50 percent of the runway according to the COE.

Yukon Kuskokwim Delta On June 5, 1995, the Governor declared a condition of disaster emergency exist in the Cities of Akiak, **Kwethluk**, Napaskiak, Emmonak, and Alakanuk, as a result of inundation. As a result of this disaster, roads, boardwalks, and other public works essential to vital community services were damaged. (closed after Jan 03)

2002 Interior Floods (AK-DR-1423) Declared May 29, 2002 by Governor Knowles, then FEMA Declared (DR-1423) on June 26 2002: Flooding occurred in various interior and western Alaska river drainages, including the Tanana, Kuskokwim, Nushagak, Susitna and Yukon River drainages beginning on April 27, 2002 and continuing. The floods caused widespread damage to and loss of property in the Fairbanks North Star Borough (Tanana River drainage); in McGrath, Lime Village, Sleetmute, Red Devil, Crooked Creek, Aniak and **Kwethluk** (Kuskokwim River drainage); Ekwok and New Stuyahok (Nushagak River drainage); in the Susitna River drainage from Chase to Montana Creek; and in Emmonak (Yukon River drainage). The following conditions existed as a result of this disaster: widespread damage to public facilities and infrastructure, including damage to public airports, roads, and buildings; to public utilities, including water , sewer, and electrical utilities; to personal residences, in some areas requiring evacuation and sheltering of residents; to commercial operations; and to other public and private real and personal property. Public & Individual Assistance provided as well as the 404 Mitigation Program. Added: Gov amendment dated July 12, 2002 added Alakanuk to the State Declaration. Gov declaration dated July 12, 2002 was also made for DOTPF to access FHWA Emergency Relief Funds for damages to roads in the State. Hazard Mitigation totaled $725K. The total for this disaster is $6.13 million.

2006 Spring Floods (AK-06-218) declared June 27,2006 by Governor Murkowski, then FEMA declared (DR-1657) on August 04, 2006: Beginning May 5, 2006 continuing through May 30, 2006, the National Weather Service (NWS) issued flood warnings and watches across the state as excessive snowmelt and ice jams caused flooding along the Yukon, Kuskokwim, and Koyukuk river drainages. The most serious impacts were reported in the communities of Hughes, Koyukuk, **Kwethluk**, Alakanuk, and Emmonak, along with substantial damage to State-maintained airports, roads, and highways. In each community, large portions of the village, city infrastructure, and several roads were inundated and eroded by the floodwaters. Total eligible state damages (item V.C. Remaining Costs, $6,704,370) less ineligible repairs for Federal-Aid roads ($469,600), less IA funds ($485,000), less Emergency Relief for Federally Owned Roads (ERFO) Program road costs ($240,500) still leaves approximately $5,509,270 that may be eligible under FEMA's Public Assistance program.

Community Participation in the NFIP

The City of Kwethluk is participating in NFIP; however, Kwethluk does not have flood maps and they are classified as an Emergency Phase A participant.

The function of the National Flood Insurance Program (NFIP) is to provide flood insurance to homes and businesses located in floodplains at a reasonable cost. In trade, the City of Kwethluk agrees to regulate new development and substantial improvement to existing structures in the floodplain, or to build safely above flood heights to reduce future damage to new construction. The program is based on mapping areas of flood risk, and requiring local implementation to reduce flood damage primarily through requiring the elevation of structures above the base (100-year) flood elevations. Table 14 describes the FIRM zones.

Table 14. FIRM Zones

Firm Zone	Explanation
A	Areas of 100-year flood; base flood elevations and flood hazard not determined.
AO	Areas of 100-year shallow flooding where depths are between one (1) and three (3) feet, average depths of inundation are shown but no flood hazard factors are determined.
AH	Areas of 100-year shallow flooding where depths are between one (1) and three (3) feet; base flood elevations are shown but no flood hazard factors are determined.
A1-A30	Areas of 100-year flood; base flood elevations and flood hazard factors determined.
B	Areas between limits of the 100-year flood and 500-year flood; or certain areas subject to 100-year flooding with average depths less than one (1) foot or where the contributing drainage area is less than one square mile; or areas protected by levees from the base flood.
C	Areas of minimal flooding.
D	Areas of undetermined, but possible, flood hazards.

Development permits for all new building construction, or substantial improvements, are required by the City in all A, AO, AH, A-numbered Zones. Flood insurance purchase may be required in flood zones A, AO, AH, A-numbered zones as a condition of loan or grant assistance. An Elevation Certificate is required as part of the development permit. The Elevation Certificate is a form published by the Federal Emergency Management Agency required to be maintained by communities participating in the NFIP. According to the NFIP, local governments maintain records of elevations for all new construction, or substantial improvements, in floodplains and to keep the certificates on file.

Elevation Certificates are used to:

- Record the elevation of the lowest floor of all newly constructed buildings, or substantial improvement, located in the floodplain.
- Determine the proper flood insurance rate for floodplain structures

Local governments must insure that elevation certificates are filled out correctly for structures built in floodplains. Certificates must include:

- The location of the structure (tax parcel number, legal description and latitude and longitude) and use of the building.
- The Flood Insurance Rate Map panel number and date, community name and source of base flood elevation date.
- Information on the building's elevation.
- Signature of a licensed surveyor or engineer.

Currently, no floodplain mapping is available for Kwethluk; consequently, it is not officially documented whether any households are situated in a floodplain.

Table 15. Housing Use Types in Kwethluk

Housing Types	Number of Structures
Total Housing Units	214
Occupied Housing (Households)	177
Vacant Housing	37
Vacant Due to Seasonal Use	11
Households located in the flood plain	Unknown

No floodplain coordinator is currently designated for the City of Kwethluk.

Table 16. Local and State Floodplain Coordinator Contact Information

Kwethluk Floodplain Coordinator	City Contact Person – Vacant Position Address Phone: Email:
State of AK Floodplain Coordinators	Floodplain Management Programs Coordinator Division of Community Advocacy Department of Commerce, Community & Economic Development Taunnie Boothby, State Floodplain Coordinator 550 W. 7th Avenue, Suite 1640 Anchorage, AK 99501 (907) 269-4567 (907) 269-4563 (fax) Email: taunnie_boothby@commerce.state.ak.us Web: http://www.commerce.state.ak.us/dca/nfip/nfip.htm

Repetitive Loss Properties

The risk assessment in all plans approved after October 1, 2008 must also addressNFIP insured structures that have been repetitively damaged floods.

Under NFIP guidelines, repetitive loss structures include any currently insured building with two or more flood losses (occurring more than ten days apart) greater than $1,000 in any 10-year period since 1978.

States should provide communities with information on historic floods throughout the state so communities will know what type of damage has occurred (even if it didn't occur within that particular community).

States should ensure that lists of repetitive loss properties are kept up to date and that communities have the most current list. States should contact their FEMA Regional Office for this information.

FEMA also maintains a national list of properties that comprise the “Repetitive Loss Target Group”. These are repetitive loss properties that have either experienced four or more losses with the characteristics above, or have had losses that cumulatively exceed the property value of the building.

Repetitive loss properties are those with at least two losses in a rolling ten-year period and two losses that are at least ten days apart. Specific property information is confidential, but the State DCRA Floodplain Coordinator related that within the City of Kwethluk there has been ***one*** property that meets the FEMA definition of repetitive loss.

Flood and Erosion Mitigation Goals and Projects

Goals

Goal 1: Reduce or prevent flood damage

Support elevation and reinforcement of roads that serve as barriers to rising waters or storm surges.

Goal 2: Increase public awareness

Increase public knowledgeable about mitigation opportunities, floodplain functions, emergency service procedures, and potential hazards.

Flood and Erosion Projects

After receiving public input, it is the recommendation of this plan that the City of Kwethluk, along with other local, State and Federal entities look at the following projects for flood and erosion control.

See Table 19 for specific projects to mitigate flooding and erosion.

FLD-1: Prepare a Suite of Emergency Plans and Training/Drills (Goals 1, 2)

Plans include Emergency Operations, Community Evacuation, etc.

FLD-2: Kwethluk Flood Plain Maps (Goals 1, 2)

Accurate flood maps should be prepared that delineate areas of flooding and upland areas.

FLD-3: Road Improvement and Extension (Goal 1)

Improve roads to areas of the community currently connected only by ATV trails. Design and construct roads that will serve to provide safe access for emergency vehicles to all parts of the community during high water events. This will also allow residents to reach other areas of the community and prevent some areas from becoming cut off.

FLD-4: Public Education (Goal 2)

Increase public knowledge about mitigation opportunities, floodplain functions, emergency service procedures, and potential hazards. This would include advising property owners, potential property owners, and visitors about the hazards. In addition, dissemination of a brochure or flyer on flood hazards in Kwethluk could be developed and distributed to all households.

FLD-5: Flood Insurance (Goals 1, 2)

Continue to obtain flood insurance for all City structures, and continue compliance with NFIP

Section 4. Severe Weather

Hazard Description

Weather is the result of four main features: the sun, the planet's atmosphere, moisture, and the structure of the planet. Certain combinations can result in severe weather events that have the potential to become a disaster.

In Alaska, there is great potential for weather disasters. High winds can combine with loose snow to produce a blinding blizzard and wind chill temperatures to 75°F below zero. Extreme cold (-40°F to -60°F) and ice fog may last for weeks at a time. Heavy snow can impact the interior and is common along the southern coast. A quick thaw means certain flooding.

In many Alaskan communities, severe weather can disrupt the delivery of fuel by barge or aircraft. Since residents are generally dependent on diesel electric power for heat as well as energy needs, this can be disastrous to the community as a whole.

Weather issues in Kwethluk include severe winds, extreme cold, blowing snow and blizzard conditions.

Severe winds cause extensive damage to structures in Kwethluk on a regular basis. Siding and roofing materials can be ripped away leaving utilities such as water pipes vulnerable to freezing.

Winter Storms

Winter storms originate as mid-latitude depressions or cyclonic weather systems. High winds, heavy snow, and cold temperatures usually accompany them. To develop, they require:

- Cold air - Subfreezing temperatures (below 32ºF, 0ºC) in the clouds and/or near the ground to make snow and/or ice.
- Moisture - The air must contain moisture in order to form clouds and precipitation.
- Lift - A mechanism to raise the moist air to form the clouds and cause precipitation. Any or all of the following may provide lift:
    - The flow of air up a mountainside.
    - Fronts, where warm air collides with cold air and rises over the dome of cold air.
    - Upper-level low-pressure troughs.

