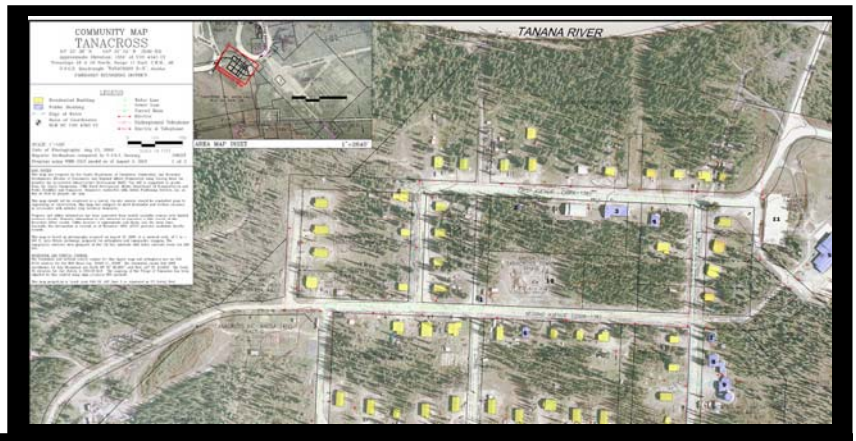
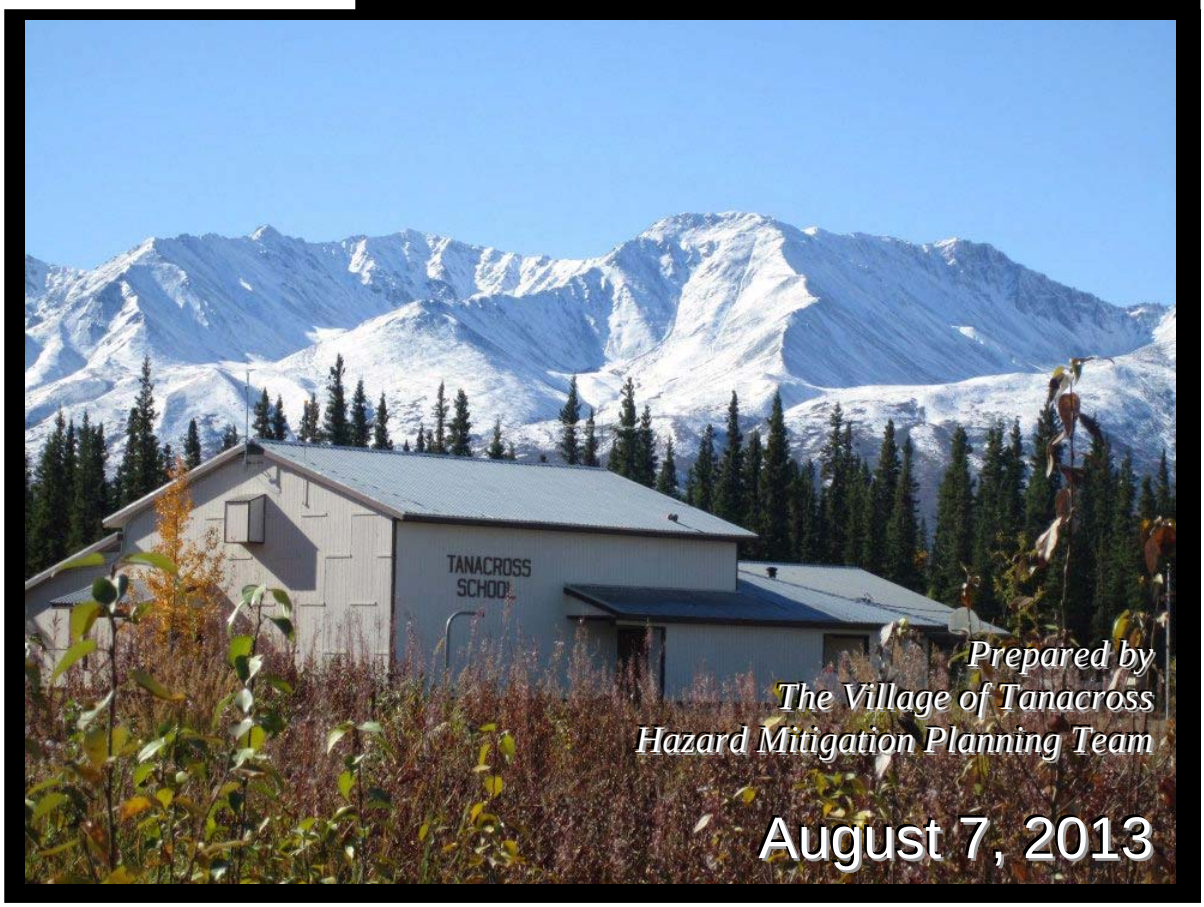
Native Village of Tanacross
Hazard Mitigation Plan





Prepared by
The Village of Tanacross
Hazard Mitigation Planning Team

August 7, 2013

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Village of Tanacross
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
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
BFE	base flood elevation
BIA	Bureau of Indian Affairs
CCP	Citizen Corps Program
CDBG	Community Development Block Grant
CFR	Code of Federal Regulations
CFP	Community Forestry Program
CGP	Comprehensive Grant Program
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
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
EWP	Emergency Watershed Protection Program
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	Hazards United States
HMA	Hazard Mitigation Assistance
HMGP	Hazard Mitigation Grant Program
HMP	Hazard Mitigation Plan
HSGP	Homeland Security Grant Program
HUD	Housing and Urban Development
IBHS	Institute for Business and Home Safety
ICDBG	Indian Community Development Block Grant
IHBG	Indian Housing Block Grant
INAP	Indian and Native American Programs
IRS	Internal Revenue Service
Kts	knots
LIHTC	Low Income Housing Tax Credits
M	Magnitude
MAP	Mitigation Action Plan
MMI	Modified Mercalli Intensity
mph	miles per hour
msl	mean sea level
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
PDM	Pre-Disaster Mitigation
PGA	peak ground acceleration

PNP	private non-profits
RCASP	Remote Community Alert Systems
RD	US Division of Rural Development
RDA	Rural Development Assistance
RFA	Rural Fire Assistance Grant
RFC	Repetitive Flood Claim
RL	repetitive loss
RUBA	Rural Utilities Business Advisor
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
USFS	US Forest Service
USGS	United States Geological Survey
VFA	Volunteer Fire Assistance
Village	Village of Tanacross
VSW	Village Safe Water
WARN	Warning, Alert, and Response Network
WHIP	Wildlife habitat Incentives Program
WTP	Water Treatment Plant

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.

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

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 Village of Tanacross 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 Village of Tanacross (Village), including historical trends for population and the demographic and economic conditions that have shaped the area.

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 Village and the surrounding area. In addition, this section documents public outreach activities (Appendix D); review and incorporation of relevant plans, reports, and other appropriate information; actions the Village 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.

HMP Adoption

Section 4 describes the HMP jurisdiction and their commitment implement HMP promulgation requirements.

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. In addition, historical and hazard location figures are included.

Vulnerability Analysis

Section 6 identifies potentially vulnerable assets—people, residential and nonresidential buildings dwelling units (where available), critical facilities, and critical infrastructure—in the Village. The resulting information identifies the full range of hazards that the Village could face and potential social impacts, damages, and economic losses. Trends in land use and development are also discussed. A location figure of the area is included.

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 Village. 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 requirements for reducing flood damage to flood-prone structures while encouraging participation with the NFIP.

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 Village.

Appendix D: Provides public outreach information, including newsletters.

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

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

This section describes the location, geography, and history; demographics; and land use development trends of the Village of Tanacross

2.1 LOCATION, GEOGRAPHY, AND HISTORY

"Tanacross is located on the south bank of the Tanana River, 12 miles northwest of Tok, at milepost 1324 of the Alaska Highway. It lies at approximately 63.385280 North Latitude and -143.346390 West Longitude. (Sec. 32, T019N, R011E, Copper River Meridian.) Tanacross is located in the Fairbanks Recording District." (Department of Community, Commerce, and Economic Development [DCCED], Division of Community and Regional Affairs [DCRA] 2011).

Figure 2-1 Tanacross Location Map

Extreme temperature changes occur throughout Alaska's interior. The Village's temperatures range from a winter low of -75 degrees Fahrenheit (°F) to a high of 90 °F. Average low in January is -22 °F, and the average high in July is 65 °F.

The village of Tanacross is located twelve miles northwest of Tok, originally on the North Side of the Tanana River. It is situated where the Eagle Trail crosses the river and initially called "Tanana Crossing". Residents are primarily Tanah or Tinneh Athabascan Indians and relocated from Mansfeild Village, Kechumstuk, and Last Tetlin in 1912. The following is a brief sketch of the Village's history:

1912	Bishop Rowe established St. Timothy's Episcopal Mission, and a trading post opened nearby, resulting in an influx of residents from other villages.
1920	St. Timothy's post office opened.
1932	Formal school opened, bringing more natives from Mansfield.
1930's	Airfield built.
1941	Village gave permission to the military to use airfield as an emergency deployment post during World War II.
1942	Airfield paved.
1941-1945	Villagers served as back-up support and volunteer scouts for the US Army.
1940's	Airfield closed after World War II ended.
1972	Village relocated to the south bank of the Tanana River due to water contamination at the old village site.
1979	Old village site burned when a grass fire spread out of control.

2.2 DEMOGRAPHICS

The 2010 census recorded 136 residents and the 2012 Department of Labor estimated 130, of which the median age was 38.5 indicating a somewhat young population. The Village is

principally a traditional Athabascan community with approximately 80.2 percent of residents recognize themselves as Alaska Native. The male and female composition is approximately 51.5 and 49.5 percent respectively. The 2010 census revealed that there are 53 households with the average household having approximately 2.57 individuals (U.S. Census Bureau 2010). Figure 2-2 illustrates the historic population of the Village.

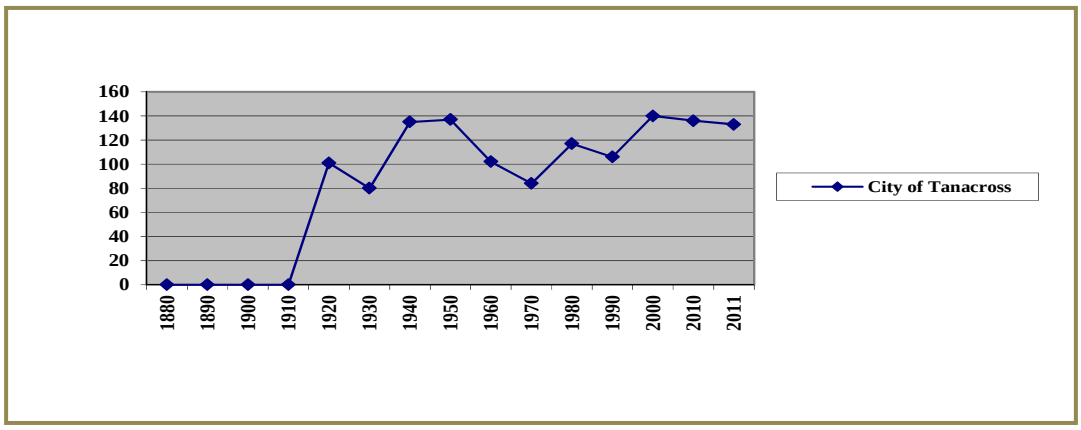

Figure 2-2 Village of Tanacross Historic Population

2.3 ECONOMY

There are limited employment opportunities in the Village. Established government provides the bulk of the employment opportunities such as the Village, State, and Federal agencies, and the BLM provides summer work as emergency firefighters. Residents also derive income from trapping and native handicrafts. Subsistence is the primary mechanisms by which the residents derive income and food sources from whitefish, moose, porcupine, rabbit, ptarmigan, ducks, and geese (DCRA 2011).

According to the 2010 census, the median household income in Tanacross was $56,563 with a per capita income o $19,281. Approximately 17 individuals (14.4 percent) were reported to be living below the poverty level. The potential work force (those aged 16 years or older) in the Village was estimated to be 90, of which 51 (56.9 percent) were actively employed. The unemployment rate was 43.1 percent.

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

Figure 2-3 Aerial Photograph of the Village of Tanacross.

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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.

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 PLANNING PROCESS OVERVIEW

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 on June 20, 2012 with Roy Denny, Tanacross Tribal President with an introductory phone call explaining the HMP planning grant and the plan development process. President Denny selected Earnest Coe as the best person to lead the HMP's planning effort. Ernest was instrumental with coordinating and working with Tanacross Tribal Council as the Planning Team. The Planning Team identified applicable Village resources and capabilities during the meeting. URS explained how the HMP differed from current emergency plans. The Planning Team then discussed the Village's 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 affect the community such as erosion, sediment deposition, and permafrost impacts, which are increasing in intensity.

The Planning Team further discussed the hazard mitigation planning process, asking participants to help identify hazards that affect the Village, to 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 June 2012 through May 2013.

1. Organize resources: Planning Team Members 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 Village of Tanacross, and with the assistance of a hazard mitigation planning consultant (URS), developed the risk assessment for their identified hazards. The Planning Team reviewed the risk assessment, including the vulnerability analysis, prior to and 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 Earnest Coe (Planning Team Leader), Tribal President Roy Denny, and Tribal Councils as Planning Team members.

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

Table 3-1 Hazard Mitigation Planning Team

Name	Title	Organization	Key Input
Coe Arnold	Tribal Administrator	Native Village of Tanacross	Mitigation Planning Team Lead, HMP data collection, HMP review
Roy Denny	Tribal President	Native Village of Tanacross	HMP data collection, HMP review and approval
Tribal Council		Native Village of Tanacross	HMP data collection, HMP review and approval
Scott Simmons	HMP Planner	URS Corporation	HMP activity coordination and plan development

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 (August 2012)	In August 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 Village Offices, bulletin boards, and stores, to enable the widest dissemination.
Newsletter Distribution (March, 2013)	In March 2013, the jurisdiction distributed a newsletter describing the upcoming planning activity. The newsletter included community relevant hazard mitigation projects and encouraged the whole community to review the draft hazard mitigation plan and to provide comments for its improvement.

Ernest Coe, Planning Team Leader, introduced the hazard mitigation planning project to the Tribal Council following a Planning Team teleconference on August 26, 2013 to explain the project to the community and other interested parties. URS extended an invitation to all individuals and entities identified on the project mailing list via a project newsletter describing the planning process. The newsletter was either faxed or emailed to relevant academia, nonprofits, and local, state, and federal agencies and signs were posted throughout the community announcing the Hazard Mitigation Planning project.

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)

The Planning Team screened and identified hazard that could potentially impact the community. They identified six potential hazards: earthquake, erosion, flood, ground failure, severe weather, and wildland fire.

The Planning Team identified critical facilities that could be impacted by the various hazards to enable URS to complete the risk analysis and vulnerability assessment. Collected information included facility name, number of occupants at any given point-in-time, location, estimated value, and typical residential structure population.

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

A Planning Team meeting was held on March 22, 2013 to review and prioritize the mitigation actions identified based on the results of the risk assessment. The draft HMP and a second newsletter was prepared and delivered on March 22, 2013 describing the process-to-date and announcing the availability of the draft HMP for public review and comment.

The Planning Team held a special meeting in April, 2013 to review the draft HMP for accuracy – ensuring it meets the Village'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 (Table 3-3) into the HMP. The following were available from two of the Village'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 Village (DCCED 2012).

Table 3-3 Documents Reviewed

Existing plans, studies, reports, ordinances, etc.	Contents Summary (How will this information improve mitigation planning?)
The Tanana Chiefs Conference, Inc., Comprehensive Economic Development Strategy Draft	*Describes the economic plan of the Doyon Region*
The Tanana Chiefs Conference, Inc., Overall Economic Development Plan Update	*Describes the economic strategy of the Doyon Region*
USACE Floodplain Manager's Report, October 2011	*Describes the Village's flood threat*
Village of Tanana Relocation Correspondence	*Describes the low flood threat and existing erosion locations*
State of Alaska, Department of Commerce, Community and Economic Development Community Profile	*Provided historical and demographic information*
State of Alaska Hazard Mitigation Plan, 2010 (SHMP)	*Defines statewide hazards and their potential locational impacts*
Village of Tanacross Water and Sewer Utilities Business Plan, July 2004	*Defines the communities water and sewer needs.*

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 Village'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, evaluating, and updating the HMP

3.5.1 Implementation Through Existing Planning Mechanisms

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

DMA 2000 Requirements
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 ensures that the HMP, in particular each Mitigation Action Project, is incorporated into existing planning mechanisms whenever possible. Each Planning Team Member has 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 MAP) 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 Village 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 Village 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 Village 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 Village-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, reviewing, 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.

