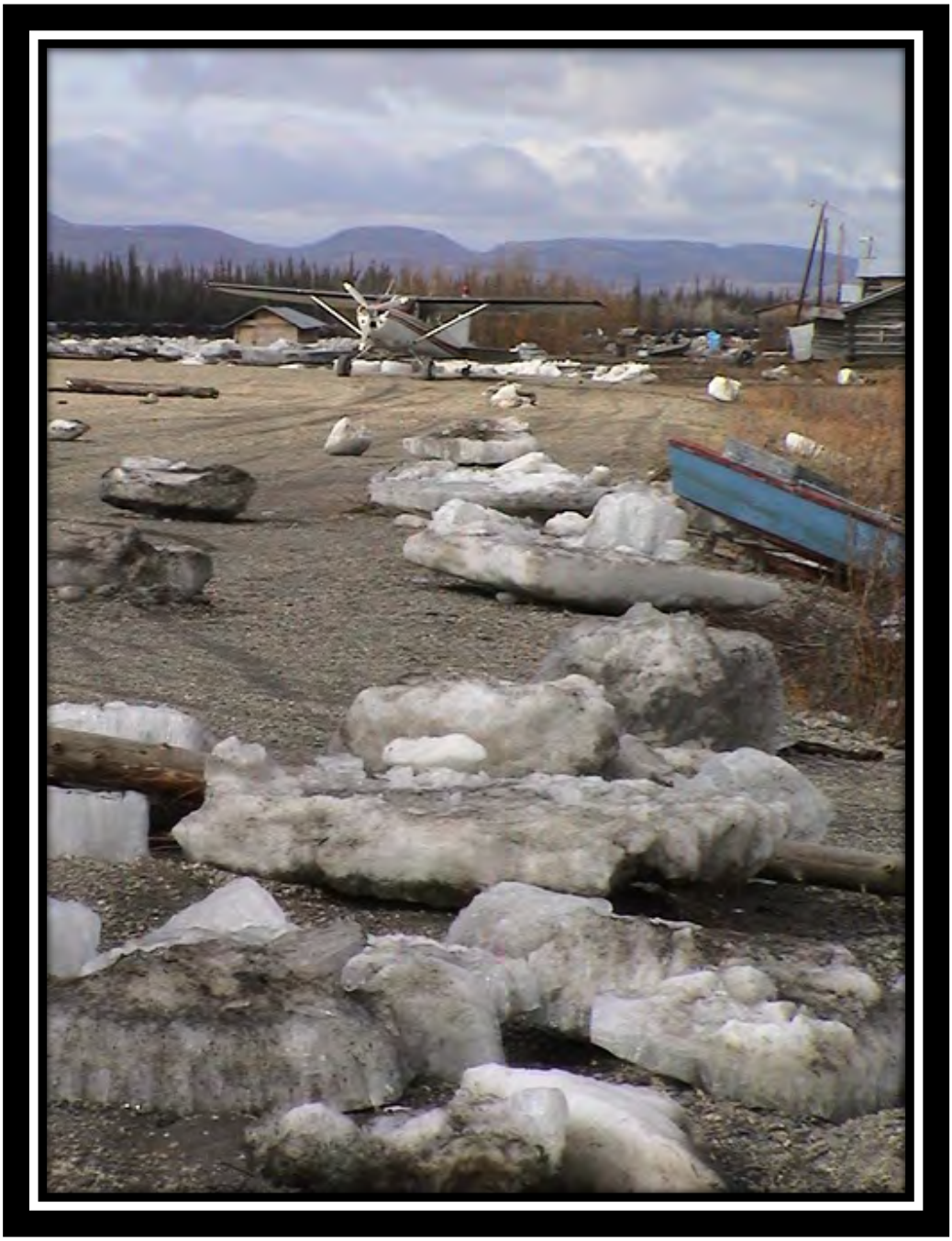
The City of Hughes

Hudotl’eekkaakk’e Tribal Council

Multi-Jurisdictional Hazard Mitigation Plan



July, 2016

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Acronyms/Abbreviations

°F	Degrees Fahrenheit
AFG	Assistance to Firefighters Grant
AHFC	Alaska Housing Finance Corporation
AICC	Alaska Interagency Coordination Center
ANA	Administration for Native Americans
ANTHC	Alaska Native Tribal Health Consortium
APA	American Planning Association
ARC	American Red Cross
BIA	Bureau of Indian Affairs
BLM	Bureau of Land Management
CD	compact disc
CDBG	Community Development Block Grant
CHEMS	Community Health and Emergency Medical Services
CFR	Code of Federal Regulations
City	City of Hughes
DCCED	Department of Commerce, Community, and Economic Development
DCRA	Division of Community and Regional Affairs
DGGS	Division of Geological and Geophysical Survey
DEC	Department of Environmental Conservation
DHSS	Department of Health and Social Services
DHS	Department of Homeland Security
DHS&EM	Division of Homeland Security and Emergency Management
DMA 2000	Disaster Mitigation Act of 2000
DMVA	Department of Military and Veterans Affairs
DNR	Department of Natural Resources
DOE	Department of Energy
DOF	Division of Forestry
DOI	Division of Insurance
DOL	Department of Labor
DOT/PF	Department of Transportation and Public Facilities
DSS	Division of Senior Services
EPA	Environmental Protection Agency
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
HMA	Hazard Mitigation Assistance
HMGP	Hazard Mitigation Grant Program
HWE	High Water Elevation
HMP	Hazard Mitigation Plan
HUD	Housing and Urban Development
IBHS	Institute for Business and Home Safety
IHBG	Indian Housing Block Grant –
IRS	Internal Revenue Service
M	Magnitude
MHHW	mean high high water
MMI	Modified Mercalli Intensity
mph	miles per hour
NAHASDA	Native American Housing Assistance and Self Determination Act
NFIP	National Flood Insurance Program
PDM	Pre-Disaster Mitigation
PGA	peak ground acceleration
RD	Rural Development
RL	repetitive loss
RFC	Repetitive Flood Claim
SAFER	Staffing for Adequate Fire and Emergency Response
SBA	U.S. Small Business Administration
SHMP	Alaska State Hazard Mitigation Plan
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
USACE	United States Army Corps of Engineers
USDA	United States Department of Agriculture
US or U.S.	United States
USC	United States Code
USGS	United States Geological Survey
VPSO	Village Public Safety Officer

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

1.1 HAZARD MITIGATION PLANNING

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

1.2 PLANNING REQUIREMENTS

1.2.1 Local Mitigation Plans

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.

For implementation guidance, FEMA published the Final Rule in the Federal Register on September 16, 2009 [Docket ID FEMA-2006-0010], 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.

Alaskan Native Tribes with an approved Tribal Mitigation Plan in accordance with 44 CFR 201.7 may apply for assistance from FEMA as a grantee. If the Tribe coordinates with the State of Alaska for development and review of their Tribal Mitigation Plan, then the Tribe also has the option to apply through the State as a subgrantee. A grantee is an entity such as a State, territory, or Tribal government to which a grant is awarded and is accountable for use of the funds. A subgrantee is an entity, such as a community, local, or Tribal government; State-recognized tribe; or a private nonprofit (PNP) organization to which a subgrant is awarded and is accountable to the grantee for use of the funds.

1.3 GRANT PROGRAMS WITH MITIGATION PLAN REQUIREMENTS

FEMA Hazard Mitigation Assistance grant programs provide funding to States, Tribes, and local entities that have a FEMA-approved State, Tribal, or Local Mitigation Plan. Two of the grants, Hazard Mitigation Grant Program (HMGP) and Pre-Disaster Mitigation (PDM) grant program,

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 HMGP is a directly funded competitive disaster grant program. Whereas the remaining Hazard Mitigation Assistance Programs: PDM and Flood Mitigation Assistance (FMA) program although competitive, rely on specific grant 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.

1.3.1 Hazard Mitigation Assistance (HMA) Unified Programs

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

The PDM grant program provides funds to State, Tribes, and local entities, including universities, for hazard mitigation planning and mitigation project implementation prior to a disaster event. PDM grants are awarded on a nationally competitive basis. Like HMGP funding, a PDM project's potential savings must be more than the cost of implementing the project. In addition, funds may be used to protect either public or private property or to purchase property that has been subjected to, or is in danger of, repetitive damage. The total amount of PDM funding available is appropriated by Congress on an annual basis. In Fiscal Year (FY) 2015, PDM program funding totaled approximately $30,000,000. The cost-share for this grant is 75 percent Federal/25 percent non-Federal.

The goal of the FMA grant program is to reduce or eliminate flood insurance claims under the NFIP. Particular emphasis for this program is placed on mitigating repetitive loss (RL) properties. The primary source of funding for this program is the National Flood Insurance Fund. Grant funding is available for three types of grants, including

The City of Hughes does not participate in FEMA's National Flood Insurance Program (NFIP) and Flood Mitigation Assistance (FMA) grant program.

Planning, Project, and Technical Assistance. Project grants, which use the majority of the program's total funding, are awarded to States, Tribes, and local entities to apply mitigation measures to reduce flood losses to properties insured under the NFIP. In FY 2015, FMA funding totaled $150,000,000. The cost-share for this grant is 75 percent Federal/25 percent non-Federal. However, 90 percent Federal/10 percent non-Federal to mitigate SRL properties is available in certain situations.

1.4 HMP DESCRIPTION

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

Prerequisites

Section 2 addresses the prerequisites of plan adoption, which include adoption by the City of Hughes and the Hudotl'eekkaakk'e Tribal Council. The adoption resolution is included in Appendix B.

Community Description

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

Planning Process

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

Hazard Analysis

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

Vulnerability Analysis

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

Mitigation Strategy

Section 7 defines the mitigation strategy which provides a blueprint for reducing the potential losses identified in the vulnerability analysis. The Planning Team developed a list of mitigation goals and potential actions to address the risks facing the City and Tribe. Mitigation actions include preventive actions, property protection techniques, natural resource protection strategies, structural projects, emergency services, and public information and awareness activities. In the

spirit of the new requirements, mitigation strategies were developed encouraging participation with the NFIP and the reduction of flood damage to flood-prone structures.

Plan Maintenance

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

References

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

Appendix A

Appendix A provides the FEMA crosswalk, which documents compliance with FEMA criteria.

Appendix B

Appendix B provides the adoption resolution for the City and Tribe.

Appendix C

Appendix C provides public outreach information, including newsletters.

Appendix D

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

Appendix E

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

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2.1 ADOPTION BY LOCAL GOVERNING BODIES AND SUPPORTING DOCUMENTATION

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

DMA 2000 REQUIREMENTS: PREREQUISITES

Local Plan Adoption

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

Element

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

Source: FEMA, July 2008.

The Hudotl'eekkaakk'e Tribal Council Supports 44 CFR 201 and assures compliance with all applicable federal statutes and regulations during the periods for which it receives grant funding, in compliance with 44 CFR 13.11(c), and will amend its plan whenever necessary to reflect changes in tribal or federal laws and statutes as required in 44 CFR 13.11(d). Hughes and Hudotl'eekkaakk'e, with assistance from the State Hazard Mitigation Officer (SHMO), the State Hazard Mitigation Advisory Committee (SHMAC), and FEMA, are responsible for monitoring, evaluating, and updating their Hazard Mitigation Plan in accordance with 44 CFRs §201.6 and §201.7.

The City of Hughes and the Hudotl'eekkaakk'e Tribal Council adopted their HMP by resolution on September 1, 2010. A scanned copy of the resolution is included in Appendix B.

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This section describes the location, geography, and history; demographics; and land use development trends of the City of Hughes. Hudotl'eekkaakk'e Tribal members reside within the City of Hughes and are included as City residents in all State and Federal demographic research.

3.1 LOCATION, GEOGRAPHY, AND HISTORY

"Hughes is a second class city located within the Unorganized Borough. The community is situated on a 500-foot (ft) bluff on the east bank of the Koyukuk River, about 115 air miles northeast of Galena and 210 air miles northwest of Fairbanks. It lies at approximately 66.048890 North Latitude and -154.255560 West Longitude. (Sec. 33, T008N, R022E, Kateel River Meridian.)" (DCRA [Division of Community and Regional Affairs] 2016)

Figure 3-1 Hughes Location Map

The City land covers approximately 3.1 square (sq.) miles and 6.1 sq. miles of water. Extreme temperature changes occur throughout Alaska's interior. The city of Hughes temperatures range from a winter low of -40 degrees Fahrenheit (°F) to above 70ºF during the summer with an extreme low of -68ºF and an extreme high of 90ºF. The area receives approximately 13 inches of rain annually and 30 inches of snow.

The Koyukon Athabascans, Kobuk, Selawik, and Nunamiut Eskimos inhabited the area as nomadic tribes living in temporary encampments following game and fish food sources to support their subsistence lifestyles.

Several key events occurred throughout the City's developmental history:

- Hughes was a trade center between Athabascans and Eskimos.
- Roy (Frederick) Hughes prospected two miles upstream in 1884.
- The community was named after New York Governor Charles Hughes in 1910.
- Hughes became a riverboat landing and supply port until 1915 when mining declined.
- Local Natives stayed as employment opportunities evolved.
- The post office opened in 1942.
- An airstrip was built in the 1950s,
- A school opened 1956, and a clinic in 1968.
- The City became incorporated in 1973.
- Local roads were built in 1974.

- A community-wide electric system was developed in 1981.
- A fall flood destroyed most of the community's buildings, homes, and food caches in 1994.
- Residents rebuilt the flood torn community with Federal disaster assistance.

(DCRA 2016)

3.2 DEMOGRAPHICS

The 2010 census recorded 77 residents, of which the median age was 32.8 indicating a relatively young population. The population of Hughes is expected to grow at the same or accelerated rate because nearly half of the population is between 18 and 44 years of age. Hughes is blended Koyukon Athabascan community, and about 96.1 percent of residents recognize themselves as Alaska Native. The male and female composition is approximately 49.4 and 50.6 percent respectively. The 2010 census revealed that there are 31 households with the average household having approximately 2.48 individuals. The most recent 2014 DCRA certified population is 89 Figure 3-2 illustrates the historic population of the City of Hughes. The City of Hughes reports a population of 97.

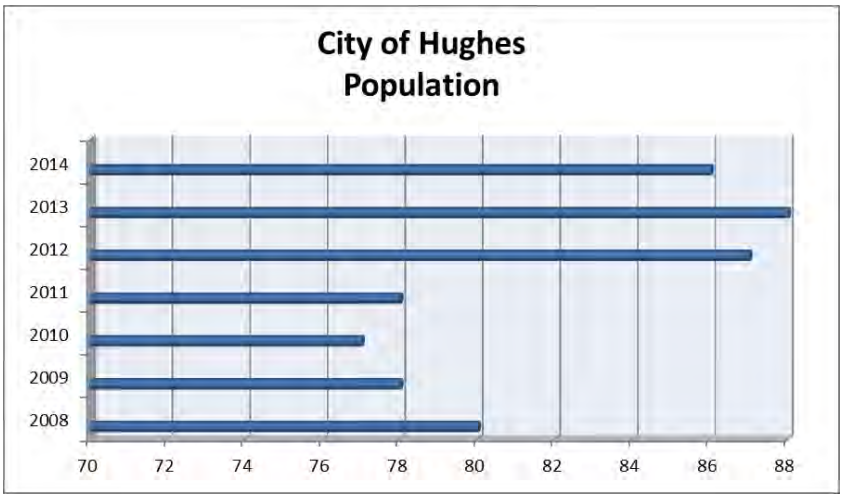

FIGURE 3-2 HUGHES HISTORIC POPULATION SINCE 2008

3.3 ECONOMY

Established government provides part-time employment opportunities with the City Office, Tribal Clinic, school district, or store. Bureau of Land Management (BLM) firefighting, construction work, trapping, and native handicrafts such as beadwork, skin sewing, and sled building provide additional income. However subsistence is the primary mechanisms by which the residents survive. (DCRA 2016)

According to DCRA, the median household income in Hughes was $30,750. Approximately 10 individuals (16.4 percent) were reported to be living below the poverty level. The potential work force (those aged 16 years or older) in Hughes was estimated to be 68, of which 57 were actively employed in 2014. In 2014 there were 19 unemployment insurance claimants (Alaska Department of Labor).

Figure 3-3 depicts an aerial photograph of the City of Hughes provided from the U.S. Army Corps of Engineers (USACE), Alaska Region, Alaska Baseline Erosion Assessment, 2009

Figure 3-3 Aerial Photo of the City of Hughes

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This section provides an overview of the planning process; identifies the Planning Team Members and key stakeholders; documents public outreach efforts; and summarizes the review and incorporation of existing plans, studies, and reports used to develop this HMP. Additional information regarding the Planning Team and public outreach efforts is provided in Appendix C.

The requirements for the planning process, as stipulated in DMA 2000 and its implementing regulations are described below.

DMA 2000 Requirements: Planning Process

Local Planning Process

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

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

Element

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

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

Element

- Does the plan provide a narrative description of the process followed to prepare the new or updated plan?
- Does the new or updated plan indicate who was involved in the planning process?
- Does the new or updated plan indicate how the public was involved?
- Does the new or updated plan discuss the opportunity for neighboring communities, agencies, businesses, academia, nonprofits, and other interested parties to be involved in the planning process?
- Does the planning process describe the review and incorporation, if appropriate, of existing plans, studies, reports, and technical information?
- *Does the updated plan document how the planning team reviewed and analyzed each section of the plan and whether each section was revised as part of the update process? (Not applicable until 2013 update)*

Source: FEMA, July 2008.

4.1 OVERVIEW OF PLANNING PROCESS

The City of Hughes and the Hudotl'eekkaakk'e Tribal Council developed their plan with the assistance from the State of Alaska, Division of Homeland Security and Emergency Management (DHS&EM). The planning team met via teleconference every two weeks beginning January 15, 2016.

An internal review of the City's LHMP was conducted on January 15, 2016. During this meeting it was determined this update would include both City and Tribe. Thelma Nicholia, the City Administrator for Hughes was identified as the Planning Team Leader.

The Planning Team held public meetings every two weeks beginning January 15, 2016. The following five-step process took place from January 2016 through May 2016:

1. Organize resources: Members of the Planning Team identified resources, including staff, agencies, and local community members, who could provide technical expertise and historical information needed to update the hazard mitigation plan.
2. Assess risks: The Planning Team identified the hazards specific to Hughes, and with the assistance of hazard mitigation planning from DHS&EM updated the risk assessment for the eight identified hazards. The Planning Team reviewed the risk assessment, including the vulnerability analysis, prior to and during the development of the mitigation strategy.
3. Assess capabilities: The planning team assessed their community's current administrative, technical, regulatory and fiscal capabilities. Develop a mitigation strategy: The planning team identified and prioritized their mitigation goals and actions.

4. Monitor, evaluate, and update the plan: The planning team evaluated their goals and actions for compatibility and community priorities. Hazard Mitigation Planning Team

The Planning Team consisted of Mayor Wilmer Beetus and City Administrator Thelma Nicholia as well as City and Tribal Council members. The State of Alaska, Division of Homeland Security and Emergency Management assisted the Hughes mitigation Planning Team. Table 4-1 identifies the hazard mitigation Planning Team lead by Thelma Nicholia, the City Adminstrator for Hughes.

Table 4-1 Hazard Mitigation Planning Team

Name	Title	Organization	Phone
Wilmer Beetus	Mayor & First Chief	City of Hughes, Tribal Council	889-2206
Thelma Nicholia	Administrator	City of Hughes	889-2206
Ella Sam	Member	City of Hughes Council Member and Tribal Council Member	889-2206
Alfred Attla Jr	Member	City of Hughes Council Member and Tribal Council Member	889-2206
Michelle Torres	Mitigation Specialist	Department of Homeland Security & Emergency Management (DHS&EM)	428-7032
Scott Nelsen	Mitigation Specialist	DHS&EM	428-7010
June Walker	Member	City of Hughes Council Member and Tribal Council Member	889-2206
Clyde Koyukuk	Member	City of Hughes Council	889-2227

4.2 PUBLIC INVOLVEMENT & OPPORTUNITY FOR INTERESTED PARTIES TO PARTICIPATE

On January 15, 2016, the Hughes Planning Team meet via teleconference to discuss the hazard mitigation plan update to the community and other interested parties. A newsletter was placed on the DSH&EM website and signs posted throughout the community announcing the public meeting (Appendix C).

The planning team conducted a vulnerability assessment of tribal and community assets. They evaluated building and infrastructure for their risk to each hazard. The results revealed the extent of damage each hazard could inflict in a worst case scenario.

4.3 INCORPORATION OF EXISTING PLANS AND OTHER RELEVANT INFORMATION

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

- *U.S. Army Corps of Engineers, Alaska Baseline Erosion Assessment, Erosion Information Paper – Hughes, Alaska. November 8, 2007, defined the City's erosion threat.*
- *Hughes, The Comprehensive Plan, A Constitutional Mandate for Long Term Survival, August 1995, defined the city's land-use initiatives.*
- *State of Alaska, Department of Commerce, Community and Economic Development Community Profile Map, provided historical and demographic information.*

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

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

5.1 OVERVIEW OF A HAZARD ANALYSIS

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

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

5.2 HAZARD IDENTIFICATION AND SCREENING

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

DMA 2000 Requirements: Risk Assessment: Identifying Hazards

Identifying Hazards

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

Element

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

Source: FEMA, July 2008.

During the update process the Planning Team identified an additional hazard, high winds, which was added to the hazard profile of severe weather. The Planning team re- evaluated and screened the comprehensive list of potential hazards based on a range of factors, including prior knowledge or perception of 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 eight hazards pose the greatest threat to the City: avalanche, earthquake, erosion, flood, landslide, permafrost, severe weather, and wildland fire. The remaining hazards excluded through the screening process were considered to pose a lower threat to life and property in the City due to the low likelihood of occurrence or the low probability that life and property would be significantly affected.

Table 5-1 Identification and Screening of Hazards

Hazard Type	Should It Be Profiled?	Explanation
Avalanche	Yes	When winter snow loads exceed slope stability capability; the City experiences snow avalanches. Seven buildings are located next to the hillside and are prone to avalanche damage or losses.
Earthquake	Yes	Periodic, unpredictable occurrences. Earthquakes damage could threaten approximately 7 houses on the north end of town. Cracks form on the runway.
Erosion	Yes	Riverine erosion by high water flow, ice flows, wind, and surface runoff occur continually.
Flood	Yes	Snowmelt and ice jam flooding occurs during spring thaw. Fall flooding rainy season events occur from soil saturation. Several minor flood events cause damage. Severe damages occur from major floods.
Landslide	Yes	Rain induced landslides potentially threaten 7 homes. The hillside is predominately rocky soil, shale, etc.
Permafrost	Yes	Permafrost is present throughout Alaska and periodically causes houses to shift due to permafrost thawing and upheaval.
Tsunami & Seiche	No	This hazard does not exist for the City.
Volcano	No	This hazard does not exist for the City.
Weather	Yes	Annual weather patterns, severe cold, freezing rain, snow accumulations are the predominate threats. Severe weather events cause fuel price increases and frozen pipes. Heavy snow loads potentially damage house roofs. Winds potentially remove or damage roofs.
Wildland Fires	Yes	The City of Hughes and the surrounding area become very dry in summer months with weather and human caused incidents igniting dry vegetation (i.e., lightning, trash burning, and campfires).