Heavy Snow

Heavy snow, generally more than 12 inches of accumulation in less than 24 hours, 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. 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

In Kwethluk, blowing snow and blizzard conditions can cause disorientation and residents can become lost an die from exposure. What is considered an excessively cold temperature 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 below –40˚ F. Excessive cold may accompany winter storms, be left in their wake, or can occur without storm activity.

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 to northern villages.

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

The term ice storm is used to describe occasions when damaging accumulations of ice are expected during freezing rain situations. They 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. 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.

Freezing rain develops as falling snow encounters a layer of warm air in the atmosphere deep enough for the snow to completely melt and become rain. As the rain continues to fall, it passes through a thin layer of cold air just above the earth's surface and cools to a temperature below freezing. The drops themselves do not freeze, but rather they become super cooled. When these super cooled drops strike the frozen ground, power lines, tree branches, etc., they instantly freeze.

Location
The hazards of severe weather impact Kwethluk on a community-wide and regional basis. A severe weather event could damage structures, ground air transportation and potentially isolate Kwethluk from the rest of the state.

Extent
Extreme weather could result in a **limited** situation in Kwethluk. Complete shutdown of critical facilities for more than one week and more than ten percent of property could be severely damaged as a result from excessive snowfall and with high winds causing shutdown of critical facilities, damage to property and isolating Kwethluk.

Extreme weather impacting the regional transportation hub (i.e. Bethel) would also impact Kwethluk. If air transportation is grounded in Bethel the community of Kwethluk will not receive vital supplies nor will community members be able to travel out of the village.

The *Alaska All-Hazard Risk Mitigation Plan, 2007* lists severe weather as creating one limited-damage event in Kwethluk.

Impact
Severe weather can cut off air access limiting medevac availability and access to goods and services, including groceries and medical supplies. Severe wind causes extensive damage to critical structures including residences and public facilities.

Probability
The City Manager and residents describe severe weather as a serious natural hazard risk in Kwethluk, due to snow, ice, and high winds. As noted on the table below, Kwethluk has a high probability of severe weather, which is defined, as the hazard is present with a high probability of occurrence within the calendar year. Event has up to a 1 in 1 chance of occurring.

Previous Occurrences
The following table from the Western Regional Climate Center provides a weather summary for Bethel. Kwethluk does not have long term weather data; nearby Bethel has a similar climate and long term weather data.

Table 17. Bethel Weather Summary

Station:(500754) BETHEL WSO AIRPORT															
From Year=1949 To Year=2007															
	Monthly Averages			Daily Extremes				Monthly Extremes				Max. Temp.		Min. Temp.	
	Max.	Min.	Mean	High	Date	Low	Date	Highest Mean	Year	Lowest Mean	Year	>= 90 F	<= 32 F	<= 32 F	<= 0 F
	F	F	F	F	dd/yyyy or yyyymmdd	F	dd/yyyy or yyyymmdd	F	-	F	-	# Days	# Days	# Days	# Days
January	12.5	-0.4	6	48	17/1963	-48	28/1989	25.7	1985	-12.9	1989	0	25.3	30.3	16
February	15.2	1.4	8.4	46	13/1970	-39	Feb-54	26.1	1989	-13.2	1984	0	21.8	27.7	13.3
March	21.3	5.2	13.3	48	31/1954	-42	Jan-56	29.4	1981	-3.1	1966	0	22.2	30.6	12.7
April	33.2	17.3	25.3	63	30/2004	-31	May-56	35.7	2007	8.3	1985	0	11.9	27.9	4.3
May	49.5	32.5	41	80	31/1993	4	Mar-65	48.1	1981	31	1964	0	1.3	15.4	0
June	60	43.1	51.5	86	19/1959	28	Jan-60	57.8	1957	45.1	1978	0	0	0.6	0
July	62.9	48	55.5	86	1-Nov	31	17/1959	61.1	2004	50.5	1959	0	0	0	0
August	59.6	46.6	53.1	87	1-Sep	28	26/1984	59.4	2004	49	1969	0	0	0.1	0
September	51.9	38.4	45.2	72	1-Oct	18	27/1957	50.2	1995	37.6	1992	0	0.1	5.7	0
October	35.8	24.4	30.1	65	1-Feb	-6	30/2001	38.5	2006	23.4	2001	0	10.4	25.2	0.4
November	23.8	11.7	17.7	51	1-Jun	-24	30/1990	27.4	1970	2.8	1963	0	20.6	28.5	6.6
December	13.8	0.8	7.3	45	21/1963	-41	28/1957	25.3	1985	-10.7	1999	0	25.1	30.5	15.7
Annual	**36.6**	**22.4**	**29.5**	**87**	**20030809**	**-48**	**19890128**	**34.3**	**2002**	**24.7**	**1956**	**0**	**138.6**	**222.5**	**68.9**
Winter	13.8	0.6	7.2	48	19630117	-48	19890128	21.8	2001	-2.7	1965	0	72.2	88.5	45
Spring	34.7	18.4	26.5	80	19930531	-42	19560301	36.6	1981	16.5	1972	0	35.5	73.8	17
Summer	60.8	45.9	53.4	87	20030809	28	19600601	58.8	2004	50.1	1965	0	0	0.7	0
Fall	37.2	24.8	31	72	19790910	-24	19901130	36.4	2002	25.2	1956	0	31	59.4	7

Table Updated 11/05/2006, Source: Western Regional Climate Center, http://wrcc.dri.edu

Severe Weather Mitigation Goals and Projects

Severe Weather Goals

Goal 1: Mitigate the effects of extreme weather.

Consider instituting programs that provide early warning and preparation.

Goal 2: Education and Preparation.

Regularly provide information about the dangers of extreme weather and how to prepare.

Goal 3: Advanced Storm Warning.

Develop practical measures to warn in the event of a severe weather event.

Severe Weather Projects

SW-1: Storm Ready (Goals 1, 2, 3)

Research and consider instituting the National Weather Service program of *"Storm Ready"*.

Storm Ready is a nationwide community preparedness program that uses a grassroots approach to help communities develop plans to handle all types of severe weather—from tornadoes to tsunamis. The program encourages communities to take a new, proactive approach to improving local hazardous weather operations by providing emergency managers with clear-cut guidelines on how to improve their hazardous weather operations.

To be officially Storm Ready, a community must:

1. Establish a 24-hour warning point and emergency operations center.

2. Have more than one way to receive severe weather forecasts and warnings and to alert the public.

3. Create a system that monitors local weather conditions.

4. Promote the importance of public readiness through community seminars.

5. Develop a formal hazardous weather plan, which includes training severe weather spotters and holding emergency exercises.

6. Demonstrate a capability to disseminate warnings.

Specific Storm Ready guidelines, examples, and applications also may be found on the Internet at: http://www.nws.noaa.gov/stormready.

SW-2: Conduct special awareness activities (Goals 1, 2, 3).

Activities such as Winter Weather Awareness Week, Flood Awareness Week, etc.

SW-3: Expand public awareness about NOAA Weather Radio (Goals 2, 3).

NOAA Weather Radio provides continuous weather broadcasts and warning tone alert capability.

SW-4: Encourage weather resistant building construction materials and practices (Goals 1).

Section 5. Wildland Fires

Hazard Description and Characterization

Wildland fires occur in every state in the country and Alaska is no exception. Each year, between 600 and 800 wildland fires, mostly between March and October, burn across Alaska causing extensive damage.

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. 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. The role of wildland fire as an essential ecological process and natural change agent has been incorporated into the fire management planning process. A full range of fire management activities is exercised in Alaska to help achieve ecosystem sustainability. 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. Firefighter and public safety is always the first and overriding priority for all fire management activities.

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.

Fuel, weather, and topography influence wildland fire behavior. Wildland fire behavior 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 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 behavior. 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 behavior. When the terrain funnels air, like what happens in a canyon, it can lead to faster spreading. Fire can also travel up slope quicker than down.

Wildland fire risk is increasing in Alaska due to the spruce bark beetle infestation. The beetles lay eggs under the bark of a tree. When the larvae emerge, they eat the trees phloem, which is what the tree uses to transport nutrients from its roots to its needles. If enough phloem is lost, the tree will die. The dead trees dry out and become highly flammable.

Location

A wildland fire event would create an area-wide impact, could damage structures, and potentially isolate Kwethluk from the rest of the state.

Extent

Wildland fire could result in a **limited** severity situation in Kwethluk. Injuries and/or illness could result from excessive smoke and fire damage causing the shutdown of critical facilities, damage to property and isolating Kwethluk from large population centers.

When tundra and grasslands, which surround the community, become too dry it is easily combustible.

The *Alaska All-Hazard Risk Mitigation Plan, 2007* lists wildland fire as creating one limited-damage event in Kwethluk.

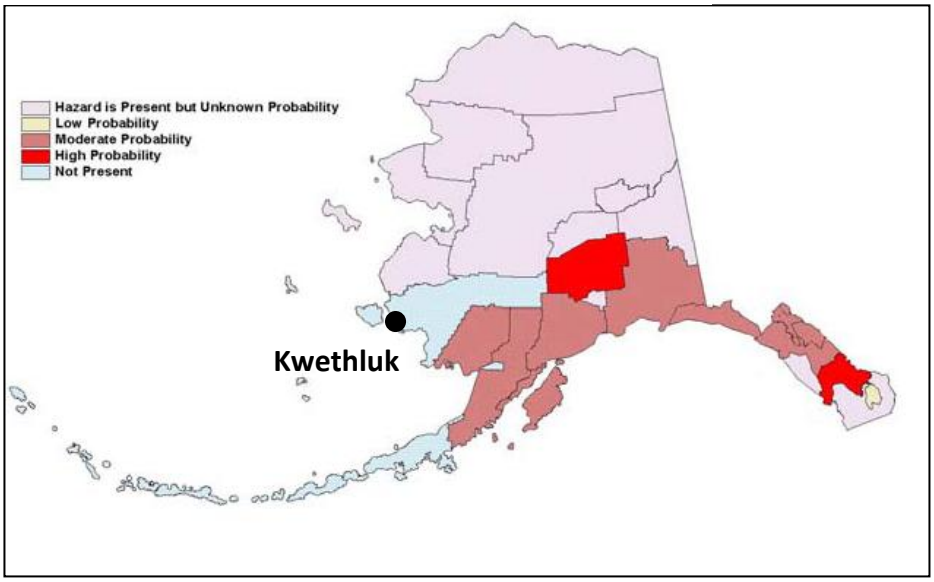
Impact

Wildfires could destroy the entire community of Kwethluk. The loss of any structure is devastating to such a small community where services and housing are limited. However, even a less cataclysmic fire has the potential to negatively impact the community. A fire that causes the closure of the airport would halt the transportation of goods and services.

Probability

The following map from the *State of Alaska All-Hazards Risk Mitigation Plan* depicts Kwethluk as being in an area where the hazard is not present. Lightning strikes as well as human-caused fires are possible in the area and can quickly spread when dry conditions combine with high winds. The community of Kwethluk and surrounding area are a full-protection area of the state protection option area where the suppression objective is to provide complete protection to identified sites and control the fire at the smallest acreage reasonably possible.

Figure 3. Alaska All-Hazards Mitigation Plan - Fire Risk Map



Source: ***Alaska All-Hazard Risk Mitigation Plan, 2007***

Previous Occurrences

There have been no reports of wildland fire damage within the community of Kwethluk. Regional wildland fire data taken from the Alaska Interagency Coordination Center is listed below.

Kwethluk Fire of 1943 was a human caused fire that burned an estimated 20 acres. This fire occurred 2.8 miles north of the community town-site.

BET E 11 Fire of 1984 was a human caused fire that burned an estimated 1500 acres. This fire occurred 3.7 miles southwest of the community town-site.

Two-W Kwethluk Fire of 1997 was a human (camp fire) caused fire that burned an estimated 0.1 of an acre. This fire occurred 1.5 miles northeast of the community town-site.

Kwethluk Fire of 2004 was a human caused fire that burned for three days an affected an estimated two acres. This fire occurred 6.7 miles southeast of the community town-site.

Wildland Fire Mitigation Goals and Projects

Wildland Fire Goals

Goal 1. Mitigate against fire damage.

Consider establishing building regulation.

Goal 2. Adopt the Fire Wise development techniques.

Conduct outreach activities to encourage Fire Wise building, design, siting, etc.

Goal 3. Emergency Plan.

Encourage the evaluation of emergency plans with respect to wildland fire assessment.

Goal 4. Public Education and Preparedness.

Acquire information on the danger of wildland fires and how best to prepare.

Projects

F-1: Become a Fire Wise Community (Goal 2, 4)

The Alaska Fire Wise Program is designed to educate people about wildland fire risks and mitigation opportunities. It is part of a national program that is operated in the State by the Alaska Wildfire Coordinating Group (AWCG).

To become a Firewise Community Kwethluk must:

1. Determine if the community is at risk
2. Organize a Firewise Board
3. Develop a Community Wildfire Protection Plan (CWPP)
4. Sponsor an education/preparedness event
5. Invest a minimum of $2/capita
6. Certification as a Firewise Community/USA
7. Continued Certification

F-2: Develop building codes and requirements (Goals 1).

Encourage the use of fire resistant building materials on new construction and require every building, have a three-foot nonflammable barrier.

F-3: Encourage residents to take mitigation measures in the immediate vicinity of their property (Goals 1, 2, 4).

Encourage residents or business owners remove dead trees or limbs (or any limbs within 10 feet of chimneys) and remove or transplant more flammable vegetation with-in 30 feet of structures.

Section 6. Earthquake

Hazard Description

Approximately 11 percent of the world's earthquakes occur in Alaska, making it one of the most seismically active regions in the world. Three of the ten largest quakes in the world since 1900 have occurred here. Earthquakes of magnitude 7 or greater occur in Alaska on average of about once a year; magnitude 8 earthquakes average about 14 years between events.

Most large earthquakes are caused by a sudden release of accumulated stresses between crustal plates that move against each other on the earth's surface. Some earthquakes occur along faults that lie within these plates. The dangers associated with earthquakes include ground shaking; surface faulting, ground failures, snow avalanches, seiches and tsunamis. The extent of damage is dependent on the magnitude of the quake, the geology of the area, distance from the epicenter and structure design and construction. A main goal of an earthquake hazard reduction program is to preserve lives through economical rehabilitation of existing structures and constructing safe new structures.

Ground shaking is due to the three main classes of seismic waves generated by an earthquake. Primary waves are the first ones felt, often as a sharp jolt. Shear or secondary waves are slower and usually have a side to side movement. They can be very damaging because structures are more vulnerable to horizontal than vertical motion. Surface waves are the slowest, although they can carry the bulk of the energy in a large earthquake. The damage to buildings depends on how the specific characteristics of each incoming wave interact with the buildings' height, shape, and construction materials.

Earthquakes are usually measured in terms of their magnitude and intensity. Magnitude is related to the amount of energy released during an event while intensity refers to the effects on people and structures at a particular place. Earthquake magnitude is usually reported according to the standard Richter scale for small to moderate earthquakes.

Large earthquakes, like those that commonly occur in Alaska are reported according to the moment-magnitude scale because the standard Richter scale does not adequately represent the energy released by these large events.

Intensity is usually reported using the Modified Mercalli Intensity Scale. This scale has12 categories ranging from not felt to total destruction. Different values can be recorded at different locations for the same event depending on local circumstances such as distance from the epicenter or building construction practices. Soil conditions are a major factor in determining an earthquake's intensity, as unconsolidated fill areas will have more damage than an area with shallow bedrock. Surface faulting is the differential movement of the two sides of a fault. There are three general types of faulting.

Strike-slip faults are where each side of the fault moves horizontally. Normal faults have one side dropping down relative to the other side. Thrust (reverse) faults have one side moving up and over the fault relative to the other side.

Earthquake-induced ground failure is often the result of liquefaction, which occurs when soil (usually sand and course silt with high water content) loses strength as a result of the shaking and acts like a viscous fluid.

Liquefaction causes three types of ground failures: lateral spreads, flow failures, and loss of bearing strength. In the 1964 earthquake, over 200 bridges were destroyed or damaged due to lateral spreads. Flow failures damaged the port facilities in Seward, Valdez and Whittier.

Similar ground failures can result from loss of strength in saturated clay soils, as occurred in several major landslides that were responsible for most of the earthquake damage in Anchorage in 1964. Other types of earthquake-induced ground failures include slumps and debris slides on steep slopes.

Location

An earthquake hazard event could potentially impact any part of Kwethluk. Earthquake damage would be area-wide with potential damage to critical infrastructure up to and including the complete abandonment of key facilities. Limited building damage assessors are available in Kwethluk to determine structural integrity following earthquake damage. Priority would have to be given critical infrastructure to include: public safety facilities, health care facilities, shelters and potential shelters, and finally public utilities. Regional airport facilities are of particular concern since the community is dependent on air transportation for delivery of medical supplies and groceries.

Extent

The extent of an earthquake in Kwethluk could be **limited**. Table 7 uses the following criteria to determine the extent of possible damage: Injuries and/or illnesses result in permanent disability, complete shutdown of critical facilities for more than one week, more than 10 percent of property is severely damaged.

Intensity is a subjective measure of the strength of the shaking experienced in an earthquake. Intensity is based on the observed effects of ground shaking on people, buildings, and natural features. It varies from place to place within the disturbed region depending on the location of the observer with respect to the earthquake epicenter.

The "intensity" reported at different points generally decreases away from the earthquake epicenter. Local geologic conditions strongly influence the intensity of an earthquake; commonly, sites on soft ground or alluvium have intensities two to three units higher than sites on bedrock.

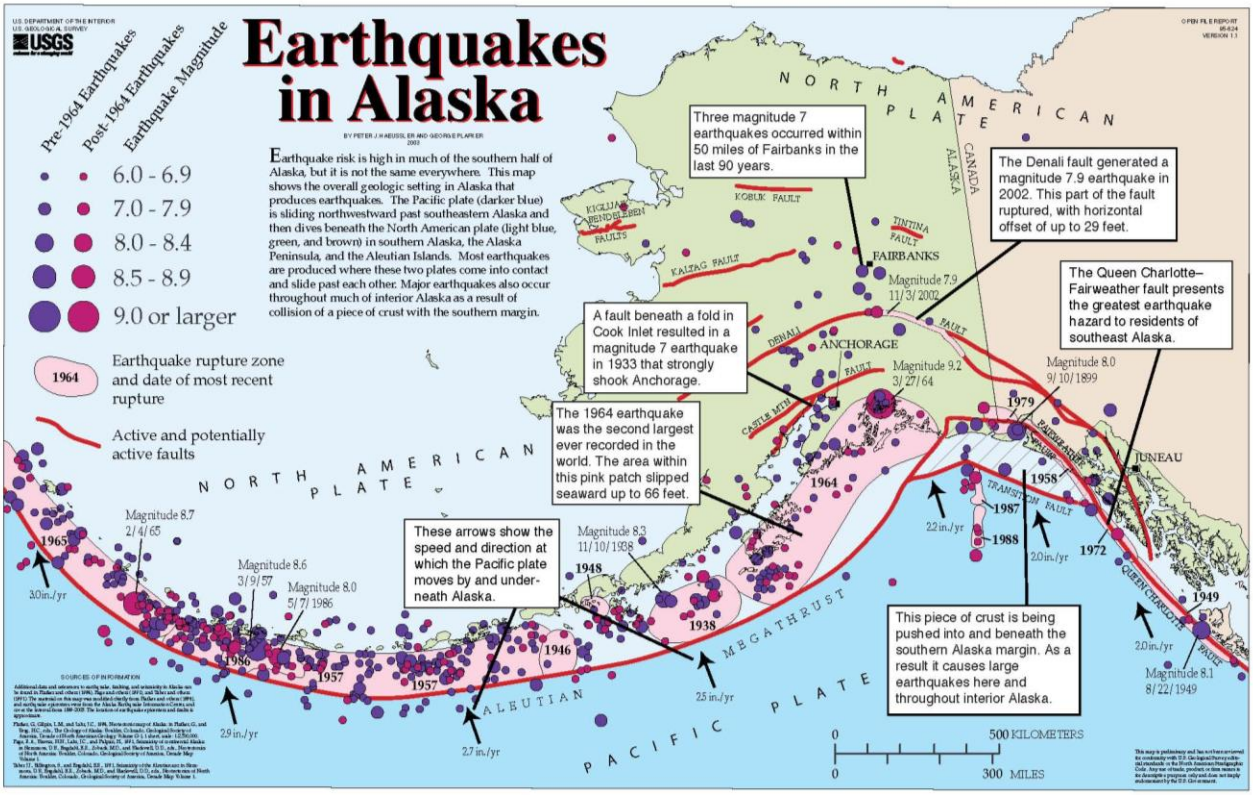
The Richter scale expresses magnitude as a decimal number. A 5.0 earthquake is a moderate event, 6.0 characterize a strong event, 7.0 is a major earthquake and a great earthquake exceeds 8.0. The scale is logarithmic and open-ended. (*Alaska All-Hazard Risk Mitigation Plan 2007*)

A magnitude of 2 or less is called a microearthquake, they cannot even be felt by people and are recorded only on local seismographs. Events with magnitudes of about 4.5 or greater are strong enough to be recorded by seismographs all over the world. But the magnitude would have to be higher than 5 to

be considered a moderate earthquake, and a large earthquake might be rated as magnitude 6 and major as 7. Great earthquakes (which occur once a year on average) have magnitudes of 8.0 or higher (British Columbia 1700, Chile 1960, Alaska 1964). The Richter Scale has no upper limit, but for the study of massive earthquakes the moment magnitude scale is used. The modified Mercalli Intensity Scale is used to describe earthquake effects on structures.

Figure 4, which show historic seismicity, also provide additional details of interest. The figures and other information at the website list the Kwethluk area as having a low probability of an earthquake. However, since all of Alaska is at risk for an earthquake event, Kwethluk could be at risk for an earthquake or have secondary impact from an earthquake in the region.

Figure 4. AEIS Historic Earthquakes in Alaska



Source: http://www.aeic.alaska.edu/html_docs/information_releases.html

Impact

The impact on the community of Kwethluk of a severe earthquake event occurring near the town site would be **limited**. The impact of a severe earthquake event impacting Bethel or Anchorage (vital transportation hubs) could potentially have a greater impact on Kwethluk.

Failing objects, structural damage and damage to community infrastructure are possible impacts. Damage to the runway would have the most severe consequences to the community, which depends on air for passengers and cargo.

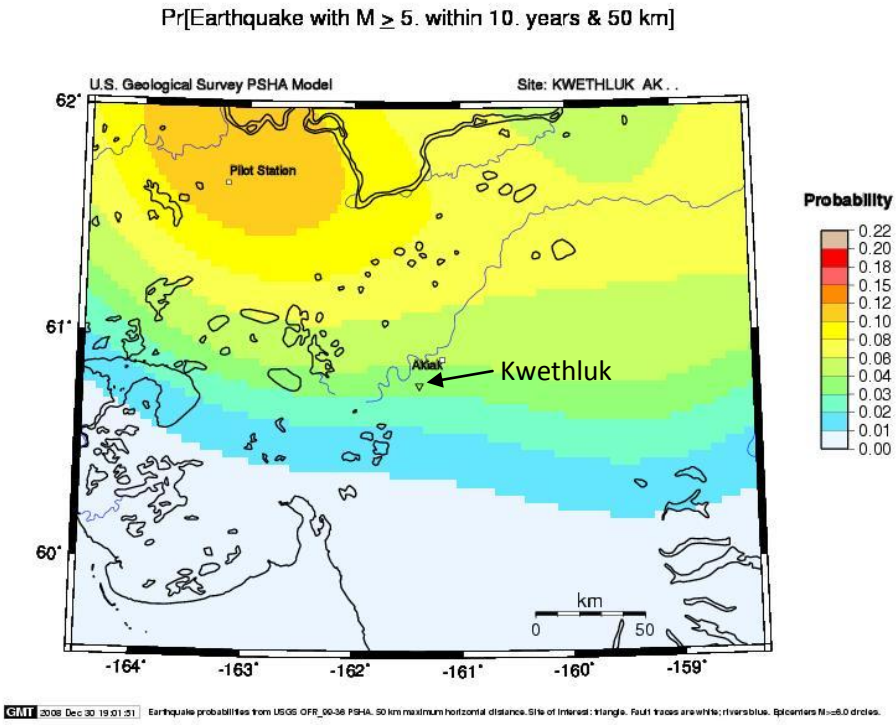
Probability

Kwethluk itself has a **low** probability of earthquake hazard. Table 8 lists the following criteria for a low probability: hazard is present with a low probability of occurrence with the nest ten years. Event has up to 1 in 10 years chance of occurring.

While it is not possible to predict an earthquake, the U.S. Geological Survey (USGS) has developed Earthquake Probability Maps that use the most recent earthquake rate and probability models. These models are derived from earthquake rate, location and magnitude data from the USGS National Seismic Hazard Mapping Project.

Figure 5 indicates that the USGS earthquake probability model places the probability of an earthquake with an intensity of 5.0 or greater occurring within the next ten years within 50 kilometers (31 miles) of Kwethluk is 3 to 4 percent.

Figure 5. USGS Kwethluk Earthquake Probability Map



Previous Occurrences

There are no known previous occurrences of earthquakes in Kwethluk.

Earthquake Mitigation Goal and Projects

Earthquake Goals

Goal 1: Mitigate against earthquake damage.

Obtain funding to protect existing critical infrastructure from earthquake damage.

Earthquake Projects

E-1: Assess the structural integrity of critical facilities and infrastructure (Goal 1).

If funding is available, perform an engineering assessment of the earthquake vulnerability of each identified critical facilities and infrastructure owned by the City of Kwethluk.

E-2: Identify buildings and facilities that must be able to remain operable durning and following an earthquake event (Goal 1).

E-3: Improve the structural integrity of critical facilities and infrastructure (Goal 1).

Contract a structural engineering firm to assess the identified buildings and facilities to determine their structural integrity and strategy to improve their earthquake resistance.

E-4: Nonstructural mitigation projects (Goal 1).

Assess facilities and improve earthquake preparedness through such measures as installing bookshelf tie-downs, improving computer servers' resistance to earthquakes, etc.

Section 7. Hazards Not Present

Avalanche

Alaska experiences many snow avalanches every year. The exact number is undeterminable as most occur in isolated areas and go unreported. Avalanches tend to occur repeatedly in localized areas and can sheer trees, cover communities and transportation routes, destroy buildings, and cause death. Alaska leads the nation in avalanche accidents per capita.

Avalanche Vulnerability Assessment

The terrain surrounding Kwethluk does not provide the necessary conditions for avalanche. No threat from avalanche is present on Kwethluk.

Tsunamis and Seiches

A *tsunami* is a series of ocean waves generated by any rapid large-scale disturbance of the seawater. These waves can travel at speeds of up to 600 miles per hour in the open ocean. Most tsunamis are generated by earthquakes, but they may also be caused by volcanic eruptions, landslides (above or under sea in origin), undersea slumps, or meteor impacts.

Tsunami damage is a direct result of three factors:

1. *Inundation* (the extent to which the water covers the land)

2. *Wave action* that will impact structures and moving objects that become projectiles.

3. Coastal erosion

Tsunamis are categorized in one of two ways:

Distant-source tsunamis

Locally generated tsunamis

This distinction is made based on the time it takes the tsunami to leave the source disturbance and reach land.

Tsunamis and Seiches Vulnerability Assessment

There is no danger of tsunamis and seiches since Kwethluk is located 52 miles inland from the Bering Sea.

Volcano

Alaska is home to more than 40 historically active volcanoes stretching across the entire southern portion of the state, from the Wrangell Mountains to the far western Aleutians. On average, one to two eruptions occur per year in Alaska. In 1912, the largest eruption of the twentieth century occurred at Novarupta and Mound Katmai, located in what is now Katmai National Park and Preserve on the Alaska Peninsula.

A volcano is a vent at the Earth's surface through which magma and associated gases erupt, and also the landform built by effusive and explosive eruptions. Volcanoes display a wide variety of shapes, sizes, and behavior; however, they are commonly classified among three main types: cinder cone, composite and shield.

Volcano Vulnerability Assessment

The Alaska Volcano Observatory identifies the closest active volcano to Kwethluk as being approximately 250 miles away in the Aleutian Chain. The Alaska Volcano Observatory website database indicates that no active volcanoes exist within a 150-mile radius of Kwethluk. Volcano events that effect hub airports such as Anchorage would also impact Kwethluk, which depends on air travel for supplies and medical evactuations.

Ground Failure Hazard

Ground failure is a problem throughout Alaska with landslides presenting the greatest threat. Ground failure hazards exist to some degree in all areas of the state.

Landslides are described as downward movement of a slope and materials under the force of gravity. The term landslide includes a wide range of ground movement, such as rock falls, deep failure of slopes, and shallow debris flows. Landslides are influenced by human activity (mining and construction of buildings, railroads, and highways) and natural factors (geology, precipitation, and topography). They are common all over the United States and its territories.

Landslides occur when masses of rock, earth, or debris move down a slope. Therefore, gravity acting on an overly steep slope is the primary cause of a landslide. They are activated by storms, fires, and by human modifications to the land. New landslides occur as a result of rainstorms, earthquakes, volcanic eruptions, and various human activities.

Mudflows (or debris flows) are flows of rock, earth, and other debris saturated with water. They develop when water rapidly accumulates in the ground, such as during heavy rainfall or rapid snowmelt, changing the earth into a flowing river of mud or "slurry." Slurry can flow rapidly down slopes or through channels and can strike with little or no warning at avalanche speeds. Slurry can travel several miles from its source, growing in size as it picks up trees, cars, and other materials along the way.

Other types of landslides include: rock slides, slumps, mudslides, and earthflows. All of these differ in terms of content and flow.

Ground Failure Vulnerability Assessment

There have been no documented occurrences of ground failure in Kwethluk and its terrain is not susceptible to this hazard.

Chapter 4: Mitigation Strategy

Benefit - Cost Review

This chapter of the plan outlines Kwethluk's overall strategy to reduce its vulnerability to the effects of the hazards studied. Currently the planning effort is limited to the hazards determined to be of the most concern; flooding, erosion, severe weather, wildland fire and earthquake; however, the mitigation strategy will be regularly updated as additional hazard information is added and new information becomes available.

The projects listed on Table 19, were prioritized using a listing of benefits and costs review method as described in the FEMA *How-To-Guide Benefit-Cost Review in Mitigation Planning* (FEMA 386-5).

Due to monetary as well as other limitations, it is often impossible to implement all mitigation actions. Therefore, the most cost-effective actions for implementation will be pursued for funding first, not only to use resources efficiently, but also to make a realistic start toward mitigating risks.

The City of Kwethluk considered the following factors in prioritizing the mitigation projects. Due to the dollar value associated with both life-safety and critical facilities, the prioritization strategy represents a special emphasis on benefit-cost review because the factors of life-safety and critical facilities steered the prioritization towards projects with likely good benefit-cost ratios.

1. Extent to which benefits are maximized when compared to the costs of the projects, the Benefit Cost Ratio must be 1.0 or greater.
2. Extent the project reduces risk to life-safety.
3. Project protects critical facilities or critical city functionality.
4. Hazard probability.
5. Hazard severity.

Other criteria that were used to developing the benefits – costs listing depicted in Table 18:

1. Vulnerability before and after Mitigation
    - Number of people affected by the hazard, areawide, or specific properties.
    - Areas affected (acreage) by the hazard
    - Number of properties affected by the hazard
    - Loss of use
    - Loss of life (number of people)
    - Injury (number of people)
2. List of Benefits
    - Risk reduction (immediate or medium time frame)
    - Other community goals or objectives achieved

- Easy to implement
- Funding available
- Politically or socially acceptable

3. Costs

    - Construction cost
    - Programming cost
    - Long time frame to implement
    - Public or political opposition
    - Adverse environmental effects

This method supports the principle of benefit-cost review by using a process that demonstrates a special emphasis on maximization of benefits over costs. Projects that demonstrate benefits over costs and that can start immediately were given the highest priority. Projects that the costs somewhat exceed immediate benefit and that can start within five years (or before the next update) were given a description of medium priority, with a timeframe of one to five years. Projects that are very costly without known benefits, probably cannot be pursued during this plan cycle, but are important to keep as an action were given the lowest priority and designated as long term.

The Kwethluk City Council will hold another round of public meetings on the MHMP Update. The plan is subject to final Kwethluk City Council approval after pre-approval is obtained by DHS&EM.

After the MHMP Update has been approved, the projects must be evaluated using a Benefit-Cost Analysis (BCA) during the funding cycle for disaster mitigation funds from DHS&EM and FEMA.

A description of the BCA process follows. Briefly, BCA is the method by which the future benefits of a mitigation project are determined and compared to its cost. The result is a Benefit-Cost Ratio (BCR), which is derived from a project's total net benefits divided by its total cost. The BCR is a numerical expression of the cost-effectiveness of a project. Composite BCRs of 1.0 or greater have more benefits

Benefit-Cost Review vs. Benefit-Cost Analysis (FEMA 386-5) states in part:

Benefit-Cost Review for mitigation planning differs from the benefit cost analysis (BCA) used for specific projects. BCA is a method for determining the potential positive effects of a mitigation action and comparing them to the cost of the action. To assess and demonstrate the cost-effectiveness of mitigation actions, FEMA has developed a suite of BCA software, including hazard-specific modules. The analysis determines whether a mitigation project is technically cost-effective. The principle behind the BCA is that the benefit of an action is a reduction in future damages.

DMA 2000 does not require hazard mitigation plans to include BCA's for specific projects, but does require that a BCR be conducted in prioritizing projects.

than costs, and are therefore cost-effective.

Benefit-Cost Analysis

The following section is reproduced from a document prepared by FEMA, which demonstrates on how to perform a Benefit –Cost Analysis. The complete guidelines document, a benefit-cost analysis document and benefit-cost analysis technical assistance is available online http://www.fema.gov/government/grant/bca.

Facilitating BCA

Although the preparation of a BCA is a technical process, FEMA has developed software, written materials, and training that simplify the process of preparing BCAs. FEMA has a suite of BCA software for a range of major natural hazards: earthquake, fire (wildland/urban interface fires), flood (riverine, coastal A-Zone, Coastal V-Zone), Hurricane Wind (and Typhoon), and Tornado.

Sometimes there is not enough technical data available to use the BCA software mentioned above. When this happens, or for other common, smaller-scale hazards or more localized hazards, BCAs can be done with the Frequency Damage Method (i.e., the Riverine Limited Data module), which is applicable to any natural hazard as long as a relationship can be established between how often natural hazard events occur and how much damage and losses occur as a result of the event. This approach can be used for coastal storms, windstorms, freezing, mud/landslides, severe ice storms, snow, tsunami, and volcano hazards.

Applicants and sub-applicants must use FEMA-approved methodologies and software to demonstrate the cost-effectiveness of their projects. This will ensure that the calculations and methods are standardized, facilitating the evaluation process. Alternative BCA software may also be used, but only if the FEMA Regional Office and FEMA Headquarters approve the software.

To assist Applicants and Sub-applicants, FEMA has prepared the *FEMA Mitigation BCA Toolkit* CD. This CD includes all of the FEMA BCA software, technical manuals, BC training courses, Data-Documentation Templates, and other supporting documentation and guidance.

The *Mitigation BCA Toolkit* CD is available free from FEMA Regional Offices or via the BC Helpline (at bchelpline@dhs.gov or toll free number at (866) 222-3580.

The BC Helpline is also available to provide BCA software, technical manuals, and other BCA reference materials as well as to provide technical support for BCA.

For further technical assistance, Applicants or Sub-Applicants may contact their State Mitigation Office, the FEMA Regional Office, or the BC Helpline. FEMA and the BC Helpline provide technical assistance regarding the preparation of a BCA.

Table 18 lists the mitigation projects currently under consideration in Kwethluk. It provides an initial overview of benefits and cost prioritization.

Benefit – Costs Review Listing Table

Table 18. Benefit - Costs Review Listing Table

Mitigation Projects	Benefits (pros)	Costs or Issues (cons)	Priority
Flood/Erosion (FLD)			
FLD-1: Suite of Emergency Plans and Training/Drills • Emergency Operations, • Community Evacuation	Life/Safety issue Risk Reduction State assistance available	Community will need technical assistance to complete this project. Cooperation between the City, State and Federal Agencies will ensure compliance with all necessary requirements. One year implementation or as funding permits	High
FLD -2: Kwethluk Flood Plain Maps	FEMA, PDM, HMGP and State DCRA funding available. USCOE facilitated project. Can be started immediately.	Not yet on priority list for FIRM mapping Implementation dependent on agency prioritization	High
FLD-3: Road Improvements and Extension	Life/Safety project Benefit to government facilities and private properties.	Dollar cost high >1 million/mile 1 – 5 years implementation	Medium
FLD-4: Public Education	DCRA funding maybe available Could be done annually Benefit to entire community Inexpensive	Unclear if there would be community interest or participation. 1-5 year implementation	High
FLD-5: Continue to obtain flood insurance for all City structures, and continue compliance with NFIP	Life/Safety project Could be done annually Benefit to entire community to have NFIP insurance on public buildings Inexpensive	Staff time	High

Mitigation Projects	Benefits (pros)	Costs or Issues (cons)	Priority
Severe Weather (SW)			
SW 1. Research and consider instituting the National Weather Service program of *"Storm Ready"*.	Life/Safety issue Risk reduction Benefit to entire community Inexpensive State assistance available Could be implemented annually	Staff time 1 year implementation	High
SW 2. Conduct special awareness activities, such as Winter Weather Awareness Week, Flood Awareness Week, etc.	Life/Safety issue Risk reduction Benefit to entire community Inexpensive State assistance available Could be an annual event	Staff time 1 year implementation	High
SW 3. Expand public awareness about NOAA Weather Radio for continuous weather broadcasts and warning tone alert capability	Life/Safety issue Risk reduction Benefit to entire community Inexpensive State assistance available Could be an annual event	Staff time 1 year implementation	High
SW 4. Encourage weather resistant building construction materials and practices.	Risk and damage reduction. Benefit to entire community.	Could require ordinance change. Potential for increased staff time. Research into feasibility necessary. Political and public support not determined. 1 – 5 year implementation	Medium

Mitigation Projects	Benefits (pros)	Costs or Issues (cons)	Priority
Wildland Fire (WF)			
WF-1: Become a Fire Wise Community.	Life/Safety issue Risk reduction Benefit to entire community State assistance available	Dollar cost not determined State assistance necessary Community interest and participation not determined 1 year implementation	High
WF 2. Consider development of building codes and requirements for new construction.	Life/Safety issue Risk reduction Benefit to entire community State assistance available	Dollar cost not determined Staff time to research grants Community interest and participation not determined 1 year implementation	High
WF 3. Enhance public awareness of potential risk to life and personal property. Encourage mitigation measures in the immediate vicinity of their property.	Life/Safety issue Risk reduction Benefit to entire community Inexpensive State assistance available Could be implemented annually	Staff time Community interest and participation not determined 1 year implementation	High
Earthquake (E)			
E 1. If funding is available, perform an engineering assessment of the earthquake vulnerability of each identified critical infrastructure.	Life/Safety issue/Risk reduction Benefit to entire community	No local capacity for assessment External contractor would be required 1-5 years implementation	Medium
E-2. Identify buildings and facilities that must be able to remain operable during and following and earthquake event	Life/Safety issue/Risk reduction Benefit to entire community	Volunteer time 1 year implementation	High
E-3. Contract a structural engineering firm to assess the identified buildings and facilities.	Benefit to entire community Risk reduction	Feasibility and need analysis needed. 1 – 5 years implementation	Medium

Mitigation Projects	Benefits (pros)	Costs or Issues (cons)	Priority
E-4. Nonstructural mitigation projects	Property damage and reduces risk of injury from falling objects	Staff or volunteer time 1-5 years implementation	Medium

Priority Levels:

High	A life/safety project, or benefits clearly exceed the cost or can be implemented 0 – 1 year.
Medium	More study required to designate as a life/safety project, or benefits may exceed the cost, or can be implemented in 1 – 5 years.
Low	More study required to designate as a life/safety project, or not known if benefits exceed the costs, or long-term project, implementation will not occur for over 5 years

Mitigation Projects

Table 19 presents Kwethluk's strategy for mitigation of the natural hazards faced by the community and includes a brief description of the projects, lead agencies, costs, potential funding sources and an estimated timeframe for each project. The final column allows the community to make note of specific progress on projects during the 5-year life of the plan.

Table 19. Mitigation Strategy

Mitigation Projects	Responsible Agency	Cost	Funding Sources	Estimated Timeframe	Project Status
Flood/Erosion (FLD)					
FLD 1: Suite of Emergency Plans and Training/Drills • Emergency Operations • Community Evacuation	DHS&EM City/Tribe	$75,000	State FY10 Capital Budgets PDMG, FMA	1 year	
FLD 2. Kwethluk Flood Plain Maps	FEMA NOAA USCOE DHS&EM	>$75,000	FEMA, DCRA	>1 year Not yet on federal priority list	
FLD-3. Road Improvements and Extension	City/Tribe State	>1 million/mile	City BIA IRR DOT/PF	>5 years	
FLD-4. Public Education	City DHS&EM	Staff Time	City	Ongoing	
FLD-5. Continue to obtain flood insurance for all City structures, and continue compliance with NFIP	City	<$1,500	City	Ongoing	
Severe Weather (SW)					
SW 1. Research and consider instituting the National Weather Service program of *"Storm Ready"*.	City	Staff Time	City	<1 year	

Mitigation Projects	Responsible Agency	Cost	Funding Sources	Estimated Timeframe	Project Status
SW 2. Conduct special awareness activities, such as Winter Weather Awareness Week, Flood Awareness Week, etc.	City DCRA DHS&EM	Staff Time	City DCRA DHS&EM	<1 year	
SW 3. Expand public awareness about NOAA Weather Radio for continuous weather broadcasts and warning tone alert capability	City	Staff Time	NOAA	Ongoing	
SW 4. Encourage weather resistant building construction materials and practices.	City	Staff Time	City	<1 year	
Wildland Fire (WF)					
WF-1: Become a Fire Wise Community.	DHS&EM City/Tribe	Staff Time	State	Ongoing	
WF 2. Consider development of building codes and requirements for new construction.	City/Tribe	Staff Time	City Budget	Ongoing	
WF 3. Enhance public awareness of potential risk to life and personal property. Encourage mitigation measures in the immediate vicinity of their property.	City/Tribe	Staff Time	City Budget	Ongoing	
Earthquake (E)					
E-1. If funding is available, perform an engineering assessment of the earthquake vulnerability of each identified critical infrastructure owned by the City of Kwethluk.	City/Tribe DHS&EM	To be determined	State Grants	>1 year	
E-2. Identify buildings and facilities that must be able to remain operable during and following an earthquake event.	City/Tribe DHS&EM DCRA	Staff Time	State Grants	>1 year	
E-3. Contract a structural engineering firm to assess the identified bldgs and facilities.	City/Tribe DHS&EM	>$10,000	PDM	>5 years	

Mitigation Projects	Responsible Agency	Cost	Funding Sources	Estimated Timeframe	Project Status
E-4. Nonstructural mitigation projects	City/Tribe, DHS&EM	Staff Time, approximately $5k	PDM	1 year and ongoing	

PDM – Pre-disaster Mitigation Grant

FMA – Flood Mitigation Assistance Program

Glossary of Terms

A-Zones

Type of zone found on all Flood Hazard Boundary Maps (FHBMs), Flood Insurance Rate Maps (FIRMs), and Flood Boundary and Floodway Maps (FBFMs).

Acquisition

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

Asset

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

Base Flood

A term used in the National Flood Insurance Program to indicate the minimum size of a flood. This information is used by a community as a basis for its floodplain management regulations. It is the level of a flood, which has a one-percent chance of occurring in any given year. Also known as a 100-year flood elevation or one-percent chance flood.

Base Flood Elevation (BFE)

The elevation for which there is a one-percent chance in any given year that floodwater levels will equal or exceed it. The BFE is determined by statistical analysis for each local area and designated on the Flood Insurance Rate Maps. It is also known as 100-year flood elevation.

Base Floodplain

The area that has a one percent chance of flooding (being inundated by flood waters) in any given year.

Building

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

Building Code

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

Community

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

Community Rating System (CRS)

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

Critical Facility

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

Designated Floodway

The channel of a stream and that portion of the adjoining floodplain designated by a regulatory agency to be kept free of further development to provide for unobstructed passage of flood flows.

Development

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

Digitize

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

Disaster Mitigation Act (DMA)

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

Earthquake

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

Elevation

The raising of a structure to place it above flood waters on an extended support structure.

Emergency Operations Plan

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

Erosion

The wearing away of the land surface by running water, wind, ice, or other geological agents.

Federal Disaster Declaration

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

Federal Emergency Management Agency (FEMA)

A federal agency created in 1979 to provide a single point of accountability for all federal activities related to hazard mitigation, preparedness, response, and recovery.

Flood

A general and temporary condition of partial or complete inundation of water over normally dry land areas from (1) the overflow of inland or tidal waters, (2) the unusual and rapid accumulation or runoff of surface waters from any source, or (3) mudflows or the sudden collapse of shoreline land.

Flood Disaster Assistance

Flood disaster assistance includes development of comprehensive preparedness and recovery plans, program capabilities, and organization of Federal agencies and of State and local governments to mitigate the adverse effects of disastrous floods. It may include maximum hazard reduction, avoidance, and mitigation measures, as well policies, procedures, and eligibility criteria for Federal grant or loan assistance to State and local governments, private organizations, or individuals as the result of the major disaster.

Flood Elevation

Elevation of the water surface above an establish datum (reference mark), e.g. National Geodetic Vertical Datum of 1929, North American Datum of 1988, or Mean Sea Level.

Flood Hazard

Flood Hazard is the potential for inundation and involves the risk of life, health, property, and natural value. Two reference base are commonly used: (1) For most situations, the Base Flood is that flood which has a one-percent chance of being exceeded in any given year (also known as the 100-year flood); (2) for critical actions, an activity for which a one-percent chance of flooding would be too great, at a minimum the base flood is that flood which has a 0.2 percent chance of being exceeded in any given year (also known as the 500-year flood).

Flood Insurance Rate Map

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

Flood Insurance Study

Flood Insurance Study or Flood Elevation Study means an examination, evaluation and determination of flood hazards and, if appropriate, corresponding water surface elevations, or an examination, evaluations and determination of mudslide (i.e., mudflow) and/or flood-related' erosion hazards.

Floodplain

A "floodplain" is the lowland adjacent to a river, lake, or ocean. Floodplains are designated by the frequency of the flood that is large enough to cover them. For example, the 10-year floodplain will be covered by the 10-year flood. The 100-year floodplain by the 100-year flood.

Floodplain Management

The operation of an overall program of corrective and preventive measures for reducing flood damage, including but not limited to emergency preparedness plans, flood control works and floodplain management regulations.

Floodplain Management Regulations

Floodplain Management Regulations means zoning ordinances, subdivision regulations, building codes, health regulations, special purpose ordinances (such as floodplain ordinance, grading ordinance and erosion control ordinance) and other applications of police power. The term describes such state or local regulations, in any combination thereof, which provide standards for the purpose of flood damage prevention and reduction.

Flood Zones

Zones on the Flood Insurance Rate Map (FIRM) in which a Flood Insurance Study has established the risk premium insurance rates.

Flood Zone Symbols

A - Area of special flood hazard without water surface elevations determined.

A1-30 - AE Area of special flood hazard with water surface elevations determined.

AO - Area of special flood hazard having shallow water depths and/or unpredictable flow paths between one and three feet.

A-99 - Area of special flood hazard where enough progress has been made on a protective system, such as dikes, dams, and levees, to consider it complete for insurance rating purposes.

AH - Area of special flood hazard having shallow water depths and/or unpredictable flow paths between one and three feet and with water surface elevations determined.

B - X Area of moderate flood hazard.

C - X Area of minimal hazard.

D - Area of undetermined but possible flood hazard.

Geographic Information System (GIS)

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

Governing Body

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

Hazard

A source of potential danger or adverse condition. Hazards in the context of this plan will include naturally occurring events such as floods, earthquakes, tsunami, coastal storms, landslides, and wildfires that strike populated areas. A natural event is a hazard when it has the potential to harm people or property.

Hazard Event

A specific occurrence of a particular type of hazard.

Hazard Identification

The process of identifying hazards that threaten an area.

Hazard Mitigation

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

Hazard Mitigation Grant Program

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

Hazard Profile

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

Hazard and Vulnerability Analysis

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

Mitigate

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

Mitigation Plan

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

National Flood Insurance

The Federal program, created by an act of Congress in Program (NFIP) 1968 that makes flood insurance available in communities that enact satisfactory floodplain management regulations.

One Hundred (100)-Year

The flood elevation that has a one-percent chance of occurring in any given year. It is also known as the Base Flood.

Planning

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

Repetitive Loss Property

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

Risk

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

Riverine

Relating to, formed by, or resembling rivers (including tributaries), streams, creeks, brooks, etc.

Riverine Flooding

Flooding related to or caused by a river, stream, or tributary overflowing its banks due to excessive rainfall, snowmelt or ice.

Runoff

That portion of precipitation that is not intercepted by vegetation, absorbed by land surface, or evaporated, and thus flows overland into a depression, stream, lake, or ocean (runoff, called immediate subsurface runoff, also takes place in the upper layers of soil).

Seiche

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

Seismicity

Describes the likelihood of an area being subject to earthquakes.

State Disaster Declaration

A disaster emergency shall be declared by executive order or proclamation of the Governor upon finding that a disaster has occurred or that the occurrence or the threat of a disaster is imminent. The state of disaster emergency shall continue until the governor finds that the threat or danger has passed or that the disaster has been dealt with to the extent that emergency conditions no longer exist and terminates the state of disaster emergency by executive order or proclamation. Along with other provisions, this declaration allows the governor to utilize all available resources of the State as reasonably necessary, direct and compel the evacuation of all or part of the population from any stricken or threatened area if necessary, prescribe routes, modes of transportation and destinations in connection with evacuation and control ingress and egress to and from disaster areas. It is required before a Presidential Disaster Declaration can be requested.

Topography

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

Tribal Government

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

Tsunami

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

Vulnerability

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

Vulnerability Assessment

The extent of injury and damage that may result from hazard event of a given intensity in a given area. The vulnerability assessment should address impacts of hazard events on the existing and future built environment.

Watercourse

A natural or artificial channel in which a flow of water occurs either continually or intermittently.

Watershed

An area that drains to a single point. In a natural basin, this is the area contributing flow to a given place or stream.

Bibliography

1. ADF&G Community Subsistence Information System: http://subsistence.adfg.state.ak.us/CSIS/index.cfm/FA/main.home
2. *Alaska All-Hazard Risk Mitigation Plan*. Prepared by and for DHS&EM. October 2007
3. Alaska Volcano Observatory website: http://www.avo.alaska.edu/volcanoes/volcinfo.php?volcname=Buzzard%20Creek
4. Bering Straits Coastal Resource Service Area Coastal Management Plan. Prepared by Glenn Gray and Associates September, 2006.
5. DCRA Community Information: http://www.dcra.state.ak.us/dca/commdb/CF_COMDB.htm.
6. *Kwethluk Economic Development Plan 2000-2004*, Prepared by The Arcturus Group, January 1998
7. Organized Village of Kwethluk Comprehensive Community Long Range Plan 1998-2003, Prepared by the Arcturus Group, February 2000
8. University of Alaska, Fairbanks, and Alaska Earthquake Information Center website at: http://www.giseis.alaska.edu/Seis/
9. USGS Earthquake Probability Mapping: www//eqint.cr.usgs.gov/eqprob/2002/index.php

Web Sites with General Hazard Planning Information

American Planning Association:	http://www.planning.org
Association of State Floodplain Managers:	http://www.floods.org
Developing the Implementation Strategy:	http://www.pro.gov.uk
FEMA: Mitigation Planning	http://www.fema.gov/fima/planning.shtm
Community Rating System:	http://www.fema.gov/nfip/crs.htm
Flood Mitigation Assistance Program:	http://www.fema.gov/fima/planfma.shtm
Hazard Mitigation Grant Program:	http://www.fema.gov/fima/hmgp
Individual Assistance Programs:	http://www.fema.gov/rrr/inassist.shtm
Interim Final Rule:	http://www.access.gpo.govl
National Flood Insurance Program:	http://www.fema.gov/nfip
Public Assistance Program:	http://www.fema.gov/rrr/pa

Public Involvement Appendix

Community of Kwethluk
Local Multi-Hazard Mitigation Plan

October 2008

The Planning Process

The Disaster Mitigation Act of 2000 requires the plan to follow and record the following elements:

1. Planning process
2. Hazard Identification
3. Risk Assessment
4. Mitigation Strategy with Goals, Objectives and Actions
5. Plan Maintenance
6. Adoption by local government
7. Approval from FEMA, and the State Department of Homeland Security and Emergency Management

For more information on mitigation planning you can visit FEMA's website at http://www.fema.gov/plan/mitplanning/index.shtm

Local Multi-Hazard Mitigation Planning

Disasters, such as avalanches, coastal erosion, earthquakes, floods, high winds, landslides, tsunamis, wildfires, and severe weather, are events beyond human control. However, reducing the risks and damage from these events through mitigation efforts is possible.

The Federal Emergency Management Agency (FEMA) wants to ensure that each community's critical facilities and services will continue to function after a natural disaster. FEMA has funds available for projects that help to do this.

Preparing a Local Multi-Hazard Mitigation Plan (MHMP) is the first step in this process. Through the planning process, risks from each type of hazard are assessed, critical facilities are identified within the community and their vulnerability to hazard is determined, potential losses are estimated, and community land use is considered.

With this information, a mitigation strategy will be developed, including mitigation goals, objectives and actions to reduce or avoid long-term risk or damage from disaster events. Projects will be identified, evaluated and prioritized, and an implementation strategy developed.

The plan must be approved by the local government, FEMA, and the state Division of Homeland Security and Emergency Management (DHS&EM) before it is official.

Once the plan is finalized, the community is eligible to apply to FEMA and DHS&EM for funds for the community's identified mitigation projects.

State DHS&EM sponsors planning effort in Kwethluk

The Alaska Division of Homeland Security and Emergency Services has funded a local hazards mitigation plan for the Community of Kwethluk. WHPacific, Inc. and Bechtol Planning and Development (BP&D) have been hired to help the community to prepare the plan.

The MHMP will include information specific to Kwethluk, including critical facilities, potential threats from natural hazards, and strategies to minimize the risk to people and property.

Strategies may be for immediate implementation or long term activities, and can range from educating residents about what to do in the event of a natural disaster to relocating structures away from high-risk areas.

To Get Involved

The most practical plans are ones that have local public input. Your ideas are valuable to the planning team and to the usefulness of the plan.

A **public presentation about the MHMP process is planned for Kwethluk at the City Council meeting October 14, 2008.** At this meeting planning team members will share information about the plan and its value to Kwethluk.

The team will also be meeting with people in the community to gather information about which facilities are critical to the community's well being and about previous occurrences of natural disasters in Kwethluk.

Your comments are welcome!

The planning team hopes that you will take an active role in the Kwethluk MHMP development. If you would like more information or have questions or comments, you can reach the planning team by phone or email:

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David Epchook
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Suzanne Taylor
WHPacific, Inc.
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Staylor@whpacific.com

Erv Petty
DHS&EM Mitigation Section
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Eileen Bechtol
Bechtol Planning & Development
907.235.4246
Bechtol@pobox.xyz.net

Planning Goals and Objectives

Mitigation is any sustained action taken to reduce or eliminate long-term risk to life and property from a hazard event.

Primary goals of hazard mitigation are to:

- Minimize loss of life and injuries
- Minimize damages
- Restore public services
- Promote economic development
- Prevent or reduce property damage
- Reduce economic losses
- Minimize social dislocation and stress
- Maintain critical facilities in functional order
- Protect infrastructure from damage
- Protect legal liability of government and public officials.

To attain these goals the Local Multi-Hazard Mitigation Plan will include measures to:

- Save lives and reduce injuries

Awareness, education and preparedness, together with prediction and warning systems can reduce the disruptive impacts of natural disasters on communities.

Mitigation is any sustained action taken to reduce or eliminate long-term risk to life and property from a hazard event.

Further information may also be found on the DHS&EM website at:
http://www.ak-prepared.com/plans/mitigation/mitplanresourcesa.htm

WHPacific

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CITY OF KWETHLUK
P.O. BOX 50
Kwethluk, Alaska 99621

(907) 757-6497 FAX

Public Hearing/Regular Meeting Minutes
October 14, 2008
1:00 p.m.

I. **Meeting Called to Order:** At 1:14 p.m. by Mayor David Epchook.

II. **Roll Call/Establishment of Quorum:** Lucy W. Olick - present; Xenia M. Nicori - excused; Irene Kerr - present; Boris L. Epchook - present; Max P. Angellan - present; Ivan Michael - present; Mayor David Epchook - present. Total present: six; absent: zero; excused: one. Quorum established. Also present: Suzanne Taylor, Planner with WHPacific. Oath of Office: Boris L. Epchook, Irene Kerr, Lucy W. Olick, and Ivan Michael. Introductions followed.

III. **Reading and Approval of Agenda:** Max P. Angellan moved to approve agenda with additions. Second by Ivan Michael. Question called for. Motion carried with voice vote.

IV. **Invocation:** By Ivan Michael.

Max P. Angellan moved to suspend the rules to enter VIII. New Business: 1. City Council Composition and 2. Suzanne Taylor, Planner with WHPacific. Second by Ivan Michael. Question called for. Motion carried with voice vote.

VIII. **New Business:**

1. City Council Composition. Election of Officers results: Mayor, David Epchook; Vice Mayor, Boris L. Epchook; Secretary, Irene Kerr; Treasurer, Ivan Michael. Boris L. Epchook moved to approve election of officers. Second by Max P. Angellan. Question called for. Motion carried with voice vote. Boris L. Epchook moved to update signers on checking and savings account with the First National Bank of Alaska. Second by Max P. Angellan. Question called for. Roll call vote: Lucy W. Olick – yes, Xenia M. Nicori – excused, Irene Kerr – yes, Boris L. Epchook – yes, Max P. Angellan – yes, Ivan Michael – yes, Mayor David Epchook- yes. Motion carried with six yeas and one excused.
2. Suzanne Taylor, Planner with WHPacific. Suzanne Taylor handed out presentation packets on the Kwethluk Local Hazards Mitigation Plan (LHMP) funded by the Alaska Division of Homeland Security and Emergency Services. Disaster Mitigation Act of 2000 requires local governments, as a condition of receiving federal disaster mitigation funds, to have a mitigation plan. A plan, adopted by the local governing body, which identifies hazards, risks, and vulnerabilities and includes prioritized mitigation projects. Mitigation is any sustained action taken to reduce or eliminate long-term risk to life and property from a hazard event. LHMP Requirements (FEMA 44 CFR 201.6): Public involvement in planning process; contributors

comment prior to drafting stage and after FEMA pre-approval. Planning steps: Coordination with other agencies, organizations, plans; review and incorporation of existing plans, studies, reports and technical information; identify the hazards; profile the location; determine probability of occurrence; previous occurrences of hazard events; identification of critical facilities; vulnerability assessment; goals; local mitigation projects; prioritization of mitigation projects based on benefit cost review; State and FEMA pre-approval; local adoption by City Council; and periodic review and update, within five year cycle. Planning Goals and Objectives: Primary goals of hazard mitigation are to: minimize loss of life and injuries; minimize damages; restore public services; and promote economic development. To attain these goals the Local Multi-Hazard Mitigation Plan will include measures to: save lives and reduce injuries; prevent or reduce property damage; reduce economic losses; minimize social dislocation and stress; maintain critical facilities in functional order; protect infrastructure from damage; and protect legal liability of government and public officials. Awareness, education and preparedness, together with prediction and warning systems can reduce the disruptive impacts of natural disasters on communities. Kwethluk LHMP process: today, October 12, 2008 Kwethluk LHMP presentation; first draft to City & Tribal Councils; State/FEMA review and pre-approval; second draft to City & Tribal Councils; final draft to City & Tribal Councils; and final approval from State/FEMA. Once the plan is completed, Kwethluk will be eligible to apply for mitigation project funds from DHS&EM and FEMA. Discussion on Kwethluk LHMP. E-mail or fax to her any concerns; Suzanne Taylor will coordinate with Margaret Fitka, City Treasurer on buildings. No cost to City, State is funding this project. The City Council thanked Suzanne Taylor for attending the meeting and for the gifts.

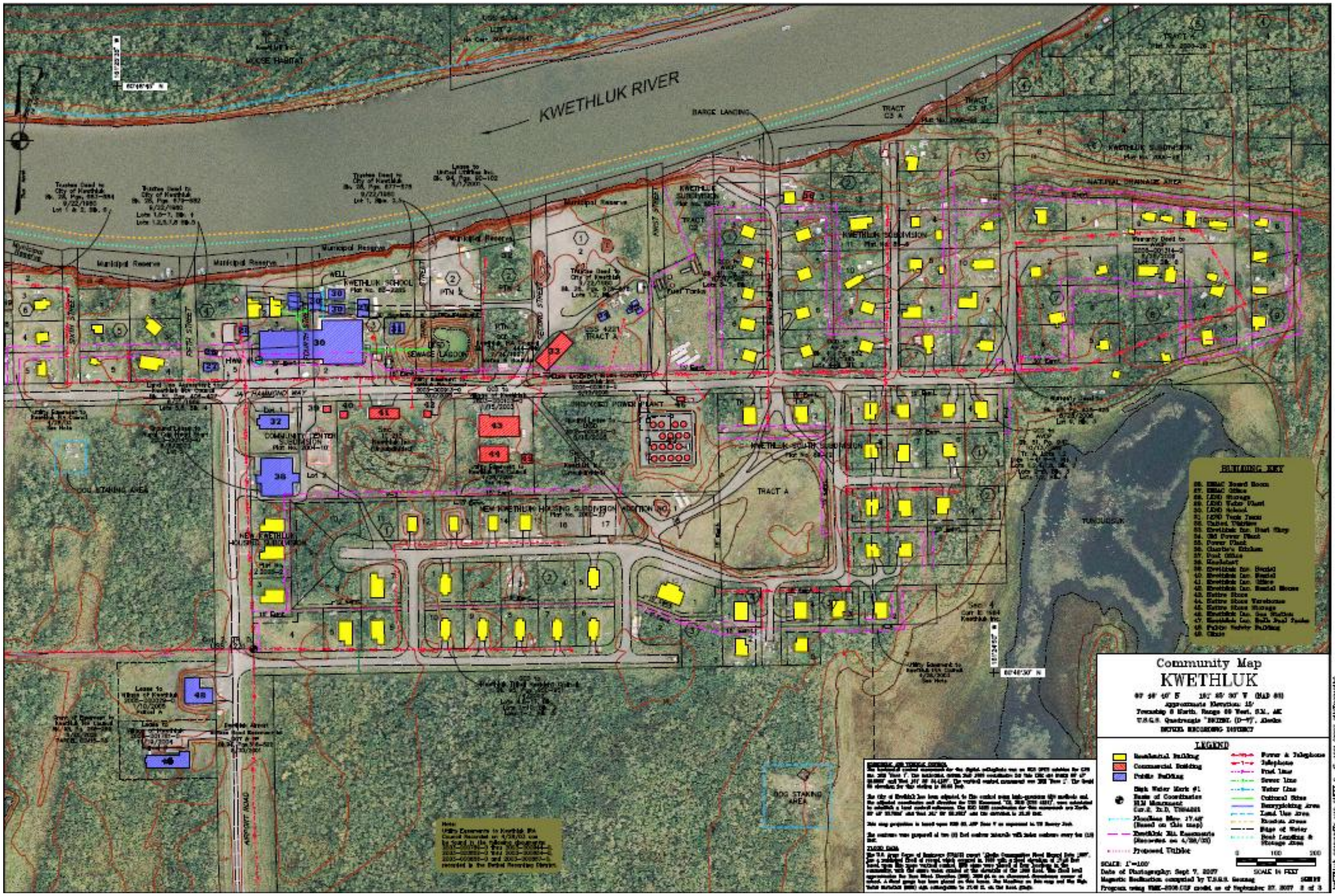
Max P. Angellan moved to go back to regular order of agenda. Second by Lucy W. Olick. Discussion. Question called for. Motion carried with voice vote.

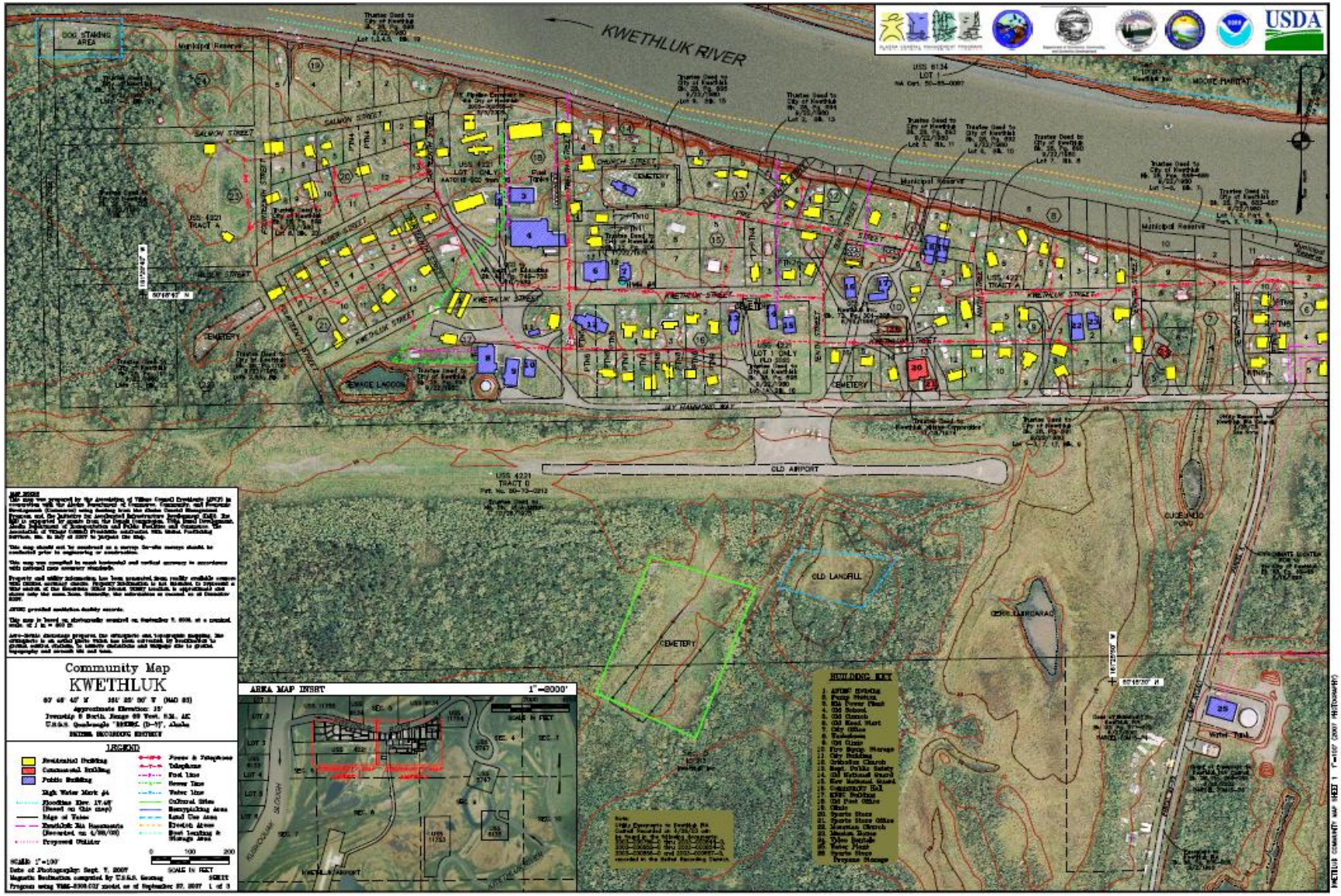
V. **Reading and Approval of Previous Meeting Minutes:** 02/18/05; 06/28/05; 10/07/05; 11/28/05; 12/19/05; 01/20/06; 03/30/06; 04/20/06; 05/30/06; 06/07/06; 08/14, 22/06; 09/12, 14, 29 (spec.), 29 (PH)/06; 10/20/06; 11/14, 22/06; 12/07, 18, 28/06; 01/16/07; 02/13, 27/07; 03/13, 20, 27/07; 04/10, 25, 30/07; 05/08, 12, 15/07; 06/12/07; 07/26/07; 08/22/07; 09/06, 25/07; 10/08, 25, 30/07; 11/15, 20/07; 12/12/07. Ivan Michael moved to defer reading and approval of previous meeting minutes. Second by Lucy W. Olick. Discussion. Question called for. Motion carried with voice vote.

VI. **Reports of Officials & Committees:**

1. City Manager, Alexie Morris, Sr. Written reports handed out to City Council. Irene Kerr read City Manager's written report. Max P. Angellan moved to approve City Manager's written report. Second by Boris L. Epchook. Discussion on Water & Sewer Project and Kwethluk Joint Group meeting on the New Power Plant location project. New power plant location was pre-approved by the Kwethluk Joint Group and is objectionable, City of Kwethluk was to approve site before construction, and project should be put on halt. Power plant discharges hazardous fumes, i.e. carbon monoxide; it is a health concern for residents. Question called for. Motion carried

Erosion Maps Appendix


KWETHLUK RIVER
BARGE LANDING
SEWAGE LAGOON
TRACT A
DOG STAKING AREA
AIRPORT ROAD
BUILDING KEY
Community Map
KWETHLUK
LEGEND


KWETHLUK RIVER
USDA
DOG STAGING AREA
SALMON STREET
CHURCH STREET
ALDER STREET
KWETHLUK STREET
SEWAGE LAGOON
CEMETERY
OLD AIRPORT
OLD LANDFILL
Community Map
KWETHLUK
LEGEND
AREA MAP INSET
1"=2000'
BUILDING KEY