This section provides an explanation of how the SBCFSA'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 Village will continue to use the Planning Team to monitor, evaluate, and update the HMP. Each authority identified in Table 7-4 will be responsible for implementing the Mitigation Action Plan. The Director of Public Safety, the hazard mitigation Planning Team Leader, (or designee), will serve as the primary point of contact and will coordinate local efforts to monitor, evaluate, and revise the HMP.

3.5.3.2 Reviewing the HMP

The Village will review their success for achieving the HMP's mitigation goals and implementing the Mitigation Action Plan's activities and projects during the annual review process.

During each annual review, each agency or authority administering a mitigation project will submit a Progress Report (Appendix F) to the Planning Team. The report will include the current

status of the mitigation project, including any project changes, a list of identified implementation problems (with an appropriate strategies to overcome them), and a statement of whether or not the project has helped achieve the appropriate goals identified in the plan.

3.5.3.3 Evaluating the HMP

The Annual Review Questionnaire (Appendix F) provides the basis for future HMP evaluations by guiding the Planning Team with identifying new or more threatening hazards, adjusting to changes to, or increases in, resource allocations, and garnering additional support for 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:

- Determine Village authorities, outside agency, stakeholders, and resident's participation in HMP implementation success.
- Identify notable risk changes for each identified and newly considered natural or human-caused hazards.
- Consider land development activities and related programs' impacts on hazard mitigation
- Mitigation Action Plan implementation progress (identify problems and suggest improvements as necessary).
- Evaluate HMP local resource implementation for HMP identified activities.

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 Village of Tanacross will annually review the HMP as described in Section 3.5.3.2 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) developed during the annual review process, to determine the success of implementing the HMP's Mitigation Action Plan (MAP) (Table 7-8).

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.

No later than the beginning of the fourth year following HMP adoption, the Planning Team will undertake the following activities:

- Request grant assistance for 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 Village of Tanacross still desires to implement.
    - Prepare a "new" Mitigation Action Plan Matrix for the Village of Tanacross.
- Prepare a new Draft Updated HMP.
- Submit the updated draft HMP to the Division of Emergency Management (DHS&EM) and FEMA for review and approval.

3.5.3.5 Formal State and FEMA HMP Review

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

The Village of Tanacross will submit the draft HMP to the State Hazard Mitigation Officer (SHMO) for initial State review and preliminary approval. Once any corrections are made, the State will send the draft HMP to FEMA Regional X for formal review and tentative pre-approval.

The SHMO will coordinate the local HMP's review process and comment analysis and ensure any required corrections are made prior to resubmittal for FEMA final approval.

Once the plan has fulfilled all FEMA criteria, the State will promulgate the HMP and return to FEMA for final approval. FEMA's final approval ensures the Village is eligibility for applying for appropriate mitigation grant programs.

The State promulgated, FEMA approved HMP assures the Village is eligible for applying for appropriate mitigation grant program funding. The FEMA approved HMP will then be returned to the Village

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 Village of Tanacross 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 State of Alaska promulgated the HMP on July 12, 2013. The Village's Tribal Council agrees to implement the HMP. A scanned copy of the promulgation is included in Appendix C.

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This section identifies and profiles the hazards that could affect the Village of Tanacross.

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 began in August, 2012; the Planning Team reviewed eight possible hazards that could affect the Alaska Gateway Regional Education Attendance Area. 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 six hazards pose the greatest threat to the Village: earthquake, erosion, flood, ground failure, 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 Village 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	Periodic, unpredictable occurrences. The Village experienced minimal damage from the 11/2003 Denali EQ.
Erosion	Yes	The Village experiences riverine erosion along the Tanana River embankments from high water flow, riverine ice flows, wind, and surface runoff.
Flood	No	Snowmelt and ice jam flooding occurs during spring thaw and the fall rainy season. However, the Village is protected by a high embankment adjacent to the Tanana River
Ground Failure (Avalanche, Landslide, Debris Flow, Permafrost)	Yes	Ground Failure occurs throughout Alaska from avalanches, landslides, land subsidence, and melting permafrost. These hazards periodically cause houses movement due to ground sinking and upheaval. The Village has occasional melting permafrost damage which accelerates erosion damage along the Tanana River embankment. Impacts all structure types throughout the community.
Severe Weather	Yes	Severe weather events cause fuel price increases and freeze water and wastewater pipes. Heavy snow loads and severe windstorms potentially damage house roofs. The Village experiences annual severe weather impact damages which include severe cold, heavy and sometimes freezing rain, snow accumulations, and high winds.
Tsunami & Seiche	No	This hazard does not exist for the Village.
Volcano	No	This hazard does not exist for the Village.
Tundra/ Wildland Fires	Yes	The Village and the surrounding tundra area become very dry in summer months with weather and human caused incidents igniting dry vegetation (i.e., lightning and human activity such as trash burning and camp fires).

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 Village'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). Probability is determined based on historic events, using the identified criteria, to describe the likelihood of a future event.

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.

Similar to estimating probability, magnitude, and severity are determined based on historic events using the criteria delineated in Table 5-3 below.

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.

The hazards profiled for the Village are presented in the rest of Section 5.3. 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 5-4, the MMI Scale consists of 12 increasing levels of intensity that range from imperceptible to catastrophic destruction. Peak ground acceleration (PGA) is also used to measure earthquake intensity by quantifying how hard the earth shakes in a given location. PGA can be measured as acceleration due to gravity (g) (see Table 5-4) (MMI 2006).

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

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

Magnitude	Intensity	PGA (% *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 Project Team determined that the Village of Tanacross has a minimal concern for small earthquakes as they do not generate damaging impacts. The Planning Team stated they only need to be concerned with earthquakes with a magnitude > M 5.0.

USGS lists a total of 1,236 earthquakes were recorded within a 100 mile radius of the Village of Tanacross since 1977. Table 5-5 lists the 20 historical events that exceeded M 5.0. The largest event, a M6.0 is yellow highlighted.

Table 5-5 Historical Earthquakes for Tanacross

(Highlight is earthquake of record)

Year	Mo	Day	Time	Latitude	Longitude	Magnitude	Depth (Radius Miles)
2005	8	30	7:55 PM	63.097	-143.576	5	21.1
2002	11	3	12:00 AM	63.022	-144.577	5.4	46.0
2002	11	3	1:55 PM	63.315	-145.634	6	70.8
2002	11	3	12:14 AM	63.208	-145.678	5.4	73.3

Table 5-5 Historical Earthquakes for Tanacross

(Highlight is earthquake of record)

Year	Mo	Day	Time	Latitude	Longitude	Magnitude	Depth (Radius Miles)
2002	11	3	6:43 AM	63.409	-145.067	5.5	53.4
2002	11	3	8:09 PM	62.741	-144.125	5.1	50.3
2002	11	3	10:48 AM	62.854	-143.712	5.1	38.5
2002	11	3	7:26 PM	63.283	-144.796	5.1	45.4
2002	11	4	8:38 PM	63.314	-145.106	5.5	54.7
2002	11	4	10:33 PM	63.177	-144.799	5.2	47.2
2002	11	4	8:52 AM	63.201	-144.759	5.1	45.4
2002	11	4	1:12 AM	62.986	-144.063	5	35.4
2002	11	4	11:02 PM	63.034	-144.167	5	34.8
2002	11	5	10:19 AM	62.832	-143.603	5.2	39.1
2002	11	5	8:52 AM	63.322	-145.496	5	66.5
2002	11	8	12:00 AM	62.8	-143.5	5.2	40.4
2002	11	13	12:57 AM	63.158	-144.33	5.1	34.2
2002	11	14	6:14 PM	63.427	-146.106	5.1	85.7
2002	12	1	12:00 AM	63.333	-145.467	5.2	65.9
1996	10	22	12:43 PM	63.347	-145.359	5.8	21.1

USGS 2009

The average magnitude of earthquakes occurring around the Village of Tanacross was M 3.2. The majority of these events were aftershocks and sub-events from the November 3, 2002 M 7.9 Denali EQ located approximately 130 miles away. Planning Team Members stated that Tanacross experienced moderate ground shaking as a result of this earthquake. The largest recorded of these earthquake events measured M 6.0 occurring on November 3, 2002. This earthquake did not cause any damage to critical facilities, residences, non-residential buildings, or infrastructure.

North America's strongest recorded earthquake occurred on March 27, 1964 in Prince William Sound, measuring M 9.2 and was felt by many residents throughout Alaska. Tanacross felt ground motion resulting from this historic event; however, no local damage occurred.

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

Location

The entire geographic area of Alaska, and thus the Village of Tanacross, is prone to earthquake effects.

Figure 5-1 shows the locations of active and potentially active faults in Alaska.

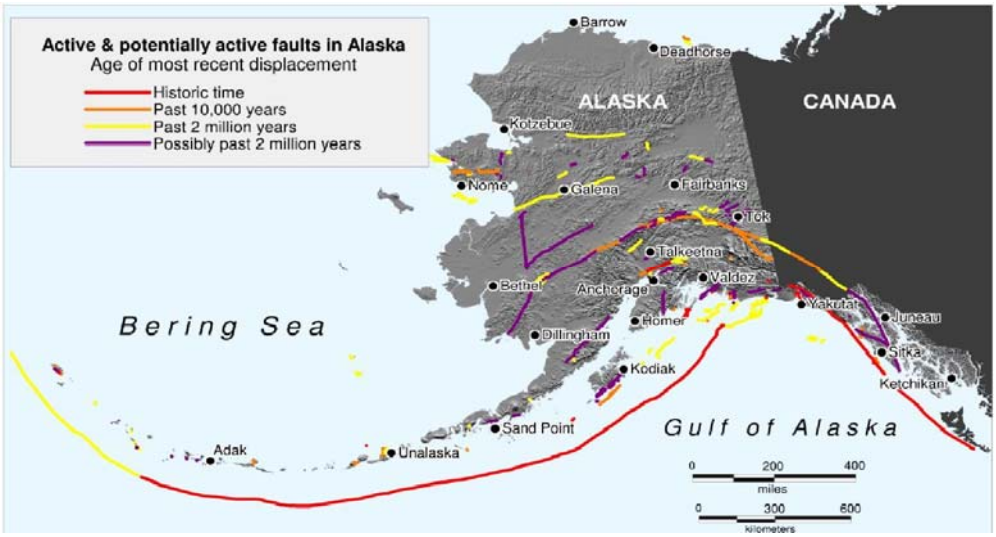

Figure 5-1 Active and Potentially Active Faults in Alaska

The Department of Geological and Geophysical Survey (DGGS) Neotectonic Map (Figure 5-2) 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).

The Denali Fault runs about 35 miles south of the Village and comprises a fault system of smaller faults running northeast by southwest. The Village lies north by northwest the Denali Fault-Muldrow Alsek and north by northwest of the McCallum Slate Fault. The Village can expect to be impacted by future earthquake events (DGGS 2009).

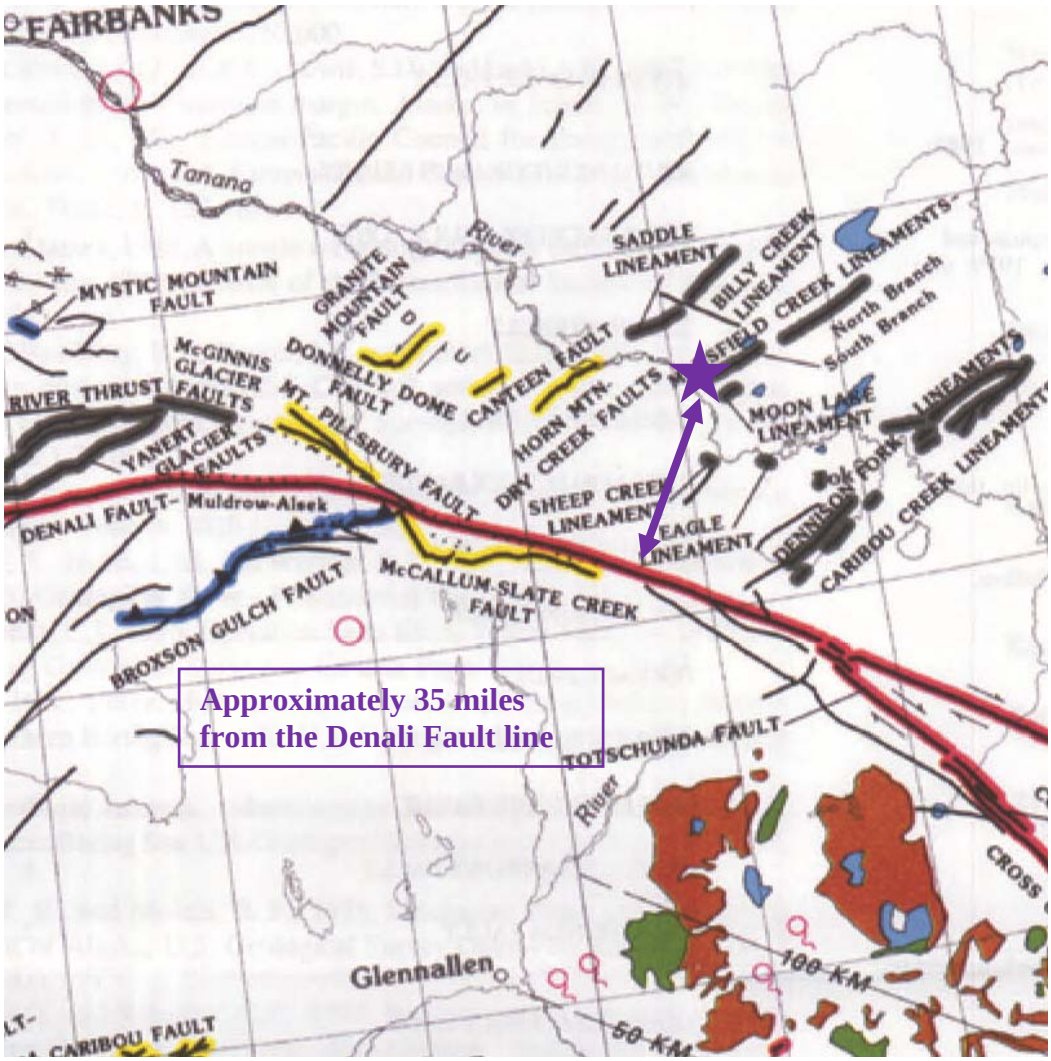

Figure 5-2 Image from "Neotechtonic Map of Alaska" – Tanacross Area (DGGS 2009)

Extent

Earthquakes felt in the Tanacross area have not exceeded M 6.0 in the past 36 years, and significant damage has seldom 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 Village are considered limited Injuries and/or illnesses that are not expected to result in permanent disability, the potential for critical facilities to be shut down for more than a week, with more than 10 percent of property or critical infrastructure being severely damaged, and extensive permanent damage to transportation, infrastructure, and or the economy could be expected.

Impact

The Village is located in an area that is more active than others in the State. Damaging impacts are expected within the community from significant ground movement. Moderate to severe 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 Village received moderate earthquake activity resulting in minimal damage and minor injuries from the 2003 Denali Fault earthquake located only 35 miles away from earthquake swarms and post event aftershocks.

Figure 5-3 was generated using the United States Geological Survey (USGS) Earthquake Mapping model and indicates greater than a 0.50 percent probability of an M 5.0 or greater earthquake occurring within 35 miles of the Village; with a 100 years recurrence interval.

Figure 5-4 illustrates that there is less than 2.5 percent probability of an event of this magnitude occurring in the next 10 years.

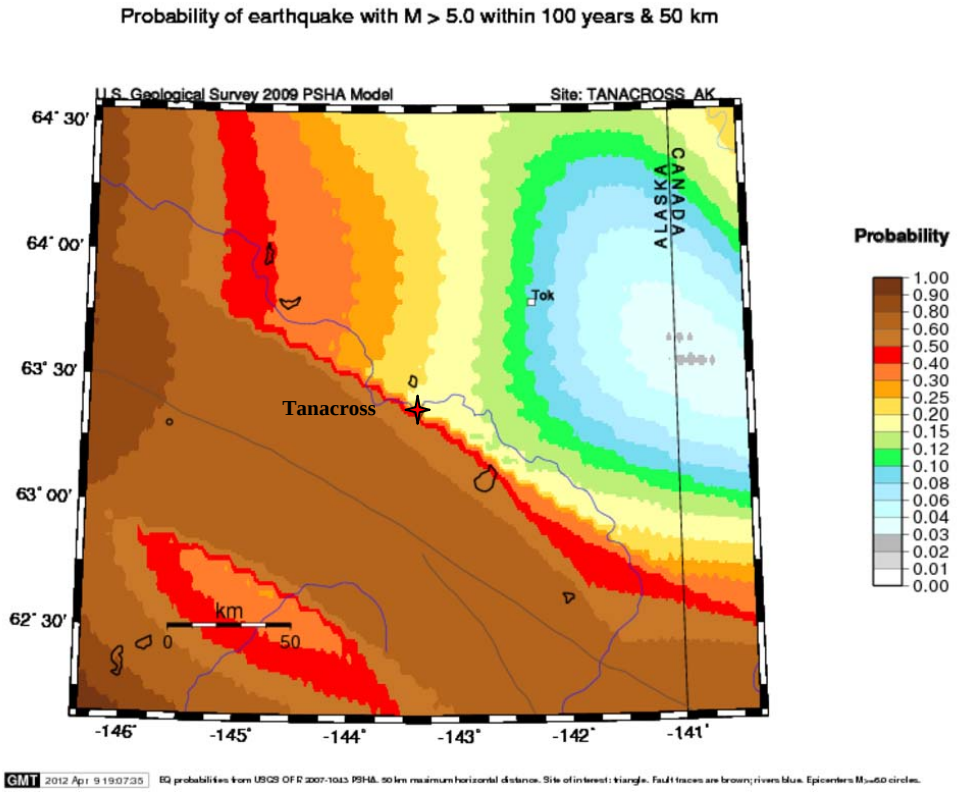

Figure 5-3 Tanacross Earthquake Probability - 100 year (USGS 2009)

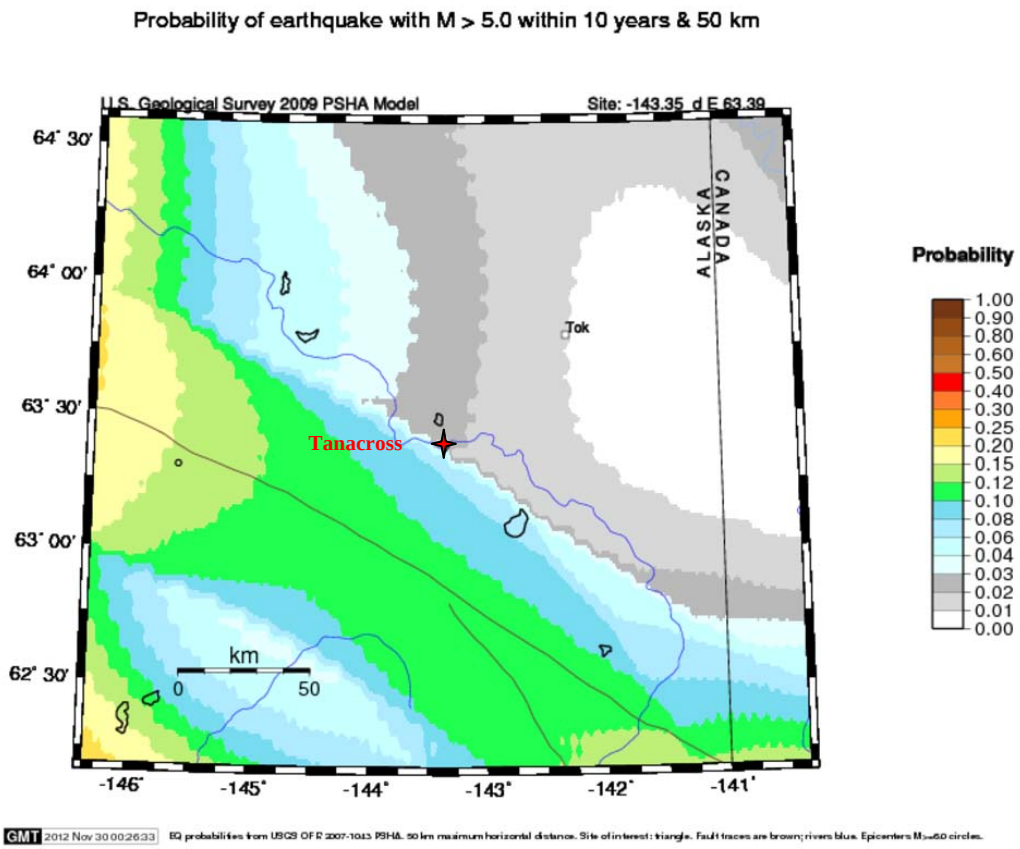

Figure 5-4 Tanacross Earthquake Probability - 10 year (USGS 2009)

This 2009 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).

Based on historical impacts and the criteria identified in Table 5-2, it is "Highly Likely" that earthquake events will occur in the calendar year (event has up to 1 in 1 years chance of occurring – 1/1=100 percent) as the history of events is greater than 33 percent likely per year.

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.

Riverine erosion are problems for communities where disappearing land threatens development and infrastructure and is a major erosion threat to the Village as it threatens the embankment, structures, and utilities of Tanacross' 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.

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

Attempts to control erosion using common protective measures such as groins, jetties, or revetments can lead to increased erosion.

5.3.2.2 History

The Arctic Health Research Laboratory 1971 correspondence to Tanacross' request for a "Comprehensive Flood Potential Report" describes the Village's erosion and flood threats:

> *"The bank on the river bend just off the north end of the runway is subject to erosion as is the area between this bend and the next one to the west. Serious consideration should be given to the situation in the final selection of the village site. Keeping the site as far south as possible would tend to alleviate this problem" (AHRL 1971).*

In 1972, the Village relocated from the North to the South side of the Tanana River which virtually eliminated their erosion impact threat.

Research shows that the Army Corp of Engineers (USACE) did not receive any response from Tanacross during their USACE's 2009 Baseline Erosion Assessment for the current location.

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

Location

The Village's Sanitation Services Report, July 1985 states that erosion is not a problem for the Village's new location on the South side of the Tanana River. However, there is a flood threat from ice jam and stream overflow flooding. The report presents a "60% flood impact severity which occurs "every five years or more."

Extent

A variety of natural and human-induced factors influence the erosion process within the community. Embankment composition 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

- Encroachment amount in the high hazard zone
- Proximity to erosion inducing coastal structures
- Nature of the coastal topography
- Development density
- Embankment elevation
- Embankment exposure to wind

Climate change may also play a part in increasing riverine erosion. Rain frequency increases results in additional water run-off and river flow rate increases which in-turn results in substantial erosion rate increases.

Based on the Village's limited past erosion events, and the criteria identified in Table 5-3, the magnitude and severity of erosion impacts in the Village are considered "negligible" with potential for critical facilities to be shut down for less than 24 hours, and less than 10 percent of property or critical infrastructure being severely damaged.

Impact

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

Probability of Future Events

Based on historical impacts 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 or the overflow of excess water from a stream, river, lake, reservoir, glacier, or coastal body of water onto adjacent floodplains. Floodplains are lowlands adjacent to water bodies that are subject to recurring floods. Floods are natural events that are considered hazards only when people and property are affected.

Flood events not only impact communities with high water levels, or fast flowing waters, but sediment transport also impacts infrastructure and barge and other river vessel access limitations. Dredging may be the only option to maintain an infrastructure's viability and longevity.

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

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

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

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

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

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

Timing of events

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

5.3.3.2 History

According to the USACE Civil Works Floodplain Management Services, the highest recorded flood occurred at the old community site at a 11.6 foot level in 1962. However, there is no history of flooding at the current location of the community which is now located across the river from the old village. No serious flooding would be expected at the new location, above 1,547 feet elevation (USACE 2011).

The NWS flood gauge (TSGA2) "0" Datum is 1,530 ft describes each flood stage category as:

Table 5-6 Tanacross Flood Stage Category List

Flood Category	Feet
Major Flood Stage	18.5
Moderate Flood Stage	17.5
Flood Stage	16.8 (Minor flood stage - minor flooding begins at old village cemetery across river. Several inches of water begin to inundate road at the end of runway. Water likely over bank at other low locations, including the Moon Lake campground about 10 miles to the west. Portions of road along lake will be covered by several inches of water. Camp/picnic site adjacent to the lake will also be flooded and unusable. The main village is unaffected.)
Action Stage	16 (Bankfull near the end of Tanacross runway and across river from village.)

The 1985 Inventory of Rural Sanitation Services survey indicates historic flooding occurs from "ice jamming/ stream flow… every five years or more often [with a] 60% severity." (

> *"Reported annual maximum discharge for the Tanana River shows a predictable downriver increase, with upstream discharge recorded at 1,107 ([mean sea level] msl) (39,100 cfs) near Tanacross building…*
>
> *[T]he Tanana varies widely in mean monthly discharge, with minimum values occurring during the lengthy period of low discharge under the winter snow and ice cover and much higher discharges characterizing break-up periods in spring…*
>
> *Up river from Fairbanks on the Tanana River, small floods occurred at Tanacross during June 1962 and July 1975, elevating discharge about 25% over annual extreme values" (UAF 2012).*

Table 5-7 lists historical flood events.

Table 5-7 Historic Flood Events (NWS)

Location	Date	Event Type
Tanacross	June 1962	Flood - Rainstorm
Tanacross	July 1975	Flood - Rainstorm

(UAF 2012, NWS 2012, DHS&EM 2010)

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

Location

The USACE Emergency Flood Reconnaissance Trip to Tanacross Village on July 22, 1969 provides information for the "Old Village" which states,

> *"Village residents report there is usually very little bank erosion in their village area. The only remembered serious flooding and bank erosion occurred in 1946 when 20 feet*

of bank was lost. When we arrived at the village the river stage was 1.5 feet below top of bank. Village residents stated it was holding steady at that elevation and expressed the opinion that it would not increase in stage. There was some erosion of the river bank above the village (residents estimated a loss of 3 feet in a 100 yd reach); however, there appeared to be no erosion danger to the village. If the water should rise another 3 to 4 feet (stage 14 ft) the village would be in danger from the water flowing across the ox-bow.…" (2012).

The USACE, Floodplain Management Flood Hazard Data report states

"No history of flooding at the present site. The "Tanacross Newsletter No. 1", dated May 27, 1971, indicates that no serious flooding would be expected above elevation 1547.0 ft at the new location. The highest recorded flood at the old community site (abandoned) was the flood of 1962 with a flood level of 11.6 ft (database unknown).

The USACE reported the structure elevations depicted in Table 5-8.

Table 5-8 USACE Community Flood Survey Elevations

Description	Elevations
New location: No serious flooding expected at new community location	1,547.0

Extent

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

The following factors contribute to riverine flooding frequency and severity:

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

The Village's relocation has dramatically reduced their flood threat. The new location high embankment protects the Village from high water.

Impact

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

- Structure flood inundation, causing water damage to structural elements and contents.

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

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

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

Probability of Future Events

Based on previous occurrences, historical flood reports, the Village's location above the floodplain, and criteria in Table 5-2, It is possible but "Unlikely" that a damaging flood event will occur within the next 10 years. Event has a 1 in 10 year chance of occurring (1/10=10 percent). History of events is less than or equal to 10 percent likely per year. There is no data identifying a 500-year (0.2 percent chance of occurring in a given year) flood threat in Tanacross.

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 as they may pertain to Tanacross.

5.3.4.2 History

There are few written records defining ground failure impacts within the Village. However, the Division of Geological and Geophysical Survey's Reconnaissance Interpretation of 1978-1983 Permafrost, Alaska Highway Corridor, Robertson River to Tetlin Junction, Alaska (DOT/PF Study 1983) described Tanacross area permafrost.

> *"Near the Tanacross Airfield in the northwestern corner of the broad, generally well-drained Tok fan is a conspicuously wet zone of groundwater emergence (Qfbe) that presents a potential impediment for a utility corridor through this area and may require rerouting or special design because of the shallow water table… Because heat is brought by groundwater fl owing into this area, permafrost is tentatively inferred to be sporadic with low to moderate ice content (Sm?). Of seven water wells in the vicinity of the Tanacross Airfield, two penetrated permafrost and the maximum depth to water was only 35 ft (10.6 m), at least 18 ft (5.5 m) shallower than in water wells at Tok 10.5 mi (11 km) to the east (Williams, 1970, p. 43). Monitoring of water wells in the vicinity of the Tanana River demonstrates that water levels there mimic changes in river stage, indicating that river water is being contributed to the groundwater reservoir (Anderson, 1970)… In the proximal zone of the fan, frozen, fi ne-grained overbank deposits of the Tok River fan have low to moderate ice contents (Fm) and overlie sporadically to discontinuously frozen gravels of the Tok expansion fan, which probably have low to moderate ice contents (fi g. 4). Peat-filled channels on the Tok River fan are frozen with moderate to high ice contents (Fr). Concentrations of shrubby vegetation and thaw ponds and thaw lakes on the surface of the Tok River fan indicate other areas of higher ice contents. Thaw bulbs with low to moderate moisture contents are present in granular channel deposits beneath active and former channels of the Tok River. In the distal half of the Tok fan and beneath the floodplain of the Tanana River, fi ne-grained sediments are generally unfrozen to discontinuously frozen with low to moderate moisture contents. In the Tanana River floodplain, thaw bulbs beneath active channels are fi ne grained and have moderate to high moisture contents. Small areas marginal to active channels of the Tanana River are underlain by expansion-fan sands of Holocene age. Areas marginal to the meander belt are interpreted to be high-resistivity, fine-grained, frozen and ice-rich slackwater-basin sediments." (DGGS 2010)*

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

Location

According to permafrost and ice conditions map (Figure 5-5) 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), and the DGGS Reconnaissance Interpretation, the entire Village is underlain by discontinuous permafrost.

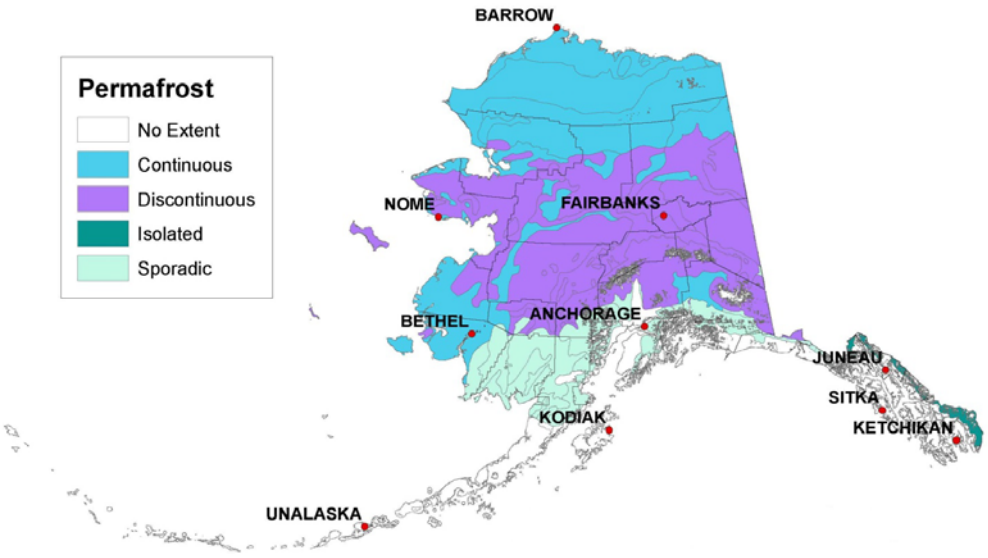

Figure 5-5 Permafrost and Ground Ice Map of Alaska (Brown et al 2001)

The Alaska Department of Transportation's Reconnaissance Interpretation of 1978-1983 Permafrost, Alaska Highway Corridor, Robertson River to Tetlin Junction, Alaska describes the permafrost threat to Tanacross:

> *"Permafrost beneath inactive and abandoned floodplain surfaces and low fluvial terraces in the meander belt north of the Tanana River is inferred to be discontinuous with low to moderate ice contents (Dm), based on the presence of mixed deciduous and coniferous forest, the presence of scattered, small thaw ponds, and the morphology of floodplain lakes (sheet 3). The younger three phases of the floodplain–lake sequence (Reger and Solie, 2008a, fi g.1) are displayed on most of the Little Tanana Slough–Tanana River floodplain north of Tanacross; ice contents in these phases increase from youngest to oldest (fi gs. 3A and 3B). The limited presence of continuous, shallow, ice-rich permafrost (Fr) is indicated by the limited distribution of the scalloped-lake phase in the oldest parts of the floodplain…*
>
> *Near the Tanacross Airfield in the northwestern corner of the broad, generally well-drained Tok fan is a conspicuously wet zone of groundwater emergence … that presents a potential impediment for a utility corridor through this area and may require rerouting or special design because of the shallow water table. The zone of groundwater emergence is indicated by swampy vegetation, the presence of water in shallow artificial trenches, a network of shallow natural drainage channels originating at clearwater springs, clearwater lakes, and clear streams from springs that drain into the silty Tanana River along the base of the fan scarp … Orientations of natural drainage channels and proximity to extensive swampy lowlands related to the nearby distal piedmont apron indicate that seepage there is apparently derived from the broad Tok fan to the southeast and from the toe of the piedmont apron to the southwest. Because heat is brought by groundwater flowing into this area, permafrost is tentatively inferred to be sporadic with low to moderate ice content … Of seven water wells in the vicinity of the Tanacross Airfield, two penetrated permafrost and the maximum depth to water was only 35 ft (10.6 m), at least 18 ft (5.5 m) shallower than in water wells at Tok 10.5 mi (11 km) to the east... Monitoring of water wells in the vicinity of the Tanana River demonstrates that water levels there mimic changes in river stage, indicating that river water is being contributed to the groundwater reservoir…"(DOT/PF 1983)*

Figure 5-6 depicts the 1983 DOT/PF's study area.

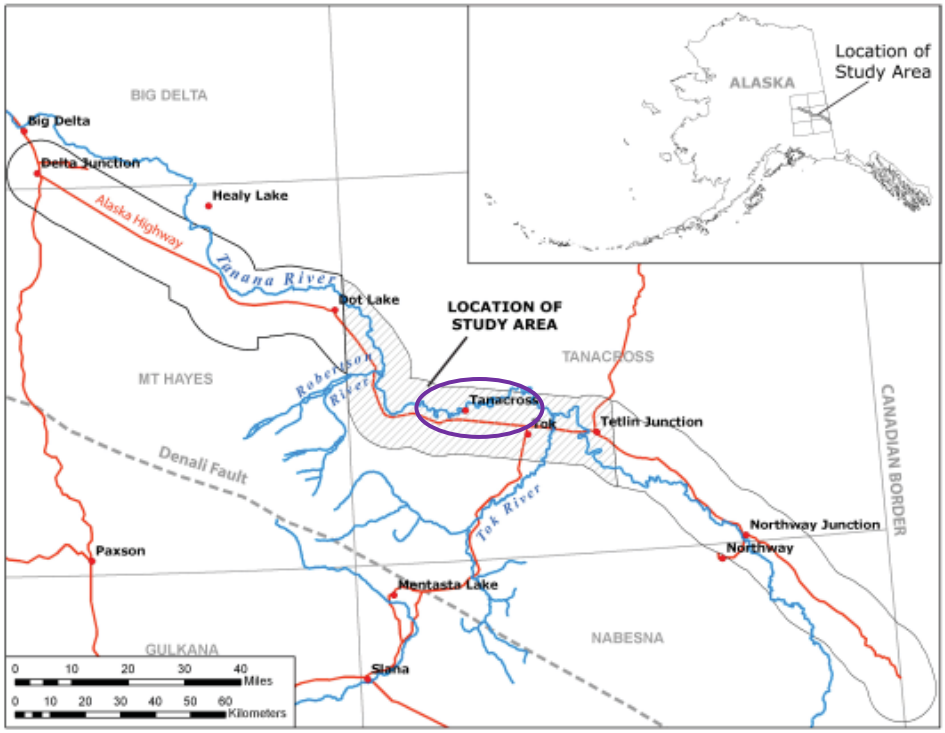

Figure 5-6 DGGS Alaska Highway Permafrost Reconnaissance (DGGS 2010)

The USGS Permafrost Regions Map (Figure 5-7) depicts permafrost extent for Tanacross as "Generally underlain by moderately thick to thin permafrost:

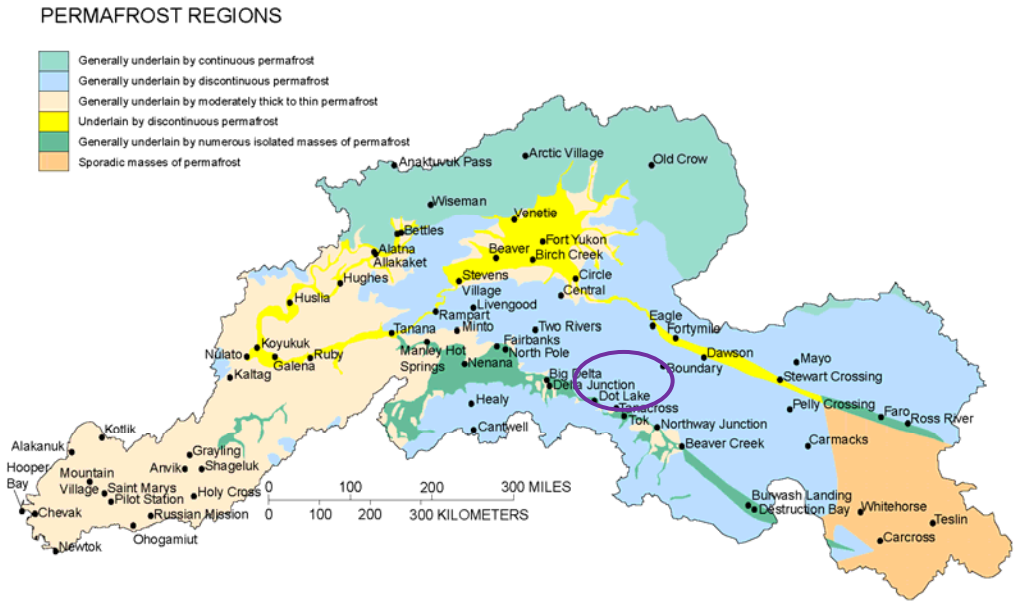

Figure 13. Permafrost regions of the Yukon River Basin (modified from Ferrians and others, 1965, and Brown and others, 1997).

Figure 5-7 Yukon River Basin Permafrost Locations Map (DGGS 2010)

Figure 5-8 depicts Tanacross indicates that Tanacross is located within the "Lowland and upland area underlain by numerous isolated masses of permafrost." (HDR 2006)

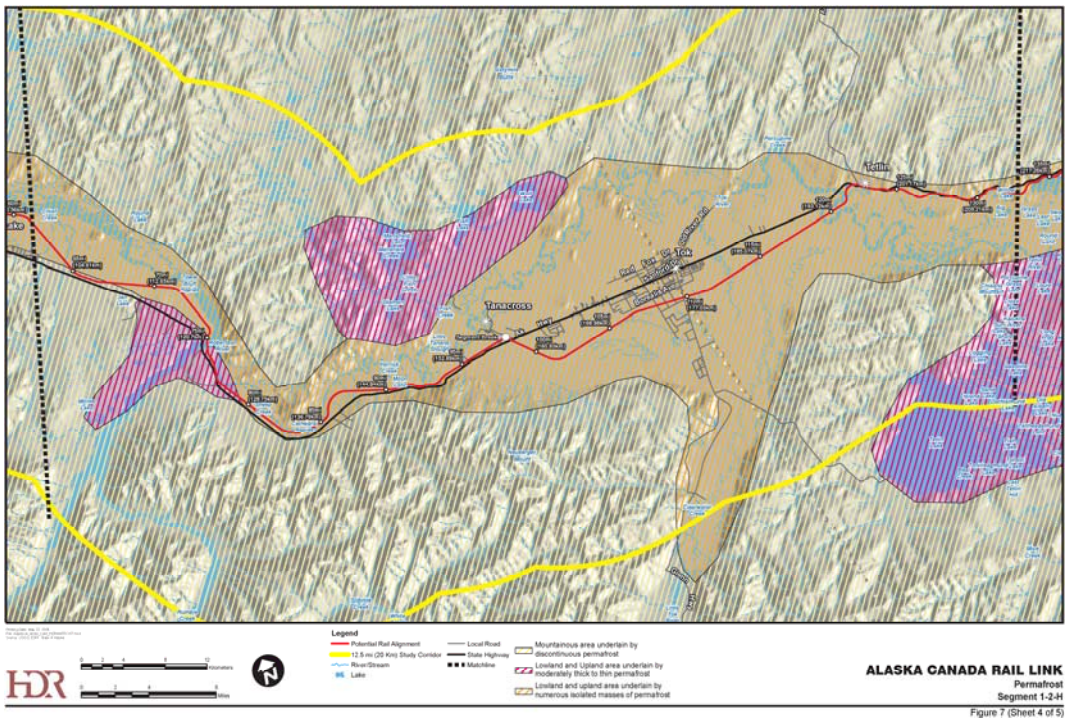

Figure 5-8 Tanacross Permafrost Type Map (HDR 2006)

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 Village are considered "Limited". 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 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 structures, roads, and the airport runway periodically experience some form of ground failure impacts.

Probability of Future Events

Even though there are few written records defining ground failure impacts for the Village, there is research studies which confirms the community has isolated permafrost pockets. Therefore future permafrost damage is classified as "Likely" in the next calendar year (event has up to 1 in 3 years chance of occurring) as the history of events is less than 20 percent, but less than or equal to 33 percent likely per year.

5.3.5 Weather (Severe)

5.3.5.1 Nature

Severe weather occur throughout Alaska with extremes experienced by the Village of Tanacross that includes thunderstorms, lightning, hail, heavy and drifting snow, freezing rain/ice storm, extreme cold, and high winds. The Village 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 Tanacross.
- **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 Tanacross, extreme cold usually involves temperatures as low as -75°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 mph) occur rather frequently over the coastal areas along the Bering Sea and the Gulf of Alaska. High winds are a severe threat to the Village.

  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 National Weather Service has continued to modify their system for assigning weather zones to facilitate and more accurately confine weather patterns to relevant geographic areas.

Table 5-9 lists 41 major storm events the National Weather Service identified for Tanacross' Weather Zone (AKZ226) from 2001 to 2011. Each location or described weather event may not have specifically impacted the Village but they are listed due to the Village's close proximity to listed communities or locations within the identified zone.

Table 5-9 Severe Weather Events

Location	Date	Event Type	Magnitude
Tok / Tanacross	9/17/2012	Severe Wind	Severe Wind Storm On the night of Sunday, Sept 17, a wind storm swept through Tanacross, Tok's Eagle Subdivision, Dot Lake, and surrounding areas. The resulting damage included roof damage, broken poles, downed power and telephone lines, damaged customer service entrances, and multiple trees on the lines.
Deltana And Tanana	4/19-23/2012	Flood, Ice Jam	An ice jam flood Formed on the Tanana River near the mouth of the Salcha River during the evening hours on the 23rd. The ice jam caused water to back up into the Starkeyville subdivision. Several homes were surrounded by water and the road entering the subdivision was under water. The ice jam released during the early morning hours on the 25th which ended the flooding. Areas of standing water remained in the area.
Northeast Slopes Of The Eastern Alaska Range	1/4/2012	Heavy Snow	Up to one foot of snow fell in just a few hours during the early morning hours on the 4th along the Richardson Highway between mileposts 202 and 238
Deltana And Tanana	11/22/2010	Ice Storm	An extremely warm and moist air mass...Freezing rain fell at Delta Junction from on the 22 - 23rd. A total of 28 hundredths of an inch of rain was observed at the Delta Junction ASOS. 59 hundredths of an inch of rain was reported at the Whitestone Farm Co-op Observation site. The freezing rain caused the school and city offices to shut down as well as Fort Greely. Zone 226: Freezing rain fell across parts of the Eastern Alaska Range from the early afternoon hours on the 23rd through the morning hours on the 24th. Weather spotter in Tok observed one tenth of an inch of ice at 5 am on the 24th. Another trained weather observer at the Robertson River Bridge reported that freezing rain began a little after midnight on the 24th and that the Alaska Highway was likely treacherous based on the amount of ice that was observed at the Robertson River Bridge.
Countywide	6/9/2010	Hail	.75 inch diameter hail
Deltana And Tanana	1/15/2009	High Wind, 82 kts	A strong Chinook ...The most significant event occurred in Delta Junction (zone 223) about a mile from the Delta River. The high winds that were estimated between 80 and 95 mph

Table 5-9 Severe Weather Events

Location	Date	Event Type	Magnitude
			blew down trees and as well as the roof of an occupied cabin...When the roof was blown off the cabin the wood stove in the cabin was moved about 2 feet and the interior stove pipe was lying on the floor several feet away. Estimate damage to this residence is $15,000. The high winds knocked out power... The Whitestone Farms Davis instruments anemometer showed a winds speed just over 90 mph (78 knots[kt]) before it stopped reporting. Zone 224: NWS Spotter near Robertson River on Alaska Highway: Estimated 60 mph (52kt)... Zone 226: Texas Condo: Measured 80 mph (69 kt.) Washington Range: Measured 77 mph (67 kt._ OP 12A: Measured 84 mph (73 kt.) The observations in zone 226 are all part of the Fort Greely Mesonet.
Deltana And Tanana	1/1/2009	Extreme Cold/wind chill changed to unseasonal warm spell	The significant cold snap that developed across interior Alaska on December 27th continued through January 12th... The cold snap ended with a strong Chinook on January 15th through the 17th, and established many all-time record warm temperatures for the month of January across interior Alaska...Zone 223: Fort Greely/Delta Junction: 54, previously 52 on January 30, 2007.
Deltana And Tanana Northeast Slopes Of The Eastern Alaska Range	12/27/2008	Extreme Cold/Wind Chill	A significant cold snap developed across interior Alaska on December 27th and continued into January...Zone 223: Delta Junction: -44° F. Zone 224: O'Brien Creek: -57° F. Tok: -52° F. Chicken: -52° F. Eagle: -50° F. Northway: -49° F. All of these low temperatures were observed on either December 30th or the 31st.
Northeast Slopes Of The Eastern Alaska Range	10/9/2008	High Wind	The Chinook led to a period of strong southeast winds with gusts in excess of 70 mph (60.8 kt). A peak wind gust of 71 mph (62 kt) was observed at the Texas Condo U.S. Army Mesonet site at 10:15 pm on the evening of the 9th.
Salcha	8/1/2008	Flood	This system dropped 2.0 to 5.0 inches of rain over the Central and Eastern interior from Tok to western Fairbanks...with heaviest amounts over the central Alaska Range as well as the hills north of the Tanana River from Salcha to Tok. This caused the flooding of rivers and streams draining into the Tanana...In addition, the Tanana River itself rose rapidly on the 29th through the 31st flooding areas around Salcha, Fairbanks, and Nenana River...The flood crest of the Tanana River of 26.53 feet was the highest level since the record 1967 flood. Damage estimate $20K
Harding Lake	8/1/2008	Flood	
Salcha	7/29/2008	Flood	
Harding Lake	7/29/2008	Flood	
Big Delta	7/28/2008	Heavy rain flood	
Salcha	5/5/2008	Ice Jam Flood	An ice jam formed near Piledriver Slough north of Salcha on the evening of the 4th, causing water to rise in Piledriver Slough and flood several homes. a few hours later another jam formed upstream causing water to rise in the Starkeyville subdivision. On the morning of May 6th, the Fairbanks North Star Borough Emergency Services and Salcha Rescue evacuated approximately 8 families (40 people) from the Starkeyville subdivision on the Tanana River about 1 mile downstream of the confluence of the Salcha

Table 5-9 Severe Weather Events

Location	Date	Event Type	Magnitude
			River. By the morning of the 8th the ice jams had dislodged and river water started flowing again allowing river water levels to recede below bank full. Property Damage amount is unknown as of report deadline.
Northeast Slopes Of The Eastern Alaska Range	4/25/2008	Heavy Snow	Heavy snow across the Alaska Range. Although significant snow was observed across the lower elevations, the greatest snowfall totals were observed above 2500 feet. 24 inches of snow as observed at the Trims DOT Camp, and 12 inches of snow was observed at Mile Post 230 on the Parks Highway.
Northeast Slopes Of The Eastern Alaska Range	4/14/2008	Heavy Snow	Heavy snowfall to parts of the Eastern Alaska Range. 20 inches of snow was observed at Isabel Pass.
Delta Junction	6/22/2007	Hail, 1.5 inch diameter	A thunderstorm produced very large hail in the Delta Junction area...Unofficial reports noted the hail was golf-ball size. Property off Nistler Road in the Clearwater area suffered some damage, the residents estimated hailstones of ping-pong ball size. At this property, the hail made numerous dents in the roofs and siding (all metal) of the home and garage. In addition, an outdoor night light was shattered. Damage costs were not provided by the owner, but is estimated to be $15,000.

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

Location

The entire Village experiences periodic severe weather impacts such as heavy rains and thunderstorms, high winds, large hail, high snow depth per storm, and extreme temperatures.

Extent

The entire Village is equally vulnerable to the severe weather effects. The Village experiences storm conditions with heavy snow depths; high winds; and extreme low temperatures that reach -75ºF.

Based on past severe weather events and the criteria identified in Table 5-3, the extent of severe weather in the Village 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. Tanacross experiences cold winters where the cold air settles in the valley and ice fog settles during the winter. Summer temperatures are quite high for Alaska with the Village experiencing high temps to 95° F. Low pressure quite frequently keeps ground fog and smoke in the valley.

Heavy snow can immobilize a community by bringing transportation to a halt. Until the snow can be removed, airports and roadways are impacted, even closed completely, stopping the flow of supplies and disrupting emergency and medical services. Accumulations of snow can cause

roofs to collapse and knock down trees and power lines. Heavy snow can also damage light aircraft and sink small boats. A quick thaw after a heavy snow can cause substantial flooding. The cost of snow removal, repairing damages, and the loss of business can have severe economic impacts on cities and towns.

Injuries and deaths related to heavy snow usually occur as a result of vehicle and or snow machine accidents. Casualties also occur due to overexertion while shoveling snow and hypothermia caused by overexposure to the cold weather.

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

Extreme cold also interferes with the proper functioning of a community's infrastructure by causing fuel to congeal in storage tanks and supply lines, stopping electric generation. Without electricity, heaters and furnaces do not work, causing water and sewer pipes to freeze or rupture. If extreme cold conditions are combined with low or no snow cover, the ground's frost depth can increase, disturbing buried pipes. The greatest danger from extreme cold is its effect on people. Prolonged exposure to the cold can cause frostbite or hypothermia and become life-threatening. Infants and elderly people are most susceptible. The risk of hypothermia due to exposure greatly increases during episodes of extreme cold, and carbon monoxide poisoning is possible as people use supplemental heating devices.

Probability of Future Events

Based on previous occurrences and the criteria identified in Table 5-2, it is “Likely” a severe storm event will occur in the next three years (event has up to 1 in 3 years chance of occurring, 1/3= 33 percent) 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.

The USGS Environmental and Hydrologic Overview of the Yukon River Basin, Alaska and Canada, Water Resources Investigations Report 99-4204, states:

> *"Wildfires disturb thousands of acres of land in the Yukon River Basin each year (fig. 15). Foote (1976) has estimated the natural fire cycle range from 70 to 130 years. After a fire, the change in surface conditions results in soil warming and increased active depths. The soil may become well drained and may no longer have a perched water table. Thus, the hydrology changes and areas that were once wetlands become completely drained" (USGS 2000).*

5.3.6.2 History

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

The Alaska Division of Forestry's Alaska Interagency Coordination Center identifies 207 wildland fire events that occurred since 1939 within 25 miles of the Village (i.e., from 1939 to 2012).

Table 5-10 lists the ten fires that burned over 25 acres.

Table 5-10 Wildfire Locations Since 1939

Fire Name	Fire Year	Estimated Acres	Latitude	Longitude	Cause
Eagle Trail	2010	17934	63.33333	-143.317	Lightning
Tanacross	2002	52	63.38694	-143.331	Slash Burning (Prescribed)
Mansfield Mount	1992	25	63.51667	-143.45	Lightning
Mansfield Lake	1992	1000	63.51667	-143.417	Lightning
Fish Creek	1959	83	63.45	-143.35	INCENDIARY (Human)
Tanacross Fire	1947	1280	63.33333	-143.3	Lightning
12 Mile Hill	1941	850	63.46667	-143.183	Unknown
Wolf Lake	1943	120	63.45	-143.2	Debris Burning
Twelve Mile Hill	1943	320	63.4	-143.133	Debris Burning
Little Fish Lake	1943	480	63.45	-143.25	Debris Burning

(AICC 2011)

Figure 5-9 depicts the Village of Tanacross' 207 historical fire locations that occurred within 25 miles of the Village.

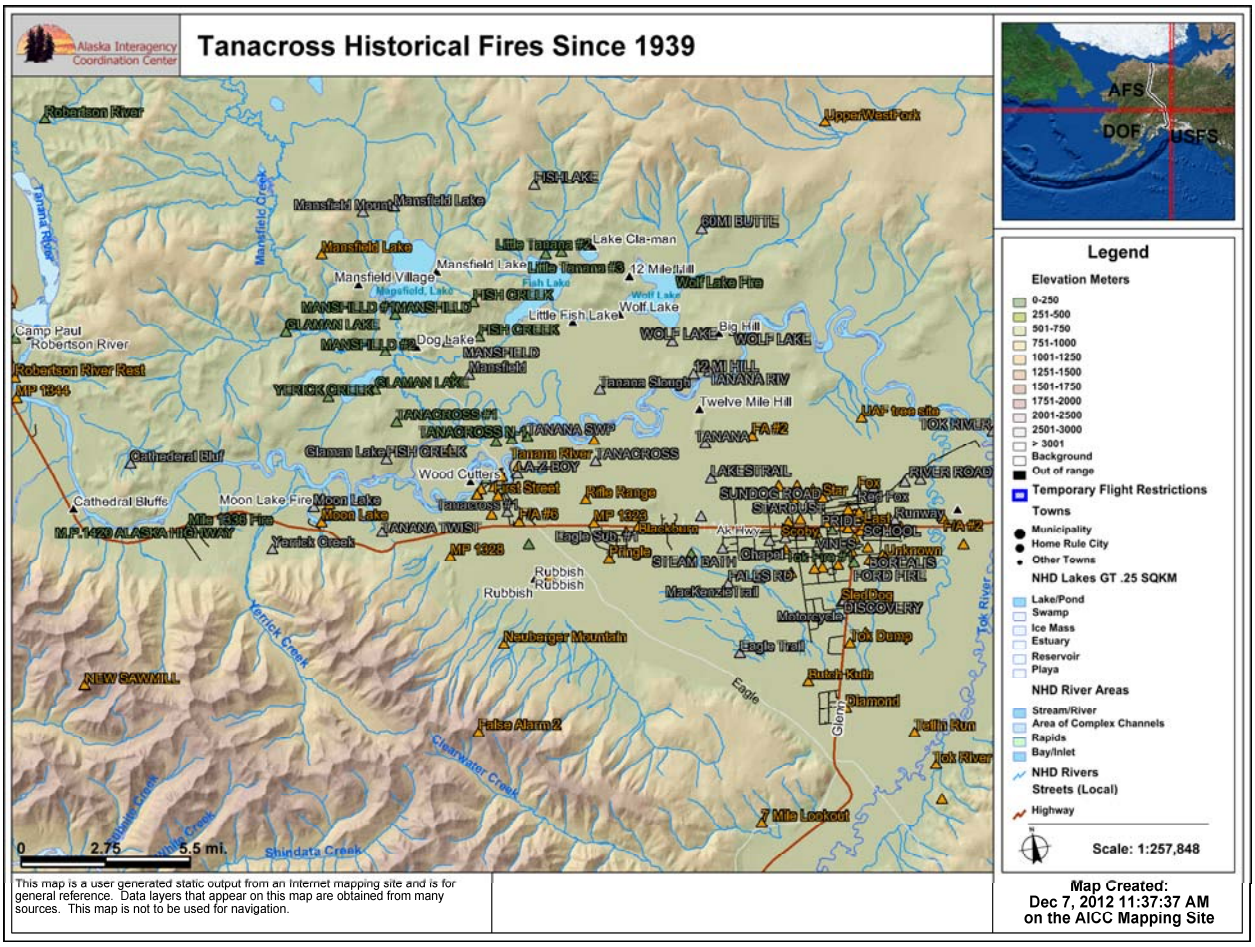

Figure 5-9 Tanacross' Historical Wildfire Locations (AICC 2011)

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

Location

Under certain conditions wildland fires may occur in any area with fuel surrounding the Village of Tanacross. Since fuels data is not readily available, for the purposes of this plan, all areas outside Village limits are considered to be vulnerable to tundra/wildland fire impacts. Since 1938, 68 Tanacross wildland fire events have occurred within 10 miles of the Village (Figure 5-9).

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.

Two fires near Tanacross burned over 1,000 acres: the Eagle Trail fire located approximately 3.7 miles from Tanacross in 2010 burning approximately 17,934 acres, and the Tanacross Fire located approximately 3.9 miles from Tanacross in 1947 burning approximately1,280 acres. The cause of the fires in both instances was lightning. It is difficult to determine the average number of acres burned as the fires were vastly different for each of the seven wildland fire events identified in Table 5-9 (DOF 2012). An average based on such diverse data would easily be overstated. However, the vast majority of the fires were human caused and involved fractions of an acre per event.

Based on the number of past wildland fire events and the criteria identified in Table 5-3, the magnitude and severity of impacts in the Village of Tanacross are considered "Negligible" with minor injuries, there is potential for critical facilities to be shut down for 24 hours or less, 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 Village 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.

Wildland fire burned the old village site in 1979 when a grass fire burned out-of-control. (RCAC 2012).

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 10 miles of the Village of Tanacross, the natural fire regime is characterized by a return interval of approximately 150 due to their tundra vegetation, gently rolling topography, and coastal location.

Based on the history of wildland fires in the Tanacross area and applying the criteria identified in Table 5-2, it is "Possible" a wildland fire event will occur within in the next five years. The event has up to 1 in 5years chance of occurring (1/5= 20 percent) and the history of events is less than or equal to 10 percent likely per year.

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

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 Village of Tanacross 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	Number or Percent of Critical Facilities and Utilities
Earthquake	100	100	100	100
Erosion	<2	<1	<5	<5
Flood	<1	<1	<1	<1
Ground Failure	100	100	100	100
Weather	100	100	100	100
Wildand Fire	100	100	100	100

6.2 CURRENT LAND USE

Land use in the Village 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 Village, and open space and various hydrological bodies surround the community. One area of town is classified as airport land use.

The DCRA Rural Utility Business Advisor's (RUBA) Status Report discusses the Villages development trends:

> *"Piped utility services have been available in Tanacross since 1976. Water is treated, stored in a 25,000-gal. tank, and piped to most homes. Some residents have individual wells. A piped sewage and septic system serve approximately half of the community; individual septic tanks are also used. Funds have been requested to replace seven failing individual septic tanks with a piped central septic system. The landfill is not permitted. Electricity is provided by Alaska Power and Telephone from Tok. (DCRA 2013)*

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 Village of Tanacross are identified and discussed in detail in the following sections.

6.3.1.1 Population and Building Stock

Population data for the Village were obtained from the 2010 U.S. Census. The Village's total population for 2010 was 136 and 2012 2012 Department of Labor estimated population of 130 (Table 6-2).

Table 6-2 Estimated Population and Building Inventory

Population		Residential Buildings	
2010 Census	DCCED 2012 Data	Total Building Count	Total Value of Buildings1
136	130	73	US Census: $7,320,100 Tanacross: $12,410,000

Sources: The Village of Tanacross, U.S. Census 2010, and 2011 DCCED/DCRA Certified population data.

[1] US Census estimated residential structure Value: $103,100. Planning Team determined that the average structural replacement value of all single-family residential buildings is $170,000 per structure.

Estimated replacement values for those structures, as shown in Table 6-2, were obtained from the 2010 U.S. Census, and 2012 Department of Labor estimate. A total of 73 single-family residential buildings were considered in this analysis. However the Village stated that residential replacement values are generally understated as the cost for materials, shipping, and labor exceed the US Census determined value.

6.3.1.2 Existing Infrastructure

The Rural Community Assistance Corporation (RCAC) states the Village of Tanacross has benefited from numerous funding opportunities to assist them with upgrading their infrastructure.

> *Over the last three years, TVC and RCAC have worked to create and implement a five-year housing development plan. [which includes:]*
>
> - *The two organizations conducted annual housing needs assessments and related third party market studies to determine village housing needs.*
> - *They have structured the Tribe's Native American Housing Assistance and Self Determination Act (NAHASDA) Indian Housing Plan away from rehabilitation… prioritized leveraging of many funding sources to support construction of new homes targeting large families and special needs households.*
> - *…they have developed a multi-funding plan for construction of 20 homes (3 and 4 bedrooms) and raised $4.6 million from Low Income Housing Tax Credits, Indian Community Development Block Grant, NAHASDA, Seattle Federal Homes Loan Bank and donated land from TVC as follows:*

Tanacross Village Council and RCAC Leveraged Funding

Funding Received	Funding Source
$2,900,000	Low Income Housing Tax Credits with Key Bank
$200,000	Federal Home Loan Bank Affordable Housing Program
$500,000	Indian Community Development Block Grant
$800,000	Title VI loan
$86,697	Native American Housing Assistance and Self Determination Act (NAHASDA)
$4,686,697	TOTAL

- *…TVC and RCAC worked to develop the Upper Tanana Regional Training Center at an abandoned K-12 school located 12 miles from Tanacross.*
  - *In collaboration with the University of Alaska, residents were trained in carpentry construction trades and pre-constructed the 20 homes in-doors during the winter months as part of their "on-the-job" training and were also paid an hourly wage.*
  - *During the summer and fall of 2005, the trained residents (80 percent local hire) each erected 20 homes with a 5 Star energy rating at Tanacross Village and were paid based on a performance based wage scale. The homes were completed in December 2005.*
- *…residents of the three villages… will pre-construct 25 homes at the Upper Tanana Regional Training Center [and] be installed at each village in 2008.*
- *To provide in-door plumbing to the 20 new homes at Tanacross, TVC and RCAC worked concurrently with the housing development timeline.*
- *Early-on, the organizations encouraged residents to receive water and wastewater training and certification to demonstrate long-term future system operation and management capacity.*
- *The partners competed for and obtained $2.2 million in water/sewer infrastructure funding, … to extend the existing piped water/sewer system at Tanacross to the 20 new homes. Village residents implemented the project with 80 percent local hire.*
- *They also competed for and obtained a $2.7 million water/sewer grant for Tanacross to extend piped services to 12 planned new homes to be constructed during 2007/2008…*
- *… RCAC is assisting TVC with plans to build 12 new homes and expanded piped water/sewer services during 2007/2008.*
- *…RCAC is also assisting TVC plan and develop a mid-level primary care community health center with wellness components (to be located at Tanacross) to serve the seven villages of the Upper Tanana Sub-region.*
- *Longer range pre-development activities are underway to develop workforce training opportunities for area residents in natural gas line construction and operations in anticipation of the upcoming $30 billion natural gas line project, which is expected to be routed through the area.*
- *Similarly, Tanacross is working to develop the underused portion of the Upper Tanana Regional Training Center (30,000 square feet) into possible commercial space to house gas line related construction and operations functions."*

Table 6-3 list the Village'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	Annual Indian Housing Block Grant (IHGB) - Comments: Native American Housing Assistance and Self Determination Act (NAHASDA) administration, operating & construction funds. Annual award 1998 to 2006. Totaling: $837,500	Completed	$837,500
Alaska Native Tribal Health Consortium (ANTHC)	2005	Funded	Water and Sewer System Expansion and Improvements	Complete	$788,460
HUD	2004	Funded	New Housing Construction w/ Low Income Housing Tax Credits (LIHTC) - Comments: ICDBG Program.	Completed	$480,000
Department of Community and Regional Affairs (DCRA)	2003	Funded	Community Health Center - Comments: Multi-Use Facility Program. OTHER FUNDING: Denali Commission $1,011,522; Indian Community Development Block Grant (ICDBG) $500,000;	Completed	$340,098
Denali Commission (Denali)	2003	Funded	Tanacross Multi-Use Community Health Center - Comments: Denali Clinic Grant $671,424, Local Match $169107.00,Indian Community Development Block Grant $500,000	Project Close-out Complete	$1,680,629
DCRA	2003	Funded	Old Tanacross Village Cemetery Dike & Repairs - Comments: Legislative Grant	Completed	$18,000
DCRA	2003	Funded	Community Facilities Improvements - Comments: Capital Matching	Completed	$26,316
DCRA	2002	Funded	Community Facilities & Equipment - Comments: Capital Matching	Completed	$26,614
ANTHC	2002	Funded	Install buried water lines; complete Water Treatment Plant (WTP) and washeteria upgrade.	Complete	$2,200,000
ANTHC	2002	Funded	Water and sewer service to 3 homes. - Comments: FY2006 4th Quarter: No change. Community is working on final report. FY2006 3rd Quarter: No change. Community is working on final report. FY2006 2nd Quarter: No change. 1st Quarter FY2006: Construction is complete for the three homes (both water and sewer services).	Complete	$120,000
DCRA	2002	Funded	Multi-Community Facilities Improvement and Renovation - Comments: Capital Matching	Completed	$26,331
HUD	2002	Funded	Rural Housing & Economic Development - Comments: Renovate old school into housing manufacturing plant	Completed	$600,000
DCRA	2002	Funded	Facilities and Equipment (project) - Comments: Capital Matching	Completed	$31,529
DCRA	2002	Funded	Old Tok School Vocational Training Center Facilities & Equipment - Comments: Capital Matching	Completed	$30,529
HUD	2001	Funded	Health Clinic - Comments: Indian Community Development Block Grant (ICDBG) Program.	Completed	$500,000
Department of Environmental Conservations,	1999	Funded	Sewer Improvements - Comments: OTHER FUNDING: Environmental Protection Agency (EPA) $611.5 Sewer Improvements	Completed	$1,223,000

Table 6-3 Completed Projects

Lead Agency	Fiscal Year	Project Status	Project Description/Comments	Project Stage	Total Cost
Village Safe Water (DEC/VSW)					
ANTHC	1999	Funded	WTP design, completion of Phase I of AN-96-L51 - Comments: No activity, project has been complete for some time now. Needs to be closed out.	Complete	$1,223,000
DCRA	1998	Funded	Community Facility Repairs & Upgrades - Comments: Capital Matching. Local priority, from 1997 US Department of Agriculture/ Rural Development (USDA/RD) survey of villages	Completed	$26,316
DCRA	1997	Funded	Solid Waste Site Improvement - Comments: Capital Matching	Completed	$24,843
DCRA	1996	Funded	Community Hall/Fire Hall Rehabilitation - Comments: Capital Matching	Completed	$24,931
DCRA	1995	Funded	Washeteria Renovation - Comments: Capital Matching	Completed	$48,684
DCRA	1994	Funded	Athabascan Cultural Center & Museum - Comments: Rural Development Assistance (RDA)	Completed	$504,841
DCRA	1993	Funded	Village Restoration & Maintenance - Comments: Legislative Grant	Completed	$25,000

(DCRA 2012)

6.3.1.3 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 Village 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 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 Village'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	Ground Failure	Weather (Severe)	Tundra/Wildland Fire
Government	15	Tanacross Village Council Office	1000 Tanacross Boulevard.	Unknown	Unknown	$300,000	W1	X			X	X	X
	15	US Post Office	1000 Tanacross Boulevard.	Unknown	Unknown	$300,000	W1	X			X	X	X
	4	Tanacross Inc Office	Second Avenue	Unknown	Unknown	$150,000	W1	X			X	X	X
Transportation	0	BLM Tanacross Airport	Airport Road	Unknown	Unknown	$10,000,000	AFO	X	X		X	X	X
	5	Tanana River Boat Landing (DOT)	Clear water Road	Unknown	Unknown	$10,000	N/A	X			X	X	X
Emergency Response	5	Fire Station	First Avenue	Unknown	Unknown	$250,000	W1	X			X	X	X
Educational	20	Tanacross School K-8	School Access Road	63.35606	-143.36066	$5,000,000	S2L	X			X	X	X
Medical	20	Tanacross Sub-Region Community Health Center	Second Avenue	Unknown	Unknown	$4,368,000	W1	X			X	X	X
Community	20	Tanacross Community Hall	First Avenue	Unknown	Unknown	$400,000	W1	X			X	X	X
	5	Youth Center	First Avenue	Unknown	Unknown	$50,000	W1	X			X	X	X
	20	Tanacross Church	First Avenue	Unknown	Unknown	$150,000	W1	X			X	X	X
	5	Hockey Rink	School Access Road	Unknown	Unknown	$500,000	N/A	X			X	X	X
	0	Cemetery	Cemetery Road	Unknown	Unknown	$75,000	N/A	X			X	X	X
Roads	0	First Avenue	N/A	N/A	N/A	$1,000,000	HRD2	X			X	X	X
	0	Second Avenue						X			X	X	X
	0	Third Avenue						X			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	Ground Failure	Weather (Severe)	Tundra/Wildland Fire
	0	Dump Road											
	0	Fourth Avenue						X			X	X	X
	0	Cemetery Road						X			X	X	X
	0	Clearwater Road						X			X	X	X
	0	Tanacross Boulevard						X			X	X	X
	0	Warbelow Drive						X			X	X	X
Bridges		N/A											
Utilities	5	Moon Lake Water Supply	5 miles east of village	63.376	-143.5395	$20,000	N/A	X			X	X	X
		Tok Alaska Telephone & Power		Unknown	Unknown	Unknown	N/A	X			X	X	X
	2	Washeteria, Water Production, and Wastewater Treatment Facility (DEC Permit # 380531)	Second Avenue	63.37743	-143.35679	$4,380,144	PWTS	X	X		X	X	X
	2	Water Plant Maintenance Shop	Tanacross Boulevard	Unknown	Unknown	$4,000,000	PWTS	X			X	X	X
	2	City Wastewater System Piping	Citywide	Unknown	Unknown	$4,000,000	WWPE	X			X	X	X
	1	Landfill/Incinerator (Class 3, 0333BA002)	Dump Road	Unknown	Unknown	$250,000	N/A	X	X		X	X	X
Total Occ	**146**				**Total Damages:**	**$35,203,144**							

(Tanacross 2013, DHS&EM 2010)

6.3.1.4 Repetitive Loss Properties

This section estimates 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.

6.3.1.5 NFIP Participation

The Village of Tanacross does not participate in the NFIP due to federal regulation prohibiting participation because they are not an organized City; 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.

6.4 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 Geospatial Information System (GIS) based hazard mapping information was available.

Replacement structure and contents values were developed for physical assets. These value estimates were provided by the Planning Team. For each physical asset located within a hazard area, exposure was calculated by assuming the worst-case scenario (that is, the asset would be completely destroyed and would have to be replaced). Finally, the aggregate exposure, in terms of replacement value or insurance coverage, for each category of structure or facility was estimated. A similar analysis was used to evaluate the proportion of the population at risk.

However, the analysis simply represents the number of people at risk; no estimate of the number of potential injuries or deaths was prepared.

6.5 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 VULNERABILITY EXPOSURE ANALYSIS

There is limited GIS data available for the Village of Tanacross. The results of the GIS based exposure analysis for loss estimations in the Village are summarized in Tables 6-5 and 6-6. 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	4/39	550,000	1/20	10,010,000	1/20	4,368,000	5/50	1,175,000
Erosion	Within 300 ft of erosion areas	--	--	--	--	--	--	--	--
Flood	Descriptive	--	--	--	--	--	--	--	--
Ground Failure	Descriptive	4/39	550,000	1/20	10,010,000	1/20	4,368,000	5/50	1,175,000
Weather, Severe	Descriptive	4/39	550,000	1/20	10,010,000	1/20	4,368,000	5/50	1,175,000
Wildland Fire	Descriptive	4/39	550,000	1/20	10,010,000	1/20	4,368,000	5/50	1,175,000

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	~2.0	1,000,000	--	--	2/5	10,000,000	5/12	12,650,144
Erosion	Within 300 ft of erosion areas	--	--	--	--	1/0	10,000,000	2/3	4,630,144
Flood	Descriptive	--	--	---	--	--	--	--	--
Ground Failure	Descriptive	~2.0	1,000,000	--	--	2/5	10,000,000	5/12	12,650,144
Weather, Severe	Descriptive	~2.0	1,000,000	--	--	2/5	10,000,000	5/12	12,650,144
Wildland Fire	Descriptive	~2.0	1,000,000	--	--	2/5	10,000,000	5/12	12,650,144

6.6.1 Exposure Analysis – Hazard Narrative Summaries

Earthquake

The Village 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 Village constructed with wood have slightly less vulnerability to the effects of earthquakes than those with masonry.

Based on earthquake probability (PGA) analysis (Section 5.3.1.3) produced by the USGS, the entire Village area is at risk of experiencing moderate to significant earthquake impacts as a result of its proximity adjacent to the Denali Fault and numerous smaller faults resulting in a seismically active location.

- 130 people in 73 residences (approximate value $12,410,000),
- 39 people in four government and emergency response facilities (approximate value $550,000),
- 20 people in one educational facilities (approximate value $10,010,000),
- 20 people in one medical facility (approximate value $4,368,000),
- 50 people in five community facilities (approximate value $1,175,000),
- 2.5 road system miles (approximate value $1,000,000),
- Five people in two transportation facilities (approximate value $10,000,000), and
- 12 people in five utility facilities (approximate value $12,650,144).

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 (beaches, docks, harbors, and electric and water/wastewater utilities), and economic impacts associated with costs trying to prevent or control erosion sites. Only a building's location can lessen its vulnerability to erosion in Tanacross.

Based on local knowledge, areas within the Village affected by erosion are located adjacent to the Tanana River as well as stormwater run-off. (Section 5.3.2.3). There are approximately:

- One transportation facility (approximate value $10,000,000), and
- Three people in two utility facilities (approximate value $4,630,144).

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

Flood

Typical flood impacts associated with flooding is water damage to structures and contents, roadbed erosion and damage, boat strandings, areas of standing water in roadways, and damage or displacement of fuel tanks, power lines, or other infrastructure. However, the Village of Tanacross has a very limited flood threat. The Planning Team stated the only structures threatened are residential. (see Section 5.3.3.3).

No detailed 100 year flood analysis has been prepared for the Village. The USACE Floodplain Manager does not provide flood information or a 100 year floodplain map for Tanacross. Flood damages for the threatened residential structures includes approximately, 90 people in 56 residences (approximate value $9,520,000),

The Village anticipates that impacts to future populations, residential structures, critical facilities, and infrastructure are at the same historical impact level.

Ground Failure

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

The potential ground failure impacts from avalanches, landslides, and subsidence can be widespread. Potential debris flows and landslides can impact transportation, utility systems, and water and waste treatment infrastructure along with public, private, and business structures located adjacent to steep slopes, along riverine embankments, or within alluvial fans or natural drainages. Response and recovery efforts will likely vary from minor cleanup to more extensive utility system rebuilding. Utility disruptions are usually local and terrain dependent. Damages may require reestablishing electrical, communication, and gas pipeline connections occurring from specific breakage points. Initial debris clearing from emergency routes and high traffic areas may be required. Water and wastewater utilities may need treatment to quickly improve water quality by reducing excessive water turbidity and reestablishing waste disposal capability.

USGS elevation datasets were used to determine the ground failure hazard areas within Tanacross. Risk was assigned based on slope angle. A slope angle less than 14 degrees was assigned a low risk, a slope angle between 14 and 32 degrees was assigned a medium risk, and a slope angle greater than 32 degrees was assigned a high risk.

Ground Failure occurs throughout Alaska from landslides, land subsidence, and melting permafrost. These hazards periodically cause houses to shift due to ground shifting, sinking, and upheaval. According to a DOT/PF road improvement Study, the entire Village is “[g]enerally underlain by moderately thick to thin permafrost” and is therefore potentially exposed to ground failure (principally permafrost) impacts (Section 5.3.4.3). This includes approximately:

- 130 people in 73 residences (approximate value $12,410,000),
- 39 people in four government and emergency response facilities (approximate value $550,000),
- 20 people in one educational facilities (approximate value $10,010,000),
- 20 people in one medical facility (approximate value $4,368,000),
- 50 people in five community facilities (approximate value $1,175,000),

- 2.5 road system miles (approximate value $1,000,000),
- Five people in two transportation facilities (approximate value $10,000,000), and
- 12 people in five utility facilities (approximate value $12,650,144).

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

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 Village of Tanacross and the National Weather Service, the entire existing, transient, and future Tanacross population, residential structures, and critical facilities are exposed to future severe weather impacts. This includes

- 130 people in 73 residences (approximate value $12,410,000),
- 39 people in four government and emergency response facilities (approximate value $550,000),
- 20 people in one educational facilities (approximate value $10,010,000),
- 20 people in one medical facility (approximate value $4,368,000),
- 50 people in five community facilities (approximate value $1,175,000),
- 2.5 road system miles (approximate value $1,000,000),
- Five people in two transportation facilities (approximate value $10,000,000), and
- 12 people in five utility facilities (approximate value $12,650,144).

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

Wildland Fire

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

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

According to the Alaska Fire Service, there were no wildland fire areas within Tanacross' boundaries. However, 207 wildland fires have occurred within a 25-mile radius of the Village (Section 5.3.6.2). There is potential for wildland fire to interface with the Village's population center.

Wildland fire hazard areas were identified using a model incorporating slope, aspect, and fuel load (See Figure 5-12). South-facing, steep, and heavily vegetated areas were assigned the highest fuel values while areas with little slope and natural vegetation were assigned the lowest fuel risk values. Risk levels of low, moderate, high, and extreme were assigned to the entire region based on the results of this modeling.

Based on local knowledge and information provided by the Alaska Interagency Coordination Center, the entire existing and future Village's population, residences, and critical facilities are equally exposed to potential wildland fire event impacts. This includes:

- 130 people in 73 residences (approximate value $12,410,000),
- 39 people in four government and emergency response facilities (approximate value $550,000),
- 20 people in one educational facilities (approximate value $10,010,000),
- 20 people in one medical facility (approximate value $4,368,000),
- 50 people in five community facilities (approximate value $1,175,000),
- 2.5 road system miles (approximate value $1,000,000),
- Five people in two transportation facilities (approximate value $10,000,000), and
- 12 people in five utility facilities (approximate value $12,650,144).

6.7 FUTURE DEVELOPMENT

6.7.1.1 Future Critical Facilities and Infrastructure

The Division of Community and Regional Affairs database does not list current or on-going capital improvement projects beyond 2011. Their website references "Funded", not completed projects such as Alaska Department of Transportation and Public Facilities (DOT/PF) road improvements, and continuation of the Upper Tanana Community Health Center Projects.

Table 6-7 delineates the Village of Tanacross' future, planned, and funded projects and their tentative progress stage or status.

Table 6-7 Planned and Funded Projects

Lead Agency	Fiscal Year	Project Status	Project Description/Comments	Project Stage	Total Cost
Department of Community and Regional Affairs (DCRA)	2011	Funded	Tanacross - Sub regional Community Health Center Project - Comments: Legislative - next phase on the construction of the Upper Tanana Community Health Center Project; previous funding $968,000	Construction	$4,368,000
Denali Commission	2010	Funded	Tanacross Road Improvements Design & Construction - Comments:	Design	$1,000,000

Table 6-7 Planned and Funded Projects

Lead Agency	Fiscal Year	Project Status	Project Description/Comments	Project Stage	Total Cost
(Denali)			Department of Transportation/Public Facilities (DOT/PF) State Match $500,000		
Alaska Energy Authority - Alternative Energy and Energy Efficiency (AEA-AEEE)	2009	Funded	Yerrick Creek Hydro Assessment - Comments: OTHER FUNDING: Federal	Contract	$136,250
Housing and Urban Development (HUD)	2009	Funded	Indian Housing Block Grant (IHGB) - Comments: Native American Housing Assistance and Self Determination Act (NAHASDA) administration, operating & construction funds	Contract	$145,372
HUD	2008	Funded	IHBG - NAHASDA administration, operating & construction funds	Design	$129,673
HUD	2007	Funded	IHBG - NAHASDA administration, operating & construction funds	Construction	$150,653

(DCRA 2012)

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

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?
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 VILLAGE OF TANACROSS CAPABILITY ASSESSMENT

The Village's capability assessment reviews the technical and fiscal resources available to the community.

This section outlines the resources available to the Village of Tanacross for mitigation and mitigation related funding and training. Tables 7-1, 7-2, and 7-3 delineate the Village's regulatory tools, technical specialists, and financial resource available for project management. Additional funding resources are identified in Appendix A.

Table 7-1 Tanacross' Regulatory Tools

Regulatory Tools (ordinances, codes, plans)	Existing?	Comments (Year of most recent update; problems administering it, etc.)
Comprehensive Plan	No	No
Land Use Plan	No	No
Business Plan	Yes	*The Tanana Chiefs Conference, Inc., Comprehensive Economic Development Strategy Draft*
Tribal Corporation Land Use Plan	No	No
Emergency Response Plan	No	No
Wildland Fire Protection Plan	No	No
Building code	No	The Village can exercise this authority.
Zoning ordinances	No	The Village can exercise this authority.
Subdivision ordinances or regulations	No	The Village can exercise this authority.
Special purpose ordinances	No	The Village can exercise this authority.

Local Resources

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

Table 7-2 Tanacross' 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 Village hires consultants with land development and land management knowledge
Engineer or professional trained in construction practices related to buildings and/or infrastructure	No	The Village may hire engineering consulting services
Planner or engineer with an understanding of natural and/or human-caused hazards	No	The Village hires consultants with hazard mitigation knowledge
Floodplain Manager	No	Taunnie Boothby, State Floodplain Manager
Surveyors	No	The Village may hire surveying consulting services
Staff with education or expertise to assess the jurisdiction's vulnerability to hazards	No	The Village hires consultants with this knowledge

Table 7-2 Tanacross' Technical Specialists for Hazard Mitigation

Staff/Personnel Resources	Y/N	Department/Agency and Position
Personnel skilled in Geospatial Information System (GIS) and/or HAZUS-MH	No	The Village 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
Emergency Manager	Yes	Village Mayor or Tribal Chief (Situation dependent)
Finance (Grant writers)	Yes	Village or Tribal Administrator (Situation dependent)
Public Information Officer	Yes	Village 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	N/A
Indian Community Development Block Grants	Limited funding, can exercise this authority with Tribal Council approval
Capital Improvement Projects Funding	Limited funding, can exercise this authority with Tribal Council approval
Authority to levy taxes for specific purposes	No
Incur debt through general obligation bonds	No
Incur debt through special tax and revenue bonds	No
Incur debt through private activity bonds	No
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. ***This grant program is scheduled for phase out in FY 2013.***
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.
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 Village of Tanacross 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 1	Promote recognizing and mitigating all natural hazards that affect the Village of Tanacross (Village).
MH 2	Promote cross-referencing mitigation goals and actions with other Village planning mechanisms and projects.
MH 3	Reduce possibility of losses from all natural hazards that affect the Village.
Natural Hazards	
EQ 4	Reduce vulnerability of structures to **earthquake** damage.
ER 5	Reduce possibility of damage and losses from **erosion**.
FL 6	Reduce the possibility of damage and losses from **flood**.
GF 7	Reduce possibility of damage and losses from **ground failure**.
SW 8	Reduce vulnerability of structures to **severe weather** damage.
WF 9	Reduce possibility of damage and losses from **wildland** fires.

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.

After mitigation goals and actions were developed, the Planning Team assessed 70 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 March 22, 2013, the Planning Team selected 14 mitigation actions for potential implantation during the five-year life cycle of this HMP. The Planning Team placed particular emphasis on projects and programs that reduce the effects of hazards on both new and existing buildings and infrastructure. These potential projects are listed in Table 7-5 below.

Table 7-5 Mitigation Goals and Potential Actions

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

Goals		Actions	
No.	**Description**	**ID**	**Description**
MH 1	Promote recognizing and mitigating all natural hazards that affect the Village of Tanacross (Village).	S	Identify and pursue funding opportunities to implement mitigation actions.
		S	Disseminate FEMA pamphlets to educate and encourage homeowners concerning structural and non-structural retrofit benefits.
MH 2	Cross reference Mitigation goals and actions with other Village planning mechanisms and projects.	S	The Village will strive to 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	Prohibit new construction in identified mitigatable hazard impact areas (avalanche, erosion, flood, permafrost, etc.).
MH 3	Reduce possibility of losses from all natural hazards that affect the Village.	S	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.
		S	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.)

Table 7-5 Mitigation Goals and Potential Actions

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

Goals		Actions	
No.	**Description**	**ID**	**Description**
EQ 4	Reduce vulnerability of structures to earthquake damage.		None
ER 5	Reduce possibility of damage and losses from erosion.	S	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.
		S	Harden culvert entrance bottoms with asphalt, concrete, rock, or similar material to reduce erosion or scour.
FL 6	Reduce the possibility of damage and losses from flooding.	S	Elevate residential, public, or critical facilities at least two feet above the (BFE)
		O	Increase culvert sizes to increase their drainage capacity or efficiency.
GF 7	Reduce possibility of damage and losses from ground failure.		Promote permafrost sensitive construction practices in permafrost areas.
SW 8	Reduce vulnerability of structures to severe weather damage.	S	Develop and implement tree clearing mitigation programs to keep trees from threatening lives, property, and public infrastructure from severe weather events.
		S	Develop personal use and educational outreach training for a “safe tree harvesting” program. Implement along utility and road corridors to prevent or reduce potential winter storm damage.
WF 9	Reduce possibility of damage and losses from wildland fires.	S	Develop outreach program to educate and encourage fire-safe construction practices for existing and new construction in high-risk areas.
		S	Identify, develop, implement, and enforce mitigation actions such as fuel breaks and reduction zones for potential wildland fire hazard areas.

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 April 22, 2013 to determine which actions would be included in the Mitigation Action Plan. The Mitigation Action Plan represents mitigation projects and programs to be implemented through the cooperation of multiple entities in the Village. 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 Village chooses to implement.

Table 7-6 STAPLEE 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 March 26, 2013, the hazard mitigation Planning Team prioritized the mitigation actions that were chosen to carry forward into the Mitigation Action Plan (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 Village 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

Native Village of Tanacross (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

Table 7-7 Potential Funding Source Acronym List

Alaska Energy Authority (AEA)
AEA/Bulk Fuel (ABF)
AEA/Alternative Energy and Energy Efficiency (AEEE)
Alaska Department of Environmental Conservation (DEC)/
V*illage 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/RFAG),
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 Village's MAP, Table 7-8, depicts how each mitigation action will be implemented and administered by the Planning Team by delineating 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 Village of Tanacross' 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	Tribal Council	Tribal Council	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	Disseminate FEMA pamphlets to educate and encourage homeowners concerning structural and non-structural retrofit benefits.	Medium	Tribal Council	Tribal Council, 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.
MH 2.1	The Village will strive to manage their existing plans to ensure they incorporate mitigation planning provisions into all community planning	Medium	Tribal Council	Tribal Council, 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 residents.

Table 7-8 Village of Tanacross' 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)
	processes such as comprehensive, capital improvement, and land use plans, etc. to demonstrate multi-benefit considerations and facilitate using multiple funding source consideration.					TF: This is feasible to accomplish as cost can be associated with plan reviews and updates. The action relies on staff and review committee availability and willingness to serve their community.
MH 2.2	Prohibit new construction in identified mitigatable hazard impact areas (avalanche, erosion, flood, permafrost, etc.).	High	Tribal Council	Tribal Council, DCRA, Denali Commission	3-5 years	B/C: Building code development, implementation and enforcement can effectively reduce future losses to hazardous events. Building codes can actually assist bush communities through making maximum use of materials and shipping costs the first time. TF: This project is technically feasible as the community need only demonstrate cost savings by demonstrating losses from history utility impacts and down time.
MH 3.1	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	High	Tribal Council	Tribal Council, HMA, NRCS, ANA, USACE, USDA, Lindbergh Grants Program	1-5 years	B/C: This project would remove threatened structures from hazard areas, eliminating future damage while keeping land clear for perpetuity. F: This project is feasible using existing staff skills, equipment, and materials. Acquiring contractor expertise may be required for large

Table 7-8 Village of Tanacross' 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)
	known hazard areas.					facilities.
MH 3.2	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.)	High	Tribal Council	Tribal Council, Lindbergh Grants Program, HMA, FP&S, SAFER, ANA, DHS, HSGP, CCP, EMPG, EOC,	1-5 years	B/C: Emergency power generation is a minor cost to ensure utility availability for use after a hazard strikes. TF: Installing emergency generators is technically feasible for this community as they already have staff to maintain existing community power generation facilities. This project typically needs to be associated with essential facility upgrades for FEMA funding
Natural Hazards						
Erosion (ER)						
ER 5.1	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.	High	Tribal Council	Tribal Council, HMA, ANA, NRCS, USACE	3-5 years	B/C: Improving embankment and slope stability 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.
ER 5.2	Harden culvert entrance bottoms with asphalt, concrete, rock, or similar	High	Tribal Council	Tribal Council, HMA, ANA, NRCS, USACE	2-4 years	B/C: This retrofit project can be a very cost effective method for bush communities as materials and

Table 7-8 Village of Tanacross' 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)
	material to reduce erosion or scour.					shipping costs are very high. This project is technically feasible as the community need only demonstrate cost savings by demonstrating losses from history utility impacts and down time.
Flood (FL)						
FL 6.1	Elevate residential, public, or critical facilities at least two feet above the (BFE)	High	Tribal Council	Tribal Council, HMA, NRCS, ANA, USACE, USDA, Lindbergh Grants Program	1-3 years	B/C: This project would raise threatened structures from hazard impacts beyond FEMA's basic elevation requirement, dramatically reducing future damages. F: This project is feasible using existing staff skills, equipment, and materials. Acquiring contractor expertise may be required for large facilities.
FL 6.2	Increase culvert sizes to increase their drainage capacity or efficiency.	High	Tribal Council	Tribal Council, HMA, ANA, Denali Commission, NRCS, USACE, USDA/EWP, USDA/ECP, DCRA/ ACCIMP	Ongoing	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.

Table 7-8 Village of Tanacross' 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)
Ground Failure (GF)						
GR 7.1	Promote ground failure and permafrost sensitive construction practices in hazard impact areas.	Medium	Tribal Council	Tribal Council, 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.
Severe Weather (SW)						
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	Tribal Council	Tribal Council, DOF: VFAGP, RAGP	Ongoing	B/C: Implementing this mitigation activity 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.
SW 8.2	Develop personal use and educational outreach training for a "safe tree harvesting" program. Implement along utility and road corridors to prevent or reduce potential winter storm damage.	Low	Tribal Council	Tribal Council, FEMA AFG, FP&S, SAFER DOF: VFAG, RAGP, FireWise	Ongoing	B/C: This mitigation activity will reduce severe winter storm damages caused by heavy snow loads and icy rain by avoiding damage to structures and infrastructure. TF: This type activity is technically feasible within the community by implementing existing programs such as Fire Wise and other State and

Table 7-8 Village of Tanacross' 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)
						Federal agency programs.
Wildland Fire (WF)						
WF 9.1	Develop outreach program to educate and encourage fire-safe construction practices for existing and new construction in high-risk areas.	Medium	Tribal Council	Tribal Council, 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 Tribal staff.
WF 9.2	Identify, develop, implement, and enforce mitigation actions such as fuel breaks and reduction zones for potential wildland fire hazard areas.	Medium	Tribal Council	Tribal Council, AFG, FP&S, SAFER	1-3 years	B/C: This sustainable mitigation activity will greatly reduce the wildland/urban interface, have minimal cost, and will help build and support community capacity to respond to wildland fire disasters. TF: This project is technically feasible using existing Tribal staff.

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 below.

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 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 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, the National Incident Management System (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. DOT increases State, Territorial, Tribal and local effectiveness in safely and efficiently handling hazardous materials accidents and incidents, enhances

implementation of the Emergency Planning and Community Right-to-Know Act of 1986, and encourages 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 provides information concerning disaster assistance, preparedness, planning, cleanup, and recovery planning. (http://www.sba.gov/category/navigation-structure/starting-managing-business/managing-business/running-business/emergency-preparedness-and-disaster-)
    - 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://ready.alaska.gov/plans/mitigation.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.

- 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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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: Native Village of Tanacross	**Title of Plan:** Native Village of Tanacross Hazard Mitigation Plan	**Date of Plan:** May 2013
Local Point of Contact: Roy Denny	**Address:** P.O. Box 76009 Tanacross, AK 99776	
Title: Tribal President		
Agency: Native Village of Tanacross		
Phone Number: 907.883.5024	**E-Mail:** tanacrossvillagecouncil@yahoo.com	

State Reviewer:	**Title:**	**Date:**
Scott Nelsen	Mitigation Planner	5/20/13

FEMA Reviewer:	**Title:**	**Date:**
Hilary Kendro, STARR Nathan Slaughter, STARR Brett Holt, FEMA	Planner Project Manager Mitigation Planner	6/13/13 6/18/13 6/24/13
Date Received in FEMA Region X	May 20, 2013	
Plan Not Approved		
Plan Approvable Pending Adoption	June 24, 2013	
Plan Approved	August 8, 2013	

SECTION 1:
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, Pages 3-1 to 3-2; Section 3.2, Pages 3-2 to 3-3	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, Pages 3-3 to 3-4	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, Pages 3-3 to 3-4	X	
A4. Does the Plan describe the review and incorporation of existing plans, studies, reports, and technical information? (Requirement §201.6(b)(3))	Sections 3.4 & 3.5, Pages 3-4 to 3-9	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, Pages 3-5 to 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, Pages 3-6 to 3-7	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, Pages 5-1 to 5-2; Section 5-3, Pages 5-5 to 5-32	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))	Section 5-3, Pages 5-5 to 5-32	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))	Section 5-3, Pages 5-5 to 5-32; Sections 6-1 to 6-7, Pages 6-1 to 6-16	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 6.3.1.4, Page 6-9; Section 6.3.1.5, Page 6-9	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, Pages 7-2 to 7-3	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 6.3.1.5, Page 6-9	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, 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, Pages 7-5 to 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))	Sections 7.4, Pages 7-7 to 7-8; Section 7.5, Pages 7-9 to 7-16	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 7-17; Section 3.5.1, Page 3-5	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	N/A	
D2. Was the plan revised to reflect progress in local mitigation efforts? (Requirement §201.6(d)(3))	N/A	N/A	
D3. Was the plan revised to reflect changes in priorities? (Requirement §201.6(d)(3))	N/A	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

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 methodology used to conduct the planning process is described. The plan defines a five-step planning process and identifies all action items accomplished during each process phase.
- Public participation was solicited through the distribution of newsletters that described mitigation planning activities and encouraged participation. The newsletters were distributed at the Village Offices, community bulletin boards, and local stores/businesses. Copies of the two newsletters are included in the Plan's appendix.
- During the planning process, the Planning Team used signage throughout the Village to announce the Hazard Mitigation Plan project.
- The plan identifies existing plans, studies, reports, and ordinances that were reviewed during the planning process. The contents of each reviewed document are described.
- Actions items to be accomplished during the review, evaluation, and implementation of the Plan are identified and described along with timelines to ensure accurate and efficient plan updates.

Opportunities for Improvement:

- Expand the Hazard Mitigation Planning Team to include a broader range of stakeholders such as additional representatives from the Village or adjacent Counties/communities. Consider including local businesses to the Planning Team since public involvement mitigation newsletters were distributed at stores within the Village.
- Include the project mailing list of identified individuals, relevant academia, nonprofits, and local, state, and federal agencies that were contacted to participate in the planning process.
- Allow for at least one public Planning Team meeting to encourage more active public participation.
- Include if and what type of public comments were submitted during the planning process. If no public comments were received during the planning process, describe how this could be improved during subsequential Plan updates.
- Add meeting agendas and action items for each planning team meeting and a list of attendees at each meeting.

Element B: Hazard Identification and Risk Assessment

Plan Strengths:

- Probability and magnitude/severity criteria are used to classify each identified hazard. The criteria are defined within the Plan.
- The plan describes the use of best available data (i.e., studies, reports, technical information, etc.) to describe significant hazards. All references used to complete each hazard profile are identified and documented.

- Historic events that have occurred within the Village are identified along with the location of each event, date, event type, and (when possible) a description of the magnitude.
- The plan describes current and future development within the Village. Current and future critical facilities and infrastructure projects are identified and described including lead agency, fiscal year, project status, project description/comments, project stage, and total cost.
- The methodologies used to conduct the vulnerability assessments are described and data limitations are identified. Estimated potential losses were calculated for critical facilities and critical infrastructure for each identified hazard based on GIS data and information obtained from the Planning Team. The Plan indicates which hazard could potentially affect each identified critical facility.

Opportunities for Improvement:
- Add a map showing where flooding sources are located within the Village.
- Obtain additional GIS information to assist in vulnerability analysis accuracy.
- Identify any data gaps that can be filled in the future as new data becomes available.
- Indicate if Hazus analyses will be pursued in future plan updates.

Element C: Mitigation Strategy

Plan Strengths:
- The plan identifies the regulatory tools, staff, and financial resources available within the Village and if it will be accessed for future Plan updates.
- The plan includes a set of mitigation actions that address prevention, property protection, and public education. For each identified mitigation action, a correlating mitigation goal is identified along with a priority, responsible entity, potential funding source, timeframe, and benefit-costs/technical feasibility.
- The STAPLEE approach was used to prioritize the mitigation actions. Actions were prioritized into three categories with each category defined in the Plan.

Opportunities for Improvement:
- Identify existing Village authorities such as the leads of agencies/departments within the Tribal structure. If existing authorities were not available or declined to participate, indicate why or how they can be established for future plan updates.
- Include mitigation actions related to preserving and protecting existing or proposed infrastructure.
- Identify a timeline or schedule for implementing mitigation strategies into existing planning mechanism.
- Identify and describe which identified mitigation actions will be incorporated into which planning mechanism. Include a description of how they will be included such as a point of contact and/or potential schedule.

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 and 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 practice 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 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 newsletters, 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.

Appendix C
HMP Promulgation

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THE STATE of ALASKA
GOVERNOR SEAN PARNELL

Department of Military and Veterans Affairs
Division of Homeland Security and Emergency Management
P.O. Box 5750
JBER, AK 99505-0800
Main: 907.428.7000
Fax: 907.428.7009
www.ready.alaska.gov

July 12, 2013

Roy Denny
Tribal President
Community of Tanacross
P.O. Box 76009
Tanacross, AK 99776

RE: Community of Tanacross Hazard Mitigation Plan

Dear Mr. Denny:

Culminating a successful collaborative effort, the Tanacross Hazard Mitigation Plan is hereby adopted. Upon FEMA approval, Tanacross will be eligible for the Robert T. Stafford Disaster Relief and Emergency Assistance Act's hazard mitigation project grants.

Tanacross is an unincorporated community located within Alaska's Unorganized Borough. Therefore, the State of Alaska is serving as the community's adopting authority in accordance with FEMA.

If you have any questions regarding your hazard mitigation plan or FEMA's mitigation grant programs, please contact Scott Nelsen, State Hazard Mitigation Planner, at (907) 428-7010.

Sincerely,

John W. Madden
Director, Homeland Security and Emergency Management

Appendix D
Public Outreach

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Simmons, Scott

From: Evans, Jessica
Sent: Wednesday, June 20, 2012 1:23 PM
To: coearnold@yahoo.com
Cc: Simmons, Scott
Subject: Tanacross Hazard Mitigation Plan Development
Attachments: @

Dear Roy,

This is a follow-up email to provide more detailed information concerning the development of the City of Tanacross Hazard Mitigation Plan, which we discussed today on the phone.

The City of Tanacross is one of fifteen communities that URS Corporation (URS) has been asked to assist in the development of a Hazard Mitigation Plan (HMP). It is important to note that Tanacross does not have to pay anything for this project. The funding for this important project is provided by FEMA through the Alaska Division of Homeland Security and Emergency Management (DHS&EM). DHS&EM has contracted URS Corporation to work with Tanacross.

When the HMP for Tanacross is complete, the City will be able to apply for future funding from FEMA to help prepare for potential hazards.

URS has been developing HMPs nationwide since 2000. Our Alaska office has completed approximately 60 State, Borough (County) and local community, State reviewed, and FEMA approved Hazard Mitigation Plans to-date. This is a link to a few Hazard Mitigation Plans we have developed: http://ready.alaska.gov/plans/localhazmitplans.htm (We developed the Alatna, Allakaket, Hughes, Kaltag, and Nulato Hazard Mitigation Plans listed on this page. URS wrote the Petersburg HMP before my arrival.) These are only a few examples of the approximately 60 HMPs that we have written.

Mitigation is defined as “any sustained action taken to reduce or eliminate long-term risk to life and property from natural, manmade or technological hazards and their impacts.”

A Hazard Mitigation Plan identifies hazards which routinely impact a community, defines those hazards so community members understand their nature, hazard impact location within the community, and their potential impact extent.

URS's role in this project is to ensure that the Plan meets state and federal requirements -- part of this requirement is to describe the process in which the community was involved. We are at the beginning stages of this project, and it is our experience that successful plans are a result of an involved community.

Our task is to write the plan while guiding you through the process of developing the HMP, which uses a community planning team process. URS will write the plan.

The community Planning Team will assist the process by working with URS to:

- Identify which hazards routinely impact your community,
- Gather and provide disaster damage information,
- Gather and provide historical impact information,
- Determine their estimated or factual (based on insurance or parcel documents etc.) replacement costs,
- Define the community’s population risk and critical facility vulnerabilities,

- Develop hazard mitigation goals,
- Identify potential projects which could reduce or eliminate each hazard's impact and subsequent damages,
- Identify potential funding sources,
- Describe the plan's development process, involved community member participants, involved agency participants, public participation processes, and continued plan maintenance and the update process.

Our first goal for the community is to select a planning team leader and team members. Who do you recommend? Do you want to be the lead? Team members should have natural hazard impact knowledge (those hazards that continually cause damages); what facilities are potentially threatened by each hazards; as well as, what Tanacross's resources and capabilities are available within the community to mitigate those hazards. We suggest you look for team members from the City and Tribal Councils, the health clinic, school, fire department, law enforcement, elders, and other stakeholders. We suggest a relatively small team to make the process manageable. Five to 10 members would be optimal.

There will be opportunities for the entire community to review the team's work during the public involvement process. FEMA requires at least two public involvement activities. These activities can include distributing community wide brochures or newsletters, holding public meetings, and participating in planning workgroup teleconferences. URS will provide two (2) newsletters. The first newsletter (draft attached) will introduce the project and explain the planning process, encourage public involvement; ask the community to identify known hazards, and to confirm their critical infrastructure as identified by DHS&EM's statewide small community Critical Facility Database. The second will introduce the draft HMP and encourage the community to review and provide comments to make the plan better or more usable to mitigation your hazards.

I would like to schedule an introductory meeting with the team leader and team members and, if required by your by-laws, the City Council to introduce the project and the process. During this meeting we will describe what information we will need to move forward with the development of the plan. You will be able to call into a teleconference using a speaker phone; or each team member can call from their home or offices using a toll free number if they are unable to attend the meeting. We would like to schedule this teleconference for no later than July 13th if feasible. Please let me know which day and time is convenient for you. We will then provide you the toll-free number which you can pass to each essential participant.

Please provide us the Planning Team Leader's name and those your Planning Team to include on the first newsletter.

Please also provide a date that we can schedule the project Kick-Off Teleconference within the next two weeks to enable us to begin the plan's development.

I will edit the draft to include your city's information and return to you for distribution before the project kick-off meeting next week.

I look forward to working with you.

Sincerely,

Jessica Evans

Jessica Evans | Environmental Scientist |URS Corporation
700 G. Street, Suite 500 | Anchorage, AK 99501
907.261.9718 | jessica.evans@urs.com

CITY OF TANACROSS HAZARD MITIGATION PLAN

June 2012

This newsletter discusses the preparation of the Tanacross 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. Tanacross 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 Tanacross 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 Tanacross 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 Nome Census Area that may also occur specifically in Tanacross.

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.

Tanacross Hazard Worksheet		
Hazard	Alaska Gateway REAA	Tanacross
Avalanche	Yes	No
Earthquake	Yes	Yes
Erosion	Yes	Yes
Flood	Yes	No
Ground Failure (Landslide, Permafrost)	Yes	Yes
Tsunami & Seiche	No	No
Volcano	No	No
Weather (Severe)	Yes	Yes
Wildland (Tundra) Fire	Yes	Yes
*Hazard Matrix from the 2010 State of Alaska Hazard Mitigation Plan for the Alaska Gateway REAA Area		

DHS&EM identified critical facilities within the City of Tanacross 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 Tanacross. Please add additional facilities if needed.

Tanacross Critical Facilities*	
Facility Name	Community Identified Facilities
Tribal Administration Office	
Airport	
Committee Hall	
Post Office	
Dock	
Maintenance shop	
Fire Station	
Elementary School	
School	
Clinic	
Emergency Shelter	
Church	
Community Hall	
Water System	
Power Generation Facility	
Treatment Facility	
Washeteria	
Landfill/Incinerator	
Waste Water Treatment Facility	
* *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 Tribal President Roy Denny, with assistance from Jerry Isaac and Earnest Coe. 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 Tanacross 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 Tanacross' 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 Jessica Evans, URS directly if you have any questions, comments, or requests for more information:

Tanacross' Planning Team Leader

Roy Denny, Tribal President
Native Village of Tanacross,
P.O. Box 76009
Tanacross, AK 99776
907.883.5024
tanacrossvillagecouncil@yahoo.com

DHS&EM Plan Development Lead

Scott Nelsen, State Support
Division of Homeland Security &
Emergency Management
PO Box 5750
Anchorage, AK 99505-5750
907.428.7010 or 800.478.2337
scott.nelsen@alaska.gov

URS Plan Development Lead

Jessica Evans, Environmental Planner
URS Corporation
700 G St. Ste. 500
Anchorage, Alaska 99503
907.261.9718 OR 800.909.6787
jessica.evans@urs.com

Memorandum

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

SUBJECT: Division of Homeland Security and Emergency Management (DHS&EM) Hazard Mitigation Plan (HMP) /Hazard Mitigation Grant Program (HMGP) Project – Tanacross Kick-Off – Team Meeting

Community: Native Village of Tanacross, 907.883.5024

Date/Time: August 26, 2012

From: R. Scott Simmons

Community Participants:
- Earnest Coe, Planning Team Lead
- Roy Denny, Tribal President
- Tribal Council

- **Subjects covered included:**
  - URS received was hired to develop hazard mitigation plans and to develop one DHS&EM eligible HMGP project application based on the City's mitigatable natural hazard threats, potential impacts, population threatened, and their priorities.
  - 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 the Data Sheets (homework) and how they would be used
    - The Critical Facilities Inventory Spreadsheet needs to list any facilities not on the list. The list needs additional information such as facilities' physical locations (GPS coordinates and 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
    - Ernest and Roy described their various hazard impacts from riverine erosion along the Tanana River embankment from high water flow, ice flows, and wind. The Village does not experiences community wide flooding due to the River's high embankment. However, the Village does have occasional permafrost melting which exacerbates river embankment erosion and has caused minor house settling and road damage.
  - 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.
  - 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 Tanacross Planning Team**
  - Prior telephonic discussion occurred to encourage the team to take-on HMP data gathering – to 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 success of the Team.
  - Public Involvement will help the team:
    - Identify known natural hazards

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  - Identify critical facilities
  - Provide historic event and damage information
  - Provide location information
- URS encourages public meeting during development to fulfill FEMA requirements, to ensure public awareness of the hazards that potentially threaten the community, and to gain public support for projects to protect infrastructure and the population.

URS

FAX TRANSMISSION

700 G Street Avenue, Suite 500
Anchorage, Alaska 99501

Phone: 907.261.9706
Fax: 907.562.1297

TO:

Name: Earnest Coe	Telephone Number: 907. 883.5024	Date: 3/21/2013
Company: Village of Tanacross	Fax Number: 907.883.4497	Number of Pages: 6 w/cover sheet

FROM:

Name: Scott Simmons	Fax Number: 907.562.1297	Telephone Number: 800.909.9767 Direct: 907.261.9706
Subject: Mitigation project selection sheet – review, consider, and select for implementation teleconference		

Comments:

I have attached the information sheet containing hazard mitigation goals and a table listing potential mitigation projects for inclusion within your Hazard Mitigation Plan (HMP).

Together we will select a few projects that will help you fulfill City needs while potentially avoiding future hazard damages from those hazards you helped me describe in the City's HMP:

- Earthquake
- Erosion
- Flood
- Ground failure
- Severe Weather
- Wildland Fire

We will look over the list together to review, consider, and then select projects the Village could potentially complete during the HMP's 5- year life cycle if funding becomes available through various agency grant programs.

This table shows the Village of Tanacross' potential Mitigation Goals

Table 7-4 Mitigation Goals

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

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

The Hazard ID column lists each goal. The **S**elected items in the Status column will be displayed in "bold" text to identify those 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.

Sample Mitigation Projects the City Considered, then **S**elected for implementation, or determined are already in-place and are Ongoing. The City determined that "S" and "O" support City goals and those should be implemented into the HMP.

Sample Table 7-5 Mitigation Action Items -Considered

Hazard ID	Status *Considered* ***Selected*** *Ongoing*	Description
Natural Hazards		
Multi-Hazard **Goal 1** Promote recognizing and mitigating natural hazard damage and loss that could potentially affect the Village of **Tanacross** (Village).		Hold an annual or biennial "hazard meeting" to provide information to residents about recognition and mitigation of all natural hazards that affect the Village of Tanacross.
		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	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 and implement strategies and educational outreach programs for debris management from natural hazard events.
	S	Identify and pursue funding opportunities to implement mitigation actions.
		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.
		Develop outreach program with school district contests having students develop, display, and explain mitigation projects or initiatives.
	N/A	Investigate benefits of, and potentially joining the National Flood Insurance Program (NFIP) to reduce monetary losses to individuals and the community.
		Identify critical facilities and vulnerable populations based on identified (and mapped

Sample Table 7-5 Mitigation Action Items -Considered		
Hazard ID	**Status** ***C****onsidered* ***S****elected* ***O****ngoing*	**Description**
		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.
		Update public emergency notification procedures and develop an outreach program for potential hazard impacts or events.
Multi-Hazard **Goal 2** Promote cross-referencing mitigation goals and actions with other Tribal planning mechanisms and projects.	*S*	The Village will strive to 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.
		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.
		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.
		Update or develop, implement, and maintain jurisdictional debris management plans.
	S	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.
		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.
		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.
Multi-Hazard **Goal 3** Reduce potential damage and loss from all natural hazards that affect the Village.		Encourage utility companies to 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.
		Encourage utility companies to evaluate and harden vulnerable infrastructure elements for sustainability.
	S	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.
	S	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

Sample Table 7-5 Mitigation Action Items -Considered		
Hazard ID	**Status** ***C****onsidered* ***S****elected* ***O****ngoing*	**Description**
		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.
Goal 4 Earthquake Reduce potential vulnerability to earthquake damage and loss.	--	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.
Goal 5 Erosion Reduce potential **erosion** damage and loss.	S	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.
	S	Harden culvert entrance bottoms with asphalt, concrete, rock, or similar material to reduce erosion or scour.
		Install walls at the end of a drainage structure to prevent embankment erosion at its entrance or outlet. (end- or wing-walls).
Goal 6 Flood Reduce potential **flood** damage and loss.	--	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.
	S	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.
	O	Increase culvert sizes to increase their drainage capacity or efficiency.
		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.
		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.
Goal 7 Ground Failure Reduce potential		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

Sample Table 7-5 Mitigation Action Items -Considered		
Hazard ID	**Status** ***C****onsidered* ***S****elected* ***O****ngoing*	**Description**
ground failure damage and loss.		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.
Goal 8 Weather (Severe) Reduce potential vulnerability to **severe weather** damage and loss.		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).
	S	Develop and implement tree clearing mitigation programs to keep trees from threatening lives, property, and public infrastructure from severe weather events.
		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 personal use and educational outreach training for a “safe tree harvesting” program. Implement along utility and road corridors to prevent or reduce potential winter storm damage.
Goal 9 Wildland Fire Reduce potential vulnerability to **tundra/wildland** fire damage and loss.		Develop Community Wildland Fire Protection Plan to mitigate wildland fire threat.
		Hold FireWise workshop to educate residents and contractors concerning fire resistant landscaping.
		Promote FireWise building siting, design, and construction processes and materials.
		Provide wildland fire hazard outreach information in an easily distributed format for all residents.
		Develop, adopt, and enforce burn ordinances that controls outdoor burning, require burn permits, and restricts open campfires during identified weather periods (windy, dry, etc.).
	S	Develop outreach program to educate and encourage fire-safe construction practices for existing and new construction in high-risk areas.
	S	Identify, develop, implement, and enforce mitigation actions such as fuel breaks and reduction zones for potential wildland fire hazard areas.

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URS

March 22, 2013

Native Village of Tanacross
P.O. Box 76009
Tanacross, AK 99776

RE: Tanacross Draft Hazard Mitigation Plan Review

Dear Coe Arnold,

Please give me a call when you receive this.

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 Tribal Office 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 April 5, 2013.

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

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VILLAGE OF TANACROSS HAZARD MITIGATION PLAN (HMP)

February 2013 **Newsletter 2**

This newsletter discusses the preparation of the Village of Tanacross 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 Village of Tanacross was one of fifteen 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 wildland (tundra) fire. The HMP also identifies the people and facilities potentially at risk and ways to mitigate hazards. The public participation and planning process has been 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.

The people and property in the State of 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 eliminate the risk or reduce the severity of hazards on people and property. Mitigation programs may include short-term and long-term activities to reduce the hazards, reduce exposure to hazards, or reduce the effects of hazards. Mitigation could include education, and construction 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 hazard mitigation plan. 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
- Hazard identification
- Risk assessment
- Goals
- Mitigation programs, actions, and projects
- A resolution from the community adopting the plan

FEMA has prepared Planning Guidance which is 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 is met. These guides are available at http://www.fema.gov/hazard-mitigation-planning-resources. The Tanacross Hazard Mitigation Plan will follow those guidelines.

The planning process kicked-off in April 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, Village 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 Tanacross.

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 March 22, 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 has 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 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 March 1, 2013. The plan will be provided to DHS&EM and FEMA for their preliminary approval and returned to Tanacross' Tribal Council.

The Planning Committee

The plan was developed with the assistance from a planning team consisting of a cross section of the community. Planning Team members included Team Leader, Coe Arnold, the Tribal Council, and URS Corporation.

Sample of the Village of Tanacross' Mitigation Actions. Review the draft HMP for a complete list.		
Identify and pursue funding opportunities to implement mitigation actions.	Identify and pursue funding opportunities to implement mitigation actions.	Harden culvert entrance bottoms with asphalt, concrete, rock, or similar material to reduce erosion or scour.
The Village will strive to 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.	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.).	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.)
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.	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.	Develop personal use and educational outreach training for a "safe tree harvesting" program. Implement along utility and road corridors to prevent or reduce potential winter storm damage.
Elevate residential, public, or critical facilities at least two feet above the (BFE)	Promote permafrost sensitive construction practices in permafrost areas.	Develop and implement tree clearing mitigation programs to keep trees from threatening lives, property, and public infrastructure from severe weather events.
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.	

We encourage you to learn more about the Village of Tanacross' 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:

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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: