

City of Fort Yukon, Alaska
Hazard Mitigation Plan Update



October 2017
Prepared by:
City of Fort Yukon



**LeMay Engineering
& Consulting, Inc.**

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The preparation of this plan was financed through funds from a grant from the Alaska State Division of Homeland Security and Emergency Management and the Federal Emergency Management Agency.

Commitment Letter



City of Fort Yukon

P.O. Box 269 ~ Fort Yukon, Alaska 99740
907-662-2379 or 662-2479
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Memorandum

Date: 05/11/2017
To: George Grady
State of Alaska
DMVA DHS&EM
P.O. Box 5750
Joint Base Elmendorf-Richardson, Alaska 99505-5750
From: Andrew Firmin, City Manager
Re: Letter of Commitment

Mr. Grady:

This memo will serve as the City of Fort Yukon's Letter of Commitment to support DMVA DHS&EM and LeMay Engineering & Consulting, Inc. in their Federal Emergency Management Agency (FEMA) Pre-Disaster Mitigation (PDM) planning grant to develop a hazard mitigation plan for the City of Fort Yukon. The end goal of this grant is a State- and FEMA- approved hazard mitigation plan that the City of Fort Yukon will adopt.

Respectfully,

Andrew Firmin, City Manager

Adoption Resolution



City of Fort Yukon

P.O. Box 269 ~ Fort Yukon, Alaska 99740
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Resolution of the City of Fort Yukon, Alaska

No. 17 – 05

A RESOLUTION OF THE CITY OF FORT YUKON COUNCIL TO ADOPT THE CITY OF FORT YUKON LOCAL HAZARD MITIGATION PLAN UPDATE

WHEREAS, the community of City of Fort Yukon recognizes the threat from natural disasters posed to residents and property; and

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

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

WHEREAS, the City of Fort Yukon Local Hazard Mitigation Plan has been sent to the Alaska Division of Homeland Security and Emergency Management Agency for their approval; and

NOW THEREFORE BE IT RESOLVED, that the City of Fort Yukon hereby adopts the City of Fort Yukon Local Hazard Mitigation Plan Update as an official plan; and

BE IT FURTHER RESOLVED, that the community of Fort Yukon will submit the adopted Local Hazard Mitigation Plan Update to the Alaska Division of Homeland Security and Emergency Management Agency officials for final review and approval.

CERTIFICATION

We, the undersigned members of the City of Fort Yukon Council do hereby certify that the foregoing joint resolution was adopted at a meeting held on 10 October 2017 by a vote of __ members.

YES 4 NO 0 ABSTAIN 0 ABSENT 3

ATTEST:

City of Fort Yukon Mayor

City Manager

FEMA Approval Letter

U.S. Department of Homeland Security
FEMA Region 10
130 – 228th Street, SW
Bothell, Washington 98021



FEMA

January 8, 2018

Mr. Brent Nichols
State Hazard Mitigation Officer
Alaska Division of Homeland Security and Emergency Management
P.O. Box 5750
Fort Richardson, Alaska 99505-5750

Dear Mr. Nichols:

As requested, on January 8, 2017, the U.S. Department of Homeland Security's Federal Emergency Management Agency (FEMA), Region 10, completed a pre-adoption review of the City of Fort Yukon Hazard Mitigation Plan. This letter serves as Region 10's commitment to approve the plan upon receiving documentation of its adoption by the community. The plan successfully contains the required criteria, excluding the adoption, for hazard mitigation plans, as outlined in Code of Federal Regulation Title 44 Part 201.

Once FEMA approves the plan, the community is eligible for mitigation project grants.

Please contact our Regional Mitigation Planning Program Manager, Brett Holt, at (425) 487-4553 with any questions.

Sincerely,

1/9/2018

X 

Signed by: TAMRA D BIASCO

Tamra Biasco
Chief, Risk Analysis Branch
Mitigation Division

AS:vl



FEMA

January 11, 2018

The Honorable Richard Carroll Jr.
Mayor, City of Fort Yukon
PO Box 269
Fort Yukon, Alaska 99740

Dear Mayor Carroll:

On January 11, 2018, the U.S. Department of Homeland Security's Federal Emergency Management Agency (FEMA), Region 10, approved the City of Fort Yukon, Alaska Hazard Mitigation Plan as a Local Plan as outlined in Code of Federal Regulations Title 44 Part 201. This approval provides the City of Fort Yukon eligibility to apply for the Robert T. Stafford Disaster Relief and Emergency Assistance Act's, Hazard Mitigation Assistance grants projects through January 10, 2023 through your state.

FEMA individually evaluates all application requests for funding according to the specific eligibility requirements of the applicable program. Though a specific mitigation activity or project identified in the plan may meet the eligibility requirements, it may not automatically receive approval for FEMA funding under any of the aforementioned programs.

Over the next five years, we encourage your communities to follow the plan's schedule for monitoring and updating, and to develop further mitigation actions. To continue eligibility, jurisdictions must review, revise as appropriate, and resubmit the plan within five years of the original approval date.

If you have questions regarding your plan's approval or FEMA's mitigation grant programs, please contact Brent Nichols, Emergency Management Specialist with Alaska Division of Homeland Security and Emergency Management, at (907) 428-7085 who locally coordinates and administers these efforts.

Sincerely,

A handwritten signature in blue ink, reading "Mark Carey", is written over a printed name and title.

Mark Carey, Director
Mitigation Division

cc: Brent Nichols, Alaska Division of Homeland Security and Emergency Management

Enclosure

AS:vl

TABLE OF CONTENTS

1.	Introduction.....	1-1
1.1	Hazard Mitigation Planning.....	1-1
1.2	Planning Requirements	1-1
1.2.1	Local Mitigation Plans.....	1-1
1.3	Grant Programs with Mitigation Plan Requirements.....	1-1
1.3.1	Hazard Mitigation Assistance (HMA) Unified Programs	1-2
1.4	HMP Description	1-3
2.	Prerequisites.....	2-1
2.1	Adoption by Local Governing Bodies and Supporting Documentation.....	2-1
3.	Community Description	3-1
3.1	Location, Geography, and History.....	3-1
3.2	Demographics	3-2
3.3	Economy	3-2
4.	Planning Process	4-1
4.1	Overview of Planning Process.....	4-1
4.2	Hazard Mitigation Planning Team.....	4-2
4.3	Public Involvement & Opportunity for Interested Parties to participate.....	4-3
4.4	Incorporation of Existing Plans and Other Relevant Information	4-4
5.	Hazard Profiles	5-1
5.1	Overview of a Hazard Analysis	5-1
5.2	Hazard Identification and Screening.....	5-1
5.3	Hazard Profile	5-2
5.3.1	Earthquake	5-4
5.3.2	Erosion	5-9
5.3.3	Flood	5-14
5.3.4	Permafrost.....	5-26
5.3.5	Weather (Severe)	5-29
5.3.6	Wildland Fire	5-37
5.3.7	Climate Change.....	5-42
6.	Vulnerability Analysis	6-1

6.1	Overview of a Vulnerability Analysis	6-1
6.2	Vulnerability Analysis: Specific steps	6-2
6.2.1	Asset Inventory	6-2
6.2.2	Methodology	6-7
6.2.3	Data Limitations.....	6-7
6.2.4	Exposure Analysis	6-8
6.3	Land Use and Development Trends.....	6-14
7.	Mitigation Strategy	7-1
7.1	Developing Mitigation Goals.....	7-1
7.2	Identifying Mitigation Actions	7-2
7.3	Evaluating and Prioritizing Mitigation Actions.....	7-7
7.4	Implementing a Mitigation Action Plan	7-8
8.	Plan Maintenance	8-1
8.1	Monitoring, Evaluating, and Updating the HMP	8-1
8.2	Implementation Through Existing Planning Mechanisms.....	8-2
8.3	City of Fort Yukon Capability Assessment	8-3
8.4	Continued Public Involvement	8-10
9.	References	9-1

Tables

Table 4-1	Hazard Mitigation Planning Team.....	4-2
Table 4-2	Public Involvement Mechanisms.....	4-3
Table 5-1	Identification and Screening of Hazards.....	5-2
Table 5-2	Hazard Probability Criteria.....	5-3
Table 5-3	Hazard Magnitude/Severity Criteria.....	5-4
Table 5-4	Magnitude/Intensity/Ground-Shaking Comparisons	5-6
Table 5-5	Historical Earthquakes for Fort Yukon.....	5-6
Table 5-6	Historical Flood Events.....	5-19
Table 5-7	Severe Weather Events	5-30
Table 6-1	Estimated Population and Building Inventory	6-2
Table 6-2	Repetitive Loss Properties	6-3
Table 6-3	Fort Yukon Critical Facilities	6-4
Table 6-4	Planned and Funded Projects	6-15
Table 7-1	Mitigation Goals	7-1
Table 7-2	Mitigation Goals and Potential Actions.....	7-3
Table 7-3	Evaluation Criteria for Mitigation Actions.....	7-8
Table 7-4	City of Fort Yukon Mitigation Action Plan Matrix.....	7-10
Table 8-1	Fort Yukon’s Regulatory Tools	8-3
Table 8-2	Fort Yukon’s Staff Resources.....	8-8
Table 8-3	Financial Resources for Hazard Mitigation	8-9

Figures

Figure 3-1	Fort Yukon Location Map	3-1
Figure 3-2	Fort Yukon Historic Population.....	3-2
Figure 3-3	Aerial Photograph of the City of Fort Yukon	3-3
Figure 5-1	Active and Potentially Active Faults in Alaska	5-7
Figure 5-2	Image from the “Neotectonic Map of Alaska” – Fort Yukon Area.....	5-8
Figure 5-2	Fort Yukon’s Earthquake Probability	5-9
Figure 5-3	Aerial Photo of Fort Yukon	5-11
Figure 5-4	Fort Yukon’s Erosion Protection Efforts	5-13
Figure 5-5	Fort Yukon Flood Gauges.....	5-16
Figure 5-6	Fort Yukon Flood Impacts (NWS 2009)	5-18
Figure 5-7	Fort Yukon Flood Threat	5-21

Figure 5-8	City of Fort Yukon’s Flood Hazard Area	5-22
Figure 5-9	1992 Fort Yukon Flood.....	5-24
Figure 5-10	USACE Flood Protection Levee System	5-24
Figure 5-11	Permafrost Map of Alaska	5-28
Figure 5-12	Fort Yukon’s Historical Wildfires	5-39
Figure 5-13	Fort Yukon’s Wildland Fire Risk	5-40

Appendices

A	Public Involvement
B	Fort Yukon Area Use Map
C	FEMA Review Tool
D	Benefit-Cost Analysis Fact Sheet
E	Plan Maintenance Documents

Acronyms/Abbreviations

°F	Degrees Fahrenheit
AEA	Alaska Energy Authority
AEEE	Alternative Energy and Energy Efficiency
AFG	Assistance to Firefighters Grant
AHFC	Alaska Housing Finance Corporation
AICC	Alaska Interagency Coordination Center
ANA	Administration for Native Americans
ANTHC	Alaska Native Tribal Health Consortium
APA	American Planning Association
ARC	American Red Cross
BF	Bulk Fuel
BFE	Base Flood Elevation
BIA	Bureau of Indian Affairs
BLM	Bureau of Land Management
CD	compact disc
CDBG	Community Development Block Grant
CHEMS	Community Health and Emergency Medical Services
CFR	Code of Federal Regulations
CGP	Comprehensive Grant Program
City	City of Fort Yukon
DCCED	Department of Commerce, Community, and Economic Development
DCRA	Division of Community and Regional Affairs
DGGS	Division of Geological and Geophysical Survey
DEC	Department of Environmental Conservation
DEED	Department of Education and Early Development
DHSS	Department of Health and Social Services
DHS	Department of Homeland Security
DHS&EM	Division of Homeland Security and Emergency Management
DMA 2000	Disaster Mitigation Act of 2000
DMVA	Department of Military and Veterans Affairs
DNR	Department of Natural Resources
DOE	Department of Energy
DOF	Division of Forestry
DOI	Division of Insurance
DOL	Department of Labor
DOT/PF	Department of Transportation and Public Facilities
DSS	Division of Senior Services

EDA	Economic Development Administration
EPA	Environmental Protection Agency
FAA	Federal Aviation Administration
FEMA	Federal Emergency Management Agency
FMA	Flood Mitigation Assistance
FP&S	Fire Prevention and Safety
ft	feet
FY	Fiscal Year
<i>g</i>	gravity as a measure of peak ground acceleration
HMA	Hazard Mitigation Assistance
HMGP	Hazard Mitigation Grant Program
HMP	Hazard Mitigation Plan
HUD	Housing and Urban Development
HWE	High Water Elevation
IBHS	Institute for Business and Home Safety
IFG	Individual Family Grant Program
IHBG	Indian Housing Block Grant
M	Magnitude
MMI	Modified Mercalli Intensity
mph	miles per hour
msl	mean sea level
NAHASDA	Native American Housing Assistance and Self Determination Act
NAVD	National American Vertical Datum of 1988
NFIP	National Flood Insurance Program
PDM	Pre-Disaster Mitigation
PGA	peak ground acceleration
RD	US Division of Rural Development
RL	repetitive loss
RFC	Repetitive Flood Claim
RPSU	Rural Power System Upgrade
SAFER	Staffing for Adequate Fire and Emergency Response
SBA	U.S. Small Business Administration
SHMP	Alaska State Hazard Mitigation Plan
Sq.	Square
SRL	Severe Repetitive Loss
Stafford Act	Robert T. Stafford Disaster Relief and Emergency Assistance Act
STAPLEE	Social, Technical, Administrative, Political, Legal, Economic, and Environmental
USACE	United States Army Corps of Engineers

USDA	United States Department of Agriculture
US or U.S.	United States
USC	United States Code
USGS	United States Geological Survey
VPSO	Village Public Safety Officer
VSW	Village Safe Water

This section provides a brief introduction to hazard mitigation planning, the grants associated with these requirements, and a description of this Hazard Mitigation Plan (HMP).

1.1 HAZARD MITIGATION PLANNING

Hazard mitigation, as defined in Title 44 of the Code of Federal Regulations (CFR), Part 201.2, is “any action taken to reduce or eliminate the long-term risk to human life and property from natural hazards.” Many areas have expanded this definition to also include human-caused hazards. As such, hazard mitigation is any work done to minimize the impacts of any type of hazard event before it occurs. It aims to reduce losses from future disasters. Hazard mitigation is a process in which hazards are identified and profiled, people and facilities at risk are analyzed, and mitigation actions are developed. The implementation of the mitigation actions, which include long-term strategies that may include planning, policy changes, programs, projects, and other activities, is the end result of this process.

1.2 PLANNING REQUIREMENTS

1.2.1 Local Mitigation Plans

In recent years, local hazard mitigation planning has been driven by a new Federal law. On October 30, 2000, Congress passed the Disaster Mitigation Act of 2000 (DMA 2000) (P.L. 106-390) which amended the Robert T. Stafford Disaster Relief and Emergency Assistance Act (Stafford Act) (Title 42 of the United States Code [USC] 5121 et seq.) by repealing the act’s previous mitigation planning section (409) and replacing it with a new mitigation planning section (322). This new section emphasized the need for State, Tribal, and local entities to closely coordinate mitigation planning and implementation efforts. In addition, it provided the legal basis for the Federal Emergency Management Agency’s (FEMA) mitigation plan requirements for mitigation grant assistance.

To implement these planning requirements, FEMA published an Interim Final Rule in the Federal Register on February 26, 2002 (FEMA 2002a), 44 CFR Part 201 with subsequent updates. The planning requirements for local entities are described in detail in Section 2 and are identified in their appropriate sections throughout this HMP.

FEMA’s October 31, 2007 and July 2008 changes to 44 CFR Part 201 combined and expanded flood mitigation planning requirements with local hazard mitigation plans (44 CFR §201.6). Furthermore, all hazard mitigation assistance program planning requirements were combined, eliminating duplicated mitigation plan requirements. This change also required participating National Flood Insurance Program (NFIP) communities’ risk assessments and mitigation strategies to identify and address repetitively flood damaged properties. Local hazard mitigation plans now qualify communities for several Federal Hazard Mitigation Assistance (HMA) grant programs.

1.3 GRANT PROGRAMS WITH MITIGATION PLAN REQUIREMENTS

FEMA Hazard Mitigation Assistance grant programs provide funding to States, Tribes, and local entities that have a FEMA-approved State, Tribal, or Local Mitigation Plan. Two of the grants are authorized under the Stafford Act and DMA 2000, while the remaining one is authorized under the National Flood Insurance Act and the Bunning-Bereuter-Blumenauer Flood Insurance Reform Act. As of June 19, 2008, the grant programs were segregated. The HMGP is a directly-funded competitive disaster grant program whereas the Unified Mitigation Assistance Programs (PDM and FMA, although competitive) rely on specific grant pre-disaster grant funding sources, sharing several common elements.

*“The Department of Homeland Security (DHS) FEMA Hazard Mitigation Assistance (HMA) grant programs present a critical opportunity to protect individuals and property from natural hazards while simultaneously **reducing reliance on Federal disaster funds**. The HMA programs provide pre-disaster mitigation grants annually to States, Territories, Tribes, and local communities. The statutory origins of the programs differ, but all share the common goal of reducing the loss of life and property due to natural hazards.*

The PDM program is authorized by the Stafford Act and focuses on mitigation project and planning activities that address multiple natural hazards, although these activities may also address hazards caused by manmade events. The FMA program is authorized by the National Flood Insurance Act and focuses on reducing claims against the NFIP” (FEMA 2006e).

1.3.1 Hazard Mitigation Assistance (HMA) Unified Programs

The HMGP provides grants to States, Tribes, and local entities to implement long-term hazard mitigation measures after a major disaster declaration. The purpose of the HMGP is to reduce the loss of life and property due to natural disasters and to enable mitigation measures to be implemented during the immediate recovery from a disaster. Projects must provide a long-term solution to a problem, for example, elevation of a home to reduce the risk of flood damages as opposed to buying sandbags and pumps to fight the flood. In addition, a project’s potential savings must be more than the cost of implementing the project. Funds may be used to protect either public or private property or to purchase property that has been subjected to, or is in danger of, repetitive damage. The amount of funding available for the HMGP under a particular disaster declaration is limited. FEMA may provide a State or Tribe with up to 20 percent of the total aggregate disaster damage costs to fund HMGP project or planning grants. The cost-share for this grant is 75 percent Federal/25 percent non-Federal.

The PDM grant program provides funds to State, Tribes, and local entities, including universities, for hazard mitigation planning and mitigation project implementation prior to a disaster event. PDM grants are awarded on a nationally competitive basis. Like HMGP funding, a PDM project’s potential savings must be more than the cost of implementing the project. In addition, funds may be used to protect either public or private property or to purchase property that has been subjected to, or is in danger of, repetitive damage. The total amount of PDM funding available is appropriated by Congress on an annual basis. In Fiscal Year (FY) 2016, PDM program funding totaled approximately \$90 million. The cost-share for this grant is 75 percent Federal/25 percent non-Federal.

The goal of the FMA grant program is to reduce or eliminate flood insurance claims under the NFIP. Particular emphasis for this program is placed on mitigating repetitive loss (RL) properties. The primary source of funding for this program is the National Flood Insurance Fund. Grant funding is available for three types of grants, including Planning, Project, and Technical Assistance. Project grants, which use the majority of the program’s total funding, are awarded to States, Tribes, and local entities to apply mitigation measures to reduce flood losses to properties insured under the NFIP. In FY 2016, FMA funding totaled \$199 million. The cost-share for this grant is 75 percent

The City of Fort Yukon has been a member of the NFIP since April 24, 1995. City Ordinance No. 95-06 establishes “...land use regulations to conform to requirements of the NFIP...” The City has an effective flood map dated February 3, 2010.

Federal/25 percent non-Federal. However, 100 percent Federal to mitigate SRL properties is available in certain situations as well as 90 percent Federal/10 percent non-Federal to mitigate RL properties.

1.4 HMP DESCRIPTION

The remainder of this HMP consists of the following sections and appendices:

Prerequisites

Section 2 addresses the prerequisites of plan adoption, which include adoption by the City of Fort Yukon (City). The adoption resolution is included on page iv of this HMP following the acknowledgment page.

Community Description

Section 3 provides a general history and background of the City, including historical trends for population and the demographic and economic conditions that have shaped the area. Trends in land use and development are also discussed. A location figure of the area is included.

Planning Process

Section 4 describes the planning process and identifies the Planning Team Members, the meetings held as part of the planning process, the LeMay Engineering & Consulting, Inc. planner, and the key stakeholders within the City and the surrounding area. In addition, this section documents public outreach activities (Appendix A) and the review and incorporation of relevant plans, reports, and other appropriate information.

Hazard Analysis

Section 5 describes the process through which the Planning Team identified, screened, and selected the hazards to be profiled in this update of the HMP. The hazard analysis includes the nature, history, location, extent, impact, and probability of future events for each hazard. In addition, historical and hazard location figures are included.

Vulnerability Analysis

Section 6 identifies potentially vulnerable assets—people, residential and nonresidential buildings, dwelling units (where available), critical facilities, and critical infrastructure—in the City. The resulting information identifies the full range of hazards that the City could face and potential social impacts, damages, and economic losses.

Mitigation Strategy

Section 7 defines the mitigation strategy which provides a blueprint for reducing the potential losses identified in the vulnerability analysis. The Planning Team developed a list of mitigation goals and potential actions to address the risks facing the City. Mitigation actions include preventive actions, property protection techniques, natural resource protection strategies, structural projects, emergency services, and public information and awareness activities. In the spirit of the new requirements, mitigation strategies were developed encouraging participation with the NFIP and the reduction of flood damage to flood-prone structures.

Plan Maintenance

Section 8 describes the Planning Team's formal plan maintenance process to ensure that the HMP remains an active and applicable document. The process includes monitoring, evaluating, and updating the HMP (Appendix E); implementation through existing planning mechanisms; and continued public involvement.

References

Section 9 lists the reference materials used to prepare this HMP.

Appendix A

Appendix A provides public outreach information, including newsletters.

Appendix B

Appendix B contains a Fort Yukon Land Use Map.

Appendix C

Appendix C provides the FEMA Local Mitigation Plan Review Tool which documents compliance with FEMA criteria.

Appendix D

Appendix D contains the Benefit-Cost Analysis Fact Sheet used to prioritize mitigation actions.

Appendix E

Appendix E provides the plan maintenance documents, such as an annual review sheet and the progress report form.

2.1 ADOPTION BY LOCAL GOVERNING BODIES AND SUPPORTING DOCUMENTATION

The requirements for the adoption of this HMP by the local governing body, as stipulated in the DMA 2000 and its implementing regulations, are described below.

DMA 2000 REQUIREMENTS: PREREQUISITES

Local Plan Adoption

Requirement §201.6(c)(5): The local hazard mitigation plan shall include documentation that the plan has been formally adopted by the governing body of the jurisdiction requesting approval of the plan (e.g., City Council, Commissioner, Tribal Council).

Element

- Has the local governing body adopted the new or updated plan?
- Is supporting documentation, such as a resolution, included?

Source: FEMA, July 2008.

The City of Fort Yukon is the local jurisdiction represented in this HMP and meets the requirements of Section 409 of the Stafford Act and Section 322 of DMA 2000.

The local governing body of Fort Yukon is the City Council. The City Council adopted the HMP by resolution on October 10, 2017. A scanned copy of the resolution is included on page iv of this HMP.

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This section describes the location, geography, and history; demographics; and land use development trends of the City of Fort Yukon.

3.1 LOCATION, GEOGRAPHY, AND HISTORY

“Fort Yukon is located at the confluence of the Yukon and Porcupine Rivers, about 145 air miles northeast of Fairbanks. It lies at approximately 66.564720 North Latitude and -145.273890 West Longitude. (Sec. 18, T020N, R012E, Fairbanks Meridian.) Fort Yukon is located in the Fairbanks Recording District.” (Department of Community, Commerce, and Economic Development [DCCED], Division of Community and Regional Affairs [DCRA] 2009).



Figure 3-1 Fort Yukon Location Map

The City of Fort Yukon (City) is surrounded by the multi-million acre Yukon Flats Wildlife Refuge. The City covers approximately 7.0 square (sq.) miles of land and approximately 0.4 sq. miles of water. Extreme temperature changes occur throughout Alaska’s interior. Fort Yukon temperatures range from a winter low of -60 degrees Fahrenheit (°F) to a high of 97 °F. The area receives approximately 6.58 inches of rain and 43.4 inches of snow.

The following is the City’s brief historical sketch:

1847	Fort Yukon founded as a Canadian outpost in Russian territory and quickly became an important trade center for the Gwich'in Indians
1846 - 1869	The Hudson Bay Company operated Fort Yukon
1862	Mission school established
1867	Alaska was purchased by the U.S.
1869	Fort Yukon was found to be located on American soil
1898	Post Office established
1889 – 1904	Whaling boom along the Arctic coast
1800s	Fur trade and the Klondike gold rush spurred economic activity and provided some economic opportunities for the Natives
1860s – 1920s	Major epidemics impacted Fort Yukon population
1949	Flood damaged or destroyed many homes in Fort Yukon
1950s	White Alice radar site and an Air Force station were established
1959	Fort Yukon incorporated as a city

Most Fort Yukon residents are descendants of several Athabascan Tribes such as the Yukon Flats, Chandalar River, Birch Creek, Black River, and Porcupine River Gwich'in Indians. They were a nomadic people; migrating throughout the year between seasonal camps where they harvested wild game and fish and gathered berries and other food sources. Trading supplemented their subsistence life style allowing tribal members to access goods from those traversing the area (DCRA 2010).

3.2 DEMOGRAPHICS

The 2010 census recorded 583 residents, of which the median age was 34, indicating a relatively young population. The population of Fort Yukon is expected to remain steady because over half of the population is between 20 and 54 years of age. The City is a blended Athabascan community, and about 89.2% of residents recognize themselves as Alaska Native. The male and female composition is approximately 55.7% and 44.3%, respectively. The 2010 census revealed that there are 246 households with the average household having approximately three individuals. The most recent 2016 DCCED certified population is 558, derived from the 2016 Department of Labor Estimate. Figure 3-2 illustrates the historic population of the City of Fort Yukon.

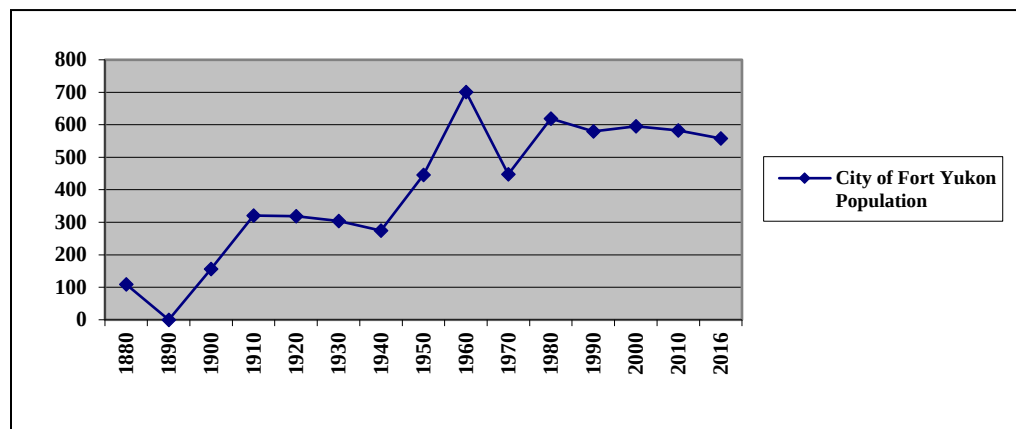


Figure 3-2 Fort Yukon Historic Population

3.3 ECONOMY

There are limited employment opportunities in Fort Yukon. Established government provides the bulk of the employment opportunities such as the City, State, and Federal agencies and the Gwitchyaa Zhee Native (G-Z) Corporation, the school district, the health clinic, and other commercial enterprises along with trapping, native handicrafts, and commercial fishing. The summer months bring fire fighting and outside construction job opportunities. However subsistence is the primary mechanisms by which residents survive (DCRA 2017).

According to the 2010 census, the median household income in Fort Yukon was \$33,194. Approximately 103 individuals (17.7%) were reported to be living below the poverty level. The potential work force (those aged 16 years or older) in Fort Yukon was estimated to be 417, of which 269 were actively employed. In 2013, the unemployment rate was 18%; however, this rate included part-time and seasonal jobs, and practical unemployment or underemployment is likely to be significantly higher.

Figure 3-3 depicts an aerial photograph of the City obtained from DCCED as part of their community mapping effort.



Figure 3-3 **Aerial Photograph of the City of Fort Yukon (DCRA 2009a).**

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This section provides an overview of the planning process; identifies the Planning Team Members and key stakeholders; documents public outreach efforts; and summarizes the review and incorporation of existing plans, studies, and reports used to develop this HMP. Additional information regarding the Planning Team and public outreach efforts is provided in Appendix A. The requirements for the planning process, as stipulated in DMA 2000 and its implementing regulations, are described below.

DMA 2000 Requirements: Planning Process

Local Planning Process

Requirement §201.6(b): An open public involvement process is essential to the development of an effective plan.

In order to develop a more comprehensive approach to reducing the effects of natural disasters, the planning process shall include:

Element

- An opportunity for the public to comment on the plan during the drafting stage and prior to plan approval;
- An opportunity for neighboring communities, local and regional agencies involved in hazard mitigation activities, and agencies that have the authority to regulate development, as well as businesses, academia and other private and nonprofit interests to be involved in the planning process; and
- Review and incorporation, if appropriate, of existing plans, studies, reports, and technical information.

Requirement §201.6(c)(1): [The plan shall document] the planning process used to develop the plan, including how it was prepared, who was involved in the process, and how the public was involved.

Element

- Does the plan provide a narrative description of the process followed to prepare the new or updated plan?
- Does the new or updated plan indicate who was involved in the planning process?
- Does the new or updated plan indicate how the public was involved?
- Does the new or updated plan discuss the opportunity for neighboring communities, agencies, businesses, academia, nonprofits, and other interested parties to be involved in the planning process?
- Does the planning process describe the review and incorporation, if appropriate, of existing plans, studies, reports, and technical information?
- Does the updated plan document how the planning team reviewed and analyzed each section of the plan and whether each section was revised as part of the update process?

Source: FEMA, July 2008.

4.1 OVERVIEW OF PLANNING PROCESS

The first step in the planning process began with the City Manager being appointed the community point of contact in April, 2017. On April 4, Andrew Firmin, City Manager identified resources and capabilities of the Planning Team, and set the date for the public meeting. The Planning Team's role was discussed to include: acting as an advocate for the planning process, assisting with gathering information, and support for the public meeting and other public participation opportunities. There was also a brief discussion about hazards that affect the community such as erosion and wildfire, which are increasing in intensity.

The Planning Team held a public workshop on May 8, 2017. Additionally, the Planning Team held a public meeting during their regularly scheduled City Council meeting on May 9, 2017. The hazard mitigation planning process was described and participants were asked to help identify hazards that affect the City and to also identify critical facilities. Ms. Jennifer LeMay, PE, PMP, LeMay Engineering & Consulting, Inc., journeyed to the City to assist the Planning Team with identifying mitigation actions and projects.

In summary, the following five-step process took place from April 2017 through September 2017.

1. **Organize resources:** Members of the Planning Team identified resources, including staff, agencies, and local community members, who could provide technical expertise and historical information needed in updating the hazard mitigation plan.
2. **Assess risks:** The Planning Team updated the hazards specific to Fort Yukon, and with the assistance of a hazard mitigation planning consultant (LeMay Engineering & Consulting, Inc.), updated the risk assessment from 2010 for the eight identified hazards and also added climate change as a ninth hazard. The Planning Team reviewed the risk assessment, including the vulnerability analysis, prior to and during the development of the mitigation strategy.
3. **Assess capabilities:** The Planning Team reviewed current administrative and technical, legal and regulatory, and fiscal capabilities to determine whether existing provisions and requirements adequately address relevant hazards.
4. **Develop a mitigation strategy:** After reviewing the risks posed by each hazard, the Planning Team reviewed the comprehensive range of potential mitigation goals and actions developed in 2010 and updated them accordingly. Subsequently, the Planning Team concluded that no new actions are required and that reprioritization of the actions from 2010 to be implemented is unnecessary.
5. **Monitor, evaluate, and update the plan:** The Planning Team developed a process to monitor the plan to ensure it was used as intended while fulfilling community needs. The team then developed a process to evaluate the plan to compare how their decisions affected hazard impacts. They then outlined a method to share their successes with community members to encourage support for mitigation activities and to provide data for incorporating mitigation actions into existing planning mechanisms and to provide data for the plan's five-year update. Opportunities are described on page 8-10 in the Continued Public Involvement Section of this Plan Update.

4.2 HAZARD MITIGATION PLANNING TEAM

The Planning Team consisted of City Manager and Team Leader Andrew Firmin, Mayor Richard Carroll, Jr., and City Council Members listed in Table 4-1. The State of Alaska, Division of Homeland Security and Emergency Management (DHS&EM) provided funding and project oversight. LeMay Engineering & Consulting, Inc., DHS&EM's contractor, provided assistance to the Planning Team. Table 4-1 identifies the hazard mitigation Planning Team.

Table 4-1 Hazard Mitigation Planning Team

NAME	TITLE	ORGANIZATION	PHONE
Andrew Firmin	City Manager, Team Leader	City of Fort Yukon	662.2479
Richard Carroll, Jr.	City Mayor	City of Fort Yukon	662.5147
Kelly Fields	City Council Member	City of Fort Yukon	662.5149
Stephanie Hinz	City Council Member	City of Fort Yukon	662.5498
Thomas Knudson	City Council Member	City of Fort Yukon	662.2463
Arlene R. Peter	City Council Member	City of Fort Yukon	662.4378
Paul Shewfelt	City Council Member	City of Fort Yukon	662.3071

Table 4-1 Hazard Mitigation Planning Team

NAME	TITLE	ORGANIZATION	PHONE
Bonnie Thomas	City Council Member	City of Fort Yukon	662.8400
Jennifer LeMay, PE, PMP	Planner/Consultant	LeMay Engineering & Consulting, Inc.	350.6061
Rick Dembroski	State Hazard Mitigation Planner	DHS&EM	428.7015
Brent Nichols	State Hazard Mitigation Officer	DHS&EM	428.7085

4.3 PUBLIC INVOLVEMENT & OPPORTUNITY FOR INTERESTED PARTIES TO PARTICIPATE

Table 4-2 lists the community's public involvement initiatives focused to encourage participation and insight for the HMP effort.

Table 4-2 Public Involvement Mechanisms

Mechanism	Description
Newsletter Distribution (April 12, 2017)	In April 2017, the jurisdiction distributed a newsletter describing the upcoming planning activity. The newsletter encouraged the whole community to provide hazard and critical facility information. It was posted at the City Office to ensure everyone was aware of the meeting.
Newsletter Distribution (September 12, 2017)	In September 2017, the jurisdiction distributed a newsletter describing the public comment period. The newsletter encouraged the whole community to review the draft plan update. It was posted at the City Office to ensure everyone was aware of the comment period.

An invitation was extended to all individuals and entities via a project newsletter describing the planning process and announcing the upcoming public meeting. A newsletter was developed and posted at the City Office on April 12, 2017 announcing the public meeting. Another newsletter was developed and posted at the City Office on September 12, 2017 announcing the public comment period on the plan after DHS&EM and FEMA comments had been incorporated. No public comments were received.

The Planning Team held a public workshop on May 8, 2017 at 5 pm to discuss the update of the hazard mitigation plan. Additionally, the Planning Team held a public meeting during their regularly scheduled City Council meeting on May 9, 2017. During the meeting, the Planning Team led the attending public through a hazard identification update and screening exercise. The attendees confirmed the hazards identified in development of the 2010 hazard mitigation plan: earthquake, erosion, flood, permafrost, severe weather, and wildland fire which periodically impact the City.

Following the hazard screening process, the Planning Team led the attendees through the process of confirming critical facilities in the community. No new critical facilities have been built since the 2010 adoption of the original plan. LeMay Engineering & Consulting, Inc. also described the specific information needed from the Planning Team and public to complete the risk assessment including the locations and values of critical facilities in the community.

After the community asset data was collected by the Planning Team over the spring of 2017, an updated risk assessment was completed that illustrated the assets that are exposed and vulnerable

to specific hazards. Mitigation actions were also reviewed. The Planning Team concluded there was no need to prioritize the mitigation actions identified in 2010 based on the results of the risk assessment.

4.4 INCORPORATION OF EXISTING PLANS AND OTHER RELEVANT INFORMATION

During the planning process, the Planning Team reviewed and incorporated information from existing plans, studies, reports, and technical reports into the HMP. The following were reviewed and used as references for the jurisdiction information and hazard profiles in the risk assessment of the HMP for the City:

- *The City of Fort Yukon Comprehensive Plan, 1996: explains the City's land use initiatives and natural hazard impacts.*
- *U.S. Army Corps of Engineers, Alaska Baseline Erosion Assessment, Erosion Information Paper – Fort Yukon, Alaska. January 21, 2008, defined the City's erosion threat.*
- *Flood Insurance Study, City of Fort Yukon, Alaska, Yukon-Koyukuk Census Area, February 3, 2010, defines the City's flood and erosion threats.*
- *City of Fort Yukon Sanitation Plan, developed by Alaska Native Tribal Consortium describes the City's soils, permafrost depth, and sanitation infrastructure needs.*
- *City of Fort Yukon Wildfire Protection Plan defines the City's wildland fire threat.*
- *State of Alaska, Department of Commerce, Community and Economic Development Community Profile, provided historical and demographic information.*
- *The City of Fort Yukon Hazard Mitigation Plan, 2010.*
- *Fort Yukon Community Plan, 2016: defines community's goals and priorities.*

A complete list of references consulted is provided in Section 9.

This section identifies and profiles the hazards that could affect the City of Fort Yukon.

5.1 OVERVIEW OF A HAZARD ANALYSIS

A hazard analysis includes the identification, screening, and profiling of each hazard. Hazard identification is the process of recognizing the natural events that threaten an area. Natural hazards result from unexpected or uncontrollable natural events of sufficient magnitude. Human and Technological, and Terrorism-related hazards are beyond the scope of this plan. Even though a particular hazard may not have occurred in recent history in the study area, all natural hazards that may potentially affect the study area are considered; the hazards that are unlikely to occur or for which the risk of damage is accepted as being very low, are eliminated from consideration.

Hazard profiling is accomplished by describing hazards in terms of their nature, history, magnitude, frequency, location, extent, and probability. Hazards are identified through the collection of historical and anecdotal information, review of existing plans and studies, and preparation of hazard maps of the study area. Hazard maps are used to determine the geographic extent of the hazards and define the approximate boundaries of the areas at risk.

5.2 HAZARD IDENTIFICATION AND SCREENING

The requirements for hazard identification, as stipulated in DMA 2000 and its implementing regulations, are described below.

DMA 2000 Requirements: Risk Assessment: Identifying Hazards

Identifying Hazards

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

Element

- Does the new or updated plan include a description of the types of all natural hazards that affect the jurisdiction?

Source: FEMA, July 2008.

For the first step of the hazard analysis, on May 8, 2017 at a public workshop, the Planning Team reviewed eleven possible hazards that could affect Fort Yukon. Ten of the eleven were evaluated in 2010 during development of the plan. Climate change was added in this plan update as a possible hazard. They then evaluated and screened the comprehensive list of potential hazards based on a range of factors, including prior knowledge or perception of their threat and the relative risk presented by each hazard, the ability to mitigate the hazard, and the known or expected availability of information on the hazard (see Table 5-1). The Planning Team determined that seven hazards pose the greatest threat to the City: earthquake, erosion, flood, permafrost, severe weather, wildland fire, and climate change. The remaining hazards excluded through the screening process were considered to pose a lower threat to life and property in the City due to the low likelihood of occurrence or the low probability that life and property would be significantly affected.

Table 5-1 Identification and Screening of Hazards

Hazard Type	Should It Be Profiled?	Explanation
Avalanche	No	This hazard does not exist for the City.
Earthquake	Yes	Periodic, unpredictable occurrences. Earthquakes damage could threaten approximately 7 houses on the north end of town. Cracks form on the runway. The City experienced no damage from the 11/2003 Denali EQ, but felt the 1964 Good Friday Earthquake.
Erosion	Yes	Riverine erosion by high water flow, ice flows, wind, and surface runoff occur continually. Erosion occurs at the lower end of town below the dock and barge landing; 50 by 500 feet per year.
Flood	Yes	Snowmelt and ice jam flooding occurs during spring thaw. Fall flooding rainy season events occur from soil saturation. Several minor flood events cause damage. Severe damages occur from major floods. The City has had flood insurance since 1995.
Landslide	No	This hazard does not exist for the City.
Permafrost	Yes	Permafrost is present throughout Alaska and periodically causes houses to shift due to permafrost thawing and upheaval. The City has numerous refrigerant rods used to maintain frozen ground reducing melting permafrost damage.
Tsunami & Seiche	No	This hazard does not exist for the City.
Volcano	No	This hazard does not exist for the City.
Weather	Yes	Annual weather patterns, severe cold, freezing rain, snow accumulations are the predominant threats. Severe weather events cause fuel price increases and frozen pipes. Heavy snow loads potentially damage house roofs. Winds potentially remove or damage roofs. -72°F occurred in 1989. The City experiences -68°F annually, causing # 2 heating oil freezing.
Wildland Fires	Yes	The City and the surrounding area become very dry in summer months with weather and human caused incidents igniting dry vegetation (i.e., lightning, trash burning, and campfires). The City experienced a dump fire in 2009. The community feels this hazard is increasing because the direction of the wind has changed, and a new neighborhood was built near the lagoon that is adjacent to the woods. There is a firebreak, but underbrush rapidly grows.
Climate Change	Yes	The community is experiencing permafrost melting, as seen in the sinking of a portion of the sewer lagoon and disappearance of nearby lakes per Public Works. Additionally, one community member noted that in the last 48 years, the temperature has rise one degree per year from the coldest extreme (a total of 48 ° in 48 years).

5.3 HAZARD PROFILE

The requirements for hazard profiles, as stipulated in DMA 2000 and its implementing regulations, are described below.

DMA 2000 Requirements: Risk Assessment – Profiling Hazards
Profiling Hazards

Requirement §201.6(c)(2)(i): [The risk assessment shall include a] description of the location and extent of all natural hazards that can affect the jurisdiction. The plan shall include information on previous occurrences of hazard events and on the probability of future hazard events.

Element

- Does the risk assessment identify the location (i.e., geographic area affected) of each natural hazard addressed in the new or updated plan?
- Does the risk assessment identify the extent (i.e., magnitude or severity) of each hazard addressed in the new or updated plan?
- Does the plan provide information on previous occurrences of each hazard addressed in the new or updated plan?
- Does the plan include the probability of future events (i.e., chance of occurrence) for each hazard addressed in the new or updated plan?

Source: FEMA, July 2008.

The specific hazards selected by the Planning Team for profiling have been examined in a methodical manner based on the following factors:

- Nature
- History
- Location
- Extent (to include magnitude and severity)
- Impact (general impacts associated with each hazard are described in the following profiles – detailed impacts to the City’s residents and critical facilities are further described in Section 6 as part of the overall vulnerability summary for each hazard)
- Probability of future events

Each hazard is assigned a rating based on the following criteria for probability (Table 5-2) and magnitude/severity (Table 5-3).

Table 5-2 Hazard Probability Criteria

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

<i>1 - Unlikely</i>	Event is possible within the next ten years. Event has up to 1 in 10 years chance of occurring (1/10=10 percent). History of events is less than or equal to 10 percent likely per year. Event is "Unlikely" but is possible of occurring.
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Probability is determined based on historic events, using the criteria identified above, to provide the likelihood of a future event.

Table 5-3 Hazard Magnitude / Severity Criteria

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

Similar to estimating probability, magnitude, and severity are determined based on historic events using the criteria identified above.

The hazards profiled for the City are presented in the rest of Section 5.3. The order of presentation does not signify the level of importance or risk.

5.3.1 Earthquake

5.3.1.1 Nature

An earthquake is a sudden motion or trembling caused by a release of strain accumulated within or along the edge of the earth's tectonic plates. The effects of an earthquake can be felt far beyond the site of its occurrence. Earthquakes usually occur without warning and after only a few seconds can cause massive damage and extensive casualties. The most common effect of earthquakes is ground motion, or the vibration or shaking of the ground during an earthquake.

Ground motion generally increases with the amount of energy released and decreases with distance from the fault or epicenter of the earthquake. An earthquake causes waves in the earth's interior (i.e., seismic waves) and along the earth's surface (i.e., surface waves). Two kinds of seismic waves occur: P (primary) waves are longitudinal or compressional waves similar in character to sound waves that cause back and forth oscillation along the direction of travel (vertical motion), and S (secondary) waves, also known as shear waves, are slower than P waves and cause structures to vibrate from side to side (horizontal motion). There are also two types of surface waves: Raleigh waves and Love waves. These waves travel more slowly and typically are significantly less damaging than seismic waves.

In addition to ground motion, several secondary natural hazards can occur from earthquakes such as:

- **Surface Faulting** is the differential movement of two sides of a fault at the earth's surface. Displacement along faults, both in terms of length and width, varies but can be

significant (e.g., up to 20 ft), as can the length of the surface rupture (e.g., up to 200 miles). Surface faulting can cause severe damage to linear structures, including railways, highways, pipelines, and tunnels.

- **Liquefaction** occurs when seismic waves pass through saturated granular soil, distorting its granular structure, and causing some of the empty spaces between granules to collapse. Pore water pressure may also increase sufficiently to cause the soil to behave like a fluid for a brief period and cause deformations. Liquefaction causes lateral spreads (horizontal movements of commonly 10 to 15 ft, but up to 100 ft), flow failures (massive flows of soil, typically hundreds of ft, but up to 12 miles), and loss of bearing strength (soil deformations causing structures to settle or tip). Liquefaction can cause severe damage to property.
- **Landslides/Debris Flows** occur as a result of horizontal seismic inertia forces induced in the slopes by the ground shaking. The most common earthquake-induced landslides include shallow, disrupted landslides such as rock falls, rockslides, and soil slides. Debris flows are created when surface soil on steep slopes becomes totally saturated with water. Once the soil liquefies, it loses the ability to hold together and can flow downhill at very high speeds, taking vegetation and/or structures with it. Slide risks increase after an earthquake during a wet winter.

The severity of an earthquake can be expressed in terms of intensity and magnitude. Intensity is based on the damage and observed effects on people and the natural and built environment. It varies from place to place depending on the location with respect to the earthquake epicenter, which is the point on the earth's surface that is directly above where the earthquake occurred. The severity of intensity generally increases with the amount of energy released and decreases with distance from the fault or epicenter of the earthquake. The scale most often used in the U.S. to measure intensity is the Modified Mercalli Intensity (MMI) Scale. As shown in Table 5-4, the MMI Scale consists of 12 increasing levels of intensity that range from imperceptible to catastrophic destruction. Peak ground acceleration (PGA) is also used to measure earthquake intensity by quantifying how hard the earth shakes in a given location. PGA can be measured as acceleration due to gravity (g) (see Table 5-4) (MMI 2006).

Magnitude (M) is the measure of the earthquake strength. It is related to the amount of seismic energy released at the earthquake's hypocenter, the actual location of the energy released inside the earth. It is based on the amplitude of the earthquake waves recorded on instruments, known as the Richter magnitude test scales, which have a common calibration (see Table 5-4).

Table 5-4 Magnitude / Intensity / Ground-Shaking Comparisons

Magnitude	Intensity	PGA (% <i>g</i>)	Perceived Shaking
0 – 4.3	I	<0.17	Not Felt
	II-III	0.17 – 1.4	Weak
4.3 – 4.8	IV	1.4 – 3.9	Light
	V	3.9 – 9.2	Moderate
4.8 – 6.2	VI	9.2 – 18	Strong
	VII	18 – 34	Very Strong
6.2 – 7.3	VIII	34 – 65	Severe
	IX	65 – 124	Violent
	X	124 +	Extreme
7.3 – 8.9	XI		
	XII		

(MMI 2006)

5.3.1.2 History

The Planning Team determined that the City of Fort Yukon has not experienced damaging effects from their historical earthquake events and only needed to be concerned with earthquakes with a magnitude > M 5.0. Table 5-5 lists historical earthquakes from 1971 to the present which exceeded M5.0 located within 100 miles of the City. These earthquakes did not induce any major damage due primarily to their community structure types and foundation support system designs.

Table 5-5 Historical Earthquakes for Fort Yukon

(Highlight is earthquake of record)

Year	Mo	Day	Orig. Time (24 hr)	Lat	Long	Magnitude	Distance (Miles)
1994	3	30	15:50	66.46	-148.03	5.1	11.2
2006	2	5	7:55	66.32	-142.55	5.1	.6
1991	2	7	12:28	66.35	-147.96	5.2	6.2
1994	1	5	0:43	67.7	-147.08	5.5	6.8
2006	2	5	8:52	66.3	-142.69	5.5	6

(USGS 2007)

From 1977-2010, 349 earthquakes were recorded within a 100 mile radius of the City of Fort Yukon. The average magnitude of these earthquakes was M 3.0. There has been a noticeable increase within the past two years of more than 1,000 earthquakes recorded within the same 100 mile radius, mostly around M 1.0. From 1977 to 2017, 1,853 earthquakes have been recorded within a 100 mile radius of the City of Fort Yukon. The average magnitude of these earthquakes is M 1.8 (this is a decrease from the M 3.0 reported in the 2010 plan since most of the earthquakes in the last two years have been +/- M1). The largest recorded earthquakes within 100 miles of the City measured M 5.5 occurring on January 5, 1994 and February 5, 2006. They caused no damage to critical facilities, residences, non-residential buildings, or infrastructure.

Planning Team members stated that Fort Yukon experienced moderate to severe ground shaking from the November 3, 2002 M 7.9 Denali EQ located approximately 300 miles away. No significant damage occurred from this event. However, North America's strongest recorded earthquake occurred on March 27, 1964 in Prince William Sound, measuring M 9.2 and was felt by many residents throughout Alaska. Fort Yukon felt ground motion resulting from this historic event; however, no local damage occurred.

5.3.1.3 Location, Extent, Impact, and Probability of Future Events

Location

The entire geographic area of Alaska, and thus the City of Fort Yukon, is prone to earthquake effects. The Denali Fault is located about 300 miles south of Fort Yukon and comprises a fault system of smaller faults running east to west along the border of the Brooks Range. The City lies north of the Preacher, Medicine Lake Lineament, Tintina, and Champion Creek faults and can expect to be impacted by future earthquake events (GSA 1998).

Of the 1,853 recorded earthquakes since 1973, five exceeded M 5.0 and two were M 5.5. (USGS 2017). They both occurred with the epicenter located between six and seven miles from the City. Figure 5-1 shows the locations of active and potentially active faults in Alaska.



Figure 5-1 Active and Potentially Active Faults in Alaska

The Department of Geological and Geophysical Survey (DGGS) Neotectonic Map of Alaska depicts Alaska's known earthquake fault locations. DGGS states:

“The Neotectonic Map of Alaska is the most comprehensive overview of Alaskan Neotectonics published to date; however, users of this map should be aware of the fact the map represents the author’s understanding of Alaskan Neotectonics at the time of publication. Since publication of the Neotectonic map, our understanding of Alaskan Neotectonics has changed and earthquakes have continued to occur. For example, M7.9 Denali fault earthquake ruptured three faults, including the Susitna Glacier fault, which was previously undiscovered...” (DGGS 2009).

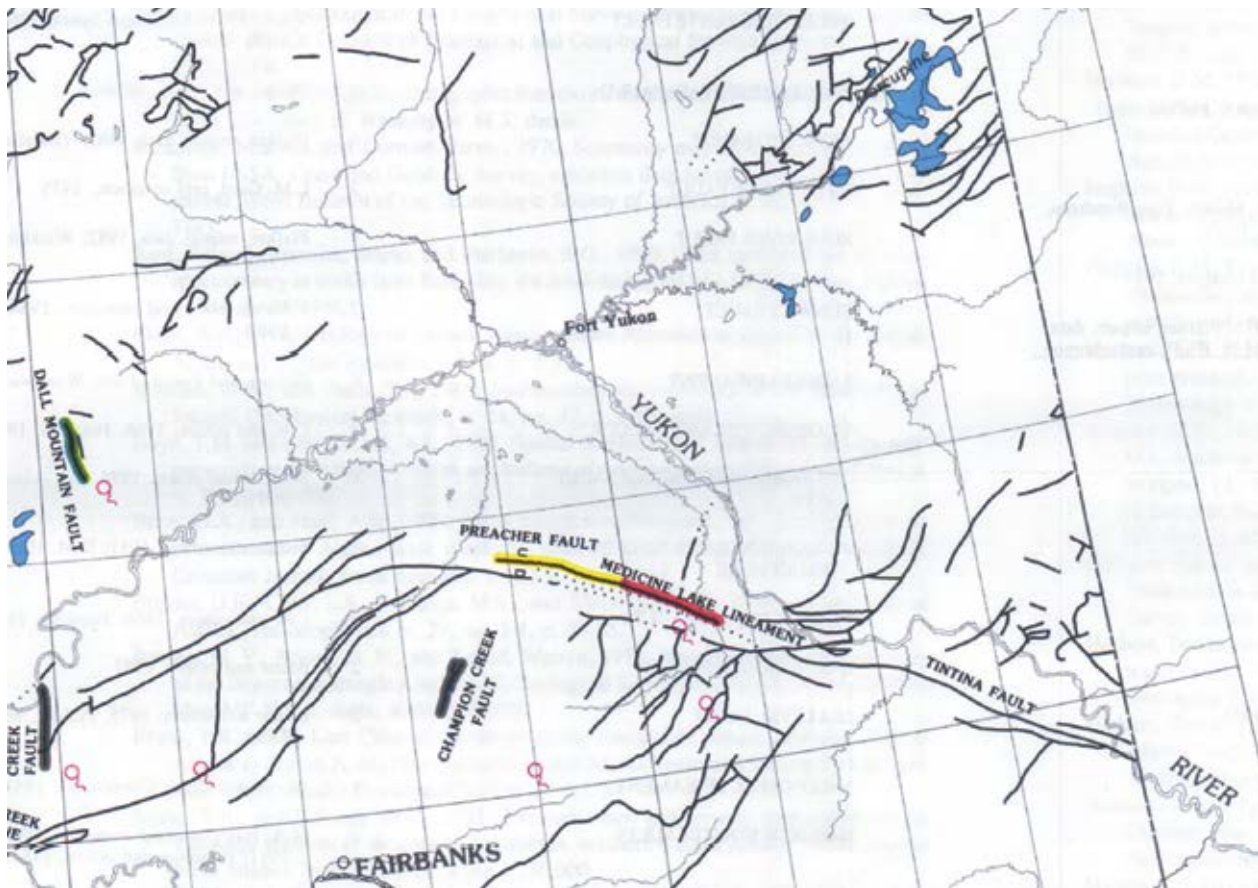


Figure 5-2 Image from the “Neotectonic Map of Alaska” – Fort Yukon Area (DGGs 2009)

Extent

Earthquakes felt in Fort Yukon area have only exceeded M 5.5 twice in the past 44 years (1994 and 2006), and damage has never been reported due to an earthquake event.

Based on historic earthquake events and the criteria identified in Table 5-3, the magnitude and severity of earthquake impacts in the City are considered negligible with minor injuries, the potential for critical facilities to be shutdown for less than 24 hours, less than 10 percent of property or critical infrastructure being severely damaged, and little to no permanent damage to transportation or infrastructure or the economy.

Impact

The City is located in an area that is less active than others in the State, although the effects of earthquakes centered elsewhere are expected to be felt in the City. Impacts to the community such as significant ground movement that may result in infrastructure damage are not expected. Minor shaking may be seen or felt based on past events. Impacts to future populations, residences, critical facilities, and infrastructure are anticipated to remain the same.

Probability of Future Events

The City of Fort Yukon has no official record of significant earthquake activity resulting in damage or injuries. While it is not possible to predict an earthquake, the 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 5-2 indicates that the USGS earthquake probability model places the probability of an earthquake with a likelihood of experiencing strong shaking (0.2g to 0.3g peak ground acceleration) with a 2% probability in 50 years, based on the USGS Alaska hazard model.

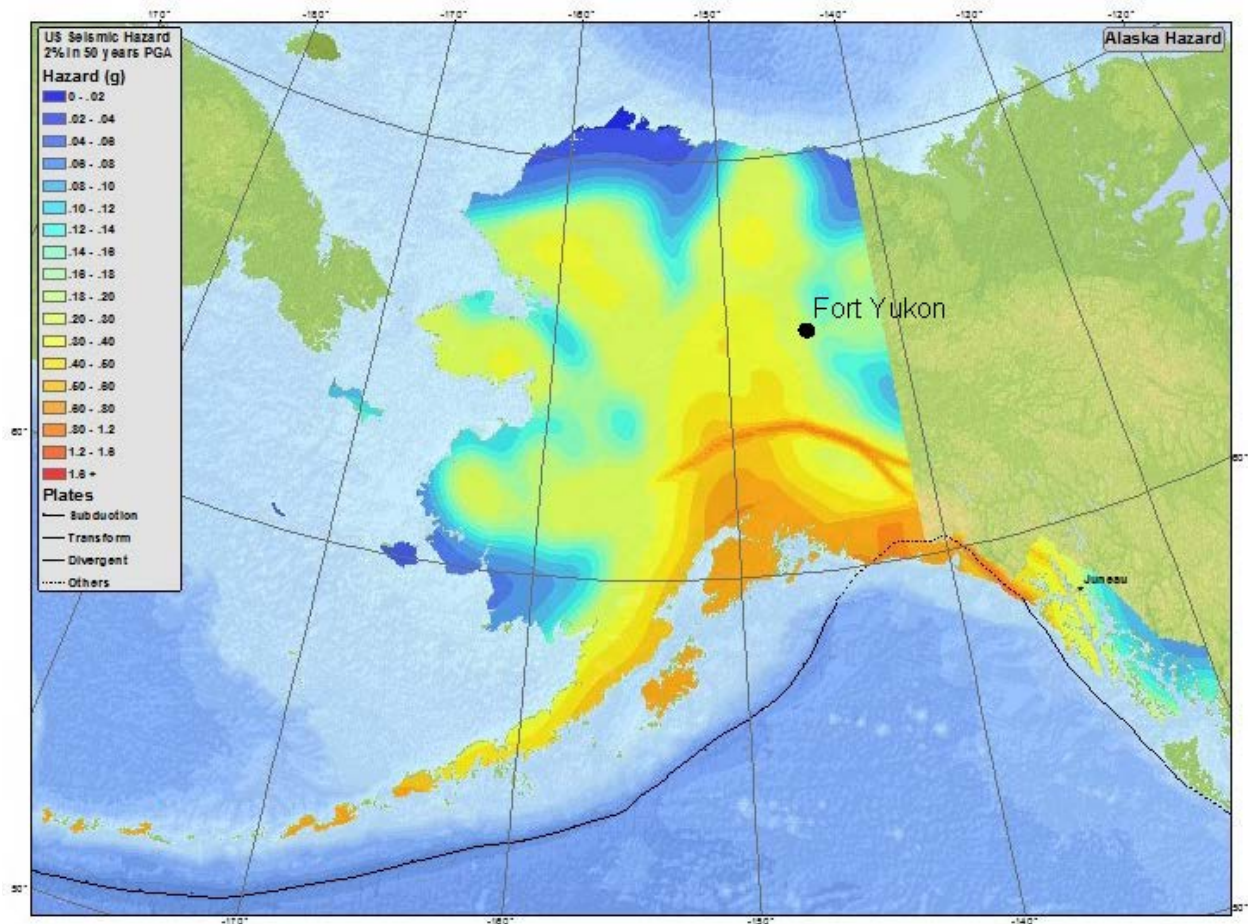


Figure 5-2 Fort Yukon's Earthquake Probability (USGS 2017)

According to Peter Haeussler, USGS, Alaska Region:

"The occurrence of various small earthquakes does not change earthquake probabilities. In fact, in the most dramatic case, the probability of an earthquake on the Denali fault was/is the same the day before the 2002 earthquake as the day afterward. Those are time-independent probabilities. The things that change the hazard maps is changing the number of active faults or changing their slip rate. For... [the City of Fort Yukon], I don't think anything has changed" (Haeussler, 2009).

5.3.2 Erosion

5.3.2.1 Nature

Erosion rarely causes death or injury. However, erosion causes the destruction of property, development and infrastructure. Erosion is the wearing away, transportation, and movement of land. It is usually gradual but can occur rapidly as the result of floods, storms or other events or

slowly as the result of long-term environmental changes. Erosion is a natural process, but its effects can be exacerbated by human activity.

Riverine erosion is a problem in developed areas where disappearing land threatens development and infrastructure. Riverine erosion is a major threat to the City as it threatens the embankment, structures, and the subsistence livelihood of Fort Yukon's residents.

Riverine erosion results from the force of flowing water and ice formations 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.

The USACE erosion assessment stated,

"The river bank is used for a variety of community activities such as fishing, hunting, fish processing, beachcombing, cultural and social events, and driftwood collecting. It also includes boat ramps, snowmachine ramps, ATV ramps, barge access, boat storage, and several residences" (USACE 2009b).

5.3.2.2 History

The City of Fort Yukon's Comprehensive Plan... states,

"Riverbank erosion has always been a major problem, especially since 1955 when a large amount of gravel was removed from the river for construction of the Air Force site. The increased velocity of the river added to the erosion caused by periodic flooding and permafrost thaw. Along some stretches of the river through Fort Yukon the bank has been eroded away to a depth of several hundred feet.

The Corps of Engineers completed a slough closure dike upstream from the town in 1967. This dike diverted slough flow through the main channel and alleviated the major erosion problem. It has also caused a buildup of sediment adjacent to the townsite, moving the channel outward several hundred feet. The U.S. Soil Conservation built seven dikes along the slough and river banks in 1992. They appear to be working. In the summer of 1976, the barge bringing supplies to Fort Yukon was not able to unload until a new loading site was prepared further downstream. In time, the new site will also be threatened with sedimentation" (Fort Yukon 1996).

In addition to the actions identified in the City's Comprehensive Plan, the USACE erosion assessment stated,

"The riverbank is eroding at an estimated rate of 10 to 15 feet per year. The present erosion site is 1,200 to 1,500 feet horizontally and 15 feet vertically, extending from the Y-shaped slough downstream and beyond the barge landing to the finger dikes upstream... These dikes appear to be working, although flooding and erosion have washed away some of the dike material. Federal Emergency Management Agency sponsored a Conceptual Design Study Report for Flood Damage Reduction at Fort Yukon in 1994 and a resulting ring levee was constructed in 1995 to provide protection from a 20 to 25 year flood event" (USACE 2009b).

5.3.2.3 Location, Extent, Impact, and Probability of Future Events

Location

The City's Comprehensive Plan, 1996 states, "Erosion is a serious problem in Fort Yukon. Past erosion control and bank stabilization efforts have been largely successful, however, erosion and subsequent downstream sediment deposition requires the City to continually relocate boat docks and barge landing sites."

Riverine erosion hazards have increased dramatically over the years. Erosion is now directly impacting the City's infrastructure. Factors that influence erosion includes flooding, spring break-up, and melting permafrost.

The riverbanks adjacent to the City are essential to the lives of the residents. According to the USACE, "Two residences are in danger of falling into the river, the city landing for boats is no longer usable due to erosion damage, and the barge landing is in danger of becoming unusable. Outbuildings, residential fuel tanks, food storage structures, drying racks, smoke houses, a main access road, utility poles, power lines, a sewage lagoon, sites of significant cultural and archeological value, pathways, and a park area are all less than 100 feet from the active erosion area" (USACE 2009b). Both of these endangered residences were moved by the Tribe in 2011 to safe locations within the community. The community stated in 2017 that erosion has since lessened in that particular area identified in 2009 due to mitigation measures.

As of 2017, eight houses are on the "wrong side of the dike" and are subject to future erosion.



Figure 5-3 Aerial Photo of Fort Yukon (DCRA 2009)

Extent

A variety of natural and human-induced factors influence the erosion process within the community. River orientation and proximity to up and downstream river bends can influence erosion rates. Embankment composition also influences erosion rates, as sand and silt will erode easily, whereas boulders or large rocks are more erosion resistant. Other factors that may influence riverine erosion include:

- Geomorphology
- Amount of encroachment in the high hazard zone
- Proximity to erosion inducing structures
- Nature of the topography

- Density of development
- Structure types along the embankment
- Embankment elevation

The USACE lists the City of Fort Yukon's erosion threat as a "Monitor Conditions". This classification is applied to communities that have reported significant erosion impacts, but the impacts are not likely to affect the City's viability. However, Federal, State, or other agency intervention may be necessary to prevent the threat from worsening (USACE 2009a).

The following is the USACE's description of the City's erosion threat:

"Bank erosion causes along the Yukon River are reported to be caused by natural river flow, water level changes, flooding, ice jams, spring break up, melting permafrost, boat traffic, pedestrian traffic, and vehicle traffic on the beach and bank all contribute to erosion. A large amount of gravel was removed from the Yukon River during construction of an Air Force site in 1955 which reportedly increased the flow velocity of the river and contributed to erosion. Several hundred feet have eroded along stretches of the river bank over the years, according to the Fort Yukon Comprehensive Plan. The riverbank is eroding at an estimated rate of 10 to 15 feet per year. The present erosion site is 1,200 to 1,500 feet horizontally and 15 feet vertically, extending from the Y-shaped slough downstream and beyond the barge landing to the finger dikes upstream.

The State of Alaska built a slough closure dike in 1967 to alleviate erosion along the south side of town. High water flow in 1989 caused 2 breaches in the dike and a large sediment plug developed upstream. A study team investigated in 1989 and reported it would take several years for erosion to cause this slough to become active again. The U.S. Department of Agriculture Natural Resources Conservation Service built 7 finger dikes along the river bank in 1992. These dikes appear to be working, although flooding and erosion have washed away some of the dike material. Federal Emergency Management Agency sponsored a Conceptual Design Study Report for Flood Damage Reduction at Fort Yukon in 1994 and a resulting ring levee was constructed in 1995 to provide protection from a 20 to 25 year flood event" (USACE 2009b).

The USACE has not conducted an update since 2009.

Figure 5-4 depicts the USACE and other agencies' erosion abatement efforts.

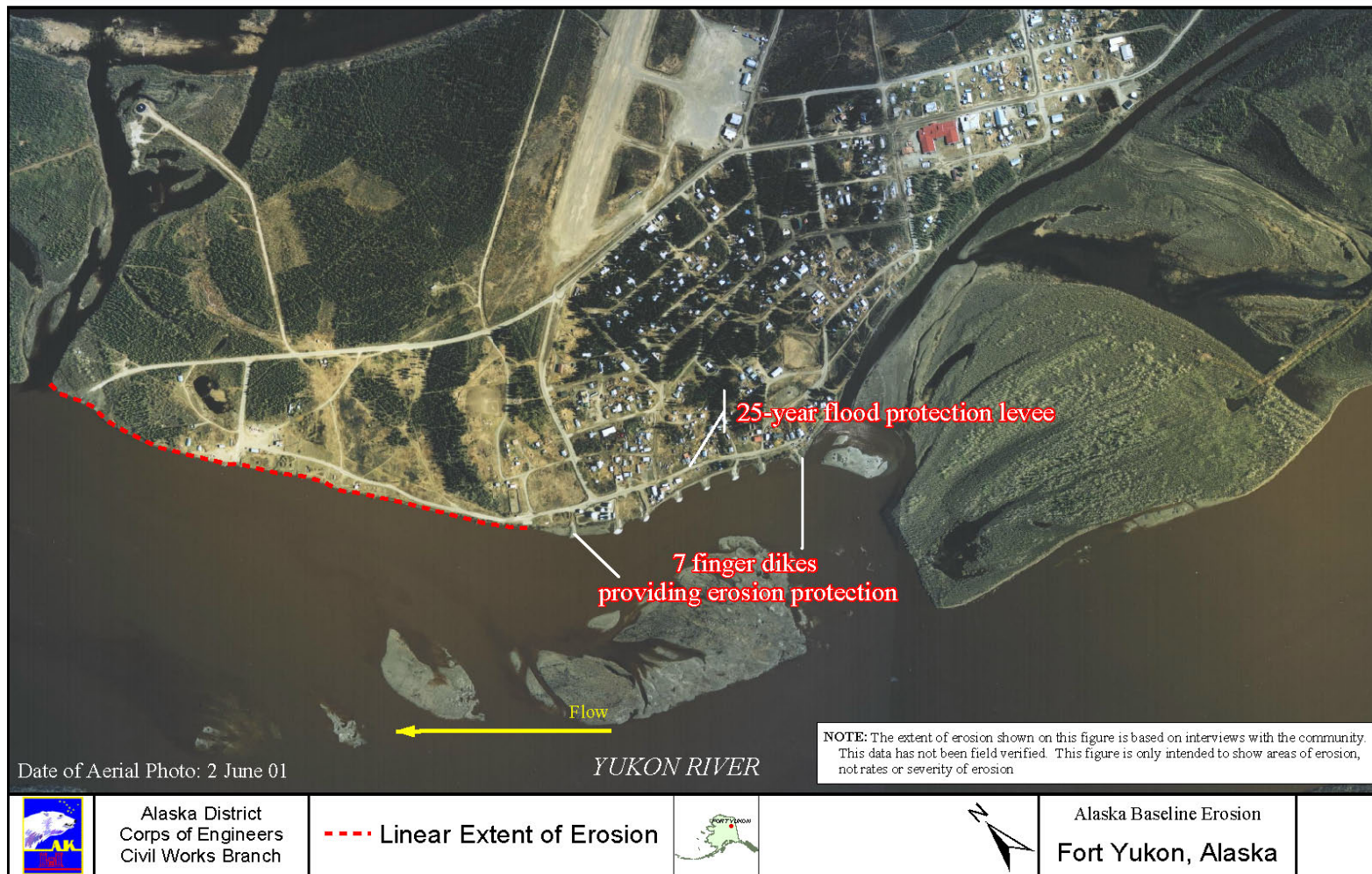


Figure 5-4 Fort Yukon's Erosion Protection Efforts (USACE 2009b)

Based on the City's levee's protection history, past erosion events, the 2009 USACE Alaska Erosion Assessment, and the criteria identified in Table 5-3, the magnitude and severity of erosion impacts in the City are considered "limited" with potential for critical facilities to be shut down for more than a week, and more than 10 percent of property or critical infrastructure being severely damaged.

Impact

Impacts from erosion include loss of land and any development on that land. Erosion can cause increased sedimentation of river deltas and hinder channel navigation—affecting marine transport. Other impacts include reduction in water quality due to high sediment loads, loss of native aquatic habitats, damage to public utilities (fuel headers and electric and water/wastewater utilities), and economic impacts associated with the costs of trying to prevent or control erosion sites.

Probability of Future Events

Based on historical impacts, the USACE Baseline Erosion Assessment, and the criteria identified in Table 5-2, it is likely that erosion will occur in the next three years (event has up to 1 in 3 years chance of occurring) as the history of events is greater than 20 percent but less than or equal to 33 percent likely per year. The community agrees that the probability is likely the same as it was seven years ago in the 2010 plan.

5.3.3 Flood

5.3.3.1 Nature

Flooding is the accumulation of water where usually none occurs or the overflow of excess water from a stream, river, lake, reservoir, glacier, or coastal body of water onto adjacent floodplains. Floodplains are lowlands adjacent to water bodies that are subject to recurring floods. Floods are natural events that are considered hazards only when people and property are affected.

Four primary types of flooding occur in the City including: rainfall-runoff floods; snowmelt floods; ice jam floods; and ice overflow (aufeis) flooding.

Rainfall-runoff Flood

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

Snowmelt Flood

Snowmelt floods typically occur from April through June. The depths of the snowpack and spring weather patterns influence the magnitude of flooding.

Ice Jam Flood

Ice jam floods occur after an ice jam develops; thus, this type of flood can occur any time of the year that a river has ice on it. Ice jams restrict water flow on a river or stream and form during April through June under the following three situations:

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

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

Water levels increase upstream behind the location of the ice jam. The result is flooding of an area by creating a lake-like effect covering a large area. Little damage typically occurs from the water current upstream of the ice jam, but significant damage can result from flooding. However, the downstream effect is very different. As soon as the ice jam is breached, there is usually rapid draining of the dammed water. Downstream water levels rise substantially after the ice jam is breached and strong water currents are created, which can cause erosion and other significant damages. Additionally, the rising water causes the ice to float while increased velocities of water move the ice further downstream. The motion of large solid ice blocks is often destructive to natural and material property in the vicinities. When ice jams cause flood events during spring break-up, snowmelt can contribute to the flood. Notable large floods in recent years on the Kuskokwim, Koyukuk, and Yukon Rivers (and locally the Porcupine River) were all caused by ice jams and snowmelt.

Ice Overflow (Aufeis) Flood

Aufeis is glaciation or icing of streams and rivers, affecting road surfaces and infrastructure. Aufeis forms during the winter when emerging ground water freezes. Stream glacial flooding occurs when ice forms from the bottom up, not from the top down forcing water out of the stream channel. If aufeis occurs on a roadway, it makes travel difficult. For example, the Steese Highway frequently has an aufeis problem in the winter months. In the mid 1980s, several homes in Fox suffered from an aufeis event occurring at the wellhead. The homes flooded 6 ft deep, then froze.

Timing of events

Many floods are predictable based on rainfall patterns. Most of the annual precipitation is received from April through October with August being the wettest. This rainfall leads to flooding in early/late summer and/or fall. Spring snowmelt increases runoff, which can cause flooding. It also breaks the winter ice cover, which causes localized ice-jam floods.

5.3.3.2 History

According to the City's Comprehensive Plan, nearly the entire City is prone to flood impacts from the Yukon and Porcupine Rivers. The worst flooding event occurred in 1949 from an ice jam on the Porcupine River upstream of its Yukon River confluence (Fort Yukon 1996). The USACE Floodplain Management Program report stated,

“The most damaging flood in recent times occurred in 1949 as a result of ice jams on the Porcupine River. A still water elevation of 435 ft above MSL [mean sea level] was reported in the community center. The floodwaters were 7 ft deep on Main Street. History shows that flooding within the City of Fort Yukon occurs in mid-May during the breakup of the Yukon and Porcupine Rivers and is caused mainly by ice jams” (USACE 2009).



Figure 5-5 Fort Yukon Flood Gauges (USACE 2009)

The City's FEMA 2010 Flood Insurance Study states,

"Past history shows that flooding within the City of Fort Yukon occurs in mid-May during the breakup of the Yukon and Porcupine Rivers and is caused mainly by ice jams. Other causes of flooding are rapid snowmelt or a combination of rain and snowmelt, occurring during late May or early June. Although flood history is not well documented, there are known instances of flood during other months ... Past flood events at Fort Yukon are listed in USACE Table 1" (FEMA 2010).

USACE Table 1. Flood Events at Fort Yukon

Year	Cause of Flooding
1889	Ice jam in mouth of Porcupine River, probably aggravated by late runoff
1927	Ice jam
1934	Ice Jam
1936	Probably local ice jam in Yukon forcing water through slough
1937	Ice jam Yukon immediately below town
1945	Late, rapid breakup compounded by ice jam
1948	Ice jam
1949	Ice jam above Forty Yukon on Porcupine River
1957	Ice jam
1961	Ice jam
1963	Ice jam and excessive spring runoff
1975	Ice jam
1979	Ice jam
1982	Ice jam

USACE Table 1. Flood Events at Fort Yukon

Year	Cause of Flooding
1989	Ice jam
1990	Ice jam
1991	Ice jam (mild breakup; water rose over bank)

“There have been a number of major floods at Fort Yukon. The U.S. Air Force documents 12 known flood events at Fort Yukon between 1924 and 1954. Between 1928 and 1933, there are no records of flooding, however, it is very likely that some occurred. Since 1954, there have been numerous occurrences of flooding from both ice jams and spring snowmelt and rain. The greatest non-ice jam flood occurred in June 1964 with an estimated elevation between 441 and 442 [National American Vertical Datum of 1988(NAVD 88)]. The greatest recorded flood level at Fort Yukon occurred on May 19, 1949, and was caused by a combination of ice jam and high stream-flow ... A still water elevation estimated to be 445 feet NAVD88 was reported in the community center” (FEMA 2010).

The Presidentially- declared 2009 Yukon Flats Flood had tremendous impact on the City of Fort Yukon. The following High Water Mark (HWE) photos depict water levels throughout the City. The photos are supplied by The National Weather Service (NWS) for this event (Figure 5-6):

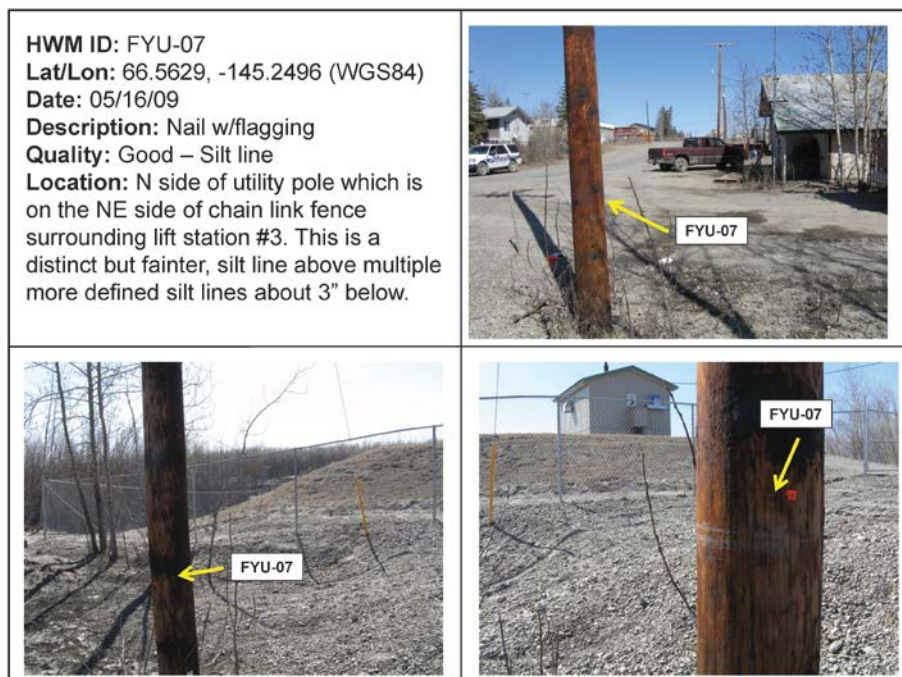




Figure 5-6 Fort Yukon Flood Impacts (NWS 2009)

The NWS has additional photos from this event that can be viewed at: http://aprfc.arh.noaa.gov/gages/HWM/HWMsite_fyu.html. Simply click on the location points on the map to see the HWE for that location.

Table 5-6 contains a comprehensive list of NWS's recorded historical flood events affecting Fort Yukon.

Table 5-6 Historical Flood Events

AK Zone(s)	Location(s)	Date(s)	Event	Description
	Fort Yukon	1949	Ice Jam Flood	Porcupine River Ice jam release caused high water flow once the ice jam was breached.
003, 004, 006, 007	Upper Yukon Valley	2/16-18/1996	Blizzard	A strong storm event produced snow; approximately 6 inches.
003	Upper Yukon Valley	06/15-21/1997	Flood	Rain of up to 3.8 inches during the 12 th through 15 th caused significant rises in streams over the zone. Several homes were flooded at Chalkyitsik on the Black River, and a road at Fort Yukon had some minor flooding near the confluence of the Porcupine and Sucker Rivers.
003	Upper Yukon Valley	8/26-31/1997	Thunderstorm Generated Flood	A large thunderstorm (complex) produced rains of .9 to 1.1 inches.
220, 222	Yukon Flats	05/01-03/2005	Flood	An Ice Jam on the Yukon River produced minor flooding of road and a few structures in the Village of Fort Yukon. Damage amount is a rough estimate (\$3,000).
220	Yukon Flats	5/7-9/2009	Ice Jam Flood	A large volume of water and a considerable and a 20 mile long ice run passed Fort Yukon. The water levels rose rapidly at Fort Yukon during the late evening of the 7 th , and several streets were flooded and people were evacuated from the low-lying areas that were flooding. The flooding became more severe overnight as water began to inundate portions of the village with water several feet deep in some homes and low-lying areas near the river. About one-half of the village flooded and the main taxiway at the airport was damaged. The levee in front of town also received some damage. The water levels remained high and the flooding continued into the 8 th . The water levels began to recede on the morning of the 9 th , and dropped approximately 7 feet by the evening of the 9 th . (Damages for this event are estimated at \$190,000,000 for all affected communities)
	Yukon Flats	5/17 – 6/10, 2013	Ice Jam Flood	Excessive snow pack and ice thickness, combined with rapid spring warming caused ice jams and severe flooding. Approximately 194 homes (requiring evacuations and sheltering) were severely damaged in all affected communities. This event cost Federal and State funds \$71,402,492.29. Fort Yukon was not one of the affected Yukon Flats' communities affected.
	Fort Yukon	5/20-27/2015	Flood	Warmer than normal temperatures in mid-May caused rapid snowmelt in the highlands of northeastern Alaska causing a corresponding rise in runoff in the Yukon and Porcupine Rivers. After the water levels receded, the City of Fort

Table 5-6 Historical Flood Events

AK Zone(s)	Location(s)	Date(s)	Event	Description
				Yukon began a damage assessment of the area and discovered flood-related damage to three roads, and the embankment of the sewage lagoon. A total of \$50,000 Public Assistance funds were made available for this event. The City met its funding obligations, but the community maintains this was only enough money to repair drainage, gabion, and road using a lower 48 pay scale. No mitigation measures were done.

(Lingaas 2010, Fort Yukon 1996, Disaster Cost Index 2016)

5.3.3.3 Location, Extent, Impact, and Probability of Future Events

Location

The City's Comprehensive Plan states,

“Almost all of the Fort Yukon townsite is subject to flooding [Figure 5-7] except the eastern portion called Crow Town and the Air Force (Aircraft Control & Warning) AC&W, and communication sites. Flooding from spring runoff are often made worse by ice jams. The most damaging flood in recent times occurred in 1949 as a result of the Porcupine River north of Fort Yukon... Flood damage is sometimes slight from a monetary standpoint, but it is a hardship to residents and a deterrent to development.

Relocation of the townsite has also been proposed. Residents have resisted moving because the river is a lifeline for supplies and important to their subsistence hunting and fishing and because there is no available high ground within a reasonable distance. Land elevations within the community vary between 428 and 438 feet above sea level...

Most of the town lies below the base flood elevation of 440 feet. The construction of dikes and flood control levees will have an important impact on land use within Fort Yukon... [a] ring levee, was constructed in 1995... around the most populated and flood prone areas of the community, and did not involve changing the shoreline or channel of the Yukon River... built to a height of 439 feet, or about eight feet above ground level at its highest point...The project is designed to protect the town from 20-25 year flood events, but not against 100-year and 500-year events. The height is a compromise between the need to protect property from flood, cost, physical access problems, and unsightly visual barriers.

The levee is designed to keep flood waters from entering the inside of the ring. In the event flood waters do exceed the height of the levee, a series of one-way culverts should drain the impounded area, thus avoiding the potential for a “bathtub effect” (Fort Yukon 1996).

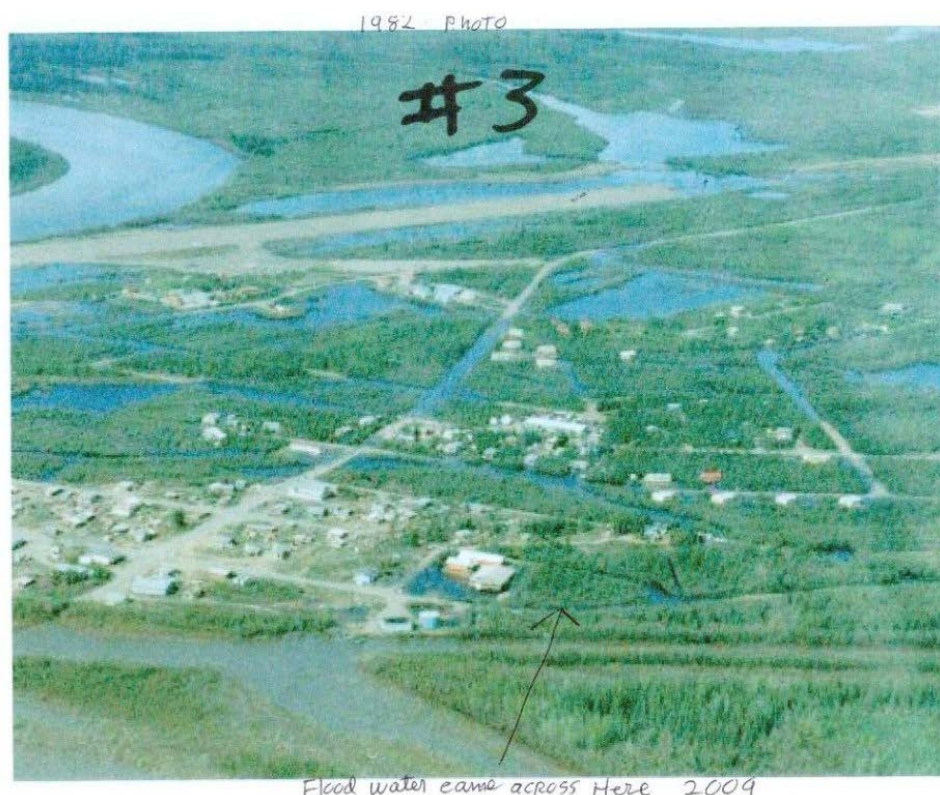


Figure 5-7 Fort Yukon Flood Threat (Fort Yukon 2010)

Subsequently, the entire community is susceptible to flood impacts and is supported by the USACE, Floodplain Management Flood Hazard Data report:

“There are two vertical datum in the community. The Corps of Engineers (COE) datum is based on the U.S. Coast and Geodetic Survey's 1953 documentation. The other datum is the one preferred by the city of Fort Yukon because much of the infrastructure was constructed using this datum. The difference between the two datum is 4.5 ft. Therefore, the city datum BFE of 439.5 ft corresponds to the COE datum BFE of 435.0 ft. High Water Elevation (HWE) signs are distributed throughout town. Full bank is at approximately 432.2 ft” (USACE 2009).

Figure 5-8 depicts the City's FEMA identified 100-year flood hazard area with the City's critical facilities identified to depict their potential threat.

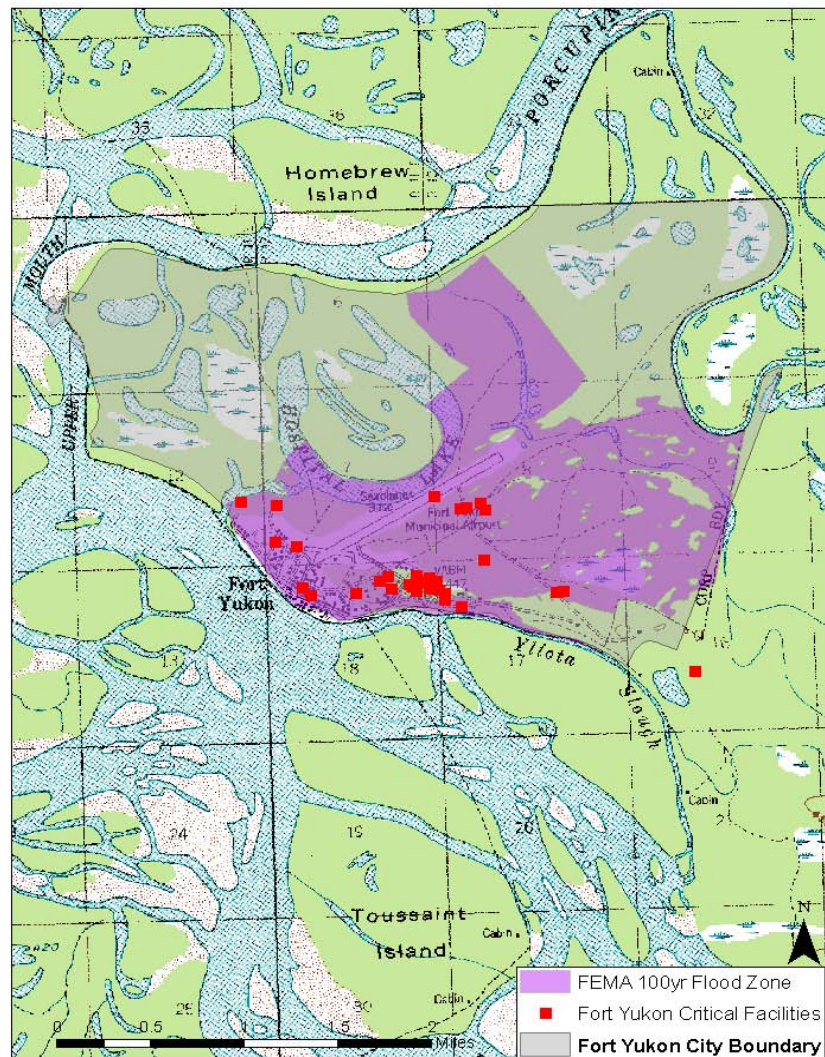


Figure 5-8 City of Fort Yukon's Flood Hazard Area

Extent

Floods are described in terms of their extent (including the horizontal area affected and the vertical depth of floodwaters) and the related probability of occurrence.

The following factors contribute to riverine flooding frequency and severity:

- Rainfall intensity and duration.
- Antecedent moisture conditions.
- Watershed conditions, including terrain steepness, soil types, amount, vegetation type, and development density.
- The attenuating feature existence in the watershed, including natural features such as swamps and lakes and human-built features such as dams.
- The flood control feature existence, such as levees and flood control channels.
- Flow velocity.
- Availability of sediment for transport, and the bed and embankment watercourse erodibility.
- Village or city location related to the base flood elevation as indicated with their certified high water mark.

The City has two datums present. The Yukon River bank and City ground level is approximately 432.2 feet. The ring levee protects to 439 feet; whereas the base-flood-elevation (BFE) is 440 feet. Therefore, the City is protected with the ring levee up to two feet below the BFE (100-year event (Fort Yukon 1996).

The USACE has reported that high water elevation (HWE) signs are placed throughout the community referencing one of the two existing datums. The City has used these signs to ensure they construct any new structures or infrastructure to the recommended BFE to remain compliant with NFIP requirements.

The City's typical flood extent is portrayed by Figure 5-9.



Figure 5-9 1992 Fort Yukon Flood (FAA 2010)

Figure 5-10 depicts the City's U. S. Soil Conservation Service's 1992 finger dike construction project and the 1995 USACE ring levee installed to protect the City from flood impacts.



Figure 5-10 USACE Flood Protection Levee System (USACE 2009b)

Based on the protection for 20- to 25-year flood events provided by the extensive dike and levee, past flood event history, and the criteria identified in Table 5-3, the extent of flood impacts in the City are considered limited where injuries do not result in permanent disability, complete

shutdown of critical facilities occurs for more than one week, and more than 10 percent of property is severely damaged.

Impact

Nationwide, floods result in more deaths than any other natural hazard. Physical damage from floods includes the following:

- Structure flood inundation, causing water damage to structural elements and contents.
- Erosion or scouring of stream banks, roadway embankments, foundations, footings for bridge piers, and other features.
- Damage to structures, roads, bridges, culverts, and other features from high-velocity flow and debris carried by floodwaters. Such debris may also accumulate on bridge piers and in culverts, increasing loads on these features or causing overtopping or backwater damages.
- Sewage and hazardous or toxic materials release as wastewater treatment plants or sewage lagoons are inundated, storage tanks are damaged, and pipelines are severed.

Floods also result in economic losses through business and government facility closure, communications, utility (such as water and sewer), and transportation services disruptions. Floods result in excessive expenditures for emergency response, and generally disrupt the normal function of a community.

Impacts and problems also related to flooding are deposition and stream bank erosion (erosion is discussed in detail in Section 5.3.2). Deposition is the accumulation of soil, silt, and other particles on a river bottom or delta. Deposition leads to the destruction of fish habitat, presents a challenge for navigational purposes, and prevents access to historical boat and barge landing areas. Deposition also reduces channel capacity, resulting in increased flooding or bank erosion. Stream bank erosion involves the removal of material from the stream bank. When bank erosion is excessive, it becomes a concern because it results in loss of streamside vegetation, loss of fish habitat, and loss of land and property (BKP 1988).

Probability of Future Events

FEMA's Flood Insurance Study states,

"For the flooding sources studied by detailed methods in the community, standard hydrologic and hydraulic study methods were used to determine the flood-hazard data required for this study. Flood events of a magnitude that is expected to be equaled or exceeded once on the average during any 10-, 50-, 100- or 500-year period (recurrence interval) have been selected as having special significance for floodplain management and or flood insurance rates. These events, commonly termed 10-, 50-, 100- or 500-year flood, have a 10-, 2-, 1-, and 0.2-percent chance, respectively, of being equaled or exceeded during any year. Although the recurrence interval represents the long-term, average period between floods of a specific magnitude, rare floods could occur at short intervals or even within the same year. For example, the risk of having a flood that equals or exceeds the 1-percent-annual-chance flood in any 50-year period is approximately 40 percent (4 in 10); for any 90-year period, the risk increased to approximately 60 percent (6 in 10)..."

Hydrologic analyses were carried out to establish peak discharge-frequency relationships for each flooding source studied by detailed methods affecting the community.

No stream record exists for the Yukon or Porcupine Rivers at Fort Yukon; however, the Porcupine River has 12 years of record and the Yukon has 27 years of record at sites near Fort Yukon. Peak flood frequencies were developed for nearby sites using the Log-Pearson Type III method as outlined by the Water Resources Council. From these frequency curves, flood peaks were derived for the 10, 2, 1, and 0.2 percent annual chance flood events using the cubic feet per square mile ratio for the Porcupine River and the Yukon River at Fort Yukon. These data are shown in Table 2....”.

FEMA Table 2. Summary of Discharges

		Peak Discharges (cubic feet per second)			
<i>Flooding Source and Location</i>	<i>Drainage Area (square miles)</i>	<i>10 Percent Annual Chance Flood</i>	<i>2 Percent Annual Chance Flood</i>	<i>1 Percent Annual Chance Flood</i>	<i>0.2 Percent Annual Chance Flood</i>
<i>Yukon River below Forty Yukon</i>	<i>182,000</i>	<i>720,000</i>	<i>900,000</i>	<i>980,000</i>	<i>1,200,000</i>
<i>Yukon River at Fort Yukon</i>	<i>126,200</i>	<i>500,000</i>	<i>670,000</i>	<i>720,000</i>	<i>890,000</i>
<i>Porcupine River at Fort Yukon</i>	<i>56,000</i>	<i>430,000</i>	<i>590,000</i>	<i>640,000</i>	<i>810,000</i>

(FEMA 2010)

Based on previous occurrences and data contained in the City’s 2010 Flood Insurance Study, there is a 1 in 1 year chance of occurring (1/1=100 percent). History of events is greater than 33 percent likely per year. There is no data identifying a 500-year (0.2 percent chance of occurring in a given year) flood threat in Fort Yukon. Fort Yukon is not included in the Risk Map study, and no other flood insurance studies have occurred since 2010.

5.3.4 Permafrost

5.3.4.1 Nature

Permafrost is defined as soil, sand, gravel, or bedrock that has remained below 32°F for two or more years. Permafrost can exist as massive ice wedges and lenses in poorly drained soils or as relatively dry matrix in well-drained gravel or bedrock. During the summer, the surficial soil material thaws to a depth of a few feet, but the underlying frozen materials prevent drainage. The surficial material that is subject to annual freezing and thawing is referred to as the “active layer”.

Permafrost melting (or degradation) occurs naturally as a result of climate change, although this is usually a very gradual process. Thermokarst is the process by which characteristic land forms result from the melting of ice-rich permafrost. As a result of thermokarst, subsidence often creates depressions that fill with melt water, producing water bodies referred to as thermokarst lakes or thaw lakes.

Human induced ground warming can often degrade permafrost much faster than natural degradation caused by a warming climate. Permafrost degradation can be caused by constructing warm structures on the ground surface allowing heat transfer to the underlying ground. Under this scenario, improperly designed and constructed structures can settle as the ground subsides, resulting in loss of the structure or expensive repairs. Permafrost is also degraded by damaging the insulating vegetative ground cover, allowing the summer thaw to extend deeper into the soil

causing subsidence of ice-rich permafrost, often leading to creation of thermokarst water bodies. Evidence of this type of degradation can be seen where thermokarst water bodies are abundant in the ruts of an old trail used by heavy equipment (cat trails) or where roads or railroads constructed by clearing and grubbing have settled unevenly.

5.3.4.2 History

There is no written record defining permafrost impacts. However, Planning Team Members stated “uneven settling throughout the years within the City has damaged buildings and roads constructed in discontinuous permafrost areas.” Public Works stated this hazard has gotten a lot worse since 2010.

5.3.4.3 Location, Extent, Impact, and Probability of Future Events

Location

The City of Fort Yukon’s Comprehensive Plan states “Permafrost is present throughout the [City].” And subsequently discusses its soils types and permafrost locations:

“...The permafrost tables here are usually 4 or more feet below the surface and may be absent close to the river. These well-drained soils also have the best potential for construction if the particular area is not subject to flooding.

A secondary soil type in the Yukon Flats is found in the many shallow slough and old stream channels. It is mostly poorly drained and is perennially frozen at shallow depths; permafrost tables are within 2 feet of the surface. Soil with these characteristics present severe construction limitations. Dominant vegetation is mosses, stunted black spruce, dwarf birch, sedge tussocks, and lichens. Maintaining vegetation in these areas is important in keeping the permafrost tables at existing levels. If vegetation is removed, the permafrost tables lower, resulting in settling of the ground surface, and erosion along the streams.

Permafrost is discontinuous in the Yukon Flats, but in poorly drained areas it may occur to a considerable depth. At Fort Yukon, the depth of permafrost was found to exceed 320 feet. Beneath water bodies and well-drained sites, the ground is frozen. Layers of unfrozen deposits can also be found within zones of permafrost. Ground ice is common in the permafrost areas. In some locations where it has melted and left depressions, lakes have formed. These are known as “thaw” or “cave-in” lakes.

Because of permafrost, there is little groundwater except near streams. Aquifers apparently do not exist and the yield from wells is low. Springs exist in the area, and the best known is Circle Hot Springs. All water in the area appears to be of the calcium bicarbonate type, which is categorized as hard water” (Fort Yukon 2007).

According to a permafrost map completed by the Institute of Northern Engineering, University of Alaska Fairbanks located in the Alaska Hazard Mitigation Plan 2013, the City’s Comprehensive Plan, and comments received from the Planning Team, the entire City is underlain by discontinuous permafrost. (Figure 5-11)

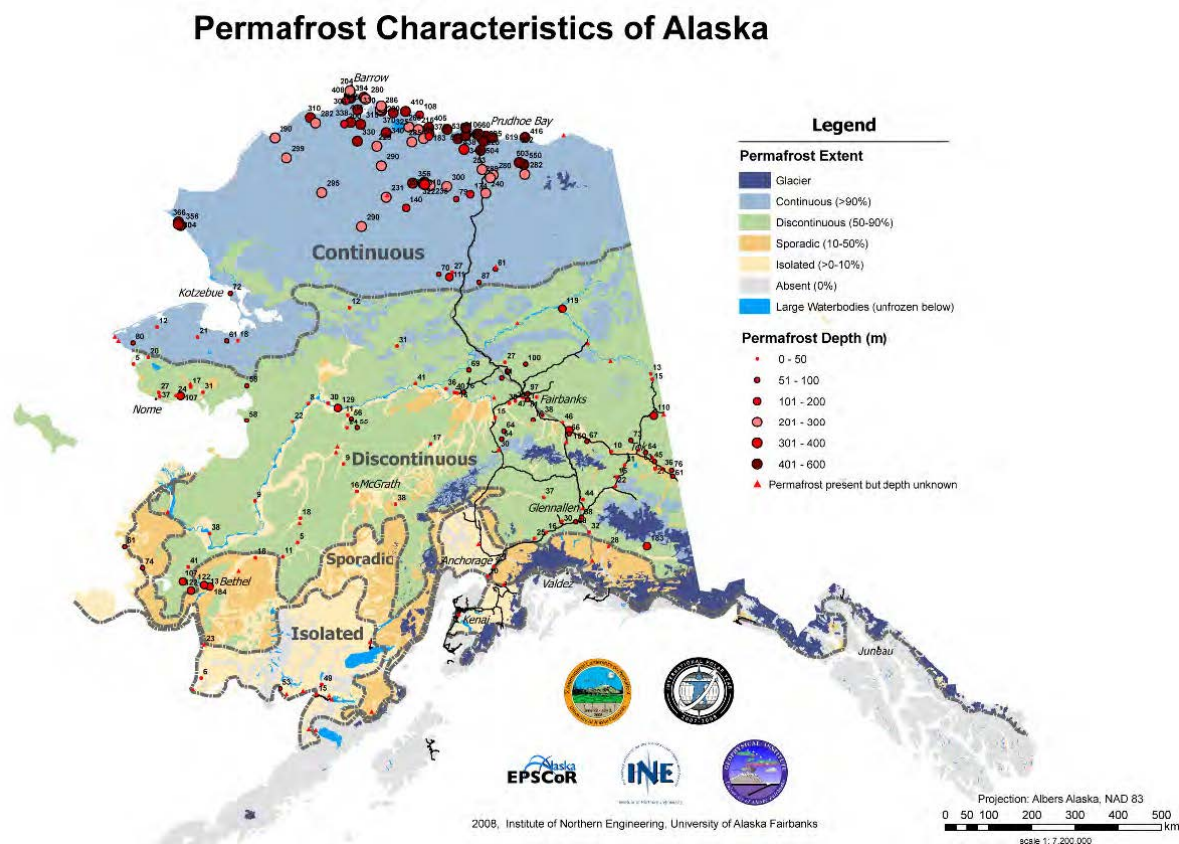


Figure 5-11 Permafrost Map of Alaska (Alaska Hazard Mitigation Plan 2013)

Extent

The damage magnitude could range from minor with some repairs required and little to no damage to transportation, infrastructure, or the economy to major if a critical facility (such as the airport) were damaged and transportation was affected.

Based on research, the Planning Team's knowledge of past permafrost degradation events, and the criteria identified in Table 5-3, the extent of permafrost degradation impacts in the City are considered limited. Impacts would not occur quickly but over time with warning signs.

Therefore, this hazard would not likely result in injuries or death, neither would it shut down critical facilities and services. However, 10 percent of property could be severely damaged.

The Mayor noted that permafrost typically is encountered at four to six feet below ground surface when digging grave sites.

Impact

Impacts associated with degrading permafrost include surface subsidence, infrastructure, structure, and/or road damage. Permafrost does not pose a sudden and catastrophic hazard, but improperly designed and constructed structures can settle as the ground subsides, resulting in loss of the structure or expensive repairs. Permafrost restricts use of the ground surface, and affects the location and design of roads, buildings, communities, pipelines, airfields, and bridges. To avoid costly damage to these facilities, careful planning and design in the location and construction of facilities is warranted.

Probability of Future Events

There is no written record defining permafrost impacts for the City. However, the Planning Team stated that permafrost damage occurs annually to structures and roads throughout the community. The Planning Team further stated the probability for permafrost occurring follows the criteria in Table 5-2, the probability of future damage resulting from permafrost is possible in the next five years (event has up to 1 in 5 years chance of occurring) as the history of events is greater than 10 percent but less than or equal to 20 percent likely per year (Fort Yukon 2010).

5.3.5 Weather (Severe)**5.3.5.1 Nature**

Severe weather occurs throughout Alaska with extremes experienced by the City of Fort Yukon that includes thunderstorms, lightning, hail, heavy and drifting snow, freezing rain/ice storm, extreme cold, and high winds. The City experiences periodic severe weather events such as the following:

Heavy and Drifting Snow

Heavy snow generally means snowfall accumulating to four inches or more in depth in 12 hours or less or six inches or more in depth in 24 hours or less. Drifting is the uneven distribution of snowfall and snow depth caused by strong surface winds. Drifting snow may occur during or after a snowfall.

Freezing Rain/Ice Storm

Freezing rain and ice storms occur when rain or drizzle freezes on surfaces, accumulating 12 inches in less than 24 hours. Ice accumulations can damage trees, utility poles, and communication towers which disrupts transportation, power, and communications.

Extreme Cold

The definition of extreme cold varies according to the normal climate of a region. In areas unaccustomed to winter weather, near freezing temperatures are considered “extreme”. In Alaska, extreme cold usually involves temperatures between -20 to -50°F. Excessive cold may accompany winter storms, be left in their wake, or can occur without storm activity. Extreme cold accompanied by wind exacerbates exposure injuries such as frostbite and hypothermia.

High Winds

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

Strong winds occasionally occur over the interior due to strong pressure differences, especially where influenced by mountainous terrain, but the windiest places in Alaska are generally along the coastlines.

(NWS 2001)

5.3.5.2 History

Table 5-7 lists the National Weather Service’s major storm events for Fort Yukon’s Weather Zone. Each weather event may not have specifically impacted the City, but they were listed due to the City’s close proximity to listed communities or by location within the identified zone.

Table 5-7 Severe Weather Events

AK Zone(s)	Location(s)	Date(s)	Event	Description
		1927	Record Warm Winter Temperatures	Record high winter temperature in Fort Yukon 40°F.
	Statewide	1/2/89 to 5/10/89	Extreme cold	Omega Block Cold Spell, with record breaking temperatures as low as -85 degrees Fahrenheit (°F). The State conducted a wide variety of emergency actions, which included: emergency repairs to maintain & prevent damage to water, sewer & electrical systems, emergency resupply of essential fuels & food, & DOT/PF support in maintaining access to isolated communities
	Fort Yukon	5/9/1989	Flood	Flooding of the Yukon River - occurred one day after the Circle flood, included in the Presidential Declaration of Major Disaster, incorporated sixteen local declarations and applied to all communities on Yukon, Kuskokwim and Kobuk rivers and their tributaries.
	Upper Yukon River	6/1992	Flood	Very late spring, post-breakup (snow melt) flooding of the Yukon River and its tributaries from Fort Yukon to Rampart. Flood waters rose slowly over a period of days and receded gradually. Major damage was sustained by both public and private property. The Individual Family Grant (IFG) program was implemented in Fort Yukon, Beaver, Stevens Village and North Pole.
003, 004, 006, 007	Upper Yukon Valley	2/16-18/1996	Blizzard	A strong storm event produced snow; approximately 6 inches.
003	Upper Yukon Valley	06/15-21/1997	Flood	Rain of up to 3.8 inches during the 12 th through 15 th caused significant rises in streams over the zone. Several homes were flooded at Chalkyitsik on the Black River, and a road at Fort Yukon had some minor flooding near the confluence of the Porcupine and Sucker Rivers.
003	Upper Yukon Valley	8/26-31/1997	Thunderstorm Generated Flood	A large thunderstorm (complex) produced rains of 0.9 to 1.1 inches.
003004-005-007-008	Upper Yukon Valley	2/1-12/1999	Extreme Wind Chill	While northern Alaska was under a relatively cold air mass, a large pool of colder air moved from the Russian high arctic and proceeded to Interior Alaska. Fort Yukon reached -60°F.
003-006-009	Upper Yukon Valley	2/09-12/1999	Blizzard	A low pressure system generated blizzard conditions.
220	Yukon Flats	1/6-7/2005	Blizzard	A small low pressure system induced snow storm.
220, 222	Yukon Flats	05/01-03/2005	Flood	An Ice Jam on the Yukon River produced minor flooding of road and a few structures in the Village of Fort Yukon. Damage amount is a

Table 5-7 Severe Weather Events

AK Zone(s)	Location(s)	Date(s)	Event	Description
				rough estimate (\$3,000).
218, 219, 220, 221, 222, 223, 224, 225, 226	Yukon Flats	12/27-31/2008	Extreme Cold/Wind Chill	A significant cold snap developed across Interior Alaska on December 27 th and continued into January. Fort Yukon temperatures dropped to -54°F on 12/31/08.
218, 219, 220, 221, 222, 223, 224, 225, 226	Yukon Flats	1/1-12/2009	Extreme Cold/Wind Chill	Continuing cold temperatures from above Fort Yukon temperatures dropped to -61°F on 1/4/09.
218, 219, 220, 221, 222, 223, 224, 225, 226	Yukon Flats	1/15-17/2009	Warm Chinook Winter Temperatures	The cold snap ended with extreme warm temperatures. Fort Yukon reached 46°F. Previous high was 40°F in 1927.
207, 209, 210, 212, 213, 214, 215, 216, 217, 218, 219, 220, 221, 225, 226		02/19/2009	Winter Storm	A 970 mb low in the central Bering Sea on the afternoon of the 17th tracked to the southern Chukchi Sea on the afternoon of the 18th, and then along the arctic coast on the 19th. This storm system brought heavy snow and blizzard conditions to much of northern Alaska. High winds were also observed in the passes of the Alaska Range. Zone 220: Snow and strong winds were observed at Eagle Summit along the Steese Highway during the morning hours on the 19th. It was estimated from DOT reports that the wind was gusting over 45 mph with low visibilities with blowing and heavy drifting snow.
220	Yukon Flats	5/7-9/2009	Ice Jam Flood	A large volume of water and a considerable amount of ice moved down river after the historic flooding at Eagle and moderate flooding at Circle. A 35 mile long ice run that moved by Circle during the evening of the 6 th , diminished to a 20 mile long ice run as it passed Fort Yukon. The water levels rose rapidly at Fort Yukon during the late evening of the 7 th , and several streets were flooded and people were evacuated from the low-lying areas that were flooding. The flooding became more severe overnight as water began to inundate portions of the village with water several feet deep in some homes and low-lying areas near the river. About one-half of the village flooded and the main taxiway at the airport was damaged. The levee in front of town also received some damage. The water levels remained high and the flooding continued into the 8 th . The water levels began to recede on the morning of the 9 th , and dropped approximately 7 feet by the

Table 5-7 Severe Weather Events

AK Zone(s)	Location(s)	Date(s)	Event	Description
				evening of the 9 th . (Damages for this event were estimated at \$190,000,000)
219, 220, 221, 222	Yukon Flats	11/12-11/13/2009	Blizzard	A 955 mb near Nome at 9 am on the 11th tracked across the Seward Peninsula and slowly weakened to 982 mb near Selawik by 3 pm on the 12th. The low brought a moist westerly flow into the interior, and produced heavy snowfall in the Upper Koyukuk Valley, parts of the Central Interior, and across the higher elevations in the Middle Tanana Valley around Fairbanks. Here are some snowfall reports that were received from this event: Zone 219: Heavy snow fell in Bettles with a storm total of 25.3 inches (three day total from the 11th through the 13th). The heaviest snow fell on the 12th, with a 24 hour total of 14.2 inches. Zone 220: Blizzard conditions likely occurred along parts of the Steese Highway in the vicinity of Eagle Summit from the late afternoon hours on the 12th through the late morning hours on the 13th. According to a statement from the State of Alaska DOT, travel was not advised on the Steese Highway MP 101 to MP 121. Strong winds, heavy snow and drifting snow were reported with low to zero visibility.
220	Yukon Flats	12/18/2009	Extreme Cold/Wind Chill	A 979 mb low in the eastern Yukon Territory on the morning of the 18th weakened and moved east during the day. The low produced a period of stronger wind along the Steese Highway summits. A west wind of 25 to 35 mph combined with temperatures of 25 to 30 below to produce wind chills as low as 65 below. The strongest wind and lowest wind chills were observed at Eagle Summit.
216, 217, 219, 220, 221, 222, 223, 224, 225, 226, 227	Yukon Flats	11/22-11/24/2010	Ice Storm	An extremely warm and moist air mass moving around a large ridge of high pressure in the north Pacific produced a prolonged period of freezing rain across much of interior Alaska on November 22-24, 2010. Zone 220: A mix of freezing rain and snow was observed at Central, Circle and Fort Yukon. Three day totals of just under one half inch of liquid precipitation were observed at the above locations. The Steese Highway was likely very treacherous in spots from Fox to Circle.
201, 202, 203, 204, 205, 206, 207, 208, 210, 211, 212, 213,	Yukon Flats	02/25-02/25/2011	Blizzard	A 968 mb low in the central Bering Sea at 2100AKST on the 23rd moved to the Gulf of Anadyr as a 976 mb low at 0900AKST on the 24th. The low tracked to the northeast as a 978 mb low in the southern Chukchi Sea at 2100AKST on the 24th. The low then tracked to

Table 5-7 Severe Weather Events

AK Zone(s)	Location(s)	Date(s)	Event	Description
214, 215, 216, 218, 219, 220, 221, 222, 225				the east and passed just south of Banks Island as a 980 mb low by 0900AKST on the 25th. The storm produced widespread blizzard conditions along the west coast as well as the arctic coast and heavy snowfall and high winds in parts of the interior. There were also areas of flooding and high water observed along parts of the west coast. Zone 220: Blizzard conditions likely occurred along the Steese and Dalton Highway Summits. The Steese Highway was closed in areas from 12 mile to Eagle Summit by the evening of the 25th due to extensive blowing and drifting snow and high winds. The Dalton Highway remained open, but travel was not advised. It is likely that winds gusted to at least 52kt (60 mph) across the higher summits.
220	Yukon Flats	06/22-06/24/2011	Heavy Rain	Heavy rainfall in excess of an inch on the 22nd caused a six mile section of the Steese Highway between Birch Creek and Circle to washout in spots on the 23rd. Repairs were made to the gravel road on the 23rd, but additional rainfall on the 23rd into the 24th caused another washout on the evening of the 24th with reports of 2 feet of water flowing over the road. The water flowing over the road was likely caused by plugged culverts and was not associated with flash flooding.
220	Yukon Flats	01/23-01/25/2012	Extreme Cold/Wind Chill	The combination of temperatures of 35 to 40 below zero with a north wind of 15 to 30 mph produced wind chills as low as 78 below zero at Eagle Summit. The wind chills were 60 below or lower from approximately Midnight AKST on the 23rd through 1800AKST on the 25th. The strong wind also produced areas of blowing and drifting snow and locally poor visibility near the summit.
220	Yukon Flats	05/28-05/29/2012	Heavy Rain-Flood	The combination of heavy rainfall in excess of an inch, residual winter snowpack in the uplands, and frozen ground in spots caused the Crooked Creek near Central to flood. The water levels peaked during the afternoon hours on the 28th, and at 1345AKST water was entering the museum. Water also flooded residential yards and some roadways adjacent to Crooked Creek on the north side of the Steese Highway.
220, 223, 224, 225	Yukon Flats	9/16/2012	High Wind	A 975 mb low near Unalakleet at 2100AKST on the evening of the 16th moved north to near Kivalina and weakened to 981 mb by 0300AKST on the morning of the 17th. A strong cold front moved from west to east across the interior and was associated with high winds. As the cold front moved east across the eastern Alaska

Table 5-7 Severe Weather Events

AK Zone(s)	Location(s)	Date(s)	Event	Description
				Range around 2200AKST on the 16th, it is suspected that a mountain wave that had developed to the lee of the Alaska Range on the north side broke out of it's stable layer to descend to near ground level over eastern zone 223 and southwestern zone 224, primarily affecting the community of Tanacross in zone 224 and Dry Creek in zone 223, along with the stretch of the Alaska Highway between these two locations. Zone 220: A peak wind gust of 56 kt (64 mph) was observed at the Eagle Summit SNOTEL at 2200AKST on the 16th.
220	YUKON FLATS NEARBY UPLANDS	5/19/2013	Ice Jam Flood	An ice jam released upstream of Circle City and sent a surge of water and ice through the city during the 19th, causing major flooding by inundating the city with 5 to 8 feet of water. Most structures were flooded except for the school which was slightly more elevated. All residents were evacuated to higher ground. The area upstream from the boat launch on the slough was most affected as the water levels brought a considerable amount of ice right into the homes in that area. Elsewhere, the main effects were water damage. One vehicle carrying village elders tried to drive through the flooded street to safety and went off of the road into the ditch. They were rescued in the bucket of a front loader and taken to safety. Water levels according to a long-time resident were the 2nd highest in over 50 years, with only the floods in 1989 more severe. Water levels began falling in the late afternoon and receded below flood level by mid-evening on the 19th. Damage amounts are estimated, and include repairs to 8 homes with major damage and 7 homes with minor damage, along with nearly 1 million dollars expended in emergency response and road repair.
220	YUKON FLATS NEARBY UPLANDS	5/20-5/23/2013	Ice Jam Flood	On the 20th a surge of water and ice from the upstream river ice breakup moved to near Fort Yukon causing flooding of low-lying areas. A large sheet of ice became stuck 12 miles upstream of Fort Yukon causing widespread flooding of low-lying areas to persist. This affected the ball field, the old tank farm, the area surrounding the tribal hall, several homes, and one of several access roads to the airport. Around midnight on the 21st, the ice jam partially released though river levels did not rise significantly in town as a result. Later on the 22nd river levels began to slowly fall and by the morning of the 23rd levels were below flood stage. Damage amounts are estimated, and

Table 5-7 Severe Weather Events

AK Zone(s)	Location(s)	Date(s)	Event	Description
				include repairs to 4 homes with major damage and 1 home with minor damage, along with affected roads, buildings and emergency response needs.
204, 207, 208, 209, 211, 212, 213, 214, 215, 216, 217, 220, 221, 222, 223, 225	YUKON FLATS NEARBY UPLANDS	11/14/2013	Strong Wind	A complex low pressure center of 993 mb over Kamchatka on the morning of the 12th moved to the southeast Beaufort Sea near Barter Island on the morning of the 14th deepening to 979 mb. This storm brought a variety of hazardous weather to northern Alaska: another surge of sea water across Norton Sound, rising 4 to 8 feet to prolong the inundation which had occurred just a few days earlier though the peak surge did occur during the falling tide so the overall rise in sea level was not as high as the previous event. A strong warm front with this system spread precipitation across the west coast and interior starting out as freezing rain, then rain, though remaining as snow near the Brooks Range. Some locations in the interior received nearly 1 inch of ice, with many locations receiving one-quarter to one-half inch overall. Very strong westerly winds gusting from 50 to 75 mph developed just behind the warm front as it moved across the west coast and interior of northern Alaska on the afternoon of the 13th through the morning of the 14th. In addition to the wintry mix of precipitation and strong winds, temperatures soared into the lower 40s when the wind arrived. As the low-pressure center continued east of Barter island on the 14th, a short period of blizzard conditions occurred there. Zone 220: Circle Hot Springs resident reported damage to the siding of a barn, as well as a bent flagpole. An estimate 0.07 inch of freezing rain fell at Fort Yukon.
220	YUKON FLATS NEARBY UPLANDS	5/6/2014	Ice Jam Flood	An ice jam formed downstream of Circle City on the 5th and remained in place on the 6th while flowing water continued to be impounded behind the jam. This water backed up and flooded portions of the village beginning in the morning of the 6th. Water entered the basements of several residences and in the fire hall...up to one foot of water entered the General Store. The State of Alaska DOT road to the airport was overtopped during the flooding. The ice jam released in the mid-afternoon of the 6th and water levels began to slowly fall through the remainder of the afternoon and evening.
220	YUKON FLATS NEARBY	5/20-5/25/2015	Flooding - Heavy Rain / Snow Melt	High river levels due to increasing snowmelt occurred at Fort Yukon from the Porcupine River from May 20th to 25th. Water rose enough to

Table 5-7 Severe Weather Events

AK Zone(s)	Location(s)	Date(s)	Event	Description
	UPLANDS			flood a portion of the Sucker River Road. Other low lying areas received flooding, but no structures were impacted, nor were other roads in town. The rapid snowmelt occurred due to above seasonal warming over eastern Alaska. Damage estimate is a guess on the coast of gravel used to repair the Sucker River Road.
220	YUKON FLATS NEARBY UPLANDS	5/31/2015	Strong Winds	A cold front moved southeast over the interior of Alaska on the night of the 31st and through the day on the 1st of June...bringing locally gusty winds and an unseasonable snowfall to selected locations, on the 1st, which melted later in the day. Event continued into June. Zone 220 - Gusty winds toppled some trees in Stevens Village the evening of the 31st resulting in several power lines being downed and a portion of the village without power. Wind gusts from the Seven Mile RAWS were reported as high as 41 kt (45 mph) during the evening of the 31st. Damage amount is a guesstimate on the repair of the several power lines.

(Lingaas 2010, DHS&EM 2016)

5.3.5.3 Location, Extent, Impact, and Probability of Future Events

Location

The City experiences periodic severe weather impacts. The National Weather Service has continued to modify their system for assigning weather zones to facilitate and more accurately confine weather patterns to relevant geographic areas. Consequently, the data in Table 5-7 reflects different zone numbering patterns and should be used to depict weather events that have historically impacted the area; some of which may not have impacted the City as severely as other areas within the same zone.

Extent

The entire City is equally vulnerable to the effects of severe weather. Blizzard conditions and heavy snow depths for the area can reach 4.5" per storm event; wind speed can exceed 28.7 mph; and extreme low temperatures have reached -61°F.

Based on past severe weather events and the criteria identified in Table 5-3, the extent of severe weather in the City are considered limited where injuries do not result in permanent disability, complete shutdown of critical facilities occurs for more than one week, and more than 10 percent of property is severely damaged.

Impact

The intensity, location, and the land's topography influence the impact of severe weather conditions on a community.

Heavy snow can immobilize a community by bringing transportation to a halt. Until the snow can be removed, airports and 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 and or snow machine accidents. Casualties also occur due to overexertion while shoveling snow and hypothermia caused by overexposure to the cold weather.

Extreme cold can also bring transportation to a halt. Aircraft may be grounded due to extreme cold and ice fog conditions, cutting off access as well as the flow of supplies to communities. Long cold spells can cause rivers to freeze, disrupting shipping and increasing the likelihood of ice jams and associated flooding.

Extreme cold also interferes with the proper functioning of a community's infrastructure by causing fuel to congeal in storage tanks and supply lines, stopping electric generation. Without electricity, heaters and furnaces 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.

Probability of Future Events

Based on previous occurrences and the criteria identified in Table 5-2, it is likely a severe storm event will occur in the next three years (event has up to 1 in 3 years chance of occurring) as the history of events is greater than 20 percent but less than or equal to 33 percent likely per year.

5.3.6 Wildland Fire

5.3.6.1 Nature

A wildland fire is a type of wildfire that spreads through consumption of vegetation. It often begins unnoticed, spreads quickly, and is usually signaled by dense smoke that may be visible from miles around. Wildland fires can be caused by human activities (such as arson or campfires) or by natural events such as lightning. Wildland fires often occur in forests or other areas with ample vegetation. In addition to wildland fires, wildfires can be classified as urban fires, interface or intermix fires, and prescribed fires.

The following three factors contribute significantly to wildland fire behavior and can be used to identify wildland fire hazard areas.

- **Topography:** As slope increases, the rate of wildland fire spread increases. South-facing slopes are also subject to more solar radiation, making them drier and thereby intensifying wildland fire behavior. However, ridgetops may mark the end of wildland fire spread since fire spreads more slowly or may even be unable to spread downhill.
- **Fuel:** The type and condition of vegetation plays a significant role in the occurrence and spread of wildland fires. Certain types of plants are more susceptible to burning or will burn with greater intensity. Dense or overgrown vegetation increases the amount of combustible material available to fuel the fire (referred to as the “fuel load”). The ratio of living to dead plant matter is also important. The risk of fire is increased significantly during periods of prolonged drought as the moisture content of both living and dead plant

matter decreases. The fuel load continuity, both horizontally and vertically, is also an important factor.

- **Weather:** The most variable factor affecting wildland fire behavior is weather. Temperature, humidity, wind, and lightning can affect chances for ignition and spread of fire. Extreme weather, such as high temperatures and low humidity, can lead to extreme wildland fire activity. By contrast, cooling and higher humidity often signal reduced wildland fire occurrence and easier containment.

The frequency and severity of wildland fires is also dependent on other hazards, such as lightning, drought, and infestations (such as the damage caused by spruce-bark beetle infestations). If not promptly controlled, wildland fires may grow into an emergency or disaster. Even small fires can threaten lives and resources and destroy improved properties. In addition to affecting people, wildland fires may severely affect livestock and pets. Such events may require emergency water/food, evacuation, and shelter.

The indirect effects of wildland fires can be catastrophic. In addition to stripping the land of vegetation and destroying forest resources, large, intense fires can harm the soil, waterways, and the land itself. Soil exposed to intense heat may lose its capability to absorb moisture and support life. Exposed soils erode quickly and enhance rivers and stream siltation, thereby enhancing flood potential, harming aquatic life, and degrading water quality. Lands stripped of vegetation are also subject to increased debris flow hazards.

5.3.6.2 History

Wildland fires have not been documented within the boundaries of the City; however, wildland fires have occurred in the City's vicinity. The Alaska Interagency Coordination Center (AICC) maintains a website (<http://fire.ak.blm.gov/aicc.php>) to consolidate Alaska's wildland fire information. Information in Table 5-8 and Figure 5-12 were obtained from this site.

Over 94 wildland fires occurred within 50 miles of the City. Table 5-8 lists ten wildfires that exceeded 300 acres burned for the most recent 77-year historical period (i.e., from 1939 to 2016).

Table 5-8 Wildfire Locations Since 1939 within 50 Miles of Fort Yukon

Fire Name	Fire Year	Estimated Acres	Specific Cause
Fort Yukon #2	1950	2000	Smokers
Yukon - Porcupine	1951	700	Campfire
Sucker River	1953	500	Campfire
DUTCH LAKE	1959	300	DEBRIS BNG
932003	1989	640	MAN
432116	1994	406.7	WARMING FIRE
Canvasback Lake	2010	35455.7	Lightning
Discovery Creek	2013	13473.8	Lightning
Crazy Slough	2015	8019.8	Lightning
Chandalar River	2016	2847.8	Lightning

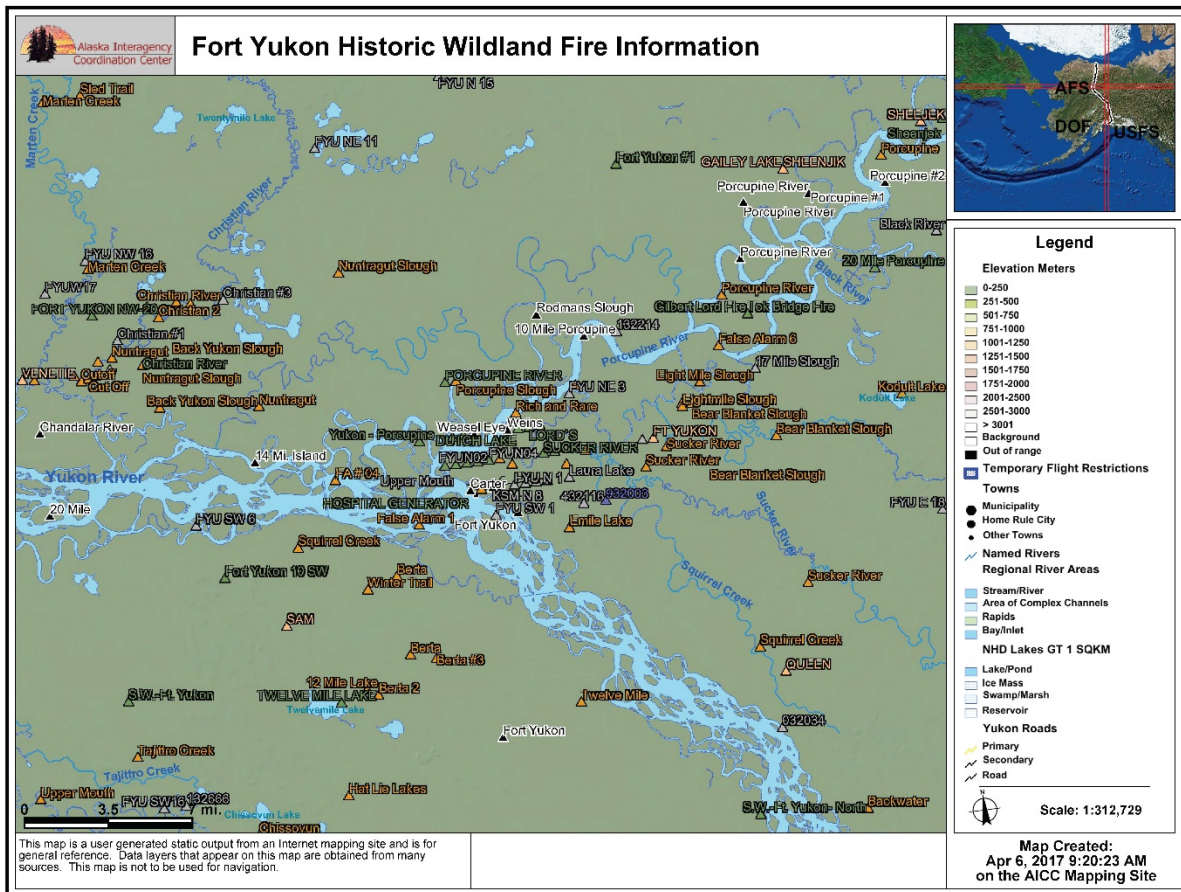


Figure 5-12 Fort Yukon's Historical Wildfires (AICC 2017)

5.3.6.3 Location, Extent, Impact, and Probability of Future Events

Location

Under certain conditions, wildland fires may occur in any area with fuel surrounding the City of Fort Yukon. Since fuels data is not readily available, for the purposes of this plan, all areas outside City limits are considered to be vulnerable to wildland fire impacts. Since 1939, over 94 wildland fire events have occurred within 50 miles of the City (Figure 5-11). Vegetation undergrowth has grown thick and dense. Numerous lots of standing black spruce and willow brush are located throughout the community.

Figures 5-12 and 5-13 depict the City's historical wildfires and the City's critical facilities and their relation to the City's Wildland fire threat.

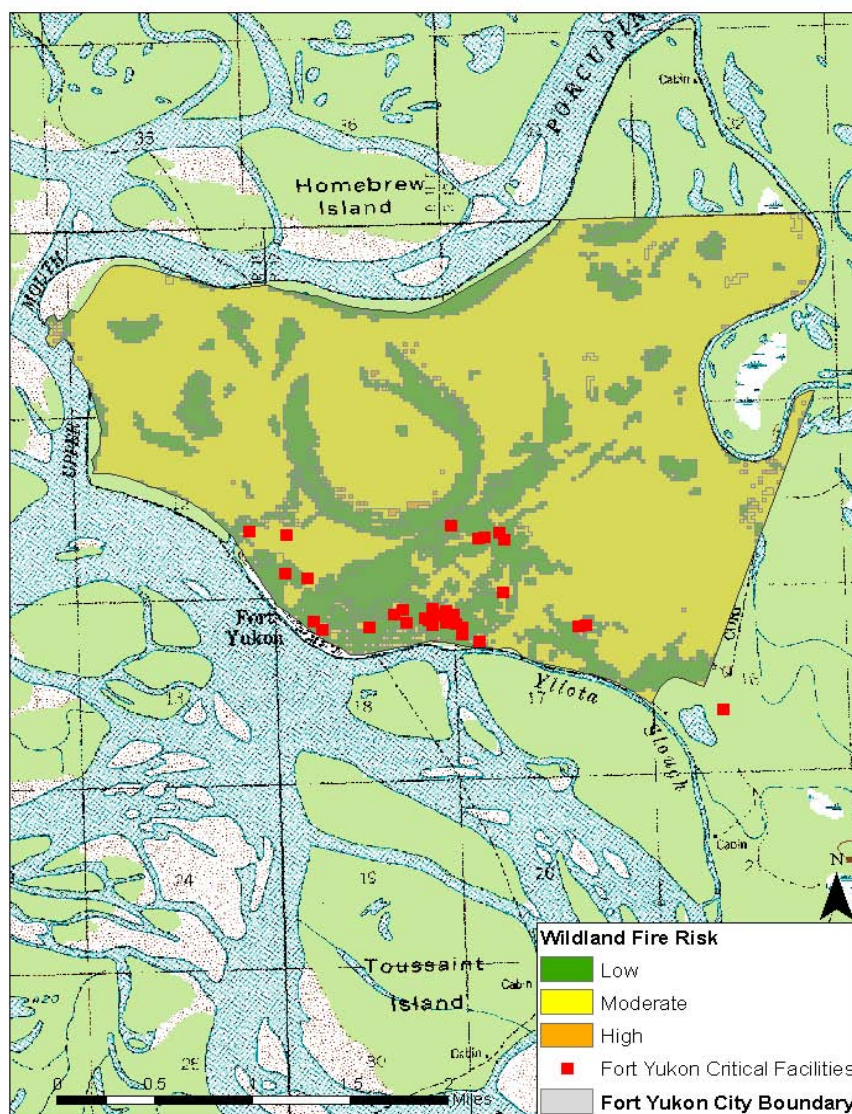


Figure 5-13 Fort Yukon's Wildland Fire Risk

Extent

Generally, fire vulnerability dramatically increases in the late summer and early fall as vegetation dries out, decreasing plant moisture content and increasing the ratio of dead fuel to living fuel. However, various other factors, including humidity, wind speed and direction, fuel load and fuel type, and topography can contribute to the intensity and spread of wildland fires. The common causes of wildland fires in Alaska include lightning strikes and human negligence.

Fuel, weather, and topography influence wildland fire behavior. 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. High temperatures and low humidity encourage fire activity while low temperatures and high humidity retard fire spread. Wind affects the speed and direction of fire spread. Topography directs the movement of air, which also affects fire behavior. When the terrain funnels air, as happens in a canyon, it can lead to faster spreading. Fire also spreads up slope faster than down slope.

An average of 6,434 acres burned during each of the ten wildland fire events over the 77 year historic period identified in Table 5-8. Recent wildland fires appear to burn much smaller acreage per event. This may be due to the fact that the State's Division of Forestry (DOF) much more efficiently manages wildland fires using a four-tiered suppression methodology based on infrastructure criticality while using more modern available resources to respond to wildland fires which potentially threaten populated areas (DOF 2009).

Based on past wildland fire events and the criteria identified in Table 5-3, the magnitude and severity of impacts in the City of Fort Yukon are considered negligible with minor injuries, the potential for critical facilities to be shutdown for less than 24 hours, less than 10 percent of property or critical infrastructure being severely damaged, and little to no permanent damage to transportation or infrastructure or the economy.

Impact

Impacts of a wildland fire that interfaces with the population center of the City could grow into an emergency or disaster if not properly controlled. A small fire can threaten lives and resources and destroy property. In addition to impacting people, wildland fires may severely impact livestock and pets. Such events may require emergency watering and feeding, evacuation, and alternative shelter.

Indirect impacts of wildland fires can be catastrophic. In addition to stripping the land of vegetation and destroying forest resources, large, intense fires can harm the soil, waterways, and the land itself. Soil exposed to intense heat may lose its capability to absorb moisture and support life. Exposed soils erode quickly and enhance siltation of rivers and streams, thus increasing flood potential, harming aquatic life, and degrading water quality.

Probability of Future Events

Fire is recognized as a critical feature of the natural history of many ecosystems. It is essential to maintain the biodiversity and long-term ecological health of the land. The role of wildland fire as an essential ecological process and natural change agent has been incorporated into the fire management planning process and the full range of fire management activities is exercised in Alaska, to help achieve ecosystem sustainability, including its interrelated ecological, economic, and social consequences on firefighters, public safety and welfare; natural and cultural resources threatened; and the other values to be protected dictate the appropriate management response to the fire. In Alaska, the natural fire regime is characterized by a return interval of 50 to 200 years, depending on the vegetation type, topography, and location. Recorded wildland fires occurring within 50 miles of Fort Yukon have an average recurrence rate of approximately 2.5 years.

Based on the history of wildland fires in the Fort Yukon area and applying the criteria identified in Table 5-2, it is possible a wildland fire event will occur in the next five years. The event has up to 1 in 5 years chance of occurring and the history of events is greater than 10 percent but less than or equal to 20 percent likely each year.

5.3.7 Climate Change

5.3.7.1 Nature

For this HMP, climate change refers to the long term variation in atmospheric composition and weather patterns on a global scale. Global climate change may occur gradually due to small variations or rapidly due to large catastrophic forces. Greenhouse gasses, especially carbon dioxide and methane, are commonly regarded as the most significant factors influencing the Earth's current climate.

Significant atmospheric variations may also be influenced by more than one event, for instance, an asteroid impact and a major eruption over a longer time period. For scientists studying climate change, both hazards imply different time periods. Therefore, the time period estimates for previous climate change events tend to vary and cannot be accurately applied to current predictive climate change models, which now must account for human activity. This is significant because hazard mitigation planning relies greatly upon the historical record.

5.3.7.2 History

Community members commented on how the water in the Yukon and Porcupine Rivers is much clearer than in past years. They speculate that the reduction in silt, which keeps water temperatures down, makes the salmon more lethargic and causes them not to fight like 30 years ago. Lack of silt increases the water temperatures. Also, the ice on the rivers isn't as thick in winter, and the rivers freeze later than they used to. Permafrost is melting.

5.3.7.3 Location, Extent, Impact, and Probability of Future Events

Location

Climate change is a global event. Therefore, the entire community of Fort Yukon is vulnerable to climate change.

Extent

Through studies of the historical record, climate change affects water acidity, atmospheric composition, precipitation, weather patterns, and temperatures.

Impact

Climate change has the potential to aggravate natural disasters already discussed in Section 5.3.7.2. Climate change will continue to exacerbate these issues. The Earth's climate has changed many times during the planet's history, with cyclical events ranging from ice ages to long periods of warmth. Historically, natural factors such as volcanic eruptions, changes in the earth's orbit, and the amount of energy released from the Sun have affected the Earth's climate.

Findings from a 190-page "Global Climate Change Impacts in the United States" report, confirm what scientists have long suspected: Climate change due to heat-trapping pollution is already occurring and is visible throughout the United States. Key findings indicate:

- Climate change is causing increases in temperatures, more heavy downpours, sea-level rise, less snow and ice cover, and other impacts.
- Unless polluting emissions are reduced significantly, heat waves will become more frequent; heavy downpours will cause more severe flooding; and agriculture will be increasingly challenged by insects, diseases, and drought.

Probability of Future Events

Effects continue to build and are thought to be having variable impacts throughout the world. Given the current observed changes in the atmosphere, it is “Credible” a disaster event attributed to climate change will occur in the next ten years as the probability is less than or equal to 10 percent likely per year.

5.3.7.4 Previous Occurrences

Beginning in the 19th century, it is generally accepted that human activities associated with the Industrial Revolution and its development since have contributed to changes in the composition of the Earth’s atmosphere and thus have become an additional source influencing the Earth’s climate.

For over the past 200 years, the burning of fossil fuels, such as coal and oil, and widespread deforestation have caused a significant build up of heat-trapping “greenhouse gases” in the atmosphere, which in earlier times would have dissipated into space. “Greenhouse gases” are necessary to life as we know it because they keep the planet’s surface warmer than it would be otherwise. But, as excessive concentrations of these gases continue to build, the Earth’s temperature has climbed abnormally beyond past levels. According to NOAA and NASA dates, the Earth’s surface temperature has increased by about 1.2 to 1.4 °F in the last 100 years. Of some concern is that the eight warmest years recorded from 1850 to the present have all occurred since 1998, with the warmest being 2005. If “greenhouse gases” continue this current pattern, climate models predict that the average temperature at the Earth’s surface could increase from 3.2 to 7.2 °F above 1990 levels by the end of the century according to the EPA.

This section provides an overview of the vulnerability analysis and describes the five specific steps: asset inventory, methodology, data limitations, exposure analysis for current assets, and areas of future development.

6.1 OVERVIEW OF A VULNERABILITY ANALYSIS

A vulnerability analysis predicts the extent of exposure that may result from a hazard event of a given intensity in a given area. The analysis provides quantitative data that may be used to identify and prioritize potential mitigation measures by allowing communities to focus attention on areas with the greatest risk of damage. A vulnerability analysis is divided into five steps:

1. Asset Inventory
2. Methodology
3. Data Limitations
4. Exposure Analysis For Current Assets
5. Areas of Future Development

The requirements for a vulnerability analysis as stipulated in DMA 2000 and its implementing regulations are described here.

- A summary of the community's vulnerability to each hazard that addresses the impact of each hazard on the community.

DMA 2000 Requirements: Risk Assessment, Assessing Vulnerability, Overview

Assessing Vulnerability: Overview

Requirement §201.6(c)(2)(ii): [The risk assessment shall include a] description of the jurisdiction's vulnerability to the hazards described in paragraph (c)(2)(i) of this section. This description **shall** include an overall summary of each hazard and its impact on the community.

Element

- Does the new or updated plan include an overall summary description of the jurisdiction's vulnerability to each hazard?
- Does the new or updated plan address the impact of each hazard on the jurisdiction?

Source: FEMA, July 2008.

- Identification of the types and numbers of RL properties in the identified hazard areas.

DMA 2000 Requirements: Risk Assessment, Assessing Vulnerability, Addressing Repetitive Loss Properties

Assessing Vulnerability: Addressing Repetitive Loss Properties

Requirement §201.6(c)(2)(ii): [The risk assessment] **must** also address National Flood Insurance Program (NFIP) Insured structures that have been repetitively damaged floods.

Element

- Does the new or updated plan describe vulnerability in terms of the types and numbers of repetitive loss properties in the identified hazard areas?

Source: FEMA, July 2008.

- An identification of the types and numbers of existing vulnerable buildings, infrastructure, and critical facilities and, if possible, the types and numbers of vulnerable future development.

DMA 2000 Recommendations: Risk Assessment, Assessing Vulnerability, Identifying Structures

Assessing Vulnerability: Identifying Structures

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

Element

- Does the new or updated plan describe vulnerability in terms of the types and numbers of existing buildings, infrastructure, and critical facilities located in the identified hazard areas?
- Does the new or updated plan describe vulnerability in terms of the types and numbers of future buildings, infrastructure, and critical facilities located in the identified hazard areas?

Source: FEMA, July 2008.

- Estimate of potential dollar losses to vulnerable structures and the methodology used to prepare the estimate.

DMA 2000 Recommendations: Risk Assessment, Assessing Vulnerability, Estimating Potential Losses

Assessing Vulnerability: Estimating Potential Losses

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

Element

- Does the new or updated plan estimate potential dollar losses to vulnerable structures?
- Does the new or updated plan describe the methodology used to prepare the estimate?

Source: FEMA, July 2008.

6.2 VULNERABILITY ANALYSIS: SPECIFIC STEPS

6.2.1 Asset Inventory

Asset inventory is the first step of a vulnerability analysis. Assets that may be affected by hazard events include population (for community-wide hazards), residential buildings (where data is available), and critical facilities and infrastructure. The assets and associated values throughout the City of Fort Yukon are identified and discussed in detail in the following sections.

6.2.1.1 Population and Building Stock

Population data for the City were obtained from the 2010 U.S. Census. The City's total population for 2010 was 583, and 2016 DCCED/DCRA data reported a population of 558 (Table 6-1).

Table 6-1 Estimated Population and Building Inventory

Population		Residential Buildings	
2010 Census	DCCED 2016 Data	Total Building Count	Total Value of Buildings ¹
583	558	312	\$78,000,000

Sources: The City of Fort Yukon (of the 312, only 290 are occupied per City), U.S. Census 2010, and 2016 DCCED/DCRA Department of Labor Estimate population data.

¹ Average structural value of all single-family residential buildings is \$250,000 per structure.

Estimated replacement values for those structures, as shown in Table 6-1, were obtained from the 2000 U.S. Census, and DCCED/DCRA. A total of 312 single-family residential buildings were

considered in this analysis. However the City stated that residential replacement values are generally understated as the cost for materials, shipping, and labor exceed the US Census determined value.

6.2.1.2 Repetitive Loss Properties

This section estimates the number and type of structures at risk to repetitive flooding. (Properties which have experienced repetitive loss (RL), and the extent of flood depth and damage potential.) RL properties have had at least two \$1,000 claims within any 10-year period since 1978.

Severe Repetitive Loss (SRL) properties are most at risk for repeat flooding. These properties include every property that has experienced: four or more separate building and content claims since 1978 each exceeding \$5,000 with cumulative claims exceeding \$20,000; or at least two separate building claims with cumulative losses exceeding the value of the main living structure.

The City of Fort Yukon has participated in the NFIP since April 24, 1995 with new D-FIRMs dated February 3, 2010. However, they do not have a repetitive flood property inventory that meets the RL or SRL criteria as the loss thresholds are substantially below FEMA values.

However, the NFIP Insurance Report states the City has a total of four properties located in the City's "AE" zone. The City's total NFIP coverage is \$240,000. The City's digital Flood Insurance Rate Maps (D-FIRMs) numbers 020045-IND0A, 020040008A, 020040009A, 0200400017A, 0200400028A, 0200400029A, 0200400036A, 0200400037A, dated February 3, 2010 delineates the City's floodplain.

Table 6-2 lists the five City identified repetitive loss properties which are uninsured and therefore ineligible to file NFIP damage claims as of the 2010 plan.

Table 6-2 Repetitive Loss Properties

Type (RL/SRL)	Town	Occupancy (#)	No. of Losses	Flood Insurance (Yes/No)	Value (\$) ¹	Total Claims (\$) ²
RL	House #1: Fort Yukon Above Yllota Slough	2	3	No	Unknown	Unknown
RL	House #2: Fort Yukon Above Yllota Slough	3	2	No	Unknown	Unknown
RL	House #3: Fort Yukon Above Yllota Slough	1	3	No	Unknown	Unknown
RL	House #4: Fort Yukon in Old Village next to bank	1	3	No	Unknown	Unknown
RL	House \$5: Fort Yukon Old Town site, 1,000 ft from river bank.	1	2	No	Unknown	Unknown

Type includes: RL or SRL

¹Insured structural value as of *date*.

²Content and building claims.

(Fort Yukon 2010)

Jimmy Smith, NFIP Floodplain Manager for Alaska, stated that as of May 2, 2017, there are no active NFIP flood insurance policies, and there are no NFIP repetitive loss properties in Fort Yukon.

6.2.1.3 Existing Critical Facilities and Infrastructure

A critical facility is defined as a facility that provides essential products and services to the general public, such as preserving the quality of life in the City and fulfilling important public safety, emergency response, and disaster recovery functions. The critical facilities profiled in this plan include the following:

- Government facilities, such as city and tribal administrative offices, departments, or agencies
- Emergency response facilities, including police department and fire fighting equipment
- Educational facilities, including K-12
- Care facilities, such as medical clinics, congregate living health, residential and continuing care, and retirement facilities
- Community gathering places, such as community and youth centers
- Utilities, such as electric generation, communications, water and waste water treatment, sewage lagoons, landfills

The total number of critical facilities is listed in Table 6-3. Per the City of Fort Yukon, there have been no critical facilities added or removed from the community since the 2010 plan.

Table 6-3 Fort Yukon Critical Facilities

Occupancy Type	Facility Name	Location / Address	Structure / Per Mile Replacement Value	Total Miles / Feet / Gallons / Occupants
Government Facility	City Office, Police, Fire Dept, Maintenance Facility	7th Avenue	\$100,000	6 Occ
	Gwitchyaa Zhee (GZ) Offices - Gas Station	East 4th Avenue	\$100,000	4 Occ
	GZ Offices - Utilities	Spruce Street	\$100,000	1 Occ
	State Office, Court, F&W, Public Health	East 3rd Avenue	\$500,000	4 Occ
	Tribal Council Building, with Housing Department	East Third and Alder Street	\$1,000,000	15 Occ
	Fish and Wildlife Office and warehouse	East 4 th Avenue	\$250,000	3 Occ
	Post Office	East 3rd Avenue	\$500,000	2 Occ
	National Guard	East 3rd Avenue	\$350,000	0 Occ (inactive unit)
Transportation Facilities	Airport	Airport Road	\$18,050,000	0 Occ
	D&D LLC	Airport Terminal	\$100,000	0 Occ
	Barge Landing Area	End 1st Avenue	\$200,000	0 Occ
	AC Company Shop (ANTHC)	East 3rd Avenue	\$200,000	2 Occ
	City Maintenance Facility	7th Avenue	\$500,000	3 Occ

Table 6-3 Fort Yukon Critical Facilities

Occupancy Type	Facility Name	Location /Address	Structure / Per Mile Replacement Value	Total Miles / Feet / Gallons / Occupants
	GZ Garage	4th Avenue	\$250,000	2 Occ
	Native Corp. of Fort Yukon	4th Avenue	\$500,000	3 Occ
	Shop Oil Co Truck Garage	William Loola Street	\$300,000	4 Occ
	School Shop	East 3rd Avenue	\$750,000	2 Occ
	YFHC Shop	FAA Site off Spruce Street	\$1,482,334	1 Occ
	Yukon Flats Garage	East 2nd Avenue	\$100,000	1 Occ
Emergency Response Facility	Police and Fire	See City Office Info		
	Fort Yukon Police Dept	See City Office Info		
	BLM Station (seasonal)	Airport Road	\$500,000	0 Occ
Educational Facility	Fort Yukon School	East 3rd Avenue	\$10,000,000	150 Occ
	Yukon Flats School District Office	Hill Street	\$750,000	12 Occ
	Resource Center - Council of Athabascan Tribal Governments (CATG)	East 4th Avenue	\$1,550,000	5 Occ
	University of Alaska	East 5th Avenue	\$2,000,000	10 Occ
	YFDS Dormitory	Ramstead Rd	\$664,786	
	CATG Education Bldg	E Second Ave	\$120,000	5
	CATG Natural Resource	E 7th Ave & Vera Vehthii	\$250,000	3
	Vocational Education Center	Ramstead Road	\$3,000,000	20 Occ
Care Facility	Yukon Flats Health Center Clinic	East 8th Avenue	\$11,212,717	30 Occ
Community Facility	Assembly of God Church	East 3rd Avenue	\$200,000	2 Occ
	Baptist Church	East 4th Avenue	\$300,000	2 Occ
	Episcopal Church	William Loola Street	\$300,000	2 Occ
	Community Center	East 3rd Avenue	\$5,000,000	20 Occ
	Elder Building – Addie Shewfelt	4th Avenue	\$1,000,000	10 Occ
	School Housing – Duplex	Ramstead Road	\$627,360	6 Occ
	AC Company Store	East 3rd Avenue	\$2,000,000	30 Occ
	City Games	Spruce Avenue	\$213,117	2 Occ
	Community Liquor Store	1st Avenue	\$200,000	5 Occ
	Temporary Housing – GZ Units Seasonal	Ramstead Road	\$5,000,000	3 Occ
	Community Gardens	Old Village Townsite 1st Avenue	\$150,000	2 Occ
	Cemetery 1	East 2nd Avenue	\$250,000	N/A
	Cemetery 2	Old Village Townsite 1st Avenue	\$250,000	N/A

Table 6-3 Fort Yukon Critical Facilities

Occupancy Type	Facility Name	Location / Address	Structure / Per Mile Replacement Value	Total Miles / Feet / Gallons / Occupants
Roads	Roads (BIA/Community)			37.5 Miles
	Ramstead Road			0.6 Miles
	Barge Landing Road			0.6 Miles
	Base Road			1 Miles
Bridges (local, state, & federal)	Ivars Bridge		\$300,000	N/A
Utilities	Water Treatment Building	Base Road	\$1,795,632	1 Occ
	Waster Building #2	N/A	\$327,818	0 Occ
	Lift Stations (5)		\$663,516	0 Occ
	Long Range Radar Site (former DEW line)	Base Road	\$17,000,000	5 Occ
	GZ Power Plant	4th Avenue	\$200,000	2 Occ
	KZPA 900,with – with CATG Offices	East 3rd Avenue	\$1,000,000	12 Occ
	Police and Fire fuel tanks, 500 gal tanks	7th Avenue	\$3,500	0 Occ
	Ft. Yukon Public Water System	City wide	\$35,000,000	0 Occ
	City Satellite Dish	7th Avenue	\$10,000	Occ
	GCI Satellite Dish	8th Avenue	\$35,000	0 Occ
	Interior Telephone Satellite Dish	William Loola Street	\$35,000	1 Occ
	Washateria	See City Office Info		
	Tank Farm	1st Avenue	\$2,000,000	0 Occ
	AC Store Generator	East 3rd Avenue	\$200,000	0 Occ
	School Generator	East 3rd Avenue	\$200,000	0 Occ
	Landfill/Incinerator	End of Runway	\$500,000	0 Occ
	Sewage Lagoon	NE of City Center	\$1,000,000	0 Occ

(Fort Yukon 2017)

6.2.1.4 Future Critical Facilities and Infrastructure

Immediate plans for future development in the City includes potentially constructing a new youth multi-purpose building, a separate multi-purpose building, and a potential feasibility study for a natural gas transfer facility construction project. No future buildings will be constructed in known hazard areas.

Since 2010, an extensive airport rehabilitation has occurred, a snow removal equipment building has been built, and a trial run for biomass began in 2016 and is performing well.

6.2.2 Methodology

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

The methodology used a two-pronged effort. First, the Planning Team used the State's Critical Facility Inventory and locally-obtained GPS coordinate data to identify critical facility locations in relation to potential hazard's threat exposure and vulnerability. Second, this data was used to develop a vulnerability assessment for those hazards where GIS based hazard mapping information was available.

Robert Gillespie, CSP, Risk Control Specialist with Alaska Municipal League Joint Insurance Association, Inc. was in Fort Yukon in May 2017 and is updating replacement structure and contents values of City-owned physical assets. 2010 plan values are used in this draft of the hazard mitigation plan. These value estimates were provided by the Planning Team. For each physical asset located within a hazard area, exposure was calculated by assuming the worst-case scenario (that is, the asset would be completely destroyed and would have to be replaced). Finally, the aggregate exposure, in terms of replacement value or insurance coverage, for each category of structure or facility was estimated. A similar analysis was used to evaluate the proportion of the population at risk. However, the analysis simply represents the number of people at risk; no estimate of the number of potential injuries or deaths was prepared. Mr. Gillespie will provide the updated values when they are available, and these will be included in the updated plan.

6.2.3 Data Limitations

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

It is also important to note that the quantitative vulnerability assessment results are limited to the exposure of people, buildings, and critical facilities and infrastructure to the identified hazards. It was beyond the scope of this HMP to develop a more detailed or comprehensive assessment of risk (including annualized losses, people injured or killed, shelter requirements, loss of facility/system function, and economic losses). Such impacts may be addressed with future updates of the HMP.

6.2.4 Exposure Analysis

There is limited GIS data available for the City of Fort Yukon. The results of the GIS based exposure analysis for loss estimations in the City are summarized in Tables 6-4 and 6-5. The following discussion contains data from GIS analysis and information obtained from the Planning Team.

Table 6-4. Potential Hazard Exposure Analysis – Critical Infrastructure

			Government and Emergency Response		Educational		Care		Community	
Hazard Type	Hazard Area	Methodology	* # Bldgs/ # Occ	Value (\$)	* # Bldgs/ # Occ	Value (\$)	* # Bldgs/ # Occ	Value (\$)	* # Bldgs/ # Occ	Value (\$)
Earthquake	Strong	9-20% (g)	7/43	3,300,000	4/185	16,550,000	1/30	11,212,717	11/76	14,000,000
	Very Strong	20-40% (g)	--	--	--	--	--	--	--	--
	Severe	>40-60% (g)	--	--	--	--	--	--	--	--
Erosion		Within 300 ft of erosion areas	--	--	--	--	--	--	--	--
Flood	Moderate	500-year floodplain	--	--	--	--	--	--	--	--
	High	100-year floodplain	5/29	2,050,000	3/35	6,550,000	1/30	11,212,717	7/24	6,700,000
Permafrost		Descriptive	--	--	--	--	--	--	--	--
Weather, Severe		Descriptive	--	--	--	--	--	--	--	--
Wildland Fire	Low	Low fuel rank	6/37	3,200,000	4/185	16,550,000	1/30	11,212,717	10/66	13,000,000
	Moderate	Moderate fuel rank	3/25	1,600,000	2/25	4,550,000	1/30	11,212,717	6/22	6,700,000
	High	High fuel rank	--	--	--	--	--	--	--	--
	Extreme	Extreme fuel rank	--	--	--	--	--	--	--	--
Climate Change		10%	--	--	--	--	--	--	--	--

Table 6-5. Potential Hazard Exposure Analysis – Critical Infrastructure

			Highway		Bridges		Transportation Facilities		Utilities	
Hazard Type	Hazard Area	Methodology	Miles	Value (\$)	No.	Value (\$)	# Bldgs / # Occ	Value (\$)	# Bldgs / # Occ	Value (\$)
Earthquake		Descriptive	37.5	--	1	300,000	9/17	20,850,000	14/16	41,979,132
Erosion		Within 300 ft of erosion areas	--	--	1	300,000	--	--	2	2,663,516
Flood	Moderate	500-year floodplain	--	--	--	--	--	--	--	--
	High	100-year floodplain	--	--	1	300,000	7/12 Occ.	19,600,000	8/3 Occ.	2,783,500
Permafrost		Descriptive	--	--	--	--	--	--	--	--
Weather, Severe		Descriptive	--	--	--	--	--	--	--	--
Wildland Fire	Low	Low fuel rank	--	--	--	--	8/14 Occ.	20,350,000	6/3 Occ.	3,635,000
	Moderate	Moderate fuel rank	--	--	1	300,000	4/8 Occ.	1,100,000	11/16 Occ.	40,579,132
	High	High fuel rank	--	--	--	--	--	--	--	--
	Extreme	Extreme fuel rank	--	--	--	--	--	--	--	--
Climate Change		10%	--	--	--	--	--	--	--	--

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Earthquake

Based on earthquake probability (Peak Ground Acceleration [PGA]) maps produced by the USGS, the entire City area is at risk of experiencing moderate earthquake impacts as a result of its proximity to the Kobuk and Denali Faults. However, the probability is low (see Section 5.3.1.3). Impacts to the community such as significant ground movement that may result in infrastructure damage are not expected. The entire existing and future Fort Yukon population, residences, and critical facilities are exposed to the effects of an earthquake. This includes 583 people in 312 residences (worth \$78,000,000), eight government and three emergency response facilities (worth \$3,400,000), eight educational facilities (worth \$18,334,786), one care facility (worth \$11,212,717), 13 community facilities (worth \$15,490,477), one bridge (worth \$300,000), 11 transportation facilities (value \$22,432,334), and 17 utilities (worth \$59,970,466).

Impacts to the community such as significant ground movement that may result in infrastructure damage are not expected. Minor shaking may be seen or felt based on past events. Although all structures are exposed to earthquakes, buildings within the City constructed with wood have slightly less vulnerability to the effects of earthquakes than those with masonry.

Impacts to future populations, residences, critical facilities, and infrastructure are anticipated at the same low impact level as the City is not located in an area with a high probability of strong shaking (i.e., >4.8M).

Erosion

Based on local knowledge, areas within the City affected by erosion are located on the “wrong side” of the dike (see Section 5.3.2.3). There are approximately four permanent residents and some transients in eight houses (worth \$2,000,000) located in areas exposed and historically prone to erosion. There are two critical facilities: one bridge and a lift station (worth \$4,095,632) located in historically erosion prone areas. The City’s tank farm was relocated in 2010 outside its previously historically erosion prone area.

Impacts from erosion include loss of land and any development on that land. Erosion can cause increased sedimentation of harbors and river deltas and hinder channel navigation, reduction in water quality due to high sediment loads, loss of native aquatic habitats, damage to public utilities (docks, harbors, electric and water/wastewater utilities), and economic impacts associated with costs trying to prevent or control erosion sites. In the City of Fort Yukon, only the location of a building can lessen its vulnerability to erosion.

Since 2010, the City has instituted land use controls prohibiting new construction in erosion prone areas. Impacts could also be lessened if affected properties on the “wrong side” of the dike could be relocated.

Flood

Impacts associated with flooding in the City include levee, and finger dike damage, water damage to structures and contents, roadbed erosion and damage, boat strandings, areas of standing water in roadways, and damage or displacement of fuel tanks, power lines, or other infrastructure. Buildings on slab foundations, not located on raised foundations, and/or not constructed with materials designed to withstand flooding events (e.g., cross vents to allow water to pass through an open area under the main floor of a building) are more vulnerable to the impacts of flooding (see Section 5.3.3.3).

FEMA FIRMs were used to outline the 100-year and 500-year floodplains for Fort Yukon (see Figure 5-7) The 100-year floodplain delineates an area of high risk, while the 500-year floodplain delineates an area of moderate risk.

The City has 30 residential structures (worth \$7,500,000), five government and emergency response facilities (worth \$2,050,000), three educational facilities (worth \$6,550,000), one care facilities (worth \$11,212,717), seven community facilities (worth \$6,700,000), seven transportation facilities (value \$19,600,000), one bridges (worth \$300,000), and eight utilities (worth \$2,783,500) within the boundaries of the 100-year floodplain.

There is no data indicating that residential structures or critical facilities are located within the boundaries of the 500-year floodplain, and therefore, considered at moderate risk.

The City indicates there are five uninsured repetitive loss properties within the floodplain. However, there is no defined RL data that would meet NFIP requirements. The City anticipates that impacts to future populations, residences, critical facilities, and infrastructure at the same historical impact level unless they can obtain funding to raise 1600 ft of Base Road to enable it to act as a barrier from flood inundation. This would protect approximately 80 homes located adjacent to the road and eliminate the need to elevate each home individually to mitigate future damages or losses. One ft of lift was added to Base Road since the 2010 plan, but Public Works has indicated more lifts are needed.

Permafrost

According to mapping completed by the USGS, the entire City is underlain by discontinuous permafrost, thus exposed to the impacts from this hazard (see Section 5.3.4.3). This includes 583 people in 312 residences (worth \$78,000,000) and all 68 critical facilities (worth approximately \$123,914,860).

Impacts associated with degrading permafrost include surface subsidence, infrastructure, structure, and/or road damage. Buildings that are built on slab foundations and/or not constructed with materials designed to accommodate the movement associated with building on permafrost land are more vulnerable to the impacts of permafrost.

Impacts to future populations, residences, critical facilities, and infrastructure are anticipated at the same impact level. To lessen future impacts, the City has instituted land use controls prohibiting new construction in permafrost zones and building codes to accommodate the effects of permafrost on structures.

Weather (Severe)

Using information provided by the City of Fort Yukon and the National Weather Service, the entire existing and future City's population, residences, and critical facilities are equally exposed to the effects of a severe weather event. 583 people in 312 residences (worth \$78,000,000) and all 68 critical facilities (worth approximately \$123,914,860).

Impacts associated with severe weather events includes roof collapse, trees and power lines falling, damage to light aircraft and sinking small boats, injury and death resulting from snow machine or vehicle accidents, overexertion while shoveling (all due to heavy snow). A quick thaw after a heavy snow can also cause substantial flooding. Impacts from extreme cold include hypothermia, halting transportation from fog and ice, congealed fuel, frozen pipes, disruption in utilities, frozen pipes, and carbon monoxide poisoning. Section 5.3.5.3 provides additional detail regarding the impacts of severe weather. Buildings that are older and/or not constructed with

materials designed to withstand heavy snow and wind (e.g., hurricane ties on crossbeams) are more vulnerable to the impacts of severe weather.

Impacts to future populations, residences, critical facilities, and infrastructure are anticipated at the same impact level. To lessen future impacts, the City has instituted building codes to accommodate the effects of severe weather on structures.

Wildland Fire

Impacts associated with a wildland fire event include the potential for loss of life and property. It can also impact livestock and pets and destroy forest resources and contaminate water supplies. Buildings closer to the outer edge of town, those with a lot of vegetation surrounding the structure, and those constructed with wood are some of the buildings that are more vulnerable to the impacts of wildland fire.

Impacts to future populations, residences, critical facilities, and infrastructure are anticipated at the same impact level. Community education, building materials, and prepared response personnel are some things that could lessen future impacts.

According to the Alaska Fire Service, there are no wildland fire areas within Fort Yukon's boundaries. However, 94 wildland fires have occurred within a 50-mile radius of the City (see Section 5.3.6.3). There is potential for wildland fire to interface with the population center of the City.

Wildland fire hazard areas were identified using a model incorporating slope, aspect, and fuel load (see Figure 5-12). South-facing, steep, and heavily vegetated areas were assigned the highest fuel values while areas with little slope and natural vegetation were assigned the lowest fuel risk values. Risk levels of low, moderate, high, and extreme were assigned to the entire region based on the results of this modeling. There are 583 people with 312 residential structures (worth approximately \$78,000,000) located in the City and potentially threatened by wildfire events.

Fort Yukon has critical facilities and infrastructure located within areas of low, moderate, high, and extreme risk. Low risk areas contain six government facilities (worth \$3,200,000), four educational facilities (worth \$16,550,000), one care facility (worth \$11,212,717), ten community facilities (worth \$13,000,000), eight transportation facilities (worth \$20,350,000), and six utilities (worth \$3,635,000).

Moderate risk areas contain three government and emergency response facilities (worth \$1,600,000), two educational facilities (worth \$4,550,000), one care facilities (worth \$11,212,717), six community facilities (worth \$6,700,000), four transportation facilities (worth \$1,100,000), one bridge (worth \$300,000), and eleven utilities (worth \$40,579,132).

There are no residences or critical facilities located in High or Extreme wildfire hazard areas.

DMA 2000 Recommendations: Risk Assessment, Assessing Vulnerability, Analyzing Development Trends

Assessing Vulnerability: Analyzing Development Trends

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

Element

- Does the new or updated plan describe land uses and development trends?

Source: FEMA, July 2008.

6.3 LAND USE AND DEVELOPMENT TRENDS

Land use in the City is predominately residential with limited area for commercial services and community (or institutional) facilities. Suitable developable vacant land is in short supply within the boundaries of the City, and open space and various hydrological bodies surround the community. One area of town is classified as airport land use.

The 1996 Comprehensive Plan states,

“Land use in Fort Yukon is governed to a large extent by the natural environment. The Yukon Flats provides a bounty of subsistence resources which sustains traditional Athabascan values...Flooding and erosion hazards posed by the Yukon and Porcupine /rivers have been reduced for much of the town by the completion of a series of dikes and earthworks. Fort Yukon has a well defined town center with a mix of residential, commercial and limited industrial activities. The recent transfer of lands from G-Z Corporation to Native Village of Fort Yukon should help safeguard traditional lands for future generations. The pending completion of ANCSA Section 14(c)(3) negotiations should allow more land to be developed for housing and other important community uses...

Land use is profoundly affected by the city’s vulnerability to ice jams and flooding... Developing new residential subdivisions out of the flood danger area is a high priority for future land use...

The past twenty years have brought significant changes to land use in the community. These major changes and trends include:

- *Loss of major portions of the village, including riverfront shoreline, to flooding and erosion*
- *Serious flooding from ice jams during break-up*
- *The “downtown” gradually relocates from the river to Crow Town*
- *The departure of most Air Force personnel*
- *Construction of finger dikes along the waterfront*
- *The transfer of significant acreage from Gwitchyaa Zhee [G-Z] Corporation to Native Village of Fort Yukon*
- *1994 loss of school to fire, and subsequent emergency reconstruction*
- *1995 construction of the new flood control levee*

...The town is laid out between the airport along Hospital Lake...Hospital Lake is used for float plane access...There are five Native Allotments within the City limits. The Fort Yukon Native Townsite was patented to the townsite trustees for disposal to the occupants. Municipal reserves, underdeveloped portions and streets were conveyed to the City...

Fort Yukon is fortunate to have at least two sand and gravel material sources for local construction projects. The Grace Thomas gravel pit is located adjacent to the Sucker River, about one mile from the center of town. The Doyon Ltd/G-Z Corporation gravel pit is located adjacent to Yllota Slough, about 3 miles east of town” (Fort Yukon 1996).

“Fort Yukon has recently received land from the G-Z’s ANCSA Section 14(c)(3) for City expansion and residential housing development” (Fort Yukon 2010).

There are a few areas of commercial land uses within Fort Yukon that include facilities such as the Alaska Rural Utility Collaborative who manages the tribal-owned power generation facility, Alaska Commercial Company Store, the Midnight Sun Lodge, Sourdough Inn, and the Community Liquor Store. The City proposed establishing a few local revenue generating activities in 2010:

- Develop a central interpretive facility and visitor center
- Re-open the Dinjii Zhuu Enjit Museum
- Create a guided tourism program.

None of these revenue generating activities were instituted as funding is scarce. Community facilities are classified under institutional land uses such as schools and government facilities.

Development Trends

The City’s 1996 Comprehensive Plan states, “...Development should be compatible with subsistence, provide training and opportunities so that people have choices regarding their future, provide enough jobs and income to give people opportunity for advancement, and give children the real option to remain in the community after they are grown.” Fort Yukon’s population has not significantly increased since 1980; therefore, development within the City will remain relatively flat. No major commercial or industrial development is planned for Fort Yukon in the near future.

Tables 6-4 and 6-5 list DCRA’s identified infrastructure improvement projects for the City. They provide a depiction of the community’s ongoing development trends and focus on improving aging infrastructure. The first three projects in Table 6-4 were listed in 2010 but work has not occurred. The remainder of Tables 6-4 and 6-5 are included in their entirety from the 2010 plan; turnover in the city has occurred, and it is assumed these planned and funded projects were completed at some point in time.

Table 6-4 Planned and Funded Projects

Lead Agency	Fiscal Year	Project Status	Project Description / Comments	Project Stage	Lead Agency Funding	Total Cost
N/A		Potential	Youth Multi-purpose Building	N/A	\$0	\$10,000,000
N/A		Potential	Local Natural Gas Development Do project overlay, hire natural gas consultants, purchase equipment, hire consultants for a feasibility study, do drilling, build drilling conversion plant, purchase new generators, train local residents, construct a new facility for natural gas transfer	N/A	\$0	\$6,000,000
N/A		Potential	Multi-purpose building	N/A	\$0	\$1,250,000

Table 6-4 Planned and Funded Projects

Lead Agency	Fiscal Year	Project Status	Project Description / Comments	Project Stage	Lead Agency Funding	Total Cost
FAA – DOT/PF	2010	Planned	Rehabilitate Runway 03/21 Federal Aviation Administration (FAA) – Alaska Department of Transportation/Public Facilities (DOT/PF)	N/A	\$6,500,000	\$6,825,000
FAA – DOT/PF	2010	Planned	Construct Runway Safety Area 03/21 FAA - DOT/PF	N/A	\$4,500,000	\$4,725,000
DOT/PF	2010	Funded	Airport Improvements OTHER FUNDING: Federal Economic Stimulus Funds. This amendment to the FY09 Governor's Economic Stimulus Budget removes \$1,990,800 of Economic Stimulus Funds for a new FY09 total of \$4,509,200. Resurface and include a dust palliative on the apron, taxiway and runway at the Fort Yukon Airport. Correct drainage problems, clear overgrown vegetation, and complete other improvements as funding allows.	Preliminary	\$0	\$6,500,000
DOT/PF	2010	Funded	Snow Removal Equipment Building Construct a new snow removal equipment building at Fort Yukon Airport to include a building pad with surfacing and drainage improvements.	Preliminary	\$0	\$1,500,000
AEA-AEEE	2010	Funded	Fort Yukon Central Wood Heating DESIGN - BIOMASS OTHER FUNDING: Federal Alaska Energy Authority (AEA) /Alternative Energy and Energy Efficiency (AEEE)	Preliminary	\$210,000	\$350,657
ANTHC	2010	Funded	Sewer Collection and Water Storage System Design and construction of a sewer collection system for Zones 4, 5, and 6, water services and a water storage tank. Alaska Native Tribal Health Consortium (ANTHC)	Preliminary	\$41,475	\$165,902
FAA – DOT/PF	2009	Planned	Conduct aeronautical survey for WAAS approach OTHER FUNDING: DOT/PF	N/A	\$100,000	\$105,000
AEA-AEEE	2009	Funded	Fort Yukon Community Wood Heating - BIOMASS	Contract	\$22,500	\$1,640,110
HUD	2009	Funded	Indian Housing Block Grant (IHBG) - Native American Housing Assistance and Self Determination Act (NAHASDA) administration, operating & construction funds	Contract	\$495,040	\$495,040

Table 6-4 Planned and Funded Projects

Lead Agency	Fiscal Year	Project Status	Project Description / Comments	Project Stage	Lead Agency Funding	Total Cost
			US Housing and Urban Development (HUD)			
DCRA	2009	Funded	Purchase Heavy Equipment for Public Works Legislative Grant Division of Community and Regional Advocacy (DCRA)	Contract	\$50,000	\$50,000
USDA/RD and DEC/VSW	2009	Funded	Construct Sewage Collection System US Department of Agriculture (USDA)/Rural Development (RD) and Alaska Department of Environmental Conservation (DEC)/Village Safe Water Program (VSW)	Design	\$2,248,500	\$2,998,000
ANTHC	2009	Funded	New water treatment plant and water system upgrades	Design	\$0	\$1,795,632
ANTHC	2009	Funded	Water service	Design	\$0	\$60,000
ANTHC	2009	Funded	Sewer service.	Preliminary	\$0	\$2,125,755
ANTHC	2009	Funded	Water and sewer service lines.	Preliminary	\$0	\$300,000
ANTHC	2009	Funded	Design and Construction of Water and Sewer Facilities	Preliminary	\$55,852	\$225,870
AHFC and Denali	2008	Funded	Rural Teacher Housing Rural Teacher Housing. OTHER FUDING: Denali Commission \$236,444 Alaska Housing Finance Corporation (AHFC)	Construction	\$0	\$236,444
DCRA	2008	Funded	School Books and Supplies for Beaver, Venetie, Arctic Village and Stevens Village Schools Legislative Grant - Named Recipient	Contract	\$40,000	\$40,000
HUD	2008	Funded	IHBG-NAHASDA administration, operating & construction funds	Design	\$447,654	\$447,654
DEED	2008	Funded	Gym Renovation Completion Legislative Grant Department of Education and Early Development (DEED)	Preliminary	\$1,442,554	\$1,442,554
AEA-RPSU and Denali	2008	Funded	Rural Power System Upgrade Design/construct power plant and upgrade distribution facilities in Ft. Yukon, considering alternative-renewable energy elements for power plant as appropriate. AEA/Rural Power System Upgrade (RPSU)	Preliminary	\$0	\$100,000

Table 6-4 Planned and Funded Projects

Lead Agency	Fiscal Year	Project Status	Project Description / Comments	Project Stage	Lead Agency Funding	Total Cost
ANTHC	2007	Funded	Continuation of community-wide sewage collection system.	Construction	\$0	\$2,998,000
ANTHC	2007	Funded	Piped Sewer Service	Construction	\$0	\$2,917,639
HUD	2007	Funded	IHBG-NAHASDA administration, operating & construction funds	Construction	\$527,532	\$527,532
DCRA	2007	Funded	Yukon Flats Visitor Center Legislative Grant	Construction	\$25,000	\$25,000
DEED	2006	Funded	Fort Yukon Gym Renovation	Construction	\$4,083,399	\$4,166,734
ANTHC	2006	Funded	Install Sewer Mains and Sewer Service Lines, and Close Two Sewage Lagoons.	Construction	\$0	\$2,200,000
ANTHC	2006	Funded	Five New Traditional Homes	Construction	\$0	\$250,500
Denali	2006	Funded	Dust Control Design & Construction OTHER FUNDING = DOT/PF State Match: \$180,600. Design and construction of improvements to roads in Fort Yukon to improve safety and reduce dust in the community. The project includes improvements to the main roads in the community and residential streets to a lesser standard based on a priority system of traffic volumes and critical destinations including airport, school and regional health clinic Denali Commission and DOT/PF	Design	\$1,819,400	\$2,000,000
ANTHC	2005	Funded	Clinic Re-design and Construction OTHER FUNDING: Denali Commission \$7,078,341; Indian Health Service \$846,241; Council of Athabaskan Tribal Governments \$788,372.	Construction	\$0	\$8,712,954
ANTHC	2005	Funded	Water and Sewer Zone 3	Construction	\$0	\$1,749,800
ANTHC	2005	Funded	Piped Water and Sewer Improvements - Design	Design	\$0	\$275,000
ANTHC	2004	Funded	Water and Sewer Service 10 homes. Water and sewer service to individual homes.	Construction	\$0	\$2,013,000
ANTHC	2003	Funded	Water & Sewer Project, Phase 4 OTHER FUNDING: Environmental Protection Agency (EPA) \$1,832.2 DEC \$610.8 Construct washateria, 60 sewer service lines and sewer mains.	Construction	\$0	\$2,443,000
DEED	2003	Funded	Fort Yukon High School Gym Sprinklers Funded by State GO Bond	Design	\$109,406	\$111,639

Table 6-4 Planned and Funded Projects

Lead Agency	Fiscal Year	Project Status	Project Description / Comments	Project Stage	Lead Agency Funding	Total Cost
BIA	2002	Funded	Grade & Drain Rabbit Line Road Bureau of Indian Affairs (BIA)	Preliminary	\$2,160,000	\$2,160,000

The City's comprehensive plan describes their water and waste systems as

“Water System

A central supply of treated water is available to Fort Yukon residents with distribution to all city lots. Two 8-inch drilled wells at the southeast edge of the city on the lower end of the Yllota Slough provide a water source for the only piped system in Fort Yukon. According to the U.S. Public Health Service, wells are cased to 30 feet, each is equipped with a 60-gpm pump and has a sustained capacity of 60[(gallons per minute) (gpm) with a drawdown of 38 inches. Static water level was at 13 feet [in] (November 1974).

Water is pumped from the well to a water treatment building located a short distance from the well. The water is chlorinated, filtered and stored in tanks enclosed within the treatment building. Water is circulated from the treatment building through an 8-inch supply line and a 4-inch return line routed through a 1,500 foot buried wooden walk-through utilidor. Heat is added to the loop by two boilers and a heat exchanger. Service lines connect the school, community hall, and state office buildings.

Water for the community is obtained from two wells located near Yllato Slough east of the water treatment plant. Treatment is provided in a 47 x 34 foot heated building using a package Magnifloe process with two 5,000 gallon storage tanks. The capacity for this facility is 59 gpm (85,000 [gallons per day] gpd). Distribution occurs through a below-ground recirculating HDPE pipe system. Most of the houses in the community that have year-round occupants are served with water. Water is continually circulated through the system, and heat is added as needed to prevent freezing. The system uses waste heat from the community electric power generation plant.

Sewer System

The typical method of disposing of sewage wastes in Fort Yukon is with individual on-site septic systems. Septic tanks and drain fields usually take the form of crib systems. Notable exceptions are the State Office Building and the new school. Both of these facilities pipe sewage directly to a lagoon that serves just these buildings. Newer government-funded homes which require DEC approval have been required to install holding tanks in many instances in order to meet minimum health and groundwater standards. The City maintains a pumper truck for cleaning septic and holding tanks. Effluent collected from septic and holding tanks is transported to the city sewage lagoons located near the city landfill.

The main problem with individual septic systems in Fort Yukon comes from the high ground water table which prevails throughout most residential areas in town. Many drain fields leach raw sewage directly into the high ground water. This contaminated material migrates to swampy low areas of town, and appears as surface water. Standing surface water containing fecal contamination is a very significant health hazard. Research indicates that tests performed in the past have found evidence of fecal

contamination. The community should make it a priority to obtain current and accurate test data to clarify the extent of this hazard. If contamination is confirmed, the city should aggressively pursue state and federal assistance to install a piped sewage collection system.

Solid Waste

Solid waste is disposed of at a landfill site constructed in 1975 approximately 2 miles north of town along the FAA road. A collection service is provided. Combustibles (paper, wood, cardboard) are typically burned in barrels, and the dump is used mostly for metals such as tin cans, auto parts, and discarded appliances. The landfill violates FAA regulations, since it's located within 5,000 feet of the airport” (Fort Yukon 1996).

The City of Fort Yukon has benefited from numerous funding opportunities to assist them with upgrading their infrastructure. The City had a new sewage lagoon constructed and their waste heat recovery system upgraded in 1988. The 1990s brought substantial airport improvements such as new land acquisition resurfacing, apron expansion, and apron lighting; housing major renovations and modernizations included lead paint removal, new exterior doors and windows and wood stove gaskets; a new school was built to replace the former school’s that was destroyed by fire; roads received resurfacing; a new Community Center/Tribal Hall; and a landfill upgrade.

The turn of the century has brought fire alarm upgrades to the Yukon Flats School and Care Center; water and sewer upgrades, building renovations, road resurfacing and fire upgrades, and police vehicle upgrades. The City received funds to begin repairs to the piped water system and to construct a piped gravity sewer system to serve 250 residents and the local businesses. This project eliminated the majority of residential septic systems and outhouses. In 2011, the community extended the piped water system gravity and gravity fed septic system to the new subdivisions with a 325,000 gallon water tank. The new Power Plant House Biomass project will be completed Summer 2017. A new landfill and sewage lagoon are expected to be operational by August 2017.

Table 6-5 lists DCRA identified completed projects for the City.

Table 6-5 Completed Projects

Lead Agency	Fiscal Year	Project Status	Project Description / Comments	Project Stage	Lead Agency Funding	Total Cost
USDA/RD	2008	Funded	Fort Yukon Police Vehicles Funding: \$66,750 RD grant; \$22,250 RD loan US Department of Agriculture/Rural Development (USDA/RD)	Completed	\$89,000	\$89,000
DCRA	2007	Funded	Fort Yukon Gym Floor Legislative Grant Division of Community and Regional Affairs (DCRA)	Completed	\$50,000	\$50,000
DCRA	2007	Funded	Equipment Purchase Legislative Grant	Completed	\$30,000	\$30,000
HUD	2006	Funded	Indian Housing Block Grant (IHBG) -Native American Housing Assistance and Self Determination Act (NAHASDA) administration, operating & construction funds	Completed	\$531,809	\$531,809

Table 6-5 Completed Projects

Lead Agency	Fiscal Year	Project Status	Project Description / Comments	Project Stage	Lead Agency Funding	Total Cost
DCRA	2006	Funded	Yukon Flats Regional Government Feasibility Study Mini-Grant. Funded through Denali Commission.	Completed	\$0	\$30,000
HUD	2005	Funded	IHBG- NAHASDA administration, operating & construction funds	Completed	\$561,553	\$561,553
HUD	2004	Funded	IHBG- NAHASDA administration, operating & construction funds	Completed	\$610,106	\$610,106
ANTHC	2003	Funded	Water/Sewer Phase 1: sewer mains and service to 41 of 123 homes {formerly Water/Sewer Phase 4} IHS-708,521; CWA AN03N53-\$1,460,085. Construct sewer mains and service connections to 41 homes. Alaska Native Tribal Health Consortium (ANTHC)	Completed	\$0	\$2,168,606
HUD	2003	Funded	IHBG- NAHASDA administration, operating & construction funds	Completed	\$521,807	\$521,807
Denali	2003	Funded	Sub-Regional Health Clinic (Council of Athabascan Tribal Governments) Other Funding = First Alaskan's Institute: \$12,500. Sub-Regional Health Clinic (Council of Athabascan Tribal Governments) produce feasibility plan for health clinic and provide site preparation. Denali Commission (Denali)	Completed	\$119,367	\$131,867
DCRA	2003	Funded	CP&I/Public Safety & Fire Dept. Equipment Purchase & or Repair Capital Matching	Completed	\$46,398	\$48,841
ANTHC	2002	Funded	Water and Sewer Project Phase 3 OTHER FUNDING: EPA \$1,899.6 DEC \$633.3 Construct force main, lift stations, and collection main. Connect school to sewage collection system. Close school lagoon.	Completed	\$0	\$2,532,900
Denali	2002	Funded	Yukon Flats Health Clinic Other Funding = IHS: \$1,599,763; Rasmuson Foundation: \$500,000.. This project is for the planning and design of a replacement sub-regional clinic in Fort Yukon that would serve the nine communities in the Yukon Flats area. Funding for final design is dependent on successful completion and Denali Commission approval of the conceptual plan. CATG has been approved to proceed with conceptual planning in accordance to their Aug 9, 2002 Conceptual Planning Proposal.	Completed	\$400,000	\$2,499,763

Table 6-5 Completed Projects

Lead Agency	Fiscal Year	Project Status	Project Description / Comments	Project Stage	Lead Agency Funding	Total Cost
HUD	2002	Funded	IHBG- NAHASDA administration, operating & construction funds	Completed	\$470,975	\$470,975
AEA-BF	2002	Funded	Bulk Fuel CDR & Business Plan, Facility Construction/Upgrades, Repairs OTHER FUNDING: Denali Commission \$74,798. This project is on hold until an area wide utility management plan for Ft. Yukon and the surrounding communities in the Yukon Flats region has been formalized and put into operation. Alaska Energy Authority (AEA)-Bulk Fuel (BF)	Completed	\$0	\$74,798
DCRA	2002	Funded	Community Roads & Fire Upgrades Capital Matching	Completed	\$33,000	\$34,856
ANTHC	2002	Funded	Repair/Renovate Health Clinic OTHER FUNDING: Denali Commission. Specific construction activities involve remodeling interior office space, installing a door, removing interior walls, and replacing exterior windows. No new ground disturbance will occur under this project.	Completed	\$0	\$18,000
DHSS	2002	Funded	Yukon Flats - Boiler Overhaul US Department of Health and Social Services (DHSS)	Completed	\$8,676	\$8,676
ANTHC	2001	Funded	Field analysis of two existing water wells. Field analysis of two existing water wells.	Completed	\$0	\$1,803,277
EDA	2001	Funded	Yukon Flats Career Training Center Western Alaska Fisheries Disaster Economic Development Administration (EDA)	Completed	\$1,560,000	\$1,560,000
ANTHC	2001	Funded	Water and Sewer Improvements DEC \$346.4 Design and construct sewage lagoon	Completed	\$0	\$1,385,500
DCRA	2001	Funded	Dust Control with Calcium Chloride Capital Matching	Completed	\$24,250	\$25,526
Private	2001	Funded	Building Renovation Funded by the First Alaskans Foundation Private Funding	Completed	\$25,000	\$25,000
ANTHC	2000	Funded	Water distribution and heat recovery systems. IHS funding. Planning & design of community water/sewer system; new water main; abandon existing main; repair waste heat valves and heat exchangers	Completed	\$0	\$755,000

Table 6-5 Completed Projects

Lead Agency	Fiscal Year	Project Status	Project Description / Comments	Project Stage	Lead Agency Funding	Total Cost
HUD	2000	Funded	IHBG- NAHASDA administration, operating & construction funds	Completed	\$461,993	\$461,993
Denali	2000	Funded	Building Renovation Other Funding = First Alaskan's Institute: \$6,000. Building Renovation to accommodate Elder kitchen/dining, community freezer, renovation and tribal office improvements	Completed	\$25,000	\$31,000
DHSS	2000	Funded	Yukon Flats - School Fire Alarm Panel Replacement	Completed	\$3,290	\$3,290
DHSS	2000	Funded	Yukon Flats - Care Center Alarm Panel Replacement	Completed	\$3,290	\$3,290
HUD	1999	Funded	IHBG- NAHASDA administration, operating & construction funds	Completed	\$461,993	\$461,993
ANTHC	1999	Funded	Planning and Design for Water and Sewer Service Planning and design for improvements to water and sewer service. Minor repairs to existing systems.	Completed	\$0	\$240,000
DCRA	1999	Funded	Community Equipment Repair Capital Matching	Completed	\$25,006	\$25,006
HUD	1998	Funded	IHBG- NAHASDA administration, operating & construction funds	Completed	\$514,380	\$514,380
DCRA	1998	Funded	Landfill Upgrade Capital Matching	Completed	\$25,000	\$26,316
AHFC	1997	Funded	Mutual help housing, 12 homes HUD 1937 Act (Indian Housing)	Completed	\$769,559	\$3,847,797
HUD/CGP	1997	Funded	Housing Modernization Energy work, exterior doors, windows, wood stove gaskets HUD/Comprehensive Grant Program (CPG)	Completed	\$34,936	\$34,936
DCRA	1997	Funded	Volunteer Fire Department Upgrade Capital Matching. Grant has not been executed	Completed	\$25,108	\$26,429
DEC/VSU	1996	Funded	Master Plan/Solid Waste ANTHC lead. Study water, sewer and solid waste improvements in the community; recommendations include water treatment upgrades, construction of a community sewer system and incremental improvements to the solid waste disposal site Department of Environmental Conservation/Village Safe Water (VSW)	Completed	\$37,243	\$37,243
DCRA	1996	Funded	Facilities and Equipment Repairs Capital Matching	Completed	\$29,138	\$30,672

Table 6-5 Completed Projects

Lead Agency	Fiscal Year	Project Status	Project Description / Comments	Project Stage	Lead Agency Funding	Total Cost
DEED	1995	Funded	New School Construction Emergency funding and insurance. School burned during winter 1994 Department of Education and Early Development (DEED)	Completed	\$7,000,000	\$7,000,000
DOT/PF	1995	Funded	Roads Resurfacing	Completed	\$37,500	\$375,000
DCRA	1995	Funded	Community Center/Tribal Hall Community Development Block Grant (CDBG)	Completed	\$158,310	\$358,310
HUD/CGP	1995	Funded	Housing Modernization Major renovation	Completed	\$82,694	\$82,694
DCRA	1995	Funded	Solid Waste Management Improvements Capital Matching	Completed	\$29,626	\$31,185
DOT/PF	1994	Funded	Airport Apron Expansion Expand the apron, taxiway and safety areas	Completed	\$38,615	\$386,147
DHSS	1994	Funded	Former State Trooper Building Renovation Named Recipient Grant. State-owned facility.	Completed	\$120,000	\$120,000
DCRA	1994	Funded	Road Improvements Legislative Grant. ED 36	Completed	\$100,000	\$100,000
DOT/PF	1994	Funded	Airport HVAC Digital Control System Summer 94	Completed	\$6,800	\$68,000
DCRA	1994	Funded	Wild Rice Farming Study RDA	Completed	\$32,000	\$51,500
DCRA	1994	Funded	Road Improvements Capital Matching	Completed	\$29,951	\$31,527
HUD/CGP	1994	Funded	Housing Modernization Remove lead based paint	Completed	\$7,000	\$7,000
DCRA	1993	Funded	Renovate Library CDBG. Renovation to also include a Museum and Radio Station	Completed	\$95,000	\$347,086
DOT/PF	1993	Funded	Airport Land Acquisition	Completed	\$30,600	\$306,000
HUD/CGP	1993	Funded	Housing Modernization	Completed	\$197,840	\$197,840
DCRA	1993	Funded	Comprehensive Plan Community Development Block Grant (CDBG)	Completed	\$59,200	\$59,200
DOT&PF	1992	Funded	Airport Runway Resurfacing	Completed	\$92,078	\$920,783
FAA – DOT/PF	1991	Funded	Rehabilitate Runway OTHER FUNDING: DOT/PF	Completed	\$732,047	\$777,800
FAA – DOT/PF	1991	Funded	Install Apron Lighting OTHER FUNDING: DOT/PF	Completed	\$92,483	\$98,263
FAA – DOT/PF	1991	Funded	Acquire Aircraft Rescue & Fire Fighting Safety Equipment OTHER FUNDING: DOT/PF	Completed	\$9,376	\$9,962
DOT&PF	1990	Funded	Airport Apron Expansion	Completed	\$261,661	\$2,616,609

Table 6-5 Completed Projects

Lead Agency	Fiscal Year	Project Status	Project Description / Comments	Project Stage	Lead Agency Funding	Total Cost
DEC/VSW	1990	Funded	Wastewater Lagoon Study the options for upgrading the sewage lagoon to provide improved treatment	Completed	\$8,056	\$8,056
ANTHC	1989	Funded	Sewage lagoon, waste heat Indian Health Service (IHS) funding. Construct a sewage disposal lagoon, upgrade waste heat recovery system	Completed	\$0	\$175,000
DEC/VSW	1988	Funded	Sewage Study	Completed	\$0	\$0

(DCRA 2009)

Development Permits

The City's NFIP membership and City adopted floodplain ordinance No. 95-06 requires the City to enforce land use regulations designed to:

- Protect land uses from flood damage
- Modify land uses which are dangerous to health, safety or property to avoid future flood damage
- Ensure that new subdivisions and development are designed and built to minimize the potential for flood damage
- Ensure that flood insurance is available for sale to residents, and
- Ensure that those who occupy areas of special flood hazard assume responsibility for their actions.

The City's 1996 Comprehensive Plan explains that the City of Fort Yukon's ordinance requires a "Development Permit" that is reviewed by the City Manager (permit administrator) who determines if the project is within the floodplain. This applies to all repairs, improvements, and new construction, which may involve any other potential changes to the floodplain through either fill or excavation within the special flood hazard area (Fort Yukon 1996). The plan goes further to explain how they implement this ordinance,

"Normally, rural Alaskan communities find it impractical to implement the NFIP, due to lack of funding for staff engineers, surveyors, and detailed Flood Insurance Studies. Fort Yukon is one of the first communities to adopt a more practical approach – to help implement the ordinance and provide for public safety, the City has installed thirty High Water Mark placards throughout the community. These signs are posted on utility poles at a height of 439.6 feet above mean sea level (mean sea level [msl]). This height is considered to be the Base Flood Elevation (BFE). Under the NFIP, all new structures in town must be constructed at or above this height. This means a house which would normally be located below this height must be raised so that the lowest floor, including the basement, is at least at the BFE" (Fort Yukon 1996).

Future Land Use Needs

The Comprehensive Plan noted that the Alaska Native Claims Settlement Act ANCSA Section (14)(c) reconveys lands received under the Act's provisions to other parties (following

predefined criteria) such as land occupation since December 18, 1971 and municipal governments for present or future public purposes.

The City reached an agreement with the G-Z Corporation concerning a map of boundaries. Twelve plots (149 acres) have been transferred to the City.

Additionally, the City has noted they desire to relocate people from flood prone areas and have identified two potential high ground sites sufficient to satisfy new housing and population growth needs. However, advantages and disadvantages exist for both locations.

The City has noted that future commercial land use “will likely remain in its present location for the foreseeable future. Most of the commercial area is above the base flood elevation, and expansion room exists as well. The commercial area, together with the school and post office, form a fairly compact “downtown” area for Fort Yukon.” (Fort Yukon 1996).

The City only noted one industrial activity, the power generation facility owned and operated by G-Z Corporation. The Corporation proposed to move this facility to a 4.3 acre site at near the White Alice site in 2010. This never happened, and the Corporation instead built a new facility on 4th Avenue next to GZ Fuel Station.

A new landfill will be built across from the new sewage lagoon and is expected to be operational in August 2017.

This section outlines the four-step process for preparing a mitigation strategy including:

1. Developing Mitigation Goals
2. Identifying Mitigation Actions
3. Evaluating Mitigation Actions
4. Implementing Mitigation Action Plans

Within this section, the Planning Team developed mitigation goals and potential mitigation actions for the City of Fort Yukon.

7.1 DEVELOPING MITIGATION GOALS

The requirements for the local hazard mitigation goals, as stipulated in DMA 2000 and its implementing regulations, are described below.

DMA 2000 Requirements: Mitigation Strategy – Local Hazard Mitigation Goals	
Local Hazard Mitigation Goals	
Requirement §201.6(c)(3)(i): [The hazard mitigation strategy shall include a] description of mitigation goals to reduce or avoid long-term vulnerabilities to the identified hazards.	
Element	
■ Does the new or updated plan include a description of mitigation goals to reduce or avoid long-term vulnerabilities to the identified hazards?	
<i>Source: FEMA, July 2008.</i>	

The exposure analysis results were used as a basis for developing the mitigation goals and actions. Mitigation goals are defined as general guidelines that describe what a community wants to achieve in terms of hazard and loss prevention. Goal statements are typically long-range, policy-oriented statements representing community-wide visions. As such, ten goals were developed to reduce or avoid long-term vulnerabilities to the identified hazards (Table 7-1).

Table 7-1 Mitigation Goals

No.	Goal Description
1	Promote recognition and mitigation of all natural hazards that affect the City.
2	Promote cross-referencing mitigation goals and actions with other City planning mechanisms and projects.
3	Reduce possibility of losses from all natural hazards that affect the City.
4	Reduce vulnerability of structures to earthquake damage.
5	Reduce possibility of damage and losses from erosion.
6	Reduce the possibility of damage and losses from flooding.
7	Reduce possibility of damage and losses from permafrost.
8	Reduce vulnerability of structures to severe weather damage.
9	Reduce possibility of damage and losses from wildland fires.
10	Reduce possibility of damage and losses from climate change.

7.2 IDENTIFYING MITIGATION ACTIONS

The requirements for the identification and analysis of mitigation actions, as stipulated in DMA 2000 and its implementing regulations, are described below.

DMA 2000 Requirements: Mitigation Strategy - Identification and Analysis of Mitigation Actions

Identification and Analysis of Mitigation Actions

Requirement §201.6(c)(3)(ii): [The mitigation strategy shall include a] section that identifies and analyzes a comprehensive range of specific mitigation actions and projects being considered to reduce the effects of each hazard, with particular emphasis on new and existing buildings and infrastructure.

Element

- Does the new or updated plan identify and analyze a comprehensive range of specific mitigation actions and projects for each hazard?
- Do the identified actions and projects address reducing the effects of hazards on new buildings and infrastructure?
- Do the identified actions and projects address reducing the effects of hazards on existing buildings and infrastructure?

Source: FEMA, July 2008.

DMA 2000 Requirements: Mitigation Strategy - Identification and Analysis of Mitigation Actions: National Flood Insurance Program (NFIP) Compliance

Identification and Analysis of Mitigation Actions: NFIP Compliance

Requirement §201.6(c)(3)(ii): [The mitigation strategy] must also address the jurisdiction's participation in the National Flood Insurance Program (NFIP), and continued compliance with NFIP requirements, as appropriate.

Element

- Does the new or updated plan describe the jurisdiction(s) participation in the NFIP?
- Does the mitigation strategy identify, analyze and prioritize actions related to continued compliance with the NFIP?

Source: FEMA, July 2008.

After mitigation goals and actions were developed, the planning team assessed the potential mitigation actions to carry forward into the mitigation strategy. Mitigation actions are activities, measures, or projects that help achieve the goals of a mitigation plan. Mitigation actions are usually grouped into three broad categories: property protection, public education and awareness, and structural projects. In the 2010 HMP, the Planning Team selected 47 mitigation actions for potential implantation during the five-year life cycle of this HMP. The Planning Team placed particular emphasis on projects and programs that reduce the effects of hazards on both new and existing buildings and infrastructure. These potential projects are listed in Table 7-2. On May 9, 2017, the Planning Team annotated Table 7-2 in red font to identify the completed, deleted or deferred mitigation actions as a benchmark for progress. If activities were unchanged (i.e., deferred), a reason was provided for why no changes occurred.

Table 7-2 Mitigation Goals and Potential Actions
(Bold ID items were selected for implantation by the Planning Team)

Goals		Actions	
No.	Description	ID	Description
1	Promote recognizing and mitigating all natural hazards that affect the City of Fort Yukon (City).	A	Develop, produce, and distribute information materials concerning mitigation, preparedness, and safety procedures for all jurisdictional identified natural hazards. In progress and ongoing.
		B	Develop and implement strategies and educational outreach programs for debris management from natural hazard events. In progress and ongoing.
		C	Disseminate FEMA pamphlets to educate and encourage homeowners concerning structural and non-structural retrofit benefits. Still need when funding is available.
		D	Develop outreach program to educate residents concerning benefits of increased seismic resistance and modern building code compliance during rehabilitation or major repairs for residences or businesses. Completed.
		E	Identify and pursue funding opportunities to implement mitigation actions. In progress and ongoing. Funding opportunities seem to be getting more difficult to identify.
		F	Maintain membership in the National Flood Insurance Program to reduce monetary losses to individuals and the community. Yes. Ongoing.
		G	Identify critical facilities and vulnerable populations based on mapped high hazard areas. Completed.
		H	Identify evacuation routes away from high hazard areas and develop outreach program to educate the public concerning warnings and evacuation procedures. Completed.
		I	Develop an inventory of properties that meet the RL or SRL criteria. Completed.
2	Reduce possibility of losses from all natural hazards that affect the City.	A	The City will aggressively manage their existing plans to ensure they incorporate mitigation planning provisions into all community planning processes such as comprehensive, capital improvement, and land use plans, etc to demonstrate multi-benefit considerations and facilitate using multiple funding source consideration. In progress and ongoing. See Section 8.2.
		B	Integrate the Mitigation Plan findings for enhanced emergency planning. In progress and ongoing.
		C	Develop and incorporate building ordinances commensurate with building codes to reflect survivability from flood, fire, wind, seismic, and other hazards to ensure occupant safety. Completed.
		D	Develop and incorporate mitigation provisions and recommendations into zoning ordinances and community development processes to maintain the floodway and protect critical infrastructure and private residences from other hazard areas. Completed.
		E	Prohibit new construction in identified mitigatable hazard impact areas (avalanche, flood, erosion, etc.) or require building to applicable building codes for other hazard impacts (earthquake, volcanic ash, weather, etc.). Ordinance has been passed. Per City Manager, this is not enforceable.

Table 7-2 Mitigation Goals and Potential Actions
(Bold ID items were selected for implantation by the Planning Team)

Goals		Actions	
No.	Description	ID	Description
3	Cross reference Mitigation goals and actions with other City planning mechanisms and projects.	A	Increase power line wire size and incorporate quick disconnects (break away devices) to reduce ice load and wind storm power line failure during severe wind or winter ice storm events. GZ Corporation needs to issue need for this.
		B	Acquire (buy-out), demolish, or relocate structures from hazard prone area. Property deeds shall be restricted for open space uses in perpetuity to keep people from rebuilding in hazard areas. In progress.
		C	Harden utility headers located along river embankments to mitigate potential flood, debris, and erosion damages. This has been completed in certain areas.
		D	Develop vegetation projects to restore clear-cut and riverine erosion damage and to increase landslide susceptible slope stability. Need funding.
4	Reduce vulnerability of structures to earthquake damage.	A	Inspect, prioritize, and retrofit any critical facility or public infrastructure that does not meet current State Adopted Building Codes. Need funding.
		B	Evaluate critical public facility seismic performance for fire stations, public works buildings, potable water systems, wastewater systems, electric power systems, and bridges within the jurisdiction. Need funding.
		C	Encourage utility companies to evaluate and harden vulnerable infrastructure elements for sustainability. Need funding.
		D	Install non-structural seismic restraints for large furniture such as bookcases, filing cabinets, and appliances to prevent toppling damage and resultant injuries. Need funding.
5	Reduce possibility of damage and losses from erosion.	A	Maintain and update erosion hazard locations, identify critical facilities potentially impacted and develop mitigation initiatives such as bank stabilization or facility relocation to prevent or reduce the threat. Need funding.
		B	Install bank protection such as rip-rap (large rocks), sheet pilings, gabion baskets, articulated matting, concrete, asphalt, vegetation, or other armoring or protective materials to provide river bank protection. Need funding.
		C	Harden culvert entrance bottoms with asphalt, concrete, rock, or similar material to reduce erosion or scour. Need funding.
		D	Install walls at the end of a drainage structure to prevent embankment erosion at its entrance or outlet. (end or wing walls). Need funding.
6	Reduce the possibility of damage and losses from flooding.	A	Develop and maintain inventory of repetitive loss properties to include the types, numbers, and locations of properties. There have been no repetitive loss properties since 2010 plan.
		B	Establish flood mitigation priorities for critical facilities and residential and commercial buildings located within the 100- year floodplain using survey elevation data. Need funding.
		C	Develop and maintain an inventory of locations subject to frequent storm water flooding based on most current USACOE flood data. Need funding.

Table 7-2 Mitigation Goals and Potential Actions
(Bold ID items were selected for implantation by the Planning Team)

Goals		Actions	
No.	Description	ID	Description
		D	Determine and implement most cost beneficial and feasible mitigation actions for locations with repetitive flooding and significant damages or road closures. Need funding.
		E	Develop, implement, and enforce floodplain management ordinances. Completed.
		F	Provide flood protection to mitigate damage and contamination of wastewater treatment systems (sewage lagoons). Completed.
		G	Raise 1600 Feet of "Base Road" roadbed to enable the road to act as a levee to protect flood threatened homes. This action will eliminate the need to elevate these threatened homes. Raised one foot. Need additional funding.
		H	Elevate road adjacent to the slough to enable the road to act as a levee to protect flood threatened homes. Needs improvement.
7	Reduce possibility of damage and losses from permafrost.	A	Identify and map existing permafrost areas to assist in new critical facility siting and existing facility relocation siting. Needs improvement.
		B	Promote permafrost sensitive construction practices in permafrost areas. Needs improvement.
8	Reduce vulnerability of structures to severe weather damage.	A	Develop and implement programs to coordinate maintenance and mitigation activities to reduce risk to public infrastructure from severe winter storms. Ongoing.
		B	Develop critical facility list needing emergency back-up power systems, prioritize, seek funding, and implement mitigation actions. Ongoing.
		C	Develop and implement tree clearing mitigation programs to keep trees from threatening lives, property, and public infrastructure from severe weather events. Tribe clears trees. Everyone else is responsible to clear brush.
		D	Develop personal use and educational outreach training for a "safe tree harvesting" program. Implement along utility and road corridors, preventing potential winter storm damage. Tribe clears trees. Everyone else is responsible to clear brush.
9	Reduce possibility of damage and losses from wildland fires.	A	Develop Community Wildland Fire Protection Plans for all at-risk communities. Need funding.
		B	Hold FireWise workshop to educate residents and contractors concerning fire resistant landscaping. Need funding.
		C	Promote FireWise building siting, design, and construction materials. Need funding.
		D	Provide wildland fire information in an easily distributed format for all residents. Need funding.
		E	Develop, adopt, and enforce burn ordinances that require burn permits, restrict campfires, and controls outdoor burning. Completed.
		F	Develop outreach program to educate and encourage fire-safe construction practices for existing and new construction in high risk areas. Need funding.

Table 7-2 Mitigation Goals and Potential Actions
(*Bold ID items were selected for implantation by the Planning Team*)

Goals		Actions	
No.	Description	ID	Description
		G	Identify, develop, implement, and enforce mitigation actions such as fuel breaks and reduction zones for potential wildland fire hazard areas. Need funding.

7.3 EVALUATING AND PRIORITIZING MITIGATION ACTIONS

The requirements for the evaluation and implementation of mitigation actions, as stipulated in DMA 2000 and its implementing regulations, are described below.

DMA 2000 Requirements: Mitigation Strategy - Implementation of Mitigation Actions

Implementation of Mitigation Actions

Requirement: §201.6(c)(3)(iii): [The mitigation strategy section shall include] an action plan describing how the actions identified in Section (c)(3)(ii) will be prioritized, implemented, and administered by the local jurisdiction. Prioritization shall include a special emphasis on the extent to which benefits are maximized according to a cost benefit review of the proposed projects and their associated costs.

Element

- Does the new or updated mitigation strategy include how the actions are prioritized?
- Does the new or updated mitigation strategy address how the actions will be implemented and administered?
- Does the new or updated prioritization process include an emphasis on the use of a cost-benefit review to maximize benefits?
- *Does the updated plan identify the completed, deleted or deferred mitigation actions as a benchmark for progress, and if activities are unchanged (i.e., deferred), does the updated plan describe why no changes occurred?*

Source: FEMA, July 2008.

The Planning Team evaluated each of the mitigation actions on May 8, 2017 to determine which actions would be included in the updated Mitigation Action Plan. The Mitigation Action Plan contained in Table 7-2 represents mitigation projects and programs to be implemented through the cooperation of multiple entities in the City. The Planning Team determined that these actions did not need to be reprioritized from 2010 due to the last seven years of historical record within the community.

The Planning Team reviewed the simplified social, technical, administrative, political, legal, economic, and environmental (STAPLEE) evaluation criteria (shown in Table 7-3) and the Benefit-Cost Analysis Fact Sheet (Appendix D) to consider the opportunities and constraints of implementing each particular mitigation action. For each action considered for implementation, a qualitative statement is provided regarding the benefits and costs and, where available, the technical feasibility. A detailed cost-benefit analysis is anticipated as part of the application process for those projects the City chooses to implement.

Table 7-3 Evaluation Criteria for Mitigation Actions

Social, Technical, Administrative, Political, Legal, Economic, and Environmental (STAPLEE)

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

On May 8, 2017, the hazard mitigation Planning Team reviewed each mitigation action in Table 7-2. The hazard mitigation Planning Team considered each hazard’s history, extent, and probability to determine each potential action’s priority. A rating system based on high, medium, or low was used. High priorities are associated with actions for hazards that impact the community on an annual or near annual basis and generate impacts to critical facilities and/or people. Medium priorities are associated with actions for hazards that impact the community less frequently and do not typically generate impacts to critical facilities and/or people. Low priorities are associated with actions for hazards that rarely impact the community and have rarely generated documented impacts to critical facilities and/or people.

Prioritizing the mitigation actions in the Mitigation Action Plan Matrix was completed to provide the City with an approach to implementing the Mitigation Action Plan. Table 7-4 defines the mitigation action priorities.

7.4 IMPLEMENTING A MITIGATION ACTION PLAN

Table 7-4 shows the City’s 2010 Mitigation Action Plan Matrix that shows how the mitigation actions were prioritized, how the overall benefit/costs were taken into consideration, and how each mitigation action will be implemented and administered by the Planning Team. On May 9,

2017, the Planning Team determined that all items in Table 7-4 are ongoing and should be retained in the 2017 plan update.

Table 7-4 City of Fort Yukon Mitigation Action Plan Matrix

(See acronym and abbreviations list for complete titles)

Action ID	Description	Priority	Responsible Department	Potential Funding	Timeframe	Benefit-Costs / Technical Feasibility
1C	Disseminate FEMA pamphlets to educate and encourage homeowners concerning structural and non-structural retrofit benefits.	Medium	City of Fort Yukon, Fort Yukon Tribal Council (The Native Council is included as a viable responsible entity in order to obtain Administration for Native Americans (ANA) funding, the Tribe would need to be the applicant for those projects)	City of Fort Yukon, Fort Yukon Tribal Council, Federal Emergency Management Agency (FEMA) Hazard Mitigation Assistance (HMA) programs, FEMA Assistance to Firefighters Grant (AFG) Program's Fire Prevention and Safety Grant (FP&S) Program, and Staffing for Adequate Fire and Emergency Response (SAFER) Program	1-3 years	B/C: Sustained mitigation outreach programs have minimal cost and will help build and support area-wide capacity. This type activity enables the public to prepare for, respond to, and recover from disasters. TF: This low cost activity can be combined with recurring community meetings where hazard specific information can be presented in small increments. This activity is ongoing demonstrating its feasibility.
1E	Identify and pursue funding opportunities to implement mitigation actions.	High	City of Fort Yukon, Fort Yukon Tribal Council	City of Fort Yukon, Fort Yukon Tribal Council, HMA, AFG, FP&S, SAFER, ANA, EFSP, Denali Commission, DCCED/CDBG	Ongoing	B/C: This ongoing activity is essential for the City as there are limited funds available to accomplish effective mitigation actions. TF: This activity is ongoing demonstrating its feasibility.
1F	Maintain membership in the National Flood Insurance Program to reduce monetary losses to individuals and the community.	High	City of Fort Yukon, Fort Yukon Tribal Council	City of Fort Yukon, Fort Yukon Tribal Council	1-3 years	B/C: NFIP participation while one of FEMA's highest priorities also enables communities with an effective program focus on repetitive flood loss properties and other priority flood locations and projects. TF: City is currently a member and residents enjoy lower cost insurance. Continuation is relatively simple.
2A	The City will aggressively manage their existing plans to ensure they incorporate mitigation planning provisions into all community planning processes such as comprehensive, capital	Medium	City of Fort Yukon, Fort Yukon Tribal Council	City of Fort Yukon, Fort Yukon Tribal Council, Denali Commission, DCCED/CDBG	1-3 years	B/C: Coordinated planning ensures effective damage abatement and ensures proper attention is assigned to reduce losses and damage to structures and City residents.

Table 7-4 City of Fort Yukon Mitigation Action Plan Matrix*(See acronym and abbreviations list for complete titles)*

Action ID	Description	Priority	Responsible Department	Potential Funding	Timeframe	Benefit-Costs / Technical Feasibility
	improvement, and land use plans, etc to demonstrate multi-benefit considerations and facilitate using multiple funding source consideration.					TF: This is feasible to accomplish as no cost is associated with the action and only relies on member availability and willingness to serve their community.
2B	Integrate the Mitigation Plan findings for enhanced emergency planning.	Medium	City of Fort Yukon, Fort Yukon Tribal Council	City of Fort Yukon, Fort Yukon Tribal Council, Denali Commission, DCCED/CDBG	1-3 years	B/C: Coordinated planning ensures effective damage abatement and ensures proper attention is assigned to reduce losses and damage to structures and City residents. TF: This is feasible to accomplish as no cost is associated with the action and only relies on member availability and willingness to serve their community.
2E	Prohibit new construction in identified mitigatable hazard impact areas (avalanche, flood, erosion, etc.) or require building to applicable building codes for other hazard impacts (earthquake, volcanic ash, weather, etc.).	High	City of Fort Yukon, Fort Yukon Tribal Council	City of Fort Yukon, Fort Yukon Tribal Council	3-5 years	B/C: Building code development, implementation and enforcement can effectively reduce future losses to hazardous events. Building codes can actually assist bush communities through making maximum use of materials and shipping costs the first time. TF: This project is technically feasible as the community need only demonstrate cost savings by demonstrating losses from history utility impacts and down time.
3B	Acquire (buy-out), demolish, or relocate structures from hazard prone area. Property deeds shall be restricted for open space uses in perpetuity to keep people from rebuilding in hazard areas.	High	City of Fort Yukon, Fort Yukon Tribal Council	City of Fort Yukon, Fort Yukon Tribal Council, HMA, Natural Resources Conservation Service (NRCS), ANA	1-5 years	B/C: This project would remove threatened structures from hazard areas, eliminating future damage while keeping land clear for perpetuity. F: This project is feasible using existing staff skills, equipment, and materials.
4C	Encourage utility companies to evaluate and harden vulnerable infrastructure elements for	Medium	City of Fort Yukon, Fort Yukon Tribal Council	City of Fort Yukon, Fort Yukon Tribal Council, HMA, AFG, FP&S, SAFER, ANA,	3-5 years	B/C: Hardening infrastructure to reduce hazard impacts reduces potential future losses and replacement costs.

Table 7-4 City of Fort Yukon Mitigation Action Plan Matrix

(See acronym and abbreviations list for complete titles)

Action ID	Description	Priority	Responsible Department	Potential Funding	Timeframe	Benefit-Costs / Technical Feasibility
	sustainability.			EFSP		TF: The City has the technical capability to manage and conduct this project.
5A	Maintain and update erosion hazard locations, identify critical facilities potentially impacted and develop mitigation initiatives such as bank stabilization or facility relocation to prevent or reduce the threat.	Medium	City of Fort Yukon, Fort Yukon Tribal Council	City of Fort Yukon, Fort Yukon Tribal Council	2-4 years	B/C: Identifying threatened infrastructure proximity to natural hazards is vital to their sustainability. There are no currently mapped hazard areas. This is a vital first step. This knowledge will help the community focus on activities to protect their vital infrastructure. TF: The project is technically feasible as the community has staff and resources they have used to relocate and elevate buildings.
6D	Determine and implement most cost beneficial and feasible mitigation actions for locations with repetitive flooding and significant damages or road closures.	High	City of Fort Yukon, Fort Yukon Tribal Council	City of Fort Yukon, Fort Yukon Tribal Council	1-3 years	B/C: Flood hazard mitigation is among FEMA's highest national priorities. FEMA desires communities focus on repetitive flood loss properties. This activity will ensure the City and Tribal Councils focus on priority flood locations and projects. TF: Low to no cost makes this outreach activity very feasible.
6E	Develop, implement, and enforce floodplain management ordinances.	High	City of Fort Yukon, Fort Yukon Tribal Council	City of Fort Yukon, Fort Yukon Tribal Council	1-3 years	B/C: Continued NFIP participation while one of FEMA's highest priorities also enables communities with an effective program focus on repetitive flood loss properties and other priority flood locations and projects. TF: Low to no cost makes this outreach activity very feasible.
G	Raise 1600 Feet of "Base Road" roadbed to enable the road to act as a levee to protect flood threatened homes. This action will eliminate the need to elevate these	Medium	City of Fort Yukon, Fort Yukon Tribal Council	City of Fort Yukon, Fort Yukon Tribal Council	3-8 years	B/C: This project would protect threatened structures from future flood damage, dramatically reduce the expense of mitigating each structure individually.

Table 7-4 City of Fort Yukon Mitigation Action Plan Matrix

(See acronym and abbreviations list for complete titles)

Action ID	Description	Priority	Responsible Department	Potential Funding	Timeframe	Benefit-Costs / Technical Feasibility
	threatened homes.					TF: This project is feasible using existing staff skills, equipment, and materials.
7A	Identify and map existing permafrost areas to assist in new critical facility siting and existing facility relocation siting.	Medium	City of Fort Yukon, Fort Yukon Tribal Council	City of Fort Yukon, Fort Yukon Tribal Council, ANA, HMA,	2-4 years	B/C: Identifying permafrost locations is a minimal cost which would decrease damage to facilities if they were sited appropriately. Project must be associated with a relocation or construction project. TF: Technically feasible as the community currently has identified permafrost locations but they have not created a map defining the area and they dig test holes to determine permafrost depth prior to construction.
7B	Promote permafrost sensitive construction practices in permafrost areas.	Medium	City of Fort Yukon, Fort Yukon Tribal Council	City of Fort Yukon, Fort Yukon Tribal Council, HMA, ANA	2-4 years	B/C: Sustained mitigation outreach programs have minimal cost and will help build and support community capacity enabling the public to prepare for, respond to, and recover from disasters. Siting education can ensure structures are sited away from known hazard areas. TF: This project is technically feasible using existing Tribal Council staff
8A	Develop and implement programs to coordinate maintenance and mitigation activities to reduce risk to public infrastructure from severe winter storms.	Low	City of Fort Yukon, Fort Yukon Tribal Council	City of Fort Yukon, Fort Yukon Tribal Council, DCCED/CDBG, Denali Commission	3-5 years	B/C: Scheduling maintenance and implementing mitigation activities will potentially reduce severe winter storm damages caused by heavy snow loads and icy rain. TF: This type activity is technically feasible within the community typically using existing labor, equipment, and materials. Specialized methods are not new to rural communities as they are used to importing required contractors.
9A	Develop Community Wildland Fire	High	City of Fort Yukon,	City of Fort Yukon, Fort	3-5 years	B/C: This project will ensure the

Table 7-4 City of Fort Yukon Mitigation Action Plan Matrix*(See acronym and abbreviations list for complete titles)*

Action ID	Description	Priority	Responsible Department	Potential Funding	Timeframe	Benefit-Costs / Technical Feasibility
	Protection Plans for all at-risk communities.		Fort Yukon Tribal Council Alaska Fire Service, Division of Forestry, US Forest Service	Yukon Tribal Council, DOF: VFAG, RAGP		community looks closely at their wildland fire hazard to ensure they can safely address actions and needs during a wildland fire event. TF: This is technically feasible using existing city and tribal resources with existing State and Federal agency support and guidance.
9D	Provide wildland fire information in an easily distributed format for all residents.	Medium	City of Fort Yukon, Fort Yukon Tribal Council, Alaska Fire Service, US Forest Service	DOF FireWise Program	1-3 years	B/C: Sustained mitigation outreach program has minimal cost and will help build and support area-wide capacity. This type activity enables the public to prepare for, respond to, and recover from disasters. TF: This low cost activity can be combined with recurring community meetings where hazard specific information can be presented in small increments. This activity is ongoing demonstrating its feasibility.

This section describes a formal plan maintenance process to ensure that the HMP remains an active and applicable document. It includes an explanation of how the City’s Planning Team intends to organize their efforts to ensure that improvements and revisions to the HMP occur in a well-managed, efficient, and coordinated manner.

The following three process steps are addressed in detail here:

1. Monitoring, evaluating, and updating the HMP
2. Implementation through existing planning mechanisms
3. Continued public involvement

8.1 MONITORING, EVALUATING, AND UPDATING THE HMP

The requirements for monitoring, evaluating, and updating the HMP, as stipulated in the DMA 2000 and its implementing regulations, are described below. No HMP monitoring or evaluating has been completed since the 2010 plan was developed.

DMA 2000 Requirements: Plan Maintenance Process - Monitoring, Evaluating, and Updating the Plan

Monitoring, Evaluating and Updating the Plan

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

Element

- Does the new or updated plan describe the method and schedule for monitoring the plan, including the responsible department?
- Does the new or updated plan describe the method and schedule for evaluating the plan, including how, when and by whom (i.e., the responsible department)?
- Does the new or updated plan describe the method and schedule for updating the plan within the five-year cycle?

Source: FEMA, July 2008.

The HMP update was prepared as a collaborative effort among the Planning Team and LeMay Engineering & Consulting, Inc. To maintain momentum and build upon previous hazard mitigation planning efforts and successes, the City will use the Planning Team to monitor, evaluate, and update the HMP. Each authority identified in Table 7-4 will be responsible for implementing the Mitigation Action Plan. The City Manager will serve as the primary point of contact and will coordinate local efforts to monitor, evaluate, and revise the HMP.

Each member of the Planning Team will conduct an annual review during the anniversary week of the plan’s official FEMA approval date to monitor the progress in implementing the HMP, particularly the Mitigation Action Plan. As shown in Appendix E, the Annual Review Worksheet will provide the basis for possible changes in the HMP Mitigation Action Plan by refocusing on new or more threatening hazards, adjusting to changes to or increases in resource allocations, and engaging additional support for the HMP implementation. The Planning Team Leader will initiate the annual review two months prior to the scheduled planning meeting date to ensure that all data is assembled for discussion with the Planning Team. The findings from these reviews will be presented at the annual Planning Team Meeting. Each review, as shown on the Annual Review Worksheet, will include an evaluation of the following:

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

- Progress made with the Mitigation Action Plan (identify problems and suggest improvements as necessary)
- The adequacy of local resources for implementation of the HMP

A system of reviewing the progress on achieving the mitigation goals and implementing the Mitigation Action Plan activities and projects will also be accomplished during the annual review process. During each annual review, each authority administering a mitigation project will submit a Progress Report to the Planning Team. As shown in Appendix E, the report will include the current status of the mitigation project, including any changes made to the project, the identification of implementation problems and appropriate strategies to overcome them, and whether or not the project has helped achieve the appropriate goals identified in the plan.

In addition to the annual review, the Planning Team will update the HMP every five years. To ensure that this update occurs, in the fourth year following adoption of the HMP, the Planning Team will undertake the following activities:

- Request grant assistance from DHS&EM to update the HMP (this can take up to one year to obtain and one year to update the plan)
- Thoroughly analyze and update the risk of natural and human-made hazards
- Provide a new annual review (as noted above), plus a review of the three previous annual reviews
- Provide a detailed review and revision of the mitigation strategy
- Prepare a new Mitigation Action Plan for the City of Fort Yukon
- Prepare a new draft HMP
- Submit an updated HMP to the DHS&EM and FEMA for approval
- Submit the FEMA approved plan for adoption by the City of Fort Yukon
- Return adoption resolution to DHS&EM and FEMA to receive formal approval

8.2 IMPLEMENTATION THROUGH EXISTING PLANNING MECHANISMS

The requirements for implementation through existing planning mechanisms, as stipulated in the DMA 2000 and its implementing regulations, are described below.

DMA 2000 Requirements: Plan Maintenance Process - Incorporation into Existing Planning Mechanisms**Incorporation into Existing Planning Mechanisms**

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

Element

- Does the new or updated plan identify other local planning mechanisms available for incorporating the mitigation requirements of the mitigation plan?
- Does the new or updated plan include a process by which the local government will incorporate the mitigation strategy and other information contained in the plan (e.g., risk assessment) into other planning mechanisms, when appropriate?
- *Does the updated plan explain how the local government incorporated the mitigation strategy and other information contained in the plan (e.g., risk assessment) into other planning mechanisms, when appropriate?*

Source: FEMA, July 2008.

After the adoption of the HMP, each Planning Team Member will ensure that the HMP, in particular each Mitigation Action Project, is incorporated into existing planning mechanisms. Each member of the Planning Team will achieve this incorporation by undertaking the following activities.

- Conduct a review of the community-specific regulatory tools to assess the integration of the mitigation strategy. These regulatory tools are identified in the following capability assessment section.
- Work with pertinent community departments to increase awareness of the HMP and provide assistance in integrating the mitigation strategy (including the Mitigation Action Plan) into relevant planning mechanisms. Implementation of these requirements may require updating or amending specific planning mechanisms.
- The City Clerk will be responsible for providing a list of all City of Fort Yukon documents to contractors focused on developing new or updating existing City Plans and ensuring that this HMP is incorporated into plans as applicable.

The City of Fort Yukon will involve the public to continually reshape and update this HMP. A paper copy of this plan will be available at the City Office. This HMP will also be stored on the State Department of Commerce, Community, and Economic Development Community and Regional Affairs (DCCED/DCRA) plans website for public reference. Planners are encouraged to integrate components of this HMP into their own plans.

8.3 CITY OF FORT YUKON CAPABILITY ASSESSMENT

The City's capability assessment reviews the technical and fiscal resources available to the community. This section outlines the resources available to the City of Fort Yukon for mitigation and mitigation related funding and training.

Table 8-1 Fort Yukon's Regulatory Tools

Regulatory Tools (ordinances, codes, plans)	Existing?	Comments (Year of most recent update; problems administering it, etc)
Building code	No	The City can exercise this authority.
Zoning ordinances	No	The City can exercise this authority.
Subdivision ordinances or regulations	No	The City can exercise this authority.

Table 8-1 Fort Yukon's Regulatory Tools

Regulatory Tools (ordinances, codes, plans)	Existing?	Comments (Year of most recent update; problems administering it, etc)
Special purpose ordinances (Referenced in Comprehensive Plan)	Yes	Floodplain ordinance. Prohibits permanent structure building in old town. New infrastructure and residences are built on higher elevation (above the Base Flood Elevation (BFE) adjacent to the City.
Comprehensive Plan	Yes	Completed in 1996. Describes its long-term planning goals and strategy
Emergency Response Plan	Yes	Completed.
Land Use Regulation	Yes	1996, Guides land use to protect safety and welfare of residents
Land Use Plan	Yes	1995 (Referenced in Comprehensive Plan)
Wildland Fire Protection Plan	Yes	Defines community fire threats
Sanitation Feasibility Study/Master Plan	Yes	Describes the City's soil types and preliminary engineering and testing; the study considered alternatives for recommended facilities
City of Fort Yukon Transportation Plan	Yes	Provides insight into future transportation needs, use, and land-use conversion.
Fort Yukon Community Plan	Yes	Provides the community vision of increasing the quality of life for community members through economic development and the preservation of their culture, heritage, and rich natural resources.

Federal Resources

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

- FEMA, through its Emergency Management Institute, offers training in many aspects of emergency management, including hazard mitigation. FEMA has also developed a large number of documents that address implementing hazard mitigation at the local level. Five key resource documents are available from FEMA Publication Warehouse (1-800-480-2520) and are briefly described here:
 - How-to Guides. FEMA has developed a series of how-to guides to assist states, communities, and tribes in enhancing their hazard mitigation planning capabilities. The first four guides describe the four major phases of hazard mitigation planning. The last five how-to guides address special topics that arise in hazard mitigation planning such as conducting cost-benefit analysis and preparing multi-jurisdictional plans. The use of worksheets, checklists, and tables make these guides a practical source of guidance to address all stages of the hazard mitigation planning process. They also include special tips on meeting DMA 2000 requirements).

- Post-Disaster Hazard Mitigation Planning Guidance for State and Local Governments. FEMA DAP-12, September 1990. This handbook explains the basic concepts of hazard mitigation and shows state and local governments how they can develop and achieve mitigation goals within the context of FEMA's post-disaster hazard mitigation planning requirements. The handbook focuses on approaches to mitigation, with an emphasis on multi-objective planning.
- Mitigation Resources for Success compact disc (CD). FEMA 372, September 2001. This CD contains a wealth of 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 programs (administered by FEMA) is the primary source of Federal assistance. This handbook discusses the procedures and process for obtaining this assistance, and provides a brief overview of each program.
- The Emergency Management Guide for Business and Industry. FEMA 141, October 1993. This guide provides a step-by-step approach to emergency management planning, response, and recovery. 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 a community's industries and businesses located in hazard prone areas.
- The FEMA Hazard Mitigation Assistance (HMA Unified Guidance, June 1, 2009. The guidance introduces the five HMA grant programs, funding opportunities, award information, eligibility, application and submission information, application review process, administering the grant, contracts, additional program guidance, additional project guidance, and contains information and resource appendices (FEMA 2009).
- Department of Agriculture (USDA). 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 (DOE), 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 Health and Human Services, Administration of Children & Families, Administration for Native Americans (ANA). The ANA awards funds through grants to American Indians, Native Americans, Native Alaskans, Native Hawaiians, and Pacific Islanders. These grants are awarded to individual organizations that successfully apply for discretionary funds. ANA publishes in the Federal Register an announcement of funds available, the primary areas of focus, review criteria, and the method of application.

- Department of Housing and Urban Development (HUD), 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 (HUD/CDBG). Provides grant assistance and technical assistance to aid communities in planning activities that address issues detrimental to the health and safety of local residents, such as housing rehabilitation, public services, community facilities, and infrastructure improvements that would primarily benefit low-and moderate-income persons.
- Department of Labor (DOL), 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 Federal Deposit Insurance Corporation, Financial Reporting Standards or Federal Home Loan Bank Board may be permitted to waive early withdrawal penalties for Certificates of Deposit and Individual Retirement Accounts.
- Internal Revenue Service (IRS), 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.
- U.S. Small Business Administration (SBA). May provide low-interest disaster loans to individuals and businesses that have suffered a loss due to a disaster. Requests for SBA loan assistance should be submitted to DHS&EM.
- USACE Alaska District's Civil Works Branch studies potential water resource projects in Alaska. These studies analyze and solve water resource issues of concern to the local communities. These issues may involve navigational improvements, flood control or ecosystem restoration. The agency also tracks flood hazard data for over 300 Alaskan communities on floodplains or the sea coast. These data help local communities assess the risk of floods to their communities and prepare for potential future floods. The USACE is a member and co-chair of the Alaska Climate Change Sub-Cabinet.

State Resources

- DHS&EM is responsible for improving hazard mitigation technical assistance for local governments for the State of Alaska. Providing hazard mitigation training, current hazard information, and communication facilitation with other agencies will enhance local hazard mitigation efforts. DHS&EM administers FEMA mitigation grants to mitigate future disaster damages such as those that may affect infrastructure including the elevation, relocation, or acquisition of hazard-prone properties. DHS&EM also provides mitigation funding resources for mitigation planning.
- Division of Senior Services (DSS): Provides special outreach services for seniors, including food, shelter, and clothing.
- Division of Insurance (DOI): Provides assistance in obtaining copies of policies and provides information regarding filing claims.

- Department of Military and Veterans Affairs (DMVA): Provides damage appraisals and settlements for VA-insured homes, and assists with filing of survivor benefits.
- The Community Health and Emergency Medical Services (CHEMS) is a section within Division of Public Health within the Department of Health and Social Services (DHSS). DHSS is charged with promoting and protecting the public health and one of CHEMS' responsibilities is developing, implementing, and maintaining a statewide comprehensive emergency medical services system. The department's statutory mandate (Alaska Statute 18.08.010) requires it to:
 - Coordinate public and private agencies engaged in the planning and delivery of emergency medical services, including trauma care, to plan an emergency medical services system
 - Assist public and private agencies to deliver emergency medical services, including trauma care, through the award of grants in aid
 - Conduct, encourage, and approve programs of education and training designed to upgrade the knowledge and skills of health personnel involved in emergency medical services, including trauma care
 - Establish and maintain a process under which hospitals and clinics can represent themselves to be trauma centers because they voluntarily meet criteria adopted by the department which are based on an applicable national evaluation system
- DCRA within the DCCED. DCRA administers the HUD/CDBG, FMA Program, and the Climate Change Sub-Cabinet's Interagency Working Group's program funds and administers various flood and erosion mitigation projects, including the elevation, relocation, or acquisition of flood-prone homes and businesses throughout the State. This department also administers programs for State "distressed" and "targeted" communities.
- Division of Environmental Conservation (DEC). The DEC primary roles and responsibilities concerning hazards mitigation are ensuring safe food and safe water, and pollution prevention and pollution response. DEC ensures water treatment plants, landfills, and bulk fuel storage tank farms are safely constructed and operated in communities. Agency and facility response plans include hazards identification and pollution prevention and response strategies.
- Department of Transportation and Public Facilities (DOT/PF) personnel provide technical assistance to the various emergency management programs, to include mitigation. This assistance is addressed in the DHS&EM-DOT/PF Memorandum of Agreement and includes, but, is not limited to: environmental reviews, archaeological surveys, and historic preservation reviews.

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

Additionally, DOT/PF provides safe, efficient, economical, and effective operation of the State's highways, harbors, and airports. DOT/PF uses its Planning, Design and Engineering, Maintenance and Operations, and Intelligent Transportation Systems resources to identify the hazard, plan and initiate mitigation activities to meet the transportation needs of Alaskans and make Alaska a better place to live and work.

DOT/PF budgets for the temporary replacement bridges and materials necessary to make the multi-modal transportation system operational following a natural disaster.

- DNR administers various projects designed to reduce stream bank erosion, reduce localized flooding, improve drainage, and improve discharge water quality through the stormwater grant program funds. Within DNR, the Division of Geological and Geophysical Survey (DGGS) is responsible for the use and development of Alaska's mineral, land, and water resources, and collaboration on earthquake mitigation.
 - DNR's Division of Geological and Geophysical Survey (DGGS). DGGS collects and distributes information about the State's geologic resources and hazards. Their geologists and support staff are leaders in researching Alaska's geology and implementing technological tools to most efficiently collect, interpret, publish, archive, and disseminate that information to the public
 - The DNR's DOF participates in a statewide wildfire control program in cooperation with the forest industry, rural fire departments, and other agencies. Prescribed burning may increase the risks of fire hazards; however, prescribed burning reduces the availability of fire fuels and therefore the potential for future, more serious fires.
 - DOF also manages various wildland fire programs, activities, and grant programs such as the FireWise Program, the Community Forestry Program (CFP) and the Volunteer Fire Assistance and Rural Fire Assistance Grant (VFA-RFAG) programs.

Other Funding Sources and Resources

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

- FEMA, <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 (APA), <http://www.planning.org> - a non-profit professional association that serves as a resource for planners, elected officials, and citizens concerned with planning and growth initiatives.
- Institute for Business and Home Safety (IBHS), <http://ibhs.org> - an initiative of the insurance industry to reduce deaths, injuries, property damage, economic losses, and human suffering caused by natural disasters.
- American Red Cross (ARC). 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

The City has a number of planning and land management tools that will allow it to implement hazard mitigation activities. The resources available in these areas have been assessed by the hazard mitigation Planning Team, and are summarized below.

Table 8-2 Fort Yukon's Staff Resources

Staff/Personnel Resources	Y/N	Department/Agency and Position
Planner or engineer with knowledge of land development and land management practices	No	The City hires consultants with land development and land management knowledge
Engineer or professional trained in construction practices related to buildings and/or infrastructure	No	The City may hire engineering consulting services
Planner or engineer with an understanding of natural and/or human-caused hazards	No	The City hires consultants with hazard mitigation knowledge
Floodplain Manager	Yes	Jimmy Smith, State Floodplain Manager
Surveyors	No	The City may hire surveying consulting services
Staff with education or expertise to assess the jurisdiction's vulnerability to hazards	No	
Personnel skilled in Geospatial Information System (GIS) and/or HAZUS-MH	No	
Scientists familiar with the hazards of the jurisdiction	No	U.S. Fish & Wildlife Service local office; Alaska Dept of Fish & Game local office
Emergency Manager	Yes	City Mayor or Tribal Chief (Situation dependent)
Finance (Grant writers)	Yes	City or Tribal Administrator (Situation dependent)
Public Information Officer	Yes	City Mayor or Tribal Chief (Situation dependent)

Table 8-3 Financial Resources for Hazard Mitigation

Financial Resource	Accessible or Eligible to Use for Mitigation Activities
General funds	Limited funding, can exercise this authority with voter approval
Community Development Block Grants	Limited funding, can exercise this authority with voter approval
Capital Improvement Projects Funding	Limited funding, can exercise this authority with voter approval
Authority to levy taxes for specific purposes	Limited funding, can exercise this authority with voter approval
Incur debt through general obligation bonds	Can exercise this authority with voter approval
Incur debt through special tax and revenue bonds	Can exercise this authority with voter approval
Incur debt through private activity bonds	Can exercise this authority with voter approval
Hazard Mitigation Grant Program (HMGP)	FEMA funding which is available to local communities after a Presidentially-declared disaster. It can be used to fund both pre- and post-disaster mitigation plans and projects.
Pre-Disaster Mitigation (PDM) grant program	FEMA funding which is available on an annual basis. This grant can only be used to fund pre-disaster mitigation plans and projects only
Flood Mitigation Assistance (FMA) grant program	FEMA funding which is available on an annual basis. This grant can be used to mitigate repetitively flooded

Table 8-3 Financial Resources for Hazard Mitigation

Financial Resource	Accessible or Eligible to Use for Mitigation Activities
	structures and infrastructure to protect repetitive flood structures.
United State Fire Administration (USFA) Grants	The purpose of these grants is to assist state, regional, national or local organizations to address fire prevention and safety. The primary goal is to reach high-risk target groups including children, seniors and firefighters.
Fire Mitigation Fees	Finance future fire protection facilities and fire capital expenditures required because of new development within Special Districts.

8.4 CONTINUED PUBLIC INVOLVEMENT

The requirements for continued public involvement, as stipulated in the DMA 2000 and its implementing regulations, are described below.

DMA 2000 Requirements: Plan Maintenance Process - Continued Public Involvement

Continued Public Involvement

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

Element

- Does the new or updated plan explain how continued public participation will be obtained?

Source: FEMA, July 2008.

The City is dedicated to involving the public directly in the continual reshaping and updating of the HMP. A paper copy of the HMP and any proposed changes will be available at the City Office. An address and phone number of the Planning Team Leader to whom people can direct their comments or concerns will also be available at the City Office.

The Planning Team will continue to raise community awareness about the HMP and the hazards that affect Fort Yukon. Each year in October, the Tribe has an annual meeting that is an all day event that includes information booths that the community visits regarding various programs. The City will sponsor a booth as their main community outreach activity regarding the HMP. Community surveys will be provided at the booth to remind the community about the potential hazards that could affect Fort Yukon as well as to provide an opportunity for the community to comment on their concerns. See Appendix E for a sample public opinion survey. This survey will be tailored to Fort Yukon prior to the 2018 Annual Meeting. Any public comments received regarding the HMP will be collected by the Planning Team Leader, included in the annual report, and considered during future HMP updates.

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Appendix A: Public Involvement

Multi-Jurisdictional Hazard Mitigation Plan Update for Fort Yukon

Newsletter #1: April 12, 2017



The State of Alaska, Department of Military and Veterans Affairs, Division of Homeland Security and Emergency Management (DHS&EM) was awarded a Pre-Disaster Mitigation Program grant from the Federal Emergency Management Agency (FEMA) to update the existing local hazard mitigation plan (LHMP) for the City of Fort Yukon. This plan was last updated in 2010 and will assist the City as a valuable resource tool in making decisions. Additionally, communities must have a State- and FEMA-approved and community-adopted HMP plan to receive FEMA pre- and post- disaster grants. LeMay Engineering & Consulting, Inc. was contracted to assist the City of Fort Yukon with the plan update.

Join the planning team and offer your advice: Any interested community member may join the planning team. To join, call or send Jennifer LeMay an email at jlemay@lemayengineering.com. The purpose of this newsletter is to introduce this project and encourage public involvement during this process. The goal is to receive comments, identify key issues or concerns, and improve mitigation ideas.

Attend the May 8 Work Shop and/or the May 9, 2017, Community Council Meeting at 5 pm: One of the agenda items will be a summary of the hazard mitigation plan update process by Jennifer LeMay. You're invited to provide input to the plan.

For more information, contact:

Andrew Firmin, City Manager, (907) 662-5129

Jennifer LeMay, PE, PMP, Lead Planner, (907) 350-6061

George Grady, DMVA, DHS&EM Project Manager, (907) 428-7055

Local Hazard Mitigation Plan Update for Fort Yukon

Newsletter #2: September 12, 2017



The State of Alaska, Department of Military and Veterans Affairs, Division of Homeland Security and Emergency Management (DHS&EM) was awarded a Pre-Disaster Mitigation Program grant from the Federal Emergency Management Agency (FEMA) to update the existing local hazard mitigation plan (LHMP) for the City of Fort Yukon. This plan was last updated in 2010 and will assist the City as a valuable resource tool in making decisions. Additionally, communities must have a State- and FEMA-approved and community-adopted HMP plan to receive FEMA pre- and post- disaster grants. LeMay Engineering & Consulting, Inc. was contracted to assist the City of Fort Yukon with the plan update and attended the May workshop and City Council meeting to discuss the plan.

You're Invited to Comment on the Plan: The goal of Newsletter #2 is to announce the availability of the draft update and invite you to provide comments, identify key issues or concerns, and improve mitigation ideas. This plan has been reviewed by the DHS&EM and FEMA, and their comments have been incorporated into this draft plan. This plan has been posted at City Hall for your review. Comments can be provided verbally to Jennifer LeMay at (907) 350-6061 or emailed at jlemay@lemayengineering.com. All comments must be received by October 2, 2017 to be included in the update.

For more information, contact:

Andrew Firmin, City Manager, (907) 662-5129

Jennifer LeMay, PE, PMP, Lead Planner, (907) 350-6061

Rick Dembroski, DMVA, DHS&EM Project Manager, (907) 428-7015

CITY OF FORT YUKON CITY COUNCIL 2017

All present @ 9 MAY 17 City Council Meeting are noted below.

Stephanie Hinz
PO Box
Fort Yukon, AK 99740
H: 662-5498
W: 662-2460
stephanie.hinz@catg.org
SEAT A 3yr term 2017-2018
Present

Thomas Knudson
PO Box 117
Fort Yukon, Alaska 9974
H: 662-2463
SEAT B 3yr term 2014-2017
present

Bonnie Thomas *present via phone*
PO Box 332
Fort Yukon, AK 99740
662-8400
bkthomas332@gmail.com
SEAT C 3 yr. term 2015-2018

Paul Shewfelt
PO Box 261
Fort Yukon, Alaska 99740
H: 662-3071
C:
SEAT D 3 yr term 2015-2018
Present

Kelly Fields
PO Box 444
Fort Yukon, Alaska 99740
W: 662-2460
C: 662-5149
kfieldsfyu@hotmail.com
SEAT E 3yr term 2014-2017
present

Richard Carroll Jr., *Mayor*
PO Box 214
Fort Yukon, Alaska 99740
H: 662-5147
SEAT F remainder 3 yr. term
2015-2016
present

Arlene R Peter *absent*
PO Box 271
Fort Yukon, Alaska 99740
H: 662-4378
W: 662-3625
C: 662-5105
arjoseph2000@yahoo.com
SEAT G 3 yr. term 2013-2016

WORKSHOP & MEETINGS
Second Monday and Tuesday
of Each Month
City Conference Room at 5 pm

City Hall East 7th Ave
PO Box 269
Fort Yukon, Alaska
99740
907-662-2479
907-662-2349

Telephone Extensions

City Clerk 221
City Cell: 662-5126
City Manager 222
City Cell: 662-5129
Public Work 224
City Cell: 662-5127
Account Clerk 225
City Cell: 662-5197
City Treasurer 229
City Cell: 662-5120
Conference Room 228

FAX: 907-2717

Email:

citymanager@fortyukon.us

~~cityclerk@gei.net~~

cityclerk@fortyukon.us

Public Safety Dept:

662-2311

City Cell: 662-5505

VPSO: 662 5466

Volunteer Fire Dept.

Water Operator:

Eric Tremblay, chief

City Cell: 662-5198

Volunteer EMS Team

Matt Reppel, leader

Also Present:

Liana ^{Harrison} - City Clerk
Andrew Firmin - City Manager
Rob Gillespie - AML/JIA
Jennifer LeMay

City of Fort Yukon, Inc.

City Council Regular Meeting
May 9, 2017 @ 5PM
CITY CONFERENCE ROOM

Minutes

1. CALL TO ORDER

Mayor Richard Carroll Jr., called the Regular City Council meeting to order at 5:02pm

2. PLEDGE OF ALLEGIANCE

3. ROLL CALL/ESTABLISH QUORUM

Stephanie Hinz	Present
Bonnie Thomas	Teleconference, off at 5:46pm
Kelly Fields	Present
Thomas Knudson	Present
Paul Shewfelt	Present
Arlene Peter	Excused
Richard Carroll Jr.	Present

QUORUM established with 6 present

4. ADOPTION OF AGENDA

Motion by Paul Shewfelt to approve the agenda with the following changes: add to **NEW BUSINESS**, Item F. Housing policy, Item G. AML Police evaluation and change the date on top to read May 9th, 2017, 2ND by **Stephanie Hinz**.

Voice vote with 6 yeas 0 nays

MOTION CARRIES

5. CITIZEN COMMENTS ON AGENDA ITEMS ONLY:

None given

6. APPROVAL OF MINUTES:

Kelly Fields made a motion to approve minutes from February 14, 2017, with the following changes: Under Public Works, change wording to read, Everett's Air Fuel extended us a line of credit up to \$50,000.00, 2nd by **Paul Shewfelt**.

Voice vote with 6 yeas 0 nays

MOTION CARRIES

Minutes approved

7. ADMINISTRATIVE REPORT:

Andrew Firmin – Verbal report

Flood Watch – Andrew held a public forum on May 9, 2017 in the City Conference Room. There were several volunteers from different entities around town. It was a good review of different roles of community

members, All organizations know their roles in an emergency. CATG would like a copy of the meeting notes for their preparedness program.

Good News!!! It looks like we will not flood. Still check the river updates and wait on news of the Porcupine River.

Landfill – Gary Lawrence had a meeting at the Tribal Hall on April 27 & 28th, the 27th was a meeting of all community leaders. There were representatives from all organizations there. They discussed the different options of where to put the new landfill and Gary explained the pros and cons of each location. There was a lot of input from people and it was made clear of our deadlines. The following day was a public forum where the community members could give their input and voice their opinions.

Public Works – they are doing good keeping up in the shop. Clint Peter, Derek Peter and Zeno Polaski were hired to do some yard work behind the City Building. They are clearing brush and cleaning the yard.

There will be a community wide clean up soon, the City will offer their equipment and a driver to haul the trash to the dump, as a donation of services to get away from the monetary donations.

Paul Shewfelt would like to see a fountain put by the ball court for the kids. Maybe a line can be run from Alice Peter's line. Get all the kids together and have a picnic or something and inform them that the water fountain is there for them and that it is their responsibility to keep it from getting vandalized.

Dust Control – Partner with Raymond Solomon @ the tribe and offer the water truck and gas if they can provide a driver. Check with Rachel to see if we have money in the gaming account to hire 1 employee to get 1 hour overtime a day, to come in early and water the roads.

When GZ tore up the roads last year to put in the Biomass pipes, they didn't replace the dust control palliative that was placed on the roads. Send them a formal letter or a fine along with pictures (before/after road work) and receipts from equipment rental. Add a copy of our work order showing that we put the palliative down before their road work was done.

Bonnie Thomas is concerned about the kids that drive too fast and create dust. We need to enforce people to get a permit or license to drive.

Surplus list – Most of the items on the list were sold except for the 2 cop cars, which we can break down and strip the police gear then sell separately on E-bay. The grader wasn't sold either.

Scattered Sites – Homer from ANTHC is coming to do a site visit and check for leaks. They will also be looking at Josh Cadzow's house, and may not finish all their projects this year.

FINANCE – Rachel submitted a written report on the finance department.

Andrew informed the council that an auditor from PERS will be here soon to audit us. This is possibly due to us previously being delinquent on payments on our PERS account.

LIQUOR STORE – There was a mistake on the order and the wrong amount of booze was shipped, we will put it on sale.

GRADUATION DAY – Hours will be from 5:00pm – 9:00pm

CLS RELOCATION – Instead of street lights, we can put our own poles up and use flood lights. We need to have fencing around the facilities to funnel traffic back to the road. We need to have access routes for the business side of the building and the Community Liquor Store. The baler will also be on the property, we should be able to get the fencing through the landfill project.

There is also the option of moving the CLS to the City Building. We can have a separate door for CLS business and use the available office space for storage of liquor.

DIRECTIVE: The council would like a feasibility study to show the difference in cost of moving the Liquor Store to the Old Clinic or the City Building. Also add the cost of the current location if it were to be renovated. This will give us sound data that we can present to the public.

GAMES – There is some money coming in from Games, but we are using it to pay the bills. Add the cost of moving the games department into the City Building, add it into the feasibility plan with the Liquor Store.

PUBLIC SAFETY - Chase needs to get a better response time, giving people their driver's test. Not sure if the DMV is slow sending them out or if the holdup is in our own Police Dept.

We have a 0 (zero) burn ORDINANCE in the City of Fort Yukon, please enforce this, there are still people burning trash in barrels and leaf piles in their yards. Charge for a burn permit.

Bring the fire truck to the old ball field and do a controlled burn, use GA workers to help.

Greg Russel, the law enforcement specialist from AML can come up and do an audit of our police procedures and possibly some training and talk with our police officers. Public education on SB91 and its effects on laws.

5:46pm Bonnie Thomas off teleconference.

Chase will be on vacation until May 29th, he's taking his family home to visit.

WATER & SEWER –

Do we need to replace the fire hydrant that was run over in front of the Water Treatment Building?

Kelly Fields made a motion to approve the City Manager's verbal report, **2nd by Paul Shewfelt**

Voice vote with 5 yeas 0 nays

MOTION CARRIES

8. NEW BUSINESS:

- A. Set date Budget Workshop:** May 24th and 25th, 2017 @ 12:00pm in the City Conference Room. Serve light lunch
- B. FEMA Mitigation plan – Jennifer LeMay:** She is here today, updating the Mitigation Plan for FEMA, she will be leaving tomorrow. She's been talking with Andrew and Gary, getting the information that she needed
- C. AML/JIA – Rob Gillespie:** He is the insurance adjuster for AML/JIA, he's here to take pictures and measurements of our buildings. He will send a report.
- D. FLOOD UPDATE –** Covered in the Manager's report.
- E. Road Maintenance –** Covered in the Manager's report.
- F. Housing Policy –**

Paul Shewfelt made a motion to approve the Housing Policy with the changes made in red, **2nd by Kelly Fields. Paul Shewfelt called the question**

Roll call vote as follows:

Stephanie Hinz	Yes
Paul Shewfelt	Yes
Thomas Knudson	Yes
Kelly Fields	Yes
Richard Carroll II	Yes
Arlene Peter	---
Bonnie Thomas	---

MOTION CARRIES

9. DONATION REQUEST:

- A. GZGTG Community clean up –** The City will pick up garbage and haul it to the dump.

10. OLD BUSINESS:

None at this time

11. ORDINANCES:

2nd Reading of: ORDINANCE 17-03 AN ORDINANCE TO AMEND CODE 5.16.030 Term, Fee, and Renewal TO CHANGE THE CURRENT BUSINESS LICENSE FEE OF \$10.00 TO \$30.00

Kelly Fields made a motion to approve 2nd reading of: ORDINANCE 17-03 for public hearing and adopt , **2nd by Paul Shewfelt.**

Roll call vote as follows:

Stephanie Hinz	Yes
Bonnie Thomas	---
Arlene Peter	---
Paul Shewfelt	Yes
Thomas Knudson	Yes
Kelly Fieldes	Yes
Richard Carroll II	Yes

MOTION CARRIES

12. RESOLUTIONS:

RESOLUTION 17-02 A RESOLUTION TO AUTHORIZE LATE PAYMENT PENALTIES ON DELINQUENT SUMS DUE TO THE WATER AND WASTEWATER UTILITIES

Kelly Fields made a motion to approve RESOLUTION 17-02, 2nd by Paul Shewfelt called the question.
Roll call vote as follows:

Stephanie Hinz	Yes
Bonnie Thomas	---
Arlene Peter	---
Paul Shewfelt	Yes
Thomas Knudson	Yes
Kelly Fieldes	Yes
Richard Carroll II	Yes

MOTION CARRIES

13. CITIZEN COMMENTS:

No comments at this time

14. COUNCIL COMMENTS:

No comments

15. EXECUTIVE SESSION:

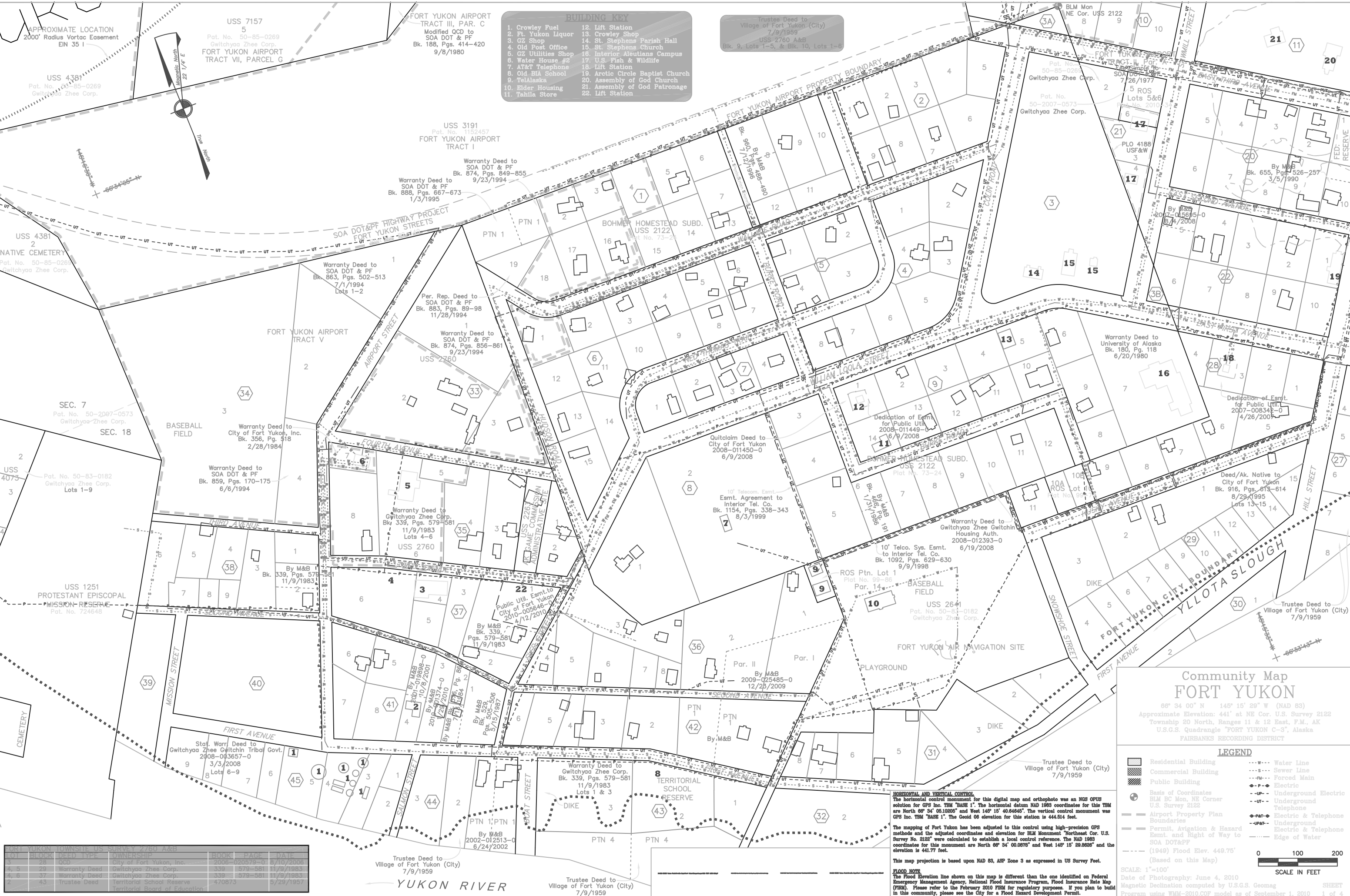
Motion by Kelly Fields to adjourn, 2nd by **Stephanie Hinz**

16. ADJOURNMENT:

Motion by Kelly Fields to adjourn, 2nd by **Stephanie Hinz**

MEETING ADJOURNED @ 6:25pm

Appendix B: Fort Yukon Area Use Map



LOT	BLOCK	QCD	TYPE	OWNERSHIP	BOOK	PAGE	DATE
3	28	QCD		City of Fort Yukon, Inc.	2006-020579-0	8	10/2008
4, 5	29	Warranty Deed		Gwitchyaa Zhee Corp.	339	579-581	11/9/1983
4, 5	37	Warranty Deed		Gwitchyaa Zhee Corp.	339	579-581	11/9/1983
2	43	Trustee Deed		Territorial School Reserve	470873		5/29/1957

HORIZONTAL AND VERTICAL CONTROL
The horizontal control monument for this digital map and orthophoto was an NGS OPUS solution for GPS Inc. TBM "BASE 1". The horizontal datum NAD 1983 coordinates for this TBM are North 68° 34' 05.10200" and West 145° 15' 40.64640". The vertical control monument was GPS Inc. TBM "BASE 1". The Geoid 06 elevation for this station is 444.514 feet.

The mapping of Fort Yukon has been adjusted to this control using high-precision GPS methods and the adjusted coordinates and elevation for BLM Monument Northeast Cor. U.S. Survey No. 2122 were calculated to establish a local control reference. The NAD 1983 coordinates for this monument are North 68° 34' 00.0676" and West 145° 15' 29.8628" and the elevation is 441.77 feet.

This map projection is based upon NAD 83, ASP Zone 3 as expressed in US Survey Feet.

FLOOD NOTE
The Flood Elevation line shown on this map is different than the one identified on Federal Emergency Management Agency, National Flood Insurance Program, Flood Insurance Rate Map (FIRM). Please refer to the February 2010 FIRM for regulatory purposes. If you plan to build in this community, please see the City for a Flood Hazard Development Permit.

Community Map
FORT YUKON

68° 34' 00" N 145° 15' 29" W (NAD 83)
Approximate Elevation: 441' at NE Cor. U.S. Survey 2122
Township 20 North, Ranges 11 & 12 East, F.M., AK
U.S.G.S. Quadrangle "FORT YUKON C-3", Alaska
FAIRBANKS RECORDING DISTRICT

Residential Building

Commercial Building

Public Building

Basis of Coordinates
BLM BC Mon, NE Corner
U.S. Survey 2122

Airport Property Plan
Boundaries

Permit, Aviation & Hazard
Esmt. and Right of Way to
SOA DOT&PF

(1948) Flood Elev. 448.75'
(Based on this Map)

Water Line

Sewer Line

Forced Main

Electric

Underground Electric

Underground
Telephone

Electric & Telephone

Underground
Electric & Telephone

Edge of Water

0100200

SCALE IN FEET

SCALE: 1"=100'

Date of Photography: June 4, 2010
Magnetic Declination computed by U.S.G.S. Geomag
Program using WMM-2010.COF model as of September 1, 2010

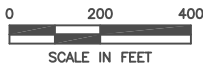
SHEET
1 of 4

Community Map FORT YUKON

66° 34' 00" N 145° 15' 29" W (NAD 83)
Approximate Elevation: 441' at NE Cor. U.S. Survey 2122
Township 20 North, Ranges 11 & 12 East, F.M., AK
U.S.G.S. Quadrangle "FORT YUKON C-3", Alaska
FAIRBANKS RECORDING DISTRICT

LEGEND

- Residential Building
- Commercial Building
- Public Building
- Edge of Water
- Airport Property Plan Boundaries
- (1949) Flood Elev. 449.75' (Based on this Map)
- Water Line
- Sewer Line
- Forced Main
- Electric
- Underground Electric
- Underground Telephone
- Electric & Telephone
- Underground Electric & Telephone

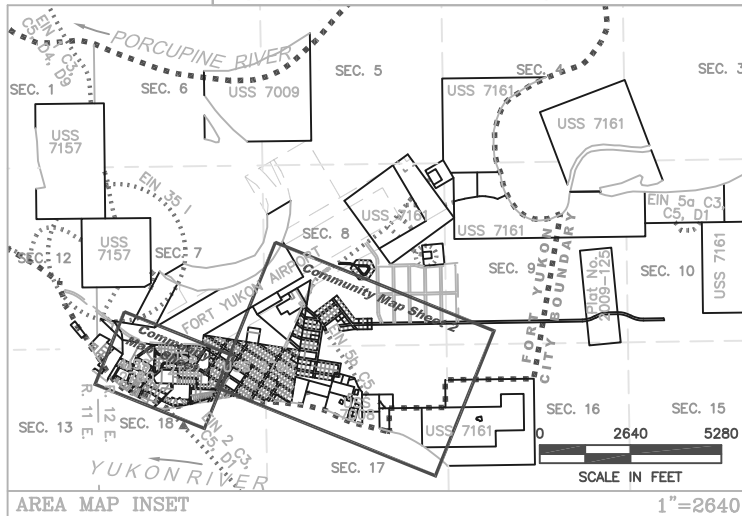


SCALE: 1"=100'

Date of Photography: June 4, 2010
Magnetic Declination computed by U.S.G.S. Geomag
Program using WMM-2010.COF model as of September 1, 2010

SHEET

2 of 4



LOT	BLOCK	DEED TYPE	OWNERSHIP	BOOK	PAGE	DATE
1	1	Warranty Deed	SOA DOT&PF	173	824	5/27/1980
2, 3	1	Amended Lease	SOA Dept. of Administration	785	893-901	7/7/1992
11	2	Warranty Deed	Gwitchyaa Zhee Corp.	339	579-581	11/9/1983
7	2	Warranty Deed	Gwitchyaa Zhee Corp.	339	579-581	11/9/1983
1	4	Warranty Deed	SOA DOT&PF	183	647	7/24/1980
2, 4, 5, 18	4	Warranty Deed	Gwitchyaa Zhee Corp.	339	579-581	11/9/1983
1-8	5	Warranty Deed	Gwitchyaa Zhee Corp.	339	579-581	11/9/1983
1-4, 8-10	8	Pat. 50-83-0182	Gwitchyaa Zhee Corp.	323	518-520	8/22/1983
5-7	8	Warranty Deed	Gwitchyaa Zhee Corp.	339	579-581	11/9/1983
1-2	8A	Warranty Deed	Gwitchyaa Zhee Corp.	339	579-581	11/9/1983
3	17	Warranty Deed	Chalkyalk Native Corp.	633	827	8/25/1989
18	18	Quitclaim Deed	Yukon Flats School Dist	853	394-395	2/8/1990
6	18	Stat. Warr. Deed	Yukon Flats School Dist	905	2	8/8/1995
19	18	Pat. No. 122-102	State of Alaska	151	300	2/1/1991

BUILDING KEY

- BLM Buildings
- FAA Garage
- YFHC Garage
- Yukon Flats Health Center
- City of Ft. Yukon Office
- CATG - Natural Resources
- CATG - Daycare
- Assembly of God Church
- Armory
- State of Alaska Office
- State of Alaska Garage
- CATG/KZPA Radio
- Ft. Yukon Public School
- School Shop
- Arctic Circle Baptist Church
- Yukon Flats School District
- School Oil Tanks
- Richard Carroll Building
- GZGTG Garage
- Alaska Commercial Company
- Post Office
- CATG Education Building
- Lift Station
- ANTHC Garages
- City of Ft. Yukon-Games
- GZGTG Recycle Center
- City of Ft. Yukon Pumphouse
- Water Storage Tank
- Future Water Storage
- GZGTG Garage
- Chief Ezias Loola Cultural Center
- GZGTG
- Vocation Education YFSD
- Student Dorm YFSD
- Airforce Monitoring Station
- Airforce Utility
- Airforce Radar
- GZ Utilities

FLOOD NOTE

The Flood Elevation line shown on this map is different than the one identified on Federal Emergency Management Agency National Flood Insurance Program, Flood Insurance Rate Map (FIRM). Please refer to the February 2010 FIRM for regulatory purposes. If you plan to build in this community, please see the City for a Flood Hazard Development Permit.

MAP NOTES

This map was prepared by the Alaska Department of Commerce, Community, and Economic Development, Division of Community and Regional Affairs (Commerce) using funding from the Initiative for Accelerated Infrastructure Development (IAID). The IAID is supported by grants from the Denali Commission, USDA Rural Development, Alaska Department of Transportation and Public Facilities and Commerce. Commerce contracted with Global Positioning Services, Inc. in May of 2010 to prepare the map.

This map should not be construed as a survey. On-site surveys should be conducted prior to engineering or construction. This map was compiled to meet horizontal and vertical accuracy in accordance with national map accuracy standards.

Property and utility information has been generated from readily available sources with limited accuracy checks. Property information is not intended to represent a title search of the Recorder's Office record. Utility location is approximate and shows only the main lines. Generally, the information is current as of December 2010. ANTHC provided sanitation facility records.

This map is based on photography acquired on June 8, 2010, at a nominal scale, of 1 in = 800 ft. Aero-Metric Anchorage prepared the orthophoto and topographic mapping. The topographic contours were prepared at two (2) foot intervals with index contours every ten (10) feet.

SEC. 20
Pat. No. 50-2007-0573
Gwitchyaa Zhee Corp.

SEC. 18
Pat. No. 50-2007-0573
Gwitchyaa Zhee Corp.

SEC. 19
Pat. No. 50-2007-0573
Gwitchyaa Zhee Corp.

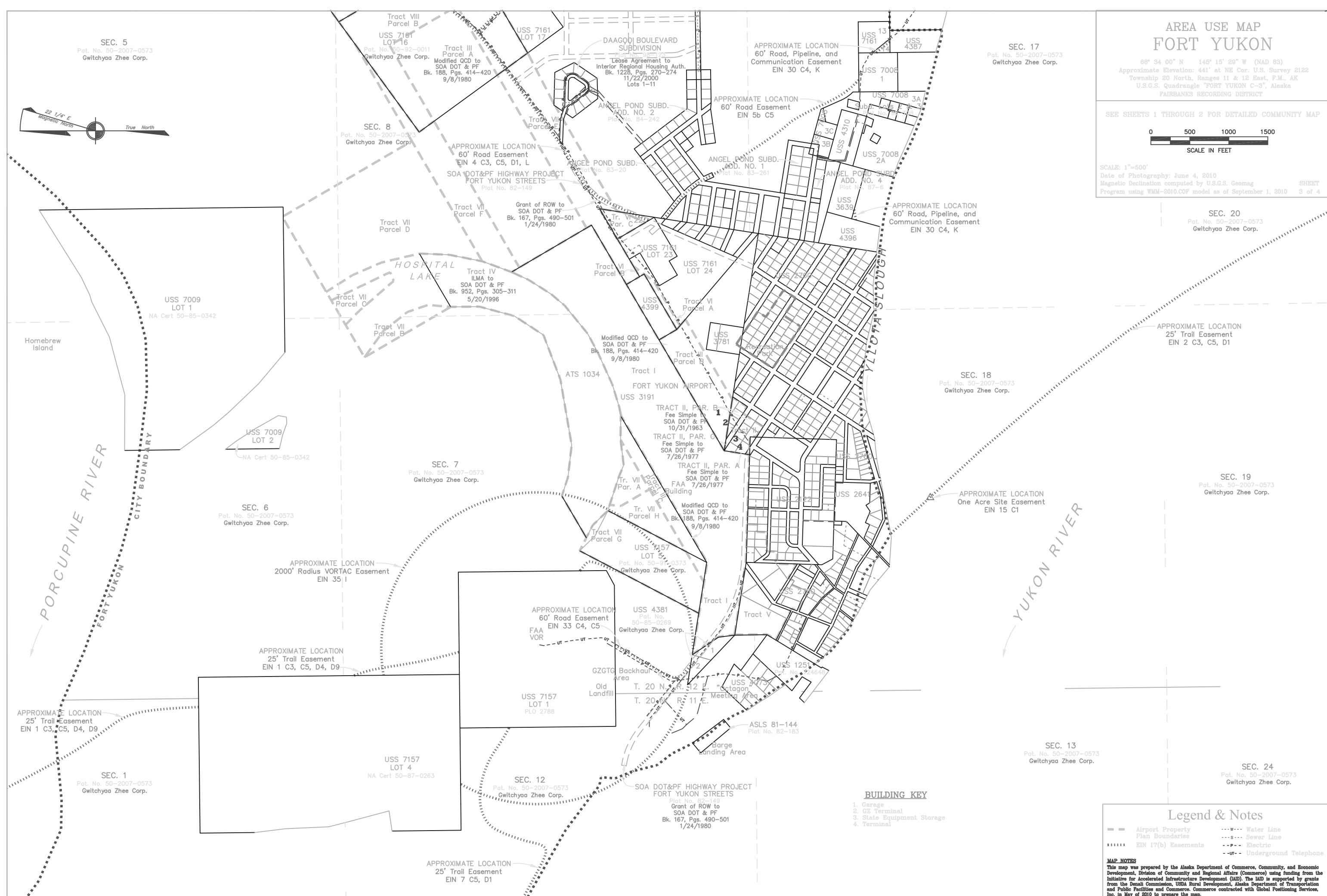
— APPROXIMATE LOCATION
One Acre Site Easement
EIN 15 C1

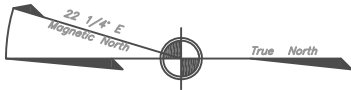
SEC. 13
Pat. No. 50-2007-0573
Gwitchyaa Zhee Corp.

SEC. 24
Pat. No. 50-2007-0573
Gwitchyaa Zhee Corp.

==	Airport Property	---W---	Water Line
	Plan Boundaries	---S---	Sewer Line
	EIN 17(b) Easements	- - P - -	Electric
		- -UT- -	Underground Telephone

This map was prepared by the Alaska Department of Commerce, Community, and Economic Development, Division of Community and Regional Affairs (Commerce) using funding from the Initiative for Accelerated Infrastructure Development (IAID). The IAID is supported by grants from the Denali Commission, USDA Rural Development, Alaska Department of Transportation and Public Facilities and Commerce. Commerce contracted with Global Positioning Services, Inc. in May of 2010 to prepare the map.





Map Legend			
==	Airport Property	---W---	Water Line
---	Plan Boundaries	---S---	Sewer Line
	EIN 17(b) Easements	-P-	Electric
		-UT-	Underground Telephone

AREA USE MAP
FORT YUKON

66° 34' 00" N 145° 15' 29" W (NAD 83)
Approximate Elevation: 441' at NE Cor. U.S. Survey 2122
Township 20 North, Ranges 11 & 12 East, F.M., AK
U.S.G.S. Quadrangle "FORT YUKON C-3", Alaska
FAIRBANKS RECORDING DISTRICT

SEE SHEETS 1 THROUGH 2 FOR DETAILED COMMUNITY MAP



SCALE: 1"=500'
Date of Photography: June 4, 2010
Magnetic Declination computed by U.S.G.S. Geomag
Program using WMM-2010.COF model as of September 1, 2010
SHEET 4 of 4

SEC. 3
Pat. No. 50-2007-0573
Gwitchyaa Zhee Corp.

USS 7161
LOT 7
NA Cert 50-86-0249

APPROXIMATE LOCATION
26' Road Easement
EIN 5a C3, C5, D1

SEC. 10
Pat. No. 50-2007-0573
Gwitchyaa Zhee Corp.

SEC. 15
Pat. No. 50-2007-0573
Gwitchyaa Zhee Corp.

SEC. 22
Pat. No. 50-2007-0573
Gwitchyaa Zhee Corp.

USS 7161
LOT 10
NA Cert 50-86-0226

USS 7161
LOT 9
NA Cert 50-86-0226

SEC. 4
Pat. No. 50-2007-0573
Gwitchyaa Zhee Corp.

LANDFILL TRACT
LANDFILL - LAGOON
SUBDIVISION
Plat No. 2009-125

LAGOON TRACT
LANDFILL-LAGOON
SUBDIVISION
Plat No. 2009-125
Sewage
Lagoon

LAGOON ACCESS
ROAD
Plat No. 2009-125

SEC. 16
Pat. No. 50-2007-0573
Gwitchyaa Zhee Corp.

SEC. 21
Pat. No. 50-2007-0573
Gwitchyaa Zhee Corp.

SEC. 4
Pat. No. 50-2007-0573
Gwitchyaa Zhee Corp.

SEC. 9
Pat. No. 50-2007-0573
Gwitchyaa Zhee Corp.

USS 7161
LOT 27
PTN. OF PAR. 1, TR. A
QCD to
Gwitchyaa Zhee Corp.
2005-013803-0
7/8/2005

USS 7161
LOT 25
FLO 1396

LANDFILL ROS
ADEC Permit No.
8631-BA006
Plat No. 2001-43

KZPA
Radio Tower

YLLOTA SLOUGH

Community
Garden

USS 7161
LOT 6B

USS 7161
LOT 6C

USS 7161
LOT 6A

USS 7161
LOT 5
NA Cert 50-89-0500

USS 7161
LOT 21
FLO 20
2455

Pat. No. 50-2007-0573
Gwitchyaa Zhee Corp.
Deed to
City of Fort Yukon
Bk. 923, Pgs. 67-61
10/11/1995
City
Landfill
Tract VIII
Parcel C

USS 7161
LOT 17
NA Cert 50-94-0021
APPROXIMATE LOCATION
26' Road Easement
EIN 5a C3, C5, D1

USS 7161
LOT 19
FLO 1396

RECORD OF SURVEY
FORT YUKON ROAD IMPROVEMENTS
(Rabbit Line Subd.)
Plat No. 2009-14

APPROXIMATE LOCATION
60' Road Easement
EIN 4b C4

FORT YUKON LONG
RANGE RADAR SITE
PTN. OF PAR. 1, TR. A
QCD to
Gwitchyaa Zhee Corp.
2005-013803-0
7/8/2005

USS 7161
LOT 26

USS 7161
LOT 13

USS 4387

SEC. 17
Pat. No. 50-2007-0573
Gwitchyaa Zhee Corp.

SEC. 20
Pat. No. 50-2007-0573
Gwitchyaa Zhee Corp.

SEC. 5
Pat. No. 50-2007-0573
Gwitchyaa Zhee Corp.

APPROXIMATE LOCATION
60' Road Easement
EIN 4 C3, C5, D1, L

Tract VIII
Parcel B

USS 7161
LOT 16

Pat. No. 50-92-0011
Gwitchyaa Zhee Corp.

Tract III
Parcel A
Modified QCD to
SOA DOT & PF
Bk. 188, Pgs. 414-420
9/6/1980

DAAGOOD BOULEVARD
SUBDIVISION
Plat No. 98-123
Lease Agreement to
Interior Regional Housing Auth.
Bk. 1228, Pgs. 270-274
11/22/2000
Lots 1-11

APPROXIMATE LOCATION
60' Road, Pipeline, and
Communication Easement
EIN 30 C4, K

YUKON
RIVER

Appendix C: FEMA Review Tool

APPENDIX A:

LOCAL MITIGATION PLAN REVIEW TOOL

The *Local Mitigation Plan Review Tool* demonstrates how the Local Mitigation Plan meets the regulation in 44 CFR §201.6 and offers States and FEMA Mitigation Planners an opportunity to provide feedback to the community.

- The Regulation Checklist provides a summary of FEMA's evaluation of whether the Plan has addressed all requirements.
- The Plan Assessment identifies the plan's strengths as well as documents areas for future improvement.
- The Multi-jurisdiction Summary Sheet is an optional worksheet that can be used to document how each jurisdiction met the requirements of the each Element of the Plan (Planning Process; Hazard Identification and Risk Assessment; Mitigation Strategy; Plan Review, Evaluation, and Implementation; and Plan Adoption).

The FEMA Mitigation Planner must reference this *Local Mitigation Plan Review Guide* when completing the *Local Mitigation Plan Review Tool*.

Jurisdiction: Region X	Title of Plan: City of Fort Yukon, Alaska Hazard Mitigation Plan Update	Date of Plan: May 24, 2017
Local Point of Contact: Andrew Firmin	Address: PO Box 269 Fort Yukon, AK 99740	
Title: City Manager		
Agency: City of Fort Yukon		
Phone Number: 907 662-5129	E-Mail: citymanager@fortyukon.us	

State Reviewer: George J. Grady	Title: EMS II	Date: June 27, 2017
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FEMA Reviewer: Amanda Siok Amanda.Siok@fema.dhs.gov	Title: Mitigation Planner	Date: 08/29/2017
Date Received in FEMA Region 10	07/24/2017	
Plan Not Approved	09/05/2017	
Plan Approvable Pending Adoption		
Plan Approved		

**SECTION 1:
REGULATION
CHECKLIST**

INSTRUCTIONS: The Regulation Checklist must be completed by FEMA. The purpose of the Checklist is to identify the location of relevant or applicable content in the Plan by Element/sub-element and to determine if each requirement has been 'Met' or 'Not Met.' The 'Required Revisions' summary at the bottom of each Element must be completed by FEMA to provide a clear explanation of the revisions that are required for plan approval. Required revisions must be explained for each plan sub-element that is 'Not Met.' Sub-elements should be referenced in each summary by using the appropriate numbers (A1, B3, etc.), where applicable. Requirements for each Element and sub-element are described in detail in this *Plan Review Guide* in Section 4, Regulation Checklist.

1. REGULATION CHECKLIST		Location in Plan (section and/or page number)	Met	Not Met
Regulation (44 CFR 201.6 Local Mitigation Plans)				
ELEMENT A. PLANNING PROCESS				
A1. Does the Plan document the planning process, including how it was prepared and who was involved in the process for each jurisdiction? (Requirement §201.6(c)(1))	PDF 24-26	X		
A2. Does the Plan document an opportunity for neighboring communities, local and regional agencies involved in hazard mitigation activities, agencies that have the authority to regulate development as well as other interests to be involved in the planning process? (Requirement §201.6(b)(2))	PDF 26	X		
A3. Does the Plan document how the public was involved in the planning process during the drafting stage? (Requirement §201.6(b)(1))	PDF 26, 125-130	X		
A4. Does the Plan describe the review and incorporation of existing plans, studies, reports, and technical information? (Requirement §201.6(b)(3))	PDF 26-27	X		
A5. Is there discussion of how the community(ies) will continue public participation in the plan maintenance process? (Requirement §201.6(c)(4)(iii))	PDF 25, 120			X
A6. Is there a description of the method and schedule for keeping the plan current (monitoring, evaluating and updating the mitigation plan within a 5-year cycle)? (Requirement §201.6(c)(4)(i))	PDF 111-112, 149-155	X		
ELEMENT A: REQUIRED REVISIONS Element A5: The plan must describe how the jurisdiction will continue to seek public participation after the plan has been approved and during the plan's implementation. PDF 120 states "The Planning Team will also identify opportunities to raise awareness about the HMP and the hazards the effect the area". These opportunities should be discussed in more detail. Additionally, an analysis of the existing public engagement should be provided with an explanation of what worked, what didn't, and how it will be improved for future updates. Reference Worksheet 3.1 in the Local Mitigation Planning Handbook (A-11). 09/12: Detailed information was added to the 5th bullet on PDF 25 and 120. The main public outreach activity will occur each October as part of the Tribe's Annual Meeting. After public comment period ends 10/2, an analysis of the existing public engagement will be added. A sample public survey was added to App. E.				

1. REGULATION CHECKLIST		Location in Plan (section and/or page number)	Met	Not Met
Regulation (44 CFR 201.6 Local Mitigation Plans)				
ELEMENT B. HAZARD IDENTIFICATION AND RISK ASSESSMENT				
B1. Does the Plan include a description of the type, location, and extent of all natural hazards that can affect each jurisdiction(s)? (Requirement §201.6(c)(2)(i))	EQ: 31-35 Erosion: 36-41 Flood: 41, 50-52 Permafrost: 54- SW: 56 Fire: 64-68 Climate Change: 69	X		
B2. Does the Plan include information on previous occurrences of hazard events and on the probability of future hazard events for each jurisdiction? (Requirement §201.6(c)(2)(i))	EQ: 33 Erosion: 38 Flood: 42-44, 46-47 Permafrost: 54 SW: 57-63 Fire: 65 Climate Change: 69	X		
B3. Is there a description of each identified hazard's impact on the community as well as an overall summary of the community's vulnerability for each jurisdiction? (Requirement §201.6(c)(2)(ii))	EQ: 29, 35, 78, 81 Erosion: 29, 41, 78, 81 Flood: 29, 52, 78, 81 Permafrost: 29, 55, 78, 82 SW: 29, 64, 78, 82 Fire: 29, 68, 78, 83 ClimateChange:29, 69, 78	X		
B4. Does the Plan address NFIP insured structures within the jurisdiction that have been repetitively damaged by floods? (Requirement §201.6(c)(2)(ii))	PDF 73	X		
<u>ELEMENT B: REQUIRED REVISIONS</u>				

ELEMENT C. MITIGATION STRATEGY			
C1. Does the plan document each jurisdiction's existing authorities, policies, programs and resources and its ability to expand on and improve these existing policies and programs? (Requirement §201.6(c)(3))	PDF 113-119	X	
C2. Does the Plan address each jurisdiction's participation in the NFIP and continued compliance with NFIP requirements, as appropriate? (Requirement §201.6(c)(3)(ii))	PDF 99	X	
C3. Does the Plan include goals to reduce/avoid long-term vulnerabilities to the identified hazards? (Requirement §201.6(c)(3)(i))	PDF 97	X	
C4. Does the Plan identify and analyze a comprehensive range of specific mitigation actions and projects for each jurisdiction being considered to reduce the effects of hazards, with emphasis on new and existing buildings and infrastructure? (Requirement §201.6(c)(3)(ii))	PDF 99-102	X	
C5. Does the Plan contain an action plan that describes how the actions identified will be prioritized (including cost benefit review), implemented, and administered by each jurisdiction? (Requirement §201.6(c)(3)(iv)); (Requirement §201.6(c)(3)(iii))	PDF 103-104, 106	X	
C6. Does the Plan describe a process by which local governments will integrate the requirements of the mitigation plan into other planning mechanisms, such as comprehensive or capital improvement plans, when appropriate? (Requirement §201.6(c)(4)(ii))	PDF 99 (2A)		X
ELEMENT C: REQUIRED REVISIONS			
Element C6: The Plan must describe the community's process to integrate the data, information, and hazard mitigation goals and actions into other planning mechanisms. Currently, the plan does an excellent job using comprehensive plan information to inform the hazard mitigation plan, but it doesn't describe how elements from the HMP will be used to inform the comprehensive or emergency response plans. 09/12: A statement was added to Table 7-2 (PDF 99 2A) referencing Section 8.2 of the HMP. Additional bullets were added to Section 8.2 describing how elements from the HMP will be incorporated into other Fort Yukon documents.			

1. REGULATION CHECKLIST		Location in Plan (section and/or page number)	Met	Not Met
Regulation (44 CFR 201.6 Local Mitigation Plans)				
ELEMENT D. PLAN REVIEW, EVALUATION, AND IMPLEMENTATION (applicable to plan updates only)				
D1. Was the plan revised to reflect changes in development? (Requirement §201.6(d)(3))	PDF 84-96	X		
D2. Was the plan revised to reflect progress in local mitigation efforts? (Requirement §201.6(d)(3))	PDF 98-102	X		
D3. Was the plan revised to reflect changes in priorities? (Requirement §201.6(d)(3))	PDF 105	X		
<u>ELEMENT D: REQUIRED REVISIONS</u>				
ELEMENT E. PLAN ADOPTION				
E1. Does the Plan include documentation that the plan has been formally adopted by the governing body of the jurisdiction requesting approval? (Requirement §201.6(c)(5))	Letter of Commitment on Page iii, Adoption Letter to be added on Page iv after FEMA approves update			X
E2. For multi-jurisdictional plans, has each jurisdiction requesting approval of the plan documented formal plan adoption? (Requirement §201.6(c)(5))	N/A			
<u>ELEMENT E: REQUIRED REVISIONS</u>				
ELEMENT F. ADDITIONAL STATE REQUIREMENTS (OPTIONAL FOR STATE REVIEWERS ONLY; NOT TO BE COMPLETED BY FEMA)				
F1.				
F2.				
<u>ELEMENT F: REQUIRED REVISIONS</u>				

SECTION 2: PLAN ASSESSMENT

Plan Strengths and Opportunities for Improvement

Element A: Planning Process

Plan Strengths:

- The Planning team includes multiple members of the City Council as well as the mayor and the State.
- Two public meetings were held, in addition to a newsletter describing the planning process.
- The annual review includes individual team member review as well as a facilitated annual meeting.

Opportunities for Improvement:

- Consider inviting additional state and local agencies to participate in the planning process. **This HMP will be stored on the State Department of Commerce, Community, and Economic Development Community and Regional Affairs (DCCED/DCRA) plans website for public reference.**

Element B: Hazard Identification and Risk Assessment

Plan Strengths:

- The plan provides a high-level summary of hazards considered with their general expected impacts.
- The earthquake section evaluates earthquakes based on both past events and probable events.
- The plan cites the City's Comprehensive Plan and USACE reports to explain the history and extent of riverbank erosion.
- The plan includes photos of past events with links to additional photos.
- Historical analysis of changing climate and its impact on the community is well written.
- The plan identifies repeatedly flooded properties that do not have flood insurance but are located in the AE Zone.

Opportunities for Improvement:

- Consider using the information on specific critical infrastructure and essential facilities identified in table 6-3 to evaluate each structure's individual vulnerability to the seven identified hazards. **See Table 6-4.**
- Consider local climate change impacts such as increased frequency and severity of storms and extreme weather events rather than mass extinctions. **This section was modified.**
- Consider using a different term to identify Table 6-2. "Repetitive Loss Properties" is a term specific to FEMA identified Repetitive Losses through the NFIP. **The table represents repetitive loss properties specific to FEMA identified Repetitive Losses through the NFIP.**

Element C: Mitigation Strategy

Plan Strengths:

- The plan lists ten goals for mitigation.
- Table 7-4 Mitigation Action Matrix includes a column for benefit-costs and technical feasibility
- The planning team concluded there was no need to prioritize the mitigation actions identified in the 2010 plan based on the results of the risk assessments.

Opportunities for Improvement:

- Consider updating table 7-4, column “responsible department” with positions of city or tribal council staff. *In a very small community, the same people wear many hats. The City Manager will likely be the “responsible department” for all actions.*
- The column in table 7-4 could be updated with additional funding sources, such as those from FEMA, DHS, etc. *They are listed.*
- Vulnerabilities identified through the risk assessment can be more directly related to specific mitigation actions by developing problem statements. *Problem statements are in the description column of Table 7-2.*

Element D: Plan Update, Evaluation, and Implementation (*Plan Updates Only*)

Plan Strengths:

- The plan lists all the infrastructure projects that have been completed since the last plan.
- The plan describes the community’s desire to move residential structures out of the floodplain.
- The planning team acknowledges the lack of efforts to implement the previous plan, and recommitted to maintaining this update.

Opportunities for Improvement:

-

A. Resources for Implementing Your Approved Plan

Ideas may be offered on moving the mitigation plan forward and continuing the relationship with key mitigation stakeholders such as the following:

- *What FEMA assistance (funding) programs are available (for example, Hazard Mitigation Assistance (HMA)) to the jurisdiction(s) to assist with implementing the mitigation actions?*
- *What other Federal programs (National Flood Insurance Program (NFIP), Community Rating System (CRS), Risk MAP, etc.) may provide assistance for mitigation activities?*
- *What publications, technical guidance or other resources are available to the jurisdiction(s) relevant to the identified mitigation actions?*
- *Are there upcoming trainings/workshops (Benefit-Cost Analysis (BCA), HMA, etc.) to assist the jurisdictions(s)?*
- *What mitigation actions can be funded by other Federal agencies (for example, U.S. Forest Service, National Oceanic and Atmospheric Administration (NOAA), Environmental Protection Agency (EPA) Smart Growth, Housing and Urban Development (HUD) Sustainable Communities, etc.) and/or state and local agencies?*

SECTION 3:
MULTI-JURISDICTION SUMMARY SHEET (OPTIONAL)

INSTRUCTIONS: For multi-jurisdictional plans, a Multi-jurisdiction Summary Spreadsheet may be completed by listing each participating jurisdiction, which required Elements for each jurisdiction were 'Met' or 'Not Met,' and when the adoption resolutions were received. This Summary Sheet does not imply that a mini-plan be developed for each jurisdiction; it should be used as an optional worksheet to ensure that each jurisdiction participating in the Plan has been documented and has met the requirements for those Elements (A through E).

MULTI-JURISDICTION SUMMARY SHEET												
#	Jurisdiction Name	Jurisdiction Type (city/borough/ township/ village, etc.)	Plan POC	Mailing Address	Email	Phone	Requirements Met (Y/N)					
							A. Planning Process	B. Hazard Identification & Risk Assessment	C. Mitigation Strategy	D. Plan Review, Evaluation & Implementation	E. Plan Adoption	F. State Requirements
1												
2												
3												
4												
5												
6												
7												
8												
9												

MULTI-JURISDICTION SUMMARY SHEET												
#	Jurisdiction Name	Jurisdiction Type (city/borough/ township/ village, etc.)	Plan POC	Mailing Address	Email	Phone	Requirements Met (Y/N)					
							A. Planning Process	B. Hazard Identification & Risk Assessment	C. Mitigation Strategy	D. Plan Review, Evaluation & Implementation	E. Plan Adoption	F. State Require- ments
10												
11												
12												
13												
14												
15												
16												
17												
18												
19												
20												

Appendix D: Benefit-Cost Analysis Fact Sheet

Benefit-Cost Analysis Fact Sheet

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

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

All Benefit-Costs must be:

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

General Data Requirements:

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

Damage and Benefit Data

- Well documented for each damage event.
- Include estimated frequency and method of determination per damage event.
- Data used in place of FEMA standard or default values MUST be documented and justified.

- The Level of Protection MUST be documented and readily apparent.
- When using the Limited Data (LD) BCA module, users cannot extrapolate data for higher frequency events for unknown lower frequency events.

Building Data

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

Use Correct Occupancy Data

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

Questions to Be Answered

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

Common Shortcomings

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

Appendix E: Plan Maintenance Documents

Annual Review Questionnaire

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

Mitigation Action Progress Report

Page 1 of 3

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

Project Title: _____ Project ID# _____

Responsible Agency: _____

Address: _____

Contact Person: _____ Title: _____

Phone #(s): _____ email address: _____

List Supporting Agencies and Contacts:

Total Project Cost: _____

Anticipated Cost Overrun/Underrun: _____

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

Anticipated completion date: _____

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

[illegible]

Plan Goal (s) Addressed:

Page 2 of 3

Goal: _____

Indicator of Success: _____

Project Status

Project Cost Status

☐ Project on schedule

☐ Cost unchanged

☐ Project completed

☐ Cost overrun*

☐ Project delayed*

*explain: _____

*explain: _____

☐ Cost underrun*

☐ Project canceled

*explain: _____

Summary of progress on project for this report:

A. What was accomplished during this reporting period?

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

C. How was each problem resolved?

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

Other Comments:

Sample Mitigation Public Opinion Survey

Mid-Columbia Region Natural Hazard Mitigation Public Opinion Survey



Your household has been randomly selected to participate in this survey about public perceptions and opinions regarding natural hazards in your county. In addition, we would like information regarding the methods and techniques you prefer for reducing the risks and losses associated with these hazards. The questionnaire should be completed by an adult, preferably the head of household. The information you provide will be used to help improve public/private coordination, mitigation, and risk reduction efforts in your county. The survey should take less than 30 minutes to complete.

This is a public opinion survey, the results of which will inform local natural hazard mitigation planning in Oregon. Your returned, completed survey indicates your willingness to take part in the study. Participation in this study is voluntary. The survey is not intended to contribute to "generalizable knowledge" and none of the information you provide will be attributed to you directly. If you have questions regarding your rights as a research participant, please contact the Office for Protection of Human Subjects, 1600 Millrace Drive, Suite 105, University of Oregon, Eugene, OR 97403-5219, or call (541) 346-2510.

NATURAL HAZARD INFORMATION

First we would like to know about your experiences involving natural hazards and your exposure to preparedness information.

- During the past five years in the county you currently reside in, have you or someone in your household directly experienced a natural disaster such as an earthquake, severe windstorm, flood, wildfire, or other type of natural disaster?
 - ☐ Yes
 - ☐ No (*IF NO Skip to Question 2*)

If "YES", which of these natural disasters have you or someone in your household experienced in the past five years?

(Please check all that apply)

- | | |
|--|---|
| ☐ Drought | ☐ Windstorm |
| ☐ Dust Storm | ☐ Volcanic Eruption |
| ☐ Earthquake | ☐ Severe Winter Storm |
| ☐ Flood | ☐ Other (specify): _____ |
| ☐ Landslide / Debris Flow | |
| ☐ Wildfire | |

- How concerned are you about the following natural disasters affecting your county?
(Check the corresponding box for each hazard)

Natural Disaster	Very Concerned	Somewhat Concerned	Neutral	Not Very Concerned	Not Concerned
Drought	☐	☐	☐	☐	☐
Dust Storm	☐	☐	☐	☐	☐
Earthquake	☐	☐	☐	☐	☐
Flood	☐	☐	☐	☐	☐
Landslide / Debris Flow	☐	☐	☐	☐	☐
Wildfire	☐	☐	☐	☐	☐
Volcanic Eruption	☐	☐	☐	☐	☐
Wind Storm	☐	☐	☐	☐	☐
Severe Winter Storm	☐	☐	☐	☐	☐
Other: _____	☐	☐	☐	☐	☐

Worksheet 3.1

Sample Mitigation Public Opinion Survey

3. Have you ever received information about how to make members of your household and your home safer from natural disasters?

- ☐ Yes
☐ No (**IF NO Skip to Question 5**)

If "YES", how recently?

- ☐ Within the last 6 months
☐ Between 6 and 12 months
☐ Between 1 and 2 years
☐ Between 2 and 5 years
☐ 5 years or more

4. From whom did you **last** receive information about how to make members of your household and your home safer from natural disasters?

(Please check only one)

- | | |
|---|--|
| ☐ News media | ☐ Elected official |
| ☐ Government agency | ☐ American Red Cross |
| ☐ Insurance agent or company | ☐ Other non-profit organization |
| ☐ Utility company | ☐ Social media (e.g. Facebook) |
| ☐ University or research institution | ☐ Not sure |
| ☐ Neighbor / friend / family member | ☐ Other: _____ |

5. Whom would you most trust to provide you with information about how to make your household and home safer from natural disasters?

(Please check up to three)

- | | |
|---|--|
| ☐ News media | ☐ Elected official |
| ☐ Government agency | ☐ American Red Cross |
| ☐ Insurance agent or company | ☐ Other non-profit organization |
| ☐ Utility company | ☐ Social media (e.g. Facebook) |
| ☐ University or research institution | ☐ Not sure |
| ☐ Neighbor / friend / family member | ☐ Other: _____ |

6. What is the most effective way for you to receive information about how to make your household and home safer from natural disasters?

(Please check up to three)

Newspapers:

- ☐ Newspaper stories
☐ Newspaper ads

Television:

- ☐ Television news
☐ Television ads

Radio:

- ☐ Radio news
☐ Radio ads

Internet:

- ☐ Email newsletters
☐ Online news outlets
☐ Social media (e.g. Facebook)

Other methods:

- ☐ Schools
☐ Outdoor advertisements (billboards, etc.)
☐ Books
☐ Mail
☐ Fire Department/Rescue
☐ Fact sheet/brochure
☐ Chamber of Commerce
☐ Public workshops/meetings
☐ Magazine
☐ University or research institution
☐ Other: _____

7. Prior to receiving this survey, were you aware of your county's Natural Hazard Mitigation Plan (NHMP)?

- ☐ Yes
☐ No

8. Prior to receiving this survey, were you aware that the Federal Emergency Management Agency (FEMA) requires your county to update the NHMP every five years in order for your county to be eligible for federal pre- and post-disaster hazard mitigation funds?

- ☐ Yes
☐ No

COMMUNITY VULNERABILITIES AND HAZARD MITIGATION STRATEGIES

In order to assess community risk, we need to understand which community assets may be vulnerable to natural hazards in the region. Vulnerable assets are those community features, characteristics, or resources that may be impacted by natural hazards (e.g. populations with functional needs, economic components, environmental resources, etc.). The next set of questions will focus on vulnerable assets in your community and your preferred strategies to mitigate risk to those assets.

9. Community assets are features, characteristics, or resources that either make a community unique or allow the community to function. In your opinion, which of the following *categories* are most susceptible to the impacts caused by natural hazards in your county?

(Please rank the community assets in order of vulnerability, 1 being most vulnerable and 6 being least vulnerable)

Community Assets	Potential Natural Hazard Impact	Order of Vulnerability
Human	Loss of life and/or injuries	_____
Economic	Business closures and/or job losses	_____
Infrastructure	Damage or loss of bridges, utilities, schools, etc.	_____
Cultural/Historic	Damage or loss of libraries, museums, fairgrounds, etc.	_____
Environmental	Damage or loss of forests, rangeland, waterways, etc.	_____
Governance	Ability to maintain order and/or provide public amenities and services	_____

10. Next we would like to know what specific types of community assets are most important to you.
(Check the corresponding box for each asset)

Community Assets	Very Important	Somewhat Important	Neutral	Not Very Important	Not Important
Elder-care facilities	☐	☐	☐	☐	☐
Schools (K-12)	☐	☐	☐	☐	☐
Hospitals	☐	☐	☐	☐	☐
Major bridges	☐	☐	☐	☐	☐
Fire/Police Stations	☐	☐	☐	☐	☐
Museums/Historic buildings	☐	☐	☐	☐	☐
Major employers	☐	☐	☐	☐	☐
Small businesses	☐	☐	☐	☐	☐
College / University	☐	☐	☐	☐	☐
City Hall / Courthouse	☐	☐	☐	☐	☐
Parks	☐	☐	☐	☐	☐
Other: _____	☐	☐	☐	☐	☐
Other: _____	☐	☐	☐	☐	☐
Other: _____	☐	☐	☐	☐	☐
Other: _____	☐	☐	☐	☐	☐
Other: _____	☐	☐	☐	☐	☐

Worksheet 3.1

Sample Mitigation Public Opinion Survey

11. A number of activities can reduce your community's risk from natural hazards. These activities can be both regulatory and non-regulatory. **Please check the box that best represents your opinion of the following strategies to reduce the risk and loss associated with natural disasters.**

Community-wide Strategies	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree	Not Sure
I support a regulatory approach to reducing risk	☐	☐	☐	☐	☐	☐
I support a non-regulatory approach to reducing risk	☐	☐	☐	☐	☐	☐
I support a mix of both regulatory and non-regulatory approaches to reducing risk	☐	☐	☐	☐	☐	☐
I support policies to prohibit development in areas subject to natural hazards	☐	☐	☐	☐	☐	☐
I support the use of tax dollars (federal and/or local) to compensate land owners for not developing in areas subject to natural hazards	☐	☐	☐	☐	☐	☐
I support the use of local tax dollars to reduce risks and losses from natural disasters	☐	☐	☐	☐	☐	☐
I support protecting historical and cultural structures	☐	☐	☐	☐	☐	☐
I would be willing to make my home more disaster-resistant	☐	☐	☐	☐	☐	☐
I support steps to safeguard the local economy following a disaster event	☐	☐	☐	☐	☐	☐
I support improving the disaster preparedness of local schools	☐	☐	☐	☐	☐	☐
I support a local inventory of at-risk buildings and infrastructure	☐	☐	☐	☐	☐	☐
I support the disclosure of natural hazard risks during real estate transactions	☐	☐	☐	☐	☐	☐

12. Natural hazards can have a significant impact on a community, but planning for these events can help lessen the impacts. The following statements will help determine citizen priorities regarding planning for natural hazards in your county. **Please tell us how important each one is to you.**

Statements	Very Important	Somewhat Important	Neutral	Not Very Important	Not Important
Protecting private property	☐	☐	☐	☐	☐
Protecting critical facilities (e.g. transportation networks, hospitals, fire stations)	☐	☐	☐	☐	☐
Preventing development in hazard areas	☐	☐	☐	☐	☐
Enhancing the function of natural features (e.g. streams, wetlands)	☐	☐	☐	☐	☐
Protecting historical and cultural landmarks	☐	☐	☐	☐	☐
Protecting and reducing damage to utilities	☐	☐	☐	☐	☐
Strengthening emergency services (e.g.- police, fire, ambulance)	☐	☐	☐	☐	☐
Disclosing natural hazard risks during real estate transactions	☐	☐	☐	☐	☐
Promoting cooperation among public agencies, citizens, non-profit organizations, and businesses	☐	☐	☐	☐	☐