5.3 HAZARD PROFILE

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

DMA 2000 Requirements: Risk Assessment – Profiling Hazards

Profiling Hazards

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

Element

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

Source: FEMA, July 2008.

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

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

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

Table 5-2 Hazard Probability Criteria

Probability	Criteria
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 five 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 of occurring.

Probability is determined based on historic events, using the criteria identified above, to provide the likelihood of a future event.

Table 5-3 Hazard Magnitude/Severity Criteria

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

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

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

5.3.1 Avalanche

5.3.1.1 Nature

A snow avalanche is a swift, downhill-moving snow mass. The amount of damage is related to the size of the slide, type of avalanche, the composition and consistency of the material in the avalanche, the force and velocity of the flow, and the avalanche path. The Alaska State Hazard Mitigation Plan (SHMP) states, "Avalanches tend to occur repeatedly in localized areas and can sheer off trees, cover communities and transportation routes, destroy buildings, and cause death. Alaska leads the nation in avalanche accidents per capita."

The SHMP further defines Avalanche types as:

- **Loose Snow Avalanches** sometimes called point releases, generally occur when a small amount of uncohesive snow slips and causes more uncohesive snow to go downhill. They occur frequently as small local [sloughs] which remove excess snow (involving just the upper layers of snow) keeping the slopes relatively safe. They can be large and destructive. For example, wet loose snow avalanches occurring in the spring are very damaging. Loose snow avalanches can also trigger slab avalanches. Loose snow avalanches typically occur on slopes above 35 degrees, leaving behind an inverted V-shaped scar. They are often caused by snow overloading (common during or just after a snowstorm) vibration or warming (triggered by rain, rising temperatures or solar radiation).
- **Slab Avalanches** are the most dangerous types of avalanches. They happen when a mass of cohesive snow breaks away and travels down the mountainside. Slab avalanches occur as a result of the presence of structural weaknesses within interfacing layers of the snowpack. The weakness exists when a relatively strong, cohesive snow layer overlies weaker snow or is not well bonded to the underlying layer. The weaknesses are caused by changes in the thickness and type of snow covers due to changes in temperature or multiple snowfalls.

  The interface fails for several reasons. It can fail naturally due to earthquakes, blizzards, temperature changes or other seismic and climatic causes, or artificially by human activity. When a slab is released, it accelerates, gaining speed and mass as it travels downhill. Slabs can range in thickness from less than an inch to 35 feet or greater.
- **Cornice Collapse** A cornice is an overhanging snow mass formed by wind blowing snow over a ridge crest or the sides of a gully. The cornice can break off and trigger bigger snow avalanches when it hits the wind-loaded snow pillow.
- **Ice Fall Avalanches** result from the sudden fall of broken glacier ice down a steep slope. They can be unpredictable as it is hard to know when ice falls are imminent. Despite common belief, they are unrelated to temperature, time of day or other typical avalanche factors.
- **Avalanche Terrain Factors** There are several factors that influence avalanche conditions, with the main ones being slope angle, slope aspect, and terrain. Other factors include slope shape, vegetation cover, elevation, and path history.

- **The Slope Angle** Avalanches usually occur on slopes 35 to 60 degrees and can occur on slopes of 25-35 degrees, but are not as likely at that slope angle because gravity does not sufficiently stress the weak layers of the snowpack. As slope angles above 70 degrees, the snow tends to slough off and does not have the opportunity to accumulate. Avalanches can occur outside the optimum slope angle range, but are not as common.
- **Slope Aspect** also termed orientation describes the direction a slope faces with respect to the wind and sun. Leeward slopes (slopes facing away from wind and snow) loaded by wind-transported snow are problematic because the wind-deposited snow increases the stress and enhances slab formation. Intense direct sunlight can weaken and lubricate the bonds between the snow grains, weakening the snowpack. Shaded slopes are also potentially unstable because the weak layers may be held for a longer time in an unstable state.
- **Local Terrain** (topographic) features determine an avalanche's path. The path has three parts: the starting zone, the track, and the run-out zone.
- **The starting zone** is where the snow breaks loose and starts sliding. It's generally near the top of a canyon, bowl, ridge, etc., with steep slopes between 25 and 50 degrees. Snowfall is usually significant in this area.
- **The track** is the actual path followed by an avalanche. The track can have milder slopes, between 15 and 30 degrees, but it is where the snow avalanche will reach maximum velocity and mass. Tracks can branch or converge, creating successive runs that increase the threat, especially when multiple releases share a run-out zone.
- **The run-out zone** is a gentler slope at the path base where the avalanche slows down, resulting in snow and debris deposition.
- **The impact pressure** determines the amount of damage caused by a snow avalanche. The impact pressure is related to the density, volume (mass) and velocity of the avalanche.
- **Urban Avalanches** Avalanche fatalities are common in areas where winter sports are popular. The most well-known avalanche deaths are those involving skiers, snowmobilers, and snowboarders; however urban avalanche events that interface with infrastructure have proven to be particularly deadly and have occurred with relative frequency around the world. In many events, the avalanche danger was well known by both residents and officials; however the avalanches occurred before any decisive action could be taken.

  Urban avalanches that do not prove fatal are also significant as they can result in interrupted utility services, delays in emergency response, and damage to roads and other infrastructure. (DHS&EM 2007)

5.3.1.2 History

The City of Hughes does not have a documented history of avalanche events, however the Hazard Mitigation Planning Team stated that minor events have "dusted" several residences

located adjacent to the City's hillside and the potential exists for a more severe event to occur due to slope height and inclination.

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

Location

The City's Planning Team stated, "…potential avalanche danger exists when winter snowloads are heavy. Several residential properties are located "not too distant from the hillside at the north end of town and are prone to avalanche damage or losses. Several small avalanches have dusted the structures located there."

Figure 5-1, developed by the Department of Natural Resources (DNR), Division of Geological and Geophysical Survey (DGGS), depicts the State's potential snow avalanche hazard risk zones. This map indicates the City has a low risk. However the City feels their risk is medium to high along the hillside.

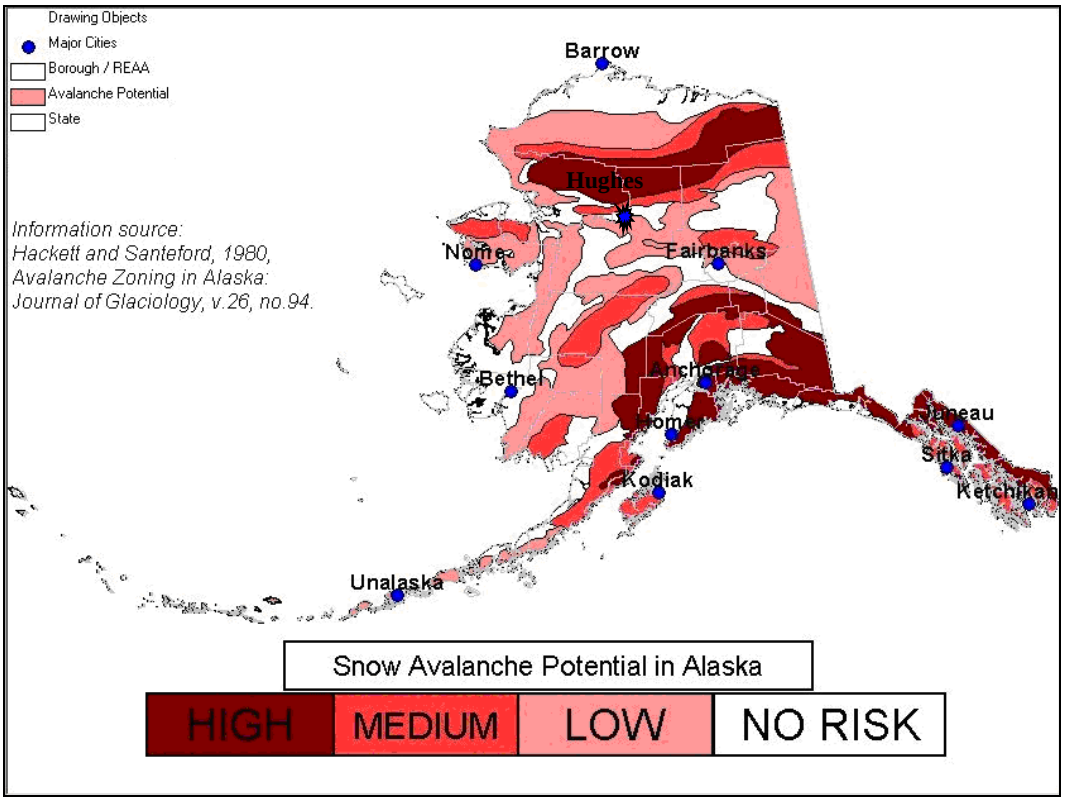


Figure 5-1 DNR/DGGS Avalanche Map of Alaska

(City of Hughes Area indicates in Low to No Risk Zone). July 2004

Extent

Most avalanches infrequently occur within a narrow portion of an existing area or path. Larger avalanches are slightly broader and can extend beyond the edges of the observed or typical path. Larger events are usually referred to as "10 year" events but in reality, reflect an order of magnitude return period between 3 years and 30 years. Exceptionally large avalanches occur which extend well beyond the established boundaries of the paths. These avalanches are often

referred to as "100 year" avalanches and are likely to impact all or most of the potential path area. (Wild RJ 2006, Alaska 2007)

Approximately 19 residences are located within the avalanche area. The hillside at the north end of town is the main source of this hazard and could potentially impact all identified structures. This area has released heavy snow loads slightly dusting several facilities and residences. However, future impacts could potentially destroy structures located too close to the hillside. Only local knowledge exists concerning recent avalanche events for the City of Hughes.

Historical avalanche damage data is non-existent for the City of Hughes. The planning team stated that based on their local knowledge of fairly recent minor events; the hillside avalanche magnitude and severity follows the criteria identified in Table 5-3. The avalanche impacts in the City of Hughes are considered limited with potential injuries and/or illnesses that 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, and/or little to no permanent damage to transportation or infrastructure or the economy will occur.

Impact

Snow avalanches generally travel over 40 miles per hour (mph) allowing very short warning opportunities creating vast devastation for unaware back country skiers, snowmachiners, and dog mushers. Residential structures and infrastructure damages can vary from a slight dusting to total destruction depending on run-out zone proximity, snow load, weather, avalanche type, and slope angle.

Probability of Future Events

Figure 5-1 indicates the City of Hughes is located within the Low to No Risk area; it is possible for an avalanche to occur anywhere that the slope, snow load, and weather conditions combine for an avalanche to occur.

The City of Hughes has no official record of significant avalanche activity resulting in damage or injuries and it is not possible to predict when an avalanche will strike. The Planning Team stated that based on their local knowledge of fairly recent minor events; the hillside avalanche recurrence probability follows the criteria listed in Table 5-2. The Planning Team believes it is possible for an avalanche impacting the City's identified residences to recur within the next 5 years (event has up to 1 in 5 years chance of occurring) with a history of events greater than 10 percent but less than or equal to 20 percent likely per year.

5.3.2 Earthquake

5.3.2.1 Nature

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

Ground motion generally increases with the amount of energy released and decreases with distance from the fault or epicenter of the earthquake. An earthquake causes waves in the earth's

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

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

- **Surface Faulting** is the differential movement of two sides of a fault at the earth's surface. Displacement along faults, both in terms of length and width, varies but can be significant (e.g., up to 20 ft.), as can the length of the surface rupture (e.g., up to 200 miles). Surface faulting can cause severe damage to linear structures, including railways, highways, pipelines, and tunnels.
- **Liquefaction** occurs when seismic waves pass through saturated granular soil, distorting its granular structure, and causing some of the empty spaces between granules to collapse. Pore water pressure may also increase sufficiently to cause the soil to behave like a fluid for a brief period and cause deformations. Liquefaction causes lateral spreads (horizontal movements of commonly 10 to 15 ft., but up to 100 ft.), flow failures (massive flows of soil, typically hundreds of ft., but up to 12 miles), and loss of bearing strength (soil deformations causing structures to settle or tip). Liquefaction can cause severe damage to property.
- **Landslides/Debris Flows** occur as a result of horizontal seismic inertia forces induced in the slopes by the ground shaking. The most common earthquake-induced landslides include shallow, disrupted landslides such as rock falls, rockslides, and soil slides. Debris flows are created when surface soil on steep slopes becomes totally saturated with water. Once the soil liquefies, it loses the ability to hold together and can flow downhill at very high speeds, taking vegetation and/or structures with it. Slide risks increase after an earthquake during a wet winter.

The severity of an earthquake can be expressed in terms of intensity and magnitude. Intensity is based on the damage and observed effects on people and the natural and built environment. It varies from place to place depending on the location with respect to the earthquake epicenter, which is the point on the earth's surface that is directly above where the earthquake occurred. The severity of intensity generally increases with the amount of energy released and decreases with distance from the fault or epicenter of the earthquake. The scale most often used in the US to measure intensity is the Modified Mercalli (MM) Intensity Scale. As shown in Table 5-4, the MM Intensity 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)

5.3.2.2 History

The Planning Team determined that the City of Hughes has had no historical damaging earthquake impacts. They subsequently decided to only be concerned with earthquake events which exceeded M 6.0. Table 5-5 lists historical earthquakes from 1965 to present which exceeded M 6.0 located within 50 miles of the City of Hughes. These earthquakes did not induce any major damage due primarily to their community structure types and foundation support system designs.

Table 5-5 Historical Earthquakes for the City of Hughes

Year	Mo	Day	Magnitude
1965	09	04	M 6.8
1968	04	23	M 6.5
1970	04	11	M 6.2
1970	04	16	M 6.8
1970	04	19	M 6.0
1989	11	30	M 6.9
1990	03	08	M 7.6
1991	02	21	M 6.5

The largest recorded earthquakes within 100 miles of the City of Hughes measured M 7.6 occurring on March 8, 1990. It 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, measuring M 9.2 and was felt by many residents throughout Alaska. The City of Hughes felt ground motion resulting from this historic event; however, no local damage occurred.

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

Location

The entire geographic area of Alaska, and thus the City of Hughes, is prone to earthquake effects. Peter Haeussler, Alaska Region United States Geological Survey (USGS) explained during a telephone conversation, the Kaltag Fault follows the Yukon River and is relatively centered on the Koyukuk/Yukon River confluence about 75 miles to the south.

The Kobuk Fault Zone comprises a fault system of smaller faults; located north of Alatna Village running east to west along the border of the Brooks Range. The Kobuk Fault is about 200 miles north-northeast of the community. (GSA 1998).

The City Planning Team determined they have not experienced damaging effects from their historical earthquake events and only needed to be concerned with earthquakes with a magnitude > M 5.0.

The City of Hughes lies between the Kaltag and Kobuk Faults and can expect to be impacted by earthquake events. Figure 5-2 shows the locations of active and potentially active faults in Alaska.

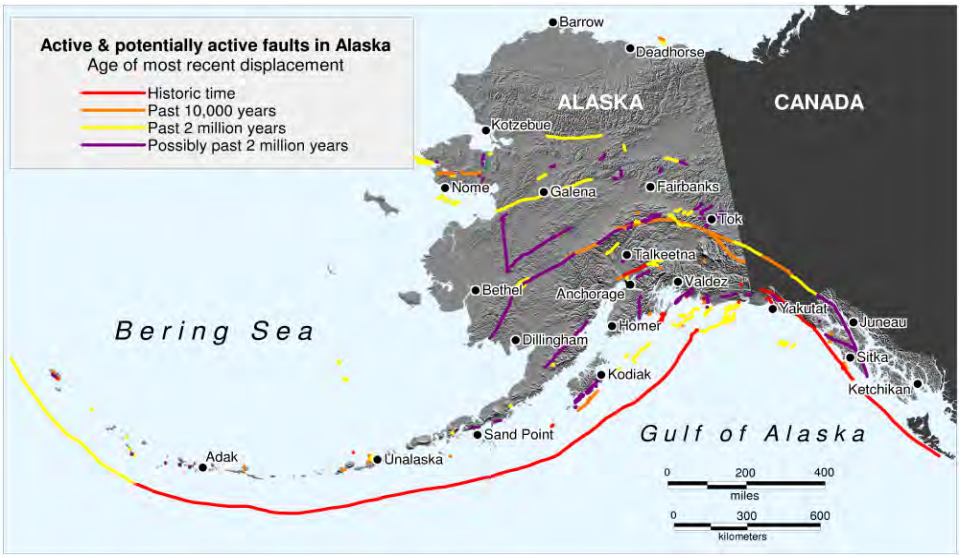


Figure 5-2 Active and Potentially Active Faults in Alaska

Extent

The Kaltag and Kobuk are normal strike-slip faults that produce intraplate earthquakes, which occur within a tectonic plate sometimes at great distance from the plate boundaries. These types of earthquakes can have magnitudes of 7.0 and greater. Shallow earthquakes in the Fairbanks area are an example of intraplate earthquakes. (GSA 1998)

Earthquakes felt in the City of Hughes area have not exceeded M 5.7 in the past 31 years, and damage has never been reported due to an earthquake event.

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

Impact

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

Probability of Future Events

The City of Hughes has no official record of significant earthquake activity resulting in damage or injuries. While it is not possible to predict when an earthquake will occur, Figure 5-3 was generated using the USGS Earthquake Mapping model and indicates approximately an 8 percent probability of a M 5.0 or greater earthquake occurring within 25 years and 50 miles of the City of Hughes.

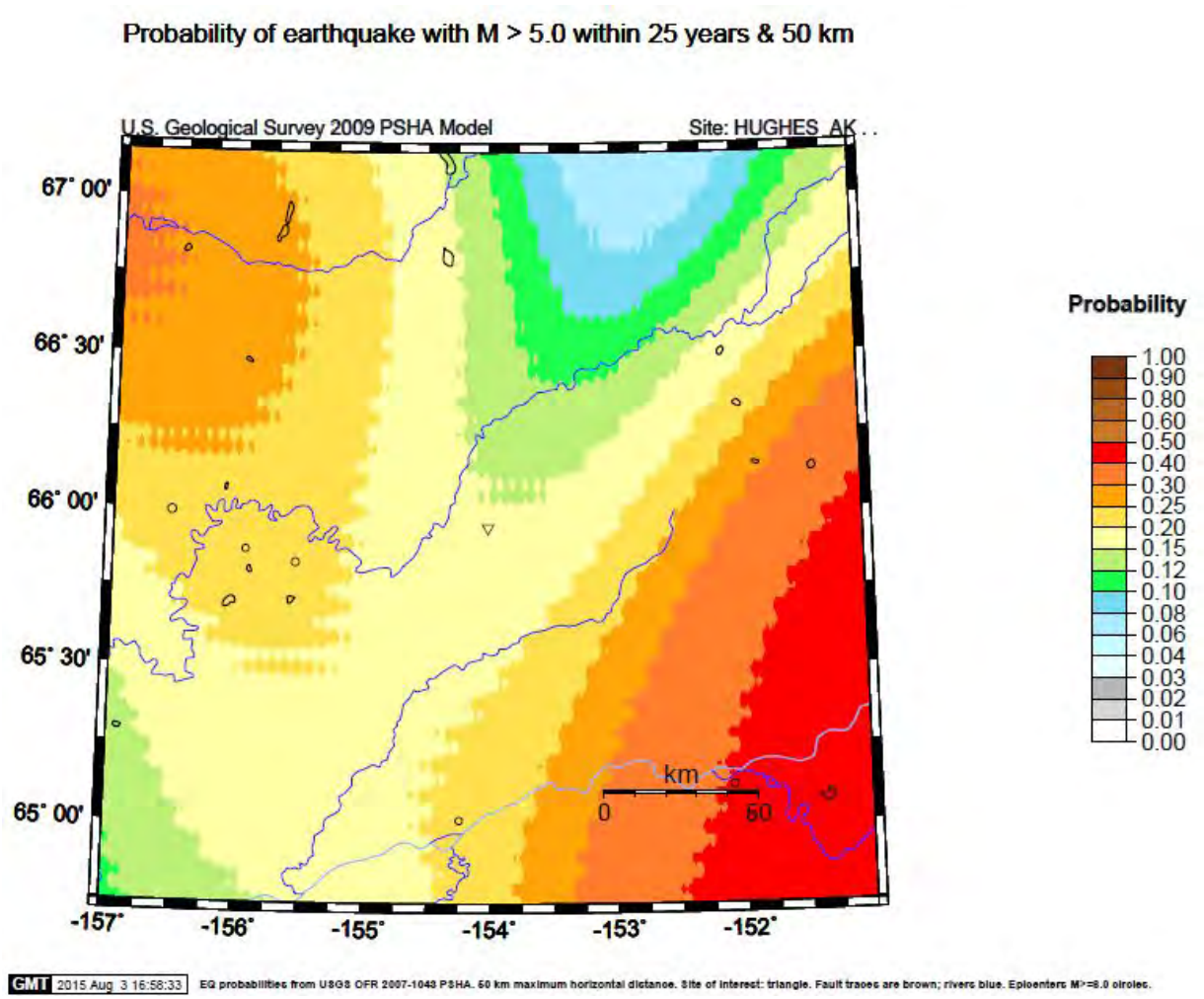


Figure 5-3 Hughes Earthquake Probability (USGS 2009)

This 2002 shake map is the most current map available for this area. However, it is a viable representation to support probability inquiries. According to Peter Haeussler, USGS, Alaska Region:

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

5.3.3 Erosion

5.3.3.1 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. Erosion is usually gradual but can occur rapidly as the result of floods, storms, and other

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

Erosion is a problem in developed areas where the disappearing land threatens development and infrastructure. Only riverine erosion affects human activity in the City of Hughes.

Riverine erosion results from the force of flowing water and ice formations in and adjacent to river channels. This erosion affects the bed and banks of the channel and can alter or preclude any channel navigation or riverbank development. In less stable braided channel reaches, erosion, and deposition of material are a constant issue. In more stable meandering channels, episodes of erosion may only occur occasionally.

5.3.3.2 History

The City of Hughes Planning Team stated that erosion incidents typically occur during spring and fall high water flood events and from spring break-up ice scour. (Hughes 2016)

The USACE Alaska Baseline Erosion Assessment, Erosion Information Paper for the City of Hughes further states,

> *"Ongoing erosion is reported at about 5 ft per year, but no documentation or measurements were provided or available. The community of Hughes has a history of frequent flooding and associated erosion with floods reported in 1937, 1938, 1963, 1964, 1965, 1966, 1968, 1972, 1989, and 1994. The worst flood was caused by heavy rains during August 1994….Water levels rose more than 40 inches above the finished floor elevation at the Hughes school during the 1994 flood"* (USACE 2009b)

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

Location

Riverine erosion hazards have historically affected the City of Hughes during each flood event due to high water flow rates and ice scouring. Factors that influence erosion include flooding, spring break-up, ice scour, and melting permafrost. The City's riverbanks are essential to the lives of the residents and are susceptible to the effects of erosion (Figure 5-1).

Figure 5-4 is an aerial photo showing the extent of the City of Hughes erosion (red arrows) and distinct downstream soil deposition (blue arrow). The photo also shows the entire length of the community is exposed to flood impact. The City's "active erosion area measures approximately 1,200 ft. along the north end of the community at the end of the runway in the residential area where the bank is approximately 10 ft. high." (USACE 2009b)

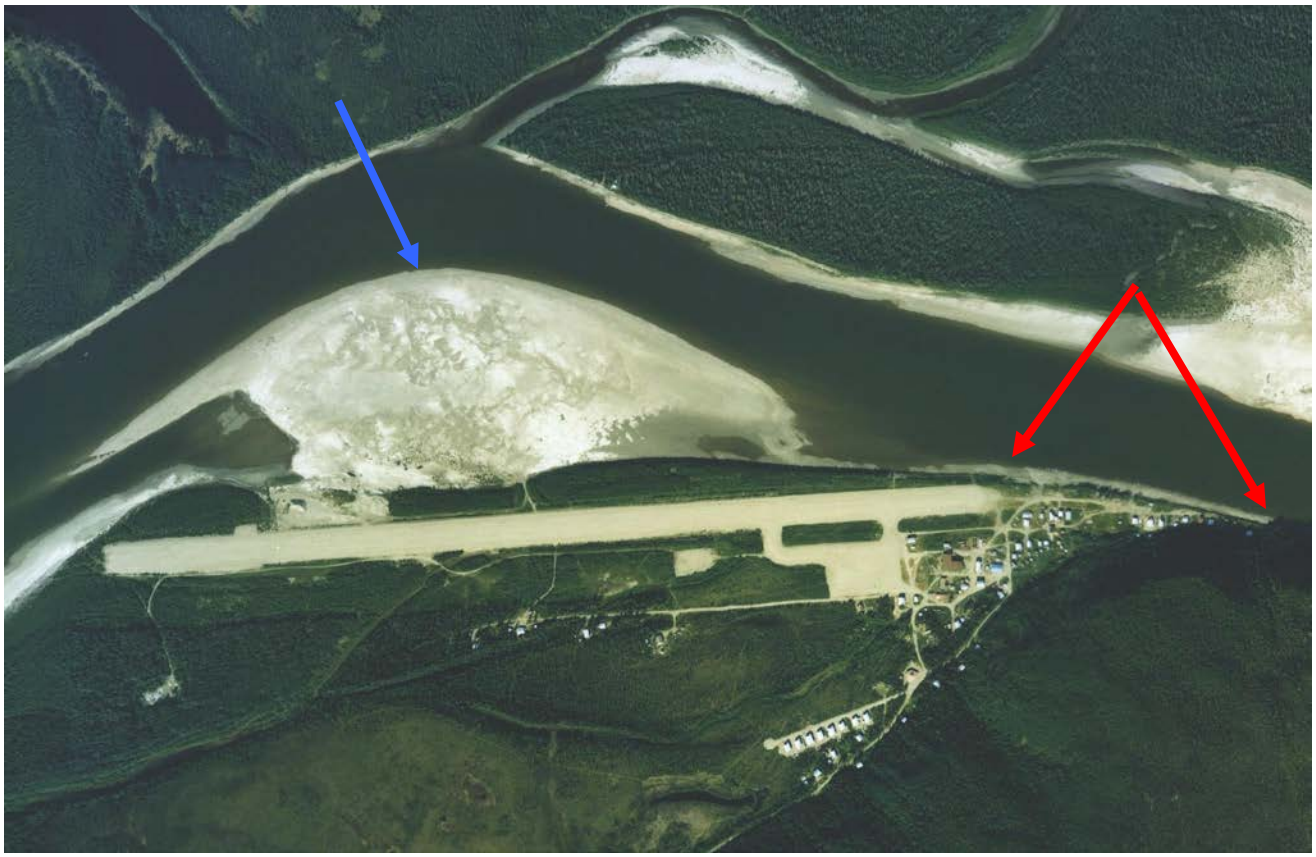


Figure 5-4 Aerial Photo of the City of Hughes

Extent

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

- Geomorphology
- Amount of encroachment in the high hazard zone
- Proximity to erosion inducing structures
- Nature of the topography
- Density of development
- Structure types along the embankment
- Embankment elevation

Erosion in the City of Hughes usually removes small areas at a time. Significant events can cause infrastructure and homes to fall into the river. Erosion sites have also been noted to be less than 100 ft. from important structures and critical facilities. "Three homes are estimated at less than 50 ft. from the riverbank. Four homes are estimated between 85 ft. and 150 ft. from the riverbank. Outbuildings, sheds, drying racks, smokehouses, a road, and the end of the airport runway are structures threatened by bank erosion. No protective measures have been taken to slow or stop the erosion." (USACE 2009b)

The USACE Alaska Baseline Erosion Assessment for the City of Hughes gave a "Monitor Conditions" classification to the City's erosion threat. "The community … has reported significant impacts related to erosion but the impacts are not likely to affect the viability of the community. The erosion issue may warrant Federal, State, or other intervention. A Monitor Conditions Community should be watched. Taking action in a Monitor Conditions Community to prevent a problem from becoming worse would be prudent." (USACE 2009a)

Based on past events, the 2009 USACE Alaska Erosion Assessment, and the criteria identified in Table 5-3, the magnitude and severity of erosion impacts in the City of Hughes are considered limited with injuries that do not result in permanent disability, the potential for critical facilities to be shut down for more than one week, and more than 10 percent of property or critical infrastructure being severely damaged.

Impact

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

The City of Hughes has experienced severe flood events which bring high river flow rates and subsequent flooding and embankment and road surface erosion. The USACE Alaska Baseline Erosion Assessment, Erosion Information Paper for the City of Hughes states, "Water levels rose more than 40 inches above the finished floor elevation at the Hughes school during the 1994 flood." (USACE 2009b).

Probability of Future Events

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

5.3.4 Flood

5.3.4.1 Nature

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

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

Rainfall-runoff Flood

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

Snowmelt Flood

Snowmelt floods typically occur in spring or early summer. The depths of the snowpack and spring weather patterns influence the magnitude of flooding.

Ice Jam Flood

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

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

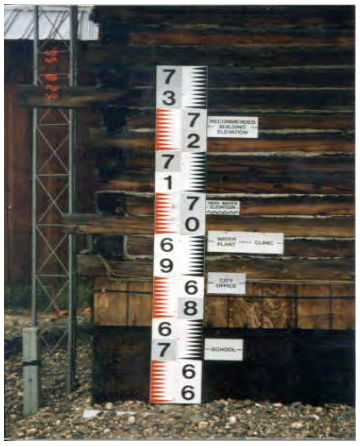
Aufeis is glaciation or icing of streams and rivers, affecting road surfaces and infrastructure. Aufeis forms during the winter when emerging ground water freezes. Stream glacial flooding occurs when ice forms from the bottom up not from the top down forcing water out of the stream channel. If aufeis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

5.3.4.2 History

"The 1937 snowmelt flood was the highest in memory until the 1994 flood. Residents in 1937 said the flood was above the roofs of the houses. The 1937 fall flood was nearly as high. There was no means to measure these flood elevations." (USACE 2009)



Flood Gauge

Gauge Location

Figure 5-5 Hughes Flood Gauges
(USACOE 2009)

Table 5-6 lists historical flood events affecting the City of Hughes.

Table 5-6 Historical Flood Events

Zone(s)	Location(s)	Date(s)	Event	Description
AK004	Hughes	Spring 1937	Snowmelt Flood	The flood was above the roofs of the houses.
AK004	Hughes	Fall 1937	Snowmelt Flood	The 1937 fall flood was nearly as high. There was no means to measure these flood elevations.
AK004	Hughes	1965	Flood	High Water Elevation (HWE) signs were placed at the 1965 flood level at the doorway of the 1937 cabin, about 1.6 feet (ft.) above the ground.
AK004	Alatna , Allakaket, Hughes	8-9 May 91	Flood	Minor Flooding.
AK004	Alatna, Allakaket, Bettles, Hughes	FEMA declared (DR-1039) on September 12, 1994	Flood	Rainfall caused flood on the Koyukuk, Kobuk, and Noatak Rivers. Governor declared disaster emergencies for Kobuk, Kiana, Kotzebue, Bettles, Wiseman, Allakaket, Alatna, and Hughes. Unprecedented losses of personal and public properties. Evacuate Allakaket, Alatna, and Hughes. Damages $74K.
AK219	Hughes	11-12 May 03	Flood	Koyukuk River ice jam formed approx. two miles downstream from Hughes. Water backed up behind the ice jam inundated Hughes with a few ft of water. High water washed-out two taxiways at the airport, flooded several houses, littered the village with large ice chunks, and knocked over two fuel tanks. Damage: $3000 for taxiways, and an ~$500 to repair/upright the fuel tanks. Damages $3.5K.
AK004	Alatna, Allakaket, Bettles, Evansville, Hughes, Huslia	26-31 May 98, 01 Jun 98	Flood	Rain combined with rapid snowmelt caused flooding on the Koyukuk River, high water flooded 1600 ft. of a 4,000 ft. gravel runway at Allakaket, swept away one floatplane dock and 30 ft. of bank and road from Bettles to Evansville (a mile or so away), Bank erosion at Huslia, though no structures were damaged.
AK219	Hughes	13 May 06	Flood	An ice jam formed 7 to 12 miles downstream from Hughes on the Koyukuk River, flooding the City. The airport's connection from the apron to the runway was washed-out and portions of the apron damaged. Water level was 1 to 3 ft. around the City, with five homes, the school, the City store flooded, water was ½ way up the City office entrance steps. The village greenhouse floated away. Damages 411.1K.

(Lingaas 2009)

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

Location

The entire community is susceptible to flood impacts. The USACE, Floodplain Management Services reports, "High Water Elevation (HWE) signs were placed at the 1965 flood level at the

doorway of the 1937 cabin, about 1.6 ft. above the ground; at the SW corner of the Post Office, 3.4 ft. above the ground; and at the NW corner of the school, approximately 1.5 ft. above the ground. A flood gauge was installed on the store with a HWE sign placed at the level of the 1994 flood, 270.5 ft." (USACE 2009)

Table 5-7 Survey Information as of September 1995

Description	Elevation
Recommended building elevation	273.0
BFE, 1965 flood of record, estimated	272.0
1994 flood, approximated	270.5
Door sill of clinic	269.8
Door sill of washeteria	269.8
First floor of Post Office	268.8
Door sill of school	267.2
Floor of generator	265.7
Typical elevation of tank farm	262.6
Recommended building elevation	273.0

(USACE 2009)

Extent

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

The following factors contribute to riverine flooding frequency and severity:

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

Most of the community's structures are above the level of this periodic flooding. However, the high water line for the 1994 flood (see Figure 5-5) went beyond that identified limit and inundated much of the lower City, including streets and residential structures. Similar flood events have been recorded in other years, including an event that occurred in 2006 when large

portions of the City, City infrastructure, and several roads were inundated and eroded by high flow floodwaters.

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

Impact

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

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

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

Impacts and problems also related to flooding are deposition and stream bank erosion (erosion is discussed in detail in Section 5.3.3). Deposition is the accumulation of soil, silt, and other particles on a river bottom or delta. Deposition leads to the destruction of fish habitat and presents a challenge for navigational purposes. Deposition also reduces channel capacity, resulting in increased flooding or bank erosion. Stream bank erosion involves the removal of material from the stream bank. When bank erosion is excessive, it becomes a concern because it results in loss of streamside vegetation, loss of fish habitat, and loss of land and property. (BKP 1988)

Probability of Future Events

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

5.3.5 Landslide

5.3.5.1 Nature

Landslide is a general term for the 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, rockfalls, 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 sloping ground development, 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, as described below:

- Shaking due to earthquakes can trigger events ranging from rockfalls and topples to massive slides
- Intense or prolonged precipitation that causes flooding can also saturate slopes and cause failures leading to landslides
- Landslides into a reservoir can indirectly compromise dam safety, and a landslide can even affect the dam itself
- Wildfires can remove vegetation from hillsides, significantly increasing runoff and landslide potential

Development and other human activities can also provoke landslides. Increased runoff, excavation in hillsides, shocks and vibrations from construction, non-engineered fill, 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 surface or ground water flow can further increase the landslide potential.

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:** 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, and then flows through confined channels, liquefying, and gaining speed. Debris flows can travel at speeds of more than 35 miles per hour for several miles. Other types of flows include debris avalanches, mudflows, creeps, earth flows, debris flows, and lahars.
- **Lateral Spreads:** This 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:** The free-fall movement of rocks and boulders detached from steep slopes or cliffs.
- **Topples:** Rocks and boulders that rotate forward and may become falls.

- **Complex:** Any combination of landslide types.

Indicators of a possible landslide 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 SHMP states, seasonally frozen ground and permafrost are often agents of ground failure. 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. (Permafrost is discussed in detail in Section 5.3.6.) (Alaska 2016)

5.3.5.2 History

The landslide hazard threat to the Yukon Koyukuk Census Area is presently unknown as there have been no historical landslides impacting the Census Area or the City of Hughes. However the Planning Team identified nineteen residential buildings that have the potential landslide threat. The history of permafrost and possible future ramifications are discussed further in Chapter 5.3.6.

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

Location

The Planning Team identified a steeply sloped hillside as a potential landslide area. The hillside is adjacent to a small residential area on the north end of the City.

In general, the probability of slope failure increases with an increase in slope inclination. However, depending on various factors such as soil type, and water content, a slope having a relatively low inclination could be at greater risk of failure than another slope having a relatively high inclination. Other factors that influence susceptibility include: rock type; water content; vegetative cover and type; slope aspect; permeability and rate of infiltration; proximity to

seismic sources; and magnitude of seismic events. In addition, unconsolidated deposits of alluvial and glacial outwash materials are subject to accelerated stream bank erosion and landslides. The possibility of failure also increases in sloped areas in which humans have disturbed the soil and vegetation such as from cutback projects and vegetation or timber reduction areas.

Extent

The geographic extent of landslide events is essentially the same as slide location, while the effects depend on what infrastructure will be impacted by a slide, as well as the magnitude and force of the slide itself. The extent of effects is limited to a few residential buildings located well away from the City's center.

Based on the Planning Team's input and the criteria listed in Table 5-3, the severity and magnitude demonstrates landslide injuries and/or illnesses are treatable with first aid, a potential for minor quality of life lost, shutdown of critical facilities and services for 24 hours or less, with less than 10 percent of property severely damaged.

Impact

Impacts to the City of Hughes' infrastructure range from typical land mass movement to uplift from permafrost. (Permafrost is discussed in detail in Section 5.3.6) Landslide threats to the City are limited to non-existent. A few residential structures located adjacent to the steeply sloped hillside could potentially experience a destructive slide event where a number of the structures would be damaged. Damages can range from minor debris impact to total destruction.

Probability of Future Events

Based on the Planning Team's input and the criteria listed in Table 5-2 a landslide event is possible within the next five years (event has a 1 in 5 years chance of occurring) the history of events is greater than 10 percent but less than or equal to 20 percent likely per year.

5.3.6 Permafrost

5.3.6.1 Nature

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

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

Human induced ground warming can often degrade permafrost much faster than natural degradation caused by a warming climate. Permafrost degradation can be caused by constructing

warm structures on the ground surface allowing heat transfer to the underlying ground. Under this scenario, improperly designed and constructed structures can settle as the ground subsides, resulting in loss of the structure or expensive repairs. Permafrost is also degraded by damaging the insulating vegetative ground cover, allowing the summer thaw to extend deeper into the soil causing subsidence of ice-rich permafrost, often leading to creation of thermokarst water bodies. Evidence of this type of degradation can be seen where thermokarst water bodies are abundant in the ruts of an old trail used by heavy equipment (cat trails) or where roads or railroads constructed by clearing and grubbing have settled unevenly.

5.3.6.2 History

There is no written record defining permafrost impacts. However, Planning Team Members stated "uneven settling throughout the years within the City has damaged buildings and roads constructed in discontinuous permafrost areas."

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

Location

The Planning Team stated that permafrost impacts occur throughout the City affecting buildings and their five roads. The Division of Geological and Geophysical Survey's Permafrost Map depicts permafrost zones for the entire State. (Figure 5-6) The map indicates the entire City of Hughes is underlain by discontinuous permafrost.

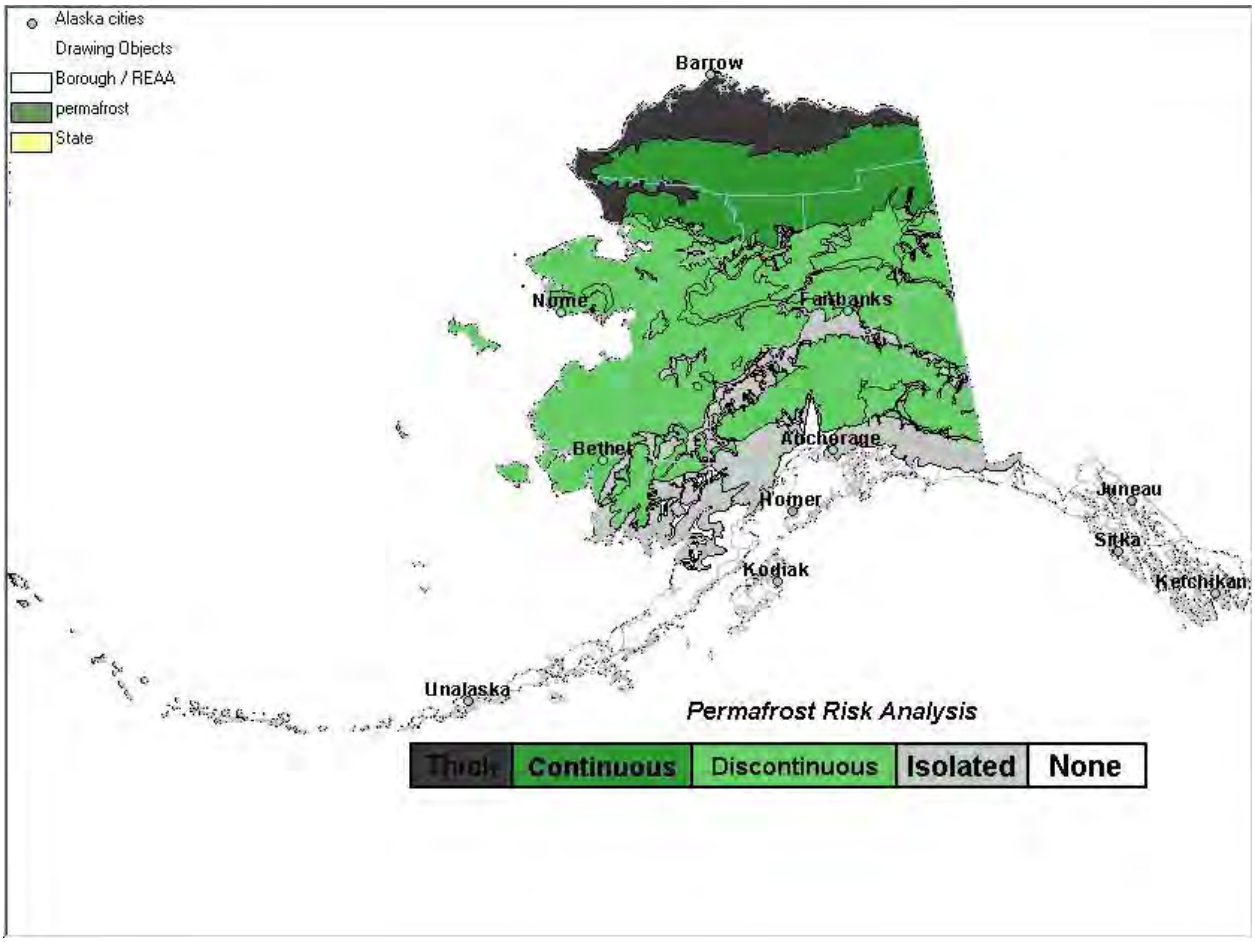


Figure 5-6 DGGS Permafrost Map of Alaska

Extent

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

Based on the Planning Team's knowledge of past permafrost degradation events and the criteria identified in Table 5-3, the extent of permafrost degradation impacts in the City of Hughes are considered limited where injuries are treatable with first aid, minor quality of life is lost, shutdown of critical facilities and services occurs for 24 hours or less, and less than 10 percent of property is severely damaged.

Impact

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

Probability of Future Events

There is no written record defining permafrost impacts for the City of Hughes. However, the Planning Team stated that permafrost damage occurs annually to structures and roads throughout the community. The Planning Team further stated the probability for permafrost occurring follows the criteria in Table 5-2, the probability of future damage resulting from permafrost is possible in the next five years (event has up to 1 in 5 years chance of occurring) as the history of events is greater than 10 percent but less than or equal to 20 percent likely per year. (Hughes 2016)

5.3.7 Weather (Severe)

5.3.7.1 Nature

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

Heavy and Drifting Snow

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

Freezing Rain/Ice Storm

Freezing rain and ice storms occur when rain or drizzle freezes on surfaces, accumulating 12 inches in less than 24 hours.

Extreme Cold

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

High Winds

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

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

5.3.7.2 History

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

Table 5-7 Severe Weather Events

Zone(s)	Location(s)	Date(s)	Event	Description
AK004 AK008	Huslia	1-3 Feb 00	Blizzard	Wide variety of winter weather, strong south winds, and blizzard conditions. Blizzard conditions occurred at Huslia.
AK004 AK008	Bettles, Nulato, Galena, Kaltag	9-11 Nov 00	Winter Storm	Variety of winter weather along with strong south winds, cold air, and blizzard conditions.
AK216	Galena, Nulato, Kaltag	2-3 Apr 01	Heavy Snow	Blizzard conditions, heavy snow, high winds.
AK219	Upper Koyukuk Valley	5 Jan 02	High Wind	Wind gusts to 50 miles per hour (mph) damages $3,500.
AK219	Hughes	11-12 May 03	Flood	Koyukuk River ice jam formed approx. two miles downstream from Hughes. Water backed up behind the ice jam inundated Hughes with a few ft. of water. High water washed-out two taxiways at the airport, flooded several houses, littered the village with large ice chunks, and knocked over two fuel tanks. Damage: $3000 for taxiways, and ~$500 to repair/upright the fuel tanks. Damages $3.5K.
AK216 AK219	Huslia	30-31 Oct 03	Winter Storm	Rain and freezing rain was reported at Huslia and Kaltag.
AK216-AK219	Galena, Bettles	2-5 Jan 05	Heavy Snow	Snow lingered behind the cold front, Heavy Snow.
AK216	Huslia	20-25 May 05	Flood	Rains, snowmelt, and bank erosion at the village of Huslia, one home was threatened and several utility poles had to be moved. River water flowed into adjacent lake, causing minor flooding to several residences along the lakeshore.
AK219	Hughes	13 May 06	Flood	An ice Jam formed 7 to 12 miles downstream from Hughes on the Koyukuk River, flooding the City. The airport's connection from the apron to the runway was washed-out and portions of the apron damaged. Water level was 1 to 3 ft. around the City, with five homes, the school, the City store - flooded, water was ½ way up the City Office entrance steps. The village greenhouse floated away. Damages $411.1K

Table 5-7 Severe Weather Events

Zone(s)	Location(s)	Date(s)	Event	Description
AK215 AK216	Huslia	3-5 Apr 08	Winter Storm	Rain and/or freezing rain, snowfall amounts of 7 to 9 inches. Snowfall estimated at 6.8 inches Huslia received more precipitation most likely in the form of freezing rain.
AK216 AK219	Lower Koyukuk Middle Yukon Valleys	9 Dec 08	High Wind	Strong winds of 50 mph with local gusts to 70 mph.
AK216 AK219	Galena, Bettles	1-12 Jan 09	Extreme Cold/Wind Chill	Cold snap. Most prolonged cold snap across interior Alaska since 1999.
AK215, AK216 AK219	Huslia	13-16 Jan 09	Winter Storm	Approx. 8 to 12 inches of snow along eastern slopes of the Nulato Hills. Likely that the snow changed to freezing rain in Huslia.

(Lingaas 2009)

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

Location

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

Extent

The entire City of Hughes is equally vulnerable to the effects of severe weather. Blizzard conditions and heavy snow depths for the area can reach 1 ft. or better per storm event; wind speed can exceed 70 mph; and extreme low temperatures have reached -67ºF.

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

Impact

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

Heavy snow can immobilize a community by bringing transportation to a halt. Until the snow can be removed, airports and roadways are impacted, even closed completely, stopping the flow of supplies and disrupting emergency and medical services. Accumulations of snow can cause roofs to collapse and knock down trees and power lines. Heavy snow can also damage light aircraft and sink small boats. A quick thaw after a heavy snow can cause substantial flooding.

The cost of snow removal, repairing damages, and the loss of business can have severe economic impacts on cities and towns.

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

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

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

Probability of Future Events

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

5.3.8 Wildland Fire

5.3.8.1 Nature

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

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

- **Topography:** As slope increases, the rate of wildland fire spread increases. South-facing slopes are also subject to more solar radiation, making them drier and thereby intensifying wildland fire behavior. However, ridgetops may mark the end of wildland fire spread since fire spreads more slowly or may even be unable to spread downhill.
- **Fuel:** The type and condition of vegetation plays a significant role in the occurrence and spread of wildland fires. Certain types of plants are more susceptible to burning or will burn with greater intensity. Dense or overgrown vegetation increases the

amount of combustible material available to fuel the fire (referred to as the "fuel load"). The ratio of living to dead plant matter is also important. The risk of fire is increased significantly during periods of prolonged drought as the moisture content of both living and dead plant matter decreases. The fuel load continuity, both horizontally and vertically, is also an important factor.

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

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

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

5.3.8.2 History

Wildland fires have not been documented within the boundaries of the City of Hughes; however, wildland fires have occurred in the City's vicinity. The Alaska Interagency Coordination Center (AICC) maintains a website (http://fire.ak.blm.gov/aicc.php) to consolidate Alaska's wildland fire information. Information in Table 5-8 and Figure 5-7 were obtained from this site.

Over 70 wildland fires occurred within 30 miles of the City of Hughes. The City determined to only be concerned with large wildland fires that exceeded 4,000 acres burned for this planning activity. Table 5-8 lists 11 wildfires that exceeded 4,000 acres burned for the historical period from 1939 to 2016).

Table 5-8 Wildland Fire History

Fire Name	Fire Year	Estimated Acres
HUS W 5	1981	12000
HUS NW 23	1985	9500
Bakatigikh Mountain	2005	11736.5
GAL NE 87	1986	6200
TAL NW 85	1985	23500
HUS SW 15	1990	4444.2

Fire Name	Fire Year	Estimated Acres
Isahultila	2015	149359.3
Rock	2015	142650.4
Baathbakdizuni Creek	2015	32327.8
Hughes Creek	2015	22435.1
Pocahontas	1968	73000

(AICC 2016)

5.3.8.3 *Location, Extent, Impact, and Probability of Future Events*

Location

Under certain conditions wildland fires may occur in any area with fuel surrounding the City of Hughes. Since fuels data is not readily available, for the purposes of this plan, all areas outside City limits are considered to be vulnerable to wildland fire impacts. Since 1939, 70 wildland fire events have occurred within 30 miles of the City of Hughes (Figure 5-7).

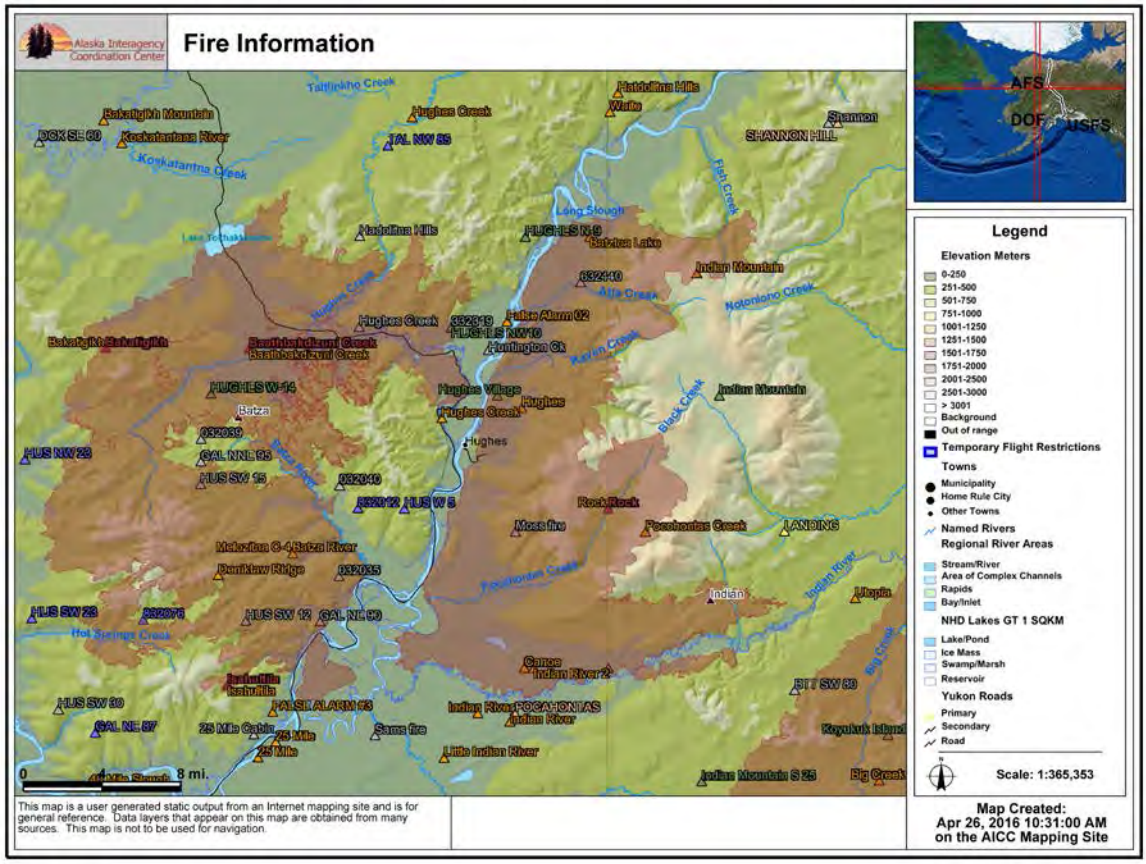


Figure 5-7 Hughes Wildfire History (AICC 2016)

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.

Past wildland fires appear to burn much smaller acreage per event than the most recent 2015 fire season This may be due to the fact that the State's Division of Forestry (DOF) much more efficiently manage wildland fires using a four tiered suppression methodology based on infrastructure criticality while using more modern available resources as the respond to wildland fires which potentially threaten populated areas (DOF 2016).

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

Impact

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

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

Probability of Future Events

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

depending on the vegetation type, topography, and location. Recorded wildland fires occurring within 50 miles of the City of Hughes have an average recurrence rate of approximately 2.5 to 3 years.

Based on the history of wildland fires in the City of Hughes area applying the criteria identified in Table 5-2, it is likely a wildland fire event will occur in the next three years. The event has up to 1 in 3 years chance of occurring and the history of events is greater than 20 percent but less than or equal to 33 percent likely each year.

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

6.1 OVERVIEW OF A VULNERABILITY ANALYSIS

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

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

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

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

DMA 2000 Requirements: Risk Assessment, Assessing Vulnerability, Overview

Assessing Vulnerability: Overview

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

Element

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

Source: FEMA, July 2008.

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

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

Assessing Vulnerability: Addressing Repetitive Loss Properties

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

Element

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

Source: FEMA, July 2008.

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

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

Assessing Vulnerability: Identifying Structures

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

Element

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

Source: FEMA, July 2008.

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

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

Assessing Vulnerability: Estimating Potential Losses

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

Element

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

Source: FEMA, July 2008.

6.2 VULNERABILITY ANALYSIS: SPECIFIC STEPS

6.2.1 Asset Inventory

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

6.2.1.1 Population and Building Stock

Population data for the City of Hughes were obtained from the 2010 U.S. Census. The City of Hughes's total population for 2010 was 77 and 2014 DCCED/DCRA data reported a population of 86 (Table 6-1). The City of Hughes reports a population of 97.

Table 6-1 Estimated Population and Building Inventory

Population		Residential Buildings	
2010 Census	DCCED 2014 Data	Total Building Count	Total Value of Buildings[1]
77	86	40	$16,880,000

Sources: The City of Hughes, U.S. Census 2000, and 2014 DCCED/DCRA Certified population data.
[1] Average structural value of all single-family residential buildings is $422,000 per structure.

Estimated numbers of residential buildings and replacement values for those structures, as shown in Table 6-1, were obtained from the City of Hughes, the 2010 U.S. Census, and DCCED/DCRA. A total of 40 single-family residential buildings were considered in this analysis. The City of Hughes stated that residential replacement values are generally understated as the cost for materials, shipping, and labor exceed the US Census determined value.

6.2.1.2 Repetitive Loss Properties

The City of Hughes does not currently participate in the NFIP and therefore does not have an inventory of properties that meet the RL or SRL criteria. This has been identified as a potential mitigation action as a result of this hazard mitigation planning process. The City of Hughes is investigating application to the NFIP program.

6.2.1.3 Existing Critical Facilities and Infrastructure

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

- Government facilities, such as city and tribal administrative offices, departments, or agencies
- Emergency response facilities, including police, Village Public Safety Officer (VSPO), fire, and Code Red 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
- Local store

The total number of critical facilities is listed in Table 6-2.

Table 6-2 Hughes Critical Facilities

Occupancy Type	Facility Name	Location/Address	Structure or Per Mile Replacement Value	Total Miles/ Feet/Gallons/ Occupants
Government Facility	City Building	110 Front Street	$1,000,000	12 Occupants
	Honey Bucket Equipment Storage	112 Front Street	$100,000	0 Occupants
Transportation Facilities	Airport, lighted, gravel, 3,400 ft x 100 ft	Airport Way	$7,000,000	0 Occupants
	Airport Maintenance Building	Airport Way	$500,000	0 Occupants
Emergency Response Facility	None			
Educational Facility	Johnny Oldman School K-12	Front Street	$1,500,000	13 Occupants
Care Facility	Hughes Tribal Office	Front Street	$300,000	6 Occupants
Community Facility	Episcopal Diocese Church	Airport Way	$250,000	12 Occupants
	Bifelt Store LLC		$500,000	1 Occupants
	Community Hall	Hillside Road	$900,000	50 Occupants
	Cemetery	Cemetery Road	$0	
Roads	Roads U.S. Bureau of Land Management (BLM)			0 Occupants
	Roads (Community)		$2,000,000	0 Occupants
	Landfill/Cemetery Road		$700,000	0 Occupants
	Sewage Lagoon Access Road		$2,000,000	0 Occupants
Bridges (local, state, & federal)	None			
Utilities	Internet/ Television/Telephone Satellite Dish	Front Street	$100,000	0 Occupants
	Washeteria/Water Treatment Plant	Front Street	$2,000,000	1 Occupants
	Water Tank	Front Street	$1,000,000	0 Occupants
	Wastewater Treatment Plant (Community Septic Tank/System)	Front Street	$1,500,000	1 Occupants
	New Landfill, Class III	Cemetery Road	$2,000,000	1 Occupants

Table 6-2 Hughes Critical Facilities

Occupancy Type	Facility Name	Location/Address	Structure or Per Mile Replacement Value	Total Miles/ Feet/Gallons/ Occupants
	Piped Septic System	Community Wide	$1,500,000	3/4 Mile 0 Occupants
	Power Plant/Generator Shed	Airport Way	$2,500,000	1 Occupants
	Community Well	Front Street	$500,000	0 Occupants
	City Electric Fuel Tank	Airport Way	$1,000,000	26,000 Gallons 0 Occupants
	Johnny Oldman School Fuel Tanks	Front Street	$500,000	28,000 Gallons 0 Occupants
	Marilyn R. Evans Medical Clinic		$2,000,000	4 Occupants
	Outside Water Storage Tank	Front Street	$1,000,000	0 Occupants
	Biomass Building	Front Street	$1,000,000	0 Occupants

(Hughes 2016)

6.2.1.4 Future Critical Facilities and Infrastructure

The City is aware of the hazards which impact the community and will take every precaution to ensure future development does not occur in known hazard areas.

Immediate plans for future development in the City of Hughes includes a snow removal equipment building construction, an airport runway rehabilitation, a City Office/clinic building heating system and plumbing upgrade projects, elevation of the City Office building, rehabilitation of the tribal elders multi-purpose center, and water and sewer project for six homes.

The elevation of the City Office building was recently funded through the Hazard Mitigation Grant Program (HMGP)

6.2.2 Methodology

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

The majority of rural communities lack Alaska DCRA community profile maps or geo-referenced data. Consequently, the City of Hughes Planning Team determined critical facility locations in relation to potential hazard threat exposure and vulnerability.

Replacement structure and contents values were developed for physical assets. These value estimates were provided by the City of Hughes. 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 calculated. A similar analysis was used to evaluate the proportion of the population at risk. However, the analysis simply represents the number of people at risk; no estimate of the number of potential injuries or deaths was prepared.

6.2.3 Data Limitations

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

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

6.2.4 Exposure Analysis

The results of the exposure analysis for loss estimations in the City of Hughes are summarized in Table 6-3 and in the following discussion.

Table 6-3 City of Hughes Potential Hazard Exposure Analysis

			Residential Structures		Critical Facilities		Total	
Hazard	Methodology	Population[(a)]	Number	Structure Value	Number	Structure Value	Structures	Value
Avalanche*	descriptive	19	10	$4,220,000	0	$0	19	$4,220,000
Earthquake*	descriptive	97	40	$16,880,000	27	$33,350,000	67	$50,230,000
Erosion	descriptive	18	7	$2,954,000	0	$0	7	$2,954,000
Flood	descriptive	52	26	$10,972,000	27	$33,350,000	57	$44,322,000
Landslide	descriptive	19	10	$4,220,000	0	$0	19	$4,220,000
Permafrost*	descriptive	97	40	$16,880,000	27	$33,350,000	67	$50,230,000
Weather (Severe)*	descriptive	97	40	$16,880,000	27	$33,350,000	67	$50,230,000
Wildland Fire*	descriptive	97	40	$16,880,000	27	$33,350,000	67	$50,230,000

* All people, critical facilities, and residential structures are equally vulnerable to this hazard.

N/A = not available

(a) total population was based on DCCED2014 population data - population estimates provided by the Planning Team for Avalanche, Erosion, Flood, and Landslide hazard areas.

(b) cost estimates based on 2010 US Census, and City of Hughes Planning Team Input

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Avalanche

Based on avalanche hazard risk area maps produced by the DNR/DGGS, the City of Hughes has a low risk from an avalanche hazard. The City of Hughes Planning Team has indicated there is a medium to low risk to this hazard potentially impacting residences along the hillside. The Planning Team has rated the probability as low (see Section 5.3.1.3). There is limited exposure to an avalanche to the existing or future City of Hughes population, residences, and critical facilities. Avalanche hazard may impact 19 people in ten residences (worth $422,000) however no critical facilities are located in the avalanche hazard area.

Impacts to the community such as high snow load impacts that may result in infrastructure damage are not expected. Minor residential structure dusting may occur. Impacts to future populations, residences, critical facilities, and infrastructure are anticipated at the same low level.

Earthquake

Based on earthquake probability model maps produced by the USGS, the entire City of Hughes area is at risk of experiencing moderate earthquake impacts. However, the probability is low (see Section 5.3.2.3). Impacts to the community such as significant ground movement that may result in infrastructure damage are not expected. The entire existing and future City of Hughes population, residences, and critical facilities are exposed to the effects of an earthquake. This includes all 97 people in 40 residences (worth $16,880,000) and 27 critical facilities (worth $33,350,000).

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

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

Erosion

Based on local knowledge, areas within the City of Hughes affected by erosion are located adjacent to the River. (Section 5.3.3.3) There are seven residences (worth approximately $2,954,000) located in areas historically prone to erosion. There is no critical infrastructure located in erosion prone areas.

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

Impacts to future populations, residences, critical facilities, and infrastructure are anticipated at the same impact level until the City institutes land use controls prohibiting new construction in erosion prone areas. Impacts could also be lessened if affected properties could be relocated.

Flood

According to community information, 26 critical facilities (worth 31,250,000) are located in areas exposed and historically prone to flooding. (Section 5.3.4.3) There are approximately 52 people in 26 residences (worth $10,972,000) located in areas exposed and historically prone to flooding.

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

As the City of Hughes is not a NFIP participant, RL flood claim data is not available. However, impacts to future populations, residences, critical facilities, and infrastructure are anticipated at the same impact level. Funding may be secured to elevate or relocate flood prone structures to mitigate future damages or losses.

Landslide

Based on the Planning Team's landslide probability estimates there is limited exposure (see Section 5.3.5.3) to a landslide to existing or future City of Hughes population, residences, and critical facilities. No critical facilities are located in the landslide hazard area.

Impacts associated with landslide events include fatalities, injuries, and public and private financial losses in indirect and direct ways. Impacts to future populations, residences, critical facilities, and infrastructure are anticipated to be less than existing impacts if land use ordinances and zoning controls dictate development is not allowed in areas with high landslide risk. However, if special land use ordinances are not established, impacts to existing and future populations, residences, critical facilities, and infrastructure could be greater than impacts that have been experienced with historic events.

Permafrost

According to mapping completed by the USGS, the entire City of Hughes is underlain by discontinuous permafrost, thus exposed to the impacts from this hazard. (Section 5.3.6.3) This includes all 97 people in 40 residences (worth $16,880,000) and all 27 critical facilities (worth approximately $33,350,000

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

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

Weather (Severe)

Using information provided by the City of Hughes and the National Weather Service, the entire existing and future City of Hughes population, residences, and critical facilities are equally exposed to the effects of a severe weather event. (Section 5.3.7.3) This includes all 97 people in 40 residences (worth $16,880,000) and all 27 critical facilities (worth approximately $33,350,000).

Impacts associated with severe weather events includes roof collapse, trees and power lines falling, damage to light aircraft and sinking small boats, injury and death resulting from snow machine or vehicle accidents, overexertion while shoveling all due to heavy snow. A quick thaw after a heavy snow can also cause substantial flooding. Impacts from extreme cold include hypothermia, halting transportation from fog and ice, congealed fuel, frozen pipes, disruption in utilities, frozen pipes, and carbon monoxide poisoning. Section 5.3.7.3 provides additional detail regarding the impacts of severe weather. Buildings that are older and/or not constructed with materials designed to withstand heavy snow and wind (e.g., hurricane ties on crossbeams) are more vulnerable to the impacts of severe weather. High winds are known to cause damage, depending upon their strength.

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

Wildland Fire

According to the Alaska Fire Service, there are no wildland fire areas within the City of Hughes boundaries. However, 269 wildland fires have occurred within a 50-mile radius of the City. (Section 5.3.8.3) There is potential for wildland fire to interface with the population center of the City. Thus, for the purposes of this exposure and vulnerability assessment, it is assumed that all structures within the City are equally exposed to the impacts of a wildland fire event. This includes all 97 people in 39 residences (worth $$16,880,000) and all 27critical facilities (worth approximately $33,350,000

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.

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

Assessing Vulnerability: Analyzing Development Trends

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

Element

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

Source: FEMA, July 2008.

6.3 LAND USE AND DEVELOPMENT TRENDS

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

The City of Hughes has no formal zoning or other land use controls. However, a wide variety of land uses exists in the City. There are few areas of commercial land uses within Hughes that include facilities such as the City Electric Utility and the Hughes General Store Cooperative, Inc.

Community facilities are classified under institutional land uses such as schools and government facilities.

Development Trends

Development trends in the City of Hughes will likely be relatively flat due the relatively flat population growth since 1980.

Like most rural communities, the City of Hughes infrastructure has limited infrastructure conveniences like indoor plumbing. Most residents use honey buckets and outhouses. A feasibility study has been completed to identify sanitation improvements. Preliminary work has begun on a new landfill site, new sewage lagoon, and water treatment improvements. A feasibility study has been completed to identify sanitation improvements.

No homes have complete plumbing; the City of Hughes maintains a central watering point where the majority of the residents acquire treated potable water. Only half of the community's occupied residences have piped water systems along with the school, teacher's quarters, and the City and Tribal offices. The City infrastructure are connected to septic tanks but most residences use a honey bucket haul system or have personal privies (outhouses). The City is concerned about overloading its landfill; they subsequently use an incinerator to reduce combustibles and recycle when appropriate. A new landfill and access road was funded in 2007 and completed in. 2009 (DCCED 2016).

The following projects are in various stages of completion:

Table 6-4 Projects Under Development

Lead Agency	Fiscal Year	Project Status	Project Description
ICDBG	2016	Funded	Hughes Tribal Council Building Rehabilitation
ANTHC	2016	Funded	Five Home well and septic hook-up
DOT	2016	Funded	Airport resurfacing

Table 6-4 Projects Under Development

Lead Agency	Fiscal Year	Project Status	Project Description
ANTHC	2016	Funded	Water/Sewer rehabilitation
DHS&EM	2016	Funded	City Office Building Elevation
State of Alaska CIP Grant	2016	Potential	Sewer system, leech field rehabilitation
City of Hughes and TCC	2016	Funded	Solar panels for power plant
City of Hughes and Rasmusson Foundation	2016	Funded	Purchase bobcat for Biomass facility
Federal Aviation Administration, Department of Transportation and Public Facilities (FAA DOT/PF)	2011	Planned	Construct Snow Removal Equipment Building.
FAA	2011	Planned	Rehabilitate Runway 17/35.
FAA	2010	Planned	Conduct aeronautical survey for Wide Area Augmentation System (WAAS) (air navigation) approach.
DOT/PF	2003	Planned	Landfill/Cemetery Road - Construct new three mile long road to cemetery and proposed landfill.
State CDBG & Denali Commission	2012	Completed	Health Clinic Design - Full design; site utilities and site control ownership/documentation.
DCCED	2009	Funded	Hughes City Office, Clinic, Building Heating System, Mechanical System and Plumbing Upgrade. (Dept of Commerce, Community and Economic Development [DCCED])
DEC/VSW	2008	Funded	Water and Wastewater Infrastructure Project. (Dept of Environmental Conservation. Village Safe Water [DEC/VSW])
DCCED	2008	Funded	School Supplies for Hughes, Koyukuk and Minto Schools.
ANTHC	2007	Funded	Construction of a New Solid Waste Landfill, Road Access and Associated Sewage Disposal Site. (Alaska Native Tribal Health Consortium [ANTHC])
Housing and Urban Development (HUD)	2007	Funded	Indian Housing Block Grant /Native American Housing Assistance and Self Determination Act (IHBG/NAHASDA) administration, operating & construction funds. (Housing and Urban Development [HUD])
ANTHC	2006	Funded	Complete Water/Sewer Feasibility Study.
DCCED	2007	Funded	Primary Health Clinic – Community Development Block Grant (CDBG).
HUD	2006	Funded	IHBG/NAHASDA administration, operating & construction funds.
Denali/AHFC	2006	Funded	Teacher Housing Construction. New construction of duplex at 1,904 sq. ft. Yukon Koyukuk School District. (Denali/Alaska Housing Finance Corporation [AHFC])
HUD	2005	Funded	Indian Housing Block Grant - NAHASDA administration, operating & construction funds.
ANTHC	2004	Funded	Community-wide Sewer Improvements. - Scope of work revised July 2006 to include piped water and sewer. Design

Table 6-4 Projects Under Development

Lead Agency	Fiscal Year	Project Status	Project Description
ANTHC	2004	Funded	Design & construct sewage lagoon access road. – Federal Highway Administration (FHWA) funding through DOT.
AEA-RPSU/ Denali/CDBG	2003	Funded	Power Plant & Distribution Upgrades. Project has been delayed due to permitting. (Alaska Energy Association- Rural Power System Upgrade [AEA-RPSU]/ Denali/CDBG)
ANTHC/EPA/DEC	2003	Funded	Water Supply & Sewage Collection Project, Phase 3; Community sewer improvements and new water source. (ANTHC/Environmental Protection Agency EPA/DEC)
HIS/ANTHC	2002	Funded	Sewage Lagoon – Indian Health Service (IHS) $80K, EPA $511.3K. Lagoon/Landfill improvements and flush/haul garage.
BIA	2002	Funded	Bridge Project. (Bureau of Indian Affairs [BIA])

(DCRA 2009)

In 1968, a community water distribution system and individual household septic tanks were constructed. Initially the system worked well, and was expanded in 1973. However, the system froze during 1983, leaving only a few facilities operational. Thirty outhouses were constructed in 1984 to replace the frozen septic systems. Many Hughes residents currently haul treated water from the central watering point. Eleven houses are served with piped water, plus the school, teacher's apartments, clinic, and the City and Tribe offices. The community facilities are connected to septic tanks.

Community wide water, privy, bulk fuel storage, and electrical and solid waste improvements were made in 1989. Airport improvements occurred in 1992 and new clinic construction occurred in 1993. In September 1994, flood waters destroyed and swept away nearly all of the community's buildings, homes, and food caches for the winter. (DCCED 2016)

> *"Twenty-two of the 29 occupied homes in Hughes were severely damaged or destroyed by the floods. The contents of all but a few homes were destroyed or washed down river. Subsistence food resources were demolished. Almost all of the community facilities that this community depends on were seriously damaged and rendered non-operational." (Hughes 1995)*

Major components have been replaced; a new washeteria, well and treatment plant, 100,000 gallon water storage tank, sewage lagoon, and force main have recently been completed. The lagoon is connected to the washeteria and school. The landfill was relocated in 2009.

Residents rebuilt near the old City site with new homes and facilities now located away from the floodplain. Table 6-5 lists completed projects for the City of Hughes.

Table 6-5 Completed Projects

Lead Agency	Fiscal Year	Project Status	Project Description
AEA-BF	2004	Complete	Bulk Fuel Facility OTHER FUNDING: Denali Commission $75,000. Bulk fuel upgrade consolidated with power plant upgrade, project No. 350155. (Alaska Energy Association/Bulk Fuel [AEA-BF])
RPSU	2003	Complete	Power Plant & Distribution Upgrades OTHER FUNDING: Denali

Table 6-5 Completed Projects

Lead Agency	Fiscal Year	Project Status	Project Description
			Commission $1,862,000, Community Development Block Grant (CDBG) $350,000 Project has been delayed due to permitting. (AEA-Rural Power System Upgrade [RPSU])
ANTHC	2002	Complete	Washeteria Renovation Denali Commission Funding. Improvements include adding 2 unit heaters, 4 commercial washing machines, 1 hot water heater, 2 hydronic circulation pumps, and improvements to windows and doors. No outdoor construction will be performed. The scope of this project includes design and planning, materials and equipment, construction, and labor. (Alaska Native Tribal Health Consortium [ANTHC])
DOT&PF	2002	Complete	Airport Snow Removal Equipment – Grader. (Department of Transportation and Public Facilities [DOT&PF])
ANTHC	2002	Complete	Design New Health Clinic Denali Commission Funding.
HUD	2002	Complete	Indian Housing Block Grant/Native American Housing Assistance and Self Determination Act (IHBG/NAHASDA) administration, operating & construction funds. (Housing and Urban Development [HUD])
DCCED	2002	Complete	Purchase Elder Vehicle Capital Matching. (Dept of Commerce, Community and Economic Development [DCCED])
DCCED	2001	Complete	Powerhouse/Distribution System Upgrade CDBG.
DCCED	2001	Complete	Loader Equipment Capital Matching.
ANTHC	2000	Complete	Renovate Water Treatment Plant, and site and design a new wastewater treatment and disposal facility. Renovate Water Treatment Plant, modernize existing control valves, switches and gauges, and site and design a new wastewater treatment and disposal facility.
HUD	2000	Complete	IHBG/NAHASDA administration, operating & construction funds.

(DCRA 2016)

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

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

Within this section the Planning Team reviewed their mitigation goals and actions from the original 2010 City of Hughes Hazard Mitigation Plan.

7.1 DEVELOPING MITIGATION GOALS

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

DMA 2000 Requirements: Mitigation Strategy – Local Hazard Mitigation Goals

Local Hazard Mitigation Goals

Requirement §201.6(c)(3)(i): [The hazard mitigation strategy shall include a] description of mitigation goals to reduce or avoid long-term vulnerabilities to the identified hazards.

Element

- Does the new or updated plan include a description of mitigation goals to reduce or avoid long-term vulnerabilities to the identified hazards?

Source: FEMA, July 2008.

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. In 2016, Hughes has applied for its first FEMA HMA grant to elevate its City Office, addressing goals 7 and 9 (Table 7-1). Also in 2016, the Hudotl'eekkaakk'e Tribal Council intends to apply for its first FEMA HMA grant to relocate and elevate the Tribal Office, addressing goals 6, 7,and 9.

Table 7-1 Mitigation Goals

No.	Goal Description
1	Promote recognition and mitigation of all natural hazards that affect the City.
2	Cross-reference mitigation goals and actions with other City planning mechanisms and projects.
3	Reduce possibility of losses from all natural hazards that affect the City.
4	Reduce vulnerability of structures to avalanche damage.
5	Reduce vulnerability of structures to earthquake damage.
6	Reduce possibility of damage and losses from erosion.
7	Reduce the possibility of damage and losses from flooding.
8	Reduce possibility of damage and losses from landslide.
9	Reduce possibility of damage and losses from permafrost.

10	Reduce vulnerability of structures to severe winter storm damage.
11	Reduce possibility of damage and losses from wildland fires.

7.2 IDENTIFYING MITIGATION ACTIONS

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

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

Identification and Analysis of Mitigation Actions

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

Element

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

Source: FEMA, July 2008.

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

Identification and Analysis of Mitigation Actions: NFIP Compliance

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

Element

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

Source: FEMA, July 2008.

After mitigation goals and actions were developed, the planning team reviewed their mitigation strategy for continuity. Mitigation actions are activities, measures, or projects that help achieve the goals of a mitigation plan. Mitigation actions are usually grouped into six broad categories: prevention, property protection, public education and awareness, natural resource protection, emergency services, and structural projects. On March 21, 2016, the Planning Team updated the 77 mitigation actions during a public council meeting attended telephonically by State DHS&EM staff. The Planning Team. The original actions from 2010 and corresponding changes are in Appendix C, Public Outreach. The revised actions are shown in Table 7-2 below.

Table 7-2 Mitigation Goals and Potential Actions
(Bold ID items were selected during a public council meeting in March 2016)

Goals		Actions	
No.	**Description**	**ID**	**Description**
1	Promote recognizing and mitigating all natural hazards that affect the City of Hughes.	A	Hold an annual or biennial "hazard meeting" to provide information to residents about recognizing and mitigating all natural hazards that affect the City of Hughes. Presented in the form of a brochure or written media so that residents can take information with them after the meeting. Example Topics: National Flood Insurance Program (NFIP) program participation benefits, safe fire practices, to help prevent wildland fires, etc.
		B	Develop, produce, and distribute information materials concerning mitigation, preparedness, and safety procedures for all natural hazards.
		C	Join the NFIP to reduce monetary losses to individuals and the community.
		D	Develop and implement strategies and educational outreach programs for debris management from natural hazard events.
		E	Update or develop, implement, and maintain jurisdictional debris management plans.
2	Reduce possibility of losses from all natural hazards that affect the City of Hughes.	**A**	Identify and pursue funding opportunities to implement mitigation actions through internal and external agencies such as (Alaska Native Tribal Health Consortium [ANTHC], Dept of Commerce, Community and Economic Development [DCCED], Alaska Department of Transportation and Public Facilities [DOT/PF], and Housing and Urban Development [HUD] etc.).
		B	Increase power line wire size and incorporate quick disconnects (breakaway devices) to reduce ice load and wind storm power line failure during severe wind or winter ice storm events.
		C	Acquire (buy-out), demolish, or relocate structures from hazard prone area. Property deeds shall be restricted for open space uses in perpetuity to keep people from rebuilding in hazard areas.
		D	Harden utility headers located along river embankments to mitigate potential flood, debris, and erosion damages.
		E	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 and medical facilities, schools, correctional facilities, and water and sewage treatment plants, etc.)
		F	Develop vegetation projects to restore hillside and riverine erosion damage and to increase landslide susceptible slope stability.

Table 7-2 Mitigation Goals and Potential Actions
(Bold ID items were selected during a public council meeting in March 2016)

Goals		Actions	
No.	**Description**	**ID**	**Description**
3	Cross reference Mitigation goals and actions with other City of Hughes planning mechanisms and projects.	**A**	The City will aggressively manage their existing plans to ensure they incorporate mitigation planning provisions into all community planning processes such as comprehensive, capital improvement, land use, and transportation plans, etc to demonstrate multi-benefit considerations and facilitate using multiple funding sources.
		B	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.
		C	Integrate the Mitigation Plan findings for enhanced emergency planning.
		D	Develop and incorporate building ordinances commensurate with building codes to reflect survivability from flood, fire, wind, seismic, and other hazards to ensure occupant safety.
		E	Develop and incorporate mitigation provisions and recommendations into zoning ordinances and community development processes to maintain the floodway and protect critical infrastructure and private residences from other hazard areas.
		F	Identify and list repetitively flooded structures and infrastructures, analyze the threat to these facilities, and prioritize mitigation actions to protect the threatened population.
		G	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.
4	Reduce vulnerability of structures to avalanche damage.	**A**	Prohibit all new construction in avalanche hazard areas.
		B	Attach “High Hazard Zone” designation to titles of properties where appropriate.
		C	Acquire or relocate structures away from avalanche hazard area
		D	Establish regular avalanche hazard evaluation and forecasting during the winter months.
5	Reduce vulnerability of structures to earthquake damage.	A	Disseminate Federal Emergency Management Agency (FEMA) pamphlets to educate and encourage homeowners concerning seismic structural and non-structural retrofit benefits.
		B	Retrofit important public facilities with significant seismic vulnerabilities.

Table 7-2 Mitigation Goals and Potential Actions
(Bold ID items were selected during a public council meeting in March 2016)

Goals		Actions	
No.	**Description**	**ID**	**Description**
		C	Develop outreach program to educate residents concerning benefits of increased seismic resistance and modern building code compliance during rehabilitation or major repairs for residences or businesses.
		D	Inspect, prioritize, and retrofit any critical facility or public infrastructure that does not meet current State Adopted Building Codes.
		E	Evaluate critical public facility seismic performance for fire stations, public works buildings, potable water systems, wastewater systems, electric power systems, and bridges within the jurisdiction.
		F	Encourage utility companies to evaluate and harden vulnerable infrastructure elements for sustainability.
6	Reduce possibility of damage and losses from erosion.	A	Develop, maintain, and update erosion hazard locations, identify critical facilities potentially impacted and develop mitigation initiatives such as bank stabilization or facility relocation to prevent or reduce the threat.
		B	Relocate buildings that are at risk of being affected by erosion.
		C	Apply for grants/funds to implement riverbank protection methods.
		D	Develop and provide information to all residents on hillside and riverbank erosion and methods to present it in an easily distributed format.
		E	Harden culvert entrance bottoms with asphalt, concrete, rock, to reduce erosion or scour.
		F	Install embankment protection such as vegetation, riprap, gabion baskets, sheet piling, and walls to reduce or eliminate erosion.
		G	Install walls at the end of a drainage structure to prevent embankment erosion at its entrance or outlet (end walls).
		H	Install bank revetment protection to prevent erosion.
7	Reduce the possibility of damage and losses from flooding.	A	Establish flood mitigation priorities for critical facilities and residential and commercial buildings located within the 100-year floodplain using survey elevation data.
		B	Develop and maintain an inventory of locations subject to frequent storm water flooding based on most current U.S. Army Corps of Engineers (USACE) flood data.

Table 7-2 Mitigation Goals and Potential Actions
(Bold ID items were selected during a public council meeting in March 2016)

Goals		Actions	
No.	**Description**	**ID**	**Description**
		C	Determine and implement most cost beneficial and feasible mitigation actions for locations with repetitive flooding and significant damages or road closures.
		D	Develop an outreach program to educate public concerning NFIP participation benefits, floodplain development, land use regulation, and NFIP flood insurance availability to facilitate continued compliance with the NFIP.
		E	Develop, implement, and enforce floodplain management ordinances.
		F	Develop outreach program to educate residents concerning flood proofed well and sewer/septic installation.
		G	Acquire (buy-out), relocate, elevate, or otherwise flood-proof identified critical facilities and private properties.
		H	Install new stream flow and rainfall measuring gauges.
		C	Flood proof non-residential structures
		I	Increase culvert size to increase its drainage efficiency.
		J	Construct debris basins to retain debris in order to prevent downstream drainage structure clogging.
		K	Install debris cribs over culvert inlets to prevent inflow of coarse bed-load and light floating debris.
		L	Create relief drainage ditch opening using a culvert, bridge, or multiple culverts; to relieve rapid water accumulation during high water flow events.
		M	Provide flood protection to mitigate damage and contamination of wastewater treatment systems.
8	Reduce possibility of damage and losses from landslide.	A	Complete a landslide location inventory; identify threatened critical facilities and other buildings and infrastructure.
		B	Develop prioritized list of mitigation actions for threatened critical facilities and other buildings or infrastructure.
		C	Develop process to limit future development in high landslide potential areas (permitting, geotechnical review, soil stabilization techniques, etc).

Table 7-2 Mitigation Goals and Potential Actions
(Bold ID items were selected during a public council meeting in March 2016)

Goals		Actions	
No.	**Description**	**ID**	**Description**
		D	Update the storm water management plan to include regulations to control runoff, both for flood reduction and to minimize saturated soils on steep slopes that can cause landslides.
		E	Develop a vegetation management plan addressing slope-stabilizing root strength while facilitating precipitation containment.
		F	Identify and seasonally restrict recreational and construction activities in high landslide areas.
		G	Develop, implement and enforce property development landslide risk assessment procedures to identify potential facility vulnerability.
9	Reduce possibility of damage and losses from permafrost.	**A**	Identify and map existing permafrost areas to assist in critical facility relocation siting
		B	Promote permafrost sensitive construction practices in permafrost areas.
10	Reduce vulnerability of structures to severe weather damage.	A	Develop and implement programs to coordinate maintenance and mitigation activities to reduce risk to public infrastructure from severe winter storms.
		B	Develop critical facility list needing emergency back-up power systems, prioritize, seek funding, and implement mitigation actions.
		C	Develop and maintain severe winter storm public outreach program defining mitigation activity benefits through educational outreach aimed at households and businesses while targeting special needs populations.
		D	Develop and implement tree clearing mitigation programs to keep trees from threatening lives, property, and public infrastructure from severe weather events.
		E	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.
		F	Develop personal use and educational outreach training for a “safe tree harvesting” program. Implement along utility and road corridors, preventing potential winter storm damage.
		G	Develop outreach program with school district contests having students develop, display, and explain mitigation projects or initiatives.

Table 7-2 Mitigation Goals and Potential Actions
(Bold ID items were selected during a public council meeting in March 2016)

Goals		Actions	
No.	**Description**	**ID**	**Description**
		H	Implement and enforce the most current State adopted building codes to ensure structures can withstand winter storm hazards such as high winds, rain, water, and snow.
		I	Increase power line wire size and incorporate quick disconnects (break away devices) to reduce ice load power line severe wind or winter ice storm event failure.
11	Reduce possibility of damage and losses from wildland fires.	A	Identify critical facilities and vulnerable populations based on mapped high hazard areas.
		B	Identify evacuation routes away from high hazard areas and develop outreach program to educate the public concerning warnings and evacuation procedures.
		C	Develop Community Wildland Fire Protection Plans for all at-risk communities.
		D	Hold FireWise workshop to educate residents and contractors concerning fire resistant landscaping.
		E	Promote FireWise building siting, design, and construction materials.
		F	Provide wildland fire information in an easily distributed format for all residents.
		G	Develop, adopt, and enforce burn ordinances that require burn permits, restrict campfires, and controls outdoor burning.
		H	Develop outreach program to educate and encourage fire-safe construction practices for existing and new construction in high risk areas.
		I Ongoing	Identify, develop, implement, and enforce mitigation actions such as fuel breaks and reduction zones for potential wildland fire hazard areas.

7.3 EVALUATING AND PRIORITIZING MITIGATION ACTIONS

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

DMA 2000 Requirements: Mitigation Strategy - Implementation of Mitigation Actions

Implementation of Mitigation Actions

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

Element

- Does the new or updated mitigation strategy include how the actions are prioritized?
- Does the new or updated mitigation strategy address how the actions will be implemented and administered?
- Does the new or updated prioritization process include an emphasis on the use of a cost-benefit review to maximize benefits?
- *Does the updated plan identify the completed, deleted or deferred mitigation actions as a benchmark for progress, and if activities are unchanged (i.e., deferred), does the updated plan describe why no changes occurred? (Not applicable until 2014 update)*

Source: FEMA, July 2008.

The Planning Team evaluated, updated and prioritized each of the mitigation actions on March 21, 2016 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 City of Hughes. To complete this task, the Planning Team first prioritized the hazards that were regarded as the most significant within the community (avalanche, erosion, flood, landslide, permafrost, and wildland fire).

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

Table 7-3 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 21, 2016, the hazard mitigation Planning Team updated and prioritized each mitigation action that was chosen to carry forward into the Mitigation Action Plan. The hazard mitigation Planning Team considered each hazard's history, extent, and probability and potential NFIP compliance 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 Mitigation Action Plan Matrix was completed to provide the City with an approach to implementing the Mitigation Action Plan. Table 7-4 defines the mitigation action priorities.

7.4 IMPLEMENTING A MITIGATION ACTION PLAN

Table 7-4 is the City of Hughes and Hudotl'eekkaakk'e Mitigation Action Plan (MAP). The MAP shows how the mitigation actions were prioritized, how the overall benefit/costs were taken into consideration, and how each mitigation action will be implemented and administered by the Planning Team. As the Tribe and City occupy the exact same geographic area, the MAP represents both government entities.

Table 7-4 City of Hughes Mitigation Action Plan Matrix

(See acronym and abbreviations list for complete titles)

Action ID	Description	Priority	Responsible Department	Potential Funding	Timefra me	Benefit-Costs / Technical Feasibility
1B	Develop, produce, and distribute information materials concerning mitigation, preparedness, and safety procedures for all natural hazards. Going to reference in the appendix the City Office Elevation	Medium	City of Hughes, Hudotl' eekkaakk'e Tribal Council	City of Hughes, Hudotl' eekkaakk'e Tribal Council	1-4 years	B/C: Sustained mitigation outreach programs have minimal cost and will help build and support community capacity enabling the public to prepare for, respond to, and recover from disasters. TF: This project is technically feasible using existing Tribal Council staff
1E	Update or develop, implement, coordinate, and maintain jurisdictional debris management plans.	Low	City of Hughes, Hudotl' eekkaakk'e Tribal Council (In order to obtain Administration for Native Americans (ANA) funding, the Tribe would need to be the applicant)	City of Hughes, Hudotl' eekkaakk'e Tribal Council, Federal Emergency Management Agency (FEMA) Hazard Mitigation Assistance (HMA) Program grants, grant, FEMA Assistance to Firefighters Grant (AFG) Program's Fire Prevention and Safety Grant (FP&S) Program, and Staffing for Adequate Fire and Emergency Response (SAFER) Program, ANA Grant Programs, Emergency Food and Shelter Program (EFSP)	1-4 years	B/C: Debris management plans are an essential disaster management tool. Focused and coordinated planning enables effective damage abatement and ensures proper attention is assigned to reduce losses, damage, and materials management. TF: This action is feasible with limited fund expenditures.
2A	Identify and pursue funding opportunities to implement mitigation actions through internal and external agencies such as (ANTHC, DCCED, AKDOT, and HUD etc.).	High	City of Hughes, Hudotl' eekkaakk'e Tribal Council (In order to obtain ANA funding, the Tribe would need to be the applicant)	City of Hughes, Hudotl' eekkaakk'e Tribal Council, HMA, AFG, PFP&S, SAFER, ANA, EFSP	11-4 years	B/C: Identifying potential funding sources is minimal in cost and essential for the City due to limited available funding levels. This activity is essential to reducing damage and losses from any hazard event. TF: City and Village Council staff are technically capable of researching available funding sources. However, engineering

Table 7-4 City of Hughes Mitigation Action Plan Matrix

(See acronym and abbreviations list for complete titles)

Action ID	Description	Priority	Responsible Department	Potential Funding	Timefra me	Benefit-Costs / Technical Feasibility
						assistance from outside the community may be required for construction projects.
2C,	Acquire (buy-out), demolish, or relocate structures from hazard prone area. Property deeds shall be restricted for open space uses in perpetuity to keep people from rebuilding in hazard areas.	High	City of Hughes, Hudotl' eekkaakk'e Tribal Council	City of Hughes, Hudotl' eekkaakk'e Tribal Council, HMA, AFG, FP&S, SAFER, ANA, EFSP	3-5 years	B/C: Acquisition or relocation projects are the most cost effective methods to remove structures from damage and the population from hazard damage. Relocation costs are minor compared to building replacement due to the community's rural location where materials cost and shipping are exceedingly expensive. TF: The City has the technical capability to manage and conduct this project.
2D	Harden utility headers located along river embankments to mitigate potential flood, debris, and erosion damages.	Medium	City of Hughes, Hudotl' eekkaakk'e Tribal Council	City of Hughes, Hudotl' eekkaakk'e Tribal Council, HMA, AFG, FP&S, SAFER, ANA, EFSP	3-5 years	B/C: Hardening infrastructure to reduce erosion and flood damages reduces potential future damages and replacement costs. TF: The City has the technical capability to manage and conduct this project.
3A	The City will manage their existing plans to ensure they and incorporate mitigation planning provisions into all community planning processes such as comprehensive, capital improvement, land use, and transportation plans, etc to demonstrate multi-benefit considerations and facilitate using multiple funding sources.	Medium	City of Hughes, Hudotl' eekkaakk'e Tribal Council	City of Hughes, Hudotl' eekkaakk'e Tribal Council	1-3 years	B/C: Coordinated planning ensures effective damage abatement and ensures proper attention is assigned to reduce losses and damage to structures and City residents. TF: This action is feasible with limited fund expenditures.
3B	Review ordinances and develop outreach programs to assure propane tanks are properly	low	City of Hughes, Hudotl' eekkaakk'e	City of Hughes, Hudotl' eekkaakk'e	2-5 years Progress	B/C: Coordinated planning ensures effective damage abatement and ensures proper attention is assigned

Table 7-4 City of Hughes Mitigation Action Plan Matrix

(See acronym and abbreviations list for complete titles)

Action ID	Description	Priority	Responsible Department	Potential Funding	Timefra me	Benefit-Costs / Technical Feasibility
	anchored and hazardous materials are properly stored and protected from known natural hazards such as flood or seismic events.		Tribal Council	Tribal Council	made- See appendix	to reduce losses and damage to structures and City residents. Sustained mitigation outreach program is minimal in cost and will help build and support community capacity to enable the public to prepare for, respond to, and recover from disasters. TF: This action is feasible with limited fund expenditures.
3C	Integrate the Mitigation Plan findings for enhanced emergency planning. Completed in 2013	Medium	City of Hughes, Hudotl' eekkaakk'e Tribal Council	City of Hughes, Hudotl' eekkaakk'e Tribal Council	Complete	B/C: Coordinated planning ensures effective damage abatement and ensures proper attention is assigned to reduce losses and damage to structures and City residents. TF: This action is feasible with limited fund expenditures.
3D	Develop and incorporate building ordinances commensurate with building codes to reflect survivability from flood, fire, wind, seismic, and other hazards to ensure occupant safety.	Medium	City of Hughes, Hudotl' eekkaakk'e Tribal Council	City of Hughes, Hudotl' eekkaakk'e tribal Council	3-5 years	B/C: Coordinated planning ensures effective damage abatement and ensures proper attention is assigned to reduce losses and damage to structures and City residents. TF: This action is feasible with limited fund expenditures.
4A	Prohibit all new construction in avalanche hazard areas.	Completed	City of Hughes	City of Hughes, Hudotl' eekkaakk'e Tribal Council	completed since 2010	B/C: Facility siting review is the single most cost effective methods to ensure structures are built in non hazard areas saving future funds and potentially preventing life losses. Critical facility relocation costs are minor compared to facility replacement due to the community's rural location where materials shipping is exceedingly expensive. TF: The Village has the technical capability to manage and conduct

Table 7-4 City of Hughes Mitigation Action Plan Matrix

(See acronym and abbreviations list for complete titles)

Action ID	Description	Priority	Responsible Department	Potential Funding	Timefra me	Benefit-Costs / Technical Feasibility
						this project.
4C	Acquire or relocate structures away from avalanche hazard area	Low	City of Hughes	City of Hughes, Hudotl' eekkaakk'e Tribal Council, HMA, AFG, FP&S, SAFER, ANA, EFSP	2-4 years	B/C: Acquisition or relocation projects are the very cost effective methods to remove structures from damage and the population from hazard damage. Relocation costs are minor compared to building replacement due to the community's rural location where materials cost and shipping are exceedingly expensive. TF: The City has the technical capability to manage and conduct this project.
4D	Establish regular avalanche hazard evaluation and forecasting during the winter months.	Low	City of Hughes	City of Hughes, Hudotl' eekkaakk'e Tribal Council, HMA, AFG, FP&S, SAFER, ANA, EFSP	5 years	B/C: Identifying threatened infrastructure proximity to natural hazards is vital to their sustainability. Providing advanced warning of pending disasters further reduces life loss and potentially can reduce damage if quick action is possible to mitigate the impact. TF: The project is technically feasible as the community has staff and resources they have used to relocate and elevate buildings.
5B	Retrofit important public facilities with significant seismic vulnerabilities.	Medium	City of Hughes	City of Hughes, Hudotl' eekkaakk'e Tribal Council, HMA, ANA, EFSP	2-4 years	B/C: Retrofit projects can be very cost effective methods for bush communities as materials and shipping costs are very high. Project viability is depending on the cost and extent of the modifications. A comprehensive BCA needs to be conducted to validate this activity. TF: The City will need phase funding to obtain engineering and design

Table 7-4 City of Hughes Mitigation Action Plan Matrix

(See acronym and abbreviations list for complete titles)

Action ID	Description	Priority	Responsible Department	Potential Funding	Timefra me	Benefit-Costs / Technical Feasibility
						expertise to determine project viability.
5C	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.	Low	City of Hughes	City of Hughes, Hudotl' eekkaakk'e Tribal Council, HMA, ANA, EFSP	2-4 years	B/C: Sustained mitigation outreach programs have minimal cost and will help build and support community capacity enabling the public to prepare for, respond to, and recover from disasters. TF: This project is technically feasible using existing Tribal Council staff
5D	Inspect, prioritize, and retrofit any critical facility or public infrastructure that does not meet current State Adopted Building Codes.. Progress being made on new Tribal Office- See appendix	Medium	City of Hughes	City of Hughes, Hudotl' eekkaakk'e Tribal Council, HMA, ANA, EFSP	2-4 years	B/C: Retrofit projects can be very cost effective methods for bush communities as materials and shipping costs are very high. Project viability is depending on the cost and extent of the modifications. A comprehensive BCA needs to be conducted to validate this activity. TF: The City will need phase funding to obtain engineering and design expertise to determine project viability.
5F	Encourage utility companies to evaluate and harden vulnerable infrastructure elements for sustainability. All new utilities are now not allowed in the flood area	Medium	City of Hughes	City of Hughes, Hudotl' eekkaakk'e Tribal Council	1-5 years	B/C: Retrofit projects can be very cost effective methods for bush communities as materials and shipping costs are very high. Utility companies could benefit from this activity TF: This project is technically feasible as the community need only demonstrate cost savings by demonstrating losses from history utility impacts and down time.
6B	Relocate buildings that are at risk of being affected by erosion.	High	City of Hughes, Hudotl' eekkaakk'e	City of Hughes, Hudotl' eekkaakk'e	1-5 years	B/C: Identifying threatened infrastructure proximity to natural

Table 7-4 City of Hughes Mitigation Action Plan Matrix

(See acronym and abbreviations list for complete titles)

Action ID	Description	Priority	Responsible Department	Potential Funding	Timefra me	Benefit-Costs / Technical Feasibility
			Tribal Council	Tribal Council, HMA, AFG, FP&S, SAFER, ANA, EFSP		hazards is vital to their sustainability. There are no currently mapped hazard areas. This is a vital first step. This knowledge will help the community focus on activities to protect their vital infrastructure. TF: The project is technically feasible as the community has staff and resources they have used to relocate and elevate buildings.
6C	Apply for grants/funds to implement riverbank protection methods.	High	City of Hughes, Hudotl' eekkaakk'e Tribal Council	City of Hughes, Hudotl' eekkaakk'e Tribal Council, HMA, ANA	1-5 years	B/C: Identifying potential funding sources is minimal in cost and essential for the City due to limited available funding levels. This activity is essential to reducing damage and losses from any hazard event. TF: City and Village Council staff are technically capable of researching available funding sources. However, engineering assistance from outside the community may be required for construction projects.
6E	Harden culvert entrance bottoms with asphalt, concrete, rock, to reduce erosion or scour. Made progress with the tribal road funding	High	City of Hughes, Hudotl' eekkaakk'e Tribal Council	City of Hughes, Hudotl' eekkaakk'e Tribal Council, HMA, ANA	2-4 years	B/C: This retrofit project can be a very cost effective method for bush communities as materials and shipping costs are very high. This project is technically feasible as the community need only demonstrate cost savings by demonstrating losses from history utility impacts and down time.
6G	Install walls at the end of a drainage structure to prevent embankment erosion at its entrance or outlet. (end walls).	High	City of Hughes, Hudotl' eekkaakk'e Tribal Council	City of Hughes, Hudotl' eekkaakk'e Tribal Council, HMA, ANA	2-4 years	B/C: This retrofit project can be a very cost effective method for bush communities as materials and shipping costs are very high. TF: This project is technically

Table 7-4 City of Hughes Mitigation Action Plan Matrix

(See acronym and abbreviations list for complete titles)

Action ID	Description	Priority	Responsible Department	Potential Funding	Timefra me	Benefit-Costs / Technical Feasibility
						feasible as the community need only demonstrate cost savings by demonstrating losses from history utility impacts and down time.
7E	Discourage and educate on development in the floodplain.	Low	City of Hughes, Hudotl' eekkaakk'e Tribal Council	City of Hughes, Hudotl' eekkaakk'e Tribal Councill	2-3 years	B/C: Identifying threatened infrastructure and residences proximity to natural hazards is vital to their sustainability. There are no currently mapped hazard areas. This is a vital first step. This knowledge will help the community focus on activities to protect their vital infrastructure. residential properties, and lives. TF: The project is technically feasible as the community has staff and resources they have used to relocate and elevate buildings.
8E	Develop a vegetation management plan addressing slope-stabilizing root strength while facilitating precipitation containment.	High	City of Hughes, Hudotl' eekkaakk'e Tribal Council	City of Hughes, Hudotl' eekkaakk'e Council, HMA, ANA	2-4 years	B/C: This project can be a very cost effective method for bush communities as materials and shipping costs are very high. Local vegetation is readily available and requires no climate adaptation for survival. Local labor is available. TF: This project is technically feasible as the community need only demonstrate cost savings by demonstrating losses from history utility impacts and down time.
9A	Identify and dig test holes in permafrost areas to assist in critical facility relocation siting.	Medium	City of Hughes, Hudotl' eekkaakk'e Tribal Council	City of Hughes, Hudotl' eekkaakk'e Tribal Council, ANA, HMA,	2-4 years	B/C: Identifying permafrost locations is a minimal cost which would decrease damage to facilities if they were sited appropriately. Project must be associated with a relocation

Table 7-4 City of Hughes Mitigation Action Plan Matrix

(See acronym and abbreviations list for complete titles)

Action ID	Description	Priority	Responsible Department	Potential Funding	Timefra me	Benefit-Costs / Technical Feasibility
						or construction project. TF: Technically feasible as the community currently has identified permafrost locations but they have not created a map defining the area and they dig test holes to determine permafrost depth prior to construction.
9B	Promote permafrost sensitive construction practices in permafrost areas.	Medium	City of Hughes, Hudotl' eekkaakk'e Tribal Council	City of Hughes, Hudotl' eekkaakk'e Tribal Council, HMA, ANA	complete since 2010	B/C: Sustained mitigation outreach programs have minimal cost and will help build and support community capacity enabling the public to prepare for, respond to, and recover from disasters. Siting education can ensure structures are sited away from known hazard areas. TF: This project is technically feasible using existing Tribal Council staff
10C	Develop a system of warning the community about winter storm	Low	City of Hughes, Hudotl' eekkaakk'e Tribal Council	City of Hughes, Hudotl' eekkaakk'e Tribal Council, HMA, ANA	complete since 2010	B/C: Sustained mitigation outreach programs have minimal cost and will help build and support community capacity enabling the public to prepare for, respond to, and recover from disasters. Siting education can ensure structures are sited away from known hazard areas. TF: This project is technically feasible using existing Tribal Council staff
10D	Develop and implement tree clearing mitigation programs to keep trees from threatening lives, property, and public infrastructure from severe weather events.	Medium	City of Hughes, Hudotl' eekkaakk'e Tribal Council	City of Hughes, Hudotl' eekkaakk'e Tribal Council, HMA, AFG, FP&S, SAFER, ANA	1-4 years Every year	B/C: Sustained maintenance programs have minimal cost and will help reduce or eliminate future tree related damages. TF: This project is technically feasible through available community member skill sets.

Table 7-4 City of Hughes Mitigation Action Plan Matrix

(See acronym and abbreviations list for complete titles)

Action ID	Description	Priority	Responsible Department	Potential Funding	Timefra me	Benefit-Costs / Technical Feasibility
10G	Develop outreach program with school district contests having students develop, display, and explain mitigation projects or initiatives implemented through the tribe IGAP program	Low	City of Hughes, Hudotl' eekkaakk'e Tribal Council	City of Hughes, Hudotl' eekkaakk'e Tribal Council, HMA, AFG, FP&S, SAFER, ANA	1-4 years	B/C: Student focused mitigation outreach activities help develop future generations knowledge and willingness to mitigate rather than rework failing infrastructure. Outreach programs generally have minimal cost and help build and support community capacity; enabling the public to prepare for, respond to, and recover from, disasters. Siting education can ensure structures are sited away from known hazard areas. TF: This project is technically feasible using existing Tribal Council staff
10H	Implement and encourage the most current State adopted building codes to ensure structures can withstand winter storm hazards such as high winds, rain, water, and snow through certified review on all building plans, electrical and plumbing	Medium	City of Hughes	City of Hughes, Hudotl' eekkaakk'e Tribal Council	1-5 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.
11D	Work as a community to educate residents on fire resistant landscaping	Medium	City of Hughes, Hudotl' eekkaakk'e Tribal Council	City of Hughes, Hudotl' eekkaakk'e e Tribal Council, HMA, AFG, FP&S, SAFER, ANA	complete	B/C: Sustained mitigation outreach programs have minimal cost and will help build and support community capacity enabling the public to prepare for, respond to, and recover from disasters. Siting education can ensure structures are sited away from

Table 7-4 City of Hughes Mitigation Action Plan Matrix

(See acronym and abbreviations list for complete titles)

Action ID	Description	Priority	Responsible Department	Potential Funding	Timefra me	Benefit-Costs / Technical Feasibility
						known hazard areas. TF: This project is technically feasible using existing Tribal Council staff
11G	Develop, adopt, and enforce burn ordinances that require burn permits, restrict campfires, and controls outdoor burning. No burining allowed in the community	High	City of Hughes	City of Hughes, Hudotl' eekkaakk'e Tribal Council	1-5 years	B/C: Ordinance development, implementation, and enforcement can effectively reduce future losses to hazardous events. TF: This project is technically feasible and enforceable.
11I	Identify, develop, implement, and enforce mitigation actions such as fuel breaks and reduction zones for potential wildland fire hazard areas. Fuel break was placed around the back of the community.	Medium	City of Hughes, Hudotl' eekkaakk'e Tribal Council, Fire Chief	City of Hughes, Hudotl' eekkaakk'e Tribal Council, HMA, AFG, FP&S, SAFER, ANA	completed	B/C: Sustained fuel load maintenance programs have minimal cost and will help reduce or eliminate future tree related damages. TF: This project is technically feasible through available community member skill sets.

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

The following three process steps are addressed in detail here:

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

8.1 MONITORING, EVALUATING, AND UPDATING THE HMP

The requirements for monitoring, evaluating, and updating the HMP, as stipulated in the DMA 2000 and its implementing regulations are described below.

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

Monitoring, Evaluating and Updating the Plan

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

Element

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

Source: FEMA, July 2008.

The HMP was prepared as a collaborative effort among the Planning Team and DHS&EM. To maintain momentum and build upon previous hazard mitigation planning efforts and successes, the City of Hughes will use the Planning Team to monitor, evaluate, and update the HMP. Each authority identified in Table 7-4 will be responsible for implementing the Mitigation Action Plan. The City Administrator, 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.

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

- Participation of authorities and others in the HMP implementation
- Notable changes in the risk of natural or human-caused hazards
- Impacts of land development activities and related programs on hazard mitigation
- Progress made with the Mitigation Action Plan (identify problems and suggest improvements as necessary)
- The adequacy of local resources for implementation of the HMP

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

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

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

8.2 IMPLEMENTATION THROUGH EXISTING PLANNING MECHANISMS

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

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

Incorporation into Existing Planning Mechanisms

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

Element

- Does the new or updated plan identify other local planning mechanisms available for incorporating the mitigation requirements of the mitigation plan?
- Does the new or updated plan include a process by which the local government will incorporate the mitigation strategy and other information contained in the plan (e.g., risk assessment) into other planning mechanisms, when appropriate?
- *Does the updated plan explain how the local government incorporated the mitigation strategy and other information contained in the plan (e.g., risk assessment) into other planning mechanisms, when appropriate? (Not applicable until 2014 update)*

Source: FEMA, July 2008.

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

- Conduct a review of the community-specific regulatory tools to assess the integration of the mitigation strategy. These regulatory tools are identified in the following capability assessment section.
- Work with pertinent community departments to increase awareness of the HMP and provide assistance in integrating the mitigation strategy (including the Mitigation Action Plan) into relevant planning mechanisms. Implementation of these requirements may require updating or amending specific planning mechanisms.

8.3 CITY OF HUGHES / HUDOTL'EEKKAAKK'E CAPABILITY ASSESSMENT

The City of Hughes capability assessment reviews the technical and fiscal resources available to the community. This section outlines the resources available to the City of Hughes for mitigation and mitigation related funding and training. The Hudotl'eekkaakk'e Tribal Council has no regulatory authority in the vicinity of Hughes. However, most city officials are also members of the tribal council. Therefore, it is common for tribal interests to be represented in all aspects of city government to include planning.

Table 8-1 City of Hughes Regulatory Tools

Regulatory Tools (ordinances, codes, plans)	Existing?	Comments (Year of most recent update; problems administering it, etc.)
Building code	No	The City can exercise this authority.
Zoning ordinances	No	The City can exercise this authority.
Subdivision ordinances or regulations	No	The City can exercise this authority.
Special purpose ordinances (Referenced in Comprehensive Plan)	Yes	Floodplain ordinance. Prohibits permanent structure building at the Old Alatna townsite. The site can only be used for subsistence and recreation purposes.
Special purpose Resolutions	Yes	#95-12: Selects Option 4 for land trade for relocating

Table 8-1 City of Hughes Regulatory Tools

Regulatory Tools (ordinances, codes, plans)	Existing?	Comments (Year of most recent update; problems administering it, etc.)
(Referenced in Comprehensive Plan)		out of the floodplain. #95-13: Resolved to build road to new townsite out of the floodplain.
Comprehensive Plan	Yes	Completed in 1995, Part II: documents village rebuilding efforts after a destructive flood. Part II: Documents the Comprehensive Plan, describing its long-term planning goals and strategy
Economic Development Plan (Referenced in Comprehensive Plan)	Yes	City of Hughes Business Development Plan, 1995
Emergency Response Plan	No	
Land Use Regulation (Referenced in Comprehensive Plan)	Yes	1995, Guides land use to protect safety and welfare of residents
Land Use Plan (Referenced in Comprehensive Plan, Part II)	Yes	1995
Local Permitting Process (Referenced in Comprehensive Plan)	Yes	1995, Ensures long-term community goals are not threatened
Fire Break Plan	Yes	Protects community from future fire threats
Sanitation Feasibility Study/Master Plan (Referenced in Comprehensive Plan)	Yes	A plan to develop a community needs survey and to conduct preliminary engineering and testing; the study considered alternatives for recommended facilities
City of Hughes Transportation Plan	Yes	Provides insight into future transportation needs, use, and land-use conversion.

Tribal Governments

Federal regulations provide eligible tribal governments with the opportunity to function as a sub-grantee through the State or as a grantee directly with FEMA. If tribes elect to function as a sovereign grantee, they are required to meet all responsibilities of the FEMA approved Tribal Plan (44 CFR §201.7). They also must pay the non-Federal share of grantee funds and fulfill grant accounting requirements. Tribal governments electing to function as a sub-grantee through the State are eligible to apply for hazard mitigation project funding in cooperation with their local communities and meet the same local government or sub-grantee responsibilities as non-tribal communities.

In the State of Alaska, planning cooperation among tribal entities and their boroughs and cities is highly encouraged. Tribal entities are eligible to apply for hazard mitigation project grant funds through the Borough and the incorporated city of residence or through the State if they are in an unincorporated community in the Unorganized Borough.

FEMA administers Hazard Mitigation Assistance (HMA) grants through Congressional authorization of the Robert T. Stafford Disaster Relief and Emergency Assistance Act of 2000 as amended (DMA 2000). While many features of the HMA grants overlap, such as the benefit cost analysis (BCA) requirement, each grant program has specific features. Detailed guidance for these grants is provided by FEMA at http://www.fema.gov/library/viewRecord.do?id=3649 .

406 Public Assistance Mitigation

FEMA Public Assistance repair projects are eligible for additional mitigation funds through (406 PA mitigation). Section (406) of the Stafford Act stipulates the mitigation project must relate directly to the disaster damages.

Hazard Mitigation Grant Program

In contrast, whenever there is a presidentially declared disaster in the State of Alaska, FEMA offers mitigation grant funds based on a percentage of the overall Federal share of disaster costs (15% in 2013). This program, called the Hazard Mitigation Grant Program (HMGP), was created in 1988 by the Stafford Act, Section 404 (404 mitigation) and allows HMGP funds to be used anywhere in the State if it is stipulated in the State disaster declaration to the President. While HMGP is funded through a presidentially declared disaster, HMGP funds are not used to repair disaster damage but to reduce future disaster losses through mitigation projects and planning.

The process and criteria used to guide State level HMGP project selection and prioritization is included in the Selection and Prioritization Process of Hazard Mitigation Assistance (HMA) Applications (Appendix 6). HMGP applications are reviewed by the SHMO, the SHMAC, and approved by the Governor's Disaster Policy Cabinet (DPC).

There are substantial FEMA eligibility and program requirements for communities applying for HMGP. Some of those requirements are detailed in the Benefit Cost Analysis (Appendix 5). These requirements include environmental and historical considerations including the Endangered Species Act, the Historic Preservation Act, Floodplain Management, and National Environmental Policy Act. Contact the State Hazard Mitigation Officer for assistance with HMGP applications.

FEMA administers HMGP funding by percentage according to use. Currently, states may use 5 % of the HMGP funds on "initiative projects", such as studies and warning systems. Likewise, states may use 7 % of HMGP funds on hazard mitigation planning. Funds from multiple disasters cannot be combined and one funding percentage category cannot be combined with another.

Program Eligibility

Generally, organizations applying for HMGP grants must have a FEMA approved hazard mitigation plan within their jurisdiction. Eligible organizations include:

1. Government Entities and Organizations
   Local communities and tribal government entities are eligible.

Eligible community agencies are those with responsibility for natural resources, geological hazards, public works, infrastructure regulation, or construction, floodplain management, parks and recreation, and community development.

Communities applying for HMGP grants need an approved mitigation plan in place. However there is a special exception allowing the plan to be completed within one year of the grant.

Federally recognized tribal organizations and Alaska Native villages are often eligible, however FEMA has determined Alaska native corporations with ownership vested in private individuals are not eligible.

2. Private Non-Profit Entities
   Organizations with Federal tax exempt status under Section 501(c), (d), or (e), or qualifying as a non-profit organization under State law may be eligible. Eligibility requires the organization participates with the appropriate local or state hazard mitigation plan and the organizations own and operate facilities falling into one of the following categories:

   - Medical: Hospitals and other outpatient, rehabilitation, or long-term care facilities
   - Custodial Care: Nursing homes and congregate living facilities including those for aging or disabled persons
   - Educational: Elementary and secondary schools and institutions of higher education.
   - Emergency: Fire departments, ambulance, and other rescue services.
   - Utility: Telephone companies, power companies, sewage treatment plants, etc.
   - Others: Governmental type services open to the public including museums, zoos, community centers, libraries, homeless shelters, senior citizen centers, and rehabilitation centers.

Program Monitoring and Closeout

As the grantee for HMGP funds and PDM funds, DHS&EM is responsible for implementation of HMGP through the SHMO. The Administrative procedures are coordinated with FEMA and the HMGP Administrative Plan is reviewed and updated annually. HMGP requirements include submission of quarterly and final "close out" narrative and financial reports, revealing overall progress towards accomplishing SHMP strategies and goals.

Federal Unmet Needs Program

Unmet Needs is a program activated in specific disasters based upon a Congressional determination there are unmet needs following a disaster. Mitigation funds may be available for jurisdictions receiving an unmet needs allocation. Mitigation projects are specified in the Unmet Needs allocation. The Unmet Needs funds up to 75% of an approved project.

Pre-Disaster Mitigation Grant Program

The FEMA Pre-Disaster Mitigation (PDM) grant program funds mitigation projects and planning for State, local, and eligible tribal organizations.

The PDM program is annual, subject to Congressional appropriation, and nationally competitive. PDM sets aside a minimum monetary amount for each State and offers any remaining funds for national competition. Congress controls the PDM program and may award PDM funds in lieu of any competitive application process.

The State is the grantee of PDM funds and communities are the sub-grantees. Grant awards are a 75 % Federal/25 % applicant cost share match. Communities identified as "small and impoverished" (Appendix 10) are eligible for 90 % Federal and 10% applicant match. The State

of Alaska does not pay the applicant match for the PDM program.

Department of Agriculture (USDA). Assistance provided includes: Emergency Conservation Program, Non-Insured Assistance, Emergency Watershed Protection, Rural Housing Service, Rural Utilities Service, and Rural Business and Cooperative Service.

- Department of Energy (DOE), Office of Energy Efficiency and Renewable Energy, Weatherization Assistance Program. This program minimizes the adverse effects of high energy costs on low-income, elderly, and handicapped citizens through client education activities and weatherization services such as an all-around safety check of major energy systems, including heating system modifications and insulation checks.
- Department of Health and Human Services, Administration of Children & Families, Administration for Native Americans (ANA). The ANA awards funds through grants to American Indians, Native Americans, Native Alaskans, Native Hawaiians, and Pacific Islanders. These grants are awarded to individual organizations that successfully apply for discretionary funds. ANA publishes in the Federal Register an announcement of funds available, the primary areas of focus, review criteria, and the method of application. (http://www.acf.hhs.gov/programs/ana/)
- Department of Housing and Urban Development (HUD), Office of Homes and Communities, Section 108 Loan Guarantee Programs. This program provides loan guarantees as security for Federal loans for acquisition, rehabilitation, relocation, clearance, site preparation, special economic development activities, and construction of certain public facilities and housing.
- Department of Housing and Urban Development, Community Development Block Grants (HUD/CDBG). Provides grant assistance and technical assistance to aid communities in planning activities that address issues detrimental to the health and safety of local residents, such as housing rehabilitation, public services, community facilities, and infrastructure improvements that would primarily benefit low-and moderate-income persons.
- Department of Labor (DOL), Employment and Training Administration, Disaster Unemployment Assistance. Provides weekly unemployment subsistence grants for those who become unemployed because of a major disaster or emergency. Applicants must have exhausted all benefits for which they would normally be eligible.
- Federal Financial Institutions. Member banks of Federal Deposit Insurance Corporation, Financial Reporting Standards or Federal Home Loan Bank Board may be permitted to waive early withdrawal penalties for Certificates of Deposit and Individual Retirement Accounts.
- Internal Revenue Service (IRS), Tax Relief. Provides extensions to current year's tax return, allows deductions for disaster losses, and allows amendment of previous tax returns to reflect loss back to three years.
- U.S. Small Business Administration (SBA). May provide low-interest disaster loans to individuals and businesses that have suffered a loss due to a disaster. Requests for SBA loan assistance should be submitted to DHS&EM.

- USACE Alaska District's Civil Works Branch studies potential water resource projects in Alaska. These studies analyze and solve water resource issues of concern to the local communities. These issues may involve navigational improvements, flood control or ecosystem restoration. The agency also tracks flood hazard data for over 300 Alaskan communities on floodplains or the sea coast. These data help local communities assess the risk of floods to their communities and prepare for potential future floods. The USACE is a member and co-chair of the Alaska Climate Change Sub-Cabinet.

State Resources

- DHS&EM is responsible for improving hazard mitigation technical assistance for local governments for the State of Alaska. Providing hazard mitigation training, current hazard information and communication facilitation with other agencies will enhance local hazard mitigation efforts. DHS&EM administers FEMA mitigation grants to mitigate future disaster damages such as those that may affect infrastructure including the elevation, relocation, or acquisition of hazard-prone properties. DHS&EM also provides mitigation funding resources for mitigation planning on their Web site at http://www.ak-prepared.com/plans/mitigation/mitigati.htm.

- *Direct State Disaster Mitigation Funding*
  While the State of Alaska has Public Assistance and Individual Assistance programs under State declared disasters, it does not have a State disaster mitigation program. However, there have been a few occasions in which the Governor and/or Legislature have elected to identify and fund mitigation work through the State Disaster Relief Fund (DRF). These actions were taken under discretionary authority and no permanent State mitigation program was established.

- *State Provision of Non-Federal Match to Federal Mitigation Programs*
  Many federal mitigation programs require a local match of non-federal funds. The match required varies with the program regulations and community being granted funds. There are several mitigation programs in which the State of Alaska provides the entire non-federal match for local communities resulting in 100% funds being granted to the community for mitigation. These programs, described in detail below, include the Public Assistance (also called 406 mitigation) and Hazard Mitigation Grant Program (HMGP) which are funded under federally declared disasters. The matching funds are paid through the State DRF. Therefore, while these programs are listed below under "Federal mitigation programs" for convenience, the State provides substantial funding for these programs, sometimes in the millions of dollars. On occasion the State has likewise provided a portion of the non-Federal match for National Resource Conservation Service (NRCS) projects.

- Division of Senior Services (DSS): Provides special outreach services for seniors, including food, shelter and clothing.

- Division of Insurance (DOI): Provides assistance in obtaining copies of policies and provides information regarding filing claims.

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

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

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

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

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

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

Other Funding Sources and Resources

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

- FEMA, http://www.fema.gov - includes links to information, resources, and grants that communities can use in planning and implementation of sustainable measures.
- American Planning Association (APA), http://www.planning.org - a non-profit professional association that serves as a resource for planners, elected officials, and citizens concerned with planning and growth initiatives.
- Institute for Business and Home Safety (IBHS), http://ibhs.org - an initiative of the insurance industry to reduce deaths, injuries, property damage, economic losses, and human suffering caused by natural disasters.
- American Red Cross (ARC). Provides for the critical needs of individuals such as food, clothing, shelter, and supplemental medical needs. Provides recovery needs such as furniture, home repair, home purchasing, essential tools, and some bill payment may be provided.
- Crisis Counseling Program. Provides grants to State and Borough Mental Health Departments, which in turn provide training for screening, diagnosing and counseling techniques. Also provides funds for counseling, outreach, and consultation for those affected by disaster.

Local Resources

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

Table 8-2 City of Hughes / Hudotl'eekkaakk'e Staff Resources

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

Table 8-3 City of Hughes / Hudotl'eekkaakk'e Financial Resources

Financial Resources	Accessible or Eligible to Use (Yes/No/DK-Don't Know)
Community Development Block Grants	Yes
Capital Improvement Projects Funding	Yes
Authority to levy taxes for specific purposes	Yes
Fees for water, sewer, gas, or electric service	Yes
Impact fees for homebuyers or developers for new developments/homes	No
Withhold spending in hazard-prone areas	No
Native Association and Corporation funds	Yes, tribe only

The Hudotl'eekkaakk'e Tribal Council is staffed by volunteers consisting of one appointed Chief and a council that varies in size. Tribe largely relies upon City staff and financial resources for projects in the vicinity of Hughes.

8.4 CONTINUED PUBLIC INVOLVEMENT

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

DMA 2000 Requirements: Plan Maintenance Process - Continued Public Involvement

Continued Public Involvement

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

Element

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

Source: FEMA, July 2008.

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

The Planning Team will also 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 Community-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.

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Appendix A
Review Tool

To be inserted post FEMA review.

Appendix B
Adoption Resolution

(To be completed by the City of Hughes post FEMA review).

Appendix C
Public Outreach

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Hughes LHMP Kickoff Meeting
1/15/2016
10:00 a.m.-12:00 p.m.

1. Establish a planning team
    a. Mayor
    b. City Administrator
    c. Tribal Administrator/Council
    d. City Council Member
    e. General Public

2. Review plan
    a. Since 2009, what has changed
        i. Any new projects, USACE, FEMA, DCRA, NCRS
        ii. Bulk fuel tanks replaced?
        iii. Runway improvements?
        iv. New buildings/houses
        v. Any building/housing losses
        vi. School improvement projects?
    b. Hazard profiles
        i. Is the hazard listed still applicable to Hughes?

3. Vulnerability Analysis
    a. Value of homes and structures
    b. Include any tribal structures

4. Mitigation Strategy
    a. New mitigation goals

Hughes Planning Team 2nd Meeting
1/28/2016
10 am

1. Planning Team Contact Information

Name
Wilmer Beetus
Thelma Nicholia
Alfred Attla Jr
June Walker
Clyde Koyukuk
Ella Sam

Homework Review:

2. After reviewing the plan did the planning team want to make any changes to the Hazard Profile?
3. Value of homes and structures
4. List of tribal structures and values
5. Scott to talk about Hughes city limits and land and how that will affect the mitigation plan
6. High wind added to severe weather. Any community data recorded on high winds mph? dates and mph?

Discussion

Erosion sites have also been noted to be less than 100 ft from important structures and critical facilities. "Three homes are estimated at less than 50 ft from the riverbank. Four homes are estimated between 85 ft and 150 ft from the riverbank. Outbuildings, sheds, drying racks, smokehouses, a road, and the end of the airport runway are structures threatened by bank erosion.

2013 spring flood event- what happened? Damages?

Any new formal zoning or land use controls?

Hughes LHMP 3rd Meeting
March 3, 2016

Attendance:

- Thelma Nicholia
- Janet Bifelt
- Scott Nelsen
- Michelle Torres

Future Critical Facilities and Infrastructure

- Elevation of the City Office
- Tribal Elder Rehabilitation Multi-Purpose Center Renovations
- New Hughes Health Center
- Hughes Tribal Office moved to the old health center building
- Water and sewer hook-up project for 6 homes-ANTHC is doing the project

Population

- State DCRA shows 89
- City of Hughes shows 97

Vulnerability Analysis

Occupancy Type	Facility Name	Location / Address	Structure or Per Mile Replacement Value	Total Miles / Feet / Gallons / Occupants
Government Facility	City & Tribal Office Building	110 Front Street	$500,000	12 Occupants
	Honey Bucket Equipment Storage	112 Front Street	$50,000	0 Occupants
Transportation Facilities	Airport, lighted, gravel, 3,400 ft x 100 ft	Airport Way	$6,437,993	0 Occupants
	Airport Maintenance Building	Airport Way	200,000	0 Occupants
Emergency Response Facility	None			
Educational Facility	Johnny Oldman School K-12	Front Street	$514,457	13 Occupants

Occupancy Type	Facility Name	Location / Address	Structure or Per Mile Replacement Value	Total Miles / Feet / Gallons / Occupants
Care Facility	Hughes Health Clinic	Front Street	$140,476	2 Occupants
Community Facility	Episcopal Diocese Church	Airport Way	$100,000	12 Occupants
	City Store	112 Front Street	$200,000	2 Occupants
	Community Hall	Hillside Road	500,000	50 Occupants
	Cemetery	Cemetery Road	$0	
Roads	Roads U.S. Bureau of Land Management (BLM)			0 Occupants
	Roads (Community)		$970,000	0 Occupants
	Landfill/Cemetery Road		$481,850	0 Occupants
	Sewage Lagoon Access Road			0 Occupants
Bridges (local, state, & federal)	None			
Utilities	Internet/ Television/Telephone Satellite Dish	Front Street	$50,000	0 Occupants
	Washeteria/Water Treatment Plant	Front Street	$278,500	1 Occupants
	Water Tank	Front Street	$50,000	0 Occupants
	Wastewater Treatment Plant (Community Septic Tank/System)	Front Street	$1,311,000	1 Occupants
	New Landfill, Class III	Cemetery Road	$1,000,000	1 Occupants
	Old Landfill, Class III	Airport Way	$237,000	0 Occupants
	Piped Septic System	Community Wide	$800,000	3/4 Mile 0 Occupants
	Power Plant/Generator Shed	Airport Way	$2,127,578	1 Occupants
	Community Well	Front Street	$200,000	0 Occupants
	City Electric Fuel Tank	Airport Way	$50,000	20,000 Gallons 0 Occupants
	City Bulk Fuel Facility	Airport Way	$200,000	0 Occupants

Occupancy Type	Facility Name	Location / Address	Structure or Per Mile Replacement Value	Total Miles / Feet / Gallons / Occupants
	Johnny Oldman School Fuel Tanks	Front Street	$200,000	28,000 Gallons 0 Occupants

Next Meeting

- **Thursday, March 17th at 10 am.**
- **We will focus on the mitigation strategy at our next meeting. Section 7-1 to 7-23**

Hughes LHMP

March 17th Notes

Attendees:

- Thelma Nicholia
- Michelle Torres
- Scott Nelsen

1. Planning Team discusses mitigation goals and strategy.
2. See PDF of mitigation notes.
3.

Homework
Next Meeting March 17th

889-
2206

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

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

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

7.1 DEVELOPING MITIGATION GOALS

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

DMA 2000 Requirements: Mitigation Strategy – Local Hazard Mitigation Goals

Local Hazard Mitigation Goals

Requirement §201.6(c)(3)(i): [The hazard mitigation strategy shall include a] description of mitigation goals to reduce or avoid long-term vulnerabilities to the identified hazards.

Element

- Does the new or updated plan include a description of mitigation goals to reduce or avoid long-term vulnerabilities to the identified hazards?

Source: FEMA, July 2008.

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, 11goals were developed to reduce or avoid long-term vulnerabilities to the identified hazards (Table 7-1).

Table 7-1 Mitigation Goals

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

Are these still the mitigation goals?

7.2 IDENTIFYING MITIGATION ACTIONS

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

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

Identification and Analysis of Mitigation Actions

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

Element

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

Source: FEMA, July 2008.

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

Identification and Analysis of Mitigation Actions: NFIP Compliance

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

Element

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

Source: FEMA, July 2008.

After mitigation goals and actions were developed, the planning team assessed the potential mitigation actions to carry forward into the mitigation strategy. Mitigation actions are activities, measures, or projects that help achieve the goals of a mitigation plan. Mitigation actions are usually grouped into six broad categories: prevention, property protection, public education and awareness, natural resource protection, emergency services, and structural projects. On August 31, 2009, the Planning Team selected 77 mitigation actions for potential implantation during the five-year life cycle of this HMP. The Planning Team placed particular emphasis on projects and programs that reduce the effects of hazards on both new and existing buildings and infrastructure. These potential projects are listed in Table 7-2 below.

Are These still what the City wants to implement?

Table 7-2 Mitigation Goals and Potential Actions

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

Goals		Actions	
No.	Description	ID	Description
1	Promote recognizing and mitigating all natural hazards that affect the City of Hughes.	A	Hold an annual or biennial "hazard meeting" to provide information to residents about recognizing and mitigating all natural hazards that affect the City of Hughes. Presented in the form of a brochure or written media so that residents can take information with them after the meeting. Example Topics: National Flood Insurance Program (NFIP) program participation benefits, safe fire practices, to help prevent wildland fires, etc.
		B	Develop, produce, and distribute information materials concerning mitigation, preparedness, and safety procedures for all natural hazards.
		C	Join the NFIP to reduce monetary losses to individuals and the community.
		D	Develop and implement strategies and educational outreach programs for debris management from natural hazard events.
		E	Update or develop, implement, and maintain jurisdictional debris management plans.
2	Reduce possibility of losses from all natural hazards that affect the City of Hughes.	**A**	Identify and pursue funding opportunities to implement mitigation actions through internal and external agencies such as (Alaska Native Tribal Health Consortium [ANTHC], Dept of Commerce, Community and Economic Development [DCCED], Alaska Department of Transportation and Public Facilities [DOT/PF], and Housing and Urban Development [HUD] etc.).
		B	Increase power line wire size and incorporate quick disconnects (breakaway devices) to reduce ice load and wind storm power line failure during severe wind or winter ice storm events.
		C	Acquire (buy-out), demolish, or relocate structures from hazard prone area. Property deeds shall be restricted for open space uses in perpetuity to keep people from rebuilding in hazard areas.
		D	Harden utility headers located along river embankments to mitigate potential flood, debris, and erosion damages.
		E	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 and medical facilities, schools, correctional facilities, and water and sewage treatment plants, etc.)
		F	Develop vegetation projects to restore hillside and riverine erosion damage and to increase landslide susceptible slope stability.

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

Goals		Actions	
No.	Description	ID	Description
3	Cross reference Mitigation goals and actions with other City of Hughes planning mechanisms and projects.	**A**	The City will aggressively manage their existing plans to ensure they incorporate mitigation planning provisions into all community planning processes such as comprehensive, capital improvement, land use, and transportation plans, etc to demonstrate multi-benefit considerations and facilitate using multiple funding sources.
		B	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.
		C	Integrate the Mitigation Plan findings for enhanced emergency planning.
		D	Develop and incorporate building ordinances commensurate with building codes to reflect survivability from flood, fire, wind, seismic, and other hazards to ensure occupant safety.
		E	Develop and incorporate mitigation provisions and recommendations into zoning ordinances and community development processes to maintain the floodway and protect critical infrastructure and private residences from other hazard areas.
		F	Identify and list repetitively flooded structures and infrastructures, analyze the threat to these facilities, and prioritize mitigation actions to protect the threatened population.
		G	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.
4	Reduce vulnerability of structures to avalanche damage.	**A**	Prohibit all new construction in avalanche hazard areas.
		B	Attach "High Hazard Zone" designation to titles of properties where appropriate.
		C	Acquire or relocate structures away from avalanche hazard area
		D	Establish regular avalanche hazard evaluation and forecasting during the winter months.
5	Reduce vulnerability of structures to earthquake damage.	A	Disseminate Federal Emergency Management Agency (FEMA) pamphlets to educate and encourage homeowners concerning seismic structural and non-structural retrofit benefits.
		B	Retrofit important public facilities with significant seismic vulnerabilities.

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

Goals		Actions	
No.	Description	ID	Description
		C	Develop outreach program to educate residents concerning benefits of increased seismic resistance and modern building code compliance during rehabilitation or major repairs for residences or businesses.
		D	Inspect, prioritize, and retrofit any critical facility or public infrastructure that does not meet current State Adopted Building Codes.
		E	Evaluate critical public facility seismic performance for fire stations, public works buildings, potable water systems, wastewater systems, electric power systems, and bridges within the jurisdiction.
		F	Encourage utility companies to evaluate and harden vulnerable infrastructure elements for sustainability.
6	Reduce possibility of damage and losses from erosion.	A	Develop, maintain, and update erosion hazard locations, identify critical facilities potentially impacted and develop mitigation initiatives such as bank stabilization or facility relocation to prevent or reduce the threat.
		B	Relocate buildings that are at risk of being affected by erosion.
		C	Apply for grants/funds to implement riverbank protection methods.
		D	Develop and provide information to all residents on hillside and riverbank erosion and methods to present it in an easily distributed format.
		E	Harden culvert entrance bottoms with asphalt, concrete, rock, to reduce erosion or scour.
		F	Install embankment protection such as vegetation, riprap, gabion baskets, sheet piling, and walls to reduce or eliminate erosion.
		G	Install walls at the end of a drainage structure to prevent embankment erosion at its entrance or outlet (end walls).
		H	Install bank revetment protection to prevent erosion.
7	Reduce the possibility of damage and losses from flooding.	A	Establish flood mitigation priorities for critical facilities and residential and commercial buildings located within the 100-year floodplain using survey elevation data.
		B	Develop and maintain an inventory of locations subject to frequent storm water flooding based on most current U.S. Army Corps of Engineers (USACE) flood data.

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

Goals		Actions	
No.	Description	ID	Description
		C	Determine and implement most cost beneficial and feasible mitigation actions for locations with repetitive flooding and significant damages or road closures.
		D	Develop an outreach program to educate public concerning NFIP participation benefits, floodplain development, land use regulation, and NFIP flood insurance availability to facilitate continued compliance with the NFIP.
		E	Develop, implement, and enforce floodplain management ordinances.
		F	Develop outreach program to educate residents concerning flood proofed well and sewer/septic installation.
		G	Acquire (buy-out), relocate, elevate, or otherwise flood-proof identified critical facilities and private properties.
		H	Install new stream flow and rainfall measuring gauges.
		C	Flood proof non-residential structures
		I	Increase culvert size to increase its drainage efficiency.
		J	Construct debris basins to retain debris in order to prevent downstream drainage structure clogging.
		K	Install debris cribs over culvert inlets to prevent inflow of coarse bed-load and light floating debris.
		L	Create relief drainage ditch opening using a culvert, bridge, or multiple culverts; to relieve rapid water accumulation during high water flow events.
		M	Provide flood protection to mitigate damage and contamination of wastewater treatment systems.
8	Reduce possibility of damage and losses from landslide.	A	Complete a landslide location inventory; identify threatened critical facilities and other buildings and infrastructure.
		B	Develop prioritized list of mitigation actions for threatened critical facilities and other buildings or infrastructure.
		C	Develop process to limit future development in high landslide potential areas (permitting, geotechnical review, soil stabilization techniques, etc).

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

Goals		Actions	
No.	Description	ID	Description
		D	Update the storm water management plan to include regulations to control runoff, both for flood reduction and to minimize saturated soils on steep slopes that can cause landslides.
		E	Develop a vegetation management plan addressing slope-stabilizing root strength while facilitating precipitation containment.
		F	Identify and seasonally restrict recreational and construction activities in high landslide areas.
		G	Develop, implement and enforce property development landslide risk assessment procedures to identify potential facility vulnerability.
9	Reduce possibility of damage and losses from permafrost.	**A**	Identify and map existing permafrost areas to assist in critical facility relocation siting
		B	Promote permafrost sensitive construction practices in permafrost areas.
10	Reduce vulnerability of structures to severe weather damage.	A	Develop and implement programs to coordinate maintenance and mitigation activities to reduce risk to public infrastructure from severe winter storms.
		B	Develop critical facility list needing emergency back-up power systems, prioritize, seek funding, and implement mitigation actions.
		C	Develop and maintain severe winter storm public outreach program defining mitigation activity benefits through educational outreach aimed at households and businesses while targeting special needs populations.
		D	Develop and implement tree clearing mitigation programs to keep trees from threatening lives, property, and public infrastructure from severe weather events.
		E	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.
		F	Develop personal use and educational outreach training for a "safe tree harvesting" program. Implement along utility and road corridors, preventing potential winter storm damage.
		G	Develop outreach program with school district contests having students develop, display, and explain mitigation projects or initiatives.

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

Goals		Actions	
No.	Description	ID	Description
		H	Implement and enforce the most current State adopted building codes to ensure structures can withstand winter storm hazards such as high winds, rain, water, and snow.
		I	Increase power line wire size and incorporate quick disconnects (break away devices) to reduce ice load power line severe wind or winter ice storm event failure.
11	Reduce possibility of damage and losses from wildland fires.	A	Identify critical facilities and vulnerable populations based on mapped high hazard areas.
		B	Identify evacuation routes away from high hazard areas and develop outreach program to educate the public concerning warnings and evacuation procedures.
		C	Develop Community Wildland Fire Protection Plans for all at-risk communities.
		D	Hold FireWise workshop to educate residents and contractors concerning fire resistant landscaping.
		E	Promote FireWise building siting, design, and construction materials.
		F	Provide wildland fire information in an easily distributed format for all residents.
		G	Develop, adopt, and enforce burn ordinances that require burn permits, restrict campfires, and controls outdoor burning.
		H	Develop outreach program to educate and encourage fire-safe construction practices for existing and new construction in high risk areas.
		I Ongoing	Identify, develop, implement, and enforce mitigation actions such as fuel breaks and reduction zones for potential wildland fire hazard areas.

7.3 EVALUATING AND PRIORITIZING MITIGATION ACTIONS

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

DMA 2000 Requirements: Mitigation Strategy - Implementation of Mitigation Actions

Implementation of Mitigation Actions

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

Element

- Does the new or updated mitigation strategy include how the actions are prioritized?
- Does the new or updated mitigation strategy address how the actions will be implemented and administered?
- Does the new or updated prioritization process include an emphasis on the use of a cost-benefit review to maximize benefits?
- *Does the updated plan identify the completed, deleted or deferred mitigation actions as a benchmark for progress, and if activities are unchanged (i.e., deferred), does the updated plan describe why no changes occurred? (Not applicable until 2014 update)*

Source: FEMA, July 2008.

The Planning Team evaluated and prioritized each of the mitigation actions on September 3, 2009 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 City of Hughes. To complete this task, the Planning Team first prioritized the hazards that were regarded as the most significant within the community (avalanche, erosion, flood, landslide, permafrost, and wildland fire).

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

Table 7-3 Social, Technical, Administrative, Political, Legal, Economic, and Environmental (STAPLEE) Evaluation Criteria for Mitigation Actions

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 September 3, 2009, the hazard mitigation Planning Team prioritized each mitigation action that was chosen to carry forward into the Mitigation Action Plan. The hazard mitigation Planning Team considered each hazard's history, extent, and probability and potential NFIP compliance 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 Mitigation Action Plan Matrix was completed to provide the City with an approach to implementing the Mitigation Action Plan. Table 7-4 defines the mitigation action priorities.

7.4 IMPLEMENTING A MITIGATION ACTION PLAN

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

Are These still The priority?

Where are you on implementing them?

Table 7-4 City of Hughes Mitigation Action Plan Matrix

(See acronym and abbreviations list for complete titles)

1B	Develop, produce, and distribute information materials concerning mitigation, preparedness, and safety procedures for all natural hazards.	Medium	City of Hughes, Hudotl'eekkcokk'e Tribal Council	City of Hughes, Hudotl'eekkcokk'e Tribal Council	1-4 years Ongoing	B/C: Sustained mitigation outreach programs have minimal cost and will help build and support community capacity enabling the public to prepare for, respond to, and recover from disasters. TF: This project is technically feasible using existing Tribal Council staff
1E	Update or develop, implement, coordinate, and maintain jurisdictional debris management plans.	Low	City of Hughes, Hudotl'eekkcokk'e Tribal Council (In order to obtain Administration for Native Americans (ANA) funding, the Tribe would need to be the applicant)	City of Hughes, Hudotl'eekkcokk'e Tribal Council, Federal Emergency Management Agency (FEMA) Hazard Mitigation Assistance (HMA) Program grants, grant, FEMA Assistance to Firefighters Grant (AFG) Program's Fire Prevention and Safety Grant (FP&S) Program, and Staffing for Adequate Fire and Emergency Response (SAFER) Program, ANA Grant Programs, Emergency Food and Shelter Program (EFSP)	1-4 years	B/C: Debris management plans are an essential disaster management tool. Focused and coordinated planning enables effective damage abatement and ensures proper attention is assigned to reduce losses, damage, and materials management. TF: This action is feasible with limited fund expenditures.
2A	Identify and pursue funding opportunities to implement mitigation actions through internal and external agencies such as (ANTHC, DCCED, AKDOT, and HUD etc.).	High	City of Hughes, Hudotl'eekkcokk'e Tribal Council (In order to obtain ANA funding, the Tribe would need to be the applicant)	City of Hughes, Hudotl'eekkcokk'e Tribal Council, HMA, AFG, PFP&S, SAFER, ANA, EFSP	1-4 years Ongoing ↓	B/C: Identifying potential funding sources is minimal in cost and essential for the City due to limited available funding levels. This activity is essential to reducing damage and losses from any hazard event. TF: City and Village Council staff are technically capable of researching available funding sources. However,

appendix?
City Office Elevation

Table 7-4 City of Hughes Mitigation Action Plan Matrix

(See acronym and abbreviations list for complete titles)

	Description	Priority	Responsible Agency	Potential Funding	Timeline	Benefit-Cost / Technical Feasibility
						engineering assistance from outside the community may be required for construction projects.
2C,	Acquire (buy-out), demolish, or relocate structures from hazard prone area. Property deeds shall be restricted for open space uses in perpetuity to keep people from rebuilding in hazard areas.	High	City of Hughes, Hudotl'eekkcokk'e Tribal Council	City of Hughes, Hudotl'eekkcokk'e Tribal Council, HMA, AFG, FP&S, SAFER, ANA, EFSP	3-5 years	B/C: Acquisition or relocation projects are the most cost effective methods to remove structures from damage and the population from hazard damage. Relocation costs are minor compared to building replacement due to the community's rural location where materials cost and shipping are exceedingly expensive. TF: The City has the technical capability to manage and conduct this project.
2D	Harden utility headers located along river embankments to mitigate potential flood, debris, and erosion damages.	~~High~~ med.	City of Hughes, Hudotl'eekkcokk'e Tribal Council	City of Hughes, Hudotl'eekkcokk'e Tribal Council, HMA, AFG, FP&S, SAFER, ANA, EFSP	3-5 years	B/C: Hardening infrastructure to reduce erosion and flood damages reduces potential future damages and replacement costs. TF: The City has the technical capability to manage and conduct this project.
3A	The City will ~~aggressively~~ manage their existing plans to ensure they and incorporate mitigation planning provisions into all community planning processes such as comprehensive, capital improvement, land use, and transportation plans, etc to	Medium	City of Hughes, Hudotl'eekkcokk'e Tribal Council	City of Hughes, Hudotl'eekkcokk'e Tribal Council	1-3 years	B/C: Coordinated planning ensures effective damage abatement and ensures proper attention is assigned to reduce losses and damage to structures and City residents. TF: This action is feasible with limited fund expenditures.

look up other plans

Table 7-4 City of Hughes Mitigation Action Plan Matrix

(See acronym and abbreviations list for complete titles)

	demonstrate multi-benefit considerations and facilitate using multiple funding sources.					
3B	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.	~~Medium~~ Low	City of Hughes, Hudotl'eekkcokk'e Tribal Council	City of Hughes, Hudotl'eekkcokk'e Tribal Council	2-5 years	B/C: Coordinated planning ensures effective damage abatement and ensures proper attention is assigned to reduce losses and damage to structures and City residents. Sustained mitigation outreach program is minimal in cost and will help build and support community capacity to enable the public to prepare for, respond to, and recover from disasters. TF: This action is feasible with limited fund expenditures.
3C	Integrate the Mitigation Plan findings for enhanced emergency planning. Since 2013	Medium	City of Hughes, Hudotl'eekkcokk'e Tribal Council	City of Hughes, Hudotl'eekkcokk'e Tribal Council	Complete 1-2 years	B/C: Coordinated planning ensures effective damage abatement and ensures proper attention is assigned to reduce losses and damage to structures and City residents. TF: This action is feasible with limited fund expenditures.
3D	Develop and incorporate building ordinances commensurate with building codes to reflect survivability from flood, fire, wind, seismic, and other hazards to ensure occupant safety.	Medium	City of Hughes, Hudotl'eekkcokk'e Tribal Council	City of Hughes, Hudotl'eekkcokk'e Tribal Council	3-5 years	B/C: Coordinated planning ensures effective damage abatement and ensures proper attention is assigned to reduce losses and damage to structures and City residents. TF: This action is feasible with limited fund expenditures.
4A	Prohibit all new construction in	Low	City of Hughes	City of Hughes,	1-2 years	B/C: Facility siting review is the

Process reference made

Table 7-4 City of Hughes Mitigation Action Plan Matrix

(See acronym and abbreviations list for complete titles)

	avalanche hazard areas.	complete		Hudotl'eekkcokk'e Tribal Council	Been doing since 2010	single most cost effective methods to ensure structures are built in non hazard areas saving future funds and potentially preventing life losses. Critical facility relocation costs are minor compared to facility replacement due to the community's rural location where materials shipping is exceedingly expensive. TF: The Village has the technical capability to manage and conduct this project.
4C	Acquire or relocate structures away from avalanche hazard area	Low	City of Hughes	City of Hughes, Hudotl'eekkcokk'e Tribal Council, HMA, AFG, FP&S, SAFER, ANA, EFSP	2-4 years	B/C: Acquisition or relocation projects are the very cost effective methods to remove structures from damage and the population from hazard damage. Relocation costs are minor compared to building replacement due to the community's rural location where materials cost and shipping are exceedingly expensive. TF: The City has the technical capability to manage and conduct this project.
4D	Establish regular avalanche hazard evaluation and forecasting during the winter months.	Low	City of Hughes	City of Hughes, Hudotl'eekkcokk'e Tribal Council, HMA, AFG, FP&S, SAFER, ANA, EFSP	~~2-4 years~~ 5yrs	B/C: Identifying threatened infrastructure proximity to natural hazards is vital to their sustainability. Providing advanced warning of pending disasters further reduces life loss and potentially can reduce damage if quick action is possible to mitigate the impact.

Table 7-4 City of Hughes Mitigation Action Plan Matrix

(See acronym and abbreviations list for complete titles)

						TF: The project is technically feasible as the community has staff and resources they have used to relocate and elevate buildings.
5B	Retrofit important public facilities with significant seismic vulnerabilities.	Medium	City of Hughes	City of Hughes, Hudotl'eekkcokk'e Tribal Council, HMA, ANA, EFSP	2-4 years	B/C: Retrofit projects can be very cost effective methods for bush communities as materials and shipping costs are very high. Project viability is depending on the cost and extent of the modifications. A comprehensive BCA needs to be conducted to validate this activity. TF: The City will need phase funding to obtain engineering and design expertise to determine project viability.
5C	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.	Low	City of Hughes	City of Hughes, Hudotl'eekkcokk'e Tribal Council, HMA, ANA, EFSP	2-4 years	B/C: Sustained mitigation outreach programs have minimal cost and will help build and support community capacity enabling the public to prepare for, respond to, and recover from disasters. TF: This project is technically feasible using existing Tribal Council staff
5D	Inspect, prioritize, and retrofit any critical facility or public infrastructure that does not meet current State Adopted Building Codes.	Medium	City of Hughes	City of Hughes, Hudotl'eekkcokk'e Tribal Council, HMA, ANA, EFSP	2-4 years	B/C: Retrofit projects can be very cost effective methods for bush communities as materials and shipping costs are very high. Project viability is depending on the cost and extent of the modifications. A comprehensive BCA needs to be

Progress - see appendix - new tribal office - renovating, elevating it -

Table 7-4 City of Hughes Mitigation Action Plan Matrix

(See acronym and abbreviations list for complete titles)

						conducted to validate this activity. TF: The City will need phase funding to obtain engineering and design expertise to determine project viability.
5F	Encourage utility companies to evaluate and harden vulnerable infrastructure elements for sustainability. all new going in to flood area	Medium	City of Hughes	City of Hughes, Hudotl'eekkcokk'e Tribal Council	1-5 years	B/C: Retrofit projects can be very cost effective methods for bush communities as materials and shipping costs are very high. Utility companies could benefit from this activity TF: This project is technically feasible as the community need only demonstrate cost savings by demonstrating losses from history utility impacts and down time.
6B	Relocate buildings that are at risk of being affected by erosion.	High	City of Hughes, Hudotl'eekkcokk'e Tribal Council	City of Hughes, Hudotl'eekkcokk'e Tribal Council, HMA, AFG, FP&S, SAFER, ANA, EFSP	1-5 years ~~Ongoing~~	B/C: Identifying threatened infrastructure proximity to natural hazards is vital to their sustainability. There are no currently mapped hazard areas. This is a vital first step. This knowledge will help the community focus on activities to protect their vital infrastructure. TF: The project is technically feasible as the community has staff and resources they have used to relocate and elevate buildings.
6C	Apply for grants/funds to implement riverbank protection methods.	High	City of Hughes, Hudotl'eekkcokk'e Tribal Council	City of Hughes, Hudotl'eekkcokk'e Tribal Council, HMA, ANA	1-5 years ~~Ongoing~~	B/C: Identifying potential funding sources is minimal in cost and essential for the City due to limited available funding levels. This activity is essential to reducing damage and

Table 7-4 City of Hughes Mitigation Action Plan Matrix

(See acronym and abbreviations list for complete titles)

						losses from any hazard event. TF: City and Village Council staff are technically capable of researching available funding sources. However, engineering assistance from outside the community may be required for construction projects.
6E	Harden culvert entrance bottoms with asphalt, concrete, rock, to reduce erosion or scour. tribal road funding - progress made	High	City of Hughes, Hudotl'eekkcokk'e Tribal Council	City of Hughes, Hudotl'eekkcokk'e Tribal Council, HMA, ANA	2-4 years	B/C: This retrofit project can be a very cost effective method for bush communities as materials and shipping costs are very high. This project is technically feasible as the community need only demonstrate cost savings by demonstrating losses from history utility impacts and down time.
6G	Install walls at the end of a drainage structure to prevent embankment erosion at its entrance or outlet. (end walls).	High	City of Hughes, Hudotl'eekkcokk'e Tribal Council	City of Hughes, Hudotl'eekkcokk'e Tribal Council, HMA, ANA	2-4 years	B/C: This retrofit project can be a very cost effective method for bush communities as materials and shipping costs are very high. TF: This project is technically feasible as the community need only demonstrate cost savings by demonstrating losses from history utility impacts and down time.
7D	Develop an outreach program to educate public concerning NFIP participation benefits, floodplain development, land use regulation, and NFIP flood insurance availability to facilitate continued	Low	City of Hughes, Hudotl'eekkcokk'e Tribal Council	City of Hughes, Hudotl'eekkcokk'e Tribal Council, HMA, ANA	1-2 years	B/C: Sustained mitigation outreach programs have minimal cost and will help build and support community capacity enabling the public to prepare for, respond to, and recover from, disasters. TF: This project is technically feasible

Table 7-4 City of Hughes Mitigation Action Plan Matrix

(See acronym and abbreviations list for complete titles)

	compliance with the NFIP.					using existing Tribal Council staff
7E	Discourage + educating development in Floodplain Develop, implement, and enforce floodplain management ordinances.	Low	City of Hughes, Hudotl'eekkcokk'e Tribal Council	City of Hughes, Hudotl'eekkcokk'e Tribal Councill	2-3 years	B/C: Identifying threatened infrastructure and residences proximity to natural hazards is vital to their sustainability. There are no currently mapped hazard areas. This is a vital first step. This knowledge will help the community focus on activities to protect their vital infrastructure. residential properties, and lives. TF: The project is technically feasible as the community has staff and resources they have used to relocate and elevate buildings.
7F	Develop outreach program to educate residents concerning flood proofed well and sewer/septic installation.	Low	City of Hughes, Hudotl'eekkcokk'e Tribal Council	City of Hughes, Hudotl'eekkcokk'e Tribal Council, HMA, , ANA	2-4 years	B/C: Sustained mitigation outreach programs have minimal cost and will help build and support community capacity enabling the public to prepare for, respond to, and recover from disasters. TF: This project is technically feasible using existing Tribal Council staff
8E	Develop a vegetation management plan addressing slope-stabilizing root strength while facilitating precipitation containment.	High	City of Hughes, Hudotl'eekkcokk'e Tribal Council	City of Hughes, Hudotl'eekkcokk'e Tribal Council, HMA, ANA	2-4 years	B/C: This project can be a very cost effective method for bush communities as materials and shipping costs are very high. Local vegetation is readily available and requires no climate adaptation for survival. Local labor is available. TF: This project is technically feasible as the community need only demonstrate cost savings by

Table 7-4 City of Hughes Mitigation Action Plan Matrix

(See acronym and abbreviations list for complete titles)

						demonstrating losses from history utility impacts and down time.
9A	DIS test holes Identify and map existing permafrost areas to assist in critical facility relocation siting.	Medium	City of Hughes, Hudotl'eekkcokk'e Tribal Council	City of Hughes, Hudotl'eekkcokk'e Tribal Council, ANA, HMA,	2-4 years	B/C: Identifying permafrost locations is a minimal cost which would decrease damage to facilities if they were sited appropriately. Project must be associated with a relocation or construction project. TF: Technically feasible as the community currently has identified permafrost locations but they have not created a map defining the area and they dig test holes to determine permafrost depth prior to construction.
9B	Promote permafrost sensitive construction practices in permafrost areas.	Medium	City of Hughes, Hudotl'eekkcokk'e Tribal Council	City of Hughes, Hudotl'eekkcokk'e Tribal Council, HMA, ANA	~~2-4 years~~ complete since 2010	B/C: Sustained mitigation outreach programs have minimal cost and will help build and support community capacity enabling the public to prepare for, respond to, and recover from disasters. Siting education can ensure structures are sited away from known hazard areas. TF: This project is technically feasible using existing Tribal Council staff
10C	Develop and maintain severe winter storm public outreach program defining mitigation activity benefits through educational outreach aimed at households and businesses while targeting special needs populations.	Low	City of Hughes, Hudotl'eekkcokk'e Tribal Council	City of Hughes, Hudotl'eekkcokk'e Tribal Council, HMA, ANA	~~1-2 years~~ complete 2010	B/C: Sustained mitigation outreach programs have minimal cost and will help build and support community capacity enabling the public to prepare for, respond to, and recover from disasters. Siting education can ensure structures are sited away from known hazard areas.

System & warning community

Table 7-4 City of Hughes Mitigation Action Plan Matrix

(See acronym and abbreviations list for complete titles)

						TF: This project is technically feasible using existing Tribal Council staff
10D	Develop and implement tree clearing mitigation programs to keep trees from threatening lives, property, and public infrastructure from severe weather events.	Medium	City of Hughes, Hudotl'eekkcokk'e Tribal Council	City of Hughes, Hudotl'eekkcokk'e Tribal Council, HMA, AFG, FP&S, SAFER, ANA	1-4 years	B/C: Sustained maintenance programs have minimal cost and will help reduce or eliminate future tree related damages. TF: This project is technically feasible through available community member skill sets.
10F	Develop personal use and educational outreach training for a "safe tree harvesting" program. Implement along utility and road corridors, preventing potential winter storm damage.	Medium	City of Hughes, Hudotl'eekkcokk'e Tribal Council	City of Hughes, Hudotl'eekkcokk'e Tribal Council, HMA, AFG, FP&S, SAFER, ANA	1-4 years	B/C: Sustained mitigation outreach programs have minimal cost and will help build and support community capacity enabling the public to prepare for, respond to, and recover from disasters. Siting education can ensure structures are sited away from known hazard areas. TF: This project is technically feasible using existing Tribal Council staff
10G	Develop outreach program with school district contests having students develop, display, and explain mitigation projects or initiatives.	Low	City of Hughes, Hudotl'eekkcokk'e Tribal Council	City of Hughes, Hudotl'eekkcokk'e Tribal Council, HMA, AFG, FP&S, SAFER, ANA	1-4 years	B/C: Student focused mitigation outreach activities help develop future generations knowledge and willingness to mitigate rather than rework failing infrastructure. Outreach programs generally have minimal cost and help build and support community capacity; enabling the public to prepare for, respond to, and recover from, disasters. Siting education can ensure structures are sited away from known hazard areas. TF: This project is technically feasible

Table 7-4 City of Hughes Mitigation Action Plan Matrix

(See acronym and abbreviations list for complete titles)

						using existing Tribal Council staff
10H	Implement and enforce the most current State adopted building codes to ensure structures can withstand winter storm hazards such as high winds, rain, water, and snow.	Medium	City of Hughes	City of Hughes, Hudotl'eekkcokk'e Tribal Council	1-5 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.
11D	Hold FireWise workshop to educate residents and contractors concerning fire resistant landscaping.	Medium	City of Hughes, Hudotl'eekkcokk'e Tribal Council	City of Hughes, Hudotl'eekkcokk'e Tribal Council, HMA, AFG, FP&S, SAFER, ANA	1-4 years	B/C: Sustained mitigation outreach programs have minimal cost and will help build and support community capacity enabling the public to prepare for, respond to, and recover from disasters. Siting education can ensure structures are sited away from known hazard areas. TF: This project is technically feasible using existing Tribal Council staff
11F	Provide wildland fire information in an easily distributed format for all residents.	Low	City of Hughes, Hudotl'eekkcokk'e Tribal Council, Fire Chief	City of Hughes, Hudotl'eekkcokk'e Tribal Council, HMA, AFG, FP&S, SAFER, ANA	2-4 years	B/C: Sustained mitigation outreach programs have minimal cost and will help build and support community capacity enabling the public to prepare for, respond to, and recover from disasters. TF: This project is technically feasible using existing Tribal Council staff.

Table 7-4 City of Hughes Mitigation Action Plan Matrix

(See acronym and abbreviations list for complete titles)

11G	Develop, adopt, and enforce burn ordinances that require burn permits, restrict campfires, and controls outdoor burning. no burning in communities	~~High~~ Medium	City of Hughes	City of Hughes, Hudotl'eekkcokk'e Tribal Council	1-5 years	B/C: Ordinance development, implementation, and enforcement can effectively reduce future losses to hazardous events. TF: This project is technically feasible and enforceable.
11I ~~Ongoing~~	Identify, develop, implement, and enforce mitigation actions such as fuel breaks and reduction zones for potential wildland fire hazard areas. fuel break around the back community	~~Low~~ med.	City of Hughes, Hudotl'eekkcokk'e Tribal Council, Fire Chief	City of Hughes, Hudotl'eekkcokk'e Tribal Council, HMA, AFG, FP&S, SAFER, ANA	~~2-4 years~~ completed	B/C: Sustained fuel load maintenance programs have minimal cost and will help reduce or eliminate future tree related damages. TF: This project is technically feasible through available community member skill sets.

Appendix D

Benefit–Cost Analysis Fact Sheet

Benefit-Cost Analysis Fact Sheet

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

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

All Benefit-Costs must be:

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

General Data Requirements:

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

Damage and Benefit Data

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

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

Building Data

- Should include FEMA Elevation Certificates for elevation projects or projects using First Floor Elevations (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 E

Plan Maintenance Documents

Annual Review Questionnaire

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

Mitigation Action Progress Report

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: