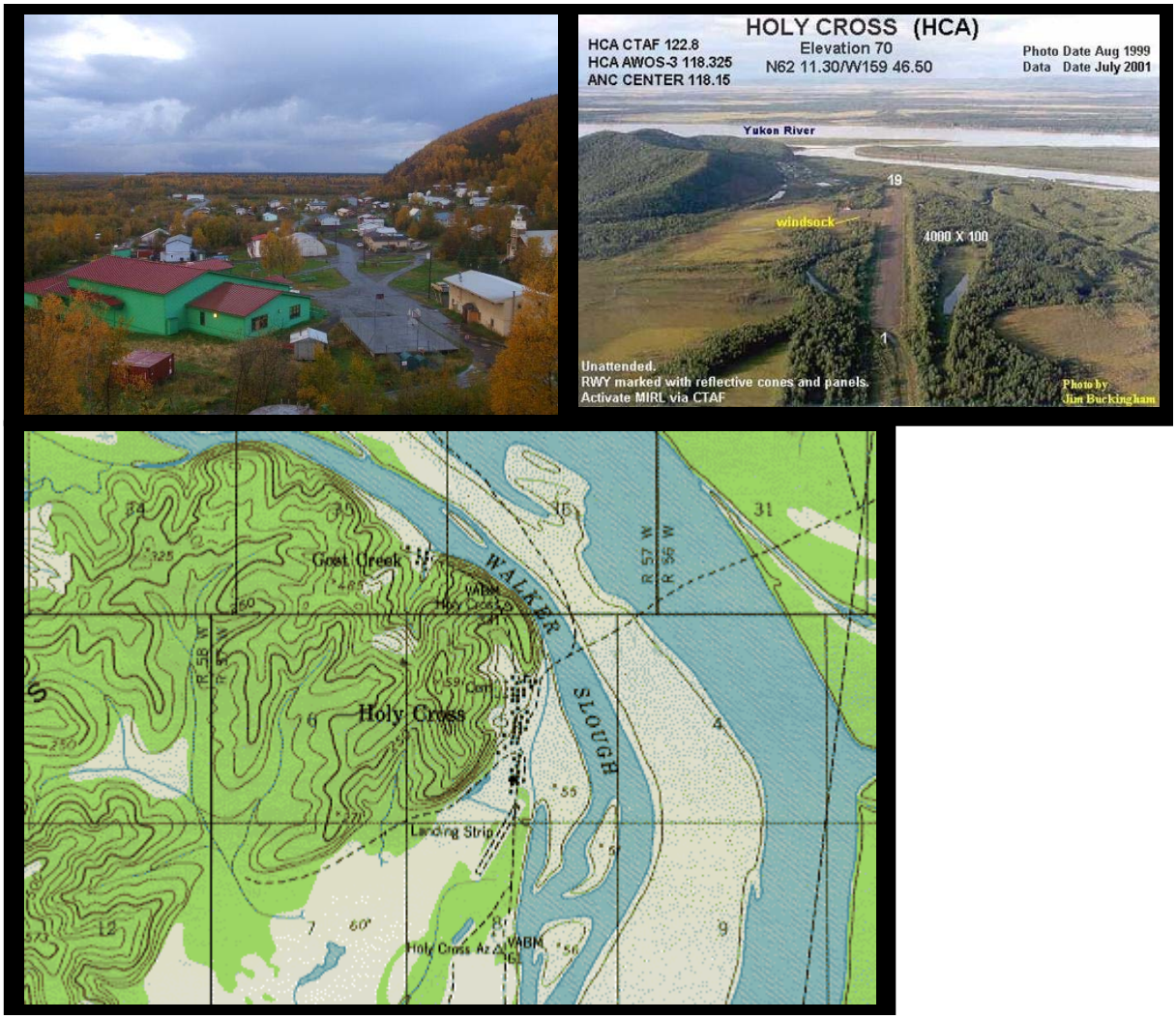
City of Holy Cross
Hazard Mitigation Plan



Prepared by
The City of Holy Cross
Hazard Mitigation Planning Team
November 2013

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

FEMA

November 7, 2013

Honorable Rebecca Demientieff
Mayor, City of Holy Cross
P.O. Box 227
Holy Cross, Alaska 99602

Dear Mayor Demientieff:

The U.S. Department of Homeland Security's Federal Emergency Management Agency (FEMA) has approved the ***Holy Cross Hazard Mitigation Plan*** as a local plan as outlined in 44 CFR Part 201. With approval of this plan, the City of Holy Cross is now eligible to apply for the Robert T. Stafford Disaster Relief and Emergency Assistance Act's hazard mitigation project grants through November 6, 2018.

The plan's approval provides eligibility to apply for hazard mitigation projects through your State. All requests for funding will be evaluated individually according to the specific eligibility and other requirements of the particular program under which the application is submitted. For example, a specific mitigation activity or project identified in the plan may not meet the eligibility requirements for FEMA funding, and even eligible mitigation activities are not automatically approved for FEMA funding under any of the aforementioned programs. Approved mitigation plans may be eligible for points under the National Flood Insurance Program's Community Rating System (CRS). Additional information regarding the CRS can be found at www.fema.gov/business/nfip/crs.shtm or through your local floodplain manager.

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

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

Sincerely,

Mark Carey, Director
Mitigation Division

cc: Ann Gravier, Alaska Division of Homeland Security and Emergency Management

Enclosure

BH:bb

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City of Holy Cross
Draft Hazard Mitigation Plan

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Acronyms/Abbreviations

°F	Degrees Fahrenheit
ACCIMP	Alaska Climate Change Impact Mitigation Program
ACWF	Alaska Clean Water Fund
ADWF	Alaska Drinking Water Fund
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
AVEC	Alaska Village Electric Cooperative
BF	Bulk Fuel
BFE	Base Flood Elevation
CBO	Other Communication Facility
CBR	Communication Facility-Radio/TV
CCP	Citizen Corps Program
CDBG	Community Development Block Grant
CFR	Code of Federal Regulations
CFP	Community Forestry Program
CGP	Comprehensive Grant Program
City	City of Holy Cross
CWSRF	Clean Water State Revolving Fund
DCCED	Department of Commerce, Community, and Economic Development
DCRA	Division of Community and Regional Affairs
DEC	Department of Environmental Conservation
DEED	Department of Education and Early Development
Dept	Department
DHS	Department of Homeland Security
DHS&EM	Division of Homeland Security and Emergency Management
DGGS	Division of Geological and Geophysical Survey
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
EMPG	Emergency Management Performance Grant
EOC	Emergency Operations Center
EPA	Environmental Protection Agency
EPPS	Electric Power Plant, Small
EWP	Emergency Watershed Protection Program
FAA	Federal Aviation Administration
FEMA	Federal Emergency Management Agency
FMA	Flood Mitigation Assistance
FP&S	Fire Prevention and Safety
ft	feet
FY	Fiscal Year
g	gravity as a measure of peak ground acceleration
GIS	Geospatial Information System
Hazus	Hazard United States – Multiple Hazards
HMA	Hazard Mitigation Assistance
HMGP	Hazard Mitigation Grant Program
HMP	Hazard Mitigation Plan
HSGP	Homeland Security Grant Program
HWE	High Water Elevation
HUD	Housing and Urban Development
IBHS	Institute for Business and Home Safety
ICDBG	Indian Community Development Block Grant
IGAP	Indian General Assistance Program
IHBG	Indian Housing Block Grant
INAP	Indian and Native American Programs
IRS	Internal Revenue Service
km	Kilometers
kts	Knots
M	Magnitude
MMI	Modified Mercalli Intensity
mph	Miles Per Hour

NAHASDA	Native American Housing Assistance and Self Determination Act
NFIP	National Flood Insurance Program
NIMS	National Incident Management System
NOAA	National Oceanic and Atmospheric Administration
NRF	National Response Framework
NRCS	Natural Resources Conservation Service
NWS	National Weather Service
OTF	Oil Tank Farm
PDM	Pre-Disaster Mitigation
PGA	Peak Ground Acceleration
PNP	Private Non-Profits
PSTS	Public Storage Tank, Steel
PWE	Potable Water Well
PWE	Potable Water Pipeline
PWSO	Potable Water Treatment Plant, Small
RCASP	Remote Community Alert Systems
RD	Rural Development
RL	Repetitive Loss
RFC	Repetitive Flood Claim
SAFER	Staffing for Adequate Fire and Emergency Response
SBA	U.S. Small Business Administration
SHMP	Alaska State Hazard Mitigation Plan
SHSP	State Homeland Security Program
SOA	State of Alaska
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
URS	URS Corporation
US or U.S.	United States
USACE	United States Army Corps of Engineers
USC	United States Code
USDA	United States Department of Agriculture
USGS	United States Geological Survey
VFA-RFA	Volunteer Fire Assistance and Rural Fire Assistance Grant
VSW	Village Safe Water
WARN	Warning, Alert, and Response Network

WHIP	Wildlife habitat Incentives Program
WLSW	Lift Station (Small) Wet Well/Dry Well
WTP	Water Treatment Plant
WWTL	Waste Water Treatment Plant

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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

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.

In October 2007 and July 2008, FEMA 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.

This HMP complies with Title 44 CFR current as of September 28, 2012 and applicable guidance documents.

1.2 GRANT PROGRAMS WITH MITIGATION PLAN REQUIREMENTS

FEMA HMA 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 three are authorized under the National Flood Insurance Act and the Bunning-Bereuter-Blumenauer Flood Insurance Reform Act. The Hazard Mitigation Grant Program (HMGP) is a competitive, disaster funded, grant program. Whereas the other Unified Mitigation Assistance Programs: Pre-Disaster Mitigation (PDM), Flood Mitigation Assistance (FMA), programs although competitive, rely on specific pre-disaster grant funding sources, sharing several common elements.

> *"Hazard mitigation is any sustained action taken to reduce or eliminate long-term risk to people and property from natural hazards and their effects. This definition distinguishes actions that have a long-term impact from those that are more closely associated with immediate preparedness, response, and recovery activities. Hazard mitigation is the only phase of emergency management specifically dedicated to breaking the cycle of damage, reconstruction, and repeated damage. As such, States, Territories, Indian Tribal*

governments, and communities are encouraged to take advantage of funding provided by HMA programs in both the pre- and post-disaster timeframes.

Together, these programs provide significant opportunities to reduce or eliminate potential losses to State, Tribal, and local assets through hazard mitigation planning and project grant funding. Each HMA program was authorized by separate legislative action, and as such, each program differs slightly in scope and intent.

The Hazard Mitigation Grant Program (HMGP) may provide funds to States, Territories, Indian Tribal governments, local governments, and eligible private non-profits (PNPs) following a Presidential major disaster declaration. The Pre-Disaster Mitigation (PDM), Flood Mitigation Assistance (FMA), programs may provide funds annually to States, Territories, Indian Tribal governments, and local governments. While the statutory origins of the programs differ, all share the common goal of reducing the risk of loss of life and property due to natural hazards" (FEMA 2010).

1.2.1 Hazard Mitigation Assistance (HMA) Unified Programs

HMA grant program activities include:

Table 1-1 HMA Eligible Activities

Activities	HMGP	PDM	FMA
1. Mitigation Projects	√	√	√
Property Acquisition and Structure Demolition	√	√	√
Property Acquisition and Structure Relocation	√	√	√
Structure Elevation	√	√	√
Mitigation Reconstruction			
Dry Floodproofing of Historic Residential Structures	√	√	√
Dry Floodproofing of Non-residential Structures	√	√	√
Minor Localized Flood Reduction Projects	√	√	√
Structural Retrofitting of Existing Buildings	√	√	
Non-Structural Retrofitting of Existing Buildings and Facilities	√	√	
Safe Room Construction	√	√	
Infrastructure Retrofit	√	√	
Soil Stabilization	√	√	
Wildfire Mitigation	√	√	
Post-disaster Code Enforcement	√		
5% Initiative Projects	√		
2. Hazard Mitigation Planning	√	√	√
3. Management Costs	√	√	√

(FEMA 2012)

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. In Fiscal Year (FY) 2006 was approximately $232 million, FY 2007 was $316 million, FY 2008 was $1.246 billion, FY 2009 was $359 million, and FY 2010 was $23 million. The cost-share for these grants is 75 percent Federal/25 percent non-Federal. Communities that fulfill "Impoverished Community" criteria and receive FEMA Regional Administrator approval may be funded at percent 90 percent Federal/10 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 FY 2008, PDM program funding totaled approximately $114 million, FY 2009 was $90 million, and FY 2010 was $100 million. The cost-share for these grants 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. Funding is available for Planning and Project grants and are awarded to States, Tribes, and local entities to apply mitigation measures to reduce flood losses to properties insured under the NFIP.

The City of Holy Cross does not currently participate in the NFIP and is therefore ineligible for National Flood Insurance Act Grant Programs until they become a NFIP participant.

HMP Description

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

Introduction

Section 1 defines what a hazard mitigation plan is, delineates federal requirements and authorities, and introduces the Hazard Mitigation Assistance program listing the various grant programs and their historical funding levels.

Community Description

Section 2 provides a general history and background of the City of Holy Cross (City), including historical trends for population and the demographic and economic conditions that have shaped the area. A location figure of the area is included.

Planning Process

Section 3 describes the planning process and identifies the Planning Team Members, the meetings held as part of the planning process, and the key stakeholders within the City and the surrounding area. In addition, this section documents public outreach activities (Appendix D),

the review and incorporation of relevant plans, reports, and other appropriate information, actions the City plans to implement to assure continued public participation, and their methods and schedule for keeping the plan current.

This section also describes the Planning Team's formal plan maintenance process to ensure that the HMP remains an active and applicable document throughout its 5-year lifecycle. The process includes monitoring, evaluating (Appendix F – Maintenance Documents), updating the HMP; and implementation initiatives.

Plan Adoption
Section 4 describes the community's HMP adoption process and supporting documentation

Hazard Analysis

Section 5 describes the process through which the Planning Team identified, screened, and selected the hazards to be profiled in this version of the HMP. The hazard analysis includes the nature, previous occurrences (history), location, extent, impact, and probability of future events for each hazard.

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. Land use and development trends are also discussed.

Mitigation Strategy

Section 7 defines the mitigation strategy which provides a blueprint for reducing the potential losses identified in the vulnerability analysis. This section lists the community's governmental authorities, policies, programs and resources.

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. Mitigation strategies were developed to address NFIP insured properties (if applicable) while encouraging participation with the NFIP and the reduction of flood damage to flood-prone structures.

References

Section 8 lists the reference materials used to prepare this HMP.

Appendices

Appendix A: Delineates Federal, State, and other potential mitigation funding sources. This section will aid the community with researching and applying for funds to implement their mitigation strategy.

Appendix B: Provides the FEMA Local Mitigation Plan Review Tool, which documents compliance with FEMA criteria.

Appendix C: Provides the adoption resolution for the City.

Appendix D: Provides public outreach information, including newsletters.

Appendix E: Contains the Benefit-Cost Analysis Fact Sheet used to prioritize mitigation actions.

Appendix F: Provides the plan maintenance documents, such as an annual review sheet and the progress report form.

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

2.1 LOCATION, GEOGRAPHY, AND HISTORY

"Holy Cross is located in Interior Alaska on the west bank of Ghost Creek Slough off the Yukon River. It is 40 miles northwest of Aniak and 420 miles southwest of Fairbanks. It lies at approximately 62.199440 North Latitude and -159.771390 West Longitude. (Sec. 05, T024N, R057W, Seward Meridian.) Holy Cross is located in the Kuskokwim Recording District." (Department of Community, Commerce, and Economic Development [DCCED], Division of Community and Regional Affairs [DCRA] 2012).

Figure 2-1 Holy Cross Location Map

The City covers approximately 31.3 square (sq.) miles of land and approximately 6.26 sq. miles of water. Extreme temperature changes occur throughout Alaska's interior. The City's temperatures range from a winter low of -62 degrees Fahrenheit (°F) to a high of 93°F. The area receives approximately 19 inches of rain and 79 inches of snow.

As shown below, the Holy Cross location has known many names. First contact occurred with Europeans in the early 1840s, when Lt. Zagoskin led his fellow Russian explorers along the Yukon River. They reported that "Anilukhtakpak," had 170 people (DCCED/DCRA). The following is a brief sketch of the City's history:

1880	1880, the village was reported as "Askhomute" with 30 residents.
1880s	Father Aloysius Robaut established the Catholic Mission and school after traversing the Chilkoot Trail.
	Ingaliks migrated to Holy Cross to be near the mission and school.
1899	The "Koserefsky" Post office was opened.
1912	The City changed to its current name, Holy Cross, from the mission.
1930s/40s	Sternwheelers brought mail and supplies two or three times a year.
	The slough was formed on which the Village is now located.
1956	The boarding school ceased operations and the mission church and many additional buildings were subsequently torn down.
1968	The Village became incorporated as a 2nd Class City
1974	The Alaska Village corporation became Deloycheet, Incorporated under Alaska Native Claims Settlement Act (ANCSA).The Holy Cross Tribal Council website describes the community's history as,

"…an Deg Hit'an Athabascan Indian village and is federally recognized. Population growth has been slow, but steady with a population of 277 in the 2000 census.

The village has a seasonal economy with its peak during the summer fishing period. Subsistence and fishing-related activities are central to the lifestyle of residents.

Homes are primarily single-family dwellings of either frame or log construction, with oil and wood burning stoves as the major heat sources. There are also new HUD sites available to expand housing for future village development.

2.2 DEMOGRAPHICS

The City is a federally recognized Deg Hit'an Athabascan Indian Village. The 2010 census recorded 178 residents, of which the median age was 35.0 indicating a relatively middle aged population. The population of Holy Cross is expected to remain steady because over half of the population is between 15 and 54 years of age. The City is principally a Yup'ik community with approximately 95.5 percent of residents recognize themselves as Alaska Native. The male and female composition is approximately 52 and 48 percent respectively. The 2010 census revealed that there are 39 households with the average household having approximately 2.78 individuals. The most recent 2011 DCCED certified population is 176. Figure 3-2 illustrates the historic population of the City.

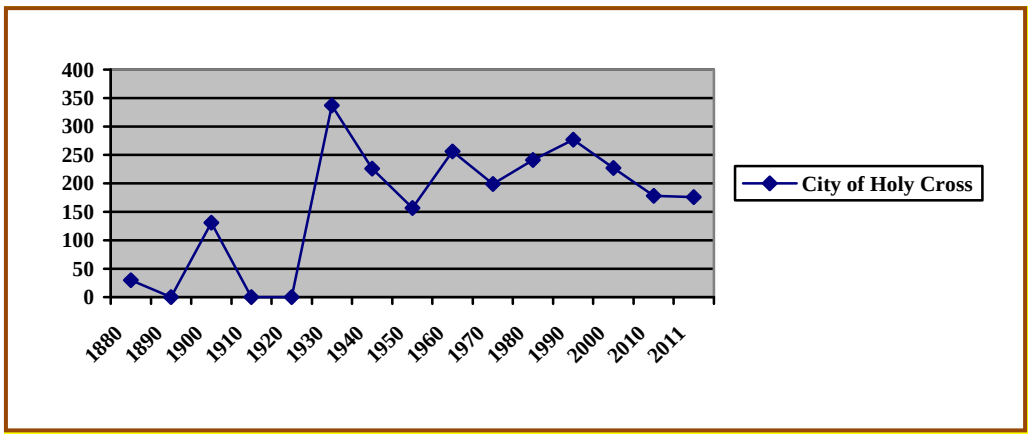

Figure 2-2 Holy Cross Historic Population

2.3 ECONOMY

There are limited employment opportunities in the City most of which are seasonal. Established government provides the bulk of the employment opportunities such as the City (48 percent), State (1 percent), and Federal agencies (2.8 percent) and the school district, the health clinic (24.7), and other commercial enterprises. Subsistence activities such as hunting, fishing, trapping, and gardening provide their income and food sources (Census 2010, DCRA 2012).

According to the 2010 census, the median household income in Holy Cross was $25,833, whereas the per capita income was approximately $12,358. There were 46.9 percent were living below the poverty level. The potential work force (those aged 16 years or older) in the City was estimated to be 84, of which 53 were actively employed. In 2010 the unemployment rate was 36.9 percent; however, this rate included part-time and seasonal jobs, and practical unemployment or underemployment is likely to be significantly higher.

Figure 2-3 depicts an aerial photograph of the City obtained from the DCCED/DCRA community profile.

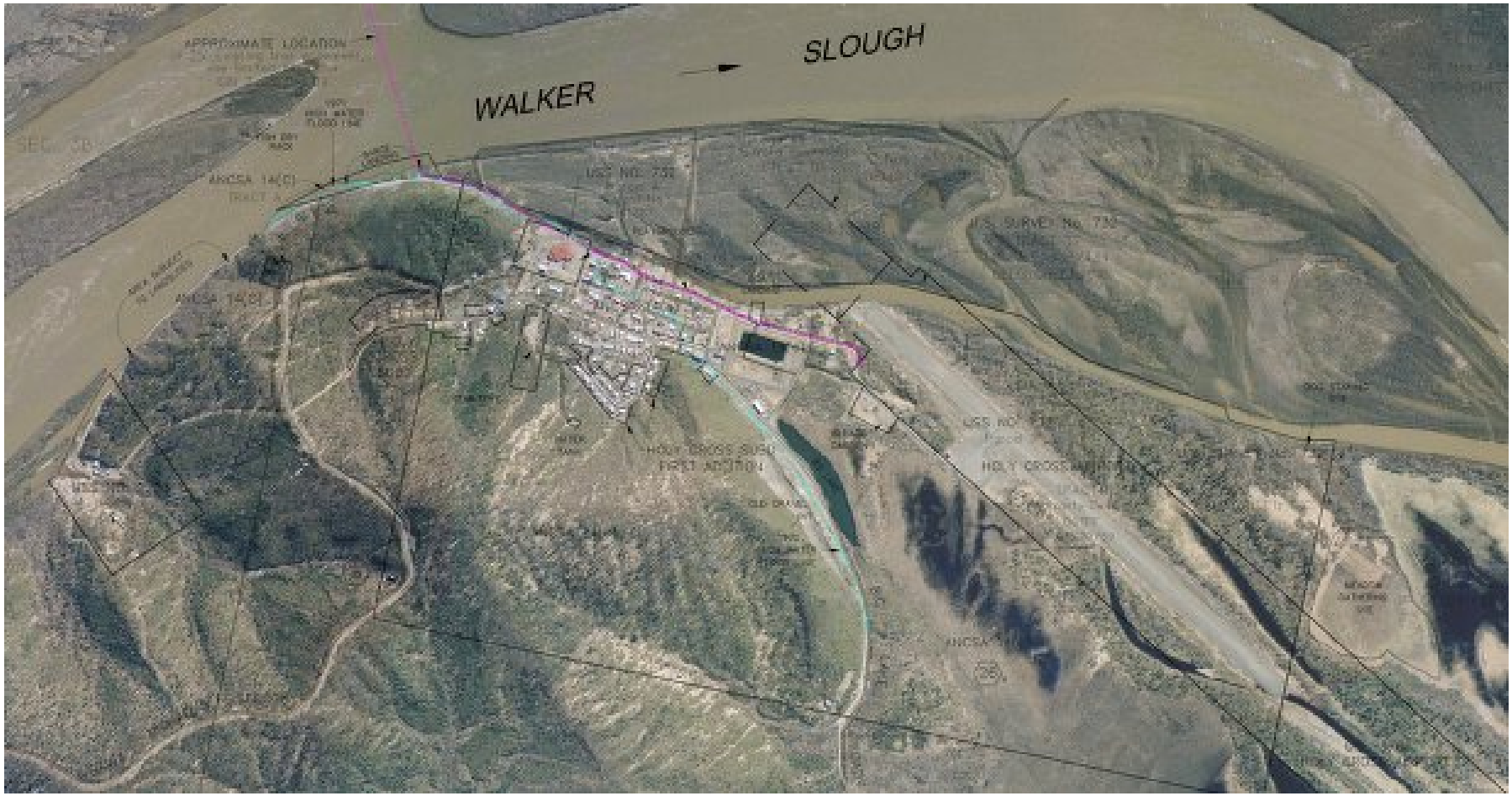

Figure 2-3 Aerial Photograph of the City of Holy Cross.

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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. Outreach support documents and meeting information regarding the Planning Team and public outreach efforts are provided in Appendix D.

The requirements for the planning process, as stipulated in DMA 2000 and its implementing regulations are described below. The gray highlighted text are the 2008 requirements, the green highlighted table is the October 2012 requirements.

DMA 2000 Requirements
1. REGULATION CHECKLIST
Local Planning Process §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 §201.6(b)(1): An opportunity for the public to comment on the plan during the drafting stage and prior to plan approval; §201.6(b)(2): An opportunity for neighboring communities, local and regional agencies involved in hazard mitigation activities, and agencies that have the authority to regulate development, as well as businesses, academia and other private and nonprofit interests to be involved in the planning process; and §201.6(b)(3): Review and incorporation, if appropriate, of existing plans, studies, reports, and technical information. §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. §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. §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 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)) 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)) A3. Does the Plan document how the public was involved in the planning process during the drafting stage? (Requirement §201.6(b)(1)) A4. Does the Plan describe the review and incorporation of existing plans, studies, reports, and technical information? (Requirement §201.6(b)(3)) A5. Is there discussion of how the community(ies) will continue public participation in the plan maintenance process? (Requirement §201.6(c)(4)(iii)) 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))
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? (Not applicable until 2013 update).
Source: FEMA, October 2011.

3.1 OVERVIEW OF PLANNING PROCESS

The State of Alaska, Division of Homeland Security and Emergency Management (DHS&EM) provided funding and project oversight to URS Corporation to facilitate and guide Planning Team development and HMP development.

The planning process began with Mayor Ms. Rebecca Turner coordinating a local Planning Team kick-off meeting to coincide with their combined City and Tribal Council's meeting on June 22, 2012. The Planning Team consists of members of the City, Deloycheet Inc., (Village Corporation) and Doyon Limited (Regional Corporation) and community members.

The Planning Team identified applicable City resources and capabilities during the meeting. URS explained how the HMP differed from current emergency plans. They then discussed the Planning Team's future rolls such as: acting as an advocate for the planning process, assisting with gathering information, and supporting public participation opportunities. There was also a brief discussion about hazards that could potentially affect the community such as earthquake, erosion, sediment deposition, flood, severe weather, and wildland/tundra fire. The team determined the HMP need only be concerned about flood, erosion, severe weather, and tundra fire.

The Planning Team further discussed the hazard mitigation planning process, explaining how residents could participants to help identify hazards that affect the City, identify impacts to residential and critical facilities, and for assisting the Planning Team with identifying and prioritizing mitigation actions for potential future mitigation project funding.

In summary, the following five-step process took place from March 2012 through June 2013.

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 the development of the hazard mitigation plan.
2. Monitor, evaluate, and update the plan: The Planning Team developed a process to ensure the plan was monitored 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 plans five year update.
3. Assess risks: The Planning Team identified the hazards specific to Holy Cross, with URS developing the risk assessment for the four identified hazards: erosion, flood, severe weather, and wildland/tundra fire. The Planning Team reviewed the risk assessment, including the vulnerability analysis during the development of the mitigation strategy.
4. 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.
5. Develop a mitigation strategy: After reviewing the risks posed by each hazard, the Planning Team developed a comprehensive range of potential mitigation goals and

actions. Subsequently, the Planning Team identified and prioritized the actions for implementation.

3.2 HAZARD MITIGATION PLANNING TEAM

The local Planning Team members are Mayor Rebecca Turner (Planning Team Leader), City Administrator Adrian Wright, City Clerk Jacqueline Turner, and City Council Members.

Table 3-1 identifies the hazard complete mitigation Planning Team.

Table 3-1 Hazard Mitigation Planning Team

Name	Title	Organization	Key Input
Rebecca Turner	Mayor	City of Holy Cross	Planning Team Lead, HMP review.
Connie Walker	City Administrator	City of Holy Cross	Planning Team Member, data input and HMP review.
Jacqueline Turner	City Clerk	City of Holy Cross	Planning Team Member, data input and HMP review.
Evan Newman	Member		Planning Team Member, Tribal data input and HMP review.
Laverne Turner	Member		Planning Team Member, Tribal data input and HMP review.
Christy Turner	Member		Planning Team Member, Tribal data input and HMP review.
Victor Laveira	Member		Planning Team Member, Tribal data input and HMP review.
Roslie Wolfe	Member		Planning Team Member, Tribal data input and HMP review.
Scott Simmons	Emergency Management, Hazard Mitigation, and Climate Change Planner	URS Corporation, Alaska	HMP development, lead writer, project coordination

3.3 PUBLIC INVOLVEMENT & OPPORTUNITY FOR INTERESTED PARTIES TO PARTICIPATE

Table 3-2 lists the community's public involvement initiatives focused to encourage participation and insight for the HMP effort.

Table 3-2 Public Involvement Mechanisms

Mechanism	Description
Newsletter Distribution (June 2012)	In June 2012, 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 and Tribal Offices and the Post Office to ensure everyone was aware of the meeting.
Newsletter Distribution (June, 2013)	In June 2013, the jurisdiction distributed a newsletter describing the HMPs availability and present potential HMP projects for review. The newsletter encouraged the whole community to provide comments or input.

On June 11, 2012, Mayor Rebecca Turner introduced the hazard mitigation planning project during the City Council Meeting to the community and other interested parties. Mayor Turner then facilitated a teleconference for URS to further clarify the HMP development process, the

intent of the project newsletter describing, and potential planning team and public meetings. Newsletters were either faxed or emailed to relevant academia, nonprofits, and local, state, and federal agencies and placed on the DSH&EM website and signs posted throughout the community.

The following agencies were invited to participate and review the HMP:

- University of Alaska Fairbanks, Geophysical Institute, Alaska Earthquake Information Center (UAF/GI/AEIC)
- Alaska Native Tribal Health Consortium-Community Development (ANTHC)
- Alaska Volcano Observatory (AVO)
- Association of Village Council Presidents (AVCP)
- Denali Commission
- Alaska Department of Environmental Conservation (DEC)
- DEC Division of Spill Prevention and Response (DSPR)
- DEC Village Safe Water (VSW)
- Alaska Department of Transportation and Public Facilities (DOT/PF)
- Alaska Department of Community, Commerce, and Economic Development (DCCED)
- DCCED, Division of Community Advocacy (DCRA)
- Alaska Department of Military and Veterans Affairs (DMVA)
- DMVA, Division of Homeland Security and Emergency Management (DHS&EM)
- US Environmental Protection Agency (EPA)
- National Weather Service (NWS) Northern Region
- NWS Southeast Region
- NWS Southcentral Region
- Natural Resources Conservation Service (NRCS)
- US Department of Agriculture (USDA)
- USDA Division of Rural Development (RD)
- US Army Corps Of Engineers (USACE)
- US Bureau of Indian Affairs (BIA)
- US Bureau of Land Management (BLM)
- US Department of Housing and Urban Development (HUD)
- US Fish & Wildlife Service (USFWS)

During the meeting, the Planning Team led the attending public through a hazard identification and screening exercise. The attendees identified four hazards for profiling within the HMP: erosion, flood, severe weather, and wildland fire which periodically impact the City.

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

A risk assessment was completed after the community asset data was collected by the Planning Team over the spring of 2012, which identified the assets that are exposed and vulnerable to specific hazards.

A Planning Team meeting was held on June 6, 2013 to review and prioritize the mitigation actions identified based on the results of the risk assessment. A second newsletter was prepared and delivered in June 2013 describing the process to date, presenting the prioritized mitigation actions, and announcing the availability of the draft HMP for public review and comment.

The Planning Team held a special meeting in June 2013 to review the draft HMP for accuracy – ensuring it meets the City's needs. The meeting was productive with the Team highlighting several minor corrections or refinements. Changes were specifically targeted to plan development information, hazard impacts, community vulnerability analysis, and the mitigation strategy.

3.4 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 available from two of the City's websites and were reviewed and used as references for the jurisdiction information and hazard profiles in the risk assessment of the HMP for the City (DCCED 2012).

Table 3-4 Documents Reviewed

Existing plans, studies, reports, ordinances, etc.	Contents Summary (How will this information improve mitigation planning?)
Doyon Limited, Holy Cross' regional corporation.	*Provided land ownership and land use information essential to Holy Cross future use and development.*
The US Army Corps of Engineers (USACE), Alaska Baseline Erosion Assessment, Study Findings and Technical Report	*Defines the State's erosion threats, lists threatened communities, and defines the various erosion categories*
The USACE, Alaska Baseline Erosion Assessment, Erosion Information Paper – Holy Cross, Alaska, Current as of February 12, 2008	*Indicates that Holy Cross' erosion threat*
The USACE Floodplain Manager's Flood Hazard Data, Current as of October 2011	*Indicates high water elevations (HWE) survey sites and flood history for the Village*
U.S. Army Corps of Engineers (USACE). Alaska Barge Landing System Design Statewide Phase 1, 2008	*Provided pertinent land use needs for barge landing operations*

Table 3-4 Documents Reviewed

Existing plans, studies, reports, ordinances, etc.	Contents Summary (How will this information improve mitigation planning?)
State of Alaska, Department of Commerce, Community and Economic Development Community Profile	*Provided historical and demographic information. Provides detailed demographic, climatic, political, and socio-economic data for the Village*
State of Alaska (SOA) Hazard Mitigation Plan, 2010 (SHMP)	*Defines statewide hazards and their potential locational impacts*

A complete list of references consulted is provided in Section 8.

3.5 PLAN MAINTENANCE

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

3.5.1 Implementation Into 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
1. REGULATION CHECKLIST
Incorporation into Existing Planning Mechanisms §201.6(b)(3): Review and incorporation, if appropriate, of existing plans, studies, reports, and technical information.
ELEMENT A Planning Process (Continued)
A4. Does the Plan describe the review and incorporation of existing plans, studies, reports, and technical information?
Source: FEMA, October 2011.

Once the HMP is community adopted and receives FEMA's final approval, 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.

3.5.2 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
1. REGULATION CHECKLIST
Continued Public Involvement §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 A Planning Process (Continued)
A5. Is there discussion of how the community(ies) will continue public participation in the plan maintenance process? (Requirement §201.6(c)(4)(iii))
Source: FEMA, October 2011.

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 identify opportunities to raise community awareness about the HMP and the hazards that affect the area. This effort could include attendance and provision of materials at City-sponsored events, outreach programs, and public mailings. 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.

3.5.3 Monitoring, Reviewing, 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.

DMA 2000 Requirements
Monitoring, Evaluating and Updating the Plan §201.6(c)(4)(i): The plan maintenance process shall include a] discussion on how the community will continue public participation in the plan maintenance process.
1. REGULATION CHECKLIST
ELEMENT A. Planning Process (Continued)
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?)
Source: FEMA, October 2011.

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. Review and revise the HMP to reflect development changes, project implementation progress, project priority changes, and resubmit.
2. HMP resubmittal at the end of the plan's five year life cycle for State and FEMA review and approval.
3. Continued mitigation initiative implementation.

3.5.3.1 Monitoring the HMP

The HMP was prepared as a collaborative effort. To maintain momentum and build upon previous hazard mitigation planning efforts and successes, the City will continue to use the Planning Team to monitor the HMP to determine whether actions identified in the Mitigation Action Plan Matrix (Table 7-7) were effectively implemented. The Tribal President, the hazard mitigation Planning Team Leader, (or designee), will serve as the primary point of contact and will coordinate local efforts to monitor, evaluate, revise, and tabulate HMP actions' status.

3.5.3.2 Reviewing the HMP

The Planning Team's review will determine how community changes have either made hazard impacts worse or whether they have experienced reduced impacts. It will allow the team to review construction and community infrastructure conditions as well as weather pattern changes, and population increases or decreases to determine if their implemented mitigation projects have reduced hazard risks or vulnerabilities.

Each member of the Planning Team will conduct an annual review during the anniversary week of the HMP's official FEMA approval date to monitor the progress in implementing the HMP, particularly the Mitigation Action Plan.

3.5.3.3 Evaluating the HMP

As shown in Appendix F, the Annual Review Questionnaire will provide the basis for evaluating 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

3.5.3.4 Updating the HMP

In addition to the annual review, the Planning Team will update the HMP every five years.

DMA 2000 Requirements
Reviewing, Evaluating, and Implementing the Plan §201.6(d)(3): A local jurisdiction must review and revise its plan to reflect changes in development, progress in local mitigation efforts, and changes in priorities, and resubmit if for approval within 5 years in order to continue to be eligible for mitigation project grant funding.
ELEMENT D. Planning Process (Continued) *Update activities not applicable to the plan version*
D1. Was the Plan revised to reflect changes in development? (Requirement §201.6(d)(3))
D2. Was the Plan revised to reflect progress in local mitigation effort? (Requirement §201.6(d)(3))
D3. Was the Plan revised to reflect changes in priorities? (Requirement §201.6(d)(3))
Source: FEMA, October 2011.

The City of Holy Cross will annually review the HMP as described in Section 3.5.3 and update the HMP every five years (or when significant changes are made) by having the identified Planning Team review all Annual Review Questionnaires (Appendix F) to determine the success of implementing the HMP's Mitigation Action Plan.

The Annual Review Questionnaire will enable the Team to identify possible changes in the HMP Mitigation Action Plan by refocusing on new or more threatening hazards, resource availability, and acquiring stakeholder support for the HMP project implementation.

In the fourth year following adoption of the HMP, the Planning Team will undertake the following activities:

No later than the beginning of the fourth year following HMP adoption, 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).
- Ensure that each authority administering a mitigation project will submit a Progress Report to the Planning Team.
- Develop a chart to identify those HMP sections that need improvement, the section and page number of their location within the HMP, and describing the proposed changes.
- Thoroughly analyze and update the natural hazard risks.
    - Determine the current status of the mitigation projects.
    - Identify the proposed Mitigation Plan Actions (projects) that were completed, deleted, or delayed. Each action should include a description of whether the

project should remain on the list, be deleted because the action is no longer feasible, or reasons for the delay.

- Describe how each action's priority status has changed since the HMP was originally developed and subsequently approved by FEMA.
- Determine whether or not the project has helped achieve the appropriate goals identified in the plan.
- Describe whether the community has experienced any barriers preventing them from implementing their mitigation actions (projects) such as financial, legal, and/or political restrictions and stating appropriate strategies to overcome them.
- Update ongoing processes, and to change the proposed implementation date/duration timeline for delayed actions the City still desires to implement.
- Prepare a "new" Mitigation Action Plan Matrix for the City.

- Prepare a new Draft Updated HMP.
- Submit the updated draft HMP to the DHS&EM and FEMA for review, approval, and subsequent promulgation.

3.5.3.5 Formal State and FEMA HMP Review

Completed Hazard Mitigation Plans do not qualify the City of Holy Cross for mitigation grant program eligibility until they have been reviewed and adopted by the City Council, and received State and FEMA final approval.

The City of Holy Cross will submit the draft HMP to the Division of Emergency Management (DHS&EM) for initial review and preliminary approval. Once any corrections are made, DHS&EM will forward the HMP to FEMA for their review and conditional approval.

Once the plan has fulfilled all FEMA criteria, the City will pass an HMP Adoption Resolution. A copy will be sent to FEMA for final HMP approval.

FEMA's final approval assures the City is eligible for applying for appropriate mitigation grant program funding. The FEMA approved HMP will then be returned to the City of Holy Cross.

4.1 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
Local Plan Adoption
§201.6(c)(5): [The plan shall include…] Documentation that the plan has been formally adopted by the governing body of the jurisdiction requesting approval of the plan (e.g., City Council, County commissioner, Tribal Council). For multi-jurisdictional plans, each jurisdiction requesting approval of the plan must document that it has been formally adopted.
1. REGULATION CHECKLIST
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))
Source: FEMA, October 2011.

The City of Holy Cross 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, and 44 CFR §201.6(c)(5).

The local governing body of the City adopted the HMP by resolution on October 25, 2013. A scanned copy of the resolution is included in Appendix C.

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This section identifies and profiles the hazards that could affect the City of Holy Cross.

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.

DMA 2000 Requirements
Identifying Hazards §201.6(c)(2)(i): The risk assessment shall include a] description of the type, location and extent of all natural hazards that can affect the jurisdiction. The plan shall include information on previous occurrences of hazard events and on the probability of future hazard events. §201.6(c)(2)(iii): For multi-jurisdictional plans, the risk assessment section must assess each jurisdiction's risks where they vary from the risks facing the entire planning area.
1. REGULATION CHECKLIST
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? B2. Does the Plan include information on previous occurrences of hazard events and on the probability of future hazard events for each jurisdiction? 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? B4. Does the Plan address NFIP insured structures within the jurisdiction that have been repetitively damaged by floods?
Source: FEMA, October 2011.

5.2 HAZARD IDENTIFICATION AND SCREENING

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

For the first step of the hazard analysis, on June 22, 2012 the Planning Team reviewed *nine* possible hazards that could affect the Iditarod Area Rural Educational Attendance Area (REAA), the Kuskokwim Recording District. 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 four hazards pose the greatest threat to the City: erosion, run-off and riverine

flood, severe weather, and wildland fire. 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
Earthquake	Yes	However, earthquakes occur below M5.0 and cause minimal damage impacts. The planning team believes they need only be concerned for activity above M5.0.
Erosion	Yes	The City experiences erosion along the embankment at Ghost Creek, and the Kuskokwim River from high water flow, riverine ice flows, wind, and surface runoff. Erosion occurs throughout the City removing quality topping leaving the streets muddy.
Flood	Yes	Snowmelt, spring thaw, and the fall rainy season causes damaging roadbed flood events.
Ground Failure (Avalanche, Landslide/Debris Flow, Permafrost)	Yes	City access roads have landslide and unstable surfaces. Outlying residents and travelers need to be aware of current road conditions which occasionally result in isolation or prohibitive travel periods.
Severe Weather	Yes	Annual weather patterns, severe cold, heavy rain, freezing rain, snow accumulations, storm surge, and wind, are the predominate threats. Intense wind and heavy rain are the primary impacts to the community. Severe weather events cause fuel price increases and frozen pipes. Heavy snow loads potentially damage house roofs. Winds potentially remove or damage roofs and moved houses off their foundations.
Tsunami (& Seiche)	No	This hazard does not exist for the City.
Volcano	No	This hazard does not exist for the City.
Tundra/Wildland Fires	Yes	The City and the surrounding tundra area become very dry in summer months with weather (such as lightening) and human caused incidents igniting dry vegetation in the adjacent area (burning trash outside their landfill's burn box).

5.3 HAZARD PROFILE

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

DMA 2000 Requirements
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.
1. REGULATION CHECKLIST
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? (Requirement §201.6(c)(2)(i)) B2. Does the Plan include information on previous occurrences of hazard events and on the probability of future hazard events for each jurisdiction?
Source: FEMA, October 2011.

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

- Nature (Type)
- History (Previous Occurrences)
- 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 5 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
4 - Highly Likely	• 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.
3 - Likely	• 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.
2 - Possible	• 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.
1 - Unlikely	• 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 to occur.

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
4 - Catastrophic	• Multiple deaths. • Complete shutdown of facilities for 30 or more days. • More than 50 percent of property is severely damaged.
3 - Critical	• 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.
2 - Limited	• Injuries and/or illnesses do not result in permanent disability. • Complete shutdown of critical facilities for more than one week. • More than 10 percent of property is severely damaged.
1 - Negligible	• Injuries and/or illnesses are treatable with first aid. • Minor quality of life lost. • Shutdown of critical facilities and services for 24 hours or less. • Less than 10 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 4.3. The presentation order does not signify their importance or risk level.

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 feet [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 4-4, 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 4-4) (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 (% *g*)	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 Holy Cross has a minor concern for earthquake damages as they have not experienced damaging impacts from their historical earthquake events and only need to be concerned with earthquakes with a magnitude > M 5.0. This is substantiated in Table 5-5 which lists historical earthquakes. Research included searching the US Geological Survey (USGS) earthquake database for events spanning from 1973 to present; none of which exceeded M5.0 located within 100 miles of the City.

Table 5-5 Historical Earthquakes for Holy Cross

(Highlight is earthquake of record)

Year	Mo	Day	Time	Latitude	Longitude	Depth (Miles)	Magnitude	Distance (Miles)
2011	1	26	6:14 PM	61.341	-159.529	12.42	2.5	59.65
2011	5	8	6:28 PM	62.632	-157.87	6.21	2.9	67.73
2010	6	1	6:43 PM	61.037	-160.863	16.77	3.5	88.23
2009	4	22	1:40 PM	61.516	-160.267	1.86	3.4	49.7
2009	7	31	3:50 PM	62.711	-159.113	16.77	3	41.01
2008	7	16	11:45 PM	61.432	-158.372	14.91	3	92.58
2008	9	5	2:09 AM	61.931	-158.403	12.42	2.7	47.84
2005	5	27	11:02 AM	61.27	-158.508	12.42	4.5	76.42
2005	6	8	8:09 AM	61.274	-158.426	27.96	4.6	77.67
2005	6	9	12:28 AM	61.275	-158.49	26.72	3.9	76.42
2005	6	9	6:00 PM	61.125	-158.201	3.72	3.9	90.09
2005	6	9	8:38 AM	61.141	-158.481	5.59	3	84.5
2005	6	11	2:24 PM	61.305	-158.363	18.64	3.5	77.05
2005	6	28	12:43 AM	61.287	-158.368	34.17	3	77.67
2005	8	19	11:45 AM	61.155	-158.24	0.62	3.1	87.67
2005	10	6	10:04 PM	62.835	-157.223	12.42	3.2	92.58
2004	4	4	8:24 AM	61.441	-159.669	11.18	3.8	52.19
2002	1	19	2:09 AM	61.859	-157.671	26.72	3.6	72.07
2002	2	5	12:43 PM	61.91	-157.673	6.21	3	70.83
1997	3	20	3:21 AM	60.901	-159.357	0	3.8	90.72
1995	1	14	4:48 AM	62.935	-159.731	6.21	3.4	50.95
1995	1	14	10:48 AM	61.897	-157.493	4.97	2.6	76.42
1995	2	20	12:00 AM	61.84	-157.551	20.5	3.4	76.42
1992	2	9	11:02 AM	61.215	-157.933	21.12	3.6	90.72
1992	4	4	6:28 AM	62.555	-160.201	6.21	3.1	27.96
1991	1	26	1:55 AM	61.881	-159.321	20.5	4.1	26.09
1991	9	21	3:21 AM	61.228	-158.592	6.21	2.7	77.67
1989	5	6	10:33 PM	62.332	-159.574	45.36	Unknown	10.56
1983	1	30	12:00 AM	61.105	-159.217	20.5	4.6	77.67
1983	8	4	4:19 PM	61.404	-157.875	20.5	4	82.64

(USGS 2009)

Only 30 earthquakes have been recorded within a 100 mile radius of the City of Holy Cross. The average magnitude of these earthquakes is M3.3 with the earliest recorded in 1983. The largest recorded earthquakes within 100 miles of the City measured M4.6 occurring on January 30, 1983 and June 8, 2005. These earthquakes did not cause damage to critical facilities, residences, non-residential buildings, or infrastructure.

Planning Team members stated that Holy Cross does not feel they have an earthquake threat. They further stated no one in the community felt the November 3, 2002 M 7.9 Denali EQ even though Denali Fault's southwestern extent is located approximately 88 miles away.

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

Location

The entire geographic area of Alaska, and thus the City of Holy Cross, is prone to earthquake effects. Figure 5-1 shows the locations of active and potentially active faults in Alaska.

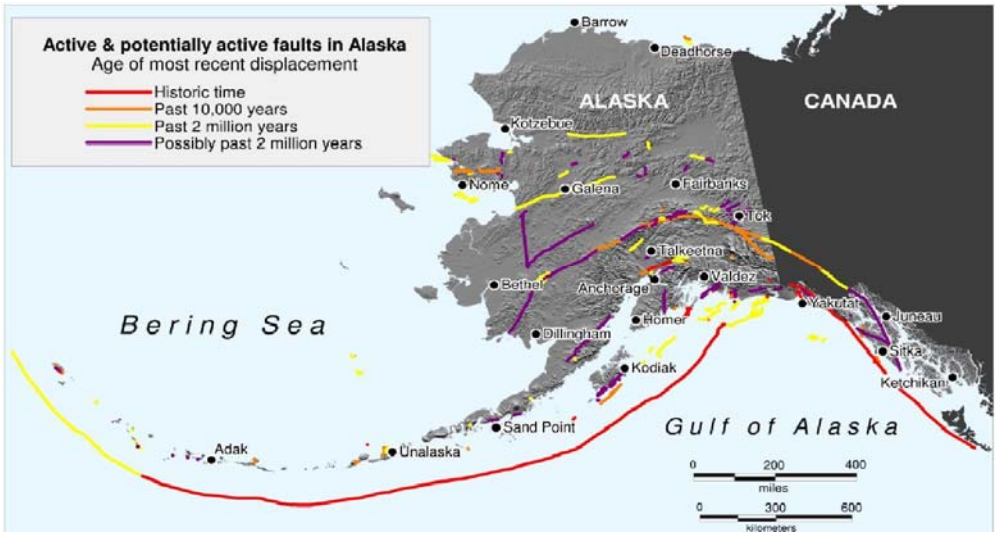

Figure 5-1 Active and Potentially Active Faults in Alaska

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).

As depicted in Figure 5-2, the City lies close to known earthquake faults. The City lies approximately five miles from the Thompson Creek Fault, 11 miles from the Unnamed Pre-Neogene Fault, 31 miles from the Iditarod-Nixon Fault, 80 miles from the Ataskaksovluk-Holokuk Fault zone, and 88 miles from the Denali Fault. The City does not expect severe damaging impacts by future earthquake events (DGGS 2009).

Of the 30 recorded earthquakes since 1973, none exceeded M 5.0. (USGS 2009) They both occurred with the epicenter located approximately 77.67 miles from the City.

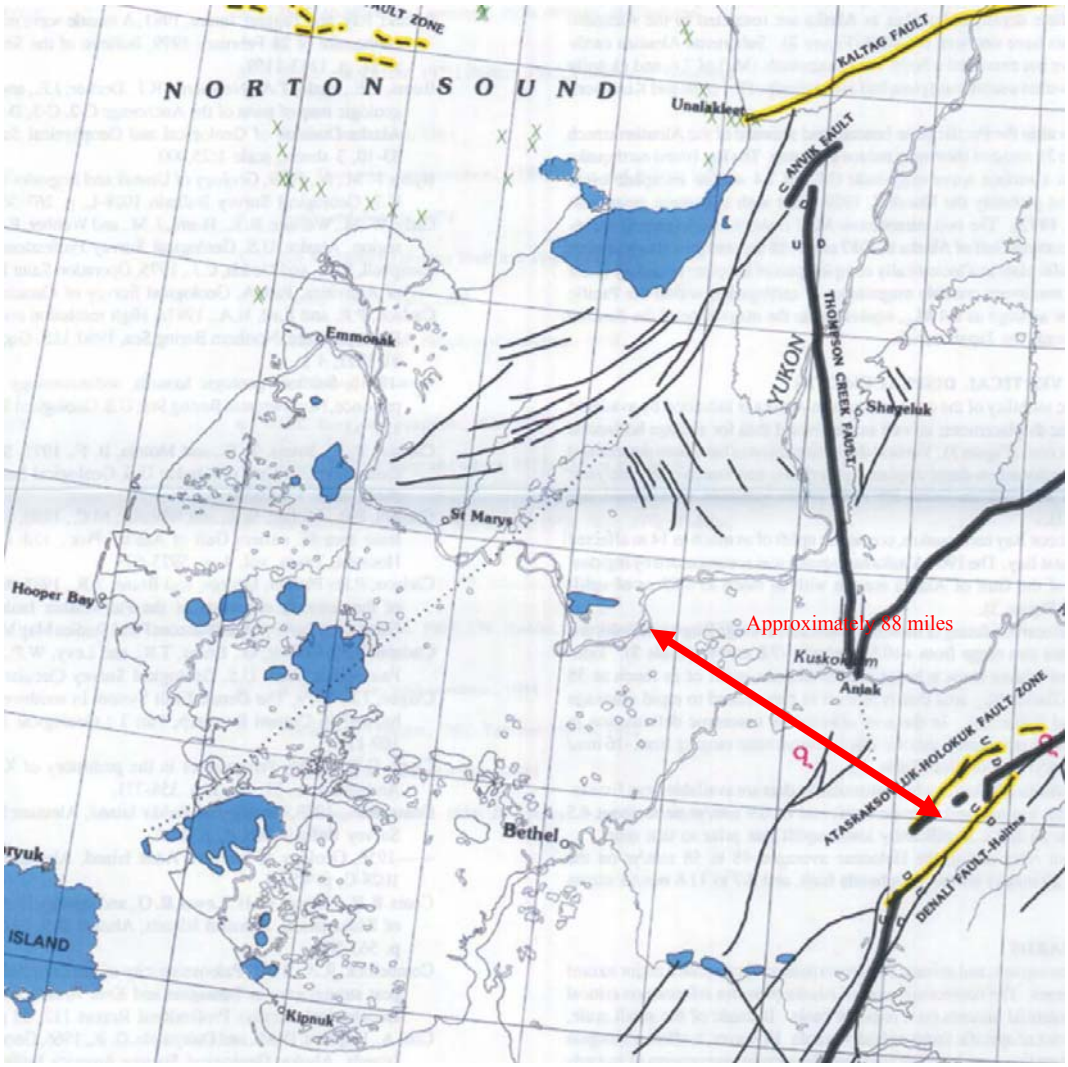

Figure 5-2 Image from the "Neotechtonic Map of Alaska" – Holy Cross Area (DGGS 2009)

Extent

Earthquakes felt in the Holy Cross area have not exceeded M 5.0 in the past 37years, 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 shut down 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 has no official record of significant earthquake activity resulting in damage or injuries. While it is not possible to predict when an earthquake will occur, Figure 5-3 was generated using the United States Geological Survey (USGS) Earthquake Mapping Model. The model depicts events within 50 kilometers (km), but historical impacts were drawn from a 100 mile radius of the City. The model also indicates less than a 0.5percent probability of an M5.0 or greater earthquake occurring within 100 years would impact the City. Therefore it is expected that an event is "Unlikely", but possible within the next 10 years.

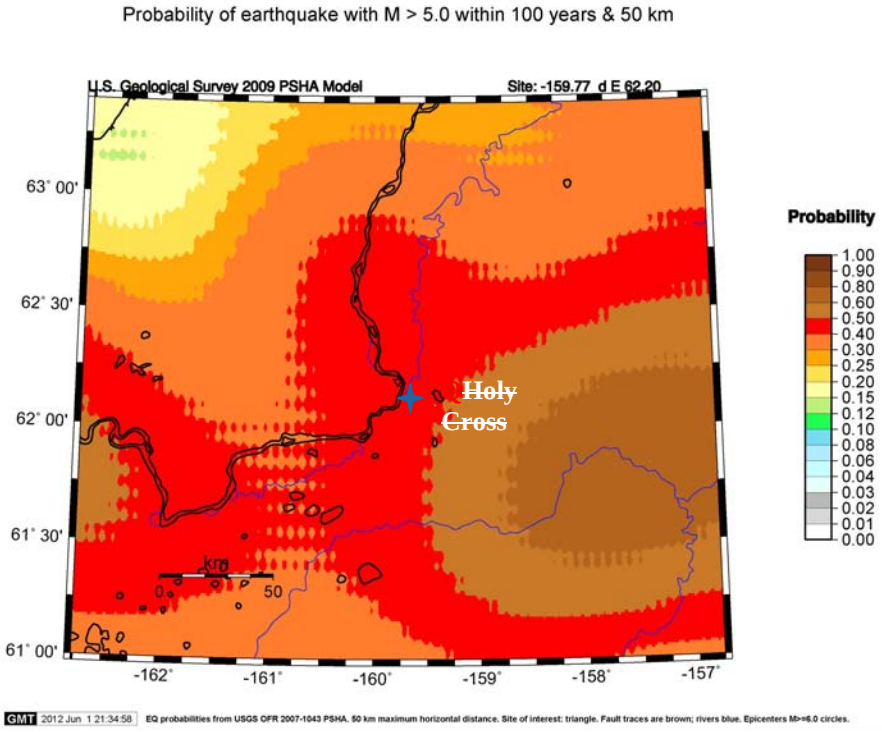

Figure 5-3 Holy Cross Earthquake Probability (USGS 2009)

This 2002 shake map is the most current map available for this area. However, it is a viable representation to support probability inquiries. 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."* (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 event or slowly as the result of long-term environmental changes such as melting permafrost. Erosion is a natural process, but its effects can be exacerbated by human activity.

Erosion is a problem for communities where disappearing land threatens development and infrastructure. Riverine erosion is a major erosion threat to the City as it threatens the embankment, structures, and utilities of Holy Cross' 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 material deposition constant issues. In more stable meandering channels, erosion episodes may only occasionally occur.

Attempts to control erosion using shoreline protective measures such as groins, jetties, seawalls, or revetments can lead to increased erosion however the City Council feels that "no action leads to increased damages". Inaction has resulted in loss of the old airfield; the sewage lagoon is presently threatened. It is imperative that actions be taken to protect potential loss of these essential infrastructures.

Land surface erosion results from flowing water across road surfaces or around other infrastructure due to poor or improper drainage during rain and snowmelt run-off which typically result from fall and winter sea storms.

5.3.2.2 History

The Army Corp of Engineers (USACE) completed an erosion survey for the City of Holy Cross during their 2009 Baseline Erosion Assessment. The report listed the community as having a "Minimal" erosion threat. The Erosion Information Paper stated "Holy Cross reported no erosion problems or issues associated with the Yukon River…" However, the City identified that the "Ghost Creek Slough is slowly filling in." (USACE 2009)

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

Location

Figure 5-4 depicts the City's location well above the floodplain and wetlands. The City stated they experience severe road top gravel damage from rain and snow-melt resulting in high water flows throughout the community. High water flow removes the road topping material, creates severe pot holes, and damage to Ghost Creek Road, Big Lake Road to the Landfill, Airport Road, and Housing Road.

These roads become extremely muddy once the topping has been removed.

Figure 5-4 USACE Aerial Photo of Holy Cross (USACE 2008)

Extent

A variety of natural and human-induced factors influence the erosion process within the community. Riverine embankment orientation and proximity to water flow, currents, and storm surges 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 coastal erosion include:

- Embankment type
- Geomorphology
- Structure types along the shoreline
- Amount of encroachment in the high hazard zone
- Proximity to erosion inducing coastal structures
- Nature of topography
- Density of development
- Exposure to wind and waves

Climate change may also play a part in increasing riverine erosion.

Based on the City's Planning Team, past erosion events, 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.

The Ghost Creek, approximately one mile upriver from the City receives severe snow-melt run-off and high water flows erosion. The boat landing area as well as they beach one mile up-river require repeated attention to keep them in good repair. (Holy Cross2012).

The City Council emphatically expressed they overwhelmingly believe that "no action leads to increased damages". Inaction and project development delays have resulted in infrastructure losses that could have been avoided. It is imperative that identifies effective erosion abatement techniques to assure their road's longevity. Loss of these critical infrastructures as well as constant maintenance requirements creates a strain on the community.

Probability of Future Events

Based on historical impacts 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 l but less than or equal to 33 percent likely per year.

5.3.3 Flood

5.3.3.1 Nature

Flooding is the accumulation of water where usually none occurs, the overflow of excess water from a stream, river, lake, reservoir, glacier, or coastal body of water onto adjacent floodplains, or water run-off from melting snow or heavy rain.

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.

Flood events not only impact communities with high water levels, or fast flowing waters, but transported sediment accumulates in areas which hamper access to the community. Barges and other river vessels soon become unable to enter or leave the shoreline. Dredging may be the only option to maintain an infrastructure's viability and longevity.

Two primary types of flooding impacts the City: rainfall-run-off and snow-melt floods.

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

Timing of events

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

Both flood types cause severe erosion to the community's roads necessitating extensive repair efforts.

5.3.3.2 History

The City experiences severe road surface damages and erosion from heavy rainfall, snowmelt, and spring run-off flooding. Spring run-off causes the most damages to the community's road surfaces.

The DHS&EM Disaster Cost Index delineates historical flood events affecting the City. The index lists the following events:

> ***"132-142. Fairbanks/North Star Borough, Aniak, McGrath, Red Devil, Anvik, Grayling, Emmonak, Holy Cross, Alakanuk, Shageluk, Galena. the Governor declared on May 3-23, 1991 FEMA declared May 30, 1991*** *Flooding. Record snowfalls in the interior combined with sudden Spring melt caused flooding all along the Yukon and Kuskokwim River systems. Numerous State Declarations were combined into a single Presidential Declaration of Major Disaster (FEMA-0909-AK) that authorized assistance for repair of public property only. State Disaster Relief Funds were used to implement the Individual and Family Grant Program in all of the communities included in the federal declaration."*
>
> ***09-227, 2009 Spring Flood declared by Governor Palin on May 6, 2009 then FEMA declared under DR-1843 on June 11, 2009.*** *Extensive widespread flooding due to snow melt and destructive river ice jams caused by rapid spring warming combined with excessive snow pack and river ice thickness beginning April 28, 2009 and continuing. The ice jams and resultant water backup along with flood waters from snow melt left a path of destruction along 3,000 miles of interior rivers, destroying the Native Village of Eagle and forcing the evacuation of multiple communities. The following jurisdictions and communities in Alaska have been impacted: Alaska Gateway Rural Regional Educational Attendance Area (REAA) including the City of Eagle and Village of Eagle; the Copper River REAA including the Village Community of Chisotchina; the Matanuska-Susitna Borough; the Yukon Flats REAA including the City Community of Circle, and City of Fort Yukon, the Villages Communities of Chalkyistik, Beaver, Stevens Village, and Rampart; the Yukon-Koyukuk REAA including the Cities of Tanana, Ruby, Galena, Koyukuk, Nulato, and Kaltag; the Iditarod Area REAA including the Cities of McGrath, Grayling, Anvik, and Holy Cross; the Northwest Arctic Borough including the Cities of Kobuk, and Buckland; the Lower Yukon REAA including the Cities of Russian Mission, Marshall, Saint Mary's, Mountain Village, Emmonak, Alakanuk and Pilot Station and the Community of Ohogamiut; the Lower Kuskokwim REAA including the Cities of Bethel, Kwethluk, Napakiak, Napaskiak, and the Village Community of Oscarville; the Yupiit REAA including the City of Akiak, and the Villages of Akiachak, and Tuluksak; the Kuspuk REAA including the Cities of Aniak, Upper Kalskag, Lower Kalskag, and the Villages Communities of Stony River, Sleetmute, Red Devil, Crooked Creek, and Napaimute; the Fairbanks North Star Borough including the City of North Pole and Community of Salcha; the Bering Strait REAA including the City of Nome area."*
>
> *(DHS&EM 2011).*

The Holy Cross Tribal website states, “The river changed course during the 1930s, and by the mid-40s, it had formed the slough on which the village is now located.” Figures 5-5 and 5-6 depict the 1935 flood impact.

Figure 5-5 Holy Cross Flood, 1935 (Holy Cross 2012).

Figure 5-6 Holy Cross Flood, 1935 (Holy Cross 2012).

Research indicates that the City experienced recurring flood events prior to the river channel changes during the 1930’s. These flood events appears to have abated since soils were deposited in front of the City creating an island within the Yukon River’s main channel and a subsequent slough adjacent to the City. These river barriers seem to reduce Yukon River ice jam flood impacts.

The US Army Corp of Engineers Floodplain Manger does not report a substantive flood threat for the City. There is a flood gauge in the community which references the 1971 flood elevation as 84.73 feet. The zero damage elevation is 77.73 feet. There are also three high-water flood elevation markers within the community.

The National Weather Service continued to modify their system for assigning weather zones to facilitate and more accurately assign weather patterns to relevant geographic areas. Consequently the data in Table 5-6 reflects different zone numbering patterns. Each weather event may not have specifically impacted the City but they are listed due to the City’s close proximity to listed communities or by location within the identified zone.

Table 5-6 Historic Flood Events (NWS)

Location	Date	Event Type
Kuskokwim Delta	5/7/2009	Flood ($2.6M Damages) The annual spring river ice break up resulted in extensive flooding along the Kuskokwim river over the 11 days it took for the river to open up from its head waters in the Kuskokwim Valley to the mouth of the Kuskokwim River on the Bering Sea coast. Damage estimates are from the State of Alaska disaster declaration request to the President.
Kuskokwim Delta	1988	Ice Jam Flood
Kuskokwim Delta	1987	Flood
Kuskokwim Delta	1984	Flood
Kuskokwim Delta	1982	Flood
Kuskokwim Delta	1971	Flood
Kuskokwim Delta	1964	Ice Jam Flood
Holy Cross Flood	1935	Flood
Kuskokwim Delta	1920	Flood

(NWS 2012, DHS&EM 2010)

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

Location

The City of Holy Cross has numerous sand deposition islands adjacent to the community. Soil deposition can both hamper access as well as provide protection from flooding. The USACE Holy Cross, Alaska Vicinity map (Figure 5-7) provides a topographic image of these deposition islands.

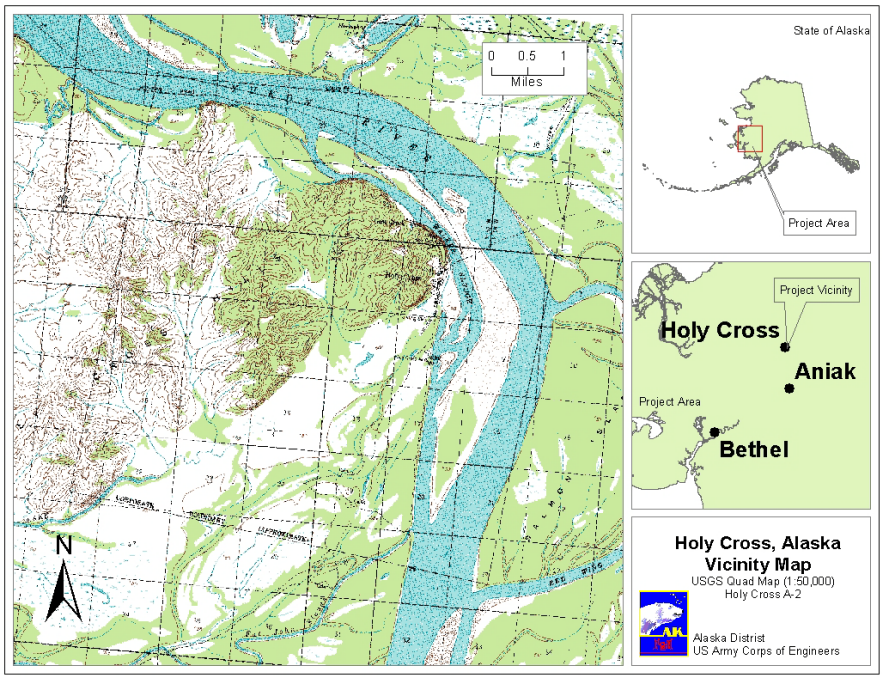

Figure 5-7 USACE Topographic Map of Holy Cross (Denali 2011)

The Denali Commission trip report provides an annotated aerial photo (Figure 5-8) of existing roads, quarries, sediment islands, and other infrastructures essential to the City of Holy Cross.

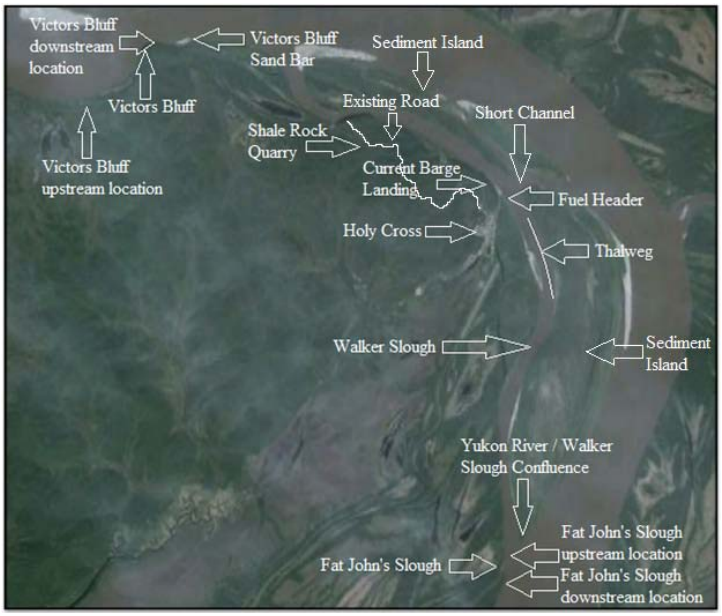

Figure 5-8 City of Holy Cross Annotated Aerial View (Denali 2011)

The USACE, Floodplain Management Flood Hazard Data, October 2011, revised report states "A flood gauge has been placed on a utility pole. The High Water Elevation (HWE) signs correspond to 84.73 ft on the flood gauge. Ground level at the gauge is 77.73 ft elevation."

The USACE reported the structure elevations depicted in Table 5-7 below, were accurate as of August 2002:

> *"HWE signs were placed at 3 locations in the community, with the sign's water symbol at the elevation of the 1971 flood.*
>
> - *HWE #1 is on a utility pole upstream of the AVEC fuel storage tanks near the generator building.*
> - *HWE #2 is approximately 7 ft above ground on a power pole, approximately 100 yards streamward of the Post Office.*
> - *HWE #3 is approximately 6 ft above ground on a utility pole, approximately 100 yards streamward and 50 yards upstream of the Post Office."*

Table 5-7 USACE Community Flood Survey Information as of August 2002

Description	Elevations
Recommended building elevation	87.73
Estimated 1971 flood elevation	84.73
Estimated zero damage elevation	77.73
Floor of lowest generator shed at AVEC	87.65
Floor of new post office	85.95
Typical crest of sewage lagoon berm	85.85

(USACE 2011).

Figures 5-9a and 5-9b depict the City of Holy Cross' USACE Flood Gauge, located on a utility pole in an easily referenced location. The side view displays three elevations. The top elevation placard states "Recommended Building Elevation;" the mid-height placard indicates the Bulk Fuel Storage Tank Elevation; and the bottom placard indicates the AVEC Fuel Storage Tank's elevation.

Figure 5-9a City of Holy Cross Flood Gauge (USACE 2011)

Figure 5-9b City of Holy Cross Flood Gauge Side View (USACE 2011)

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.
- City location related to the base flood elevation as indicated with their certified high water mark.

The City does not experience severe riverine flooding. Therefore, based on past flood history and the criteria identified in Table 5-3, the extent of flooding in the City are considered "negligible" where critical facilities would shut-down for 24 hours or less with less 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).

However, the City has stated they do not experience severe flooding from the Yukon River, but they must expend a substantial amount of their meager funds to continuously repair their road surface from storm and snow-melt water run-off.

Probability of Future Events

Based on historical damages and the criteria in Table 4-2, there is a 1 in 1 year chance of flood occurring (1/1=100 percent) which washes out the Ghost Creek Road. History of water force run-off road surface erosion events is greater than 33 percent likely per year.

5.3.4 Ground Failure (Landslide, Subsidence, Unstable Soils)

5.3.4.1 Nature

Ground failure describes gravitational soil movement. Soil movement influences can include rain snow and/or water saturation, seismic activity, melting permafrost, river or coastal embankment undercutting, or a combination of conditions on steep slopes.

Landslides are a dislodgment and fall of a mass of soil or rocks along a sloped surface, or for the dislodged mass itself. The term is used for varying phenomena, including mudflows, mudslides, debris flows, rock falls, rockslides, debris avalanches, debris slides, and slump-earth flows. The susceptibility of hillside and mountainous areas to landslides depends on variations in geology, topography, vegetation, and weather. Landslides may also be triggered or exacerbated by indiscriminate development of sloping ground, or the creation of cut-and-fill slopes in areas of unstable or inadequately stable geologic conditions.

Additionally, landslides often occur with other natural hazards, thereby exacerbating conditions, such as:

- Earthquake ground movement can trigger events ranging from rock falls and topples to massive slides.
- Intense or prolonged precipitation that causes flooding can also saturate slopes and cause failures leading to landslides.
- Wildfires can remove vegetation from hillsides significantly increasing runoff and landslide potential.

Development, construction, and other human activities can also provoke ground failure events. Increased runoff, excavation in hillsides, shocks and vibrations from construction, non-engineered fill places excess load to the top of slopes, and changes in vegetation from fire, timber harvesting and land clearing have all led to landslide events. Broken underground water mains can also saturate soil and destabilize slopes, initiating slides. Something as simple as a blocked culvert can increase and alter water flow, thereby increasing the potential for a landslide event in an area with high natural risk. Weathering and decomposition of geologic material, and alterations in flow of surface or ground water can further increase the potential for landslides.

The USGS identifies six landslide types, distinguished by material type and movement mechanism including:

Slides, the more accurate and restrictive use of the term landslide, refers to a mass movement of material, originating from a discrete weakness area that slides from stable underlying material. A *rotational slide* occurs when there is movement along a concave surface; a *translational slide* originates from movement along a flat surface.

Debris Flows arise from saturated material that generally moves rapidly down a slope. A debris flow usually mobilizes from other types of landslide on a steep slope, then flows through confined channels, liquefying and gaining speed. Debris flows can travel at speeds of more than 35 mph for several miles. Other types of flows include debris avalanches, mudflows, creeps, earth flows, debris flows, and lahars.

Lateral Spreads are a type of landslide generally occurs on gentle slope or flat terrain. Lateral spreads are characterized by liquefaction of fine-grained soils. The event is typically triggered by an earthquake or human-caused rapid ground motion.

Falls are the free-fall movement of rocks and boulders detached from steep slopes or cliffs.

Topples are rocks and boulders that rotate forward and may become falls.

Complex is any combination of landslide types.

In Alaska, earthquakes, seasonally frozen ground, and permafrost are often agents of ground failure. 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. (Subsidence, liquefaction, and surface faulting are described in Section 5.3.1.1).

Seasonal freezing can cause frost heaves and frost jacking. Frost heaves occur when ice forms in the ground and separates sediment pores, causing ground displacement. Frost jacking causes unheated structures to move upwards. Permafrost is frozen ground in which a naturally occurring temperature below 32ºF has existed for two or more years. Permafrost can form a stable foundation if kept frozen but when thawed; the soil weakens and can fail. Approximately 85 percent of Alaska is underlain by continuous or discontinuous permafrost. (DHS&EM 2010).

Indicators of a possible ground failure include:

- Springs, seeps, or wet ground that is not typically wet
- New cracks or bulges in the ground or pavement
- Soil subsiding from a foundation
- Secondary structures (decks, patios) tilting or moving away from main structures

- Broken water line or other underground utility
- Leaning structures that were previously straight
- Offset fence lines
- Sunken or dropped-down road beds
- Rapid increase in stream levels, sometimes with increased turbidity
- Rapid decrease in stream levels even though it is raining or has recently stopped and
- Sticking doors and windows, visible spaces indicating frames out of plumb

The State of Alaska 2010 State Hazard Mitigation Plan provides additional ground failure information defining mass movement types, topographic and geologic factors which influence ground failure which pertain to Holy Cross.

5.3.4.2 History

There are few written records defining ground failure impacts. However, Planning Team Members stated that,

> *"…landslides cause road closures and deposit 'mucky' soils throughout the community during spring thaw and from rain run-off…*
>
> *The City Office building is settling and sinking. This is especially evident at one of the building corners. The Community has come to realize they need to wait well into the summer before they start either road or building construction projects because they need to wait until the ground thaws to enable them to identify permafrost indications" (Holy Cross 2013).*

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

Location

The City is located in an area of discontinuous permafrost. As described by the Planning Team and indicated within the permafrost and ice conditions map (Figure 5-10) developed for the National Snow and Ice Data Center/World Data Center for Glaciology located in the State Hazard Mitigation Plan (SHMP) (DHS&EM 2010).

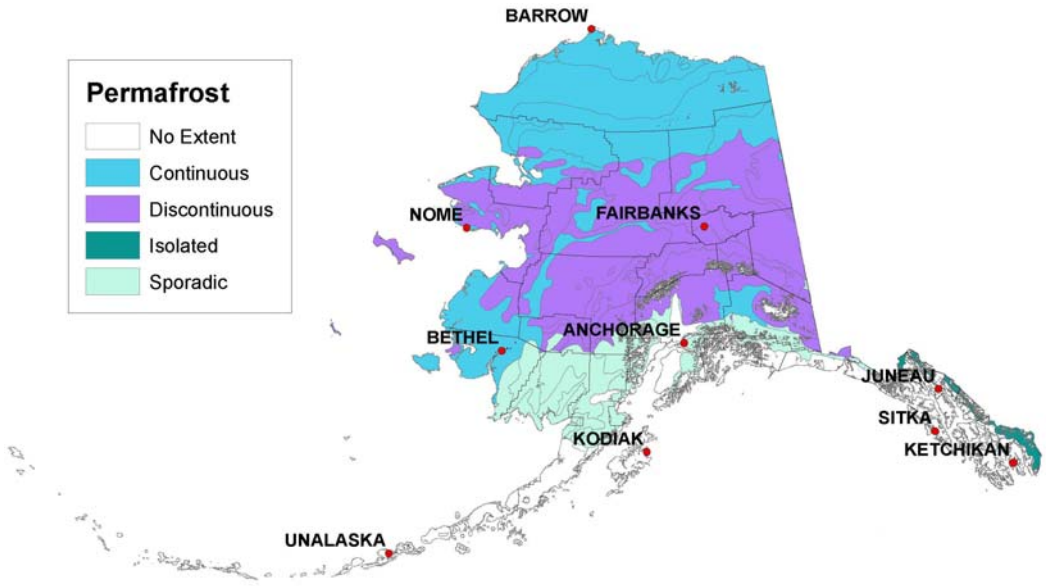

Figure 5-10 Permafrost and Ground Ice Map of Alaska (Brown et al 2001)

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 effected.

Based on research and the Planning Team's knowledge of past ground failure and permafrost degradation events and the criteria identified in Table 5-3, the extent of ground failure impacts in the City are considered limited but pervasive. Impacts would not occur quickly but over time with warning signs. Therefore this hazard would not likely cause injuries or death, neither would it shutdown critical facilities and services. However, 10 percent of property is could be severely damaged.

Impact

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

The Planning Team stated that the vast majority of their roads are slowing losing their surface material exposing soft soils. This creates a safety hazard, unstable surfaces from excessive water saturation, extensive potholes and a "generally mucky road surface." The City is impacted from saturated soil landslides along a three-mile stretch of the road from the City to Saint Michael and along the road to Ghost Creek. "This situation lasts until snow melt and rain run-off influenced road conditions dries up." (Holy Cross 2012a)

Probability of Future Events

Even though there are few written records defining ground failure impacts for the City, the Planning Team has solid evidence of their annually recurring permafrost damages throughout the community – to structures, roads, and the airport. 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 highly likely in the next calendar year (event has up to 1 in 1 years chance of occurring) as the history of events is greater than 33 percent likely per year (Holy Cross 2012a).

5.3.5 Weather (Severe)

5.3.5.1 Nature

Severe weather occur throughout Alaska with extremes experienced by the City of Holy Cross 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 Rain** occurs rather frequently over the coastal areas along the Bering Sea and the Gulf of Alaska. Heavy rain is a severe threat to Holy Cross.
- **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 Snow** 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 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** is 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** 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 hurricane characteristics. In Alaska, high winds (winds in excess of 60 miles per hour [mph]) occur rather frequently over the coastal areas along the Bering Sea and the Gulf of Alaska. High winds are a severe threat to Holy Cross.

  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 2011)

5.3.5.2 History

The City is continually impacted by severe weather. Table 5-8 provides a representative sample of the 76 major storm events the National Weather Service identified for Holy Cross's Weather Zone (Kuskokwim Delta) since 2006. Each weather event may not have specifically impacted the City but they are listed due to the City's close proximity to listed communities or by location within the identified zone.

Table 5-8 Severe Weather Events

Location	Date	Event Type
Lower Yukon Valley (AZ 215)	03/29/2008	Winter Storm Heavy snow, particularly against the southern Nulato Hills and other south and southeast facing slopes; snow to change to freezing rain in some locations. Zone 215: From observations of visibility, temperature, and precipitation amounts and occurrences from Russian Mission, Holy Cross, and Anvik, the region received long durations of snowfall, likely heavy snowfall in low visibility. Based on snowfall at McGrath (6.4 inches) and Bethel (10 inches), it is likely that 6 to 8 inches fell over the southern portion of this zone...including the southern Nulato Hills.
Lower Yukon Valley (AZ 215)	04/03/2008	Winter Storm Widespread snowfall and some freezing rain into the Western Interior of Alaska. Zone 215: Based on precipitation amounts and estimated snowfall for Kaltag in Zone 216...heavy snow likely fell over the Nulato hills on the 3rd through the 4th...with some period of turning to rain and/or freezing rain. snowfall amounts of 7 to 9 inches are likely in the highest hills.
Lower Yukon Valley (AZ 215)	01/13/2009	Winter Storm Heavy snow and freezing rain to a large portion of northern Alaska. The snow combined with high winds to produce blizzard conditions in parts of the Brooks Range. Zone 215: Based on the NWS observation of 8.7 inches of snow at McGrath, it is estimated that 8 to 12 inches of snow fell along the eastern slopes of the Nulato Hills. Based on the observations of near to above freezing temperatures from the Marshall and Russian Mission AWSS's, it is likely that the snow changed to freezing rain in spots, and the freezing rain likely accumulated in excess of a tenth of an inch in spots.
Lower Yukon Valley, (AZ 215)	01/17/2009	High Wind, 55kt/63 miles per hour (mph) High winds were observed at the Marshall AWSS during the early morning hours of the 17th. Wind gusts to 55kt/63mph were observed. Periods of snow were also observed, but it is unknown how much snow accumulated. The Anvik AWOS briefly had visibilities reduced to one quarter mile in snow and blowing snow during the early morning hours of the 17th.
Lower Yukon Valley (AZ 215)	02/18/2009	Heavy Snow Heavy snow and blizzard conditions to much of northern Alaska. High winds were also observed in the passes of the Alaska Range. Zone 215: Based on the observation of 13 inches of snow at the Kaltag Coop (zone 216), it is likely that 8 inches of snow fell in parts of lower

Table 5-8 Severe Weather Events

Location	Date	Event Type
		Yukon Valley.
Lower Yukon Valley (AZ 215)	02/27/2009	Blizzard The storm brought blizzard conditions to much of the west coast as well as the arctic coasts of Alaska. Zone 215: Blizzard conditions were observed at Marshall during the late morning and afternoon hours on the 27th. The visibility was reduced to one quarter mile or less in snow and blowing snow. The wind gusted to 45 mph/39kt at the Marshall AWSS.
Lower Yukon Valley (AZ 215)	03/04/2009	Heavy Snow The storm brought blizzard conditions and heavy snowfall to portions of northern Alaska. Zone 215: Snow fell in the lower Yukon Valley during the early morning hours on the 4th through the early morning hours on the 6th. The snow likely fell heavily at times. It is estimated that 8 to 10 inches of snow fell based on the 8.4 inches that was observed in McGrath. There was also likely considerable blowing and drifting snow. The Marshall AWSS had a peak wind gust to 63 mph/55kt during this event, and the visibility was reduced to one quarter mile at times which created blizzard conditions at times.
Grayling (AZ 215)	05/16/2009	Damages: $2,000 Ice Jam Flood at Grayling
Russian Mission (AZ 215)	05/18/2009	Damages: $20,000 Ice Jam Flood at Russian Mission
Marshall (AZ 215)	05/19/2009	Damages: $40,000 Ice Jam Flood at Marshal
Lower Yukon Valley (AZ 215)	10/10/2009	High Wind, 60 mph (52 kts)
Lower Yukon Valley (AZ 215)	01/04/2010	Heavy Snow Heavy snow was observed at Mountain Village along the Yukon Delta. Heavy snowfall was also observed at Shageluk in the lower Yukon Valley, and at Shaktoolik along the eastern Norton Sound. Heavy snowfall was observed at Shageluk with a storm total of approximately 6 inches. The amount of snow that fell was difficult to measure due to extensive drifting of the snow that fell.
Lower Yukon Valley (AZ 215)	02/07/2011	Winter Storm The low produced heavy snow across parts of western Alaska and blizzard conditions along parts of the Seward Peninsula and Chukchi Sea Coast. Heavy snow was observed at Anvik with a storm total of 8 inches. The snow may have changed to freezing rain at times at Holy Cross and Marshall as temperatures were just above freezing at times. The snow began late on the evening of the 7th and ended late in the afternoon on the 8th.
Lower Yukon Valley (AZ 215)	02/19/2011	Blizzard The low produced blizzard conditions along parts of the west coast of Alaska on the 19th into the 20th. Blizzard conditions were observed at Marshall from approximately 2230AKST on the 19th through 0216AKST on the 20th. The visibility

Table 5-8 Severe Weather Events

Location	Date	Event Type
		was reduced to one quarter mile or less in snow and blowing snow. There was a peak wind gust of |47 kt (54 mph) at the Marshall AWSS.
Lower Yukon Valley (AZ 215)	02/24/2011	Winter Storm 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. The city office in Marshall reported 8 inches of heavy wet snow. The snow was accompanied by winds that were estimated to be 30 to 40 mph and produced brief white-out conditions. The AWSS at Marshall observed a peak wind gust of 50 kt (58 mph). Temperatures were near or a little above freezing during the event which did limit the blowing snow and prevented any sustained blizzard conditions. The tribal council in Anvik also reported 8 inches of heavy wet snow. The snow was accompanied by winds that were estimated to be around 30 mph and produced very poor visibility at times. The Anvik AWOS had a peak wind gust of 31 kt (36 mph). It is likely that the snow mixed with or changed over to rain and/or freezing rain in areas across the lower Yukon Valley during the afternoon and evening hours on the 24th.
Lower Yukon Valley (AZ 215)	04/06/2011	Winter Storm The low produced strong winds and heavy snowfall along much of the west coast. The city office in Russian Mission estimated that 18 to 24 inches of snow fell during this event. The snow began at on the 6th at 1756AKST and ended around 0830AKST on the 8th. The snow likely mixed with rain at times from the early morning through the late evening hours on the 7th. There was also a period of blizzard conditions at Marshall at the onset of the storm from approximately 1830AKST on the 6th until 0100AKST on the 7th. The ending time of the blizzard conditions was estimated as there were some missing observations. There was a peak wind gust of 53 kt/ 61 mph at the Marshall AWSS. It was estimated that 12 inches of snow fell at Marshall, but it was nearly impossible to measure the snow due to the strong winds.
Lower Yukon Valley (AZ 215)	11/03/2011	Winter Storm The low produced heavy snowfall and blizzard conditions across parts of southwest Alaska. There were reports of snow drifts of 3 to 4 feet at Russian Mission. The snow was nearly impossible to measure due to considerable blowing and drifting snow. Based on the observations at Russian Mission, Anvik, and Holly Cross it is likely that snowfall amounts of 6 to 12 inches were observed in parts of the lower Yukon Valley. The visibility was reduced to one quarter mile or less at Anvik at times, but the wind was not strong enough to support blizzard conditions.
Lower Yukon Valley (AZ 215)	11/11/2011	Winter Storm, High Wind, 40 mph (34 kts) The low produced heavy snowfall and strong winds in parts of southwest Alaska. Based on reports along the Yukon Delta and at Unalakleet it is likely

Table 5-8 Severe Weather Events

Location	Date	Event Type
		that snowfall amounts of 8 to 12 inches were observed in parts of the lower Yukon Valley. Peak wind gusts of 34 kt (40 mph) at the **Holy Cross AWSS** and 38kt (45 mph) at the Russian Mission AWSS likely produced significant blowing and drifting snow and the visibility briefly dropped to one quarter of a mile in snow and blowing snow.
Lower Yukon Valley (AZ 215)	12/03/2011	Winter Storm The low produced heavy snow and blizzard conditions along much of the west coast and arctic coast. A strong Chinook produced high winds, freezing rain and snow in parts of the interior. Heavy snow fell across the lower Yukon Valley. The snow may have changed over to freezing rain at times during the morning and early afternoon hours on the 4th, mainly from Anvik south. A storm total in excess of 12 inches was observed at Anvik.
Lower Yukon (AZ 215)Valley	12/18/2011	Heavy Snow Heavy snowfall was observed in parts of the lower Yukon Valley on the afternoon of the 17th into the morning of the 18th. It was estimated by the city office in Russian Mission that 12 inches of snow fell.
Lower Yukon Valley (AZ 215)	01/09/2012	Heavy Snow The low moved north and weakened to 994 mb in the western interior by 0300AKST on the 11th. Heavy snowfall was observed in parts of the lower and middle Yukon Valleys. Zone 215: Approximately 12 inches of snow was observed at the Anvik Post Office. The snow began during the evening hours on the 9th and continued until the evening hours on the 10th.
Lower Yukon Valley (AZ 215)	01/28/2012	Extreme Cold/Wind Chill Temperatures of 30 to 35 below zero combined with a north wind of 15 to 20 mph to produce wind chills as low as 63 below at the **Holy Cross AWSS**. Wind chills of 60 below or lower were observed from approximately 0930AKST through 1300AKST on the 28th.

(NWS 2012)

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. Their most current effort has resulted in a web-based historical severe weather database to facilitate and more accurately confine weather patterns to relevant geographic areas. The data in Table 5-7 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 severe weather effects. The City experiences severe storm conditions with heavy snow depths; wind speeds exceeding 60 mph; and extreme low temperatures that reach -62ºF.

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 power lines and utility poles. 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 describes** slope increases, which influences 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, ridge tops may mark the end of wildland fire spread since fire spreads more slowly or may even be unable to spread downhill.
- **Fuel** is 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** is 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

The Alaska Interagency Coordination Center (AICC) identified 72 tundra/wildland fires (Figure 5-11) that occurred within 50 miles of the City. Table 5-9 lists 40 of those fires that exceeded 45 acres with the largest one burning 129,500 acres in 2005, and another burning 227,510 acres in 2002. Figure 5-12 depicts the fire's perimeters to depict their relative location and potential threat to the City.

Table 5-9 Wildfire Locations Since 1939 within 50 Miles of Holy Cross

Fire Name	Fire Year	Estimated Acres	Total Cost	Latitude	Longitude	Cause
Cobalt Creek	2009	895	61.88389	-159.293	Lightning	Cobalt Creek
Owhat River	2009	135	61.86167	-159.359	Lightning	Owhat River
Albert Lake	2005	54	62.26667	-159.5	Lightning	Albert Lake
Stuyahok	2005	5,167.5	62.48333	-160.933	Lightning	Stuyahok
Paradise Creek	2005	349.2	62.49111	-160.284	Lightning	Paradise Creek
Saddle	2005	129,634	62.11666	-159.15	Lightning	Saddle
West Deer Hunter	2005	462.6	62.17611	-160.311	Lightning	West Deer Hunter
Reindeer	2004	70	62.41667	-159.083	Lightning	Reindeer
Reindeer	2002	227,510	62.4	-158.883	Lightning	Reindeer
Paimiut	1997	2,468	62	-160.383	Lightning	Paimiut
Reindeer Lake	1997	45	62.13334	-159.35	Lightning	Reindeer Lake
Hawk River	1997	8,640	62.33333	-161	Lightning	Hawk River
Innoko	1996	160	62.05	-159.7	Other	Innoko
Pike	1995	90	61.85	-159.417	Lightning	Pike
Mosquito	1994	630	62.1	-158.883	Lightning	Mosquito
Foxhills	1993	238	62.23333	-159.017	Lightning	Foxhills
Montana	1993	130	62.23333	-158.8	Lightning	Montana
Cross	1991	22,400	62.03333	-159.267	Lightning	Cross
Russian	1991	2000	62	-159.3	Lightning	Russian
132687	1991	7,800	62.51667	-160.4	Lightning	132687
Moly	1991	6,880	61.85	-159.25	Lightning	Moly
Landmark	1987	3,540	61.96667	-159.283	Lightning	Landmark
Albert 1	1984	1,500	62.26667	-159.5	Lightning	Albert 1
Ellie	1974	2,000	62.11666	-159.083	Lightning	Ellie
Fox Hills	1972	2,650	62.18333	-158.933	Lightning	Fox Hills
Axel	1972	500	62.03333	-158.783	Lightning	Axel
Thompson Slough	1969	50,000	62.75	-159.75	Recreation	Thompson Slough
Kudos	1968	4,600	62.11666	-159.4	Lightning	Kudos
Juno	1968	4,000	62.08333	-158.983	Lightning	Juno
Holy Cross E-32	1962	10,240	62.33333	-158.833	Lightning	Holy Cross E-32
Shageluk	1959	1,000	62.5	-159.667	Smoking	Shageluk
Lookout Mountain	1957	934	62.03333	-158.75	Lightning	Lookout Mountain
Bonasila	1957	266,000	62.5	-161	Lightning	Bonasila
Paimiut	1957	65	61.96667	-160.433	Smoking	Paimiut
S Shageluk S 15	1957	3,500	62.46667	-159.65	Smoking	S Shageluk S 15
Hill 900	1954	300	62.05	-159.017	Lightning	Hill 900
Shagaluk	1953	1,500	62.48333	-159.067	Lightning	Shagaluk
Anvik	1943	86,450	62.73333	-159.917	Lightning	Anvik
Holy Cross	1940	40,000	62.2	-159.883	Unknown	Holy Cross
Stuyahok River	1940	17,000	62.43333	-160.867	Unknown	Stuyahok River

(AICC 2012)

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

Location

Under certain conditions wildland fires may occur near the City when weather, fuel availability, topography, and ignition sources combine. Since fuels data is not readily available, for the purposes of this plan, all areas outside City limits are considered to be vulnerable to tundra/wildland fire impacts. Since 1938, only four wildland fire events have occurred within 50 miles of the City (Figure 5-10).

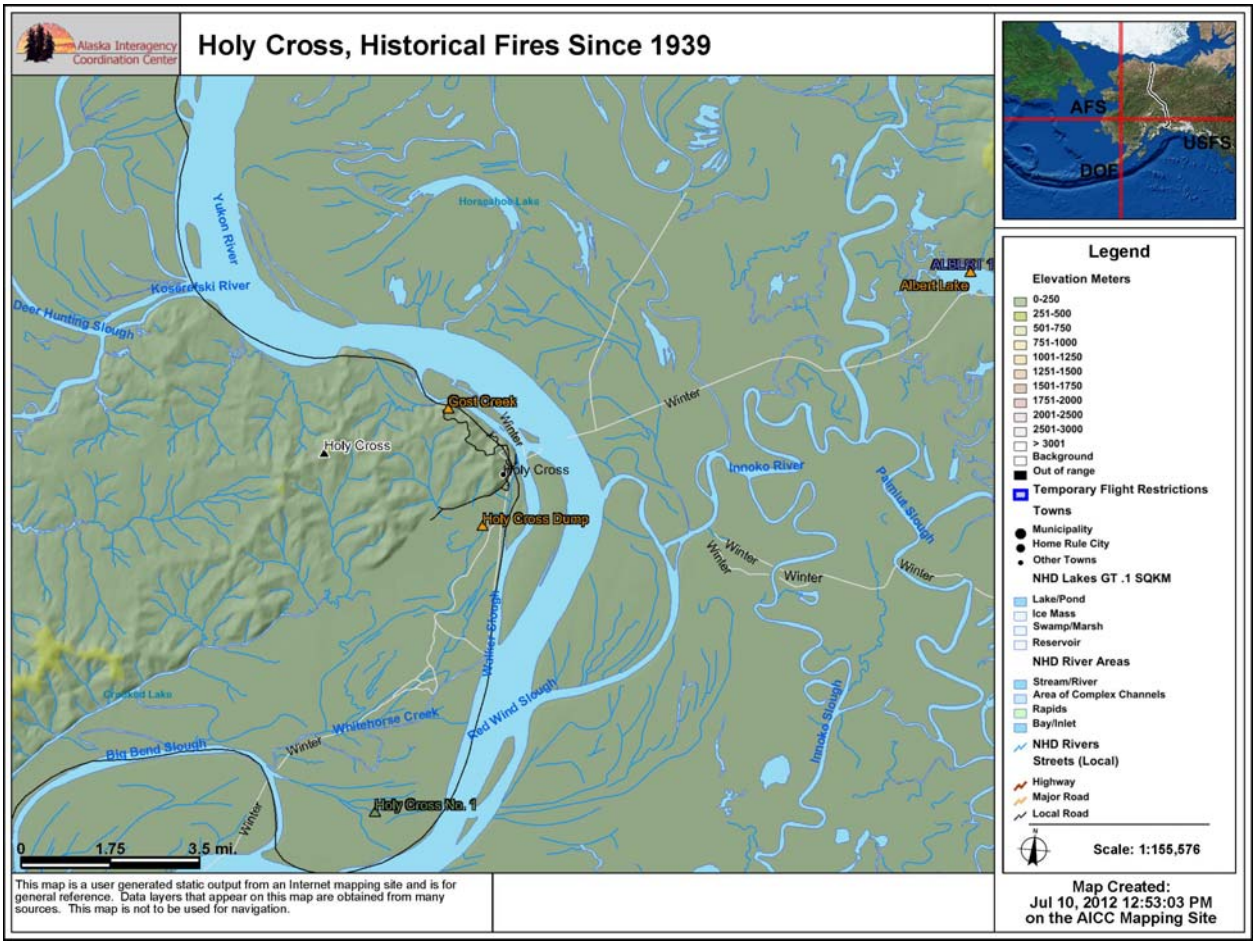

Figure 5-11 Holy Cross' Historical Wildfires (AICC 2012)

Figure 5-12 depicts a Geographical Information System (GIS) based historical fire map generated from AICC's historical fire data. This map displays historical fires within 100 miles of the City.

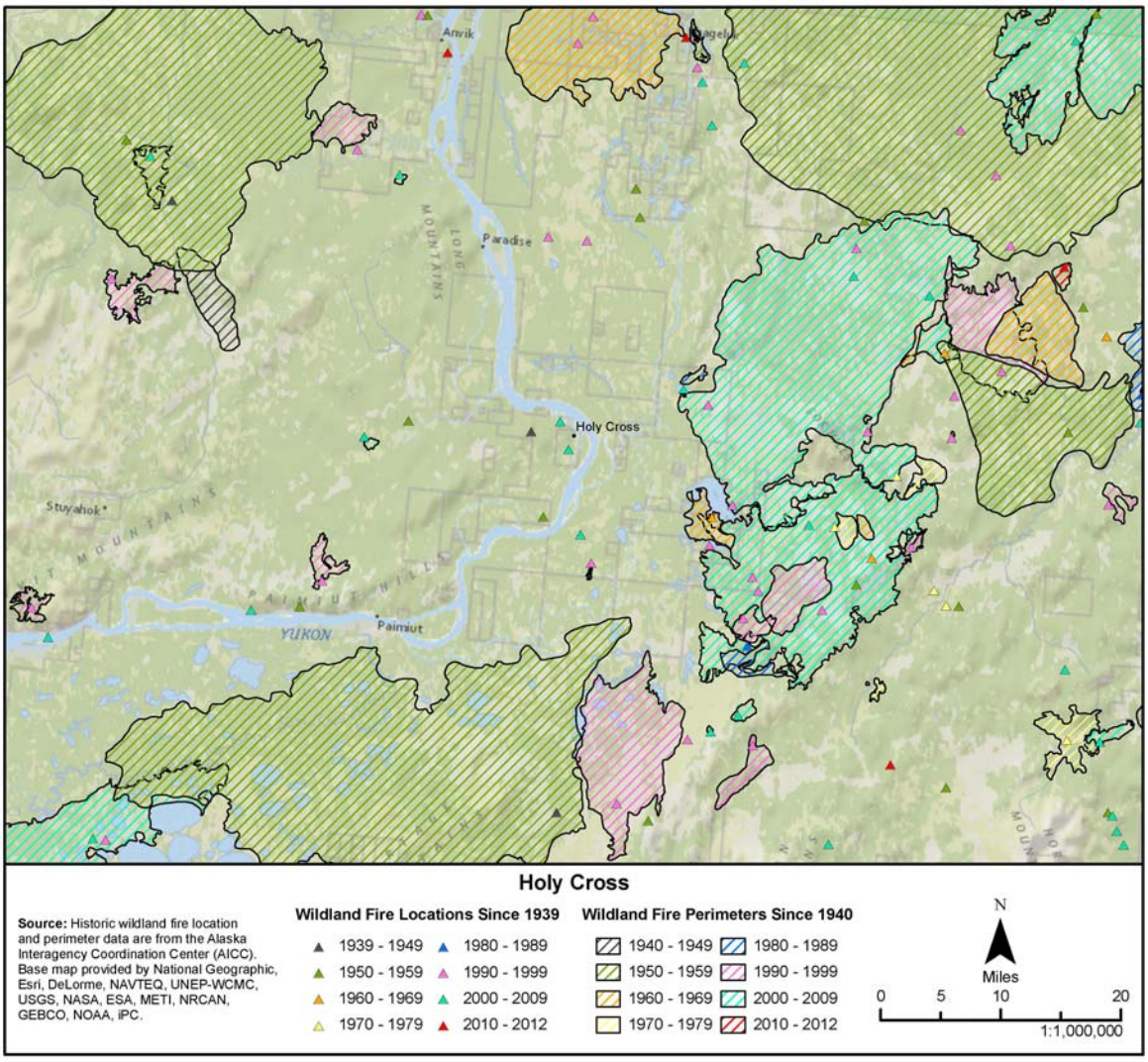

Figure 5-12 Holy Cross' Historical Wildfires within 50 miles (URS 2012)

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.

Only the 1940 Holy Cross fire burned approximately 40,000 acres. Due to poor records, the location is approximate. The cause of the fire was unknown. It is difficult to determine the average number of acres burned as the fires were vastly different for each of the four wildland fire events identified in Table 5-9 (DOF 2012). An average based on such diverse data would easily be overstated.

Based on the limited number of past wildland fire events and the criteria identified in Table 4-x, the magnitude and severity of impacts in the City of Holy Cross are considered negligible with minor injuries, there is potential for critical facilities to be shut down 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, and within 50 miles of the City of Holy Cross, the natural fire regime is characterized by a return interval of approximately 150 due to their tundra vegetation, gently rolling topography.

Based on the history of wildland fires in the Holy Cross area and applying the criteria identified in Table 4-2, it is unlikely but possible a wildland fire event will occur within in the next ten years. The event has up to 1 in 10 years chance of occurring and the history of events is less than or equal to 10 percent likely each year.

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This section outlines the vulnerability process for determining potential losses for the community from various hazard impacts.

6.1 VULNERABILITY ANALYSIS OVERVIEW

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
1. Exposure Analysis For Current Assets
2. Repetitive Loss Properties
3. Land Use and Development Trends
4. Vulnerability Analysis Methodology
5. Data Limitations
6. Vulnerability Exposure Analysis
7. Future Development

This section provides an overview of the vulnerability analysis for current assets, and area future development initiatives.

DMA 2000 Recommendations
Assessing Risk and Vulnerability, and Analyzing Development Trends §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. *All plans approved after October 1, 2008 must also address NFIP insured structures that have been repetitively damaged by floods.* The plan should describe vulnerability in terms of: §201.6(c)(2)(ii)(A): The types and numbers of existing and future buildings, infrastructure, and critical facilities located in the identified hazard areas; §201.6(c)(2)(ii)(B): An estimate of the potential dollar losses to vulnerable structures identified in … this section and a description of the methodology used to prepare the estimate. §201.6(c)(2)(ii)(C): Providing a general description of land uses and development trends within the community so that mitigation options can be considered in future land use decisions. §201.6(c)(2)(iii): For multi-jurisdictional plans, the risk assessment section must assess each jurisdiction's risks where they vary from the risks facing the entire planning area.
1. REGULATION CHECKLIST
ELEMENT B. Risk Assessment, Assessing Vulnerability, Analyzing Development Trends
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))
B4. Does the Plan address NFIP insured structures within each jurisdiction that have been repetitively damaged by floods?
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))
Source: FEMA, October 2011.

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.
- Identification of the types and numbers of RL properties in the identified hazard areas.
- 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.
- Estimate of potential dollar losses to vulnerable structures and the methodology used to prepare the estimate.

Table 6-1 lists the City of Holy Cross infrastructures' hazard vulnerability.

Table 6-1 Vulnerability Overview

Hazard	Area's Hazard Vulnerability			
	Percent of Jurisdiction's Geographic Area	Percent of Population	Percent of Building Stock	Percent of Critical Facilities and Utilities
Earthquake	100	100	100	100
Erosion	2	2	2	2
Flood	2	2	2	2
Weather	100	100	100	100
Tundra/Wildland Fire	100	100	100	100

6.2 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 Doyon, Limited's land ownership map (Figure 4-12) illustrates the City's, as well as Doyon Limited's, land ownership.

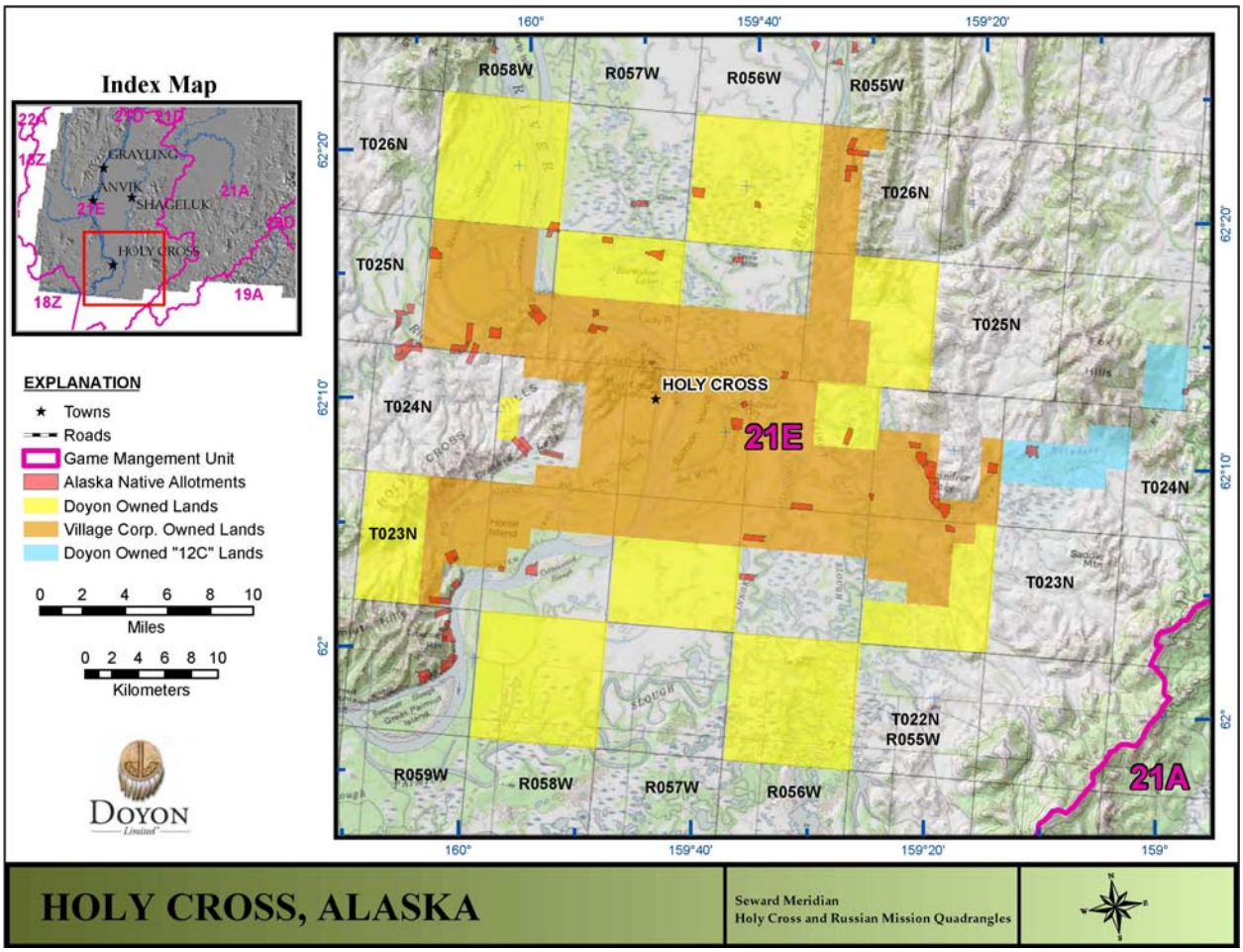

Figure 6-1 **Holy Cross, Alaska Land Ownership** (Doyon 2012)

6.3 EXPOSURE ANALYSIS FOR CURRENT ASSETS

6.3.1 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 Holy Cross are identified and discussed in detail in the following sections.

6.3.2 Population and Building Stock

Population data for the City were obtained from the 2000 U.S. Census. The City's total population for 2010 was 178 and 2011 DCCED/DCRA data reported a population of176(Table 6-2).

Table 6-2 Estimated Population and Building Inventory

Population		Residential Buildings	
2010 Census	DCCED 2011 Data	Total Building Count	Total Value of Buildings[1]
178	176	86	US Census: $2,786,400 City: $8,600,000

Sources: The City of Holy Cross, U.S. Census 2010, and 2011 DCCED/DCRA Certified population data.

[1] 2010 Census estimates structure value at $32,400. However, The Planning Team determined that the average structural replacement value of all single-family residential buildings is $100,000 per structure due to rural construction expense adjustment.

The Planning Team stated that residential replacement values are generally understated because replacement costs exceed Census structure estimates due to material purchasing, barge or airplane delivery, and construction in rural Alaska. The Planning Team estimates an average 30ft by 40 ft (1,200 sq ft) residential structure costs $100,000. A total of 86 single-family residential buildings were considered in this analysis.

6.3.3 Existing Critical Facilities and Infrastructure

The City of Holy Cross has benefited from numerous funding opportunities to assist them with upgrading their infrastructure from various agencies such as the Indian General Assistance Program (IGAP) to help the City manage their solid waste through the following activities:

- Collecting and sending aluminum cans to ALPAR
- Back hauling various categories such as whites, vehicle, snowmachines, ATVs, trucks, household batteries, computers, and ink cartridges.
- Share their vision of recycling and environmental concerns.
- Developing tribal labor capabilities
- Improve tribal refuse clean-up and sustainable management planning
- Improve hazardous waste management and back hauling
- Communicate environmental health related concern awareness

The City has been dramatically improving water and wastewater services throughout the City since the early 1990's with a new sewage lagoon, upgraded water mains, and circulation system. The 1990's also say major equipment purchases include a new AVEC generator, D-8 purchase, an airport loader; snow removal equipment purchases were made in 2001. Homes receive weatherization improvements in 1995 and modernization projects in 1996 and new home construction in 200. The Community Hall, washeteria watering point, and health clinic experience renovation in 1999 with additional clinic renovations in 2002. The water treatment plant was upgraded and renovated in 2001

Table 6-3 list the City's DCRA funded "completed" infrastructure improvement projects. They provide a depiction of the community's ongoing development trends and focus toward improving aging infrastructure.

Table 6-3 Completed Projects

Lead Agency	Fiscal Year	Project Status	Project Description/Comments	Project Stage	Total Cost
Housing and Urban Development (HUD)	2006	Funded	Indian Housing Block Grant/Native American Housing Assistance and Self Determination Act (IHBG/NAHASDA) administration, operating & construction funds	Completed	$170,889
HUD	2005	Funded	IHBG/NAHASDA administration, operating & construction funds	Completed	$166,674
HUD	2004	Funded	IHBG/NAHASDA administration, operating & construction funds	Completed	$182,011
Alaska Native Tribal Health Consortium (ANTHC)	2003	Funded	Water and sewer service lines to 3 homes.	Complete	$150,000
HUD	2003	Funded	IHBG/NAHASDA administration, operating & construction funds	Completed	$294,306
Division of Community and Regional Affairs (DCRA)	2003	Funded	Renovation of City Facilities - Comments: Capital Matching	Completed	$26,778
Denali Commission	2002	Funded	Bulk Fuel Storage Project CDR - Comments: Bulk Fuel Business Plan and Conceptual Design	Project Close-out Complete	$45,621
HUD	2002	Funded	IHBG/NAHASDA administration, operating & construction funds	Completed	$267,709
DCRA	2002	Funded	Heavy Equipment Purchase or Upgrade - Comments: Capital Matching	Completed	$31,689
Department of Education and Early development (DEED)	2002	Funded	Holy Cross School Bathroom & Shower Deterioration	Completed	$52,500
Denali Commission	2002	Funded	Construction/Renovation of Holy Cross Clinic - Comments: The scope of work for this project covers the renovation and expansion of the existing Community Health Clinic. This project was awarded under Amendment No. 1.	Project Close-out Complete	$469,854
DCRA	2001	Funded	Overhaul, Repair Heavy Equipment - Comments: Capital Matching	Completed	$21,132
ANTHC	2001	Funded	Water Treatment Plant (WTP) upgrades and renovation. - Comments: 2006 Q1 Review recorded drawings for Water Treatment Plant and complete project closeout. 2006 Q2 - Complete project closeout. WTP upgrades and renovation.	Complete	$60,000
Federal Aviation Administration (FAA)	2001	Funded	Improve Snow Removal Equipment Building - Comments: OTHER FUNDING: Department of Transportation/Public Facilities (DOT/PF)	Completed	$757,262
DOT/PF	2000	Funded	Airport Snow Removal Equipment Building - Comments: Bid advertising in Feb. 2001	Completed	$650,000

Table 6-3 Completed Projects

Lead Agency	Fiscal Year	Project Status	Project Description/Comments	Project Stage	Total Cost
HUD/Alaska Housing Finance Corporation (AHFC)	2000	Funded	Construct 35 Single-family homes - Comments: NAHASDA	Completed	$725,158
HUD	2000	Funded	IHBG/NAHASDA administration, operating & construction funds	Completed	$270,131
DCRA	2000	Funded	Renovation for Community Hall and Washeteria Relocation - Comments: Capital Matching	Completed	$28,399
HUD	1999	Funded	IHBG/NAHASDA administration, operating & construction funds	Completed	$270,131
HUD	1999	Funded	Health Clinic - Comments: Indian Community Development Block Grant (ICDBG) Program	Completed	$321,014
DCRA	1999	Funded	Community Hall and Washeteria Project - Comments: Capital Matching	Completed	$76,345
HUD	1998	Funded	IHBG/NAHASDA administration, operating & construction funds	Completed	$297,856
Alaska Energy Authority/Bulk Fuel (AEA/BF)	1998	Funded	Unspecified Project	Completed	$135,000
AEA/BF	1998	Funded	Bulk Fuel Upgrade for School Tank Farm - Comments: OTHER FUNDING: DEC $48K. Construction Summer 98	Completed	$49,000
DCRA	1996	Funded	Washeteria Renovation - Comments: Capital Matching	Completed	$26,316
AEA/BF	1996	Funded	Bulk Fuel Upgrade for Alaska Village Electric Cooperative (AVEC) Tank Farm - Comments: Local priority, from 1997 US Department of Agriculture/Rural Development (USDA/RD) survey of villages	Completed	$60,000
HUD/Comprehen sive Grant Program (CGP)	1995	Funded	Housing Modernization - Comments: Exterior paint, retaining wall	Completed	$117,000
AHFC	1995	Funded	Weatherize Homes - Comments: Weatherization	Completed	$75,200
DOT/PF	1995	Funded	Airport Loader	Completed	$110,000
DCRA	1995	Funded	D-8 Repair/Labor - Comments: Capital Matching	Completed	$11,316
DCRA	1995	Funded	D-8 Purchase - Comments: Capital Matching	Completed	$15,000
DCRA	1994	Funded	Equipment Purchase & Delivery - Comments: Capital Matching. 450 Cat. 966 Loader	Completed	$26,316
HUD/CGP	1994	Funded	Unspecified Project	Completed	$340,000

Table 6-3 Completed Projects

Lead Agency	Fiscal Year	Project Status	Project Description/Comments	Project Stage	Total Cost
Department of Environmental Conservation/ Village Safe Water (DEC/VSW)	1994	Funded	Sanitation/Lagoon Design/Construction - Comments: ANTHC lead. Upgrade water mains and circulation system; upgrade sewage lagoon and lift station	Completed	$500,000
AEA	1993	Funded	AVEC Electrical Efficiency Improvements - Comments: Replace generator for efficiency improvement; anticipated savings are 5,790 gals. fuel per year	Completed	$61,358

(DCRA 2012)

6.3.3.1 Critical Facilities

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 firefighting 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 City's critical facilities and infrastructure are listed in Table 6-4.

Table 6-4 Critical Facilities and Infrastructure

Facilities	Number of Occupants	Facilities	Address	Latitude	Longitude	Estimated Value	Building Type	Earthquake	Erosion	Flood	Weather (Severe)	Tundra/Wildland Fire
Government	10	City Offices	Fourth Street	62.19906	-159.76852	$400,000	W2 A frame	X			X	X
	2	Deloycheet & Tanana Cheifs Conference Offices	Fourth Street	62.19882	-159.7687	$400,000	W1	X			X	X
	20	New Tribal Building Fall 2013	Airport Road	Unknown	Unknown	$300,000	W1	x			x	x
	10	Tribal Building	Front Street	62.20251	-159.76937	$150,000	W1	X			X	X
	0	National Guard Armory (shut down)	A Street	62.20289	-159.76972	$300,000	W1	X			X	X
	3	Post Office	Fourth Street	62.198	-159.7697	$500,000	W1	X			X	X
Transportation	1	Airport	Airport Road	62.18792	-159.77528	$180,000	AFO	X			X	X
	3	City Shop	AVEC Road	62.19638	-159.77119	$100,000	1 story Metal	X			X	X
	2	DOT Airport Shop	Airport Road	62.1917	-159.77164	$100,000	W1 w/ Metal	X			X	X
	0	Boat Landing	Front Street	62.19911	-159.7638	$0	land	X	X	X	X	X
Emergency Response	0	Village Public Safety Officer	No Building	Unknown	Unknown	$0	N/A	X			X	X
Educational	65	Holy Cross School	Third Street	62.20131	-159.76602	$17,000,000	W1 w/ Metal	X			X	X
Medical	3	Theresa Demientieff Health Clinic	Main Street	Unknown	Unknown	$500,000	W1 w/ Metal	X			X	X

Table 6-4 Critical Facilities and Infrastructure

Facilities	Number of Occupants	Facilities	Address	Latitude	Longitude	Estimated Value	Building Type	Earthquake	Erosion	Flood	Weather (Severe)	Tundra/Wildland Fire
Community	20	Youth Center	A Street	62.20236	-159.76883	$500,000	W1 w/ Metal	X			X	X
	5	Teachers Quarters	Main Street	62.20131	-159.76602	$100,000	W2-A/frame	X			X	X
	10	Community Hall (same building as City Office)	Fourth Street	62.19911	-159.76855	Same	W1	X			X	X
	50	Church	Main Street	62.20108	-159.76655	$200,000	W1	X			X	X
	4	Patricias Store (connected to a house)	Hud Road	62.19975	-159.77102	$100,000	W1	X			X	X
	5	Holy Cross Enterprice (connected to a house)	Front Street	62.1995	-159.7686	$250,000	W1	X		X	X	X
	0	Village Garden	Airport Road	Unknown	Unknown	$0	Ground	X			X	X
	0	Cemetery	Fourth Street/ Hud Road	62.20143	-159.76869	$0	Ground	X			X	X
Roads	0	Main Street		N/A	N/A	$2,000,000	HRD2	X			X	X
	0	Pump House Road					HRD2	X			X	X
	0	Front Street (Beach Road)					HRD2	X			X	X
	0	A Street					HRD2	X			X	X
	0	AVEC Road					HRD2	X			X	X
	0	Cross Road					HRD2	X			X	X
	0	Third Street					HRD2	X			X	X
	0	Fourth Street					HRD2	X			X	X
	0	Fifth Street					HRD2	X			X	X
	0	Big Lake Road					HRD2	X			X	X
	0	Michael's Slough Road					HRD2	X			X	X
	0	Nud Road					HRD2	X			X	X
	0	Ghost Creek Road					HRD2	X			X	X
	0	Airport Road					HRD2	X			X	X

Table 6-4 Critical Facilities and Infrastructure

Facilities	Number of Occupants	Facilities	Address	Latitude	Longitude	Estimated Value	Building Type	Earthquake	Erosion	Flood	Weather (Severe)	Tundra/Wildland Fire
Bridges		None	--	--	--	--	--					
Utilities	3	AVEC Power Facility	AVEC Road	62.19734	-159.76932	$5,000,000	EPPS	X			X	X
	1	School backup generator	Third Street	62.2016	-159.76694	$100,000	EPPS	X			X	X
	1	AVEC Fuel Storage Tanks	AVEC Road	62.19744	-159.76906	$1,000,000	OTF	X			X	X
	0	Church Fuel Storage Tanks	Main Street	62.20153	-159.76746	$20,000	OTF	X			X	X
	1	City Fuel Storage Tanks	AVEC Road	62.19754	-159.76868	$75,000	OTF	X			X	X
	1	School Fuel Storage Tanks	Third Street	62.2016	-159.76722	$75,000	OTF	X			X	X
	1	Holy Cross Oil Company Office/ Tanks	Airport Road	62.19644	-159.76703	$1,000,000	OTF	X			X	X
	20	Washeteria	Main Street	62.19941	-159.76822	$80,000	W1	X			X	X
	2	Holy Cross Water System	Main Street	62.19925	-159.7682	$90,000	PWE	X			X	X
	0	Water Tank	Third Street	62.20014	-159.77382	$100,000	PSTS	X			X	X
	2	Water Treatment Plant/Pumphouse	Main Street	62.1992	-159.76763	$200,000	PWSO	X			X	X
	2	Landfill/Incinerator	Main Street	62.19132	-159.7915	$80,000	N/A	X			X	X
	2	Waste Water Treatment Facility	Main Street	62.19657	-159.76841	$200,000	WWTS	X			X	X
	0	Sewage Lagoon	Main Street	62.19657	-159.76841	$1,000,000	N/A	X			X	X
	0	Lift Station	Main Street	62.19733	-159.76741	$30,000	WLSW	X			X	X
	0	FM Radio at school	Third Street	62.20102	-159.76524	$10,000	CBO	X			X	X
	0	Bush Tell (Telephone)	Forth Street	62.20039	-159.76963	$1,000,000	CBO	X			X	X
	0	ARCS TV Reciever at City Office	Third Street	62.19906	-159.76852	$5,000	CBR	X			X	X
	0	School Satellite Reciever/Internet	Third Street	62.20131	-159.76602	$20,000	CBO	X			X	X
Total Occ	249				**Total Damages:**	$33,165,000						

(Holy Cross 2011, DHS&EM 2009a)

6.4 REPETITIVE LOSS PROPERTIES

This section would be used to estimate the number and type of structures at risk to repetitive flooding. (Properties which have experienced RL and the extent of flood depth and damage potential.)

DMA 2000 Requirements
Addressing Risk and Vulnerability to NFIP Insured Structures §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. *All plans approved after October 1, 2008 must also address NFIP insured structures that have been repetitively damaged by floods.* The plan should describe vulnerability in terms of: §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 areas; §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; §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. §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.
1. REGULATION CHECKLIST
ELEMENT B. NFIP Insured Structures
B4. Does the Plan address NFIP insured structures within the jurisdiction that have been repetitively damaged by floods?
C2. Does the Plan address each jurisdiction's participation in the NFIP and continued compliance with NFIP requirements, as appropriate?
Source: FEMA, October 2011.

6.4.1 NFIP Participation

The City of Holy Cross does not participate in the NFIP neither do they have a repetitive flood property inventory that meets the RL or SRL criteria as the loss thresholds are substantially below FEMA values.

6.5 VULNERABILITY ANALYSIS 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.

Replacement structure and contents values were determined by the community for their physical assets. Thecommunity's aggregate exposure was calculated by assuming the worst-case scenario (that is, the asset would be completely destroyed and would have to be replaced) for each physical asset located within a hazard area. 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.

6.6 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.

6.6.1 Exposure Analysis

There is limited GIS data available for the City of Holy Cross. The results of the GIS based exposure analysis for loss estimations in the City are summarized in Tables 6-7 and 6-8. The following discussion contains data from GIS analysis and information obtained from the Planning Team.

Table 6-5 Potential Hazard Exposure Analysis – Critical Facilities

		Government and Emergency Response		Educational		Medical		Community	
Hazard Type	Methodology	* # Bldgs/ # Occ	Value ($)	* # Bldgs/ # Occ	Value ($)	* # Bldgs/ # Occ	Value ($)	* # Bldgs/ # Occ	Value ($)
Earthquake	Descriptive	7/45	2,050,000	1/65	17,000,000	1/3	500,000	8/94	1,150,000
Erosion	Within 300 ft of erosion areas	0/0	$0	0/0	$0	0/0	$0	0/0	$0
Flood	Descriptive	0/0	$0	0/0	$0	0/0	$0	1/5	250,000
Weather, Severe	Descriptive	7/45	2,050,000	1/65	17,000,000	1/3	500,000	8/94	1,150,000
Wildland Fire	Descriptive	7/45	2,050,000	1/65	17,000,000	1/3	500,000	8/94	1,150,000

Table 6-6 Potential Hazard Exposure Analysis – Critical Infrastructure

		Highway		Bridges		Transportation Facilities		Utilities	
Hazard Type	Methodology	Miles	Value ($)	No.	Value ($)	# Bldgs/ # Occ	Value ($)	# Bldgs/ # Occ	Value ($)
Earthquake	Descriptive	~ 5	2,000,000	N/A	--	4/6	380,000	21/36	10,085,000
Erosion	Within 300 ft of erosion areas	0/0	$0	0/0	$0	1/0	Unknown	0/0	$0
Flood	Descriptive	0/0	$0	0/0	$0	1/0	Unknown	0/0	$0
Weather, Severe	Descriptive	~ 5	2,000,000	N/A	--	4/6	380,000	21/36	10,085,000
Wildland Fire	Descriptive	~ 5	2,000,000	N/A	--	4/6	380,000	21/36	10,085,000

6.6.2 Exposure Analysis – Hazard Narrative Summaries

Earthquake

The City and surrounding area can expect to experience significant earthquake ground movement that may result in infrastructure damage. 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.

Based on earthquake probability (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 Thompson Creek Fault, Unnamed Pre-Neogene Fault, Iditarod-Nixon Fork Fault, Ataskaksovluk-Holokuk Fault Zone and the Denali Fault. 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 Holy Cross population, residences, and critical facilities are exposed to the effects of an earthquake. This includes approximately:

- 181 people in 86 residences (approximate value $8,600,000)
- 45 people in seven government and emergency response facilities (approximate value $2,050,000)
- 65 people in one educational facilities (approximate value $17,000,000)
- Three people in one medical facility (approximate value $500,000)
- 94 people in eight community facilities (approximate value $1,150,000)
- Five road system miles (approximate value $2,000,000)
- Six people in four transportation facilities (approximate value $380,000)
- 36 people in 21 utility facilities (approximate value $10,085,000)

Impacts to future populations, residential structures, critical facilities, and infrastructure are anticipated at the same historical impact level.

Erosion

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. Only the building's location can lessen its vulnerability to erosion in the City of Holy Cross.

The City Council stated "there is minimal flood threat for the City." However, the City does experience rain and snow-melt run-off erosion and Ghost Creek is washed out by high water annually. Based on local knowledge, areas within the City affected by erosion are located adjacent to the River (see Section 5.3.2.3).

- The boat launch, beach landing area is the primary facility impacted by erosion. This area has an unknown value.

Impacts to future populations, residential structures, critical facilities, and infrastructure are anticipated at the same impact level.

Flood

Impacts associated with flooding in the City is mainly roadbed erosion and damage, boat strandings, areas of standing water in roadways, and culvert damage or displacement. (See Section 5.3.3.3).

The City Council stated "there is minimal flood threat for the City." However, the City does experience annual rain and snow-melt run-off and Ghost Creek is washed out by high water. The USACE information does not include 100 year floodplain map for the current townsite. Impact areas include:

- Five people in one community facility (approximate value $250,000)
- The boat launch, beach landing area is the primary facility impacted by flood. This area has an unknown value.

The City anticipates that impacts to future populations, residences, critical facilities, and infrastructure will remain unthreatened.

Weather (Severe)

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, utility disruptions, frozen pipes, and carbon monoxide poisoning. Additional impacts may occur from secondary weather hazards or complex storms such as extreme high winds combined with freezing rain, high seas, and storm surge. Section 5.3.5.3 provides additional detail regarding severe weather impacts. 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 severe weather damage.

Using information provided by the City of Holy Cross 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. This includes approximately:

- 181 people in 86 residences (approximate value $8,600,000)
- 45 people in seven government and emergency response facilities (approximate value $2,050,000)
- 65 people in one educational facilities (approximate value $17,000,000)
- Three people in one medical facility (approximate value $500,000)
- 94 people in eight community facilities (approximate value $1,150,000)
- Five road system miles (approximate value $2,000,000)
- Six people in four transportation facilities (approximate value $380,000)
- 36 people in 21 utility facilities (approximate value $10,085,000)

Impacts to future populations, residences, critical facilities, and infrastructure are anticipated at the same impact level. To lessen future impacts the City could institute and enforce 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.

According to the Alaska Fire Service, there are no wildland fire areas within Holy Cross's boundaries. However, four wildland fires have occurred within a 50-mile radius of the City (see Section 4.3.5.3). There is a slight potential for wildland fire to interface with the population center of the City. This area includes approximately:

- 181 people in 86 residences (approximate value $8,600,000)
- 45 people in seven government and emergency response facilities (approximate value $2,050,000)
- 65 people in one educational facilities (approximate value $17,000,000)
- Three people in one medical facility (approximate value $500,000)
- 94 people in eight community facilities (approximate value $1,150,000)
- Five road system miles (approximate value $2,000,000)
- Six people in four transportation facilities (approximate value $380,000)
- 36 people in 21 utility facilities (approximate value $10,085,000)

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.

6.7 FUTURE DEVELOPMENT

6.7.1 Development Trends

The City has several future land use planning initiatives to include future road development. Figure 6-13 depicts the City's proposed road development developed for their 1993 Long Range Transportation Plan.

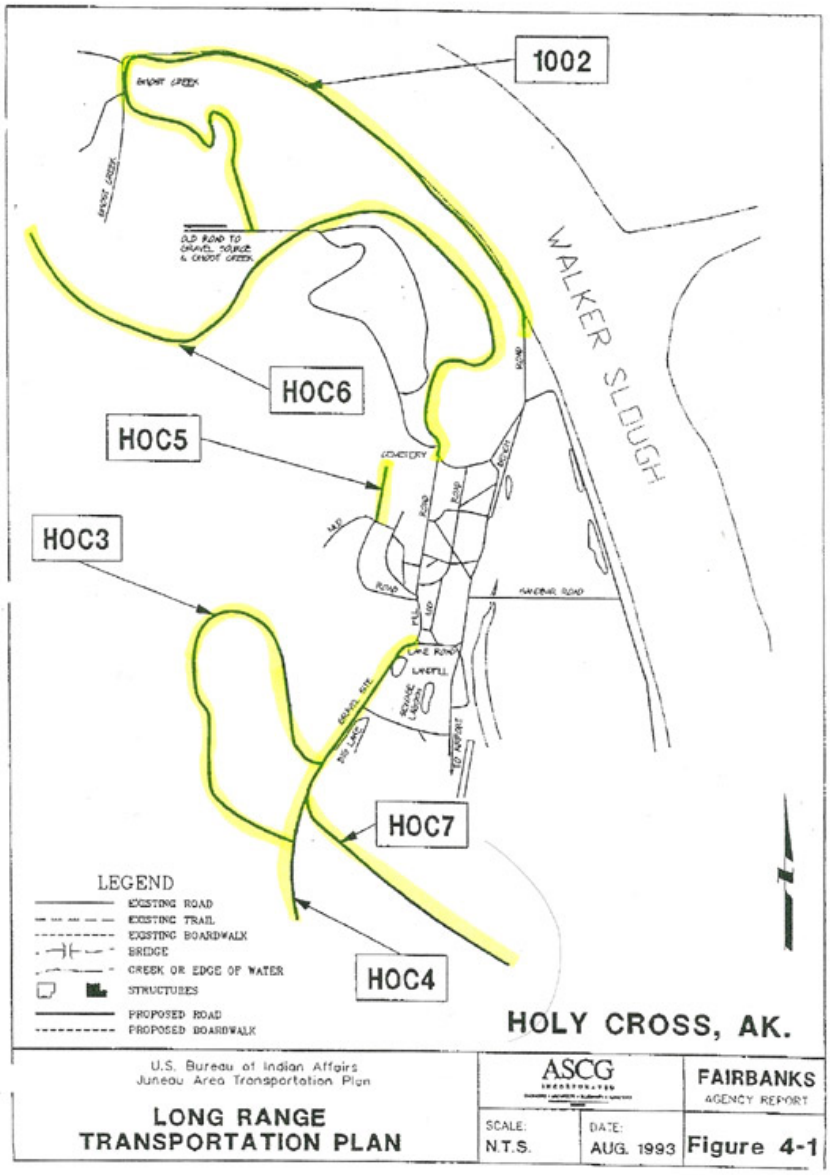

Figure 6-2 Long Range Transportation Plan (Holy Cross 2012).

Immediate plans for future development in the City includes potentially constructing a new multi-purpose Community Services Center, developing a Sanitation Master Plan, and upgrading their vocational education facility.

Table 6-5 delineates Holy Cross' future, planned, and funded projects and their tentative status of stages of completion.

Table 6-5 Planned and Funded Projects

Lead Agency	Fiscal Year	Project Status	Project Description/Comments	Project Stage	Total Cost
DCRA	2011	Funded	Multi-Purpose Community Services Center - Comments: Legislative Grant - Building for social and safety services	Preliminary	$2,100,000
ANTHC	2001	Funded	Sanitation Facilities Master plan	Preliminary	$119,485
HUD	2009	Funded	Indian Housing Block Grant/Native American Housing Assistance and Self Determination Act (IHBG/NAHASDA) administration, operating & construction funds	Contract	$158,013
HUD	2008	Funded	IHBG/NAHASDA administration, operating & construction funds	Design	$143,695
HUD	2007	Funded	IHBG/NAHASDA administration, operating & construction funds	Construction	$169,203
DEED	2006	Funded	Holy Cross School Vocational Education Shop Upgrade	Construction	$213,312

(DCRA 2012)

This section outlines the five-step process for preparing a mitigation strategy which includes:

1. Identifying each jurisdiction's existing authorities for implementing mitigation action initiatives
2. NFIP Participation
3. Developing Mitigation Goals
4. Identifying Mitigation Actions
5. Evaluating Mitigation Actions
6. Implementing Mitigation Action Plans

DMA requirements for developing a comprehensive mitigation strategy include:

DMA 2000 Requirements
Identification and Analysis of Mitigation Actions §201.6(c)(3): [The plan shall include the following:] A *mitigation strategy* that provides the jurisdiction's blueprint for reducing the potential losses identified in the risk assessment, based on existing authorities, policies, programs, and resources, and its ability to expand on and improve these existing tools. §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. §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. §201.6(c)(3)(iii): [The hazard mitigation strategy shall include an] action plan, describing how the action identified in paragraph (c)(3)(ii) of this section will be prioritized, implemented, and administered by the local jurisdiction. Prioritization shall include a special emphasis on the extent to which benefits are maximized according to a cost benefit review of the proposed projects and their associated costs. §201.6(c)(3)(iv): [For multi-jurisdictional plans, there must be identifiable action items specific to the jurisdiction requesting FEMA approval or credit of the plan. Requirement §201.6(c)(4): [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 improvements, when appropriate.
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?
C2. Does the Plan address each jurisdiction's participation in the NFIP and continued compliance with NFIP requirements, as appropriate? *(Addressed in Section 6.4)*
C3. Does the Plan include goals to reduce/avoid long-term vulnerabilities to the identified hazards?
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?
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?
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?
Source: FEMA, October 2011.

7.1 CITY OF HOLY CROSS 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 Holy Cross for mitigation and mitigation related funding and training. Tables 5-1 and 5-2 delineate the City's regulatory tools, technical specialists, and financial resource available for project management. Additional funding resources are identified in Appendix A.

Table 7-1 Holy Cross' Regulatory Tools

Regulatory Tools (ordinances, codes, plans)	Existing?	Comments (Year of most recent update; problems administering it, etc.)
Comprehensive Plan	No	
Land Use Plan	No	
Tribal Corporation Land Use Plan	No	
Emergency Response Plan	No	
Wildland Fire Protection Plan	No	
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.
Special purpose ordinances	No	The City can exercise this authority.

Local Resources

The City has a the capability to accomplish planning and land management through joint City and Tribal Councils 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 7-2 Holy Cross' Technical Specialists for Hazard Mitigation

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	No	Taunnie Boothby, 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	The City hires consultants with this knowledge
Personnel skilled in Geospatial Information System (GIS) and/or Hazus	No	The City hires consultants with this knowledge
Scientists familiar with the hazards of the jurisdiction	No	U.S. Fish & Wildlife Service local office; Alaska Dept. of Fish & Game local office

Table 7-2 Holy Cross' Technical Specialists for Hazard Mitigation

Staff/Personnel Resources	Y/N	Department/Agency and Position
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 7-3 Financial Resources Available for Hazard Mitigation

Financial Resource	Accessible or Eligible to Use for Mitigation Activities
General funds	Limited funding, City can exercise this authority with voter approval
Community Development Block Grants	Limited funding, City can exercise this authority with voter approval
Capital Improvement Projects Funding	Limited funding, City can exercise this authority with voter approval
Authority to levy taxes for specific purposes	Limited funding, City can exercise this authority with voter approval
Incur debt through general obligation bonds	City can exercise this authority with voter approval
Incur debt through special tax and revenue bonds	City can exercise this authority with voter approval
Incur debt through private activity bonds	City 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 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 structures and infrastructure to protect repetitive flood structures. *Note: Holy Cross does not qualify for this funding as they do not participate in the NFIP.*
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.

The Planning Team developed the mitigation goals and potential mitigation actions for the City of Holy Cross within Section 5.3.

7.2 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
Local Hazard Mitigation Goals §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 C. Mitigation Goals
C3. Does the Plan include goals to reduce/avoid long-term vulnerabilities to the identified hazards?
Source: FEMA, October 2011.

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, nine goals were developed to reduce or avoid long-term vulnerabilities to the identified hazards (Table 7-4).

Table 7-4 Mitigation Goals

No.	Goal Description
Multi-Hazards (MH)	
MH 1	Promote recognition and mitigation of all natural hazards that affect the City of Holy Cross.
MH 2	Promote cross-referencing mitigation goals and actions with other City planning mechanisms and projects.
MH 3	Reduce possibility of losses from all natural hazards that affect the City.
Natural Hazards	
EQ 4	Reduce vulnerability of structures to earthquake (EQ) damage.
ER 5	Reduce possibility of damage and losses from erosion (ER).
FL 6	Reduce the possibility of damage and losses from flood (FL).
GF 7	Reduce the possibility of damage and losses from ground failure events (GF).
SW 8	Reduce vulnerability of structures to severe weather (SW) damage.
WF 9	Reduce possibility of damage and losses from tundra/wildland fires (WF).

7.3 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
Identification and Analysis of Mitigation Actions §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 C. Mitigation Actions
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?
Source: FEMA, October 2011.

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
Identification and Analysis of Mitigation Actions §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 C. Mitigation Actions
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?
Source: FEMA, October 2011.

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.

On June 6, 2013, the Planning Team considered 28 mitigation actions for potential implementation 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 7-5 below.

Table 7-5 Mitigation Goals and Potential Actions

(Bold ID items were selected for implantation by the Planning Team)

Goal	Status *Consider Select Ongoing*	Description
Multi-Hazard (MH)		
MH 1	**S**	Identify and pursue funding opportunities to implement mitigation actions.
	S	Develop, produce, and distribute information materials concerning mitigation, preparedness, and safety procedures for all identified natural hazards.
	S	Disseminate FEMA pamphlets to educate and encourage homeowners concerning preparedness, and mitigation actions such as structural and non-structural retrofit benefits.
	C	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.
	C	Develop outreach program with school district contests having students develop, display, and explain mitigation projects or initiatives such as severe weather.
	O	Update public emergency notification procedures and develop an outreach program for potential hazard impacts or events.
MH 2	**S**	The City will strive to 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.
	S	Develop and incorporate mitigation provisions and recommendations into all community plans and community development processes to maintain protect critical infrastructure, residences, and population from natural hazard impacts.
	S	Develop prioritized list of mitigation actions for threatened critical facilities and other buildings or infrastructure.
MH 3	**S**	Encourage utility companies to evaluate and harden vulnerable infrastructure elements for sustainability.
	S	Develop new barge landing and staging area due to increased Yukon River sedimentation preventing access to the existing barge landing area.
Natural-Hazards		
EQ 4		*None selected due to extremely low threat to residents*
ER 5	C	Harden culvert entrance bottoms and sides with asphalt, concrete, rock, or similar material to reduce erosion or scour.
	S	Install walls at the end of a drainage structure to prevent embankment erosion at its entrance or outlet. (end- or wing-walls).
	S	Create drainage ditches to divert water from run-off to prevent or reduce damage to roadbeds.
FL 6	**S**	Install or increase culvert sizes to improve their drainage capacity or efficiency.
	S	Construct debris basins to retain debris in order to prevent downstream drainage structure clogging.
	S	Create detention storage basins, ponds, reservoirs etc. to allow water to temporarily accumulate to reduce pressure on culverts and low water crossings allowing water to ultimately return to its watercourse at a reduced flow rate.
GF 7	C	Complete a ground failure (avalanche, landslide, permafrost etc.) location inventory; identify (and map) threatened critical facilities, residential buildings, infrastructure, and other essential buildings.
	S	Promote permafrost sensitive construction practices in permafrost areas.
	S	Seek training for existing personnel to properly grade and maintain City roads to reduce pot-hole reoccurrence.

Table 7-5 Mitigation Goals and Potential Actions

(Bold ID items were selected for implantation by the Planning Team)

Goal	Status *Consider Select Ongoing*	Description
	S	Acquire finding to resurface roads with high quality gravel (Village to St. Michael Slough – 3 miles and the road to Ghost Creek) to replace the soft soils to prevent recurring road damage.
SW 9	C	Develop and implement programs to coordinate maintenance and mitigation activities to reduce risk to public infrastructure from severe winter storms (snow load, ice, and wind).
	O	Develop, implement, and maintain partnership program with electrical utilities to use underground utility placement methods where possible to reduce or eliminate power outages from severe winter storms. Consider developing incentive programs.
	S	Develop and implement tree clearing mitigation programs to keep trees from threatening lives, property, and public infrastructure from severe weather events.
WF 10	**S**	Hold FireWise workshop to educate residents and contractors concerning fire resistant landscaping.
	S	Promote FireWise building siting, design, and construction processes and materials.
	S	Provide wildland fire hazard outreach information in an easily distributed format for all residents.
	O	Develop, adopt, and enforce burn ordinances that controls outdoor burning, require burn permits, and restricts open campfires during identified weather periods (windy, dry, etc.).

7.4 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 §201.6(c)(3)(iii): [The hazard mitigation strategy shall include an] action plan, describing how the action identified in paragraph (c)(3)(ii) of this section will be prioritized, implemented, and administered by the local jurisdiction. Prioritization shall include a special emphasis on the extent to which benefits are maximized according to a cost benefit review of the proposed projects and their associated costs.
ELEMENT C. MITIGATION STRATEGY
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))
Source: FEMA, October 2011.

The Planning Team evaluated and prioritized each of the mitigation actions on June 7, 2013 to determine which actions would be included in the Mitigation Action Plan. The Mitigation Action Plan (MAP) represents mitigation projects and programs to be implemented through the cooperation of multiple entities in the City. To complete this task, the Planning Team first prioritized the hazards that were regarded as the most significant within the community (earthquake, erosion, flood, ground failure, severe weather, and wildland fire).

The Planning Team reviewed the simplified social, technical, administrative, political, legal, economic, and environmental (STAPLEE) evaluation criteria (shown in Table 7-6) and the Benefit-Cost Analysis Fact Sheet (Appendix E) 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 7-6 Evaluation Criteria for Mitigation Actions

Evaluation Category	Discussion "It is important to consider…"	Considerations
Social	The public support for the overall mitigation strategy and specific mitigation actions.	Community acceptance Adversely affects 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 June 7, 2013, the hazard mitigation Planning Team prioritized 23 mitigation actions that were chosen to carry forward into the MAP. The hazard mitigation Planning Team considered each hazard's history, extent, and probability to determine each potential actions 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 MAP matrix was completed to provide the City with an approach to implementing their selected mitigation actions..

7.5 IMPLEMENTING A MITIGATION ACTION PLAN

Table 7-7 delineates the acronyms used in the Mitigation Action Plan (MAP) (Table 7-8). See Appendix A for complete agency funding source descriptions.

Table 7-7 Potential Funding Source Acronym List

City of Holy Cross (City)
Native Village of Holy Cross Tribal Council (Village)
Federal Management Agency (FEMA)/
Hazard Mitigation Assistance (HMA) Grant Programs,
Emergency Management Program Grant (EMPG)
Debris Management Grant
Flood Mitigation Assistance Grants
National Earthquake Hazards Reduction Program (NEHRP)
National Dam Safety Program (NDS)
US Department of Homeland Security (DHS)
Citizens Corp Program (CCP)
Emergency Operations Center (EOC)
Homeland Security Grant Program (HSGP)
Emergency Management Performance Grant (EMPG)
State Homeland Security Program (SHSP)
US Department of Commerce (DOC)/
Remote Community Alert Systems Program (RCASP)
National Oceanic and Atmospheric Administration (NOAA)
Denali Commission (Denali)
Energy Program,
Solid Waste Program,
Alaska Department of Military and Veterans Affairs (DMVA), Division of Homeland Security and Emergency Management (DHSEM)
Mitigation Section (for PDM & HMGP projects and plan development)
Preparedness Section (for community planning)
State Emergency Operations Center (SEOC for emergency response)
Alaska Department of Community, Commerce, and Economic Development (DCCED) Division of Community and Regional Affairs (DCRA)/
Community Development Block Grant (CDBG)
Alaska Climate Change Impact Mitigation Program (ACCIMP)
Flood Mitigation Assistance Grants (FMA)

Alaska Department of Transportation
State road repair funding

Alaska Energy Authority (AEA)
AEA/Bulk Fuel (ABF)
AEA/Alternative Energy and Energy Efficiency (AEEE)

Alaska Department of Environmental Conservation (DEC)/
Village Safe Water (VSW),
DEC/Alaska Drinking Water Fund (ADWF),
DEC/Alaska Clean Water Fund [ACWF],
DEC/Clean Water State Revolving Fund (CWSRF)

US Army Corp of Engineers (USACE)/
Planning Assistance
Capital Projects: Erosion, Flood, Ports & Harbors,

Alaska Division of Forestry (DOF)/
Volunteer Fire Assistance and Rural Fire Assistance Grant (VFAG/RFA),
Assistance to Firefighters Grant (AFG),
Fire Prevention and Safety (FP&S),
Staffing for Adequate Fire and Emergency Response Grants (SAFER)
Emergency Food and Shelter (EF&S)

US Department of Agriculture (USDA)/
Emergency Watershed Protection Program (EWP])
Emergency Conservation Fund (ECF),
Rural Development (RD)

US Geological Survey (USGS)
Alaska Volcano Observatory (AVO)

Assistance to Native Americans (ANA)
(NAFSMA),

Natural Resources Conservation Service (NRCS)/
Emergency Watershed Protection Program (EWP)
Wildlife Habitat Incentives Program (WHIP)
Watershed Planning

US Army Corps of Engineers (USACE)/
Planning Assistance Program

Lindbergh Foundation Grant Programs

Rasmuson Foundation Grants

The City's MAP, Table 7-8, depicts how each mitigation action will be implemented and administered by the Planning Team. The table delineates each selected mitigation action, its priorities, the responsible entity, the anticipated implementation timeline, and provides a brief explanation as to how the overall benefit/costs and technical feasibility were taken into consideration.

Table 7-8 City of Holy Cross Mitigation Action Plan (MAP) Matrix

(See acronym and abbreviations list for complete titles)

Goal/ Action ID	Project/Action Description	Priority (High, Medium, Low)	Responsible Entity	Potential Funding Source(s) (See Appendix A)	Time-frame (1-3 Years 2-4 Years 3-5 Years)	Benefit-Costs (BC) / Technical Feasibility (T/F)
Multi-Hazard (MH)						
MH 1.1	Identify and pursue funding opportunities to implement mitigation actions.	High	City of Holy Cross (City) and/or Holy Cross Tribe Council	City, Tribe	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.
MH 1.2	Develop, produce, and distribute information materials concerning mitigation, preparedness, and safety procedures for all identified natural hazards.	Medium	City & Tribal Councils	City, Tribe, FEMA HMA, HMGP, DOF (See Section 8.4)	Ongoing	B/C: FEMA provides free publications for community education purposes. TF: Low to no cost makes this a very feasible project to successfully educate large populations.
MH 1.3	Disseminate FEMA pamphlets to educate and encourage homeowners concerning preparedness, and mitigation actions such as structural and non-structural retrofit benefits.	Medium	City & Tribal Councils	City, Tribe, FEMA HMA programs, AFG, FP&S, and SAFER	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.

Table 7-8 City of Holy Cross Mitigation Action Plan (MAP) Matrix

(See acronym and abbreviations list for complete titles)

Goal/ Action ID	Project/Action Description	Priority (High, Medium, Low)	Responsible Entity	Potential Funding Source(s) (See Appendix A)	Time-frame (1-3 Years 2-4 Years 3-5 Years)	Benefit-Costs (BC) / Technical Feasibility (T/F)
MH 1.4	Update public emergency notification procedures and develop an outreach program for potential hazard impacts or events.	Medium	City & Tribal Councils	City, Tribe, FG, FP&S, SAFER	Ongoing	B/C: Sustained emergency response planning and 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. TF: This project is technically feasible using existing City staff
MH 2.1	The City will strive to 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.	Medium	City & Tribal Councils	City, Tribe, 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.
MH 2.2	Develop and incorporate mitigation provisions and recommendations into all community plans and community development processes to maintain protect critical infrastructure, residences, and population from natural hazard impacts.	Medium	City & Tribal Councils	City, Tribe, Denali Commission, DCRA	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 technically feasible because it requires application of knowledge of the hazard mitigation plan and other planning efforts. Feasibility is reliant on technical skills

Table 7-8 City of Holy Cross Mitigation Action Plan (MAP) Matrix

(See acronym and abbreviations list for complete titles)

Goal/ Action ID	Project/Action Description	Priority (High, Medium, Low)	Responsible Entity	Potential Funding Source(s) (See Appendix A)	Time-frame (1-3 Years 2-4 Years 3-5 Years)	Benefit-Costs (BC) / Technical Feasibility (T/F)
						already possessed by employees holding positions that would implement this action.
MH 2.3	Develop prioritized list of mitigation actions for threatened critical facilities and other buildings or infrastructure.	Medium	City & Tribal Councils	City, Tribe, Denali Commission, DCRA	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 action is feasible with limited fund expenditures.
MH 3.1	Encourage utility companies to evaluate and harden vulnerable infrastructure elements for sustainability.	Low	City & Tribal Councils	City, Tribe, HMA, NRCS, ANA, USACE, USDA, Lindbergh	1-5 years	B/C: This project would ensure threatened infrastructures are available for use – there loss would exacerbate potential damages and further threaten survivability. F: This project is feasible using existing staff skills, equipment, and materials.
MH 3.2	Develop new barge landing and staging area due to increased Yukon River sedimentation preventing access to the existing barge landing area.	High	City & Tribal Councils	City, Tribe, HMA, ANA, NRCS, USACE, USDA/EWP, USDA/ECP, DCRA/ ACCIMP	Ongoing	B/C: High water flows are being redirected by river sedimentation accumulation (formed a sand bar); this redirects water flow and ice jams away from the City but now prevents barge resupply access. Improving embankment and slope stability will greatly reduce potential infrastructure and residential losses. Project costs would outweigh replacement costs of lost facilities.

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Goal/ Action ID	Project/Action Description	Priority (High, Medium, Low)	Responsible Entity	Potential Funding Source(s) (See Appendix A)	Time-frame (1-3 Years 2-4 Years 3-5 Years)	Benefit-Costs (BC) / Technical Feasibility (T/F)
						TF: The community has the skill to implement this action. Specialized skills may need to be contracted-out with materials and equipment barged in depending on the method selected.
Natural Hazards						
ER 5.1	Install culvert "end"-walls to prevent embankment erosion at its entrance or outlet. (end- or wing-walls).	High	City & Tribal Councils	City, Tribe, HMA, ANA, NRCS, USACE, USDA/EWP, USDA/ECP, DCRA/ ACCIMP	2-4 years	B/C: This retrofit project can be a very cost effective method for bush communities as materials and shipping costs are very high. TF: This project is technically feasible as the community need only demonstrate cost savings by demonstrating losses from history utility impacts and down time.
ER 5.2	Create drainage ditches to divert water from run-off to prevent or reduce damage to roadbeds.	High	City & Tribal Councils	City, Tribe, HMA, ANA, Denali Commission, NRCS, USACE, USDA/EWP, USDA/ECP, DCRA/ ACCIMP	2-4 years	B/C: This retrofit project can be a very cost effective method for bush communities as materials and shipping costs are very high. TF: This project is technically feasible as the community need only demonstrate cost savings by demonstrating losses from history utility impacts and down time.
ER 5.3	Evaluate infrastructure erosion damages caused by rain and snowmelt run-off. Example damages occur along road system, structure foundation	High	City & Tribal Councils	City, Tribe, HMA, ANA, NRCS, USACE, USDA/EWP, USDA/ECP, DCRA/ ACCIMP	3-5 years	B/C: Pre-planning and implementing appropriate ground failure restoration or protection measures will greatly reduce or delay potential infrastructure and residential losses.

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	damages, and culverts.					Project costs would outweigh replacement costs of lost facilities. TF: The community has the skill to implement this action. Specialized skills may need to be contracted-out with materials and equipment barged in depending on the method selected.
FL 6.1	Install new culverts or increase existing culvert sizes to improve their drainage capacity or efficiency.	High	City & Tribal Councils	City, Tribe, HMA, ANA, Denali Commission, NRCS, USACE, USDA/EWP, USDA/ECP, DCRA/ ACCIMP	2-4 years	B/C: Improving water flow capability will greatly reduce potential infrastructure and residential losses. Project costs would outweigh replacement costs of lost facilities. TF: The community has the skill to implement this action. Specialized skills may need to be contracted-out with materials and equipment barged in depending on the method selected.
FL 6.2	Construct debris basins to retain debris in order to prevent downstream drainage structure clogging.	Medium	City & Tribal Councils	City, Tribe, HMA, ANA, Denali Commission, NRCS, USACE, USDA/EWP, USDA/ECP, DCRA/ ACCIMP	2-4 years	B/C: Hardening infrastructure to reduce erosion and flood damages reduces potential future damages and replacement costs. TF: The City has the technical capability to manage and conduct this project.
FL 6.3	Create detention storage basins, ponds, reservoirs etc. to allow water to temporarily accumulate to reduce pressure on culverts and low water crossings allowing water to ultimately	Medium	City & Tribal Councils	City, Tribe, HMA, ANA, Denali Commission, NRCS, USACE, USDA/EWP, USDA/ECP, DCRA/ ACCIMP	2-4 years	B/C: Improving water flow capability will greatly reduce potential infrastructure and residential losses. Project costs would outweigh replacement costs of lost facilities.

Table 7-8 City of Holy Cross Mitigation Action Plan (MAP) Matrix

(See acronym and abbreviations list for complete titles)

Goal/ Action ID	Project/Action Description	Priority (High, Medium, Low)	Responsible Entity	Potential Funding Source(s) (See Appendix A)	Time-frame (1-3 Years 2-4 Years 3-5 Years)	Benefit-Costs (BC) / Technical Feasibility (T/F)
	return to its watercourse at a reduced flow rate.					TF: The community has the skill to implement this action. Specialized skills may need to be contracted-out with materials and equipment barged in depending on the method selected.
GF 7.1	Promote permafrost sensitive construction practices in permafrost and other ground failure areas.	Medium	City & Tribal Councils	City, Tribe, HMA, ANA	2-4 years	B/C: This outreach project would decrease damage to facilities if they were sited and used the most appropriate construction practices. TF: Technically feasible as the community is currently working with UAF and other entities to determine most viable permafrost construction practices.
GF 7.2	Seek training for existing personnel to properly grade and maintain City roads to reduce pot-hole reoccurrence.	Low	City & Tribal Councils	City, Tribe, DOF: VFAGP, RAGP	3-5 years	B/C: Implementing this mitigation training activity will potentially reduce ancillary damage from rain, snow-melt, and traffic erosion. TF: This type activity is technically feasible within the community typically using existing labor, equipment, and materials.
GF 7.3	Acquire finding to resurface roads with high quality gravel (Village to St. Michael Slough – 3 miles and the road to Ghost Creek) to replace the soft soils to prevent recurring road damage.	High	City & Tribal Councils	City, Tribe, HMA, NRCS, ANA, USACE, USDA, Lindbergh Grants Program	1-5 years	B/C: This project would improve road surfaces which are essential for residents health and safety. F: This project is feasible using existing staff skills, equipment, and materials. Acquiring contractor expertise may be required for large facilities.

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SW 8.1	Develop and implement tree clearing mitigation programs to keep trees from threatening lives, property, and public infrastructure from severe weather events.	Low	City & Tribal Councils	City, Tribe, DOF: VFAGP, RAGP	3-5 years	B/C: Implementing this mitigation activities will potentially reduce ancillary damage from severe winter storms caused by heavy snow loads, icy rain, and wind. TF: This type activity is technically feasible within the community typically using existing labor, equipment, and materials.
WF 9.1	Hold FireWise workshop to educate residents and contractors concerning fire resistant landscaping.	Medium	City & Tribal Councils	City, Tribe, AFG, FP&S	1-3 Years	B/C: Sustained mitigation outreach programs have minimal cost and will help build and support community capacity enabling the public to appropriately prepare for, respond to, and recover from disasters. TF: This project is technically feasible using existing City and Tribal staff.
WF 9.2	Promote FireWise building siting, design, and construction processes and materials.	Medium	City & Tribal Councils	City, Tribe, AFG, FP&S	1-3 Years	B/C: Sustained mitigation outreach programs have minimal cost and will help build and support community capacity enabling the public to appropriately prepare for, respond to, and recover from disasters. TF: This project is technically feasible using existing City and Tribal staff.
WF 9.3	Provide wildland fire hazard outreach information in an easily distributed format for all residents.	Medium	City & Tribal Councils	City, Tribe, 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

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						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.
WF 9.4	Develop, adopt, and enforce burn ordinances that controls outdoor burning, require burn permits, and restricts open campfires during identified weather periods (windy, dry, etc.).	Medium	City & Tribal Councils	City, Tribe, AFG, FP&S, SAFER	Ongoing	B/C: Ordinance development, implementation, and enforcement can effectively reduce future losses to hazardous events. TF: This project is technically feasible and enforceable.

7.6 IMPLEMENTING MITIGATION STRATEGY INTO EXISTING PLANNING MECHANISMS

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

DMA 2000 Requirements
Incorporation into Existing Planning Mechanisms §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 C. Incorporate into Other Planning Mechanisms
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?
Source: FEMA, October 2011.

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.

- Review the community-specific regulatory tools to determine where to integrate the mitigation philosophy and implementable initiatives. These regulatory tools are identified in Section 7.1 capability assessment.
- Work with pertinent community departments to increase awareness for implementing HMP philosophies and identified initiatives. Provide assistance with integrating the mitigation strategy (including the Mitigation Action Plan) into relevant planning mechanisms (i.e. Comprehensive Plan, Capital Improvement Project List, Transportation Improvement Plan, etc.).
- Implementing this philosophy and activities may require updating or amending specific planning mechanisms.

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Appendix A
Federal, State, and Other Funding Resources

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Federal Funding 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 (http://www.fema.gov/plan/mitplanning/resources.shtm#1).
    - 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.
    - A Guide to Recovery Programs FEMA 229(4), September 2005. The programs described in this guide may all be of assistance during disaster incident recovery. Some are available only after a Presidential declaration of disaster, but others are available without a declaration. Please see the individual program descriptions for details. (http://www.fema.gov/txt/rebuild/ltrc/recoveryprograms229.txt)
    - 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, 2010. 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).

- FEMA also administers emergency management grants (http://www.fema.gov/help/site.shtm) and various firefighter grant programs (http://www.firegrantsupport.com/) such as
  - Emergency Management Performance Grant (EMPG). This is a pass through grant. The amount is determined by the State. The grant is intended to support critical assistance to sustain and enhance State and local emergency management capabilities at the State and local levels for all-hazard mitigation, preparedness, response, and recovery including coordination of inter-governmental (Federal, State, regional, local, and tribal) resources, joint operations, and mutual aid compacts state-to-state and nationwide. Sub-recipients must be compliant with National Incident Management System (NIMS) implementation as a condition for receiving funds. Requires 50% match.
  - Assistance to Fire Fighters Grant (AFG), Fire Prevention and Safety (FP&S), Staffing for Adequate Fire and Emergency Response Grants (SAFER), and Assistance to Firefighters Station Construction Grant programs. Information can be found at: (http://forestry.alaska.gov/fire/vfarfa.htm).
- Department of Homeland Security (DHS) provides the following grants:
  - Homeland Security Grant Program (HSGP), State Homeland Security Program (SHSP) are 80% pass through grants. SHSP supports implementing the State Homeland Security Strategies to address identified planning, organization, equipment, training, and exercise needs for acts of terrorism and other catastrophic events. In addition, SHSP supports implementing the National Preparedness Guidelines, NIMS, and the National Response Framework (NRF). Must ensure at least 25% of funds are dedicated towards law enforcement terrorism prevention-oriented activities.
  - Citizen Corps Program (CCP). The Citizen Corps mission is to bring community and government leaders together to coordinate involving community members in emergency preparedness, planning, mitigation, response, and recovery activities.
  - Emergency Operations Center (EOC) This program is intended to improve emergency management and preparedness capabilities by supporting flexible, sustainable, secure, strategically located, and fully interoperable Emergency Operations Centers (EOCs) with a focus on addressing identified deficiencies and needs. Fully capable emergency operations facilities at the State and local levels are an essential element of a comprehensive national emergency management system and are necessary to ensure continuity of operations and continuity of government in major disasters or emergencies caused by any hazard. Requires 25% match.
- U.S. Department of Commerce's grant programs include:
  - Remote Community Alert Systems (RCASP) grant for outdoor alerting technologies in remote communities effectively underserved by commercial mobile service for the

purpose of enabling residents of those communities to receive emergency messages. This program is a contributing element of the Warning, Alert, and Response Network (WARN) Act.

  - National Oceanic and Atmospheric Administration (NOAA), provides funds to the State of Alaska due to Alaska's high threat for tsunami. The allocation supports the promotion of local, regional, and state level tsunami mitigation and preparedness; installation of warning communications systems; installation of warning communications systems; installation of tsunami signage; promotion of the Tsunami Ready Program in Alaska; development of inundation models; and delivery of inundation maps and decision-support tools to communities in Alaska.

- Department of Agriculture (USDA). Disaster assistance provided includes: Emergency Conservation Program, Non-Insured Assistance, Emergency Forest Restoration Program, Emergency Watershed Protection, Rural Housing Service, Rural Utilities Service, and Rural Business and Cooperative Service. (http://www.fsa.usda.gov/FSA/webapp?area=home&subject=diap&topic=landing)
- Department of Energy (DOE), Office of Energy Efficiency and Renewable Energy, Weatherization Assistance Program (http://www1.eere.energy.gov/wip/wap.html). 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.
  - The Tribal Energy Program offers financial and technical assistance to Indian tribes to help them create sustainable renewable energy installations on their lands. This program promotes tribal energy self-sufficiency and fosters employment and economic development on America's tribal lands. (http://www1.eere.energy.gov/wip/tribal.html)
- US Environmental Protection Agency (EPA). Under EPA's Clean Water State Revolving Fund (CWSRF) program, each state maintains a revolving loan fund to provide independent and permanent sources of low-cost financing for a wide range of water quality infrastructure projects, including: municipal wastewater treatment projects; non-point source projects; watershed protection or restoration projects; and estuary management projects. (http://yosemite.epa.gov/R10/ecocomm.nsf/6da048b9966d22518825662d00729a35/7b68c420b668ada5882569ab00720988!OpenDocument)
  - Public Works and Development Facilities Program. This program provides assistance to help distressed communities attract new industry, encourage business expansion, diversify local economies, and generate long-term, private sector jobs. Among the types of projects funded are water and sewer facilities, primarily serving industry and commerce; access roads to industrial parks or sites; port improvements; business incubator facilities; technology infrastructure; sustainable development activities; export programs; brownfields redevelopment; aquaculture facilities; and other infrastructure projects. Specific activities may include demolition, renovation, and construction of public facilities; provision of water or sewer infrastructure; or the development of stormwater control mechanisms (e.g., a retention pond) as part of an

industrial park or other eligible project. (http://cfpub.epa.gov/fedfund/program.cfm?prog_num=51)

- 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. (http://www.acf.hhs.gov/programs/ana/programs/program_information.html)
- Department of Housing and Urban Development (HUD) provides a variety of disaster resources. They also partner with Federal and state agencies to help implement disaster recovery assistance. Under the *National Response Framework* the FEMA and the Small Business Administration (SBA) offer initial recovery assistance. (http://www.hud.gov/info/disasterresources_dev.cfm)
    - 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. (http://www.hud.gov/offices/cpd/communitydevelopment/programs/108/index.cfm)
    - HUD, Office of Homes and Communities, Section 184 Indian Home Loan Guarantee Programs. The Section 184 Indian Home Loan Guarantee Program is a home mortgage specifically designed for American Indian and Alaska Native families, Alaska Villages, Tribes, or Tribally Designated Housing Entities. Section 184 loans can be used, both on and off native lands, for new construction, rehabilitation, purchase of an existing home, or refinance.
    - Because of the unique status of Indian lands being held in Trust, Native American homeownership has historically been an underserved market. Working with an expanding network of private sector and tribal partners, the Section 184 Program endeavors to increase access to capital for Native Americans and provide private funding opportunities for tribal housing agencies with the Section 184 Program. (http://www.hud.gov/offices/pih/ih/homeownership/184/)
    - 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 (http://www.hud.gov/offices/cpd/communitydevelopment/programs/)
- 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. (http://www.workforcesecurity.doleta.gov/unemploy/disaster.asp)
    - The Workforce Investment Act contains provisions aimed at supporting employment and training activities for Indian, Alaska Native, and Native Hawaiian individuals.

The Department of Labor's Indian and Native American Programs (INAP) funds grant programs that provide training opportunities at the local level for this target population. (http://www.dol.gov/dol/topic/training/indianprograms.htm)

- U.S. Department of Transportation (DOT), Hazardous Materials Emergency Preparedness Grant. Increases State, Territorial, Tribal and local effectiveness in safely and efficiently handling hazardous materials accidents and incidents, enhance implementation of the Emergency Planning and Community Right-to-Know Act of 1986, and encourage a comprehensive approach to emergency training and planning by incorporating the unique challenges of responses to transportation situations, through planning and training. Requires a 20% local match.
- 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), Disaster Tax Relief. Provides extensions to current year's tax return, allows deductions for disaster losses, and allows amendment of previous year's tax returns (http://www.irs.gov/newsroom/article/0,,id=108362,00.html).
- Natural Resources Conservation Service (NRCS) has several funding sources to fulfill mitigation needs. Further information is located at: http://www.ak.nrcs.usda.gov/sitemap.html
    - The Emergency Watershed Protection Program (EWP). This funding source is designed is to undertake emergency measures, including the purchase of flood plain easements, for runoff retardation and soil erosion prevention to safeguard lives and property from floods, drought, and the products of erosion on any watershed whenever fire, flood or any other natural occurrence is causing or has caused a sudden impairment of the watershed.
    - Wildlife habitat Incentives Program (WHIP). This is a voluntary program for conservation-minded landowners who want to develop and improve wildlife habitat on agricultural land, nonindustrial private forest land, and Indian land.
    - Watershed Planning. NRCS watershed activities in Alaska are voluntary efforts requested through conservation districts and units of government and/or tribes. The watershed activities are lead locally by a "watershed management committee" that is comprised of local interest groups, local units of government, local tribal representatives and any organization that has a vested interest in the watershed planning activity. This committee provides direction to the process as well as provides the decision-making necessary to implement the process. Technical assistance is provided to the watershed management committee through a "technical advisory committee" comprised of local, state and federal technical specialist. These specialists provide information to the watershed management committee as needed to make sound decisions. NRCS also provides training on watershed planning organization and process.
- U.S. Small Business Administration (SBA) Disaster Assistance (http://www.sba.gov/category/navigation-structure/starting-managing-

business/managing-business/running-business/emergency-preparedness-and-disaster-) provides information concerning disaster assistance, preparedness, planning, cleanup, and recovery planning.

  - May provide low-interest disaster loans to individuals and businesses that have suffered a loss due to a disaster. (http://www.sba.gov/category/navigation-structure/loans-grants/small-business-loans/disaster-loans). Requests for SBA loan assistance should be submitted to DHS&EM.

- United States Army Corps of Engineers (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 (http://www.poa.usace.army.mil/en/cw/index.htm). The USACE is a member and co-chair of the Alaska Climate Change Sub-Cabinet.

State Funding Resources

- Department of Military and Veterans Affairs (DMVA): Provides damage appraisals and settlements for VA-insured homes, and assists with filing of survivor benefits. (http://veterans.alaska.gov/links.htm)

  - DHS&EM within DMVA 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 elevating, relocating, or acquiring hazard-prone properties. (http://www.ak-prepared.com/plans/mitigation/mitigati.htm)

    DHS&EM also provides mitigation funding resources for mitigation planning on their Web site at http://www.ak-prepared.com/plans/mitigation/localhazmitplan.htm.

- Division of Senior Services (DSS): Provides special outreach services for seniors, including food, shelter and clothing. (http://www.hss.state.ak.us/dsds/seniorInfoResources.htm)

- Division of Insurance (DOI): Provides assistance in obtaining copies of policies and provides information regarding filing claims. (http://www.dced.state.ak.us/insurance/)

- DCRA within the DCCED 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 division also administers programs for State's" distressed" and "targeted" communities. (http://www.commerce.state.ak.us/dca/)

  - DCRA Planning and Land Management staff provide Alaska Climate Change Impact Mitigation Program (ACCIMP) funding to Alaskan communities that meet one or more of the following criteria related to flooding, erosion, melting permafrost, or

other climate change-related phenomena: Life/safety risk during storm/flood events; loss of critical infrastructure; public health threats; and loss of 10% of residential dwellings.

The Hazard Impact Assessment is the first step in the ACCIMP process. The HIA identifies and defines the climate change-related hazards in the community, establishes current and predicted impacts, and provides recommendations to the community on alternatives to mitigate the impact. The community may then pursue these recommendations through an ACCIMP Community Planning Grant. (http://commerce.alaska.gov/dca/planning/accimp/hazard_impact.html)

- Department 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. (http://dec.alaska.gov/)
  - The Division of Water's Village Safe Water Program works with rural communities to develop sustainable sanitation facilities. Communities apply each year to VSW for grants for sanitation projects. Federal and state funding for this program is administered and managed by the State of Alaska's Village Safe Water (VSW) program. VSW provides technical and financial support to Alaska's smallest communities to design and construct water and wastewater systems. In some cases, funding is awarded by VSW through the Alaska Native Tribal Health Consortium, who in turn assist communities in design and construct of sanitation projects.
  - Municipal Grants and Loans Program. The Department of Environmental Conservation / Division of Water administer the Alaska Clean Water Fund (ACWF) and the Alaska Drinking Water Fund (ADWF). The division is fiscally responsible to the Environmental Protection Agency (EPA) to administer the loan funds as the EPA provides capitalization grants to the division for each of the loan funds. In addition, it is prudent upon the division to administer the funds in a manner that ensures their continued viability.
  - Under EPA's Clean Water State Revolving Fund (CWSRF) program, each state maintains a revolving loan fund to provide independent and permanent sources of low-cost financing for a wide range of water quality infrastructure projects, including: municipal wastewater treatment projects; non-point source projects; watershed protection or restoration projects; and estuary management, [and stormwater management] projects. (http://yosemite.epa.gov/R10/ecocomm.nsf/6da048b9966d22518825662d00729a35/7b68c420b668ada5882569ab00720988!OpenDocument)

    Alaska's Revolving Loan Fund Program, prescribed by Title VI of the Clean Water Act as amended by the Water Quality Act of 1987, Public Law 100-4. DEC will use the ACWF account to administer the loan fund. This Agreement will continue from year-to-year and will be incorporated by reference into the annual capitalization grant agreement between EPA and the DEC. DEC will use a fiscal year of July 1 to June 30

for reporting purposes.
(http://www.epa.gov/region10/pdf/water/srf/cwsrf_alaska_operating_agreement.pdf)

- 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.
  - 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 the safe, efficient, economical, and effective State highway, harbor, and airport operation. DOT/PF uses it's Planning, Design and Engineering, Maintenance and Operations, and Intelligent Transportation Systems resources to identify hazards, 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 temporary bridge replacements and materials necessary to make the multi-modal transportation system operational following natural disaster events.
- Department of Natural Resources (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 Alaska's mineral, land, and water resources use, development, and earthquake mitigation collaboration.

    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 information to the public. Information is available at: (http://www.dggs.dnr.state.ak.us/index.php?menu_link=publications&link=publications_search#)
  - The DNR's Division of Forestry (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.
    (http://forestry.alaska.gov/pdfs/08FireSuppressionMediaGuide.pdf)
  - DOF also manages various wildland fire programs, activities, and grant programs such as the FireWise Program (http://forestry.alaska.gov/fire/firewise.htm), Community Forestry Program (CFP) (http://forestry.alaska.gov/community/), Assistance to Fire Fighters Grant (AFG), Fire Prevention and Safety (FP&S), Staffing for Adequate Fire and Emergency Response Grants (SAFER), and Volunteer Fire Assistance and Rural Fire Assistance Grant (VFA-RFA) programs (http://forestry.alaska.gov/fire/vfarfa.htm). Information can be found at http://forestry.alaska.gov/fire/current.htm.

Other Funding 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. (http://dialoguemakers.org/Resourses4states+Nonprofits.htm)
- Denali Commission. Introduced by Congress in 1998, the Denali Commission is an independent federal agency designed to provide critical utilities, infrastructure, and economic support throughout Alaska. With the creation of the Denali Commission, Congress acknowledged the need for increased inter-agency cooperation and focus on Alaska's remote communities. Since its first meeting in April 1999, the Commission is credited with providing numerous cost-shared infrastructure projects across the State that exemplifies effective and efficient partnership between federal and state agencies, and the private sector. (http://www.denali.gov/index.php?option=com_content&view=section&id=1&Itemid=3)
    - The Energy Program primarily funds design and construction of replacement bulk fuel storage facilities, upgrades to community power generation and distribution systems, alternative-renewable energy projects, and some energy cost reduction projects. The Commission works with the Alaska Energy Authority (AEA), Alaska Village Electric Cooperative (AVEC), Alaska Power and Telephone and other partners to meet rural communities' fuel storage and power generation needs.
    - The goal of the solid waste program at the Denali Commission is to provide funding to address deficiencies in solid waste disposal sites which threaten to contaminate rural drinking water supplies.
- Lindbergh Foundation Grants. Each year, The Charles A. and Anne Morrow Lindbergh Foundation provides grants of up to $10,580 (a symbolic amount representing the cost of the Spirit of St. Louis) to men and women whose individual initiative and work in a wide spectrum of disciplines furthers the Lindberghs' vision of a balance between the advance

of technology and the preservation of the natural/human environment. (http://www.lindberghfoundation.org/docs/index.php/our-grants)

- Rasmuson Foundation Grants. The Rasmuson foundation invests both in individuals and well-managed 501(c)(3) organizations dedicated to improving the quality of life for Alaskans.

  The Foundation seeks to support not-for-profit organizations that are focused and effective in the pursuit of their goals, with special consideration for those organizations that demonstrate strong leadership, clarity of purpose and cautious use of resources.

The Foundation trustees believe successful organizations can sustain their basic operations through other means of support and prefer to assist organizations with specific needs, focusing on requests which allow the organizations to become more efficient and effective. The trustees look favorably on organizations which demonstrate broad community support, superior fiscal management and matching project support. (http://www.rasmuson.org/index.php)

Appendix B
Local Mitigation Plan Review Tool

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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: City of Holy Cross	**Title of Plan:** City of Holy Cross Hazard Mitigation Plan	**Date of Plan:** June 2013
Local Point of Contact: Connie Walker	**Address:** P.O. Box 227 Holy Cross, AK 99602	
Title: City Administrator		
Agency: City of Holy Cross		
Phone Number: 907.476.7139	**E-Mail:** cityofholycross@gci.net	

State Reviewer:	**Title:**	**Date:**
Scott Nelsen	Mitigation Planner	2 August 2013

FEMA Reviewer: Brett Holt	**Title:** Mitigation Planner	**Date:** September 11, 2013
Date Received in FEMA Region X	August 5, 2013	
Plan Not Approved		
Plan Approvable Pending Adoption	September 11, 2013	
Plan Approved	November 7, 2013	

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 **Regulation** (44 CFR 201.6 Local Mitigation Plans)	**Location in Plan** (section and/or page number)	**Met**	**Not Met**
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))	Section 3.1, Page 3-2 Section 3.2, Page 3-2	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))	Section 3.3, Page 3-3	X	
A3. Does the Plan document how the public was involved in the planning process during the drafting stage? (Requirement §201.6(b)(1))	Section 3.3, Page 3-3	X	
A4. Does the Plan describe the review and incorporation of existing plans, studies, reports, and technical information? (Requirement §201.6(b)(3))	Section 3.4, Page 3-4, p. 8-1	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))	Section 3.5.2, Page 3-6	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))	Section 3.5.3,Page 3-6	X	
ELEMENT A: REQUIRED REVISIONS			

1. REGULATION CHECKLIST **Regulation** (44 CFR 201.6 Local Mitigation Plans)	**Location in Plan** (section and/or page number)	**Met**	**Not Met**
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))	Section 5.2, Page 5-1 Table 5-1, Page 5-2 ***Earthquake*** Section 5.3.1, Page 5-5 ***Erosion***, Section 5.3.2, Page 5-11 ***Flood***, Section 5.3.3, Page 5-13 ***Ground Failure*** Section 5.3.4 Page 5-20 ***Weather (Severe)*** Section 5.3.5, Page 5-24 ***Wildland Fire***, Section 5.3.6, Page 5-29	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))	***Earthquake***, Section 5.3.1.2 History, Page 5-6 Section 5.3.1.3 Probability, Page 5-10 ***Erosion***, Sec. 5.3.2.2, History, Page 5-11 Section 5.3.2.3 Probability, Page. 5-13 ***Flood***, Section 5.3.3.2 History, Page 5-14 Section 5.3.3.3 Probability, Page 5-20 ***Ground Failure***, Section 5.3.4.2 History, Page 5-22 Section 5.3.4.3 Probability, Page 5-24 ***Weather (Severe)*** Section 5.3.5.2 History, Page 5-25 Section 5.3.5.3 Probability, Page 5-29 ***Wildland Fire***, Section 5.3.6.2 History Page 5-30 Section 5.3.6.3 Probability, Page 5-35	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))	***Earthquake***, Section 5.3.1.3 Impact, Page 5-9 Extent, Page 5-9 ***Erosion***, Section 5.3.2.3, Impact, Page 5-13 Extent, Page 5-12 ***Flood***, Section 5.3.3.3 Impact, Page 5-19 Extent, Page 5-18 ***Ground Failure***, Section 5.3.4.3 Impact, Page 5-23 Extent, Page 5-23 ***Weather (Severe)*** Section 5.3.5.3 Impact, Page 5-29 Extent, Page 5-28 ***Wildland Fire***, Section 5.3.6.3 Impact, Page 5-34 Extent Page 5-34 **Vulnerability Analysis** Chapter 6, Page 6-1 through Page 6-18	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))	Section 6.4. Page 6-11	X	
ELEMENT B: REQUIRED REVISIONS			

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))	Section 7.1, Page 7-2 Tables 7-1, 7-2, 7-3, Page 7-2	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))	Section 1.1, Page 1-3 Section 6.4.1. Page 6-11	X	
C3. Does the Plan include goals to reduce/avoid long-term vulnerabilities to the identified hazards? (Requirement §201.6(c)(3)(i))	Section 7.2 Table 7-4, Page 7-4	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))	Section 7-3 Table 7-5, Page 7-6	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))	Section 7-4, Process, Page 7-7 Section 7.5 Implementation Plan Tables 7-7, 7-8, Page 7-10	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))	Section 7.6 Page 7-20	X	
ELEMENT C: REQUIRED REVISIONS			

1. REGULATION CHECKLIST **Regulation** (44 CFR 201.6 Local Mitigation Plans)	Location in Plan (section and/or page number)	Met	Not Met
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))		N/A	
D2. Was the plan revised to reflect progress in local mitigation efforts? (Requirement §201.6(d)(3))		N/A	
D3. Was the plan revised to reflect changes in priorities? (Requirement §201.6(d)(3))		N/A	
ELEMENT D: REQUIRED REVISIONS			
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))	Section 4.1, Page 4-1	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		
ELEMENT E: REQUIRED REVISIONS			
ELEMENT F. ADDITIONAL STATE REQUIREMENTS (OPTIONAL FOR STATE REVIEWERS ONLY; NOT TO BE COMPLETED BY FEMA)			
F1.			
F2.			
ELEMENT F: REQUIRED REVISIONS			

SECTION 2:

PLAN ASSESSMENT

Element A. Plan Strengths and Opportunities for Improvement

This section provides a discussion of the strengths of the plan document and identifies areas where these could be improved beyond minimum requirements.

Element A: Planning Process

Plan Strengths

- The outreach material is detailed and well done.

Opportunities for Improvement

- Provide a list of all public comments and how they were addressed.

Element B: Hazard Identification and Risk Assessment

Plan Strengths

- The exposure analysis by hazard provides good detail on how the community may be impacted by the different hazards.

Opportunities for Improvement

- On page 5-34, the plan identifies that "fuels data is not readily available" for the wildfire hazard. Consider this as a strategy for the plan update so that the data is available for an improved analysis.
- Though the village does not identify any regulatory tools on page 7-2, the plan should identify if these are capability gaps that need to be addressed.

Element C: Mitigation Strategy

Plan Strengths

- The community went through an excellent prioritization process to determine what strategies to focus on.

Opportunities for Improvement

- The community identified a lot of great strategies. It may want to consider the top 3-5 strategies to specifically pursue so that efforts are focused with limited resources.

B. Resources for Implementing Your Approved Plan

- The **Local Mitigation Plan Review Guide and Tool** resource is available through FEMA's Library and should be referred to for the next plan update. http://www.fema.gov/library/viewRecord.do?id=4859
- The **Local Mitigation Planning Handbook** is available. While the requirements under §201.6 have not changed, the *Handbook* provides guidance to local governments on developing or updating hazard mitigation plans to meet the requirements is available through the FEMA Library website. http://www.fema.gov/library/viewRecord.do?id=7209
- The **Mitigation Ideas: A Resource for Reducing Risk from Natural Hazards** resource presents ideas for how to mitigate the impacts of different natural hazards, from drought and sea level rise, to severe winter weather and wildfire. The document also includes ideas for actions that communities can take to reduce risk to multiple hazards, such as incorporating a hazard risk assessment into the local development review process. http://www.fema.gov/library/viewRecord.do?id=6938
- The **Integrating Hazard Mitigation Into Local Planning: Case Studies and Tools for Community Officials** resource provides practical guidance on how to incorporate risk reduction strategies into existing local plans, policies, codes, and programs that guide community development or redevelopment patterns. It includes recommended steps and tools to assist with local integration efforts, along with ideas for overcoming possible impediments, and presents a series of case studies to demonstrate successful integration in practice. http://www.fema.gov/library/viewRecord.do?id=7130
- The FEMA Region X Risk Mapping, Analysis, and Planning program (RiskMAP) releases a monthly newsletter that includes information about upcoming events and training opportunities, as well as hazard and risk related news from around the Region. Past newsletters can be viewed at http://www.starr-team.com/starr/RegionalWorkspaces/RegionX/Pages/default.aspx. If you would like to receive future, email rxnewsletter@starr-team.com.
- The mitigation strategy includes projects that are eligible for FEMA's grant programs. Contact the State Hazard Mitigation Officer, Ann Gravier, at ann.gravier@alaska.gov for application information.

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).

NOTE* **See Page A-10 & A-11 for City contact information**

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
1	Holy Cross	City					Y	Y	Y	Y	Y	N/A

Appendix C
Adoption Resolution

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City of Holy Cross

P.O. BOX 227
HOLY CROSS, ALASKA 99602
(907) 476-7139 • FAX (907) 476-7141

Resolution of Adoption
14-2

City of Holy Cross, State of Alaska Hazard Mitigation Plan

WHEREAS, the City of Holy Cross is vulnerable to damages from natural hazardous events which pose a threat to public health and safety and could result in property loss and economic hardship;

WHEREAS, a Hazard Mitigation Plan (the Plan) has been developed through the work of the City of Holy Cross Planning Team, and interested parties within the City of Holy Cross;

WHEREAS, the Plan recommends hazard mitigation actions that will protect people and property affected by natural hazards that face the City of Holy Cross, that will reduce future public, private, community, and personal costs of disaster response and recovery; and that will reinforce the City of Holy Cross's leadership in emergency preparedness efforts;

WHEREAS, the Disaster Mitigation Act of 2000(P.L. 106-390) (DMA 2000) and associated Federal regulations published under 44 CFR Part 201 require the City of Holy Cross to formally adopt a Hazard Mitigation Plan subject to the approval of the Federal Emergency Management Agency to be eligible for federal hazard mitigation projects and activities funds;

WHEREAS, public meetings were held to receive comment on the Plan as required by DMA 2000;

NOW THEREFORE BE IT RESOLVED by the City Council of Holy Cross that:

1. The Plan is hereby adopted as an official plan of the City of Holy Cross.

2. The City of Holy Cross officials identified in the Mitigation Action Plan (Section 8) are hereby directed to implement the recommended acions assigned to them. These officials will report quarterly on their activities, accomplishments, and progress to the City Council.

3. The City of Holy Cross Hazard Mitigation Planning Team will provide annual progress reports on the status of the implemented Mitigation Action Plan's projects to the Planning Team Leader. This report shall be submitted to the City Council annually by the Planning Team Leader. This report shall be submitted to the City Council annually by the Plan's adoption anniversary date.

4. The City of Holy Cross Planning Team, will complete periodic updates of the Plan as indicated in the Plan Maintenance Section (Section 8), but no less frequently than every five years.

NOW THEREFORE BE IT RESOLVED by the City Council that the City of Holy Cross adopts the City of Holy Cross Hazard Mitigation Plan, dated_____, 2013 as this jurisdiction's Hazard Mitigation Plan, and resolves to execute the actions in the Plan

ADOPTED this 25, 2013 at The meeting of the City of Holy Cross Council.

Rebecca Demientieff, Mayor

Appendix D
Public Outreach

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Memorandum

700 G Street, Suite 500
Anchorage, AK 99503
Phone: 907.261.9706
Fax: 907.562.1297

SUBJECT: Hazard Mitigation Plan (HMP) – Holy Cross Kick-Off – Team Meeting

Community: City of Holy Cross, AK; Meeting Hall :476.7109

Date/Time: June 22, 2012

From: R. Scott Simmons

Attendees:

URS: Tim Kramer

Community Members:

- Mayor Rebecca Turner
- Rebecca Turner
- Jacqueline Turner
- Adrian Wright
- Evan Newman
- Laverne Turner
- Christy Turner
- Victor Laveira
- Roslie Wolfe

- **Subjects covered included:**
  - URS was hired to develop hazard mitigation plans for 15 rural Alaskan communities. The City of Holy Cross selected to identify mitigatable natural hazard threats, potential impacts, population threatened, and develop a mitigation strategy to enable the City of address those hazards.
  - It is URS' responsibility to write the plan and take on the bulk of the work to guarantee FEMA compliance, but we need several critical items that only the community can provide:
    - The attendees identified and screened hazards that impact the community and provided brief histories. Attendees also screened which hazards need to be profiled and included in the plan.
    - URS explained previously sent Data Sheets (homework) and how they would be used
    - Asked the City to review the Critical Facilities Inventory Spreadsheet andto list any facilities not on the identified. The list needs additional information such as facilities' physical locations (GPS coordinates and/or street addresses), estimated values, and estimated number of occupants to enable URS to complete a usable risk assessment and vulnerability analysis.
    - The Capability Assessment Data Sheet lists community resources for implementing and administering projects
    - Mayor Turner mentioned a few concerns about snow-melt and rain run-off destroying the roads within the community such as main street, Ghost Creek Road, and others.
    - Planning Team members identified flood impacts Ghost Creek Road, approximately one mile from the village, preventing access to subsistence locations, culver upgrades in various locations, boat landing beach wash-outs, and fuel header hardening to prevent damage from storm surge or water craft. Members also stated that wildland/tundra fires occur in the nearby mountains and from residents burning trash at the landfill when they do not use the Tribal Village's burn-boxes.
  - URS explained, that a mitigation plan ensures community eligibility for FEMA and potentially other federal agency funding, which they are not currently eligible for... the more the information gathered, the better the plan. The HMP along prepares the community to potentially obtain funding to implement projects.

700 G Street, Suite 500
Anchorage, AK 99503
Phone: 907.261.9706
Fax: 907.562.1297

- Public meetings and newsletters provide the public opportunities to contribute to the process and lets the public know where a copy of the plan is available for review, etc.

- **City of Holy Cross Planning Team**
  - URS encourages the team to take-on HMP data gathering – spread the work among the team members reducing the workload on the Team Leader, and to have periodic meetings to check progress and to obtain guidance from URS which can save time for everyone. Teams are far more successful than any individual as one idea can lead to several – increasing the Team's success.
  - Public Involvement will help the team:
    - Identify known natural hazards
    - Identify additional critical facilities
    - List historic events and subsequent damage information
    - List potential hazard locations with as much information available
  - URS encourages public meetings or teleconferences during HMP development to fulfill FEMA requirements, provide public awareness of the hazards that potentially threaten the community, and to gain public support for projects to protect infrastructure and the population.

CITY OF CITY OF HOLY CROSS HAZARD MITIGATION PLAN

June 2012

This newsletter discusses the preparation of the City of Holy Cross Hazard Mitigation Plan. It has been prepared to inform interested agencies, stakeholders, and the public about the project and to solicit comments. This newsletter can also be viewed on the State of Alaska Division of Homeland Security and Emergency Management Website at http://www.ready.alaska.gov/plans/localhazmitplans.htm.

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 prepare Hazard Mitigation Plans (HMP) for fifteen Alaskan Communities. The City of Holy Cross was selected for participation in this effort.

URS was contracted to assist the community with preparing a FEMA approvable hazard mitigation plan and subsequent hazard mitigation grant program application during 2012 and 2013.

The Holy Cross Hazard Mitigation Plan will identify all natural hazards, such as earthquake, erosion, flood, severe weather, and wildland fire hazards and others. The plan will also identify the people and facilities potentially at risk and ways to mitigate damage from future hazard impacts. The public participation and planning process is documented as part of these projects.

What is Hazard Mitigation?

Across the United States, natural and human-caused disasters have increasingly caused injury, death, property damage, and business and government service interruptions. The toll on individuals, families, and businesses can be very high. The time, money, and emotional effort required to respond to and recover from these disasters takes public resources and attention away from other important programs and problems.

The people and property in the State of Alaska are at risk from a variety of natural hazards that can potentially cause human injury, property damage, or environmental harm.

Hazard mitigation projects eliminate the risk or reduce the hazard impact severity to people and property. Projects may include short- or long-term activities to reduce exposure to or the effects of known hazards. Hazard mitigation activities include relocating or elevating buildings, replacing insufficiently sized culverts, using alternative construction techniques, or developing, implementing, or enforcing building codes, and education.

Why Do We Need A Hazard Mitigation Plan?

Communities must have a State, FEMA approved, and community adopted mitigation plan to receive a project grant from FEMA's pre- and post- disaster grants identified in their Hazard Mitigation Assistance and other agency's mitigation grant programs. The City of Holy Cross plans to apply for mitigation funds after our plan is complete.

A FEMA approved and community adopted HMP enables the Local government to apply for the Hazard Mitigation Grant Program (HMGP), a disaster related assistance program. Applicants typically compete on a statewide basis.

The Pre-Disaster Mitigation (PDM), Flood Mitigation Assistance (FMA), Repetitive Flood Loss (RL), Severe Repetitive Flood Loss (SRL) grant programs are nationally competitive funding programs. These grans use the same application process and eligibility requirements.

The Planning Process

There are very specific federal requirements that must be met when preparing a hazard mitigation plan. These requirements are commonly referred to as the Disaster Mitigation Act of 2000, or DMA2000 criteria. Information about the criteria and other applicable laws and regulations may be found at: http://www.fema.gov/plan/mitplanning/guidance.shtm

The DMA2000 requires the plan to include and document the following topics:

- Plan development process
- Identify hazards specific to the community
- Identify the population's and structures' risks
- Define the jurisdiction's mitigation goals
- List the community's mitigation strategy, selected actions, and implemented projects
- Provide a copy of the community's HMP Adoption Resolution

FEMA has prepared Planning Guidance which is available at: http://www.fema.gov/library/viewRecord.do?id=4225; and "How to" Guides that explain in detail how each of the DMA2000 requirements are met. These guides are available at http://www.fema.gov/plan/mitplanning/resources.shtm.

The City's Hazard Mitigation Plan will follow those guidelines.

We are currently in the very beginning stages of preparing the plan. We will be conducting a public meeting to introduce the project and planning team, and to gather comments from our community residents. Specifically we will complete the hazard identification task, and collect data to conduct the risk assessment.

DHS&EM has previously identified natural hazards that occur in the Iditarod Area Regional Educational Attendance Area (REAA) that may also occur specifically in Holy Cross.

We Need Your Help

Please use the following table to identify any hazards you have observed in your area that DHS&EM is not aware of AND any additional natural hazards that may not be on the list.

Holy Cross Hazard Worksheet		
Hazard	Iditarod Area REAA*	Holy Cross
Avalanche	Yes (Low)	No
Earthquake	Yes (Low)	No
Erosion	Yes (1)	Yes
Flood	Yes (High) (6)	Yes
Ground Failure (Landslide, Permafrost)	Yes	No
Tsunami & Seiche	No	No
Volcano	No	No
Weather (Severe)	Yes (High)	Yes
Wildland (Tundra) Fire	Yes (2)	Yes

**Hazard Matrix from the 2010 State of Alaska Hazard Mitigation Plan for the Iditarod Area REAA.*

(Parenthesis indicate threat level and number of recorded events)

DHS&EM identified critical facilities within the City of Holy Cross as part of the Alaska Critical Facilities Inventory, but the list of critical facilities needs to be updated and the estimated value and location (latitude/longitude) determined.

In addition, the number and value of structures, and the number of people living in each structure will need to be documented. Once this information is collected we will determine which critical facilities, residences, and populations are vulnerable to specific hazards in Holy Cross. Please add additional facilities if needed.

Holy Cross Critical Facilities*	
Facility Type	Facility Name
City Offices	Church Fuel Storage Tanks
Deloycheet & TCC Offices	City Fuel Storage Tanks
Tribal Building	School Tanks
Vacant National Guard Armory	Village Corp Fuel Storage Tanks
Post Office	Washeteria
Airport	Holy Cross Water System
City Shop	Water Tank
DOT Airport Shop	Water Treatment Plant/Pump house
Boat Landing	FM at school
Holy Cross School	Microwave Repeater
Youth Center	Landfill/Incinerator
Teachers Quarters	Waste Water Treatment Facility
Community Hall	Sewage Lagoon
Church	Lift Station
Patricia's Store	Bush Tell (Telephone)
Tweedies Store	ARCS TV Receiver at City Office
Cemetery	School Satellite Receiver/Internet
AVEC Power Facility	Telephone Receiver at Tribal Office
School backup generator	Telephone Receiver at Tribal Office
AVEC Fuel Storage Tanks	
* Alaska Critical Facilities Inventory	

Please email or fax updated hazard and critical facility information directly to URS or provide it to your community planning & project team leader.

The Planning Team

The planning team is being led by Mayor Rebecca Turner (Planning Team Leader), City Administrator Adrian Wright, City Clerk Jacqueline Turner, and City Council Members. URS Corporation has been contracted by DHS&EM to provide assistance and guidance to the planning team throughout the planning process.

Public Participation

Public involvement will continue throughout the project. The goal is to receive comments, identify key issues or concerns, and improve ideas for mitigation. When the Draft Holy Cross Hazard Mitigation Plan is complete, the results will be presented to the community before DHS&EM and FEMA approval, and community adoption.

We encourage you to take an active part in preparing the City of Holy Cross' Hazard Mitigation Plan development effort. The purpose of this newsletter is to keep you informed and to allow you every opportunity to voice your opinion regarding these important projects. Please contact your community representative or Scott Simmons, URS directly if you have any questions, comments, or requests for more information:

Holly Cross Planning Team Leader
Rebecca Turner, Mayor
P. O. Box 227
Holy Cross, Alaska 99602
476.7139
cityofholycross@gci.net

URS Corporation
Scott Simmons, Hazard Mitigation, Emergency Management, and Climate Change Planner
560 E 34th Avenue, Suite 200
Anchorage, Alaska 99503
261.9706 OR 800.909.6787
scott_Simmons@urscorp.com

Division of Homeland Security & Emergency Management
Ervin Petty, State Support
PO Box 5750
Anchorage, AK 99505-5750
428.7010 or 800.478.2337
scott.nelsen@alaska.gov

URS

FAX TRANSMISSION

3201 C Street Avenue, Suite 200
Anchorage, Alaska 99503

Phone: 907.433.6711
Fax: 907.644.6930

TO:

Name: Connie Walker	Telephone Number: 907.476.7139	Date: 6/7/2013
Company: City of Holy Cross	Fax Number: 907.476.7141	Number of Pages: 6 w/cover sheet

FROM:

Name: Scott Simmons	Fax Number: 907.644.6930	Telephone Number: 800.909.9767 Direct: 907.433.6711
Subject: Mitigation project selection sheet – review		

Comments:

Hello Connie,

Thank you for fitting me in with completing the mitigation plan project selection list. I have attached the work sheets we worked through yesterday for your review.

I will include those identified as selected with an "s" and for those that are considered as ongoing actions marked with an "O" within the plan's Mitigation Strategy.

I noticed a couple others that I believe are beneficial to the community or that are being fulfilled with the HMP. For example:

S: Develop and incorporate mitigation provisions and recommendations into all community plans and community development processes to maintain protect critical infrastructure, residences, and population from natural hazard impacts.

S: Develop prioritized list of mitigation actions for threatened critical facilities and other buildings or infrastructure.

S: Develop new barge landing and staging area due to increased Yukon River sedimentation preventing access to the existing barge landing area.

I reworded this one:

S: Disseminate FEMA pamphlets to educate and encourage homeowners concerning preparedness, and mitigation actions such as structural and non-structural retrofit benefits.

Please let me know if you desire any changes to this list.

Thank you!

Mitigation Goals and Action Items Considered

Table 7-4 Mitigation Goals

No.	Goal Description
Multi-Hazards (MH)	
MH 1	Promote recognizing and mitigating natural hazard damage and loss that could potentially affect the City Village of **Holy Cross** (City).
MH 2	Promote cross-referencing mitigation goals and actions with other City and Tribal planning mechanisms and projects.
MH 3	Reduce potential damage and loss from all natural hazards that affect the City.
Natural Hazards	
EQ 4	Reduce potential vulnerability to **earthquake** (EQ) damage and loss.
ER 5	Reduce potential **erosion** (ER) damage and loss.
FL 6	Reduce potential **flood** (FL) damage and loss.
GF 7	Reduce potential **ground failure** (GF) damage and loss.
SW 8	Reduce potential vulnerability to **severe weather** (SW)damage and loss.
WF9	Reduce potential vulnerability to **tundra/wildland fire** (WF) damage and loss.

Once we refine the goals, we then take the potential projects and match them against the goals.

The Hazard ID column lists each goal. The Selected Status items will be displayed in "bold" text to identify those Considered and Selected for implementation by the City and carried forward into Table 7-8, Mitigation Strategy. For example, the first Selected action would be listed in Table 7-8 as MH 1.1 etc.

Mitigation Projects the City considered and selected:

Mitigation Action Items to Consider and Select

Hazard	Status **C**onsidered **S**elected **O**ngoing	Description
Natural Hazards		
Multi-Hazard (MH) 1	**S**	Identify and pursue funding opportunities to implement mitigation actions.
		Hold an annual or biennial "hazard meeting" to provide information to residents about recognition and mitigation of all natural hazards that affect the City of Holy Cross.
		Establish a formal role for the Hazard Mitigation Planning Team to develop a sustainable process to implement, monitor, review, and evaluate community wide mitigation actions.
	S	Develop, produce, and distribute information materials concerning mitigation, preparedness, and safety procedures for all identified natural hazards.
		Develop and implement strategies and educational outreach programs for debris management from natural hazard events.
	S	Disseminate FEMA pamphlets to educate and encourage homeowners concerning preparedness, and mitigation actions such as structural and non-structural retrofit benefits.
	C	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.
	C	Develop outreach program with school district contests having students develop, display, and explain mitigation projects or initiatives such as severe weather.
		Investigate benefits of, and potentially Join the National Flood Insurance Program to reduce monetary losses to individuals and the community.
		Identify critical facilities and vulnerable populations based on identified (and mapped where applicable) high hazard areas.
		Identify evacuation routes away from high hazard areas and develop outreach program to educate the public concerning warnings and evacuation procedures.
		Acquire emergency warning sirens to communicate critical emergency warnings and alerts.
	O	Update public emergency notification procedures and develop an outreach program for potential hazard impacts or events.
MH 2	**S**	The City will strive to 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.
	S	Develop and incorporate mitigation provisions and recommendations into all community plans and community development processes to maintain protect critical infrastructure, residences, and population from natural hazard impacts.
		Review ordinances and develop outreach programs to assure propane tanks are properly anchored and hazardous materials are properly stored and protected from known natural hazards such as flood or seismic events.
		Integrate the Mitigation Plan findings for enhanced emergency planning.
		Develop, incorporate, and enforce building ordinances commensurate with building codes to reflect survivability from flood, fire, wind, seismic, and other hazards to ensure occupant safety.
		Update or develop, implement, and maintain jurisdictional debris management plans.
		Prohibit new construction in identified mitigatable hazard impact areas (avalanche, erosion, flood, permafrost, etc.) or require building to applicable building codes for other hazard impacts (earthquake, volcanic ash, weather, etc.).
		Identify and list repetitively flooded structures and infrastructure, analyze the threat to these facilities, and raise mitigation action priorities to protect the threatened population.

Mitigation Action Items to Consider and Select

Hazard	Status **C**onsidered **S**elected **O**ngoing	Description
		Perform hydrologic and hydraulic engineering, and drainage studies and analyses. Use information obtained for feasibility determination and project design. This information should be a key component, directly related to a proposed project.
	S	Develop prioritized list of mitigation actions for threatened critical facilities and other buildings or infrastructure.
		Develop process to regulate future development in high landslide potential areas (permitting, geotechnical review, soil stabilization techniques, etc.).
		Update Emergency Response Plans to discuss volcanic ashfall, tsunami, and stormwater event management, prioritize response actions, and initiate actions to fill capability gaps.
MH 3		Increase power line wire size and incorporate quick disconnects (break-away devices) to reduce ice load and windstorm power-line failure during severe wind or winter ice storm events.
	S	Encourage utility companies to evaluate and harden vulnerable infrastructure elements for sustainability.
		Acquire (buy-out), demolish, or relocate structures from hazard prone area (erosion, flood, ground failure, etc.) Property deeds "must be" restricted for open space uses for perpetuity to keep people from rebuilding in known hazard areas.
		Harden utility headers located along river embankments to mitigate potential flood, debris, and erosion damages.
		Purchase and install generators with main power distribution disconnect switches for identified and prioritized critical facilities susceptible to short term power disruption. (i.e. first responder, medical facilities, schools, correctional facilities, and water and sewage treatment plants, etc.)
		Develop vegetation projects to restore clear-cut and riverine erosion damage and to slope stability in avalanche and landslide areas.
		Develop an outreach program to educate public concerning NFIP participation benefits, floodplain development, land use regulation, and NFIP flood insurance availability to facilitate continued compliance with the NFIP.
		Develop, implement, and enforce floodplain management ordinances.
		Develop outreach program to educate residents concerning flood proofed well and sewer/septic facility installations.
		Update the Stormwater Management Plan to include regulations to control runoff, both for flood reduction and to minimize ground failure from saturated soils, steep slope collapse, and erosion or scour.
		Develop a vegetation management plan addressing slope-stabilizing root strength to maintain or encourage precipitation containment.
		Develop land use guidelines to minimize vegetation removal to maintain slope stability to reduce rain, snowmelt run-off, and erosion.
	S	Develop new barge landing and staging area due to increased Yukon River sedimentation preventing access to the existing barge landing area.
EQ 4	None	Evaluate critical public facilities with significant seismic vulnerabilities and complete retrofit. (e.g. evaluate fire stations, public works buildings, potable water systems, wastewater systems, electric power systems, and bridges, etc.)
		Inspect, prioritize, and retrofit any critical facility or public infrastructure that does not meet current State Adopted Building Codes.
		Install non-structural seismic restraints for large furniture such as bookcases, filing cabinets, heavy televisions, and appliances to prevent toppling damage and resultant injuries to small children, elderly, and pets.
ER 5		Develop mitigation initiatives 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.

Mitigation Action Items to Consider and Select

Hazard	Status **C**onsidered **S**elected **O**ngoing	Description
	C	Harden culvert entrance bottoms and sides with asphalt, concrete, rock, or similar material to reduce erosion or scour.
	S	Install walls at the end of a drainage structure to prevent embankment erosion at its entrance or outlet. (end- or wing-walls).
	S	Create drainage ditches to divert water from run-off to prevent or reduce damage to roadbeds.
FL 6		Develop and maintain NFIP compliant Repetitive Loss, Severe Repetitive Loss, and Repetitive Flood Claim (RFC) property inventory. Inventory should include property type, structure type, number of buildings, and their geo-referenced locations.
		Establish flood mitigation priorities for critical facilities, residential structures, and commercial buildings located within the identified flood hazard area(s) (100- and 500-year floodplains, stormwater, etc.) based on current Base Flood Elevation (BFE) survey elevation data.
		Determine and implement most cost beneficial and feasible mitigation actions for locations with repetitive flooding, significant historical damages, or road closures.
		Elevate residential, public, or critical facilities at least two feet above the (BFE)
		Install NOAA/NWS stream flow and rainfall measuring gauges.
		Dry flood-proof historical, residential, and/or non-residential structures.
	S	Install or increase culvert sizes to improve their drainage capacity or efficiency.
	S	Construct debris basins to retain debris in order to prevent downstream drainage structure clogging.
		Install debris cribs over culvert inlets to prevent inflow of coarse bed-load and light floating debris.
	S	Create detention storage basins, ponds, reservoirs etc. to allow water to temporarily accumulate to reduce pressure on culverts and low water crossings allowing water to ultimately return to its watercourse at a reduced flow rate.
		Create relief drainage ditch-openings using culverts or bridges to relieve rapid water accumulation during high water-flow events.
		Protect wastewater treatment systems flood protection to prevent erosion damage and sewage lagoons out-wash.
GF 7	C	Complete a ground failure (avalanche, landslide, permafrost etc.) location inventory; identify (and map) threatened critical facilities, residential buildings, infrastructure, and other essential buildings.
		Develop, implement, and enforce a property development “ground failure” risk assessment for any structure that may be sited in potentially vulnerable locations.
		Identify and seasonally restrict recreational and construction activities in high avalanche and landslide areas.
	S	Promote permafrost sensitive construction practices in permafrost areas.
	S	Seek training for existing personnel to properly grade and maintain City roads to reduce pot-hole reoccurrence.
	S	Acquire finding to resurface roads with high quality gravel (Village to St. Michael Slough – 3 miles and the road to Ghost Creek) to replace the soft soils to prevent recurring road damage.
SW 8	C	Develop and implement programs to coordinate maintenance and mitigation activities to reduce risk to public infrastructure from severe winter storms (snow load, ice, and wind).
	O	Develop, implement, and maintain partnership program with electrical utilities to use underground utility placement methods where possible to reduce or eliminate power outages from severe winter storms. Consider developing incentive programs.
	S	Develop and implement tree clearing mitigation programs to keep trees from threatening lives, property, and public infrastructure from severe weather events.
		Develop personal use and educational outreach training for a “safe tree harvesting”

Mitigation Action Items to Consider and Select

Hazard	Status **C**onsidered **S**elected **O**ngoing	Description
		program. Implement along utility and road corridors to prevent or reduce potential winter storm damage.
WF 9		Develop Community Wildland Fire Protection Plan to mitigate wildland fire threat.
	S	Hold FireWise workshop to educate residents and contractors concerning fire resistant landscaping.
	S	Promote FireWise building siting, design, and construction processes and materials.
	S	Provide wildland fire hazard outreach information in an easily distributed format for all residents.
	O	Develop, adopt, and enforce burn ordinances that controls outdoor burning, require burn permits, and restricts open campfires during identified weather periods (windy, dry, etc.).
		Develop outreach program to educate and encourage fire-safe construction practices for existing and new construction in high-risk areas.
		Identify, develop, implement, and enforce mitigation actions such as fuel breaks and reduction zones for potential wildland fire hazard areas.

URS

June 7, 2013

City of Holy Cross
P.O. Box 227
Holy Cross, AK 99602

RE: Holy Cross Draft Hazard Mitigation Plan Review

Dear Connie Walker,

Here is your Draft Hazard Mitigation Plan for your review. This plan is not completed yet. Please make it available for the public to also review. You may desire to place a copy in the City and Tribal Offices or some other location more suitable for your community. You may want to punch holes and place it in a 3-ring binder to make it easier for people to review. Also, please make a log sheet, have people sign it, and keep track of any comments to help us make the changes that may be beneficial to the community. Please send me the log sheet so I may insert it into the plan to demonstrate the public review process.

There are two ways you may make changes in the document.

- You may write directly on a copy and send it back to me with the changes indicated by inserting slips of paper to direct me to specific pages. or
- If there are only a few changes or corrections, you can call me and we can make the changes over the phone.

I have also enclosed the second newsletter for posting in the community informing every one of its availability for review.

We would like to have the draft reviewed and comments returned by June 21, 2013.

R. Scott Simmons
Emergency Management, Hazard Mitigation, and
Climate Change Adaptation Planner

Note: We have moved this is my new contact phone number:

Direct: 907.433.6711
Scott_simmons@urs.com

URS Corporation
3201 C Street, Suite 200
Anchorage, AK 99503
Toll Free: 800.909.6787
Phone: 907.433.6711
800.909.6787
Fax: 907.644.6930

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CITY OF HOLY CROSS HAZARD MITIGATION PLAN (HMP)

June 2013 **Newsletter 2**

This newsletter discusses the preparation of the City of Holy Cross Hazard Mitigation Plan. It has been prepared to inform interested agencies, stakeholders, and the public about the project and to solicit comments. This newsletter can also be viewed on the State of Alaska Division of Homeland Security and Emergency Management Website at http://www.ready.alaska.gov/plans/localhazmitplans.htm.

HMP Development

The City of Holy Cross was one of 15 communities selected by the State of Alaska, Division of Homeland Security and Emergency Management (DHS&EM) for a Hazard Mitigation Planning (HMP) development project. The plan identifies natural hazards that affect the community including earthquake, erosion, flood, ground failure, severe weather, and tundra/wildland fire. The HMP also identifies the people and facilities potentially at risk and potential actions to mitigate community hazards. The public participation and planning process is documented as part of the project.

What is Hazard Mitigation?

Across the United States, natural disasters have increasingly caused injury, death, property damage, and business and government service interruptions. The toll on individuals, families, and businesses can be very high. The time, money, and emotional effort required to respond to and recover from these disasters take public resources and attention away from other important programs and problems.

People and property throughout Alaska are at risk from a variety of hazards that have the potential for causing human injury, property damage, or environmental harm.

The purpose of hazard mitigation is to implement projects that reduce the risk severity of hazards on people and property. Mitigation programs may include short-term and long-term activities to reduce hazard impacts or exposure to hazards. Mitigation could include education, construction or planning projects. Hazard mitigation activity examples include relocating buildings, developing or strengthening building codes, and educating residents and building owners.

Why Do We Need A Hazard Mitigation Plan?

A community is only eligible to receive grant money for mitigation programs by preparing and adopting a hazard mitigation plan. Communities must have an approved mitigation plan to receive grant funding from the Federal Emergency Management Agency (FEMA) for eligible mitigation projects.

The Planning Process

There are very specific federal requirements that must be met when preparing a HMP. These requirements are commonly referred to as the Disaster Mitigation Act of 2000, or DMA2000 criteria. Information about the criteria may be found on the Internet at: http://www.fema.gov/mitigation-planning-laws-regulations-guidance.

The DMA2000 requires the plan to document the following topics:

- Planning process
- Community Involvement and HMP review
- Hazard identification
- Risk assessment
- Mitigation Goals
- Mitigation programs, actions, and projects
- A resolution from the community adopting the plan

FEMA has prepared Planning Guidance which are available at: http://www.fema.gov/library/viewRecord.do?fromSearch=fromsearch&id=4859, and "How to Guides" that explain in detail how each of the DMA2000 requirements are met. These guides are available at http://www.fema.gov/hazard-mitigation-planning-resources. The Holy Cross Hazard Mitigation Plan will follow those guidelines.

The planning process kicked-off in May 2012 by establishing a local planning committee and holding a public meeting. The planning committee examined the full spectrum of hazards listed in the State Hazard Mitigation Plan and identified six hazards the HMP would address.

After the first public meeting, City staff and URS began identifying critical facilities, compiling the hazard profiles, assessing capabilities, and conducting the risk assessment for the identified hazards. Critical facilities are facilities that are critical to the recovery of a community in the event of a disaster. After collection of this information, URS helped to determine which critical facilities and estimated populations are vulnerable to the identified hazards in Holy Cross.

A mitigation strategy was the next component of the plan to be developed. Understanding the community's local capabilities and using information gathered from the public and the local planning committee and the expertise of the

consultants and agency staff, a mitigation strategy was developed. The mitigation strategy is based on an evaluation of the hazards, and the assets at risk from those hazards. Mitigation goals and a list of potential actions/projects were developed as the foundation of the mitigation strategy.

Mitigation goals are defined as general guidelines that explain what a community wants to achieve in terms of hazard and loss prevention. Goals are positively stated future situations that are typically long-range, policy-oriented statements representing community-wide visions. Mitigation actions and projects are undertaken in order to achieve your stated objectives. On June 6, 2013, the local planning committee identified projects and/or actions for each hazard that focus on six categories: prevention, property protection, public education and awareness, natural resource protection, emergency services, and structural projects. A representative sample of the mitigation actions identified as a priority by the planning team are listed below, and explained in more detail in the plan.

The selected projects and/or actions will potentially be implemented over the next five years as funding becomes available. A maintenance plan was also been developed for the hazard mitigation plan. It outlines how the community will monitor progress on achieving the projects and actions that will help meet the stated goals and objectives, as well as an outline for continued public involvement.

The draft plan is available in the City and Tribal offices for public review and comment. Comments should be made via email, fax, or phone to Scott Simmons (listed below) and be received no later than June 21, 2013. The plan will be provided to DHS&EM and FEMA for their preliminary approval and returned to Holy Cross' City Council for formal adoption.

The Planning Committee

The plan was developed with the assistance from the community's planning committee consisting of a cross section from the community. Planning Team members who helped with developing the plan include Team Leader, Connie Walker, with assistance from Mayor Rebecca Turner, City Clerk Jacqueline Turner, Evan Newman, Laverne Turner, Christy Turner, Victor Laveira, Rosalie Wolfe and URS Corporation.

Sample of the City of Holy Cross' Mitigation Actions. Review the draft HMP for a complete list.		
Identify and pursue funding opportunities to implement mitigation actions.	Develop, produce, and distribute information materials concerning mitigation, preparedness, and safety procedures for all identified natural hazards.	Develop new barge landing and staging area due to increased Yukon River sedimentation preventing access to the existing barge landing area.
Disseminate FEMA pamphlets to educate and encourage homeowners concerning preparedness, and mitigation actions such as structural and non-structural retrofit benefits.	Update public emergency notification procedures and develop an outreach program for potential hazard impacts or events.	Evaluate infrastructure erosion damages caused by rain and snowmelt run-off. Example damages occur along road system, structure foundation damages, and culverts.
The City will strive to 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.	Develop and incorporate mitigation provisions and recommendations into all community plans and community development processes to maintain protect critical infrastructure, residences, and population from natural hazard impacts.	Create detention storage basins, ponds, reservoirs etc. to allow water to temporarily accumulate to reduce pressure on culverts and low water crossings allowing water to ultimately return to its watercourse at a reduced flow rate.
Develop prioritized list of mitigation actions for threatened critical facilities and other buildings or infrastructure.	Install culvert "end"-walls to prevent embankment erosion at its entrance or outlet. (end- or wing-walls).	Acquire finding to resurface roads with high quality gravel (Village to St. Michael Slough – 3 miles and the road to Ghost Creek) to replace the soft soils to prevent recurring road damage.
Encourage utility companies to evaluate and harden vulnerable infrastructure elements for sustainability.	Create drainage ditches to divert water from run-off to prevent or reduce damage to roadbeds.	Hold FireWise workshop to educate residents and contractors concerning fire resistant landscaping.

We encourage you to learn more about the City of Holy Cross' Hazard Mitigation Plan. The purpose of this newsletter is to keep you informed and to allow you every opportunity to voice your opinion regarding this important project. If you have any questions, comments, or requests for more information, please contact:

Scott Simmons, Hazard Mitigation, Emergency Management, and Climate Change Planner
URS Corporation
3201 C Street, Suite 200
Anchorage, Alaska 99503
907.433.6711 or 800.909.6787
scott_simmons@urs.com

Scott Nelsen, Emergency Management Specialist
DHS&EM
P.O. Box 5750
Fort Richardson, Alaska 99506
907.428.7010 or 800.478.2337
Scott.Nelsen@alaska.gov

Appendix E
Benefit–Cost Analysis Fact Sheet

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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 (FFEs).
- 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 F

Plan Maintenance Documents

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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

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

Project Title: _____ Project ID# _____

Responsible Agency: _____

Address: _____

City: _____

Contact Person: _____ Title: _____

Phone #(s): _____ email address: _____

List Supporting Agencies and Contacts:

_____

_____

Total Project Cost: _____

Anticipated Cost Overrun/Underrun: _____

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

Anticipated completion date: _____

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

_____

_____

_____

Milestones	Complete	Projected Date of Completion

Plan Goal (s) Addressed:

Goal: _____

Indicator of Success: _____

Project Status

☐ Project on schedule

☐ Project completed

☐ Project delayed*

*explain: _____

☐ Project canceled

Project Cost Status

☐ Cost unchanged

☐ Cost overrun*

*explain: _____

☐ Cost underrun*

*explain: _____

Summary of progress on project for this report:

A. What was accomplished during this reporting period?

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

C. How was each problem resolved?

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

Other Comments: