

City of Grayling Hazard Mitigation Plan



*Prepared by
The City of Grayling
Hazard Mitigation Planning Team*
December 2015

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FEMA

December 21, 2015

Honorable Shirley Clark
Mayor, City of Grayling
PO Box 89
Grayling, Alaska 99590

Dear Mayor Clark:

The U.S. Department of Homeland Security's Federal Emergency Management Agency (FEMA) has approved the *City of Grayling Hazard Mitigation Plan* as a local plan as outlined in 44 CFR Part 201. With approval of this plan, the City of Grayling is now eligible to apply for the Robert T. Stafford Disaster Relief and Emergency Assistance Act's hazard mitigation project grants through December 20, 2020.

The plan's approval provides eligibility to apply for hazard mitigation projects through your state. All requests for funding will be evaluated individually according to the specific eligibility and other requirements of the particular program under which the application is submitted. For example, a specific mitigation activity or project identified in the plan may not meet the eligibility requirements for FEMA funding, and even eligible mitigation activities are not automatically approved for FEMA funding under any of the aforementioned programs.

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

If you have questions regarding your plan's approval or FEMA's mitigation grant programs, please contact Scott Nelson, Emergency Management Specialist with Alaska Division of Homeland Security and Emergency Management, at (907) 428-7010, who coordinates and administers these efforts for local entities.

Sincerely,

A handwritten signature in blue ink that reads "Mark Carey" with a stylized flourish at the end.

Mark Carey, Director
Mitigation Division

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

KM

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City of Grayling Hazard Mitigation Plan

Acronyms/Abbreviations

°F	Degrees Fahrenheit
ACCIMP	Alaska Climate Change Impact Mitigation Program
ACWF	Alaska Clean Water Fund
ADWF	Alaska Drinking Water Fund
AEA	Alaska Energy Authority
AEEE	Alternative Energy And Energy Efficiency
AFG	Assistance To Firefighters Grant
AHFC	Alaska Housing Finance Corporation
AICC	Alaska Interagency Coordination Center
AK	Alaska
ANA	Administration For Native Americans
ARC	American Red Cross
ARW	Airport Runway
AVEC	Alaska Village Electric Cooperative
BF	Bulk Fuel
BIA	Bureau Of Indian Affairs
CBO	Communications Building-Other
CCP	Citizen Corps Program
CDBG	Community Development Block Grant
CFR	Code Of Federal Regulations
CFP	Community Forestry Program
CGP	Comprehensive Grant Program
City	City Of Grayling
CWSRF	Clean Water State Revolving Fund
DCCED	Department Of Commerce, Community, And Economic Development
DCRA	Division Of Community And Regional Affairs
DEC	Department Of Environmental Conservation
Denali	Denali Commission
DHS	Department Of Homeland Security
DHS&EM	Division Of Homeland Security And Emergency Management
DHSS	Department Of Health And Social Services
DGGS	Division Of Geological And Geophysical Survey
DMA 2000	Disaster Mitigation Act Of 2000
DMVA	Department Of Military And Veterans Affairs
DNR	Department Of Natural Resources
DOE	Department Of Energy
DOF	Division Of Forestry
DOI	Division Of Insurance
DOL	Department Of Labor
DOT/PF	Department Of Transportation And Public Facilities
DSS	Division Of Senior Services
EOC	Emergency Operations Center

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Acronyms/Abbreviations

EMPG	Emergency Management Performance Grant
EPA	Environmental Protection Agency
EPPS	Energy Production Plant-Small
EQ	Earthquake
EWP	Emergency Watershed Protection Program
FAA	Federal Aviation Administration
FEMA	Federal Emergency Management Agency
FL	Flood
FMA	Flood Mitigation Assistance
FP&S	Fire Prevention And Safety
ft	Feet
FY	Fiscal Year
g	Gravity
GF	Ground Failure
GIS	Geospatial Information System
Hazus	Hazard United States – Multi-Hazard Software
HMA	Hazard Mitigation Assistance
HMGP	Hazard Mitigation Grant Program
HMP	Hazard Mitigation Plan
HSGP	Homeland Security Grant Program
HUD	Housing And Urban Development
IBHS	Institute For Business And Home Safety
ICDBG	Indian Community Development Block Grant
IHBG	Indian Housing Block Grant
IHLGP	Indian Home Loan Guarantee Program
INAP	Indian And Native American Programs
IRS	Internal Revenue Service
Kt or Kts	Knots
M	Magnitude
MAP	Mitigation Action Plan
MMI	Modified Mercalli Intensity
mph	Miles Per Hour
NAHASDA	Native American Housing Assistance And Self Determination Act
NFIP	National Flood Insurance Program
NIMS	National Incident Management System
NOAA	National Oceanic And Atmospheric Administration
NRF	National Response Framework
NRCS	Natural Resources Conservation Service
NWS	National Weather Service
PDM	Pre-Disaster Mitigation
PGA	Peak Ground Acceleration
PNP	Private Non-Profits
PPSB	Potable Pump Station

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Acronyms/Abbreviations

PWE	Potable Water Well
PWPB	Potable Water Pipelines-Buried
PWTS	Potable Water Treatment (Plant)-Small
RCASP	Remote Community Alert Systems
RD	Rural Development
RL	Repetitive Loss
RurALCAP	Rural Alaska Community Action Program Incorporated
SAFER	Staffing For Adequate Fire And Emergency Response
SBA	U.S. Small Business Administration
SHMP	Alaska State Hazard Mitigation Plan
SHSP	State Homeland Security Program
SOA	State Of Alaska
Sq.	Square
Stafford Act	Robert T. Stafford Disaster Relief And Emergency Assistance Act
STAPLEE	Social, Technical, Administrative, Political, Legal, Economic, And Environmental
US or U.S.	United States
USACE	United States Army Corps Of Engineers
USC	United States Code
USDA	United States Department Of Agriculture
USGS	United States Geological Survey
VFA-RFA	Volunteer Fire Assistance And Rural Fire Assistance Grant
Village	Village of Grayling
VSW	Village Safe Water
WARN	Warning, Alert, And Response Network
WWTS	Wastewater Treatment (Plant)-Small

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

1.1 HAZARD MITIGATION PLANNING

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

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

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

This HMP complies with Title 44 CFR current as of March 11, 2015 and applicable guidance documents. (FEMA 2015a)

1.2 GRANT PROGRAMS WITH MITIGATION PLAN REQUIREMENTS

FEMA HMA grant programs provide funding to States, Tribes, and local entities that have a FEMA-approved State, Tribal, or Local Mitigation Plan. Two of the grants are authorized under the Stafford Act and DMA 2000, while the remaining three are authorized under the National Flood Insurance Act and the Bunning-Bereuter-Blumenauer Flood Insurance Reform Act. Excerpts from FEMA's 2015 HMA Guidance, Part I, is as follows:

"The U.S. Department of Homeland Security (DHS) FEMA HMA programs present a critical opportunity to reduce the risk to individuals and property from natural hazards, while simultaneously reducing reliance on Federal disaster funds. On March 30, 2011, the President signed Presidential Policy Directive 8 (PPD-8): National Preparedness, and the National Mitigation Framework was finalized in May 2013. The National Mitigation Framework comprises seven core capabilities, including:

- ◆ *Threats and Hazard Identification*
- ◆ *Risk and Disaster Resilience Assessment*
- ◆ *Planning*

- ◆ *Community Resilience*
- ◆ *Public Information and Warning*
- ◆ *Long-Term Vulnerability Reduction*
- ◆ *Operational Coordination*

HMA programs provide funding for eligible activities that are consistent with the National Mitigation Framework’s Long-Term Vulnerability Reduction capability. HMA programs reduce community vulnerability to disasters and their effects, promote individual and community safety and resilience, and promote community vitality after an incident. Furthermore, HMA programs reduce response and recovery resource requirements in the wake of a disaster or incident, which results in a safer community that is less reliant on external financial assistance.

Hazard mitigation is defined as 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. Accordingly, States, territories, federally-recognized tribes, and local communities are encouraged to take advantage of funding that HMA programs provide in both the pre- and post-disaster timelines.

In addition to hazard mitigation, FEMA’s Risk Mapping, Assessment, and Planning (Risk MAP) Program provides communities with education, risk communication, and outreach to better protect its citizens. The Risk MAP project lifecycle places a strong emphasis on community engagement and partnerships to ensure a whole community approach that reduces flood risk and builds more resilient communities. Risk MAP risk assessment information strengthens a local community’s ability to make better and more informed decisions. Risk MAP allows communities to better invest and determine priorities for projects funded under HMA. These investments support mitigation efforts under HMA that protect life and property and build more resilient communities.

The whole community includes children, individuals with disabilities, and others with access and functional needs; those from religious, racial, and ethnically diverse backgrounds; and people with limited English proficiency. Their contributions must be integrated into mitigation/resilience efforts, and their needs must be incorporated as the whole community plans and executes its core capabilities.

WHOLE COMMUNITY

A. HMA Commitment to Resilience and Climate Change Adaptation

FEMA is committed to promoting resilience as expressed in PPD-8: National Preparedness; the President’s State, Local, and Tribal Leaders Task Force on Climate Preparedness and Resilience; the Administrator’s 2011 FEMA Climate Change Adaptation Policy Statement (Administrator Policy 2011-OPPA-01); and the 2014–2018 FEMA Strategic Plan. Resilience refers to the ability to adapt to changing conditions and withstand and rapidly recover from disruption due to emergencies. The concept of resilience is closely related to the concept of hazard mitigation, which reduces or eliminates potential losses by breaking the cycle of damage, reconstruction, and repeated damage. Mitigation capabilities include, but are not limited to, community-wide risk

reduction projects, efforts to improve the resilience of critical infrastructure and key resource lifelines, risk reduction for specific vulnerabilities from natural hazards and climate change, and initiatives to reduce future risks after a disaster has occurred.

FEMA is supporting efforts to streamline the HMA programs so that these programs can better respond to the needs of communities nationwide that are addressing the impacts of climate change. FEMA, through its HMA programs:

- ◆ *Develops and encourages adoption of resilience standards in the siting and design of buildings and infrastructure*
- ◆ *Modernizes and elevates the importance of hazard mitigation*

FEMA has issued several policies that facilitate the mitigation of adverse effects from climate change on the built environment, structures and infrastructure. Consistent with the 2014–2018

FEMA Strategic Plan, steps are being taken by communities through engagement of individuals, households, local leaders, representatives of local organizations, and private sector employers and through existing community networks to protect themselves and the environment by updating building codes, encouraging the conservation of natural and beneficial functions of the floodplain, investing in more resilient infrastructure, and engaging in mitigation planning. FEMA plays an important role in supporting community-based resilience efforts, establishing policies, and providing guidance to promote mitigation options that protect critical infrastructure and public resources.

FEMA encourages better integration of Sections 404 and 406 of the Robert T. Stafford Disaster Relief and Emergency Assistance Act, as amended (Stafford Act), Title 42 of the United States Code (U.S.C.) 5121 et seq., to promote more resilience during the recovery and mitigation process. FEMA regulations that implement Sections 404 and 406 of the Stafford Act allow funding to incorporate mitigation measures during recovery activities. Program guidance and practice limits Section 406 mitigation to the damaged elements of a structure. This limitation to Section 406 mitigation may not allow for a comprehensive mitigation solution for the damaged facility; however, Section 404 funds may be used to mitigate the undamaged portions of a facility.

Recognizing that the risk of disaster is increasing as a result of multiple factors, including the growth of population in and near high-risk areas, aging infrastructure, and climate change, FEMA promotes climate change adaptation by:

- ◆ *Incorporating sea level rise in the calculation of Benefit-Cost Analysis (BCA)*
- ◆ *Publishing a new HMA Job Aid on pre-calculated benefits for hurricane wind retrofit measures, see HMA Job Aid (Cost Effectiveness Determination for Residential Hurricane Wind Retrofit Measures Funded by FEMA)*
- ◆ *Encouraging floodplain and wetland conservation associated with the acquisition of properties in green open space and riparian areas*
- ◆ *Reducing wildfire risks*
- ◆ *Preparing for evolving flood risk*
- ◆ *Encouraging mitigation planning and developing mitigation strategies that encourage community resilience and smart growth*

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- ◆ *Encouraging the use of building codes and standards (the American Society of Civil Engineers/Structural Engineering Institute [ASCE/SEI] 24-14, Flood Resistant Design and Construction) wherever possible.*

For additional information, see <http://www.fema.gov/climate-change>” (FEMA 2015b).

1.2.1 Hazard Mitigation Assistance (HMA) Grant Programs

HMA grant program activities include:

Table 1-1 HMA Eligible Activities

Activities	HMGP	PDM	FMA
1. Mitigation Projects	✓	✓	✓
Property Acquisition and Structure Demolition	✓	✓	✓
Property Acquisition and Structure Relocation	✓	✓	✓
Structure Elevation	✓	✓	✓
Mitigation Reconstruction	✓	✓	✓
Dry Floodproofing of Historic Residential Structures	✓	✓	✓
Dry Floodproofing of Non-residential Structures	✓	✓	✓
Generators	✓	✓	
Localized Flood Risk Reduction Projects	✓	✓	✓
Non-localized Flood Risk Reduction Projects	✓	✓	
Structural Retrofitting of Existing Buildings	✓	✓	✓
Non-structural Retrofitting of Existing Buildings and Facilities	✓	✓	✓
Safe Room Construction	✓	✓	
Wind Retrofit for One- and Two-Family Residences	✓	✓	
Infrastructure Retrofit	✓	✓	✓
Soil Stabilization	✓	✓	✓
Wildfire Mitigation	✓	✓	
Post-Disaster Code Enforcement	✓		
Advance Assistance	✓		
5 Percent Initiative Projects	✓		
Miscellaneous/Other ⁽¹⁾	✓	✓	✓
2. Hazard Mitigation Planning	✓	✓	✓
Planning Related Activities	✓		
3. Technical Assistance			✓
4. Management Cost	✓	✓	✓
⁽¹⁾ Miscellaneous/Other indicates that any proposed action will be evaluated on its own merit against program requirements. Eligible projects will be approved provided funding is available.			

(FEMA 2015b)

The Hazard Mitigation Grant Program (HMGP) is a competitive, disaster funded, grant program. Whereas the other Unified Mitigation Assistance Programs: Pre-Disaster Mitigation (PDM) and Flood Mitigation Assistance (FMA) programs although competitive, rely on specific pre-disaster

grant funding sources, sharing several common elements. The 2015 HMA Guidance provides the following programmatic information:

HMGP is authorized by Section 404 of the Stafford Act, 42 U.S.C. 5170c. The key purpose of HMGP is to ensure that the opportunity to take critical mitigation measures to reduce the risk of loss of life and property from future disasters is not lost during the reconstruction process following a disaster.

HMGP funding is available, when authorized under a Presidential major disaster declaration, in the areas of the State requested by the Governor. Federally-recognized tribes may also submit a request for a Presidential major disaster declaration within their impacted areas (see <http://www.fema.gov/media-library/assets/documents/85146>). The amount of HMGP funding available to the Applicant is based on the estimated total Federal assistance, subject to the sliding scale formula outlined in Title 44 of the Code of Federal Regulations (CFR) Section 206.432(b) that FEMA provides for disaster recovery under Presidential major disaster declarations. The formula provides for up to 15 percent of the first \$2 billion of estimated aggregate amounts of disaster assistance, up to 10 percent for amounts between \$2 billion and \$10 billion, and up to 7.5 percent for amounts between \$10 billion and \$35.333 billion. For States with enhanced plans, the eligible assistance is up to 20 percent for estimated aggregate amounts of disaster assistance not to exceed \$35.333 billion.

The Period of Performance (POP) for HMGP begins with the opening of the application period and ends no later than 36 months from the close of the application period.

PDM is designed to assist States, territories, federally-recognized tribes, and local communities to implement a sustained pre-disaster natural hazard mitigation program to reduce overall risk to the population and structures from future hazard events, while also reducing reliance on Federal funding in future disasters. Congressional appropriations provide the funding for PDM.

The total amount of funds distributed for PDM is determined once the appropriation is provided for a given fiscal year. It can be used for mitigation projects and planning activities.

The POP for PDM begins with the opening of the application period and ends no later than 36 months from the date of subapplication selection.

FMA is authorized by Section 1366 of the National Flood Insurance Act of 1968, as amended (NFIA), 42 U.S.C. 4104c, with the goal of reducing or eliminating claims under the National Flood Insurance Program (NFIP). FMA was created as part of the National Flood Insurance Reform Act (NFIRA) of 1994. The Biggert-Waters Flood Insurance Reform Act of 2012 (Public Law 112-141) consolidated the Repetitive Flood Claims and Severe Repetitive Loss grant programs into FMA. FMA funding is available through the National Flood Insurance Fund (NFIF) for flood hazard mitigation projects as well as plan development and is appropriated by Congress. States, territories, and federally-recognized tribes are eligible to apply for FMA funds. Local governments are considered subapplicants and must apply to their Applicant State, territory, or federally-recognized tribe.

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

The POP for FMA begins with the opening of the application period and ends no later than 36 months from the date of subapplication selection” (FEMA 2015b)

As the State Hazard Mitigation plan states:

“The [FMA] provides pre-disaster grants to State and Local Governments for planning and flood mitigation projects. Created by the National Flood Insurance Reform Act of 1994, its goal is to reduce or eliminate NFIP claims. It is an annual nationally competitive program. Residential and non-residential properties may apply for FMA grants through their NFIP community and are required to have NFIP insurance to be eligible. FMA grant funds may be used to develop the flood portions of hazard mitigation plans or to do flood mitigation projects. FMA grants are funded 75% Federal and 25% applicant.

The Biggert-Waters Flood Insurance Reform Act of 2012 eliminated the Repetitive Flood Claims (RFC) and Severe Repetitive Loss (SRL) grant programs. Elements of these flood programs have been incorporated into FMA. The FMA program now allows for additional cost share flexibility:

- *Up to 100-percent Federal cost share for severe repetitive loss properties.*
- *Up to 90-percent Federal cost share for repetitive loss properties.*
- *Up to 75-percent Federal cost share for NFIP insured properties.*

The FMA program is available only to communities participating in the NFIP. In the State of Alaska, the Department of Commerce, Community, and Economic Development (DCCED) manages this program” (SHMP 2013).

HMP Layout Description

The HMP consists of the following sections and appendices:

Section 1 Introduction

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

Section 2 Community Description

Provides a general history and background of the City of Grayling (City), including historical trends for population and the demographic and economic conditions that have shaped the area.

Section 3 Planning Process

Describes the HMP update’s planning process, identifies the Planning Team Members, the meetings held as part of the planning process, and the key stakeholders within the City of Grayling and the surrounding area. This section documents public outreach activities (support documents are located in Appendix D); the review and incorporation of relevant plans, reports, and other appropriate information; actions the City of Grayling plans to implement to assure continued public participation; and their methods and schedule for keeping the plan current.

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

Section 4 HMP Adoption

Describes the community’s HMP adoption process (support documents are located in Appendix C)

Section 5 Hazard Assessment

Describes the process through which the Planning Team identified, screened, and selected the hazards to for profiling in this version of the HMP. The hazard analysis includes the nature, previous occurrences (history), location, extent, impact, and future event recurrence probability for each hazard. In addition, historical impact and hazard location figures are included when available.

Section 6 Vulnerability Analysis

Identifies the City of Grayling’s potentially vulnerable assets—people, residential and nonresidential buildings (where available), critical facilities, and critical infrastructure. The resulting information identifies the full range of hazards that the City could face and potential social impacts, damages, and economic losses. Land use and development trends are also discussed.

Section 7 Mitigation Strategy

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

The Planning Team developed a list of mitigation goals and potential actions to address the risks facing the City of Grayling. Mitigation actions include preventive actions, property protection techniques, natural resource protection strategies, structural projects, emergency services, and public information and awareness activities. Mitigation strategies were developed to address NFIP insured properties (if applicable) while encouraging participation with the NFIP and the reduction of flood damage to flood-prone structures.

Section 8 References

Lists reference materials and resources used to prepare this HMP.

Appendices

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

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

Appendix C: Provides the adoption resolution for the City of Grayling.

Appendix D: Provides public outreach information, including newsletters.

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

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

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Section Two provides the City and the Organized Village of Graylings’ location, geography, history, and demographic information.

2.1 LOCATION, GEOGRAPHY, AND HISTORY

“Grayling is located in Interior Alaska on the west bank of the Yukon River, east of the Nulato Hills at latitude 62.9036 and longitude -160.0647. It is 18 air miles north of Anvik.” (Department of Community, Commerce, and Economic Development [DCCED], Division of Community and Regional Affairs [DCRA] 2015).

The city covers approximately 10.9 square (sq.) miles of land and approximately 0.1 sq. miles of water. The climate of Grayling is continental, with long, cold winters and relatively warm summers. Temperature extremes range between -60 to 87 °F. Annual snowfall averages 110 inches, with 21 inches of total precipitation. The Yukon River is ice-free from June through October. (DCRA 2015, WRCC 2014).



Figure 2-1 Grayling’s Location Map

DCRA further describes the community as being *“comprised of Holikachuk and Ingalik Indians. Subsistence activities are important to villagers’ livelihoods”* (DCRA 2015). Their database provides the following brief sketch of the City’s history:

- 1900 U.S. Revenue steamer Nunivak reports:
 - 75 residents, a store, and a large wood yard to supply steamers
 - 1962 – 1966 25 Families move from Holikachuk on the nearby Innoko River to Grayling due to low water levels and spring flooding
 - 1969 City government is incorporated
- (DCRA 2015)

2.2 DEMOGRAPHICS

The 2010 census recorded 194 residents, of which the median age was 23 indicating a relatively young population. The population of 194 is expected to remain steady because over half of the population is between 10 and 39 years of age. The City population is principally of Native Alaskan Athabascan heritage. The male and female composition is approximately 51 and 49 % respectively. The 2010 census revealed that there are 55 households with the average household having approximately 4 individuals. The most recent 2013 DCCED certified population is 191. Figure 2-2 illustrates the City’s historic population. There are no population records before 1940.

2

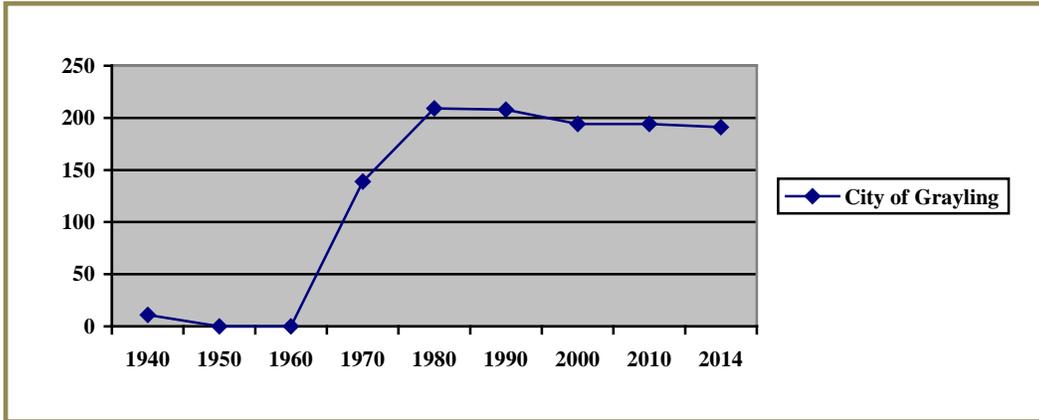


Figure 2-2 Grayling's Historic Population

2.3 ECONOMY

Local government services and subsistence are the principle industries in Grayling, however, few other general employment opportunities exist within the community.

According to the U.S. Census Bureau's 2009-2013 American Community Survey 5-Year Estimates, the median household income is \$23,125 with a per capita income of \$10,662. Approximately 38.5 % were reported to be living below the poverty level. The potential work force (those aged 16 years or older) in the City was estimated to be 123, of which 33 were actively employed. In 2010 the unemployment rate was 17.1 percent; however, this rate included part-time and seasonal jobs, and practical unemployment or underemployment is likely to be significantly higher.

Figure 2-3 depicts the Federal Aviation Administration's aerial photograph of the City

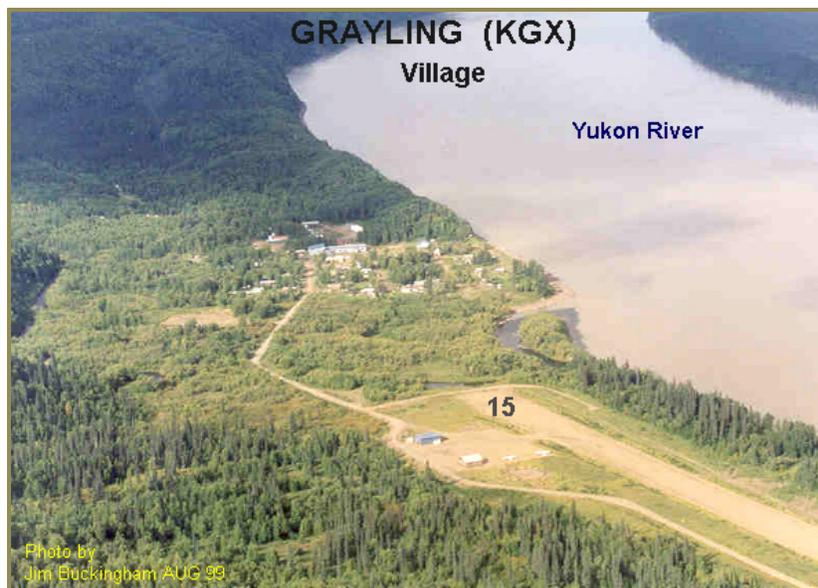


Figure 2-3 Aerial Photograph of the City of Grayling (FAA, 2015)

Section Three provides an overview of the planning process; identifies the Planning Team Members and key stakeholders; documents public outreach efforts; and summarizes the review and incorporation of existing plans, studies, and reports used to develop this HMP. Outreach support documents and meeting information regarding the Planning Team and public outreach efforts are provided in Appendix F.

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

3

DMA 2000 Requirements
<p>Local Planning Process</p> <p>§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:</p> <p>Element</p> <p>§201.6(b)(1): An opportunity for the public to comment on the plan during the drafting stage and prior to plan approval;</p> <p>§201.6(b)(2): An opportunity for neighboring communities, local and regional agencies involved in hazard mitigation activities, and agencies that have the authority to regulate development, as well as businesses, academia and other private and nonprofit interests to be involved in the planning process; and</p> <p>§201.6(b)(3): Review and incorporation, if appropriate, of existing plans, studies, reports, and technical information.</p> <p>§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.</p> <p>§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.</p> <p>§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.</p>
1. REGULATION CHECKLIST
ELEMENT A. Planning Process
<p>A1. Does the Plan document the planning process, including how it was prepared and who was involved in the process for each jurisdiction? (Requirement §201.6(c)(1))</p> <p>A2. Does the Plan document an opportunity for neighboring communities, local and regional agencies involved in hazard mitigation activities, agencies that have the authority to regulate development as well as other interests to be involved in the planning process? (Requirement §201.6(b)(2))</p> <p>A3. Does the Plan document how the public was involved in the planning process during the drafting stage? (Requirement §201.6(b)(1))</p> <p>A4. Does the Plan describe the review and incorporation of existing plans, studies, reports, and technical information? (Requirement §201.6(b)(3))</p> <p>A5. Is there discussion of how the community(ies) will continue public participation in the plan maintenance process? (Requirement §201.6(c)(4)(iii))</p> <p>A6. Is there a description of the method and schedule for keeping the plan current (monitoring, evaluating and updating the mitigation plan within a 5-year cycle?) (Requirement §201.6(c)(4)(i))</p> <p><i>Does the <u>updated plan</u> 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).</i></p>
<p><small>Source: FEMA, March 2015</small></p>

3.1 OVERVIEW

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

The planning process began with an introductory email confirming the HMP planning activity; to explain how their community was selected by the Division of Homeland Security and Emergency Management with a 2014 Pre-Disaster Mitigation Grant award. AECOM staff described the HMP development requirement to enable the City to qualify for Hazard Mitigation Grant Program grants and the overall HMP development process.

Ms. Shirley Clark, Mayor was encouraged to develop a community Planning Team to assist the community's efforts to identify available resources and capabilities for HMP development. AECOM explained how the HMP differed from current emergency plans. The Planning Team will assist the City by acting as an advocate for the planning process, assist with gathering information, and provide support during public participation opportunities. AECOM briefly discussed existing hazards that affect the community such as erosion, sediment deposition, and permafrost impacts, which are increasing in intensity due to climate changes.

The Team Leader; Ms. Shirley Clark organized a Planning Team to begin HMP development coordination on November 21, 2014. The Team identified applicable City resources and capabilities during the meeting. AECOM explained how the HMP differed from current emergency plans. The Planning Team then discussed the City's rolls such as: acting as an advocate for the planning process, assisting with gathering information, and supporting public participation opportunities. There was also a brief discussion about hazards that affect the community such as erosion, sediment deposition, and permafrost impacts, which are increasing in intensity.

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

In summary, the following five-step process took place from November 2014 through June 2015.

1. Organize resources: Members of the Planning Team identified resources, including staff, agencies, and local community members, who could provide technical expertise and historical information needed in the development of the hazard mitigation plan.
2. Monitor, evaluate, and update the plan: The Planning Team developed a process to ensure the plan was monitored to ensure it was used as intended while fulfilling community needs. The team then developed a process to evaluate the plan to compare how their decisions affected hazard impacts. They then outlined a method to share their successes with community members to encourage support for mitigation activities and to provide data for incorporating mitigation actions into existing planning mechanisms and to provide data for the plans five year update.
3. Assess risks: The Grayling Planning Team identified the hazards specific to their area and, with the assistance of a hazard mitigation planning consultant (AECOM), developed the risk assessment for seven identified hazards. The Planning Team reviewed the risk assessment, including the vulnerability analysis, prior to and during the development of the mitigation strategy.

4. Assess capabilities: The Planning Team reviewed current administrative and technical, legal and regulatory, and fiscal capabilities to determine whether existing provisions and requirements adequately address relevant hazards.
5. Develop a mitigation strategy: After reviewing the risks posed by each hazard, the Planning Team developed a comprehensive range of potential mitigation goals and actions. Subsequently, the Planning Team identified and prioritized the actions for implementation.

3.2 PLANNING TEAM

The local Planning Team members are Mayor Clark (Planning Team Leader) with the City and Tribal Councils’ forming the Planning Team’s membership.

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



Table 3-1 Hazard Mitigation Planning Team

Name	Title	Organization	Key Input
Shirley Clark	Mayor	City of Grayling	Planning Team Lead, HMP data input and review.
Council Members	City Council	City of Grayling	Planning Team Member, data input and HMP review.
Gabriel H. Nicholi Sr.	Chief	Native Village of Grayling	Planning Team Member, Tribal data input and HMP review.
Council Members	Tribal Council	Native Village of Grayling	Planning Team Member, Tribal data input and HMP review.
Scott Simmons	Emergency Management, Hazard Mitigation, and Climate Change Planner	AECOM, Alaska	Responsible for HMP development, lead writer, project coordination.

3.3 PUBLIC & AGENCY INVOLVEMENT

AECOM extended an invitation to all individuals and entities identified on the project mailing list described the planning process and announced the upcoming communities’ planning activities. The announcement was emailed to relevant academia, nonprofits, and local, state, and federal agencies on November 20, 2014. The following agencies were invited to participate and review the HMP:

- University of Alaska Fairbanks, Geophysical Institute, Alaska Earthquake Information Center (UAF/GI/AEIC)
- Alaska Native Tribal Health Consortium-Community Development (ANTHC)
- Alaska Volcano Observatory (AVO)
- Association of Village Council Presidents (AVCP)
- Denali Commission
- Alaska Department of Environmental Conservation (DEC)
- DEC Division of Spill Prevention and Response (DSPR)
- DEC Village Safe Water (VSW)
- Alaska Department of Transportation and Public Facilities (DOT/PF)

3

- Alaska Department of Community, Commerce, and Economic Development (DCCED)
- DCCED, Division of Community Advocacy (DCRA)
- Alaska Department of Military and Veterans Affairs (DMVA)
- DMVA, Division of Homeland Security and Emergency Management (DHS&EM)
- US Environmental Protection Agency (EPA)
- National Weather Service (NWS) Northern Region
- NWS Southeast Region
- NWS Southcentral Region
- Natural Resources Conservation Service (NRCS)
- US Department of Agriculture (USDA)
- USDA Division of Rural Development (RD)
- US Army Corps Of Engineers (USACE)
- US Bureau of Indian Affairs (BIA)
- US Bureau of Land Management (BLM)
- US Department of Housing and Urban Development (HUD)
- US Fish & Wildlife Service (USFWS)

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

Table 3-2 Public Involvement Mechanisms

Mechanism	Description
Newsletter #1 Distribution (November 21, 2014)	In November 2014, the jurisdiction distributed the 1 st project newsletter encouraging the whole community to provide hazard and critical facility information. It was emailed to the city for their posting and distribution.
Agency Involvement eMail (November 20, 2014)	Invited agencies to participate in mitigation planning effort and to review applicable newsletters located on the DHS&EM Local/Tribal All Hazard Mitigation Plan Development website at: http://ready.alaska.gov/plans/localhazmitplans.htm
Newsletter #2 Distribution (June, 2015)	In June, 2015, the jurisdiction distributed a 2 nd newsletter describing the draft HMPs availability and present potential HMP projects for review. The newsletter encouraged the whole community to provide comments. It was posted at the City and Tribal offices, the post office, store, and on community bulletin boards to ensure everyone was aware of the HMP review opportunity.

Initial contact was made with Mayor Shirley Clark on November 21, 2014; she was pleased to be included within DHS&EM’s Pre-Disaster Mitigation grant and the prospects of completing the hazard mitigation plan. She quickly formed the Planning Team and began coordinating HMP data acquisition efforts.

The Planning Team identified five natural hazards: earthquake, flood, ground failure, severe weather, and wildland/tundra fire which periodically impact the City. AECOM described the specific information needed from the Planning Team to assess critical facility vulnerability and population risk by the location, value, and population within residential properties and critical facilities.

The risk assessment was completed after the community asset data was collected by the Planning Team during 2015, which identified the assets that are exposed and vulnerable to specific hazards. They subsequently evaluated these facilities and their associated risks to facilitate creating a viable or realistic risk analysis and subsequent vulnerability assessment.

A Planning Team meeting was held on June 24, 2015 to review and prioritize the mitigation actions identified based on the results of the risk assessment. A second newsletter was prepared and delivered on June 30, 2015 describing the process to date, presenting the prioritized mitigation actions, and announcing the availability of the draft HMP for public review and comment.

The Planning Team held a special meeting in early July 2015 to review the draft HMP for accuracy. The meeting was productive with the Team stated the plan included vital community specific information such as historic and potential future hazard impacts, community vulnerability analysis, and a comprehensive mitigation strategy.

3.4 EXISTING DATA INCORPORATION

During the planning process, the Planning Team reviewed and incorporated information from existing plans, studies, reports, and technical reports into the HMP. The following were available various sources and were reviewed and referenced throughout the HMP (Table 3-3).

Table 3-3 Documents Reviewed

Existing plans, studies, reports, ordinances, etc.	Contents Summary (How will this information improve mitigation planning?)
Environmental and Hydrologic Overview of the Yukon River Basin, Alaska and Canada; Water-Resources Investigations Report 99-4204, developed in 2000	Provided water resource data for developing HMP hazard profiles
USGS, Geologic bibliography for selected onshore sedimentary basins of central and southern Alaska stressing basin analysis and including an index of publicly available well and subsurface data, Open File (OF) 84-99.	Provided geologic data for the Lower Yukon River
Provided geologic data for the Lower Yukon River Preliminary Geology Along the Lower Yukon River, Alaska, OF61-64, Sheet 1 (Map)	Provided geologic data for the Grayling area
USACE Historical Flood Survey Data	Provided historical flood impact information
US Army Corps of Engineers, Erosion Information Paper, - Grayling, Alaska, February 27, 2008	Defined Grayling's erosion threat
US Army Corps of Engineers, Alaska Baseline Erosion Assessment, 2009	Defined the area's erosion impacts
US Army Corps of Engineers, Floodplain Manager's Reports, Grayling, October 2011	Defined the area's historical flood impacts
State of Alaska, Department of Commerce, Community and Economic Development Community Profile	Provided historical and demographic information
State of Alaska Hazard Mitigation Plan (SHMP), 2013	Defined statewide hazards and their potential locational impacts

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

3.5 PLAN MAINTENANCE

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

The following three process steps are addressed in detail here:

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

3

3.5.1 Implementing HMP into Existing Planning Mechanisms

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

DMA 2000 Requirements
Incorporation into Existing Planning Mechanisms §201.6(b)(3): Review and incorporation, if appropriate, of existing plans, studies, reports, and technical information.
1. REGULATION CHECKLIST
ELEMENT A Planning Process (Continued)
A4. Does the Plan describe the review and incorporation of existing plans, studies, reports, and technical information?
<i>Source: FEMA, March 2015</i>

Once the HMP is community adopted and receives FEMA’s final approval, each Planning Team Member ensures that the HMP, in particular each Mitigation Action Project, is incorporated into existing planning mechanisms whenever possible. Each member of the Planning Team has undertaken the following activities.

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

3.5.2 Continued Public Involvement

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

DMA 2000 Requirements
<p>Continued Public Involvement</p> <p>§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.</p>
1. REGULATION CHECKLIST
ELEMENT A Planning Process (Continued)
<p>A5. Is there discussion of how the community(ies) will continue public participation in the plan maintenance process? (Requirement §201.6(c)(4)(iii))</p>
<p><i>Source: FEMA, March 2015</i></p>

3

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

The Planning Team will continue to identify opportunities to raise community awareness about the HMP and the hazards that affect the area. This effort could include attendance and provision of materials at City-sponsored events, outreach programs, and public mailings. Any public comments received regarding the HMP will be collected by the Planning Team Leader, included in the annual report, and considered during future HMP updates.

3.5.3 Monitoring, Reviewing, Evaluating, and Updating the HMP

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

DMA 2000 Requirements
<p>Monitoring, Evaluating and Updating the Plan</p> <p>§201.6(c)(4)(i): The plan maintenance process shall include a) discussion on how the community will continue public participation in the plan maintenance process.</p>
1. REGULATION CHECKLIST
ELEMENT A. Planning Process (Continued)
<p>A6. Is there a description of the method and schedule for keeping the plan current (monitoring, evaluating and updating the mitigation plan within a 5-year cycle?)</p>
<p><i>Source: FEMA, March 2015</i></p>

This section provides an explanation of how Grayling’s Planning Team intends to organize their efforts to ensure that improvements and revisions to the HMP occur in a well-managed, efficient, and coordinated manner.

The following three process steps are addressed in detail here:

1. Review and revise the HMP to reflect development changes, project implementation progress, project priority changes, and resubmit

2. HMP resubmittal at the end of the plan's five year life cycle for State and FEMA review and approval
3. Continued mitigation initiative implementation

3.5.3.1 *Monitoring the HMP*

The HMP was prepared as a collaborative effort. To maintain momentum and build upon previous hazard mitigation planning efforts and successes, the City will continue to use the Planning Team to monitor, review, evaluate, and update the HMP. Each authority identified in the Mitigation Action Plan (MAP) matrix (Table 7-8) will be responsible for implementing the Mitigation Action Plan and determining whether their respective actions were effectively implemented. The Director of Public Safety, the hazard mitigation Planning Team Leader, (or designee), will serve as the primary point of contact and will coordinate local efforts to monitor, evaluate, revise, and tabulate HMP actions' status.

3.5.3.2 *Reviewing the HMP*

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

During each annual review, each agency or authority administering a mitigation project will submit a Progress Report (Appendix F) to the Planning Team. The report will include the current status of the mitigation project, including any project changes, a list of identified implementation problems (with an appropriate strategies to overcome them), and a statement of whether or not the project has helped achieve the appropriate goals identified in the plan.

3.5.3.3 *Evaluating the HMP*

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

The Planning Team Leader will initiate the annual review two months prior to the scheduled planning meeting date to ensure that all data is assembled for discussion with the Planning Team. The findings from these reviews will be presented at the annual Planning Team Meeting. Each review, as shown on the Annual Review Worksheet, will include an evaluation of the following:

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

3.5.3.4 Updating the HMP

In addition to the annual review, the Planning Team will update the HMP every five years. The following section explains how the HMP will be reviewed, evaluated, and implementation successes described.

DMA 2000 Requirements
<p>Reviewing, Evaluating, and Implementing the Plan</p> <p>§201.6(d)(3): A local jurisdiction must review and revise its plan to reflect changes in development, progress in local mitigation efforts, and changes in priorities, and resubmit if for approval within 5 years in order to continue to be eligible for mitigation project grant funding.</p>
1. REGULATION CHECKLIST
ELEMENT D. Planning Process (Continued) <i>Update activities not applicable to the plan version</i>
D1. Was the Plan revised to reflect changes in development? (Requirement §201.6(d)(3))
D2. Was the Plan revised to reflect progress in local mitigation effort? (Requirement §201.6(d)(3))
D3. Was the Plan revised to reflect changes in priorities? (Requirement §201.6(d)(3))
Source: FEMA, March 2015

3

The City of Grayling will annually review the HMP as described in Section 3.5.3.2 and update the HMP every five years (or when significant changes are made) by having the identified Planning Team review all Annual Review Questionnaires (Appendix F) to determine the success of implementing the HMP’s Mitigation Action Plan.

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

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

- Request grant assistance from DHS&EM to update the HMP (this can take up to one year to obtain and one year to update the plan)
- Ensure that each authority administering a mitigation project will submit a Progress Report to the Planning Team
- Develop a chart to identify those HMP sections that need improvement, the section and page number of their location within the HMP, and describing the proposed changes
- Thoroughly analyze and update the natural hazard risks
 - Determine the current status of the mitigation projects
 - Identify the proposed Mitigation Plan Actions (projects) that were completed, deleted, or delayed. Each action should include a description of whether the project should remain on the list, be deleted because the action is no longer feasible, or reasons for the delay
 - Describe how each action’s priority status has changed since the HMP was originally developed and subsequently approved by FEMA

3

- Determine whether or not the project has helped achieve the appropriate goals identified in the plan
 - Describe whether the community has experienced any barriers preventing them from implementing their mitigation actions (projects) such as financial, legal, and/or political restrictions and stating appropriate strategies to overcome them
 - Update ongoing processes, and to change the proposed implementation date/duration timeline for delayed actions the City of Grayling still desires to implement
 - Prepare a “new” MAP matrix for the City of Grayling
- Prepare a new Draft Updated HMP
 - Submit the updated draft HMP to the Division of Emergency Management (DHS&EM) and FEMA for review and approval

3.5.3.5 *Formal State and FEMA HMP Review*

Completed HMPs do not automatically qualify the City or Tribe for mitigation grant program eligibility until they have been reviewed and adopted by the City and Tribal councils and received State and FEMA final approval.

Upon completion, the City (or its contractor) and Tribe will submit the updated HMP to the DHS&EM for initial review and preliminary approval. Once any corrections are made, DHS&EM will forward the HMP to FEMA for their review and conditional approval.

The City of Grayling and the Organized of Grayling are represented in this HMP and meet the requirements of Section 409 of the Stafford Act and Section 322 of DMA 2000, and 44 CFR §201.6(c)(5) and §201.7 respectively.

The Organized Village of Grayling has participated with this HMP’s development and it intends to follow and implement applicable tribal activities to qualify the Village Tribal Council for tribal grant opportunities. The Village’s Traditional Council supports 44 CFR 201 and assures compliance with all applicable Federal statutes and regulations.

The City of Grayling’s and the of Grayling’s respective councils, with assistance the State Hazard Mitigation Officer (SHMO) and the State Hazard Mitigation Advisory Committee (SHMAC), are responsible for monitoring, evaluating, and updating their portion of the Grayling Hazard Mitigation Plan in accordance with 44 CFR §201.6 and §201.7 respectively. Their respective councils will monitor the plan to evaluate progress and update the plan every five years, or within 90 days of a Presidential Declared Disaster (as required), to reflect changes in State or Federal law. The Hazard Mitigation Plan Annual Progress Report and Hazard Mitigation Plan Annual Evaluation Forms are plan review tools.

The City and Tribal councils, with assistance from the SHMO and FEMA, determines when significant changes warrant an update prior to the scheduled date.

Once the plan has fulfilled all FEMA criteria, the City of Grayling and the Organized/Village of Grayling will pass HMP Adoption Resolutions and forward them to the State and FEMA for final approval. FEMA’s final approval assures the City is eligible for applying for appropriate mitigation grant program funding.

Section Four is included to fulfill the City of Grayling’s HMP adoption requirements.

4.1 JURISDICTIONAL ADOPTION

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
<p>Local Plan Adoption</p> <p>§201.6(c)(5): [The plan shall include...] Documentation that the plan has been formally adopted by the governing body of the jurisdiction requesting approval of the plan (e.g., City Council, County commissioner, Tribal Council). For multi-jurisdictional plans, each jurisdiction requesting approval of the plan must document that it has been formally adopted.</p>
1. REGULATION CHECKLIST
ELEMENT E. Plan Adoption
<p>E1. Does the Plan include documentation that the plan has been formally adopted by the governing body of the jurisdiction requesting approval??) (Requirement §201.6(c)(5))</p>
<p><i>Source: FEMA, March 2015</i></p>

4

The City of Grayling and Organized Village of Grayling’s council are represented in this HMP; they meet the requirements of Section 409 of the Stafford Act, Section 322 of DMA 2000, and 44 CFR §201.6(c)(5) and §201.7 respectively.

The City of Grayling’s City Council adopted the HMP on November 3, 2015.

The Organized Village of Grayling’s Tribal Council adopted the HMP on _____.

The City submitted the final draft HMP to FEMA for formal approval; scanned copies of their formal adoption resolutions are included in Appendix C.

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Section Five identifies and profiles the hazards that could affect the City of Grayling.

5.1 OVERVIEW

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 historical and anecdotal information collection, existing plans, studies, and map reviews, and study area hazard map preparations when appropriate. Hazard maps are used to define a hazard’s geographic extent as well as define the approximate risk area boundaries.

5

DMA 2000 Requirements
<p>Identifying Hazards</p> <p>§201.6(c)(2)(i): The risk assessment shall include a) description of the type, location and extent of all natural hazards that can affect the jurisdiction. The plan shall include information on previous occurrences of hazard events and on the probability of future hazard events.</p> <p>§201.6(c)(2)(iii): For multi-jurisdictional plans, the risk assessment section must assess each jurisdiction’s risks where they vary from the risks facing the entire planning area.</p>
1. REGULATION CHECKLIST
ELEMENT B. HAZARD IDENTIFICATION AND RISK ASSESSMENT
<p>B1. Does the Plan include a description of the type, location, and extent of all natural hazards that can affect each jurisdiction?</p> <p>B2. Does the Plan include information on previous occurrences of hazard events and on the probability of future hazard events for each jurisdiction?</p> <p>B3. Is there a description of each identified hazard’s impact on the community as well as an overall summary of the community’s vulnerability for each jurisdiction?</p> <p>B4. Does the Plan address NFIP insured structures within the jurisdiction that have been repetitively damaged by floods?</p>
<p><i>Source: FEMA, March 2015</i></p>

5.2 HAZARD IDENTIFICATION AND SCREENING

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

For the first step of the hazard analysis, on November 21, 2015 the Planning Team reviewed seven possible hazards that could affect the Iditarod Area REAA. They then evaluated and screened the comprehensive list of potential hazards based on a range of factors, including prior knowledge or perception of their threat and the relative risk presented by each hazard, the ability to mitigate the hazard, and the known or expected availability of information on the hazard

(Table 5-1). The Planning Team determined that five hazards pose a great threat to the City: earthquake, flood, ground failure, severe weather, and wildland fire; some of which are influenced by increasing changing climate conditions such as late ice formation, early thaw conditions, increased, lack, or inconsistent rain.

Table 5-1 Identification and Screening of Hazards

Hazard Type	Should It Be Profiled?	Explanation
Natural Hazards		
Earthquake	Yes	The City has experienced 134 earthquakes below M5.0 with epicenters located from 0 to 50 miles from the area since 1978.
Flood (Riverine and high water flow scour [erosion])	Yes	The community lies within the 100-year flood plain of the Yukon river and occasionally experiences spring flooding due to ice jams during the Yukon River breakup. The most significant flooding event occurred in 1975, causing \$1500 in damage and floor flooding to 3 homes.
Ground Failure (Permafrost, Subsidence)	Yes	Ground Failure occurs throughout Alaska from melting permafrost, and ground subsidence. Subsidence and permafrost cause houses to shift due to ground sinking and upheaval, and high ground water melting the permafrost.
Severe Weather (Cold, Rain, Snow, Wind, etc.)	Yes	Severe weather impacts the community with climate change/global warming and changing El Niño/La Niña Southern Oscillation (ENSO) patterns generating increasingly severe weather events such as winter storms, heavy or freezing rain, thunderstorms and with subsequent secondary hazards such as riverine or coastal storm surge floods, etc.
Tsunami	No	This hazard does not exist for this location.
Volcano	No	This hazard does not exist for this location.
Wildland Fire	Yes	The community and the surrounding forest area become dry in early summer months with weather (such as lightning) and human caused incidents igniting dry vegetation in adjacent areas.

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5.3 PROFILING

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

DMA 2000 Requirements
Profiling Hazards
Requirement §201.6(c)(2)(i): [The risk assessment shall include a] description of the location and extent of all natural hazards that can affect the jurisdiction. The plan shall include information on previous occurrences of hazard events and on the probability of future hazard events.
1. REGULATION CHECKLIST
ELEMENT B. HAZARD IDENTIFICATION AND RISK ASSESSMENT
B1. Does the Plan include a description of the type, location, and extent of all natural hazards that can affect each jurisdiction? (Requirement §201.6(c)(2)(i))
B2. Does the Plan include information on previous occurrences of hazard events and on the probability of future hazard events for each jurisdiction?
<i>Source: FEMA, March 2015</i>

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

- Nature (Type)
 - Potential climate change impacts are primarily discussed in the Severe Weather hazard profile but are also identified where deemed appropriate within each hazard profile.
- History (Previous Occurrences)
- Location
- Extent (breadth, magnitude, and severity)
- Impact (Section 5 provides general impacts associated with each hazard. Section 6 provides detailed impacts to Grayling’s residents and critical facilities)
- Recurrence Probability

NFIP insured Repetitive Loss Structures (RL) are addressed in Section 6.0, Vulnerability Analysis.

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

Estimating magnitude and severity are determined based on historic events using the criteria identified in the introductory narrative description of Section 5.3.



Table 5-2 Hazard Magnitude/Severity Criteria

Magnitude / Severity	Criteria
<i>4 - Catastrophic</i>	<ul style="list-style-type: none"> • Multiple deaths. • Complete shutdown of facilities for 30 or more days. • More than 50 percent of property is severely damaged.
<i>3 - Critical</i>	<ul style="list-style-type: none"> • Injuries and/or illnesses result in permanent disability. • Complete shutdown of critical facilities for at least two weeks. • More than 25 percent of property is severely damaged.
<i>2 - Limited</i>	<ul style="list-style-type: none"> • Injuries and/or illnesses do not result in permanent disability. • Complete shutdown of critical facilities for more than one week. • More than 10 percent of property is severely damaged.
<i>1 - Negligible</i>	<ul style="list-style-type: none"> • 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 magnitude and severity, probability is determined based on historic events, using the criteria identified in Table 5-3, to provide the likelihood of future event recurrence.

Table 5-3 Hazard Recurrence Probability Criteria

Probability	Criteria
<i>4 - Highly Likely</i>	<ul style="list-style-type: none"> • Event is probable within the calendar year. • Event has up to 1 in 1 year chance of occurring (1/1=100 percent). • History of events is greater than 33 percent likely per year. • Event is "Highly Likely" to occur.
<i>3 - Likely</i>	<ul style="list-style-type: none"> • Event is probable within the next three years. • Event has up to 1 in 3 years chance of occurring (1/3=33 percent). • History of events is greater than 20per cent but less than or equal to 33 percent likely per year. • Event is "Likely" to occur.
<i>2 - Possible</i>	<ul style="list-style-type: none"> • Event is probable within the next five years. • Event has up to 1 in 5 years chance of occurring (1/5=20 percent). • History of events is greater than 10 percent but less than or equal to 20 percent likely per year. • Event could "Possibly" occur.
<i>1 - Unlikely</i>	<ul style="list-style-type: none"> • Event is possible within the next ten years. • Event has up to 1 in 10 years chance of occurring (1/10=10 percent). • History of events is less than or equal to 10 percent likely per year. • Event is "Unlikely" but is possible to occur.

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The hazards profiled for the City of Grayling are presented throughout the remainder of Section 5.3. The presentation order does not signify their importance or risk level.

5.3.1 Earthquake

5.3.1.1 Nature

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

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

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

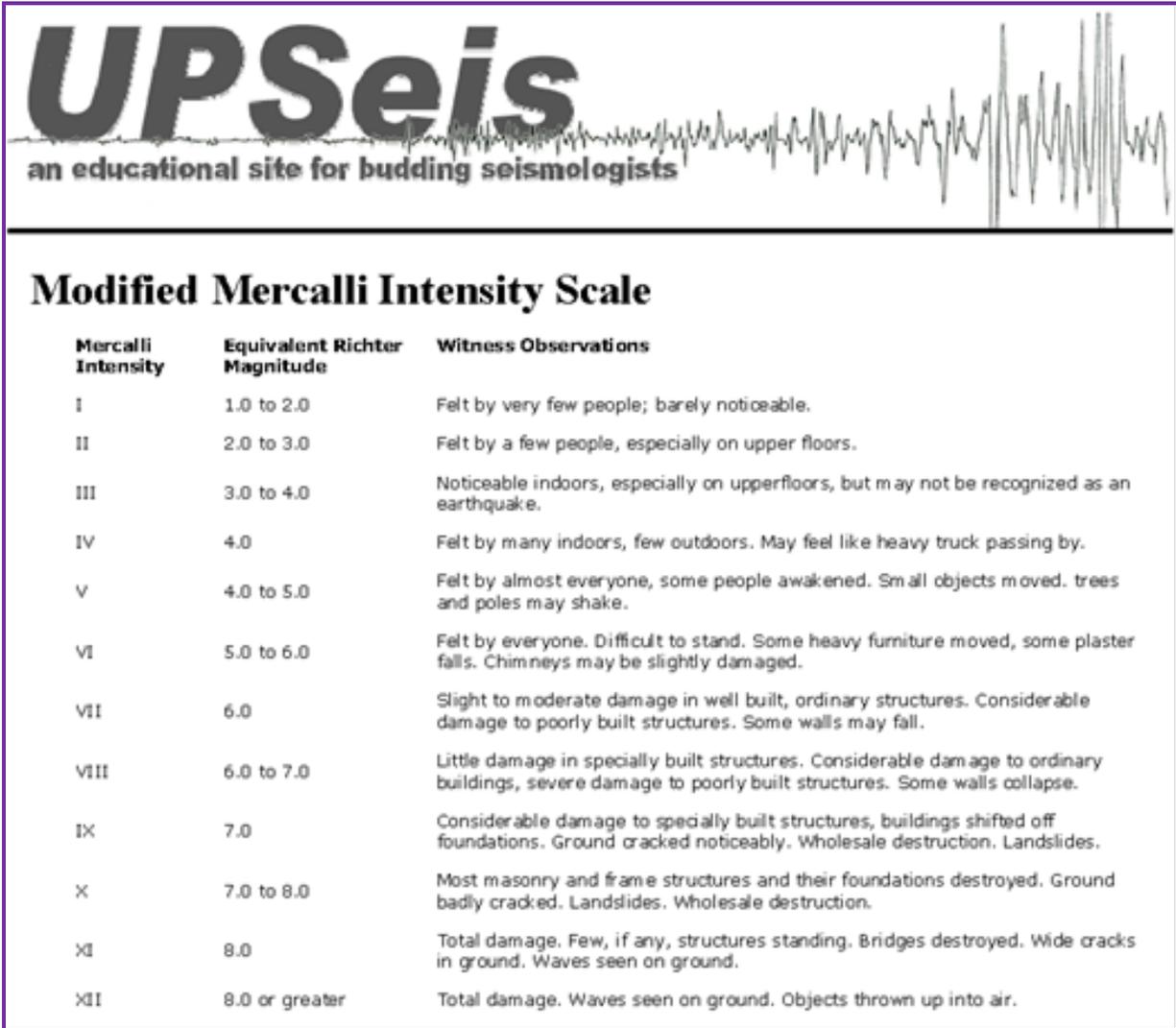
- **Surface Faulting** is the differential movement of two sides of a fault at the earth’s surface. Displacement along faults, both in terms of length and width, varies but can be significant (e.g., up to 20 feet [ft]), as can the length of the surface rupture (e.g., up to 200

miles). Surface faulting can cause severe damage to linear structures, including railways, highways, pipelines, and tunnels.

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

The severity of an earthquake can be expressed in terms of intensity and magnitude. Intensity is based on the damage and observed effects on people and the natural and built environment. It varies from place to place depending on the location with respect to the earthquake epicenter, which is the point on the earth's surface that is directly above where the earthquake occurred. The severity of intensity generally increases with the amount of energy released and decreases with distance from the fault or epicenter of the earthquake. The scale most often used in the U.S. to measure intensity is the Modified Mercalli Intensity (MMI) Scale. As shown in Table 5-4, the MMI Scale consists of 12 increasing levels of intensity that range from imperceptible to catastrophic destruction. Peak ground acceleration (PGA) is also used to measure earthquake intensity by quantifying how hard the earth shakes in a given location. PGA can be measured as acceleration due to gravity (g) (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 5-1).



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Figure 5-1 Modified Mercalli Intensity (MMI 2015)

5.3.1.2 History

Accurate seismology for Alaska is relatively young with historic data beginning in 1973 for most locations. Therefore data is limited for acquiring long-term earthquake event data. The HMP’s Alaska earthquake data is based on best available data; obtained from the US Geological Survey (USGS) and the State of Alaska, UAF Geophysical Institute’s archives.

Research indicates that over 134 earthquakes have occurred within 100 miles of Grayling since 1978; the majority of which were below M4.0 (not felt or weak events); none of which exceeded M4.8 located within 100 miles of the City. Table 5-4 substantiates the Planning Team’s decision to be concerned to only be concerned with earthquakes with a magnitude > M5.0.

Table 5-4 Historical Earthquakes for Grayling

Date	Time	Latitude	Longitude	Depth (Km)	Magnitude (M)	Location
11/9/2010	1:33:43 AM	64.663	-161.79	14.3	3.7	Northern Alaska
11/30/2008	2:31:36 PM	65.421	-162.007	7.7	3.7	Northern Alaska
7/6/2006	11:26:58 PM	65.287	-160.734	5.1	4.5	Northern Alaska
9/7/2005	2:01:06 AM	65.423	-162.211	30	4.7	Northern Alaska
9/6/2005	7:16:58 AM	65.439	-162.173	3.9	4.8	Northern Alaska
7/28/2005	6:58:31 PM	64.582	-163.576	18.7	3.7	Northern Alaska
7/21/2005	11:48:21 AM	64.614	-163.471	30	3.9	Northern Alaska
7/12/2005	5:48:05 AM	64.572	-163.472	15.2	3.8	Northern Alaska
11/18/2004	11:14:22 PM	63.462	-162.582	5.2	3.7	Northern Alaska
12/29/2002	9:59:44 PM	65.381	-162.157	10	3.9	Northern Alaska
12/22/2002	7:03:04 AM	65.392	-162.124	10	3.9	Northern Alaska
8/13/2002	6:47:30 PM	64.002	-164.42	6.7	3.7	Northern Alaska
4/30/2001	12:36:03 PM	64.51	-163.834	8	4.4	Northern Alaska
6/18/2000	3:37:14 PM	65.317	-164.083	10	4.7	Northern Alaska
11/5/1998	10:12:41 AM	63.885	-165.684	10	3.7	Bering Strait
7/21/1998	10:59:43 AM	64.881	-162.32	10	4	Northern Alaska
12/15/1997	2:22:33 PM	64.555	-162.672	25.1	4.5	Northern Alaska
7/14/1997	9:55:57 PM	64.961	-164.722	10	4.4	Northern Alaska
8/27/1996	1:33:04 AM	65.204	-165.444	10	4.4	Northern Alaska
5/25/1996	7:08:27 AM	64.513	-162.846	10	3.8	Northern Alaska
5/18/1995	6:04:21 PM	64.746	-162.311	25	3.8	Northern Alaska
4/21/1994	1:02:46 AM	64.813	-164.821	10	4.2	Northern Alaska
9/24/1993	5:03:37 PM	64.197	-164.414	0	3.9	Northern Alaska
7/31/1993	9:09:39 PM	64.423	-162.447	10	4	Northern Alaska
9/14/1992	8:31:07 AM	64.671	-165.795	0	3.7	Northern Alaska
9/14/1992	5:25:15 AM	64.468	-165.936	0	3.7	Northern Alaska
8/30/1992	1:51:13 PM	64.822	-165.665	18.3	4.7	Northern Alaska
4/1/1989	9:25:44 AM	63.561	-164.27	33	4.1	Northern Alaska
7/27/1988	11:45:30 PM	64.301	-161.391	10	4.3	Northern Alaska
10/5/1983	9:55:31 AM	64.7	-160.558	33	3.9	Central Alaska
3/3/1983	6:26:05 PM	65.145	-165.626	33	3.9	Northern Alaska
8/15/1982	3:47:27 PM	65.015	-162.068	33	4.4	Northern Alaska
10/24/1979	10:19:36 PM	65.238	-164.736	33	4.4	Northern Alaska
3/22/1978	3:45:20 PM	64.879	-160.482	33	4.7	Central Alaska

(USGS 2015)

North America's strongest recorded earthquake occurred on March 27, 1964 in Prince William Sound measuring M9.2 and was felt by many residents throughout Alaska. Grayling experienced minimal ground motion from this historic event. Planning Team members further stated that neither did they experience ground shaking from the November 3, 2002 M7.9 Denali EQ.

The largest recorded earthquake that has occurred within 100 miles of the City measured M4.8, occurring on September 6, 2005. This earthquake did not cause any damage to critical facilities, residences, non-residential buildings, or infrastructure.

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

Location

As seen by Figure 5-2 the entire geographic area of Alaska is prone to earthquake impacts from numerous named and unnamed earthquake fault locations. As such the City of Grayling has experienced over 134 earthquakes since 1978 with an average of approximately a magnitude of M3.2.

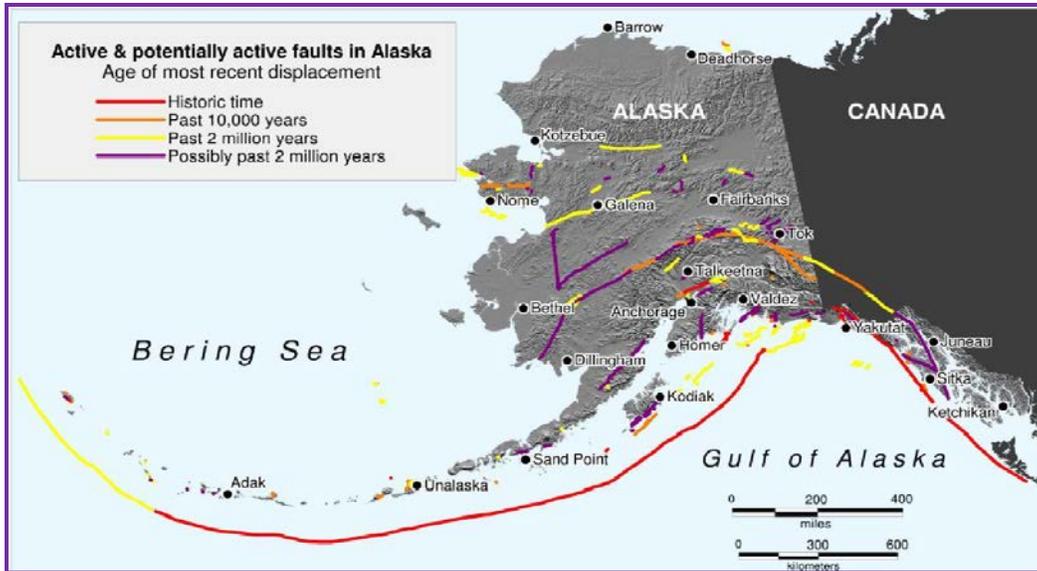


Figure 5-2 Active and Potentially Active Faults in Alaska (DGGS 2014)

Extent

Based on historic earthquake events and the criteria identified in Table 5-2, the magnitude and severity of earthquake impacts in the City are considered “Critical” with potential injuries and/or illnesses that could result in permanent disability; critical facilities could expect complete shut-down for at least two weeks; and more than 25 percent of property is severely damaged with limited long-term damage to transportation, infrastructure, or the economy.

The City is located in very close proximity to the Thompson Creek Fault. The Anvik Fault is located to the north of the City, the Iditarod Nixon Fork Fault to the south, and numerous unnamed faults are located to the west of the City. These earthquake faults are depicted in Figure 5-3, an extracted view of the “Neotectonic Map of Alaska.” (DGGS 1994)

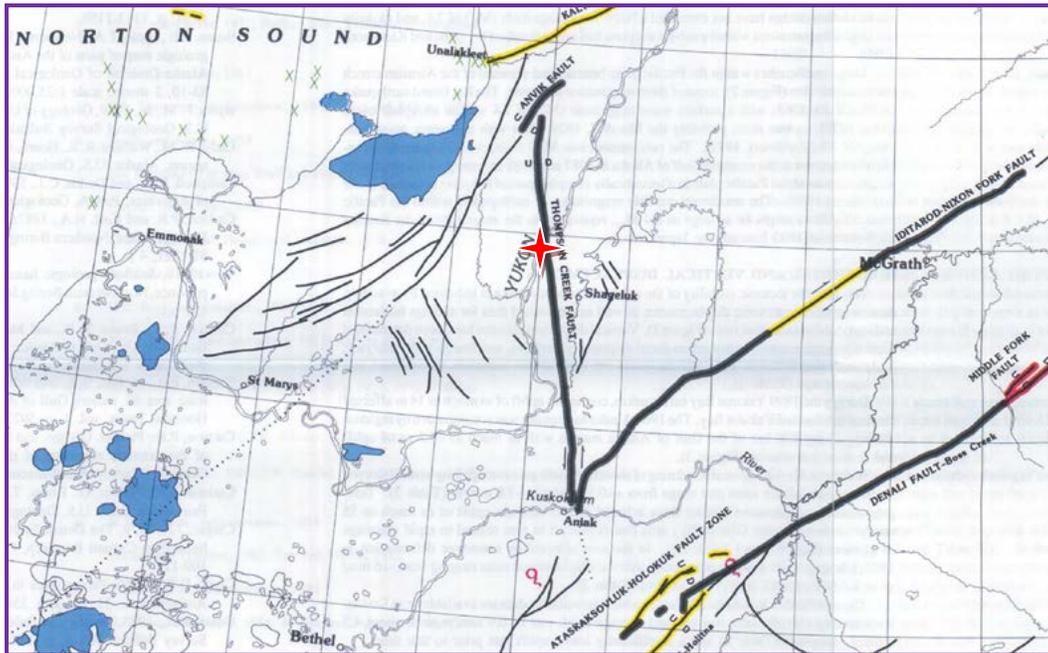


Figure 5-3 Excerpt from Alaska Tectonic Fault Maps (DGGS 1994)

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Impact

Impacts to the community such as significant ground movement that may result in infrastructure damage can be 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.

Recurrence Probability

This 2009 Shake Map incorporates current seismicity in its development and is the most current map available for this area. Peter Haeussler, USGS, Alaska Region states, it is a viable representation to support probability inquiries.

“The occurrence of various small earthquakes does not change earthquake probabilities. In fact, in the most dramatic case, the probability of an earthquake on the Denali fault was/is the same the day before the 2002 earthquake as the day afterward. Those are time-independent probabilities. The things that change the hazard maps is changing the number of active faults or changing their slip rate” (Haeussler, 2009).

The Shake Map in Figure 5-4, was generated using the United States Geological Survey (USGS) Earthquake Mapping Model and indicates a M5.0 or greater earthquake occurring within 100 years and 35 miles of the City is “Highly Likely” within the calendar year with a chance of 1 in 1 year (1/1=100 percent) chance of occurring; due to an event history that is less greater than 33 percent likely per year.

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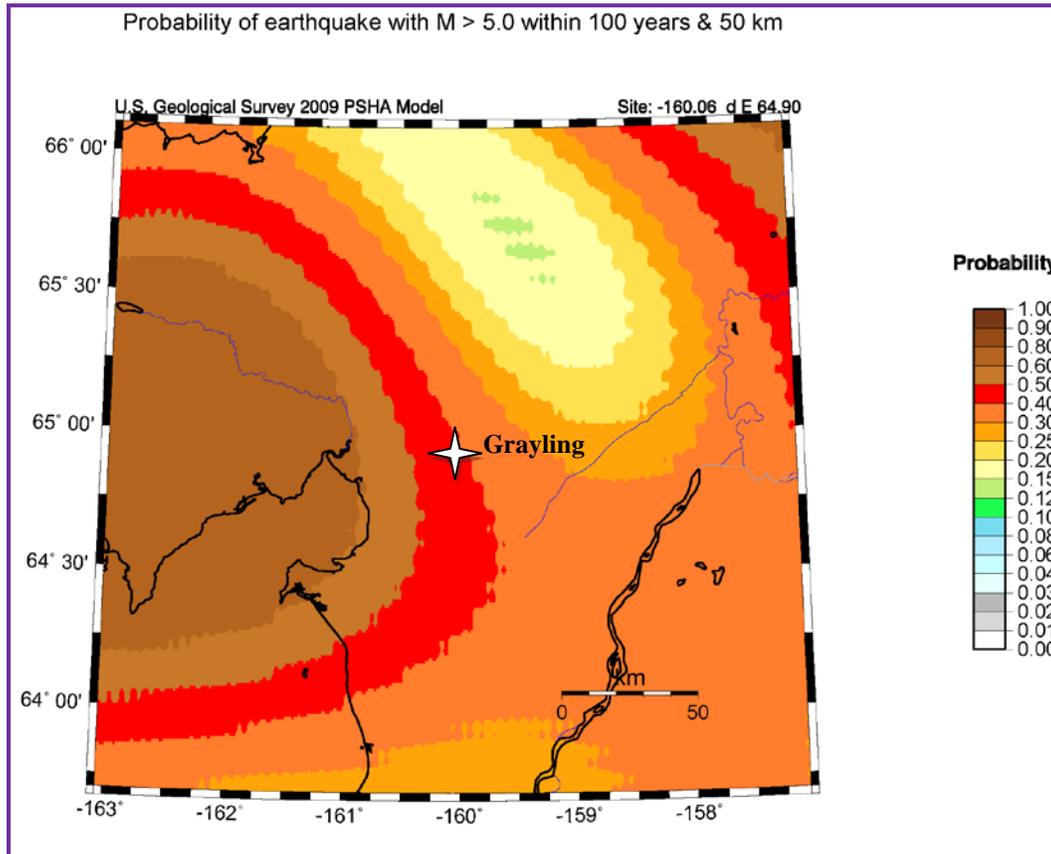


Figure 5-4 Grayling's Earthquake Probability (USGS 2015)

5.3.2 Flood

5.3.2.1 Nature

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

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

Four primary types of flooding occur in the City: rainfall-runoff, snowmelt, ice jam, storm surge, and ice override floods.

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

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

Ice-Jam floods occur when warming temperatures and rising water flows causes the ice to break-up and disconnect from the embankment. The large ice chunks begin to flow and move down river. The ice does not flow easily, often impacting with adjacent blocks resulting in occasional ice jams. Some ice jams quickly break apart, however, larger jams occur which create small dams causing the water to exert increasing pressure on the jam creating a damming effect. Water subsequently begins to build depth and often overtops adjacent embankments which flood upstream communities.

When the ice-jam breaks the built-up water rushes downstream with great force. Ice blocks scour the embankment, destroying infrastructure such as fuel headers, barge landings, and boat mooring structures. Large house sized ice blocks may even be driven above the embankment destroying any structure in its path. Communities are virtually helpless against such devastation.

Riverine Flood Scour rarely causes death or injury. However, erosion causes property destruction, prohibits development, and impacts community infrastructure. Erosion is typically gradual land loss through wind or water scour. However, erosion can occur rapidly as the result of floods, storms or other event or slowly as the result of long-term environmental changes such as melting permafrost. Erosion is a natural process, but its effects can be easily exacerbated by human activity.

Riverine high water flow scour is problem for communities where disappearing land threatens development and infrastructure. This is a moderate threat to Grayling as it threatens their Yukon River embankment and its infrastructure, structures, and utilities.

Riverine erosive scour results from high water flow and ice formations in and adjacent to river channels. These impacts affect the river bed and channel banks and can alter or preclude any channel navigation or riverbank development. In less stable braided channel reaches, scour and material deposition are constant issues. In more stable meandering channels, these damaging episodes may only occasionally occur such as from human activities including boat wakes and dredging.

Attempts to control scour impacts using shoreline protective measures such as groins, jetties, levees, or revetments can lead to increased damages and subsequent downstream land loss.

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

Event Recurrence Intervals

Many floods are predictable based on rainfall and seasonal thaw 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 or coastal ice override damages.

5.3.2.2 History

The City experiences severe damages from heavy rainfall, snowmelt, spring run-off, and ice jam flooding to their frontage road. Spring run-off causes the most damages to the community's road surfaces. Table 5-5 lists Grayling's NWS identified historic flood events.

Table 5-5 Grayling’s Historic Flood Events (NWS)

Date	Event Type	Magnitude
2009	Ice Jam	Flood
1985	Ice Jam	Flood
1977	Ice Jam	Flood waters impacted one home
1976	Ice Jam	Ice jam occurred down river from community
1975	Ice Jam	Flood of record
1973	Ice Jam	Flood

(USACE 2012, NWS 2011, DHS&EM 2010)

The KNOM radio station vision says it all: “KNOM strives to entertain, to engage, to inspire, and to inform the listeners of Western Alaska: from the Yukon Delta to the Bering Strait and throughout the villages and rural stretches of the Alaskan Bush.” They are located in Nome, Alaska; broadcasting area specific weather advisory and warning updates obtained from the NWS Forecast Center provides. The following advisory depict Grayling’s 2009 potential flood threat and impact magnitude:

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*“WGAK89pafg_akz215.13479
ALZ215-200230-
/o.con.pafg.fa.y.0008.000000t0000z-090520t0230z/
/00000.n.er.000000t0000z.000000t0000z.000000t0000z.oo/Lower Yukon Valley ak-439
pm akdt mon may 18 2009
...the flood advisory remains in effect until 630 pm AKDT Tuesday for Lower Yukon
Valley from grayling to Anvik...
High water associated with breakup continues to cause minor flooding in the villages of
grayling and Anvik. An ice jam upstream of grayling released Saturday night and the ice
and high water associated with that jam are still flooding roads in grayling and Anvik
even though the ice run has passed downstream. Levels were still high late Monday
morning and will fall very slowly over the next 24 hours.
The road to the airport in grayling and the frontage road on the river at Anvik will
continue to be inundated until the high water on the Yukon River subsides.
Precautionary/preparedness actions...a flood advisory means river or stream flows are
elevated or ponding of water in urban or other areas is occurring or is imminent”
NWS...”
(KNOM 2009)*

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

“94. Spring Floods, FEMA declared (DR-0832) on June 10, 1989. Presidential Declaration of Major Disaster, incorporated sixteen local declarations and applied to all communities on Yukon, Kuskokwim and Kobuk rivers and their tributaries. Provided public and individual assistance to repair damage.

111. '89 Spring Floods Hazard Mitigation, April 14, 1990. *The Major Disaster Declaration by the President in response to statewide flooding in the Spring of 1989 authorized the commitment of federal funds to projects designed to mitigate flood damage in future years. Since the federal funding required a State matching share, the Governor declared a disaster to provide these funds and authorize their expenditure.*

132-142. Fairbanks/North Star Borough, Aniak, McGrath, Red Devil, Anvik, Grayling, Emmonak, Holy Cross, Alakanuk, Shageluk, Galena. the Governor declared on May 3-23, 1991 FEMA declared May 30, 1991. *Flooding. Record snowfalls in the interior combined with sudden Spring melt caused flooding all along the Yukon and Kuskokwim River systems. Numerous State Declarations were combined into a single Presidential Declaration of Major Disaster (FEMA-0909-AK) that authorized assistance for repair of public property only. State Disaster Relief Funds were used to implement the Individual and Family Grant Program in all of the communities included in the federal declaration.*

09-227, 2009 Spring Flood declared by Governor Palin on May 6, 2009 then FEMA declared under DR-1843 on June 11, 2009. *Extensive widespread flooding due to snow melt and destructive river ice jams caused by rapid spring warming combined with excessive snow pack and river ice thickness beginning April 28, 2009 and continuing. The ice jams and resultant water backup along with flood waters from snow melt left a path of destruction along 3,000 miles of interior rivers, destroying the Native Village of Eagle and forcing the evacuation of multiple communities. The following jurisdictions and communities in Alaska have been impacted: Alaska Gateway Rural Regional Educational Attendance Area (REAA) including the City of Eagle and Village of Eagle; the Copper River REAA including the Village Community of Chisotchina; the Matanuska-Susitna Borough; the Yukon Flats REAA including the City Community of Circle, and City of Fort Yukon, the Villages Communities of Chalkyistik, Beaver, Stevens Village, and Rampart; the Yukon-Koyukuk REAA including the Cities of Tanana, Ruby, Galena, Koyukuk, Nulato, and Kaltag; the Iditarod Area REAA including the Cities of McGrath, Grayling, Anvik, and Holy Cross; the Northwest Arctic Borough including the Cities of Kobuk, and Buckland; the Lower Yukon REAA including the Cities of Russian Mission, Marshall, Saint Mary's, Mountain Village, Emmonak, Alakanuk and Pilot Station and the Community of Ohogamiut; the Lower Kuskokwim REAA including the Cities of Bethel, Kwethluk, Napakiak, Napaskiak, and the Village Community of Oscarville; the Yupiit REAA including the City of Akiak, and the Villages of Akiachak, and Tuluksak; the Kuspuk REAA including the Cities of Aniak, Upper Kalskag, Lower Kalskag, and the Villages Communities of Stony River, Sleetmute, Red Devil, Crooked Creek, and Napaimute; the Fairbanks North Star Borough including the City of North Pole and Community of Salcha; the Bering Strait REAA including the City of Nome area" (DHS&EM 2014).*

The US Army Corp of Engineers (USACE) conducted a "High Water Elevation Identification community visit in September 1990. The following is excerpted from their travel report.

"General Observations / Comments:

The community is located on the right bank of the Yukon River approximately 21 miles north of Anvik and 350 miles west-northwest of Anchorage.

The topographic relief of Grayling is moderate, with hills adjacent to the town...

Actions Taken:

High Water Elevation (HWE) signs were placed at three locations in the community, with the sign's water symbol at the elevation of the 1975 flood.

HWE sign #1 is on the downstream, streamward corner of a house owned by Mountain Deacon.



HWE sign #2 is on a power pole approximately 100 feet shoreward from Mountain Deacon's house near the Grayling Aviation building.



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HWE sign #3 is on a pole approximately 200 feet upstream from sign #2, toward the school from Grayling Aviation.

Miscellaneous:

Grayling is in the 100-year floodplain of the Yukon River. Hills adjacent to the town are above the floodplain.

The estimated zero damage elevation is approximately 3 feet above the HWE level.

A flood gauge has been placed on a power pole so that flood levels can be easily monitored. The HWE signs correspond to 5.80 feet pm the flood gauge. (USACE 1990)

The USACE provided the following high water elevation criteria to assist the community with building new, or elevating existing, structures above their 100-year floodplain (Table 5-6).

Table 5-6 Historic Flood Events (NWS)

SURVEY INFORMATION AS OF SEPTEMBER 2002 (NAVD88 DATUM)	
Location	Recommended Structure Elevation
Recommended building elevation	86.57
Estimated 1975 flood elevation	83.57
Door sill on clinic	88.75
Door sill of post office	86.61
Top of first step on high school	83.56

(USACE 2011)

The USACE Floodplain Manager’s Report, October 2011 describes where Grayling’s high water elevation (HWE) markers are located at various City locations to assist the community with ensuring buildings are elevated to potentially avoid flood impacts. The following excerpt (Figure 5-5) describes and depicts these HWE locations:

HWE signs were placed at three locations in the community, with the sign's water symbol at the elevation of the 1975 flood. This flood level approximates the Base Flood Elevation (BFE). HWE #1 is on the downstream, streamward corner of a house owned by Mountain Deacon. HWE #2 is on a utility pole approximately 100 ft shoreward from Mountain Deacon's house near the Grayling Aviation building. HWE #3 is on a utility pole approximately 200 ft upstream from HWE #2, toward the school from Grayling Aviation. A flood gauge has been placed on a utility pole so that flood levels can be easily monitored. The High Water Elevation (HWE) signs correspond to 5.80 ft on the flood gauge. Ground level at the flood gauge is considered 0.0 ft elevation. Floodwaters reached floor level in 6 homes in 1975.

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Figure 5-5 USACE 2011 Floodplain Manager’s Report Excerpt (USACE 2011).

Flood or High Water Flow Induced Scour

The Army Corp of Engineers (USACE) completed an erosion survey for Grayling during their 2009 Alaska Baseline Erosion Assessment. The Erosion Information Paper – Grayling, Alaska,

February 27, 2008 classified Grayling as a “Monitor Conditions” community as having “no potential erosion damages or erosion problems.” The report further stated,

“The community of Grayling does not experience erosion problems from the Yukon River or other sources. The Alaska Division of Community and Regional Affairs produced Grayling Community Profile Maps at a scale of 1 inch = 200 feet in 1984, 1999 and 2006. None of the maps indicate areas of erosion or any appreciable change along the river bank” (USACE 2008).

5.3.2.3 Location, Extent, Impact, and Future Events Probability

Location

The USACE 1994 trip report indicated: “Grayling is in the 100-year floodplain of the Yukon River. Hills adjacent to the town are above the floodplain.”

There are a few USACE historical flood survey accounts describing Grayling ice jam flooding impacts;

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- 1976, Fredrick Howard states on his flood survey form:
 - “Depth of Flood: “17” above floor lowest house”
 - High Water marks (describe & Locate): Water up to attic Mission Church, Community Hall between Bede Deacon’s House and Olga Deacon’s
 - Number of Homes Flooded: 3
 - Number of Public Facilities and Type Flooded: Basement flooded of Native Store”
- 1973, Willy Nicholas, Sr. Village President and Dale Mitchell, Flood Data form:
 - “Floods of Record and Cause: 1970, 1971, 10% flooded from Ice Jam at Holy Cross
 - No flood problems except ice jam caused. Does not happen every year
- Is erosion a problem? Slight 6 – 8’ since 1963
- Is Ice a problem? Causes Erosion”
(USACE 2007)

Figure 565 depicts the City’s USACE generated aerial photograph with an arrow showing Yukon River flow direction.

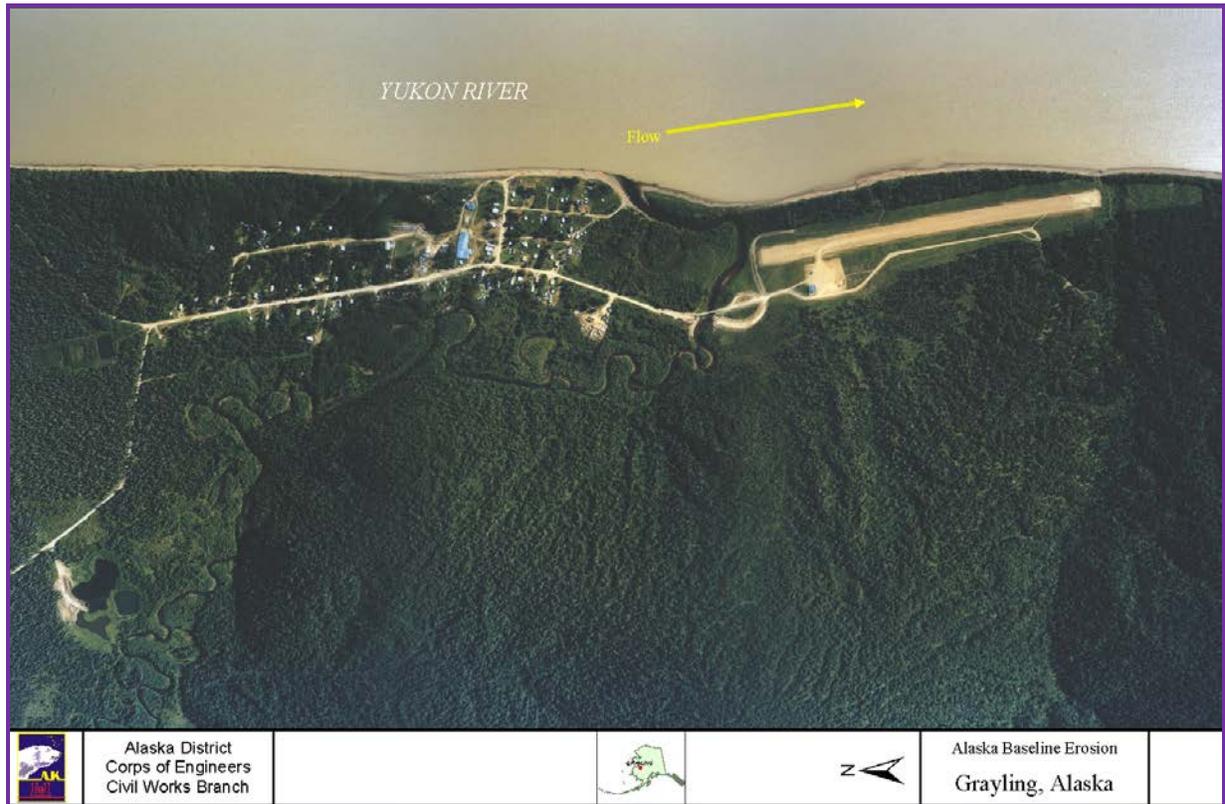


Figure 5-6 Grayling's Yukon River Locations (USACE 2008)

The City stated they experience erosion along the Yukon River along with damage from high water flow rain and snow-melt resulting in road surface material losses, creating severe pot holes, and other damages. The roads become extremely muddy once the topping has been removed.

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
- Grayling’s location related to identified-historical flood elevation

The City does not consistently experience severe riverine flooding except from down-river ice jams. Therefore, based on past high water flow event history and the criteria identified in Table 5-2, the extent of flooding and resultant scour damages to infrastructure and their embankments in the City are considered “Negligible” where critical facilities would shut-down for 24 hours or less with 10 percent of property impacted.

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
- Stream bank, roadway embankment, foundation, bridge pier footings, and other features’ scour
- 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

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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 as well as embankment, coastal erosion, and/or wind. Deposition is the accumulation of soil, silt, and other particles on a river bottom or delta. Deposition leads to the destruction of fish habitat, presents a challenge for navigational purposes, and prevents access to historical boat and barge landing areas. Deposition also reduces channel capacity, resulting in increased flooding or bank erosion. Embankment erosion involves material removal from the stream or river banks, coastal bluffs, and dune areas. When bank erosion is excessive, it becomes a concern because it results in loss of embankment vegetation, fish habitat, and land, property, and essential infrastructure (BKP 1988).

Recurrence Probability

Based on previous occurrences, USACE Floodplain Manager’s report, and criteria in Table 5-3; it is “Possible” for Grayling to experience flood impact damages. There is a 1 in 5 year (1/5=20 percent) chance of occurring. History of events is greater than 10 percent but less than or equal to 20 percent likely per year. There is no data identifying a 500-year (0.2 percent chance of occurring in a given year) flood threat in Grayling.

5.3.3 Ground Failure

5.3.3.1 Nature

Ground failure describes avalanche, landslide, subsidence, and unstable soils gravitational or other soil movement mechanisms. Soil movement influences can include rain, snow, and/or water saturation induced avalanches or landslides; as well as from seismic activity, melting permafrost, river or coastal embankment undercutting, or in combination with steep slope conditions.

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

Additionally, avalanches and landslides often occur secondary to other natural hazard events, thereby exacerbating conditions, such as:

- Earthquake ground movement can trigger events ranging from rock falls and topples to massive slides
- Intense or prolonged precipitation can cause slope over-saturation and subsequent destabilization failures such as avalanches and landslides.
- Climate change related drought conditions may increase wildfire conditions where a wildland fire consumes essential stabilizing vegetation from hillsides significantly increasing runoff and ground failure potential

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

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

- **Slides**, the more accurate and restrictive use of the term landslide, refers to a mass movement of material, originating from a discrete weakness area that slides from stable underlying material. A *rotational slide* occurs when there is movement along a concave surface; a *translational slide* originates from movement along a flat surface.
- **Debris Flows** arise from saturated material that generally moves rapidly down a slope. A debris flow usually mobilizes from other types of landslide on a steep slope, then flows through confined channels, liquefying and gaining speed. Debris flows can travel at

speeds of more than 35 mph for several miles. Other types of flows include debris avalanches, mudflows, creeps, earth flows, debris flows, and lahars.

- **Lateral Spreads** are a type of landslide generally occurs on gentle slope or flat terrain. Lateral spreads are characterized by liquefaction of fine-grained soils. The event is typically triggered by an earthquake or human-caused rapid ground motion.
- **Falls** are the free-fall movement of rocks and boulders detached from steep slopes or cliffs.
- **Topples** are rocks and boulders that rotate forward and may become falls.
- **Complex** is any combination of landslide types.

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

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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 32°F has existed for two or more years. (DHS&EM 2010).

Indicators of a possible ground failure include:

- Springs, seeps, or wet ground that is not typically wet
- New cracks or bulges in the ground or pavement
- Soil subsiding from a foundation
- Secondary structures (decks, patios) tilting or moving away from main structures
- Broken water line or other underground utility
- Leaning structures that were previously straight
- Offset fence lines
- Sunken or dropped-down road beds
- Rapid increase in stream levels, sometimes with increased turbidity
- Rapid decrease in stream levels even though it is raining or has recently stopped and
- Sticking doors and windows, visible spaces indicating frames out of plumb

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

5.3.3.2 History

There are few written records defining ground failure impacts. However, the those that exist are referenced within Section 5.3.3.3 below.

5.3.3.3 Location, Extent, Impact, and Recurrence Probability

Location

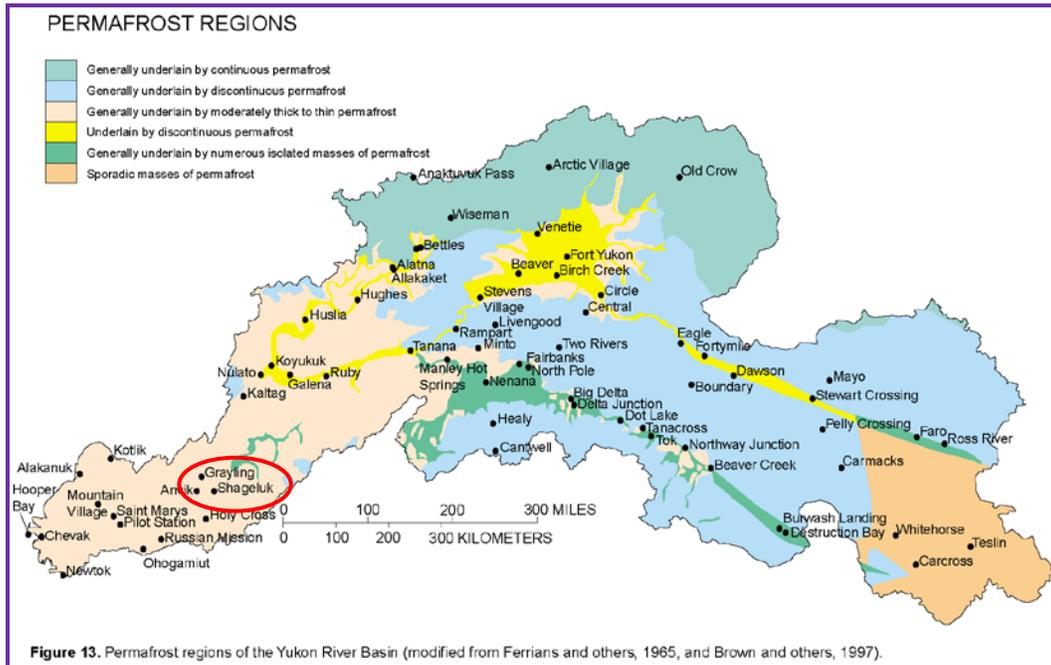
There are various soil compositions throughout the Lower Yukon. Grayling only has a minor concern for ground failure impacts because there is very little permafrost within the community. Potential community specific geologic data sources include USACE, NRCS, USGS, and Alaska DGGs, as well as other agencies' developed plans and studies. Land subsidence such as melting permafrost and groundwater soil saturation are the most common statewide ground failure impacts.

The 1961, Preliminary geology along the lower Yukon River, Alaska describes a few soil conditions adjacent to Grayling (Figure 5-7); namely that peat and silt deposits are permanently frozen.

The deposits contain quantities of brown peat in layers that are commonly several feet thick. Much of the peat and most of the older silt deposits are permanently frozen. The older silt deposits of Pleistocene age mantle the lower slopes of hills and ridges and in places form near-vertical bluffs along the river that are 40 to 60 feet high. Such bluffs form the west bank of the Yukon for several miles below the mouth of Grayling Creek.

Figure 5-7 Grayling Area Soil Deposit Analysis (DGGs 1961)

The Environmental and Hydrologic Overview of the Yukon River Basin, Alaska and Canada; Water-Resources Investigations Report 99-4204, provides various maps and data pertinent to current conditions in Grayling. Figure 5-8 depicts permafrost regions within the Yukon River Basin showing Grayling as located within the “generally underlain by moderately thick to thin permafrost” area.



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Figure 5-8 Yukon River Basin Permafrost Regions (USGS 2000)

The *Permafrost and Ground Ice Map of Alaska* (Figure 5-9) developed for the National Snow and Ice Data Center/World Data Center for Glaciology supports this data. The Jorgenson study indicates the City location has discontinuous permafrost. (Jorgenson et al 2008)

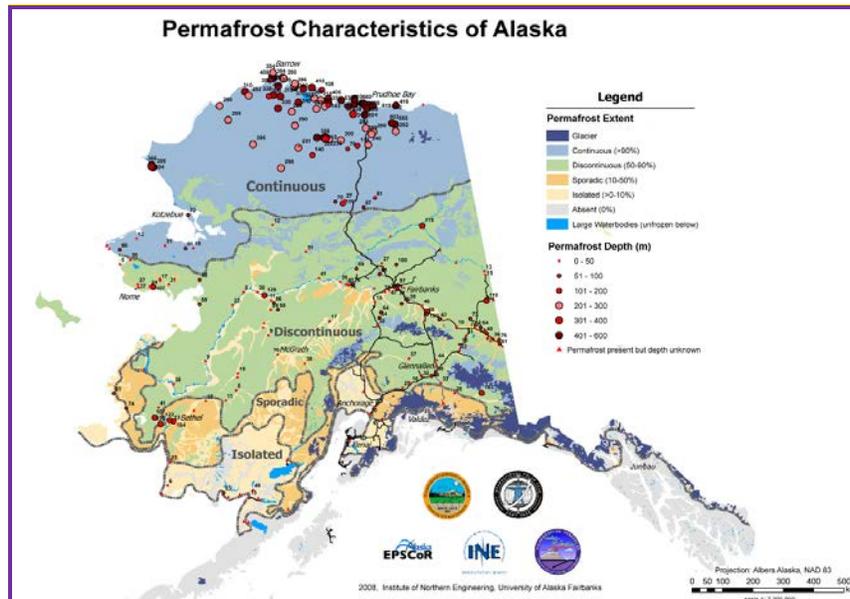


Figure 5-9 Permafrost and Ground Ice Map of Alaska (Jorgenson et al 2008)

Extent

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

Based on research and the Planning Team’s knowledge of past ground failure and various degradation events and the criteria identified in Table 5-2, the extent of ground failure impacts in the City are considered ”Limited” due to the permafrost’s discontinuous nature and location. Impacts would not occur quickly but over time with warning signs. Therefore this hazard would not likely to cause injuries or death, neither would it shutdown critical facilities and services with 10 percent of property being adversely damaged.

Impact

Impacts associated with ground failure include surface subsidence, infrastructure, building, and/or road damage. Ground failure does not typically pose a sudden and catastrophic hazard; however landslides and avalanches may. Ground failure damage occur from improperly designed and constructed buildings that settle as the ground subsides, resulting in structure loss or expensive repairs. It may also impact buildings, communities, pipelines, airfields, as well as road and bridge design costs and location. To avoid costly damage to these facilities, careful planning and location and facility construction design is warranted.

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Recurrence Probability

Even though there are few written records defining ground failure impacts for the City, Planning Team members state they experience annually recurring ground failure damages throughout the community – to structures, roads, and river embankments. The Planning Team feel the ground failure recurrence probability follows the criteria in Table 5-3, the future damage probability resulting from ground failure is “Likely” 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 33 percent likely per year.

5.3.4 Severe Weather

5.3.4.1 Nature

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

Climate Change influences the environment, particularly historical weather patterns. Climate change and El Niño/La Niña Southern Oscillation (ENSO) influences create increased weather volatility such as hotter summers (drought) and colder winters, intense thunderstorms, lightning, hail, snow storms, freezing rain/ice storms, high winds and even a few tornadoes within and around Alaska.

ENSO is comprised of two weather phenomena known as El Niño and La Niña. While ENSO activities are not a hazard, they can lead to severe weather events and large-scale damage throughout Alaska’s varied jurisdictions. Direct correlations were found linking ENSO events to

severe weather across the Pacific Northwest, particularly increased flooding (riverine, coastal storm surge) and severe winter storms. Therefore, increased awareness and understanding how ENSO events potentially impact Alaska's vastly differing regional weather.

Climate change is described as a phenomena of water vapor, carbon dioxide, and other gases in the earth's atmosphere acting like a blanket over the earth, absorbing some of the heat of the sunlight-warmed surfaces instead of allowing it to escape into space. The more gasses, the thicker the blanket, the warmer the earth. Trees and other plants cannot absorb carbon dioxide through photosynthesis if foliage growth is inhibited. Therefor carbon dioxide builds up and changes precipitation patterns, increases storms, wildfires, and flooding frequency and intensity; and substantially changes flora, fauna, fish, and wildlife habitats.

The governor's Alaska's Climate, Ecosystems & Human Health Work Group is tasked with determining how the changing ecosystems may impact human health and to identify, prioritize, and educate Alaskan's about the connection between their health and changing environmental patterns.

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Heavy Rain occurs rather frequently over the coastal areas along the Bering Sea and the Gulf of Alaska.

Heavy Snow generally means snowfall accumulating to four inches or more in depth in 12 hours or less or six inches or more in depth in 24 hours or less.

Drifting Snow is the uneven distribution of snowfall and snow depth caused by strong surface winds. Drifting snow may occur during or after a snowfall.

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

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

High Winds occur in Alaska when there are winter low-pressure systems in the North Pacific Ocean and the Gulf of Alaska. Alaska's high wind can equal hurricane force but fall under a different classification because they are not cyclonic nor possess other hurricane characteristics.

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. In Alaska, high winds (winds in excess of 50 mph) occur rather frequently in the Grayling area.

Winter Storms include a variety of phenomena described above and as previously stated may include several components; wind, snow, and ice storms. Ice storms, which include freezing rain, sleet, and hail, can be the most devastating of winter weather phenomena and are often the cause of automobile accidents, power outages, and personal injury. Ice storms result in the accumulation of ice from freezing rain, which coats every surface it falls on with a glaze of ice.

Freezing rain is most commonly found in a narrow band on the cold side of a warm front, where surface temperatures are at or just below freezing temperatures. Typically, ice crystals high in the atmosphere grow by collecting water vapor molecules, which are sometimes supplied by evaporating cloud droplets. As the crystals fall, they encounter a layer of warm air where they particles melt and collapse into raindrops. As the raindrops approach the ground, they encounter a layer of cold air and cool to temperatures below freezing. However, since the cold layer is so shallow, the drops themselves do not freeze, but rather, are supercooled, that is, in liquid state at below-freezing temperature. These supercooled raindrops freeze on contact when they strike the ground or other cold surfaces.

Snowstorms happen when a mass of very cold air moves away from the polar region. As the mass collides with a warm air mass, the warm air rises quickly and the cold air cuts underneath it. This causes a huge cloud bank to form and as the ice crystals within the cloud collide, snow is formed. Snow will only fall from the cloud if the temperature of the air between the bottom of the cloud and the ground is below 40 degrees Fahrenheit. A higher temperature will cause the snowflakes to melt as they fall through the air, turning them into rain or sleet. Similar to ice storms, the effects from a snowstorm can disturb a community for weeks or even months. The combination of heavy snowfall, high winds and cold temperatures pose potential danger by causing prolonged power outages, automobile accidents and transportation delays, creating dangerous walkways, and through direct damage to buildings, pipes, livestock, crops and other vegetation. Buildings and trees can also collapse under the weight of heavy snow.

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Figure 5-10 displays Alaska’s statewide annual rainfall map based on Parameter-elevation Regressions on Independent Slopes Model (PRISM) that combines climate data from NOAA and Natural Resources Conservation Service (NRCS) climate stations with a digital elevation model to generate annual, monthly, and event-based climatic element estimates such as precipitation and temperature.

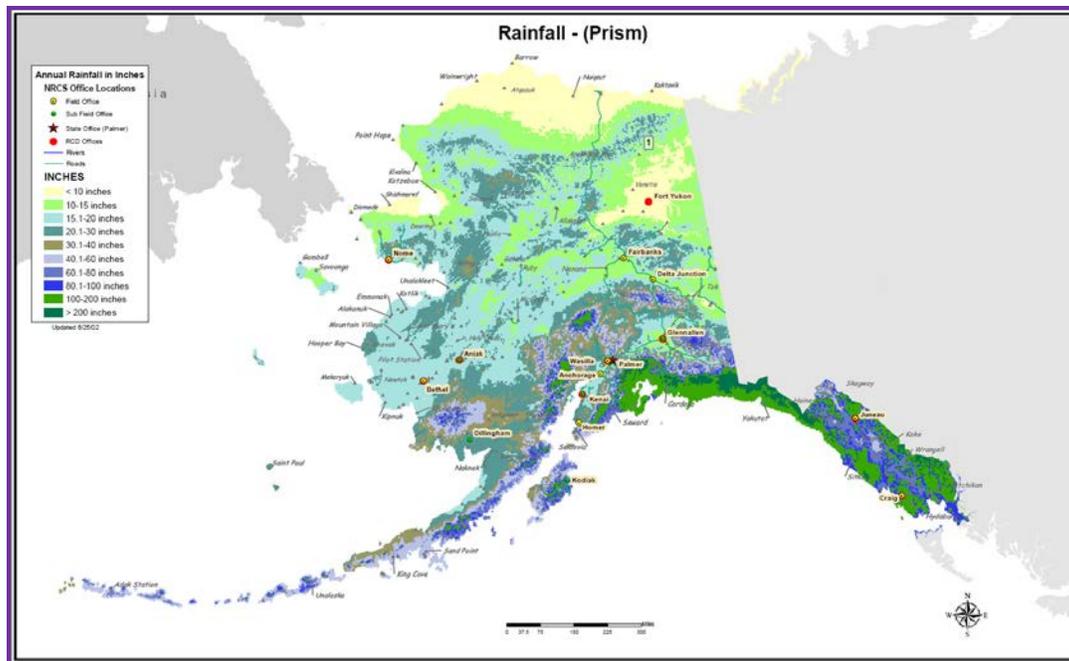


Figure 5-10 Alaska Rainfall Map (NRCS – PRISM 2012)

Figure 5-11 depicts the Yukon River Basin Regional annual precipitation.

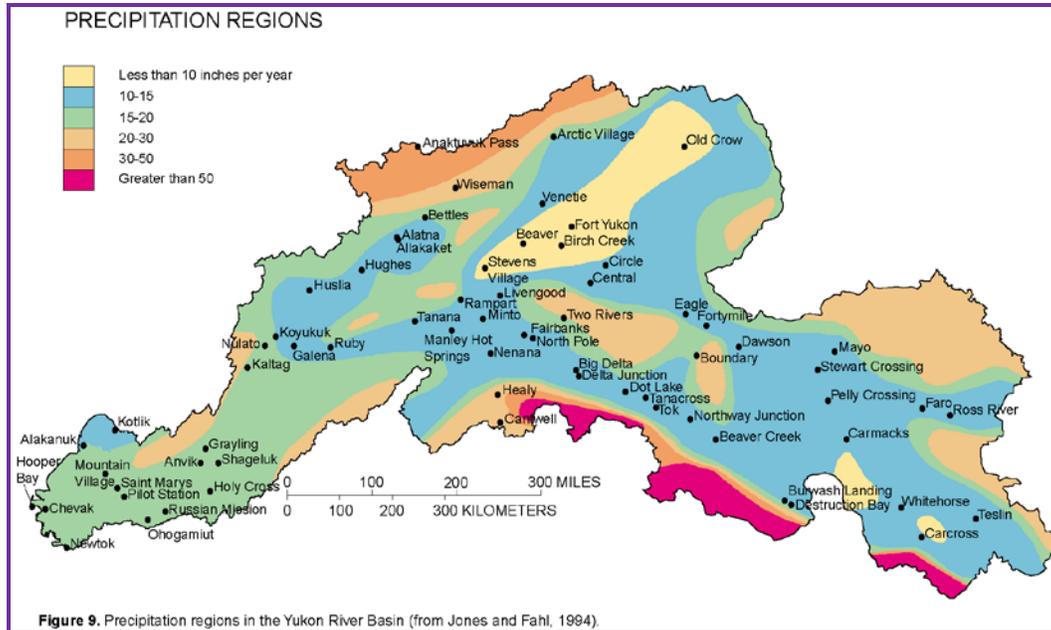


Figure 5-11 Yukon River Basin Precipitation Regions Map (USGS 2000)

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5.3.4.2 History

The City of Grayling continually experiences severe weather events. Hurricane force wind, ice storms, and cold typically have disastrous results.

Climate Change. The University of Alaska Fairbanks (UAF) Arctic Climate Impact Assessment describes recent weather changes and how they impact Alaska:

“18.3.3.1. Changes in climate

Alaska experienced an increase in mean annual temperature of about 2 to 3 °C between 1954 and 2003... Winter temperatures over the same period increased by up to 3 to 4 °C in Alaska and the western Canadian Arctic, but Chukotka experienced winter cooling of between 1 and 2 °C...

The entire region, but particularly Alaska and the western Canadian Arctic, has undergone a marked change over the last three decades, including a sharp reduction in snow-cover extent and duration, shorter river- and lake ice seasons, melting of mountain glaciers, sea-ice retreat and thinning, permafrost retreat, and increased active layer depth. These changes have caused major ecological and socio-economic impacts, which are likely to continue or worsen under projected future climate change. Thawing permafrost and northward movement of the permafrost boundary are likely to increase slope instabilities, which will lead to costly road replacement and increased maintenance costs for pipelines and other infrastructure. The projected shift in climate is likely to convert some forested areas into bogs when ice-rich permafrost thaws. Other areas of Alaska, such as the North Slope, are expected to continue drying. Reduced sea-ice extent and thickness, rising sea level, and increases in the length of the open-water season in the region will increase the frequency and intensity of storm surges and wave development, which in turn will increase coastal erosion and flooding...

18.3.3.4. *Impacts on people’s lives*

Traditional lifestyles are already being threatened by multiple climate-related factors, including reduced or displaced populations of marine mammals, seabirds, and other wildlife, and reductions in the extent and thickness of sea ice, making hunting more difficult and dangerous. Indigenous communities depend on fish, marine mammals, and other wildlife, through hunting, trapping, fishing, and caribou/reindeer herding. These activities play social and cultural roles that may be far greater than their contribution to monetary incomes. Also, these foods from the land and sea make significant contributions to the daily diet and nutritional status of many indigenous populations and represent important opportunities for physical activity among populations that are increasingly sedentary...” (ACIA 2014)

Table 5-12 summarizes temperature, precipitation, and snowfall trends for the Holy Cross WSO the closest proximity to the Grayling area represents the typical weather conditions which may have impacted Grayling.

HOLY CROSS, ALASKA (503655)													
Period of Record Monthly Climate Summary													
Period of Record : 1/ 1/1931 to 5/31/1975													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Average Max. Temperature (F)	8.4	13.4	21.0	37.1	52.7	65.4	66.7	61.6	52.7	35.8	20.0	8.8	37.0
Average Min. Temperature (F)	-7.0	-2.7	1.7	19.2	32.9	44.0	48.1	46.0	37.8	23.8	6.7	-6.1	20.4
Average Total Precipitation (in.)	0.92	1.13	1.02	0.63	0.90	1.24	2.07	3.79	2.80	1.42	1.05	0.97	17.92
Average Total SnowFall (in.)	13.9	12.8	10.5	6.3	0.3	0.0	1.9	0.0	0.0	5.1	12.9	12.4	76.0
Average Snow Depth (in.)	25	33	39	31	7	0	0	0	0	1	6	15	13
Percent of possible observations for period of record.													
Max. Temp.: 87.3% Min. Temp.: 87.3% Precipitation: 85.8% Snowfall: 84% Snow Depth: 72%													
Check Station Metadata or Metadata graphics for more detail about data completeness.													
Western Regional Climate Center, wrcc@dri.edu													

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Figure 5-12 WRCC Climate Summary-Holy Cross (WRCC 2015)

DHS&EM’s Disaster Cost Index records the following severe weather disaster events which may have affected the area:

“83. Omega Block Disaster, January 28, 1989 & FEMA declared (DR-00826) on May 10, 1989 The Governor declared a statewide disaster to provide emergency relief to communities suffering adverse effects of a record breaking cold spell, with temperatures as low as -85 degrees. The State conducted a wide variety of emergency actions, which included: emergency repairs to maintain & prevent damage to water, sewer & electrical systems, emergency resupply of essential fuels & food, & DOT/PF support in maintaining access to isolated communities.

119. Hazard Mitigation Cold Weather, 1990. *The Presidential Declaration of Major Disaster for the Omega Block cold spell of January and February 1989 authorized federal funds for mitigation of cold weather damage in future events. The Governor's declaration of disaster provided the State matching funds required for obtaining and using this federal money.*

156. Flood Response, June 9, 1992. *The Upper Yukon River drainage was experiencing the third worst snow melt flooding in recorded history according to the National Weather Service. The Declaration provided \$100,000.00 from the Disaster Relief Fund to cover DHS&EM expenses that began to occur as a result of the need to provide response activities and surveillance. An RSA was established with the Division of Environmental Quality, DEC to respond to and test for environmental contamination for assurance of public health.*

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

09-227, 2009 Spring Flood declared by Governor Palin on May 6, 2009 then FEMA declared under DR-1843 on June 11, 2009. *Extensive widespread flooding due to snow melt and destructive river ice jams caused by rapid spring warming combined with excessive snow pack and river ice thickness beginning April 28, 2009 and continuing. The ice jams and resultant water backup along with flood waters from snow melt left a path of destruction along 3,000 miles of interior rivers, destroying the Native Village of Eagle and forcing the evacuation of multiple communities. The following jurisdictions and communities in Alaska have been impacted: Alaska Gateway Rural Regional Educational Attendance Area (REAA) including the City of Eagle and Village of Eagle; the Copper River REAA including the Village Community of Chisotchina; the Matanuska-Susitna Borough; the Yukon Flats REAA including the City Community of Circle, and City of Fort Yukon, the Villages Communities of Chalkyistik, Beaver, Stevens Village, and Rampart; the Yukon-Koyukuk REAA including the Cities of Tanana, Ruby, Galena, Koyukuk, Nulato, and Kaltag; the Iditarod Area REAA including the Cities of McGrath, Grayling, Anvik, and Holy Cross; the Northwest Arctic Borough including the Cities of Kobuk, and Buckland; the Lower Yukon REAA including the Cities of Russian Mission, Marshall, Saint Mary's, Mountain Village, Emmonak, Alakanuk and Pilot Station and the Community of Ohogamiut; the Lower Kuskokwim REAA including the Cities of Bethel, Kwethluk, Napakiak, Napaskiak, and the Village Community of Oscarville; the Yupiit REAA including the City of Akiak, and the Villages of Akiachak, and Tuluksak; the Kuspuk REAA including the Cities of Aniak, Upper Kalskag, Lower Kalskag, and the Villages Communities of Stony River, Sleetmute, Red Devil, Crooked Creek, and Napaimute; the Fairbanks North Star Borough including the City of North Pole and Community of Salcha; the Bering Strait REAA including the City of Nome area.*

The Grayling area is continually impacted by severe weather. The UAF's Scenarios Network for Alaska and Arctic Planning depict the City's historic and future predicted precipitation and temperatures. (Figures 5-13 and 5-14) Note that both precipitation and temperature are projected to increase due to anticipated climatic changes. Rain and snow variations could dramatically

determine wildland fire potential as well as adversely impact future subsistence food source and wildlife habitat support capacity.

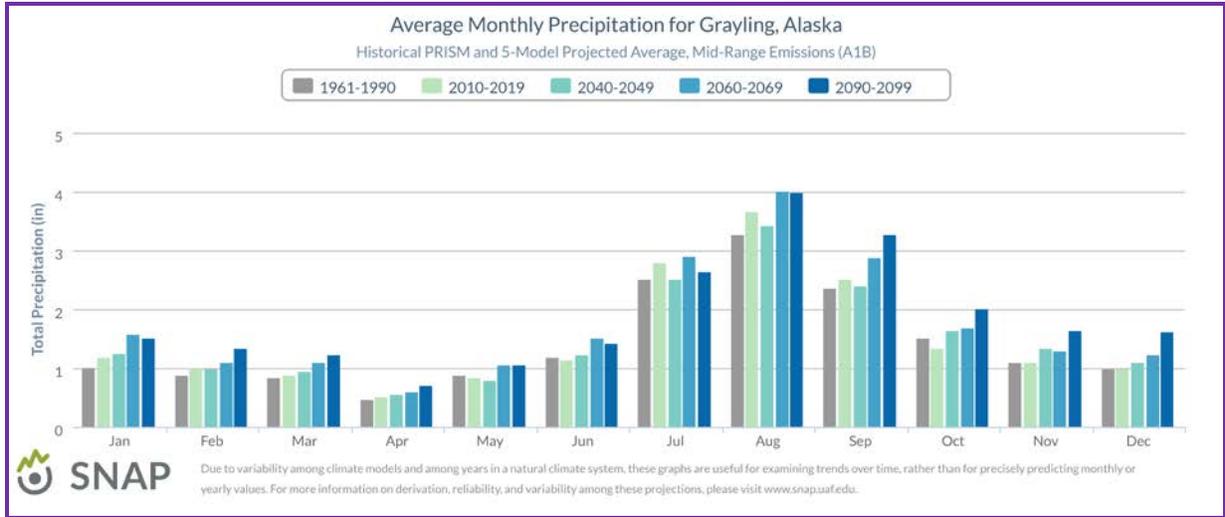


Figure 5-13 Grayling’s Historic and Predicted Precipitation (SNAP 2015).

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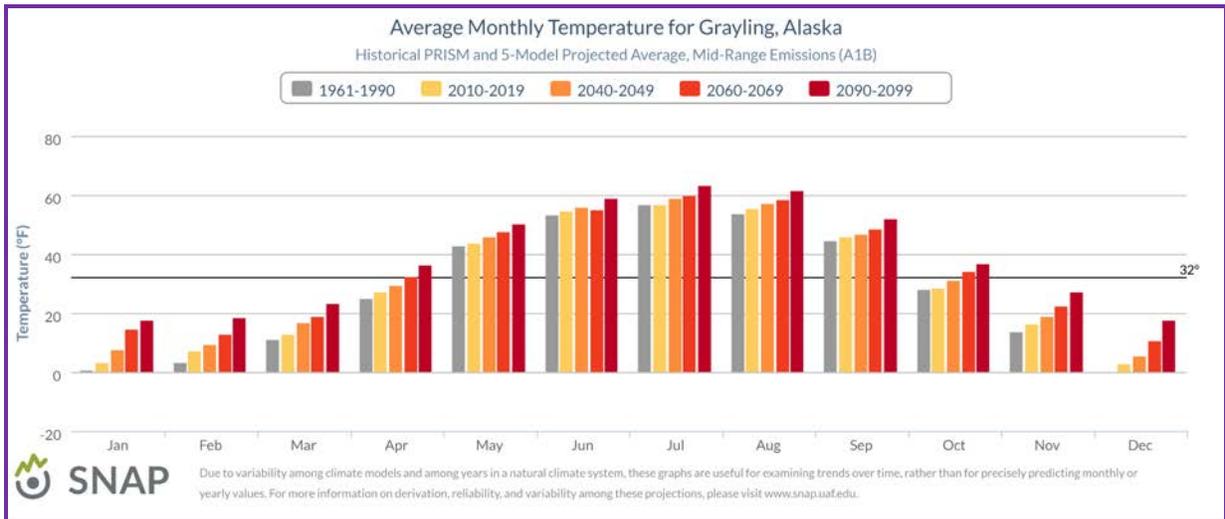


Figure 5-14 Grayling’s Historic and Predicted Temperatures (SNAP 2015)

Table 5-7 lists a representative sample of Grayling area major storm events the National Weather Service (NWS) identified for the Lower Yukon Valley’s Weather Zone. Each weather event may not have specifically impacted the Grayling area as it the identified locations.

These storm events are listed due to their close proximity to listed communities or by location within the identified zone.

Table 5-7 Severe Weather Events

Location	Date	Event Type	Magnitude
Lower Yukon Valley (Zone 215)	2/13/2013	Heavy Snow	Heavy snowfall, Lower and middle Yukon Valleys
Lower Yukon Valley (Zone 215)	1/12/2013	Ice Storm	Rain, Russian Mission , 0.21 inches fell
Lower Yukon Valley (Zone 215)	1/9/2012	Heavy Snow	Heavy snowfall Approximately 12 inches of snow was observed at the Anvik Post Office
Lower Yukon Valley (Zone 215)	12/18/2011	Heavy Snow	Heavy snowfall was observed in parts of the lower Yukon Valley; it was estimated by the city office in Russian Mission that 12 inches of snow fell
Lower Yukon Valley (Zone 215)	12/3/2011	Winter Storm	Heavy snow, blizzard conditions, high winds, freezing rain and snow; Heavy snow fell across the lower Yukon Valley; may have changed over to freezing rain at times, mainly from Anvik south. A storm total in excess of 12 inches was observed at Anvik
Lower Yukon Valley (Zone 215)	11/11/2011	Winter Storm	Heavy snowfall and strong winds in parts of southwest Alaska; Based on reports along the Yukon Delta and at Unalakleet it is likely that snowfall amounts of 8 to 12 inches were observed in parts of the lower Yukon Valley Peak wind gusts of 40 mph (34 kt) at the Holy Cross AWSS and 45 mph (38kt) at the Russian Mission AWSS likely produced significant blowing and drifting snow
Lower Yukon Valley (Zone 215)	11/3/2011	Winter Storm	Heavy snowfall and blizzard conditions across parts of southwest Alaska; Reports of snow drifts of 3 to 4 feet at Russian Mission. The snow was nearly impossible to measure due to considerable blowing and drifting snow Based on the observations at Russian Mission, Anvik, and Holy Cross it is likely that snowfall amounts of 6 to 12 inches were observed. The visibility was reduced to one quarter mile or less at Anvik at times, but the wind was not strong enough to support blizzard conditions
Lower Yukon Valley (Zone 215)	4/6/2011	Blizzard	Strong winds 61 mph (53 kt) and Heavy snowfall; Russian Mission estimated that 18 to 24 inches of snow fell during this event . Snow likely mixed with rain at time. There was also a period of blizzard conditions at Marshall . There was a peak wind gust of 61 mph (53 kt) at the Marshall AWSS with approximately 12 inches of snow
Lower Yukon Valley (Zone 215)	2/7/2011	Winter Storm	Heavy snow across parts of western Alaska and blizzard conditions along parts of the Seward Peninsula; Heavy snow at Anvik with a storm total of 8 inches . The snow may have changed to freezing rain at times at Holy Cross and Marshall as temperatures were just above freezing at times
Lower Yukon Valley (Zone 215)	1/17/2009	High Wind	High winds, heavy snow, blizzard conditions, and freezing rain, High winds were observed at the Marshall AWSS, Wind gusts to 63 mph (55kt) with periods of snow, but it is unknown how much snow accumulated. The Anvik had snow and blowing snow visibilities reduced to one quarter mile
Lower Yukon	1/13/2009	Winter	Blizzard conditions in parts of the Brooks Range; Based on the

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Table 5-7 Severe Weather Events

Location	Date	Event Type	Magnitude
Valley (Zone 215)		Storm	observations of near to above freezing temperatures from the Marshall and Russian Mission AWSS's, likely that the snow changed to freezing rain in spots, and the freezing rain likely accumulated in excess of a tenth of an inch in spots
Lower Yukon Valley (Zone 215)	4/3/2008	Winter Storm	Heavy snow likely fell over the Nulato hills o...with some period of rain and/or freezing rain. Snowfall amounts of 7 to 9 inches estimates of 6.8 inches for Kaltag
Lower Yukon Valley (Zone 215)	3/29/2008	Winter Storm	Heavy snow, particularly against the southern Nulato Hills ; snow to change to freezing rain; visibility, temperature, and precipitation amounts and occurrences from Russian Mission, Holy Cross, and Anvik , snowfall was likely that 6 to 8 inches fell over the southern portion of this zone...including the southern Nulato Hills.
Lower Yukon Valley (Zone)	1/29/1999	Cold/Wind Chill	Severe Cold and wind chill; Zone 8: Galena: -64 31st, Grayling: -58 31st , Unofficial: Kaiyuh (20E Kaltag) -69; No deaths or known injuries, however, much disruption of commercial air service to villages as piston engine craft could not fly at temperatures continuously below -40. Reports of some frozen sewer and water mains in a few villages. Overall financial impact of event is unknown. Event continued in February.

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(NWS 2013, WRCC 2013)

5.3.4.3 Location, Extent, Impact, and Recurrence Probability

Location

The entire area, which includes the City of Grayling, experiences periodic severe weather impacts. The most common area severe weather events are high winds and severe winter storms. Table 5-8 depicts a historic, representative sample of typical weather events that may have impacted the area.

Extent

The entire City is equally vulnerable to the severe weather effects. The City experiences severe storm conditions with moderate snow depths; wind speeds exceeding 65 mph; and extreme low temperatures that reach -58°F.

Based on past severe weather events and the criteria identified in Table 5-2, the extent of severe weather in the City are considered limited where injuries do not result in permanent disability, complete shutdown of critical facilities occurs for more than one week, and more than 10 percent of property is severely damaged.

Impact

The intensity, location, and the land's topography influence a severe weather event's impact within a community. High winds, rain, snow, and winter storms can be expected to impact the entire Grayling area.

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.

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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.

Recurrence Probability

Based on previous occurrences and the criteria identified in Table 5-3, 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.

5.3.5 Wildland Fire

5.3.5.1 Nature

A wildland fire is a wildfire type that spreads through vegetation consumption. 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 unattended burns 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 tundra fires, urban fires, interface or intermix fires, and prescribed burns.

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

Topography describes slope increases, which influences the rate of wildland fire spread increases. South-facing slopes are also subject to more solar radiation, making them drier and

thereby intensifying wildland fire behavior. However, ridge tops may mark the end of wildland fire spread since fire spreads more slowly or may even be unable to spread downhill.

Fuel is the type and condition of vegetation plays a significant role in the occurrence and spread of wildland fires. Certain types of plants are more susceptible to burning or will burn with greater intensity. Dense or overgrown vegetation increases the amount of combustible material available to fuel the fire (referred to as the “fuel load”). The ratio of living to dead plant matter is also important. Climate change is deemed to increase wildfire risk significantly during periods of prolonged drought as the moisture content of both living and dead plant matter decreases. The fuel load continuity, both horizontally and vertically, is also an important factor.

Weather is the most variable factor affecting wildland fire behavior is weather. Temperature, humidity, wind, and lightning can affect chances for ignition and spread of fire. Extreme weather, such as high temperatures and low humidity, can lead to extreme wildland fire activity. Climate change increases the susceptibility of vegetation to fire due to longer dry seasons. 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.

5.3.5.2 History

The Alaska Interagency Coordination Center (AICC) identified 14 wildland fires (mostly lightning caused fires) that occurred within 25 miles of the City (Table 5-8) of those fires that exceeded 10,000 acres with the largest one burning 644,380 acres and another burning 435,000 acres, both of which occurred in 1957.

Table 5-8 Historic Wildland Fires within 25 miles of Grayling

Fire Name	Fire Year	Estimated Acres	Latitude	Longitude	Cause
Grayling Creek	2005	45,930	62.75	-160.6375	Lightning
Goblet Creek	2002	3,891	62.90944	-160.4956	Lightning
Thompson Creek	2002	115	63.21833	-160.0808	Lightning
132687	1991	7,800	62.5166664	-160.3999939	Lightning
Kgx Nw 19	1985	400	63.2166672	-160.2166595	Lightning
Yellowhead	1972	1,000	63.25	-160.25	Lightning



Table 5-8 Historic Wildland Fires within 25 miles of Grayling

Fire Name	Fire Year	Estimated Acres	Latitude	Longitude	Cause
Yellow River	1972	100	62.9500008	-160.5500031	Lightning
Thompson Slough	1969	50,000	62.75	-159.75	Recreation
Anvik River 1	1962	8,000	62.7999992	-160.9499969	Lightning
Shageluk	1959	1,000	62.5	-159.6666718	Smoking
Shageluk E	1957	644,380	62.75	-158.5	Lightning
Anvik River	1957	405,500	63.25	-160.5	Lightning
Bonasila	1957	266,000	62.5	-161	Lightning
Holikachuk	1957	435,000	63.75	-158.8333282	Lightning

(AICC 2014)

Figure 5-15 depicts the Graylings historical fire locations and the largest fires’ perimeters, relative location, and potential threat to the City.

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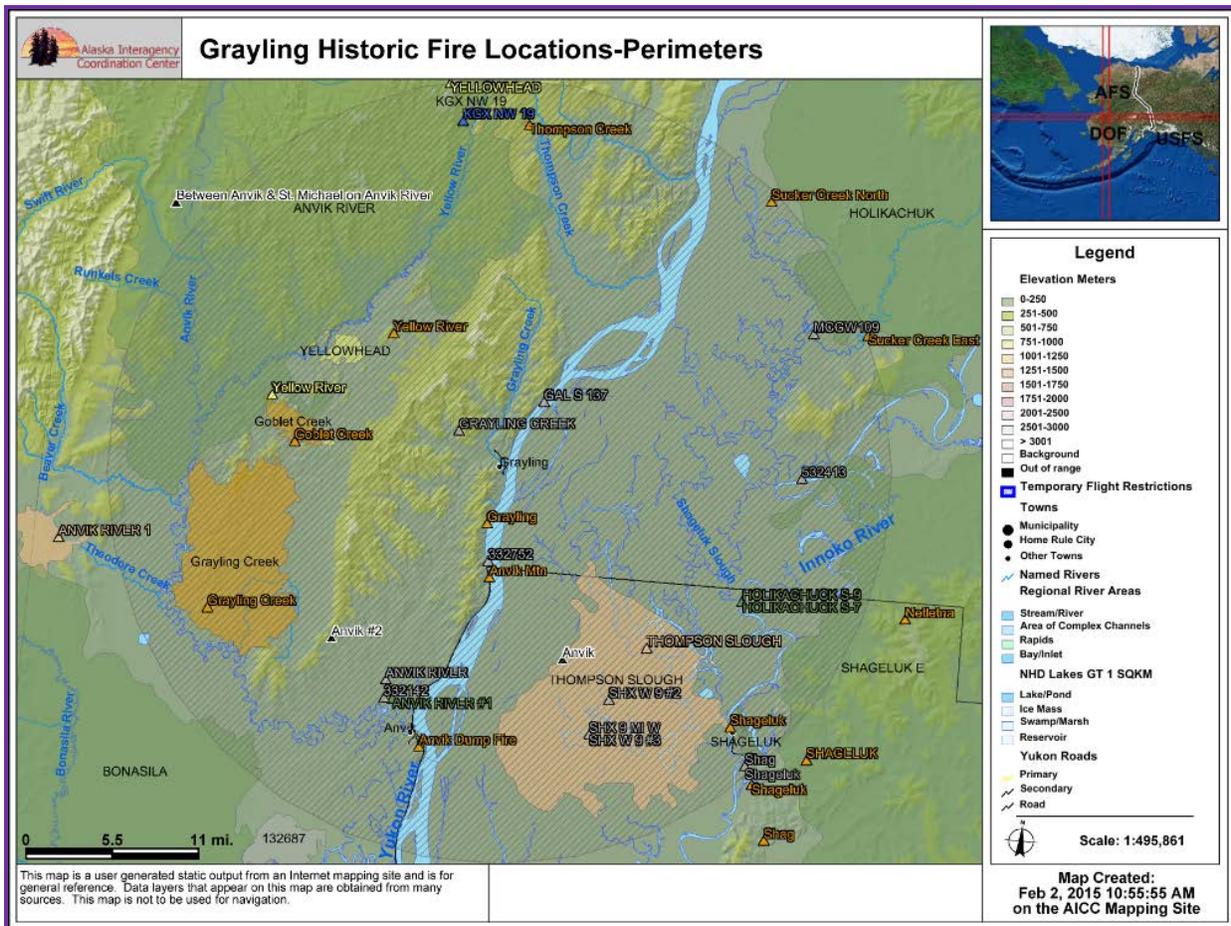


Figure 5-15 Grayling Area Historical Wildfire Locations (AICC 2014)

5.3.5.3 Location, Extent, Impact, and Recurrence Probability

Location

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

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.

The 1957 fires burned approximately 1,750,880 acres. These were lightning caused fire. It is difficult to determine the average number of acres burned as the fires were vastly different for each of the four wildland fire events identified in Table 5-9 (DOF 2012). An average based on such diverse data would easily be overstated.

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

Impact

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

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

Fire is recognized as a critical feature of the natural history of many ecosystems. It is essential to maintain the biodiversity and long-term ecological health of the land. The role of wildland fire as an essential ecological process and natural change agent has been incorporated into the fire management planning process and the full range of fire management activities is exercised in Alaska, to help achieve ecosystem sustainability, including its interrelated ecological, economic, and social consequences on firefighters, public safety and welfare; natural and cultural resources threatened; and the other values to be protected dictate the appropriate management response to the fire. In Alaska, and within 25 miles of the Grayling, the natural fire regime is characterized by a return interval of approximately 150 due to their tundra vegetation, gently rolling topography.

Recurrence Probability

An important issue related to the wildland or tundra fire probability is the interface fire is increased development along the community's perimeter, accumulation of hazardous wildfire fuels, and the uncertainty of weather patterns that may accompany climate change. These three combined elements are reason for concern and heightened mitigation management of each community's wildland interface areas, natural areas, and open spaces.

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Based on the history of wildland fires in the Grayling area and applying the criteria identified in Table 5-3, it is unlikely but possible a wildland fire event will occur within in the next ten years. The event has up to 1 in 10 years chance of occurring and the history of events is less than or equal to 10 percent likely each year. Climate change and flammable vegetation species are prolific throughout Alaska's forests and tundra locations. Fire frequency may increase in the future as a result.

Section Six outlines the vulnerability process for determining potential losses for the community from various hazard impacts.

6.1 VULNERABILITY ANALYSIS OVERVIEW

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

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

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



DMA 2000 Recommendations
<p>Assessing Risk and Vulnerability, and Analyzing Development Trends</p> <p>§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. <i>All plans approved after October 1, 2008 must also address NFIP insured structures that have been repetitively damaged by floods.</i> The plan should describe vulnerability in terms of:</p> <p>§201.6(c)(2)(ii)(A): The types and numbers of existing and future buildings, infrastructure, and critical facilities located in the identified hazard areas;</p> <p>§201.6(c)(2)(ii)(B): An estimate of the potential dollar losses to vulnerable structures identified in ... this section and a description of the methodology used to prepare the estimate.</p> <p>§201.6(c)(2)(ii)(C): Providing a general description of land uses and development trends within the community so that mitigation options can be considered in future land use decisions.</p> <p>§201.6(c)(2)(iii): For multi-jurisdictional plans, the risk assessment section must assess each jurisdiction's risks where they vary from the risks facing the entire planning area.</p>
1. REGULATION CHECKLIST
ELEMENT B. Risk Assessment, Assessing Vulnerability, Analyzing Development Trends
B3. Is there a description of each identified hazard's impact on the community as well as an overall summary of the community's vulnerability for each jurisdiction? (Requirement §201.6(c)(2)(ii))
B4. Does the Plan address NFIP insured structures within each jurisdiction that have been repetitively damaged by floods?
C2. Does the Plan address each jurisdiction's participation in the NFIP and continued compliance with NFIP requirements, as appropriate? (Requirement §201.6(c)(3)(ii))
Source: FEMA, March 2015

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

- A summary of the community’s vulnerability to each hazard that addresses the impact of each hazard on the community.
- Identification of the types and numbers of RL properties in the identified hazard areas.
- An identification of the types and numbers of existing vulnerable buildings, infrastructure, and critical facilities and, if possible, the types and numbers of vulnerable future development.
- Estimate of potential dollar losses to vulnerable structures and the methodology used to prepare the estimate.

Table 6-1 lists the City of Grayling infrastructures’ hazard vulnerability.

Table 6-1 Vulnerability Overview

Hazard	Area’s Hazard Vulnerability			
	Percent of Jurisdiction’s Geographic Area	Percent of Population	Percent of Building Stock	Percent of Critical Facilities and Utilities
Earthquake	100	100	100	100
Flood	10	5	10	7
Ground Failure	100	100	100	100
Weather	100	100	100	100
Wildland Fire	100	100	100	100

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6.2 LAND USE AND DEVELOPMENT TRENDS

6.2.1 Land Use

There is limited land use data available for Grayling. The community is predominately residential with limited area for commercial services and community (public) facilities. Suitable developable vacant land is in short supply within the boundaries of the City. One area of town is classified as airport land use.

The Tanana Chief Conference provides a Land Status Map (Figure 6-1) for Grayling, Alaska. The map depicts private, native allotments, ANCSA selected and convey, Federal, and State land ownership.

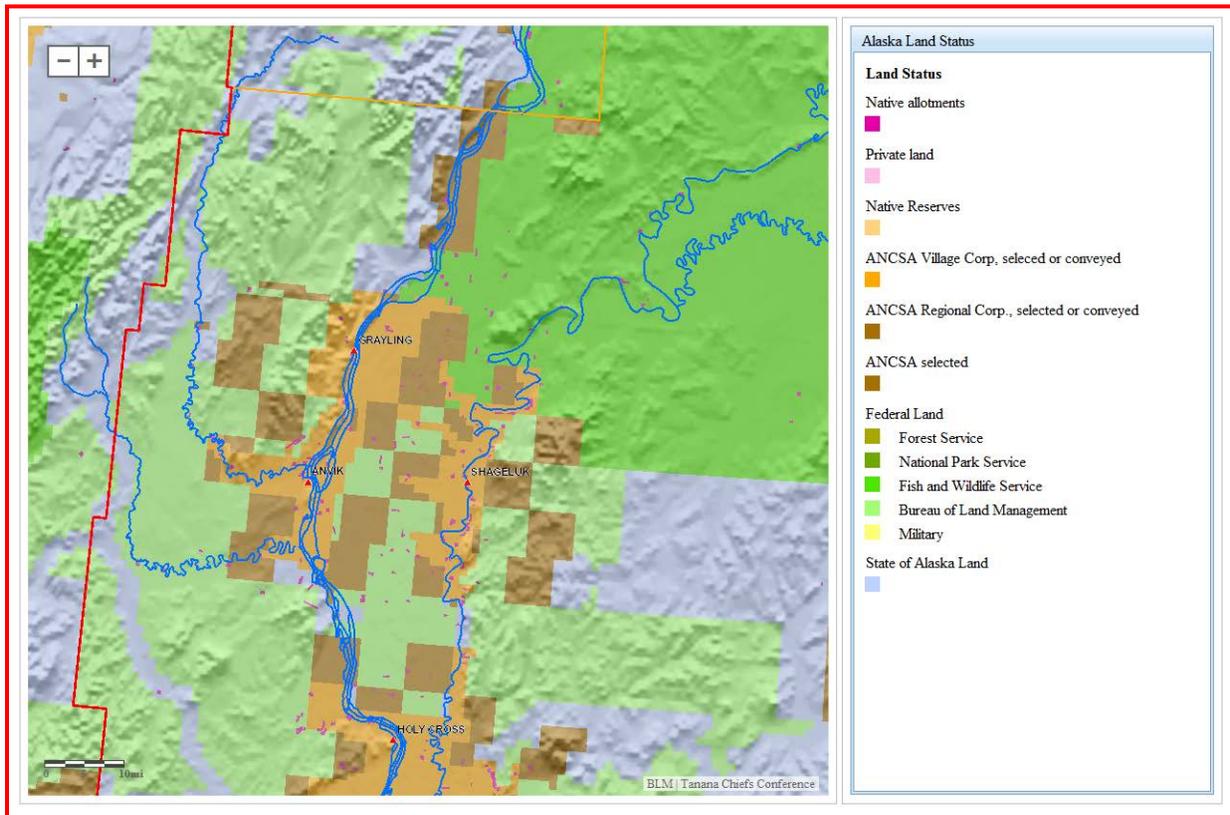


Figure 6-1 Grayling Area Land Ownership Status Map (TCC 2015)

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6.3 EXPOSURE ANALYSIS FOR CURRENT ASSETS

6.3.1 Asset Inventory

Asset inventory is the first step of a vulnerability analysis. Assets that may be affected by hazard events include population (for community-wide hazards), residential buildings (where data is available), and critical facilities and infrastructure.

6.3.1.1 Population and Building Stock

Population data for the City were obtained from the 2010 U.S. Census and 2014 DCRA certified data. The U.S. Census reports the City’s total population for 2010 as 194 and 2014 DCRA data reported a population of 188 (Table 6-2).

Table 6-2 Estimated Population and Building Inventory

Population		Residential Buildings	
2010 Census	DCCED 2014 Data	Total Building Count	Total Value of Buildings ¹
194	191	67	U.S. Census \$8,971,300 City: \$16,750,000

¹ Sources: U.S. Census 2010, and 2014 DCRA population data. US Census listed median housing value at \$133,900. The Project Team determined that the average structural replacement value of all single-family residential buildings is \$250,000.

Estimated replacement values for those structures, as shown in Table 6-2, were obtained from the 2010 U.S. Census, and 2014 DCCED/DCRA certified estimate.

The Planning Team stated that residential replacement values are generally understated because replacement costs exceed Census structure estimates due to material purchasing, barge or airplane delivery, and construction in rural Alaska. The Planning Team estimates an average 30ft by 40 ft (1,200 sq ft) residential structure costs \$250,000. A total of 67 single-family residential buildings were considered in this analysis.

6.3.1.2 Existing Infrastructure

Various regional plans provide a glimpse into rural Alaska’s survival challenges such as transportation, a clean unpolluted water system, and access to reasonable health environment. For example,

The Yukon River Inter-Tribal Watershed Council, Yukon River Unified Watershed Assessment, June 2002 describes Grayling’s infrastructure as:

“The community water supply is derived from an infiltration gallery on the Grayling River. The water is then piped to the homes. Access to Grayling is by airplane or boat during the open water months.” (YRITWC 2002.)

The Yukon-Kuskokwim Delta Transportation plan Summary provides insight for area transportation and other normal urban services...:

*“Department of Transportation and Public Facilities (DOT&PF) staff and project consultants worked with Yukon–Kuskokwim (Y-K) Delta villages, businesses, and an Advisory Committee of regional leaders over the last three years to analyze the region’s transportation networks and determine future demand on the networks. The planning team also examined alternatives to the existing systems, including highway and railroad routes from interior Alaska to Bethel. **Small populations in the region and relatively low freight volumes combined with long distances to the state’s rail and highway connections and challenging construction conditions to make these alternatives impractical within the Y-K Delta Plan’s 20-year horizon.***

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[Note photo from Y-KDTP 2002: Typical transportation methods throughout rural Alaska... walking, ATV, and snowmachine. Wet terrain requires using boardwalks in lieu of a roads]

Out on the coast, line-haul barges stand off the shallow coastal waters, loading shallow draft lightering barges that transport fuel and goods to individual villages. Line-haul

barges also call at St. Michael, which then serves lower Yukon River villages with river barges...

The distances and challenging terrain between Y-K Delta population centers and the state highway system preclude highway construction as a major transportation strategy. Airport development is the plan’s most important transportation issue.

In a region lacking highways, residents travel by plane five times more frequently per person than the national average. Aircraft are also the prime means to deliver goods (mail and cargo) normally delivered by truck in the rest of the country...

The team found that constructing new roads in the Y-K Delta’s coastal and tundra sections is not cost effective. Despite the short distances between some villages, the area’s **prevailing wetland/permafrost soils**, frequent need for structures, high mobilization costs for contractors, and absence of gravel sources combine to create **construction costs that range from \$2.5 to \$4.0 million per mile** using a recent design report for the Napakiak to Bethel cost estimates as a base model...

Due to road construction costs and community preferences, aircraft, snow machines, boats, and barges will continue to be the primary inter-village modes of transport in the coastal and tundra portions of the Y-K Delta” (Y-KDTPb 2002).

The Alaska Village Electric Cooperative (AVEC) describes Grayling’s community facilities as having piped water and wastewater. The obtain potable water from a ground water infiltration gallery, then treating, storing and using piped distribution throughout the community. AVEC provides electrical power from an aging power facility (Figure 6-



Figure 6-2 AVEC Power Generation Facility (AVEC 2015)

Table 6-3 list the City’s identified “completed” infrastructure improvement projects. They provide a depiction of the community’s ongoing development trends and focus toward improving aging infrastructure.

FISCAL YEAR	AGENCY	STATUS	PROJECT DESCRIPTION	FUNDED STAGE	TOTAL COST
2009	Housing and Urban Development (HUD)	Funded	Indian Housing Block Grant (IHBG) - Comments: Native American Housing Assistance and Self Determination Act (NAHASDA) administration, operating & construction funds	Contract	\$169,448
2009	Department of Transportation (DOT) and Public Facilities (PF)	Funded	Airport Improvements - Legislative Grant	Preliminary	\$1,560,000
2008	HUD	Funded	IHBG/NAHASDA administration, operating & construction funds	Design	\$153,878

Table 6-3 Grayling's Completed Capital Improvement Project List

FISCAL YEAR	AGENCY	STATUS	PROJECT DESCRIPTION	FUNDED STAGE	TOTAL COST
2008	DCRA	Funded	Community Hall Improvements - Legislative Grant	Construction	\$40,000
2008	DOT/PF	Funded	Airport Reconstruction - Legislative Grant	Completed	\$2,500,000
2007	HUD	Funded	IHBG/NAHASDA administration, operating & construction funds	Construction	\$180,706
2006	HUD	Funded	Indian Housing Block Grant (IHBG) - Comments: Native American Housing Assistance and Self Determination Act (NAHASDA) administration, operating & construction funds	Completed	\$182,414
2005	ANTHC	Funded	Water System Improvements	Preliminary	\$1,238,800
2005	DOT&PF	Funded	Airport Bridge Repair the Grayling Airport Bridge	Construction	\$2,200,000
2005	HUD	Funded	IHBG/NAHASDA administration, operating & construction funds	Completed	\$179,426
2005	Department of Education and Early Development (DEED)	Funded	David Louis Memorial School Emergency Repairs & Boiler Relocation, Grayling	Construction	\$180,128
2005	Department of Community and Regional Affairs (DCRA)	Funded	Community Projects & Improvements - Capital Matching	Completed	\$26,197
2005	Alaska Native Tribal Health Consortium (ANTHC)	Funded	WTP and lift station upgrades	Complete	\$644,700
2005	Alaska Housing Authority (AHFC)	Funded	1 SF unit rehab Supplemental Housing Program	Completed	\$60,691
2004	HUD	Funded	IHBG/NAHASDA administration, operating & construction funds	Completed	\$194,918
2004	ANTHC	Funded	Buried water and sewer service lines to three like new homes.	Complete	\$161,300
2004	DOT/PF	Funded	Community Roads - Improve roads	Completed	\$100,000
2003	HUD	Funded	IHBG/NAHASDA administration, operating & construction funds	Completed	\$113,908
2003	DCRA	Funded	Facility Renovation - Capital Matching	Completed	\$26,316
2003	DCRA	Funded	Roads Upgrade - Capital Matching	Completed	\$26,316
2003	DCRA	Funded	City Equipment Repair - Capital Matching	Completed	\$26,316
2002	ANTHC	Funded	Rural health clinic construction. This project is managed by YKHC and funded by the Denali commission. Clinic construction complete.	Complete	\$792,195

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Table 6-3 Grayling's Completed Capital Improvement Project List					
FISCAL YEAR	AGENCY	STATUS	PROJECT DESCRIPTION	FUNDED STAGE	TOTAL COST
2002	Denali Commission	Funded	Clinic Construction (Split Award) The scope of work for this project is the construction of the Grayling Health Clinic. This project was awarded under Amendment No. 1, and received supplemental funds from award 0100-DC-2003-113.	Project Close-out Complete	\$1,319,155
2002	HUD	Funded	Primary Care Facility - ICDBG Program.	Completed	\$500,000
2002	HUD	Funded	IHBG/NAHASDA administration, operating & construction funds	Completed	\$105,494
2002	DEED	Funded	David Louis Memorial School Asbestos Abatement & Demolition	Completed	\$305,768
2002	ANTHC	Funded	Water and sewer service lines to 4 new homes. 2006 Q1: Project closeout initiated and progressed. 2006 Q2: Project closeout will be completed.	Complete	\$160,000
2002	DCRA	Funded	Washeteria Building Construction - Capital Matching	Completed	\$10,000
2002	US Bureau of Indian Affairs (BIA)	Funded	Bridge Project	Completed	\$32,500
2002	DOT/PF	Funded	Airport Reconstruction, Stage 2	Design	\$7,000,000
2000	HUD	Funded	IHBG/NAHASDA administration, operating & construction funds	Completed	\$104,517
1999	HUD	Funded	IHBG/NAHASDA administration, operating & construction funds	Completed	\$104,517
1999	DEED	Funded	Gym Ceiling Replacement Project	Completed	\$48,970
1999	DCRA	Funded	Washeteria Building Capital Matching. Balance Remaining of \$1,644.42 Reappropriated, (R/R FY04, Ch82, pg 92, line 4-10)	Completed	\$11,513
1998	HUD	Funded	Indian Housing Block Grant - NAHASDA administration, operating & construction funds	Completed	\$116,642
1998	DCRA	Funded	Washeteria Building - Capital Matching	Completed	\$13,158
1998	DCRA	Funded	Electrical Distribution Project and Wiring of the Teen Center and the Washeteria Building - Legislative Grant	Completed	\$38,259
1998	DOT/PF	Funded	Landfill Access Road Construction Construct sanitation road to proposed landfill, in conjunction with PHS/ANTHC project	Completed	\$690,000
1998	DCRA	Funded	Heavy Equipment Repair Capital Matching. Balance Remaining of \$1,963.63 Reappropriated, (R/R FY04, Ch82, pg 92, line 4-10), Unrecovered Advance \$6,792.02	Completed	\$10,691
1997	DCRA	Funded	Teen Center Capital Matching. Grant has not been executed. Also applied for FY 96 RDA grant	Completed	\$13,158

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Table 6-3 Grayling's Completed Capital Improvement Project List

FISCAL YEAR	AGENCY	STATUS	PROJECT DESCRIPTION	FUNDED STAGE	TOTAL COST
1997	DCRA	Funded	Washeteria Building - Capital Matching	Completed	\$13,158
1997	Alaska Energy Authority (AEA) /Bulk Fuel (BF)	Funded	Consolidated Bulk Fuel Facility OTHER FUNDING: EPA funds \$850K. Completed November 1998.	Completed	\$1,100,000
1996	DCRA	Funded	Washeteria Building - Capital Matching	Completed	\$26,316
1996	US Department of Agriculture (USDA) / Rural Development (RD)	Funded	Solid Waste Site Improvements & In-home Plumbing ANTHC project \$488.0. Current site is out of compliance and too close to airport. Also provide water & sewer connections to 28 homes	Completed	\$712,000
1995	DCRA	Funded	Teen Center Design & Construction - Capital Matching	Completed	\$25,316
1995	DOT/PF	Funded	Airport Snow Removal Equipment - Dozer	Completed	\$88,000
1994	DCRA	Funded	Clinic Foundation Repair - Capital Matching	Completed	\$13,158
1994	DCRA	Funded	Washeteria Upgrade - Capital Matching	Completed	\$13,158
1994	DOT/PF	Funded	Airport Improvements Ph III	Completed	\$2,755,481
1993	DCRA	Funded	Electrical Distribution Project - Legislative Grant	Completed	\$50,000
1993	Federal Aviation Administration (FAA)	Funded	Install Runway Lighting OTHER FUNDING: DOT/PF	Completed	\$302,813
1993	FAA	Funded	Extend Runway OTHER FUNDING: DOT/PF	Completed	\$79,688
1993	FAA	Funded	Improve Access Road - OTHER FUNDING: DOT/PF	Completed	\$252,875
1993	FAA	Funded	Improve Snow Removal Equipment Building - OTHER FUNDING: DOT/PF	Completed	\$85,000
1993	FAA	Funded	Construct Apron OTHER FUNDING: DOT/PF	Completed	\$236,938
1993	FAA	Funded	Acquire Snow Removal Equipment OTHER FUNDING: DOT/PF	Completed	\$151,532
1993	FAA	Funded	Improve Runway Safety Area OTHER FUNDING: DOT/PF	Completed	\$1,480,350
1993	HUD/CGP	Funded	Housing Modernization Attic insulation, HRV, boiler, seal crawlspace	Completed	\$147,248
1990	DOT&PF	Funded	Airport Improvements Ph II	Completed	\$1,262,585
1990	DCRA	Funded	Baseball Field & Picnic Area - Legislative Grant	Completed	\$80,133

(DCRA 2013)

6.3.1.3 Grayling's Critical Facilities

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

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- Government facilities, such as city and tribal administrative offices, departments, or agencies
- Emergency response facilities, including police department and firefighting equipment
- Educational facilities, including K-12
- Care facilities, such as medical clinics, congregate living health, residential and continuing care, and retirement facilities
- Community gathering places, such as community and youth centers
- Utilities, such as electric generation, new bulk fuel tank farm (Figure 6-3), communications, water and waste water treatment, sewage lagoons, landfills



Figure 6-3 New AVEC Bulk Fuel Tank Farm (AVEC 2015)

The City’s critical facilities and infrastructure are listed in Table 6-4.

Table 6-4 Critical Facilities and Infrastructure

Facilities	Number of Occupants	Facilities	Address	Latitude	Longitude	Estimated Value	Building Type	Earthquake	Flood	Ground Failure	Severe Weather	Tundra/Wildland Fire
								X	X	X	X	X
Government	2	City Office (Post Office)	E Street	62.90759	-160.06426	\$500,000	Log structure	X	X	X	X	X
	7	IRA Council Office & Multi-Purpose Building	C Street	62.90556	-160.0623	\$1,710,000	Log structure	X	X	X	X	X
	3	Village Corp. Office	Third Street	62.90759	-160.06426	\$300,000	W2	X	X	X	X	X
Emergency Response	0	None (Volunteer Only)										
Education	53	David Louis Memorial School	D Street	62.90631	-160.06354	\$534,866	W2	X	X	X	X	X
	0	School Mechanical Building	D Street	62.904.864	-160.064042	\$25,000	W1	X	X	X	X	X
Medical	2	Grayling Clinic	E Street	62.90759	-160.06426	\$2,118,159	W1	X	X	X	X	X

Table 6-4 Critical Facilities and Infrastructure

Facilities	Number of Occupants	Facilities	Address	Latitude	Longitude	Estimated Value	Building Type	Earthquake	Flood	Ground Failure	Severe Weather	Tundra/Wildland Fire	
Community	0	Arctic Mission Church	Third Street	62.904946	-160.06722	\$150,000	W1	X	X	X	X	X	
	0	Episcopal Building (Church)	C Street	62.90452	-160.06491	\$350,000	W2	X	X	X	X	X	
	0	New IRA Multi-Purpose Center	C Street	62.904952	-160.06470	\$0	W2	X	X	X	X	X	
	3	Grayling Native Store	C Street	62.90568	-160.06351	\$250,000	W2	X	X	X	X	X	
	2	City Bingo Hall	Third Street	62.906539	-160.06660	\$250,000	W2	X		X	X	X	
	0	Teen Center	E Street	62.906026	-160.06555	\$37,500	W1	X		X	X	X	
	0	Ball Park (Storage Area)	3rd Street	62.90631	-160.06352	\$52,058	N/A	X		X	X	X	
	0	Cemetery	Cemetery Lane	62.91428	-160.06737	\$20,000	N/A	X		X	X	X	
Roads	0	<i>Approximately 4.5 road miles @ \$1M/mile due to equipment mobilization and demobilization:</i>				\$4,500,000	HRD 1						
		1st Street	930	N/A	N/A	Gravel							
		2nd Street	592										
		3rd Street	4850										
		B Street	143										
		C Street	656										
		D Street											
		E Street	384										
		F Street	419										
		G Street	429										
		Cemetery Lane	2800										
		Gravel Pit Road	571										
		Hill Street	2000										
		Landfill Road	8751										
	Winter Trail	Undefined											

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Table 6-4 Critical Facilities and Infrastructure

Facilities	Number of Occupants	Facilities	Address	Latitude	Longitude	Estimated Value	Building Type	Earthquake	Flood	Ground Failure	Severe Weather	Tundra/Wildland Fire
Bridges	0	Airport Road Bridge	3rd Street	62.90096	-160.06753	\$2,200,000	Undefined	X		X	X	X
Transportation	0	Airport, Gravel Runway	Airport Road	62.8976	-160.0644	\$17,177,855	ARW	X		X	X	X
	0	DOT Maintenance Building	Airport Apron	62.897901	-160.06886	\$1,000,000	S1L	X		X	X	X
	0	City Maintenance Shop	Third Street	62.90631	-160.06402	\$40,000	S1L	X		X	X	X
	0	City Shop	3rd Street	62.905701	-160.06641	\$25,000	W1	X		X	X	X
Utilities	2	AVEC Power Generation Facility	Hill Street	62.9074	-160.06298	\$1,200,000	EPPS	X		X	X	X
	0	AVEC Fuel Storage	Hill Street	62.90739	-160.06265	\$1,100,000	OTF	X		X	X	X
	0	School Generator	E Street	62.90631	-160.06352	\$45,000	EPPS	X		X	X	X
	0	Grayling Water System Well	E Street	62.90679	-160.0663	\$45,000	PWE	X		X	X	X
	3	Potable Water Production and Treatment Facility	Hill Street	62.907327	-160.06525	\$1,100,000	PWTS	X		X	X	X
	0	PHS Pump House	E Street	62.90679	-160.06272	\$85,000	PPSB	X		X	X	X
	0	Piped Water System	Citywide	citywide	citywide	\$1,200,000	PWPB	X		X	X	X
	0	Landfill	Grayling Landfill Road	62.89231	-160.06448	\$500,000	Undefined	X		X	X	X
	0	Gravel Pit	Gravel Pit Road	62.92981	-160.10425	Undefined	Undefined	X		X	X	X
	0	Sewage Lagoon	3rd Street	62.91428	-160.06737	\$450,000	WWTS	X		X	X	X
	0	Satellite	Undefined	62.90759	-160.06426	\$30,000	CBO	X		X	X	X
	0	Telephone (Bush-Tel Inc.)	Third Street	62.90759	-160.06426	\$35,000	CBO	X		X	X	X
Total Occ	77					Total Estimated Value	\$37,030,438					

(Grayling 2015, DHS&EM 2009a)

6.4 REPETITIVE LOSS PROPERTIES

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

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DMA 2000 Requirements
<p>Addressing Risk and Vulnerability to NFIP Insured Structures</p> <p>§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. <i>All plans approved after October 1, 2008 must also address NFIP insured structures that have been repetitively damaged by floods. The plan should describe vulnerability in terms of:</i></p> <p>§201.6(c)(2)(ii)(A): The plan should describe vulnerability in terms of] the types and numbers of existing and future buildings, infrastructure, and critical facilities located in the identified hazard areas;</p> <p>§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;</p> <p>§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.</p> <p>§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.</p>
1. REGULATION CHECKLIST
ELEMENT B. NFIP Insured Structures
B4. Does the Plan address NFIP insured structures within the jurisdiction that have been repetitively damaged by floods?
C2. Does the Plan address each jurisdiction's participation in the NFIP and continued compliance with NFIP requirements, as appropriate?
Source: FEMA, March 2015

6.4.1.1 NFIP Participation

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

6.5 VULNERABILITY ANALYSIS METHODOLOGY

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

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

Replacement structure and contents values were determined by the community for their physical assets. The community’s aggregate exposure was calculated by assuming the worst-case scenario (that is, the asset would be completely destroyed and would have to be replaced) for each physical asset located within a hazard area. A similar analysis was used to evaluate the proportion of the population at risk. However, the analysis simply represents the number of people at risk; no estimate of the number of potential injuries or deaths was prepared.

6.6 DATA LIMITATIONS

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

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

6.7 VULNERABILITY EXPOSURE ANALYSIS

There is limited GIS data available for the City Grayling. Therefore, infrastructure loss estimations were developed by Planning Team for Table 6-4 and are summarized in Tables 6-5 and 6-6. The following discussion contains data analysis and information obtained from the Project Team.



Table 6-5 Potential Hazard Exposure Analysis – Critical Facilities

Hazard Type	Methodology	Government		Educational		Medical		Community	
		# Bldgs/ # Occ	Value (\$)						
Earthquake	Descriptive	3/12	2,510,000	2/53	10,025,000	1/2	2,118,159	8/5	1,109,558
Flood	Descriptive	2/9	2,210,000	2/53	10,025,000	1/2	2,118,159	4/3	750,000
Ground Failure	Descriptive	3/12	2,510,000	2/53	10,025,000	1/2	2,118,159	8/5	1,109,558
Severe Weather	Descriptive	3/12	2,510,000	2/53	10,025,000	1/2	2,118,159	8/5	1,109,558
Wildland Fire	Descriptive	3/12	2,510,000	2/53	10,025,000	1/2	2,118,159	8/5	1,109,558

Table 6-6 Potential Hazard Exposure Analysis – Critical Infrastructure

Hazard Type	Methodology	Roads		Bridges		Transportation Facilities		Utilities	
		Miles	Value (\$)	No.	Value (\$)	# Bldgs/ # Occ	Value (\$)	# Bldgs/ # Occ	Value (\$)
Earthquake	Descriptive	4.5	4,500,000	1	2,200,000	4/0	18,242,855	12/5	5,790,000
Flood	Descriptive	1.5	250,000	1	2,200,000	0/0	0	0/0	0
Ground Failure	Descriptive	4.5	4,500,000	1	2,200,000	4/0	18,242,855	12/5	5,790,000
Severe Weather	Descriptive	4.5	4,500,000	1	2,200,000	4/0	18,242,855	12/5	5,790,000
Wildland Fire	Descriptive	4.5	4,500,000	1	2,200,000	4/0	18,242,855	12/5	5,790,000

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6.7.1 Exposure Analysis – Hazard Narrative Summaries

Earthquake

The City and surrounding area can expect to experience moderate earthquake ground movement that may result in infrastructure damage. Intense shaking may be seen or felt based on past events. Although all structures are exposed to earthquakes, buildings within the City constructed with wood have slightly less vulnerability to the effects of earthquakes than those with masonry. Based on earthquake probability (PGA) maps produced by the USGS, the entire City area is at risk of experiencing moderate earthquake impacts as a result of its close proximity to known earthquake faults.

The probability is “Highly Likely” (high) (see Section 5.3.1.3) that impacts to the community such as “severe” ground movement may result in infrastructure damage and personal injury.

The entire existing, transient, and future population, residential structures, and critical facilities are exposed to the effects of potentially “severe” earthquake events. This includes approximately:

- 191 people in 67 residences (approximate value \$16,750,000)
- 12 people in three government and emergency response facilities (approximate value \$2,510,000)
- 53 people in two educational facilities (approximate value \$10,025,000)
- Two people in one medical facility (approximate value \$2,118,159)
- Five people in eight community facilities (approximate value \$1,109,558)
- 4.5 road system miles (approximate value \$4,500,000)
- One bridge (approximate value \$2,200,000)
- Zero people in four transportation facilities (approximate value \$18,242,855)
- Five people in 12 utility facilities (approximate value \$5,790,000)

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

Flood

Typical flood impacts associated include structures and contents water damage, roadbed, embankment, and coastal erosion, boat strandings, areas of standing water in roadways. Flood events may also damage or displace 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 pass-through an open area under the main floor of a building) are more vulnerable to flood impacts (see Section 5.3.2.3).

The USACE Floodplain Manager does not provide flood information or a 100 year floodplain map for Grayling, There is a flood history for Grayling with the 1985 ice jam flood as their most

recent event. Therefore there is potential for future flooding if conditions recur that are similar to their historical floods. Flooding or erosive scour could potentially impact approximately:

- 75 people in 25 residences (approximate value \$6,250,000)
- Nine people in two government and emergency response facilities (approximate value \$2,210,000)
- 53 people in two educational facilities (approximate value \$10,025,000)
- Two people in one medical facility (approximate value \$2,118,159)
- Three people in four community facilities (approximate value \$750,000)
- 1.5 road system miles (approximate value \$250,000)
- One bridge (approximate value \$2,210,000)

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

Ground Failure

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

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

Ground Failure hazards periodically cause structure and infrastructure displacement due to ground shifting, sinking, and upheaval. According to mapping completed by the DGGs, Grayling has limited permafrost (see Section 5.3.3.3). There have been periodic but minor ground failure incidents in Grayling. Potentially threatened facilities and individuals include:

- 191 people in 67 residences (approximate value \$16,750,000)
- 12 people in three government and emergency response facilities (approximate value \$2,510,000)
- 53 people in two educational facilities (approximate value \$10,025,000)
- Two people in one medical facility (approximate value \$2,118,159)
- Five people in eight community facilities (approximate value \$1,109,558)

- 4.5 road system miles (approximate value \$4,500,000)
- One bridge (approximate value \$2,200,000)
- Zero people in four transportation facilities (approximate value \$18,242,855)
- Five people in 12 utility facilities (approximate value \$5,790,000)

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

Severe Weather

Impacts associated with severe weather events includes roof collapse, trees and power lines falling, damage to light aircraft and sinking small boats, injury and death resulting from snow machine or vehicle accidents, overexertion while shoveling all due to heavy snow. A quick thaw after a heavy snow can also cause substantial flooding. Impacts from extreme cold include hypothermia, halting transportation from fog and ice, congealed fuel, frozen pipes, utility disruptions, frozen pipes, and carbon monoxide poisoning. Additional impacts may occur from secondary weather hazards or complex storms such as extreme high winds combined with freezing rain, high seas, and storm surge. Section 5.3.4.3 provides additional detail regarding severe weather impacts. Buildings that are older and/or not constructed with materials designed to withstand heavy snow and wind (e.g., hurricane ties on crossbeams) are more vulnerable to the severe weather damage.

Based on information provided by the community and the National Weather Service, the entire existing, transient, and future population, residential structures, and critical facilities are exposed to future severe weather impacts. This includes approximately:

- 191 people in 67 residences (approximate value \$16,750,000)
- 12 people in three government and emergency response facilities (approximate value \$2,510,000)
- 53 people in two educational facilities (approximate value \$10,025,000)
- Two people in one medical facility (approximate value \$2,118,159)
- Five people in eight community facilities (approximate value \$1,109,558)
- 4.5 road system miles (approximate value \$4,500,000)
- One bridge (approximate value \$2,200,000)
- Zero people in four transportation facilities (approximate value \$18,242,855)
- Five people in 12 utility facilities (approximate value \$5,790,000)

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

Wildland Fire

Impacts associated with a wildland fire event include the potential for loss of life and property. It can also impact livestock and pets and destroy forest resources and contaminate water supplies.



Buildings closer to the outer edge of town, those with a lot of vegetation surrounding the structure, and those constructed with wood are some of the buildings that are more vulnerable to the impacts of wildland fire. Section 5.3.5.3 provides additional detail regarding wildland/tundra fire impacts

According to the Alaska Fire Service, there are no wildland fire areas within Grayling’s boundaries. However, 14 wildland fires have occurred within a 25-mile radius of the City (see Section 5.3.7.3). Therefore there is a slight potential for wildland fire to interface with the population center of the City. This area includes approximately:

- 191 people in 67 residences (approximate value \$16,750,000)
- 12 people in three government and emergency response facilities (approximate value \$2,510,000)
- 53 people in two educational facilities (approximate value \$10,025,000)
- Two people in one medical facility (approximate value \$2,118,159)
- Five people in eight community facilities (approximate value \$1,109,558)
- 4.5 road system miles (approximate value \$4,500,000)
- One bridge (approximate value \$2,200,000)
- Zero people in four transportation facilities (approximate value \$18,242,855)
- Five people in 12 utility facilities (approximate value \$5,790,000)

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6.8 FUTURE DEVELOPMENT

Table 6-7 delineates Grayling’s future, planned projects and their tentative completion status as provided by DCRA Research & Analysis Section.

Table 6-7 Planned and Funded Projects

Grant Recipient	Award Year	Project Description/Comments	Project Status	Award Amount	End Date
Housing and Urban Development (HUD)	2013	Multi-Purpose Community Services Center Completion	Pending	\$200,000	6/30/2018
HUD	2013	Grayling Multi-Purpose Center Match	Active	\$170,000	6/30/2017

(DCRA 2014)

Section Seven outlines the six-step process for preparing a mitigation strategy including:

1. Identifying each jurisdiction’s existing authorities for implementing mitigation action initiatives
2. NFIP Participation
3. Developing Mitigation Goals
4. Identifying Mitigation Actions
5. Evaluating Mitigation Actions
6. Implementing the Mitigation Action Plan (MAP)

DMA requirements for developing a comprehensive mitigation strategy include:

DMA 2000 Requirements
<p>Identification and Analysis of Mitigation Actions §201.6(c)(3): [The plan shall include the following:] A <i>mitigation strategy</i> that provides the jurisdiction’s blueprint for reducing the potential losses identified in the risk assessment, based on existing authorities, policies, programs, and resources, and its ability to expand on and improve these existing tools. §201.6(c)(3)(i): [The hazard mitigation strategy shall include a] description of mitigation goals to reduce or avoid long-term vulnerabilities to the identified hazards. §201.6(c)(3)(ii): [The mitigation strategy shall include a] section that identifies and analyzes a comprehensive range of specific mitigation actions and projects being considered to reduce the effects of each hazard, with particular emphasis on new and existing buildings and infrastructure. §201.6(c)(3)(iii): [The hazard mitigation strategy shall include an] action plan, describing how the action identified in paragraph (c)(3)(ii) of this section will be prioritized, implemented, and administered by the local jurisdiction. Prioritization shall include a special emphasis on the extent to which benefits are maximized according to a cost benefit review of the proposed projects and their associated costs. §201.6(c)(3)(iv): [For multi-jurisdictional plans, there must be identifiable action items specific to the jurisdiction requesting FEMA approval or credit of the plan. Requirement §201.6(c)(4): [The plan shall include a] process by which local governments incorporate the requirements of the mitigation plan into other planning mechanisms such as comprehensive or capital improvements, when appropriate.</p>
1. REGULATION CHECKLIST
ELEMENT C. Mitigation Strategy
C1. Does the plan document each jurisdiction’s existing authorities, policies, programs and resources and its ability to expand on and improve these existing policies and programs?
C2. Does the Plan address each jurisdiction’s participation in the NFIP and continued compliance with NFIP requirements, as appropriate? <i>(Addressed in Section 6.4)</i>
C3. Does the Plan include goals to reduce/avoid long-term vulnerabilities to the identified hazards?
C4. Does the Plan identify and analyze a comprehensive range of specific mitigation actions and projects for each jurisdiction being considered to reduce the effects of hazards, with emphasis on new and existing buildings and infrastructure?
C5. Does the Plan contain an action plan that describes how the actions identified will be prioritized (including cost benefit review), implemented, and administered by each jurisdiction?
C6. Does the Plan describe a process by which local governments will integrate the requirements of the mitigation plan into other planning mechanisms, such as comprehensive or capital improvement plans, when appropriate?
Source: FEMA, March 2015



7.1 GRAYLING’S CAPABILITY ASSESSMENT

The City’s capability assessment reviews the technical and fiscal resources available to the community.

DMA 2000 Requirements
Incorporation into Existing Planning Mechanisms §201.6(c)(3): [The plan shall include the following:] A <i>mitigation strategy</i> that provides the jurisdiction’s blueprint for reducing the potential losses identified in the risk assessment, based on existing authorities, policies, programs, and resources, and its ability to expand on and improve these existing tools.
1. REGULATION CHECKLIST
ELEMENT C. Incorporate into Other Planning Mechanisms
C1. Does the plan document each jurisdiction’s existing authorities, policies, programs and resources and its ability to expand on and improve these existing policies and programs?
C6. Does the Plan describe a process by which local governments will integrate the requirements of the mitigation plan into other planning mechanisms, such as comprehensive or capital improvement plans, when appropriate?
<i>Source: FEMA, March 2015</i>

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

Table 7-1 Grayling’s Regulatory Tools

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

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Local Resources

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

Table 7-2 Grayling's Technical Specialists

Staff/Personnel Resources	Yes / No	Department/Agency and Position
Planner or engineer with knowledge of land development and land management practices	No	The City hires planners and engineering consultants
Engineer or professional trained in construction practices related to buildings and/or infrastructure	No	The City hires engineering consultants
Planner or engineer with an understanding of natural and/or human-caused hazards	No	The City hires planners and engineering consultants
Floodplain Manager	No	The City does not have this capability
Surveyors	No	The City hires consultants when they need a surveyor.
Staff with education or expertise to assess the jurisdiction's vulnerability to hazards	Yes	The City hires consultants when they need a surveyor.
Personnel skilled in Geospatial Information System (GIS) and/or Hazards Us-Multi Hazard (Hazus-MH) software	Yes	The City hires consultants when they need a surveyor.
Scientists familiar with the hazards of the jurisdiction	No	City works with U.S. Fish & Wildlife Service (USFWS), Fish & Game (ADF&G), Alaska Department of Transportation and Public Facilities and other agencies as needed
Emergency Manager	Yes	The City Mayor, City Administrator, or Tribal President
Finance (Grant writers)	Yes	City or Tribal Bookkeeper as applicable
Public Information Officer	Yes	The City Mayor, City Administrator, or Tribal President

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Table 7-3 Available Financial Resources

Financial Resource	Accessible or Eligible to Use for Mitigation Activities
General funds	Can exercise this authority with voter approval
Payment in Lieu of Taxes (PILT)	Provides operating support funding
Municipal Energy Assistance Program (MEAP)	Provides operating support funding
Community Development Block Grants (CDBG)	City and Tribe may exercise this option
Capital Improvement Project Funding	Can exercise this authority with voter approval
Authority to levy taxes for specific purposes	Can exercise this authority with voter approval
Incur debt through general obligation bonds	Can exercise this authority with voter approval
Incur debt through special tax and revenue bonds	Can exercise this authority with voter approval
Incur debt through private activity bonds	Can exercise this authority with voter approval
Hazard Mitigation Grant Program (HMGP)	FEMA funding which is available to local communities after a Presidentially-declared disaster. It can be used to fund both pre- and post-disaster mitigation plans and projects.
Pre-Disaster Mitigation (PDM) grant program	FEMA funding which available on an annual basis. This grant can only be used to fund pre-disaster mitigation plans and projects only

Table 7-3 Available Financial Resources

Financial Resource	Accessible or Eligible to Use for Mitigation Activities
Flood Mitigation Assistance (FMA) grant program	FEMA funding which is available on an annual basis. This grant can be used to mitigate repetitively flooded structures and infrastructure to protect repetitive flood structures. <i>Grayling does not qualify for this funding source because they do not participate in the NFIP.</i>
United State Fire Administration (USFA) Grants	The purpose of these grants is to assist state, regional, national or local organizations to address fire prevention and safety. The primary goal is to reach high-risk target groups including children, seniors and firefighters.
Fire Mitigation Fees	Finance future fire protection facilities and fire capital expenditures required because of new development within Special Districts.

The Planning Team developed the mitigation goals and potential mitigation actions to address identified potential hazard impacts for the City of Grayling within Section 5.3.

7.2 DEVELOPING MITIGATION GOALS

DMA 2000 stipulated and implementing regulations for developing hazard mitigation goals:

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DMA 2000 Requirements
Local Hazard Mitigation Goals §201.6(c)(3)(i): The hazard mitigation strategy shall include a description of mitigation goals to reduce or avoid long-term vulnerabilities to the identified hazards.
1. REGULATION CHECKLIST
ELEMENT C. Mitigation Goals
C3. Does the Plan include goals to reduce/avoid long-term vulnerabilities to the identified hazards?
Source: FEMA, March 2015

The exposure analysis results were used as a basis for developing the mitigation goals and actions (Table 7-4). 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, eight goals were developed to reduce or avoid identified long-term hazard vulnerabilities.

Table 7-4 Mitigation Goals

No.	Goal Description
Multi-Hazards (MH)	
MH 1	Provide outreach activities to educate and promote recognizing and mitigating all natural and manmade hazards that affect the City of Grayling (City) and/or Native Village of Grayling (Tribe)□
MH 2	Cross-reference mitigation goals and actions with other City/Tribe planning mechanisms and projects.
MH 3	Develop construction activities that reduce possibility of losses from all natural and manmade hazards that affect the City/Village.
Natural Hazards	
EQ 4	Reduce structural vulnerability to earthquake (EQ) damage.
FL 5	Reduce flood (FL) and erosive scour damage and loss possibility.
GF 6	Reduce ground failure (GF) damage and loss possibility.
SW 7	Reduce structural vulnerability to severe weather (SW) damage.
WF 8	Reduce structural vulnerability to tundra/wildland fire (WF) damage.

7.3 IDENTIFYING MITIGATION ACTIONS

DMA 2000 requirements and implementing regulations for identifying and analyzing mitigation actions:

DMA 2000 Requirements
<p>Identification and Analysis of Mitigation Actions</p> <p>§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.</p>
1. REGULATION CHECKLIST
ELEMENT C. Mitigation Actions
<p>C4. Does the Plan identify and analyze a comprehensive range of specific mitigation actions and projects for each jurisdiction being considered to reduce the effects of hazards, with emphasis on new and existing buildings and infrastructure?</p>
<p><i>Source: FEMA, March 2015</i></p>

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After developing mitigation goals, the Planning Team reviewed a comprehensive list of potential mitigation actions that were identified during this HMP development process.

The Planning Team assessed the potential mitigation actions to carry forward into the mitigation strategy. Mitigation actions are activities, measures, or projects that help achieve the goals of a mitigation plan. Mitigation actions are usually grouped into three broad categories: property protection, public education and awareness, and structural projects.

On June 24, 2015, the Planning Team selected 12 natural hazard, mitigation actions for potential Mitigation Action Plan (MAP) implementation during the five-year life cycle of this HMP. The Planning Team additionally identified their ongoing defensive space 15 foot fire-break around

the perimeter of the community that began in 2014. Their mitigation efforts demonstrate their commitment on projects and programs that reduce the effects of hazards on both new and existing buildings and infrastructure as well as facilities located in potential flood zones to comply with NFIP requirements should the City join the program.

The table breaks out the project criteria as considered, selected, or ongoing. The Planning Team considered projects from a comprehensive list for each hazard type. They identified one “ongoing” mitigation action currently in-process. The Planning Team then selected their “selected” actions identified through this plan development activity that would most benefit the community as well as those they considered for future implementation in Table 7-5.

Table 7-5 Potential Mitigation Actions
(*Ongoing and Selected items were identified for MAP implementation*)

Supports Goal No.	Hazard	Criteria <i>Considered</i> <i>Selected</i> <i>Ongoing</i> <i>Completed</i>	Action Description
Multi- Hazards (MH)			
MH 1	Provide outreach activities to educate and promote recognizing and mitigating all natural and manmade hazards that affect the City of Grayling (City) and Native Village of Grayling (Tribe).	S	Identify and pursue funding opportunities to implement mitigation actions.
		S	Disseminate FEMA pamphlets to educate and encourage homeowners concerning structural and non-structural retrofit benefits.
		C	Identify critical facilities and vulnerable populations based on identified (and/or mapped where applicable) high hazard areas.
MH 2	Cross-reference mitigation goals and actions with other City/Tribal planning mechanisms and projects.	S	The City will strive to manage their existing plans to coordinate and incorporate mitigation planning provisions into all community planning processes such as comprehensive, capital improvement, and land use plans, etc. to demonstrate multi-benefit considerations and facilitate using multiple funding source consideration.
		C	Integrate the Mitigation Plan hazard analysis findings for enhanced emergency planning.
		C	Develop and incorporate mitigation provisions and recommendations into all community plans and community development processes to maintain protect critical infrastructure, residences, and population from natural hazard impacts.
		S	Prohibit new construction in identified mitigatable hazard impact areas (avalanche, flood, erosion, ground failure etc.) or require building to applicable building codes for other hazard impacts (earthquake, volcanic ash, weather, etc.).
MH 3	Develop construction activities that reduce possibility of losses from all natural and	C	Encourage utility companies to evaluate and harden vulnerable infrastructure elements for sustainability.
		S	Acquire (buy-out), demolish, elevate, or relocate structures from hazard prone areas (erosion, flood, ground failure, etc.) * Property deeds “must be” restricted for open space uses for perpetuity to keep people from rebuilding in known

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Table 7-5 Potential Mitigation Actions
(*Ongoing and Selected items were identified for MAP implementation*)

Supports Goal No.	Hazard	Criteria <i>Considered Selected Ongoing Completed</i>	Action Description
	manmade hazards that affect the community.		hazard areas.
Natural Hazards			
EQ 4	Reduce vulnerability of structures to earthquake (EQ) damage.	None	
FL 5	Reduce flood (FL) and erosive scour damage and loss possibility.	S	Determine and implement most cost beneficial and feasible mitigation actions for locations with repetitive flooding, significant historical damages, or road closures.
		S	Elevate residential, public, or critical facilities at least two feet above the base flood elevation (BFE).
		C	Increase culvert sizes to increase their drainage capacity or efficiency.
		C	Harden culvert entrance bottoms with asphalt, concrete, rock, or similar material to reduce erosion or scour.
S	Install hardened bank protection such as Rip-rap (large rocks), sheet pilings, gabion baskets, articulated matting, concrete, asphalt, vegetation, or other armoring or protective materials to provide river bank protection.		
GF 6	Reduce possibility of damage and losses from ground failure (GF).	None	
SW 7	Reduce vulnerability of structures to severe weather (SW) damage.	S	Develop and implement programs to coordinate maintenance and mitigation activities to reduce risk to public infrastructure from severe winter storms (snow load, ice, and wind).
		S	Increase power line wire size and incorporate quick disconnects (break---away devices) to reduce ice load and windstorm power-line failure during severe wind or winter ice storm events.
WF 8	Reduce vulnerability of population and infrastructure to wildland or tundra fire (WF) impacts.	S	Promote FireWise building siting, design, and construction processes and materials.
		S	Develop, adopt, and enforce burn ordinances that controls outdoor burning, require burn permits, and restricts open campfires during identified weather periods (windy, dry, etc.).
		C	Develop outreach program to educate and encourage fire-safe construction practices for existing and new construction in high-risk areas.
		O	Community began constructing a 15' fire break around the community in 2014. They continual work to expand the perimeter to encompass the entire community.

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Evaluating and Prioritizing Mitigation Actions

DMA 2000 stipulated and implementing regulations for evaluating and implementing mitigation actions:

DMA 2000 Requirements: Mitigation Strategy - Implementation of Mitigation Actions
<p>Implementation of Mitigation Actions</p> <p>§201.6(c)(3)(iii): [The hazard mitigation strategy shall include an] action plan, describing how the action identified in paragraph (c)(3)(ii) of this section will be prioritized, implemented, and administered by the local jurisdiction. Prioritization shall include a special emphasis on the extent to which benefits are maximized according to a cost benefit review of the proposed projects and their associated costs.</p>
1. REGULATION CHECKLIST
ELEMENT C. MITIGATION STRATEGY
<p>C5. Does the Plan contain an action plan that describes how the actions identified will be prioritized (including cost benefit review), implemented, and administered by each jurisdiction? (Requirement §201.6(c)(3)(iv)); (Requirement §201.6(c)(3)(iii))</p>
<p>Source: FEMA, March 2015</p>

The Planning Team evaluated and prioritized each of the mitigation actions on June 24, 2015 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. To complete this task, the Planning Team first prioritized the hazards that were regarded as the most significant within the community (earthquake, flood, ground failure, severe weather, and tundra/wildland fire).

The Planning Team reviewed the simplified social, technical, administrative, political, legal, economic, and environmental (STAPLEE) evaluation criteria (Table 7-6) and the Benefit-Cost Analysis Fact Sheet (Appendix G) 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.

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Table 7-6 Evaluation Criteria for Mitigation Actions

Evaluation Category	Discussion "It is important to consider..."	Considerations
<u>S</u> ocial	The public support for the overall mitigation strategy and specific mitigation actions.	Community acceptance Adversely affects population
<u>T</u> echnical	If the mitigation action is technically feasible and if it is the whole or partial solution.	Technical feasibility Long-term solutions Secondary impacts
<u>A</u> ministrative	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
<u>P</u> olitical	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
<u>L</u> egal	Whether the community has the legal authority to implement the action, or whether the	Local, State, and Federal authority Potential legal challenge

Table 7-6 Evaluation Criteria for Mitigation Actions

Evaluation Category	Discussion "It is important to consider..."	Considerations
	community must pass new regulations.	
E conomic	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
E nvironmental	The impact on the environment because of public desire for a sustainable and environmentally healthy community.	Effect on local flora and fauna Consistent with community environmental goals Consistent with local, state, and Federal laws

On June 24, 2015, the hazard mitigation Planning Team prioritized 12 natural hazard and one ongoing mitigation action that were selected to carry forward into the Mitigation Action Plan (MAP).

The hazard mitigation Planning Team considered each hazard’s history, extent, and probability to determine each potential actions priority. A rating system based on high, medium, or low was used.

- High priorities are associated with actions for hazards that impact the community on an annual or near annual basis and generate impacts to critical facilities and/or people.
- Medium priorities are associated with actions for hazards that impact the community less frequently, and do not typically generate impacts to critical facilities and/or people.
- Low priorities are associated with actions for hazards that rarely impact the community and have rarely generated documented impacts to critical facilities and/or people.



Prioritizing the mitigation actions within the MAP matrix (Table 7-8) was completed to provide the City with an implementation approach.

7.4 MITIGATION ACTION PLAN

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

Table 7-7 Potential Funding Source Acronym List

<p>City of Grayling (City Mayor’s Office)</p> <p>Organized Village of Grayling’s Tribal Council (Tribal Council Office)</p> <p>US Department of Homeland Security (DHS) <i>Citizens Corp Program (CCP)</i> <i>Emergency Operations Center (EOC)</i> <i>Homeland Security Grant Program (HSGP)</i> <i>Emergency Management Performance Grant (EMPG)</i> <i>State Homeland Security Program (SHSP)</i></p> <p>Federal Management Agency (FEMA)/</p>
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Hazard Mitigation Assistance Grant Programs (HMA)
Emergency Management Program Grant (EMPG)
Debris Management Grant (DM)
Flood Mitigation Assistance Grants (FMA)
National Earthquake Hazards Reduction Program (NEHRP)
National Dam Safety Program (NDS)

US Department of Commerce (DOC)/
Remote Community Alert Systems Program (RCASP)
National Oceanic and Atmospheric Administration (NOAA)
Economic Development Administration (EDP)

Public Works and Development Facilities Program (PWDFP)
US Environmental Protection Agency (EPA)/
Indian Environmental General Assistance Program (IGAP)

US Department of Agriculture (USDA)/
USDA, Farm Service Agency
Emergency Conservation Program (ECF)
Rural Development (RD)

USDA, Natural Resources Conservation Service (NRCS)
Conservation Technical Assistance Program (DCT)
Conservation Innovation Grants (CIG)
Environmental Quality Incentives Program (EQIP)
Emergency Watershed Protection Program (EWP)
Watershed Planning (WSP)

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

Assistance to Native Americans (ANA)
Native American Housing Assistance and Self Determination Act (NAFSMA),

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

Alaska Department of Military and Veterans Affairs (DMVA), Division of Homeland Security and Emergency Management (DHSEM)

Mitigation Section (for PDM & HMGP projects and plan development)
Preparedness Section (for community planning)
State Emergency Operations Center (SEOC for emergency response)

Alaska Department of Community, Commerce, and Economic Development (DCCED)

Division of Community and Regional Affairs (DCRA)/
Community Development Block Grant (CDBG)
Alaska Climate Change Impact Mitigation Program (ACCIMP)
Flood Mitigation Assistance Grants (FMA)

Alaska Department of Transportation
State road repair funding

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

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

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

Emergency Food and Shelter (EF&S)
Denali Commission (Denali)
Energy Program (EP)
Solid Waste Program (SWP)
Lindbergh Foundation Grant Programs (LFGP)
Rasmuson Foundation Grants (LFG)

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

Table 7-8 City of Grayling’s Mitigation Action Plan (MAP)

(See Appendix A and Table 7-7 for complete funding resource or applicable acronyms)

Goal/ Action ID	Description	Priority (High, Medium, Low)	Responsible Department	Potential Funding Source(s)	Timeframe (1-3 Years 2-4 Years 3-5 Years)	Benefit-Costs (BC) / Technical Feasibility (T/F)
MH 1.1	Identify and pursue funding opportunities to implement mitigation actions.	High	Grayling's Mayor Native Village of Grayling's Tribal Council (The Native Council is included as a viable responsible entity in order to obtain Administration for Native Americans (ANA) funding, the Tribe would need to be the applicant for those projects)	City, Tribe, (See Appendix A for funding agency acronyms)	Ongoing	B/C: City and Village life requires this as an ongoing activity; it is essential for rural communities as there are limited funds available to accomplish effective mitigation actions. TF: This activity is ongoing demonstrating its feasibility.
MH 1.2	Disseminate FEMA pamphlets to educate and encourage homeowners concerning structural and non-structural retrofit benefits.	Medium	City Mayor or Tribal Council as applicable	City, Tribe, Federal Emergency Management Agency (FEMA) HMA programs, AFG, FP&S, and SAFER	1-3 years	B/C: Sustained mitigation outreach programs have minimal cost and will help build and support area-wide capacity. This type activity enables the public to prepare for, respond to, and recover from disasters.

Table 7-8 City of Grayling’s Mitigation Action Plan (MAP)

(See Appendix A and Table 7-7 for complete funding resource or applicable acronyms)

Goal/ Action ID	Description	Priority (High, Medium, Low)	Responsible Department	Potential Funding Source(s)	Timeframe (1-3 Years 2-4 Years 3-5 Years)	Benefit-Costs (BC) / Technical Feasibility (T/F)
						TF: This low cost activity can be combined with recurring community meetings where hazard specific information can be presented in small increments. This activity is ongoing demonstrating its feasibility.
MH 2.1	The City will strive to manage their existing plans to coordinate and incorporate mitigation planning provisions into all community planning processes such as comprehensive, capital improvement, and land use plans, etc. to demonstrate multi-benefit considerations and facilitate using multiple funding source consideration.	Medium	City Mayor or Tribal Council as applicable	City, Tribe, Denali Commission, Division of Community and Regional Affairs (DCRA)	1-3 years	B/C: Coordinated planning ensures effective damage abatement and ensures proper attention is assigned to reduce losses and damage to structures and residents. TF: This is feasible to accomplish as cost can be associated with plan reviews and updates. The action relies on staff and review committee availability and willingness to serve their community.
MH 2.2	Prohibit new construction in identified mitigatable hazard impact areas (avalanche, flood, erosion, ground failure etc.) or require building to applicable building codes for other hazard impacts (earthquake, volcanic ash, weather, etc.).	High	City Mayor or Tribal Council as applicable	City, Tribe, DCRA, Denali Commission	3-5 years	B/C: Building code development, implementation and enforcement can effectively reduce future losses to hazardous events. Building codes can actually assist bush communities through making maximum use of materials and shipping costs the first time. TF: This project is technically feasible as the community need only demonstrate cost savings by demonstrating losses from history utility impacts and down time.

Table 7-8 City of Grayling’s Mitigation Action Plan (MAP)
(See Appendix A and Table 7-7 for complete funding resource or applicable acronyms)

Goal/ Action ID	Description	Priority (High, Medium, Low)	Responsible Department	Potential Funding Source(s)	Timeframe (1-3 Years 2-4 Years 3-5 Years)	Benefit-Costs (BC) / Technical Feasibility (T/F)
MH 3.1	Acquire (buy-out), demolish, elevate, or relocate structures from hazard prone areas (erosion, flood, ground failure, etc.) * Property deeds “must be” restricted for open space uses for perpetuity to keep people from rebuilding in known hazard areas.	High	City Mayor or Tribal Council as applicable	City, Tribe, HMA, Natural Resources Conservation Service (NRCS), ANA, USACE, US Department of Agriculture (USDA), Lindbergh Grants Program	1-5 years	B/C: This project would remove threatened structures from hazard areas, eliminating future damage while keeping land clear for perpetuity. TF: This project is feasible using existing staff skills, equipment, and materials. Acquiring contractor expertise may be required for large facilities.
EQ 4.1	None					
FL 5.1	Determine and implement most cost beneficial and feasible mitigation actions for locations with repetitive flooding, significant historical damages, or road closures.	High	City Mayor or Tribal Council as applicable	City, Tribe, HMA, NRCS, USACE, USDA/EWP, USDA/ECP, DCRA/ ACCIMP	1-3 years	B/C: Flood hazard mitigation is among FEMA’s highest national priorities. FEMA desires communities focus on repetitive flood loss properties. This activity will ensure the City and Tribal Councils focus on priority flood locations and projects. TF: Low to no cost makes this outreach activity very feasible.
FL 5.2	Elevate residential, public, or critical facilities at least two feet above the base flood elevation (BFE).	High	City Mayor or Tribal Council as applicable	City, Tribe, HMA, Natural Resources Conservation Service (NRCS), ANA, USACE, US Department of Agriculture (USDA), Lindbergh Grants Program	1-5 years	B/C: This project would raise threatened structures above hazard areas, to potentially reduce future damage while keeping land clear for perpetuity. TF: This project is feasible using existing staff skills, equipment, and materials. Acquiring contractor expertise may be required for large facilities.

Table 7-8 City of Grayling’s Mitigation Action Plan (MAP)
(See Appendix A and Table 7-7 for complete funding resource or applicable acronyms)

Goal/ Action ID	Description	Priority (High, Medium, Low)	Responsible Department	Potential Funding Source(s)	Timeframe (1-3 Years 2-4 Years 3-5 Years)	Benefit-Costs (BC) / Technical Feasibility (T/F)
FL 5.3	Install hardened bank protection such as Rip-rap (large rocks), sheet pilings, gabion baskets, articulated matting, concrete, asphalt, vegetation, or other armoring or protective materials to provide river bank protection.	High	City Mayor or Tribal Council as applicable	City, Tribe, HMA, ANA, NRCS, USACE	3-5 years	B/C: Improving embankment and slope stability will greatly reduce potential infrastructure and residential losses. Project costs would outweigh replacement costs of lost facilities. TF: The community has the skill to implement this action. Specialized skills may need to be contracted-out with materials and equipment barged in depending on the method selected.
GF 6.1	None					
SW 7.1	Develop and implement programs to coordinate maintenance and mitigation activities to reduce risk to public infrastructure from severe winter storms (snow load, ice, and wind).	Low	City Mayor or Tribal Council, or responsible agency	City, Tribe, DCCED/CDBG, Denali Commission	3-5 years	B/C: Scheduling maintenance and implementing mitigation activities will potentially reduce severe winter storm damages caused by heavy snow loads, wind, and freezing rain. TF: This type activity is technically feasible within the community typically using existing labor, equipment, and materials. Specialized methods are not new to rural communities as they are used to importing required contractors.
SW 7.2	Increase power line wire size and incorporate quick disconnects (break---away devices) to reduce ice load and windstorm power-line failure during severe wind or winter ice storm events.	High	City Mayor or Tribal Council as applicable	City, Tribe, Lindbergh Grants Program, HMA, FP&S, SAFER, ANA, Department of Homeland Security (DHS), Homeland Security Grant Program (HSGP) Citizen Corps Program	1-5 years	B/C: Emergency power generation is a minor cost to ensure utility availability for use after a hazard strikes. TF: Installing emergency generators is technically feasible for this community as they already have staff to maintain existing community power generation facilities. This project typically needs to

Table 7-8 City of Grayling’s Mitigation Action Plan (MAP)

(See Appendix A and Table 7-7 for complete funding resource or applicable acronyms)

Goal/ Action ID	Description	Priority (High, Medium, Low)	Responsible Department	Potential Funding Source(s)	Timeframe (1-3 Years 2-4 Years 3-5 Years)	Benefit-Costs (BC) / Technical Feasibility (T/F)
				(CCP), Emergency Management Performance Grant (EMPG), Emergency Operations Center (EOC)		be associated with essential facility upgrades for FEMA funding
WF 8.1	Promote FireWise building siting, design, and construction processes and materials.	Medium	City Mayor or Tribal Council as applicable	City, Tribe, AFG, FP&S	1-3 Years	B/C: Sustained mitigation outreach programs have minimal cost and will help build and support community capacity enabling the public to appropriately prepare for, respond to, and recover from disasters. TF: This project is technically feasible using existing City and Tribal staff.
WF 8.2	Develop, adopt, and enforce burn ordinances that controls outdoor burning, require burn permits, and restricts open campfires during identified weather periods (windy, dry, etc.).	Medium	City Mayor or Tribal Council as applicable	City, Tribe	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.
WF 8.2	Community began constructing a 15' fire break around the community in 2014. They continual work to expand the perimeter to encompass the entire community.	Medium	City Mayor or Tribal Council as applicable	City, Tribe, AFG, FP&S, SAFER	1-3 years	B/C: This sustainable mitigation activity will greatly reduce the wildland/urban interface, have minimal cost, and will help build and support community capacity to respond to wildland fire disasters. TF: This project is technically feasible using existing Tribal Council staff.

7.5 IMPLEMENTING MITIGATION STRATEGY INTO EXISTING PLANNING MECHANISMS

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

DMA 2000 Requirements
Incorporation into Existing Planning Mechanisms
§201.6(c)(4)(ii): [The plan shall include a] process by which local governments incorporate the requirements of the mitigation plan into other planning mechanisms such as comprehensive or capital improvement plans, when appropriate.
1. REGULATION CHECKLIST
ELEMENT C. Incorporate into Other Planning Mechanisms
C6. Does the Plan describe a process by which local governments will integrate the requirements of the mitigation plan into other planning mechanisms, such as comprehensive or capital improvement plans, when appropriate?
<i>Source: FEMA, March 2015</i>

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

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



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Section Eight provides a comprehensive reference list used to develop the HMP.

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Appendix A
Funding Resources

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Funding Resources

Federal Funding Resources

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

- FEMA, through its Emergency Management Institute, offers training in many aspects of emergency management, including hazard mitigation. FEMA has also developed a large number of documents that address implementing hazard mitigation at the local level. Five key resource documents are available from FEMA Publication Warehouse (1-800-480-2520) and are briefly described here:
 - How-to Guides. FEMA has developed a series of how-to guides to assist states, communities, and tribes in enhancing their hazard mitigation planning capabilities. The first four guides describe the four major phases of hazard mitigation planning. The last five how-to guides address special topics that arise in hazard mitigation planning such as conducting cost-benefit analysis and preparing multi-jurisdictional plans. The use of worksheets, checklists, and tables make these guides a practical source of guidance to address all stages of the hazard mitigation planning process. They also include special tips on meeting DMA 2000 requirements (<http://www.fema.gov/plan/mitplanning/resources.shtm#1>).
 - Post-Disaster Hazard Mitigation Planning Guidance for State and Local Governments. FEMA DAP-12, September 1990. This handbook explains the basic concepts of hazard mitigation and shows state and local governments how they can develop and achieve mitigation goals within the context of FEMA's post-disaster hazard mitigation planning requirements. The handbook focuses on approaches to mitigation, with an emphasis on multi-objective planning.
 - A Guide to Recovery Programs FEMA 229(4), September 2005. The programs described in this guide may all be of assistance during disaster incident recovery. Some are available only after a Presidential declaration of disaster, but others are available without a declaration. Please see the individual program descriptions for details. (<http://www.fema.gov/txt/rebuild/ltrc/recoveryprograms229.txt>)
 - The Emergency Management Guide for Business and Industry. FEMA 141, October 1993. This guide provides a step-by-step approach to emergency management planning, response, and recovery. It also details a planning process that businesses can follow to better prepare for a wide range of hazards and emergency events. This effort can enhance a business's ability to recover from financial losses, loss of market share, damages to equipment, and product or business interruptions. This guide could be of great assistance to a community's industries and businesses located in hazard prone areas.
 - The FEMA Hazard Mitigation Assistance (HMA Unified Guidance, June 1, 2010. The guidance introduces the five HMA grant programs, funding opportunities, award

information, eligibility, application and submission information, application review process, administering the grant, contracts, additional program guidance, additional project guidance, and contains information and resource appendices(FEMA 2009).

- FEMA also administers emergency management grants (<http://www.fema.gov/help/site.shtm>) and various firefighter grant programs (<http://www.firegrantsupport.com/>) such as
 - Emergency Management Performance Grant (EMPG). This is a pass through grant. The amount is determined by the State. The grant is intended to support critical assistance to sustain and enhance State and local emergency management capabilities at the State and local levels for all-hazard mitigation, preparedness, response, and recovery including coordination of inter-governmental (Federal, State, regional, local, and tribal) resources, joint operations, and mutual aid compacts state-to-state and nationwide. Sub-recipients must be compliant with National Incident Management System (NIMS) implementation as a condition for receiving funds. Requires 50% match.
 - National Earthquake Hazards Reduction Program (NEHRP). The National Earthquake Hazards Reduction Program (NEHRP) seeks to mitigate earthquake losses in the United States through both basic and directed research and implementation activities in the fields of earthquake science and engineering.

The NEHRP is the Federal Government's coordinated approach to addressing earthquake risks. Congress established the program in 1977 (Public Law 95-124) as a long-term, nationwide program to reduce the risks to life and property in the United States resulting from earthquakes. The NEHRP is managed as a collaborative effort among FEMA, the National Institute of Standards and Technology, the National Science Foundation, the United States Geological Survey, and the Department of Interior.

The four goals of the NEHRP are to:

- Develop effective practices and policies for earthquake loss-reduction and accelerate their implementation.
- Improve techniques to reduce seismic vulnerability of facilities and systems.
- Improve seismic hazards identification and risk-assessment methods and their use.
- Improve the understanding of earthquakes and their effects.

Information may be found at:

<http://www.fema.gov/plan/prevent/earthquake/nehrrp.shtm>, and
http://www.ehow.com/info_7968511_disaster-research-grant-funding.html

- Assistance to Fire Fighters Grant (AFG), Fire Prevention and Safety (FP&S), Staffing for Adequate Fire and Emergency Response Grants (SAFER), and Assistance to Firefighters Station Construction Grant programs. Information can be found at: (<http://forestry.alaska.gov/fire/vfarfa.htm>).

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- Department of Homeland Security (DHS) provides the following grants:
 - Homeland Security Grant Program (HSGP), State Homeland Security Program (SHSP) are 80% pass through grants. SHSP supports implementing the State Homeland Security Strategies to address identified planning, organization, equipment, training, and exercise needs for acts of terrorism and other catastrophic events. In addition, SHSP supports implementing the National Preparedness Guidelines, the NIMS, and the National Response Framework (NRF). Must ensure at least 25% of funds are dedicated towards law enforcement terrorism prevention-oriented activities.
 - Citizen Corps Program (CCP). The Citizen Corps mission is to bring community and government leaders together to coordinate involving community members in emergency preparedness, planning, mitigation, response, and recovery activities.
 - Emergency Operations Center (EOC) This program is intended to improve emergency management and preparedness capabilities by supporting flexible, sustainable, secure, strategically located, and fully interoperable Emergency Operations Centers (EOCs) with a focus on addressing identified deficiencies and needs. Fully capable emergency operations facilities at the State and local levels are an essential element of a comprehensive national emergency management system and are necessary to ensure continuity of operations and continuity of government in major disasters or emergencies caused by any hazard. Requires 25% match.
 - U.S. Department of Commerce's grant programs include:
 - Remote Community Alert Systems (RCASP) grant for outdoor alerting technologies in remote communities effectively underserved by commercial mobile service for the purpose of enabling residents of those communities to receive emergency messages. This program is a contributing element of the Warning, Alert, and Response Network (WARN) Act.
 - National Oceanic and Atmospheric Administration (NOAA), provides funds to the State of Alaska due to Alaska's high threat for tsunami. The allocation supports the promotion of local, regional, and state level tsunami mitigation and preparedness; installation of warning communications systems; installation of warning communications systems; installation of tsunami signage; promotion of the Tsunami Ready Program in Alaska; development of inundation models; and delivery of inundation maps and decision-support tools to communities in Alaska.
 - Department of Agriculture (USDA). Disaster assistance provided includes: Emergency Conservation Program, Non-Insured Assistance, Emergency Forest Restoration Program, Emergency Watershed Protection, Rural Housing Service, Rural Utilities Service, and Rural Business and Cooperative Service.
(<http://www.fsa.usda.gov/FSA/webapp?area=home&subject=diap&topic=landing>)
 - Department of Energy (DOE), Office of Energy Efficiency and Renewable Energy, Weatherization Assistance Program (<http://www1.eere.energy.gov/wip/wap.html>). This program minimizes the adverse effects of high energy costs on low-income, elderly, and handicapped citizens through client education activities and weatherization services such

as an all-around safety check of major energy systems, including heating system modifications and insulation checks.

- The Tribal Energy Program offers financial and technical assistance to Indian tribes to help them create sustainable renewable energy installations on their lands. This program promotes tribal energy self-sufficiency and fosters employment and economic development on America's tribal lands.
(<http://www1.eere.energy.gov/wip/tribal.html>)
- US Environmental Protection Agency (EPA). Under EPA's Clean Water State Revolving Fund (CWSRF) program, each state maintains a revolving loan fund to provide independent and permanent sources of low-cost financing for a wide range of water quality infrastructure projects, including: municipal wastewater treatment projects; non-point source projects; watershed protection or restoration projects; and estuary management projects.
(<http://yosemite.epa.gov/R10/ecocomm.nsf/6da048b9966d22518825662d00729a35/7b68c420b668ada5882569ab00720988!OpenDocument>)
- Public Works and Development Facilities Program. This program provides assistance to help distressed communities attract new industry, encourage business expansion, diversify local economies, and generate long-term, private sector jobs. Among the types of projects funded are water and sewer facilities, primarily serving industry and commerce; access roads to industrial parks or sites; port improvements; business incubator facilities; technology infrastructure; sustainable development activities; export programs; brownfields redevelopment; aquaculture facilities; and other infrastructure projects. Specific activities may include demolition, renovation, and construction of public facilities; provision of water or sewer infrastructure; or the development of stormwater control mechanisms (e.g., a retention pond) as part of an industrial park or other eligible project.
(http://cfpub.epa.gov/fedfund/program.cfm?prog_num=51)
- Department of Health and Human Services, Administration of Children & Families, Administration for Native Americans (ANA). The ANA awards funds through grants to American Indians, Native Americans, Native Alaskans, Native Hawaiians, and Pacific Islanders. These grants are awarded to individual organizations that successfully apply for discretionary funds. ANA publishes in the Federal Register an announcement of funds available, the primary areas of focus, review criteria, and the method of application.
(http://www.acf.hhs.gov/programs/ana/programs/program_information.html)
- Department of Housing and Urban Development (HUD) provides a variety of disaster resources. They also partner with Federal and state agencies to help implement disaster recovery assistance. Under the *National Response Framework* the FEMA and the Small Business Administration (SBA) offer initial recovery assistance.
(http://www.hud.gov/info/disasterresources_dev.cfm)
- HUD, Office of Homes and Communities, Section 108 Loan Guarantee Programs. This program provides loan guarantees as security for Federal loans for acquisition, rehabilitation, relocation, clearance, site preparation, special economic development activities, and construction of certain public facilities and housing.
(<http://www.hud.gov/offices/cpd/communitydevelopment/programs/108/index.cfm>)

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- HUD, Office of Homes and Communities, Section 184 Indian Home Loan Guarantee Programs (IHLGP). The Section 184 Indian Home Loan Guarantee Program is a home mortgage specifically designed for American Indian and Alaska Native families, Alaska Villages, Tribes, or Tribally Designated Housing Entities. Section 184 loans can be used, both on and off native lands, for new construction, rehabilitation, purchase of an existing home, or refinance.
 - Because of the unique status of Indian lands being held in Trust, Native American homeownership has historically been an underserved market. Working with an expanding network of private sector and tribal partners, the Section 184 Program endeavors to increase access to capital for Native Americans and provide private funding opportunities for tribal housing agencies with the Section 184 Program. (<http://www.hud.gov/offices/pih/ih/homeownership/184/>)
 - HUD/CDBG provides grant assistance and technical assistance to aid communities in planning activities that address issues detrimental to the health and safety of local residents, such as housing rehabilitation, public services, community facilities, and infrastructure improvements that would primarily benefit low-and moderate-income persons (<http://www.hud.gov/offices/cpd/communitydevelopment/programs/>)
 - Department of Labor (DOL), Employment and Training Administration, Disaster Unemployment Assistance. Provides weekly unemployment subsistence grants for those who become unemployed because of a major disaster or emergency. Applicants must have exhausted all benefits for which they would normally be eligible. (<http://www.workforcesecurity.doleta.gov/unemploy/disaster.asp>)
 - The Workforce Investment Act contains provisions aimed at supporting employment and training activities for Indian, Alaska Native, and Native Hawaiian individuals. The Department of Labor's Indian and Native American Programs (INAP) funds grant programs that provide training opportunities at the local level for this target population. (<http://www.dol.gov/dol/topic/training/indianprograms.htm>)
 - U.S. Department of Transportation (DOT), Hazardous Materials Emergency Preparedness Grant. DOT increases State, Territorial, Tribal and local effectiveness in safely and efficiently handling hazardous materials accidents and incidents, enhances implementation of the Emergency Planning and Community Right-to-Know Act of 1986, and encourages a comprehensive approach to emergency training and planning by incorporating the unique challenges of responses to transportation situations, through planning and training. Requires a 20% local match.
 - Federal Financial Institutions. Member banks of Federal Deposit Insurance Corporation, Financial Reporting Standards or Federal Home Loan Bank Board may be permitted to waive early withdrawal penalties for Certificates of Deposit and Individual Retirement Accounts.
 - Internal Revenue Service (IRS), Disaster Tax Relief. Provides extensions to current year's tax return, allows deductions for disaster losses, and allows amendment of previous year's tax returns (<http://www.irs.gov/newsroom/article/0,,id=108362,00.html>).

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- Natural Resources Conservation Service (NRCS) has several funding sources to fulfill mitigation needs. Further information is located at:
<http://www.ak.nrcs.usda.gov/sitemap.html>
 - The Emergency Watershed Protection Program (EWP). This funding source is designed is to undertake emergency measures, including the purchase of flood plain easements, for runoff retardation and soil erosion prevention to safeguard lives and property from floods, drought, and the products of erosion on any watershed whenever fire, flood or any other natural occurrence is causing or has caused a sudden impairment of the watershed.
 - Wildlife Habitat Incentives Program (WHIP). This is a voluntary program for conservation-minded landowners who want to develop and improve wildlife habitat on agricultural land, nonindustrial private forest land, and Indian land.
 - Watershed Planning. NRCS watershed activities in Alaska are voluntary efforts requested through conservation districts and units of government and/or tribes. The watershed activities are lead locally by a "watershed management committee" that is comprised of local interest groups, local units of government, local tribal representatives and any organization that has a vested interest in the watershed planning activity. This committee provides direction to the process as well as provides the decision-making necessary to implement the process. Technical assistance is provided to the watershed management committee through a "technical advisory committee" comprised of local, state and federal technical specialist. These specialists provide information to the watershed management committee as needed to make sound decisions. NRCS also provides training on watershed planning organization and process.
 - U.S. Small Business Administration (SBA) Disaster Assistance provides information concerning disaster assistance, preparedness, planning, cleanup, and recovery planning. (<http://www.sba.gov/category/navigation-structure/starting-managing-business/managing-business/running-business/emergency-preparedness-and-disaster->)
 - May provide low-interest disaster loans to individuals and businesses that have suffered a loss due to a disaster. (<http://www.sba.gov/category/navigation-structure/loans-grants/small-business-loans/disaster-loans>). Requests for SBA loan assistance should be submitted to DHS&EM.
 - United States Army Corps of Engineers (USACE) Alaska District's Civil Works Branch studies potential water resource projects in Alaska. These studies analyze and solve water resource issues of concern to the local communities. These issues may involve navigational improvements, flood control or ecosystem restoration. The agency also tracks flood hazard data for over 300 Alaskan communities on floodplains or the sea coast. These data help local communities assess the risk of floods to their communities and prepare for potential future floods (<http://www.poa.usace.army.mil/en/cw/index.htm>). The USACE is a member and co-chair of the Alaska Climate Change Sub-Cabinet.
 - Grants.gov. was established as a governmental resource named the E-Grants Initiative, part of the President's 2002 Fiscal Year Management Agenda to improve government services to the public. The concept has its origins in the Federal Financial Assistance

Management Improvement Act of 1999, also known as Public Law 106-107. The Grants Policy Committee (GPC), a committee of the U.S. Chief Financial Officers (CFO) Council consisting of grants policy experts from across the federal government assumed responsibility for implementing P.L. 106-107, working to enhance federal financial assistance even after P.L. 106-107 expired in November 2007. The Council on Financial Assistance Reform (COFAR), created in October 2011, continues to assist the Federal financial assistance community with delivery, management, coordination, and accountability of Federal grants and cooperative agreements.

Today, www.Grants.gov is a central storehouse for information on over 1,000 grant programs and provides access to approximately \$500 billion in annual awards.

State Funding Resources

- Department of Military and Veterans Affairs (DMVA): Provides damage appraisals and settlements for VA-insured homes, and assists with filing of survivor benefits. (<http://veterans.alaska.gov/links.htm>)
 - DHS&EM within DMVA is responsible for improving hazard mitigation technical assistance for local governments for the State of Alaska. Providing hazard mitigation training, current hazard information and communication facilitation with other agencies will enhance local hazard mitigation efforts. DHS&EM administers FEMA mitigation grants to mitigate future disaster damages such as those that may affect infrastructure including elevating, relocating, or acquiring hazard-prone properties. (<http://ready.alaska.gov/plans/mitigation.htm>)

DHS&EM also provides mitigation funding resources for mitigation planning on their Web site at <http://www.ak-prepared.com/plans/mitigation/localhazmitplan.htm>.
- Division of Senior Services (DSS): Provides special outreach services for seniors, including food, shelter and clothing. (<http://www.hss.state.ak.us/dsds/seniorInfoResources.htm>)
- Division of Insurance (DOI): Provides assistance in obtaining copies of policies and provides information regarding filing claims. (<http://www.dced.state.ak.us/insurance/>)
- DCRA within the DCCED administers the HUD/CDBG, FMA Program, and the Climate Change Sub-Cabinet's Interagency Working Group's program funds and administers various flood and erosion mitigation projects, including the elevation, relocation, or acquisition of flood-prone homes and businesses throughout the State. This division also administers programs for State's "distressed" and "targeted" communities. (<http://www.commerce.state.ak.us/dca/>)
 - DCRA Planning and Land Management staff provide Alaska Climate Change Impact Mitigation Program (ACCIMP) funding to Alaskan communities that meet one or more of the following criteria related to flooding, erosion, melting permafrost, or other climate change-related phenomena: Life/safety risk during storm/flood events; loss of critical infrastructure; public health threats; and loss of 10% of residential dwellings.

The Hazard Impact Assessment is the first step in the ACCIMP process. The HIA identifies and defines the climate change-related hazards in the community,

establishes current and predicted impacts, and provides recommendations to the community on alternatives to mitigate the impact. The community may then pursue these recommendations through an ACCIMP Community Planning Grant. (http://commerce.alaska.gov/dca/planning/accimp/hazard_impact.html)

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

Alaska's Revolving Loan Fund Program, prescribed by Title VI of the Clean Water Act as amended by the Water Quality Act of 1987, Public Law 100-4. DEC will use the ACWF account to administer the loan fund. This Agreement will continue from year-to-year and will be incorporated by reference into the annual capitalization grant agreement between EPA and the DEC. DEC will use a fiscal year of July 1 to June 30 for reporting purposes.
(http://www.epa.gov/region10/pdf/water/srf/cwsrf_alaska_operating_agreement.pdf)

- Department of Transportation and Public Facilities (DOT/PF) personnel provide technical assistance to the various emergency management programs, to include mitigation. This assistance is addressed in the DHS&EM-DOT/PF Memorandum of

Agreement and includes but is not limited to: environmental reviews, archaeological surveys, and historic preservation reviews.

- DOT/PF and DHS&EM coordinate buy-out projects to ensure that there are no potential right-of-way conflicts with future use of land for bridge and highway projects, and collaborate on earthquake mitigation.
- Additionally, DOT/PF provides the safe, efficient, economical, and effective State highway, harbor, and airport operation. DOT/PF uses its Planning, Design and Engineering, Maintenance and Operations, and Intelligent Transportation Systems resources to identify hazards, plan and initiate mitigation activities to meet the transportation needs of Alaskans, and make Alaska a better place to live and work. DOT/PF budgets for temporary bridge replacements and materials necessary to make the multi-modal transportation system operational following natural disaster events.
- DNR administers various projects designed to reduce stream bank erosion, reduce localized flooding, improve drainage, and improve discharge water quality through the stormwater grant program funds. Within DNR,
 - The Division of Geological and Geophysical Survey (DGGS) is responsible Alaska's mineral, land, and water resources use, development, and earthquake mitigation collaboration.

Their geologists and support staff are leaders in researching Alaska's geology and implementing technological tools to most efficiently collect, interpret, publish, archive, and disseminate information to the public. Information is available at: (http://www.dggs.dnr.state.ak.us/index.php?menu_link=publications&link=publications_search#)
 - The DNR's Division of Forestry (DOF) participates in a statewide wildfire control program in cooperation with the forest industry, rural fire departments and other agencies. Prescribed burning may increase the risks of fire hazards; however, prescribed burning reduces the availability of fire fuels and therefore the potential for future, more serious fires.
(<http://forestry.alaska.gov/pdfs/08FireSuppressionMediaGuide.pdf>)
 - DOF also manages various wildland fire programs, activities, and grant programs such as the FireWise Program (<http://forestry.alaska.gov/fire/firewise.htm>), Community Forestry Program (CFP) (<http://forestry.alaska.gov/community/>), Assistance to Fire Fighters Grant (AFG), Fire Prevention and Safety (FP&S), Staffing for Adequate Fire and Emergency Response Grants (SAFER), and Volunteer Fire Assistance and Rural Fire Assistance Grant (VFA-RFA) programs (<http://forestry.alaska.gov/fire/vfarfa.htm>). Information can be found at <http://forestry.alaska.gov/fire/current.htm>.

Other Funding Resources

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

- FEMA, <http://www.fema.gov> - includes links to information, resources, and grants that communities can use in planning and implementation of sustainable measures.

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- Rural Alaska Community Action Program Inc. (RurAL CAP) In the nearly 50 years since it began, it is difficult to imagine any aspect of rural Alaskan lives which has not been touched in some way by the people and programs of RurAL CAP. From Head Start, parent education, adult basic education, and elder-youth programs, to Native land claims and subsistence rights, energy and weatherization programs, and alcohol and substance abuse prevention, RurAL CAP has left a lasting mark on the history and development of Alaska and its rural Peoples. (http://ruralcap.com/?page_id=334)

From its earliest days to the present, RurAL CAP's success can be attributed to the direct involvement of rural Alaskans in its programs and in the decision making processes which affect their lives, and to the belief in and respect for those Peoples by the board and staff of RurAL CAP.

- Weatherization Assistance Program assists low to moderate income households in weatherization needs. The program is available to homeowners as well as renters and includes; single family homes, cabins, mobile homes, condominiums and multifamily dwellings.

Services *may* include improvements such as; air sealing, caulking and insulation, doors and windows, exterior paint, heating system test and tune, ventilation and moisture control. Major home repairs are not classified under weatherization and thus are not eligible under the program.

(<http://www.weatherizeme.org/Applications/RUR/Wx%20app%20Rural%2004-13.pdf>)

- Energy Programs. VISTA Energy Program (VEP) Members work on projects like energy efficiency education, planning and capacity building for renewable energy options, and home energy efficiency education. VEP helps rural Alaskan communities reduce their energy bills.

VEP Members build partnerships, developed funding proposals, and worked with their sponsoring council to raise money and in-kind resources for energy projects in their communities.

- Environment. RurAL CAP has several interwoven projects under the Environmental Program. All of these projects were created to respond to the needs rural Alaskans reported in community assessments conducted by AmeriCorps members. All of these interconnected projects address local environmental issues with local solutions, connect rural Alaskans to each other to share resources, and are connected to the RAVEN AmeriCorps program.

RurAL CAP's environmental programs surround issues of solid waste, backhaul efforts, the RAVEN AmeriCorps program, subsistence and indoor air quality. The programs include the Denali Solid Waste Grants, EPA Community Environmental Demonstration Projects, Solid Waste Management Technical Assistance, RAVEN AmeriCorps Members, Subsistence in Alaska, and Alaska Village Indoor Air Quality.

- Solid Waste Management. RurAL CAP continues to host an expert solid waste liaison, Ted Jacobson, through funding provided by the Environmental Protection Agency (EPA) and Senior Services America, Inc. The liaison provides solid waste management technical assistance to rural communities through training, site visits,

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- hands-on demonstrations, and remote contact. Resources are provided for dump management activities, collaborating with funders for funding and technical assistance on solid waste management, recycling, and backhaul.
- American Planning Association (APA), <http://www.planning.org> - a non-profit professional association that serves as a resource for planners, elected officials, and citizens concerned with planning and growth initiatives.
 - Institute for Business and Home Safety (IBHS), <http://ibhs.org> - an initiative of the insurance industry to reduce deaths, injuries, property damage, economic losses, and human suffering caused by natural disasters.
 - American Red Cross (ARC). Provides for the critical needs of individuals such as food, clothing, shelter, and supplemental medical needs. Provides recovery needs such as furniture, home repair, home purchasing, essential tools, and some bill payment may be provided.
 - Crisis Counseling Program. Provides grants to State and Borough Mental Health Departments, which in turn provide training for screening, diagnosing and counseling techniques. Also provides funds for counseling, outreach, and consultation for those affected by disaster. (<http://dialoguemakers.org/Resourses4states+Nonprofits.htm>)
 - Denali Commission. Introduced by Congress in 1998, the Denali Commission is an independent federal agency designed to provide critical utilities, infrastructure, and economic support throughout Alaska. With the creation of the Denali Commission, Congress acknowledged the need for increased inter-agency cooperation and focus on Alaska's remote communities. Since its first meeting in April 1999, the Commission is credited with providing numerous cost-shared infrastructure projects across the State that exemplifies effective and efficient partnership between federal and state agencies, and the private sector.
(http://www.denali.gov/index.php?option=com_content&view=section&id=1&Itemid=3)
 - The Energy Program primarily funds design and construction of replacement bulk fuel storage facilities, upgrades to community power generation and distribution systems, alternative-renewable energy projects, and some energy cost reduction projects. The Commission works with the Alaska Energy Authority (AEA), Alaska Village Electric Cooperative (AVEC), Alaska Power and Telephone and other partners to meet rural communities' fuel storage and power generation needs.
 - The goal of the solid waste program at the Denali Commission is to provide funding to address deficiencies in solid waste disposal sites which threaten to contaminate rural drinking water supplies.
 - Lindbergh Foundation Grants. Each year, The Charles A. and Anne Morrow Lindbergh Foundation provides grants of up to \$10,580 (a symbolic amount representing the cost of the Spirit of St. Louis) to men and women whose individual initiative and work in a wide spectrum of disciplines furthers the Lindberghs' vision of a balance between the advance of technology and the preservation of the natural/human environment.
(<http://www.lindberghfoundation.org/docs/index.php/our-grants>)

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

Rasmuson Foundation awards grants both to organizations serving Alaskans through a base of operations in Alaska, and to individuals for projects, fellowships and sabbaticals. To be considered for a grant award, grant seekers must meet specific criteria and complete and submit the required application according to the specific guidelines of each program. (<http://www.rasmuson.org/index.php?switch=viewpage&pageid=5>)

- Tier 1 Awards: Grants of up to \$25,000 for capital projects, technology updates, capacity building, program expansion, and creative works.
- Tier 2 Awards: Grants over \$25,000 for projects of demonstrable strategic importance or innovative nature.
- Pre-Development Program: Guidance and technical resources for planning new, sustainable capital projects.

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

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

Appendix B
FEMA Hazard Mitigation Plan (HMP) Review Tool

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APPENDIX A:

LOCAL MITIGATION PLAN REVIEW TOOL

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

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

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

Jurisdiction: City of Grayling	Title of Plan: City Grayling Hazard Mitigation Plan	Date of Plan: July 2015
Local Point of Contact: Shirley Clark	Address: City of Grayling P. O. Box 89 Grayling, AK 99590	
Title: City Mayor		
Agency: City of Grayling		
Phone Number: 907.453.5148	E-Mail: cityofgrayling@yahoo.com	

State Reviewer: Scott Nelsen	Title: Mitigation Planner	Date: 7/31/2015
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FEMA Reviewer: Christine Caggiano	Title: Mitigation Planner (FEMA Contractor)	Date: 8/25/2015
Kristen Meyers	FEMA Mitigation Planner	9/15/2015; 10/24/15
Date Received in FEMA Region X	7/31/2015	
Plan Not Approved		
Plan Approvable Pending Adoption	10/24/15	
Plan Approved	12/21/2015	

**SECTION 1:
REGULATION CHECKLIST**

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

1. REGULATION CHECKLIST		Location in Plan (section and/or page number)	Met	Not Met
Regulation (44 CFR 201.6 Local Mitigation Plans)				
ELEMENT A. PLANNING PROCESS				
A1. Does the Plan document the planning process, including how it was prepared and who was involved in the process for each jurisdiction? (Requirement §201.6(c)(1))	Section 3.1, Page 3-1 Section 3.2, Page 3-3 to 3-5 Table 3-1, Page 3-3	✓		
A2. Does the Plan document an opportunity for neighboring communities, local and regional agencies involved in hazard mitigation activities, agencies that have the authority to regulate development as well as other interests to be involved in the planning process? (Requirement §201.6(b)(2))	Section 3.3, Page 3-3 to 3-4	✓		
A3. Does the Plan document how the public was involved in the planning process during the drafting stage? (Requirement §201.6(b)(1))	Section 3.3, Page 3-3 to 3-4 Table 3-2, Page 3-4	✓		
A4. Does the Plan describe the review and incorporation of existing plans, studies, reports, and technical information? (Requirement §201.6(b)(3))	Section 3.4, Page 3-5, Table 3-3, Page 3-5 Section 3.5.1 Page 3-6	✓		
A5. Is there discussion of how the community(ies) will continue public participation in the plan maintenance process? (Requirement §201.6(c)(4)(iii))	Section 3.5, Page 3-6 Section 3.5.2, Page 3-6 to 3-7	✓		
A6. Is there a description of the method and schedule for keeping the plan current (monitoring, evaluating and updating the mitigation plan within a 5-year cycle)? (Requirement §201.6(c)(4)(i))	Section 3.5.3, Page 3-7 to 3-10	✓		
<u>ELEMENT A: REQUIRED REVISIONS</u>				

1. REGULATION CHECKLIST		Loc ati on	Met	Not Met
Regulation (44 CFR 201.6 Local Mitigation Plans)				
ELEMENT B. HAZARD IDENTIFICATION AND RISK ASSESSMENT				
<p>B1. Does the Plan include a description of the type, location, and extent of all natural hazards that can affect each jurisdiction(s)? (Requirement §201.6(c)(2)(i))</p>	<p>Section 5.2, Page 5-2 to 5-3; Table 5-1, Page 5-3</p> <p>Earthquake Section 5.3.1; Section 5.3.1.1, Page 5-4; Location: Section 5.3.1.3, Page 5-8 Extent: Page 5-8 to 5-9</p> <p>Flood Section 5.3.2; Section 5.3.2.1 Page 5-10 to 5-11 Section 5.3.2.3, Location: Page 5-16 to 5-17 Extent: Page 5-17 to 5-18</p> <p>Ground Failure, Section 5.3.3 Section 5.3.3.1, Page 5-19 to 5-20 Section 5.3.3.3 Location: Pages 5-21 to 22 Extent: Page 5-23</p> <p>Severe Weather Section 5.3.4 Section 5.3.4.1, Page 5-23 to 5-26 Section 5.3.4.3, Location: Page 5-32 Extent: Page 5-32</p> <p>Wildland Fire, Section 5.3.5 Page 5-32 to 5-33 Section 5.3.5.3, Location: Page 5-35 Extent: Page 5-35</p>	<p>v</p>		

<p>B2. Does the Plan include information on previous occurrences of hazard events and on the probability of future hazard events for each jurisdiction? (Requirement §201.6(c)(2)(i))</p>	<p>Earthquake, Section 5.3.1.2, History, page 5-6 to 5-7 Section 5.3.1.3, Probability, page 5-9 to 5-10</p> <p>Flood Section 5.3.2.2 History, Page 5-11 to 5-16 Section 5.3.2.3 Probability: Page 5-18</p> <p>Ground Failure, Section 5.3.3.2 History, Page 5-21 Section 5.3.3.3 Probability, Page 5-23</p> <p>Severe Weather, Section 5.3.4.2 History, Page 5-26 to 5-31 Section 5.3.4.3 Probability, Page 5-32</p> <p>Wildland Fire, Section 5.3.5.2 Section 5.3.5.3, History: Page 5-33 to 5-34 Section 5.3.5.3 Probability Page 5-36</p>	<p>√</p>	
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<p>B3. Is there a description of each identified hazard’s impact on the community as well as an overall summary of the community’s vulnerability for each jurisdiction? (Requirement §201.6(c)(2)(ii))</p>	<p>Earthquake, Section 5.3.1.3 Impact, Page 5-9</p> <p>Flood Section 5.3.2.3 Impact, Page 5-18</p> <p>Ground Failure, Section 5.3.3.3 Impact, Page 5-23</p> <p>Weather (Severe) Section 5.3.4.3 Impact, Page 5-31 to 5-32</p> <p>Wildland Fire, Section 5.3.5.3 Impact, Page 5-35 to 5-36</p> <p>Vulnerability Analysis Overview Chapter 6, Page 6-1 through Page 6-18</p>	<p>✓</p>	
<p>B4. Does the Plan address NFIP insured structures within the jurisdiction that have been repetitively damaged by floods? (Requirement §201.6(c)(2)(ii))</p>	<p>Section 1.2.1 Page 1-4 Section 6.4 Page 6-12</p>	<p>✓</p>	
<p><u>ELEMENT B: REQUIRED REVISIONS</u></p>			

ELEMENT C. MITIGATION STRATEGY			
C1. Does the plan document each jurisdiction's existing authorities, policies, programs and resources and its ability to expand on and improve these existing policies and programs? (Requirement §201.6(c)(3))	Section 7.1, Page 7-2 Tables 7-1, 7-2, 7-3, Pages 7-2 to Page 7-4	✓	
C2. Does the Plan address each jurisdiction's participation in the NFIP and continued compliance with NFIP requirements, as appropriate? (Requirement §201.6(c)(3)(ii))	Section 1.2.1 Page 1-5 Section 6.4, Page 6-12 Section 6.4.1.1, Page 6-12 Section 7.1, Table 7-3, Page 7-4 Section 7.3, Page 7-6	✓	
C3. Does the Plan include goals to reduce/avoid long-term vulnerabilities to the identified hazards? (Requirement §201.6(c)(3)(i))	Section 7.2, Page 7-4 Table 7-4, Page 7-5	✓	
C4. Does the Plan identify and analyze a comprehensive range of specific mitigation actions and projects for each jurisdiction being considered to reduce the effects of hazards, with emphasis on new and existing buildings and infrastructure? (Requirement §201.6(c)(3)(ii))	Section 7-3, Page 7-5 to 7-7 Table 7-5, Page 7-5 to Page 7-7	✓	
C5. Does the Plan contain an action plan that describes how the actions identified will be prioritized (including cost benefit review), implemented, and administered by each jurisdiction? (Requirement §201.6(c)(3)(iv)); (Requirement §201.6(c)(3)(iii))	Section 7-3 Process: Page 7-5 to 7-9 Table 7-6, Page 7-8 to 7-9 Section 7.4 MAP Page 7-9 through Page 7-16 Tables 7-7 and 7-8	✓	
C6. Does the Plan describe a process by which local governments will integrate the requirements of the mitigation plan into other planning mechanisms, such as comprehensive or capital improvement plans, when appropriate? (Requirement §201.6(c)(4)(ii))	Section 3.4, Page 3-5 Section 3.5.1 Page 3-6 Section 7.5 Page 7-17	✓	

ELEMENT C: REQUIRED REVISIONS				
1. REGULATION CHECKLIST		Location in Plan (section and/or page number)	Met	Not Met
Regulation (44 CFR 201.6 Local Mitigation Plans)				
ELEMENT D. PLAN REVIEW, EVALUATION, AND IMPLEMENTATION (applicable to plan updates only)				
D1. Was the plan revised to reflect changes in development? (Requirement §201.6(d)(3))	N/A – first plan			
D2. Was the plan revised to reflect progress in local mitigation efforts? (Requirement §201.6(d)(3))	N/A – first plan			
D3. Was the plan revised to reflect changes in priorities? (Requirement §201.6(d)(3))	N/A – first plan			
ELEMENT D: REQUIRED REVISIONS				
ELEMENT E. PLAN ADOPTION				
E1. Does the Plan include documentation that the plan has been formally adopted by the governing body of the jurisdiction requesting approval? (Requirement §201.6(c)(5))	Section 4.1, Page 4-1	✓		
E2. For multi-jurisdictional plans, has each jurisdiction requesting approval of the plan documented formal plan adoption? (Requirement §201.6(c)(5))	N/A	✓		
ELEMENT E: REQUIRED REVISIONS Adoption will be completed when the plan achieves Approval-Pending-Adoption Status.				
ELEMENT F. ADDITIONAL STATE REQUIREMENTS (OPTIONAL FOR STATE REVIEWERS ONLY; NOT TO BE COMPLETED BY FEMA)				
F1.	N/A			
F2.	N/A			
ELEMENT F: REQUIRED REVISIONS				

SECTION 2:

PLAN ASSESSMENT

A. Plan Strengths and Opportunities for Improvement

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

ELEMENT A. PLANNING PROCESS

Plan Strengths

- The plan includes a strong list of stakeholders invited to participate in the planning process and comment on the plan.
- The plan maintenance documents and templates in Appendix F will be a good starting point for the Planning Team to monitor and evaluate the effectiveness of the HMP and the Mitigation Strategy.

Opportunities for Improvement

- Consider listing the names of all members of City Council and the Tribal Council that participated in the planning process.
- Having a description of which of the added stakeholders actually participated from the list, and how they participated, would strengthen the plan.
- Similarly, consider including a description of how the public was involved instead of simply when the opportunity was given. Did any members of the public provide comments or feedback? If so, how were they incorporated?
- Consider using more active public participation efforts in the plan update.
- Consider including the Annual Review Questionnaires as an appendix to the HMP in the next five-year update.

ELEMENT B. HAZARD IDENTIFICATION AND RISK ASSESSMENT

Plan Strengths

- Table 5-1 provides a nice and brief snapshot of why hazards were selected for inclusion in the HMP.
- Scales for magnitude/severity and likelihood are well-defined and described.
- The 5.3.X.1: Nature sections very clearly delineate the range of types of hazards included in each categorization.
- Plan does a good job of incorporating climate change information and its projected impacts on hazards, where appropriate.

Opportunities for Improvement

- Page 5-5 incorrectly references Table 5-1 as showing Richter Scale magnitudes. It is Figure 5-1.
- Section 5.3.1.3, Earthquake future probability, states that USGS modeling “indicates a M5.0 or greater earthquake occurring within 100 years and 35 miles of the City is “Highly Likely” within the calendar year with a chance of 1 in 1 year (1/1=100 percent) chance of occurring; due to an

event history that is less greater than 33 percent likely per year.” However, the earthquake probability map shows a range of likelihoods of between 20 and 80%. Likelihood immediately near the City of Grayling appears to be 40%. While this still equates to “Highly Likely” according to the scale stated in Section 5.3, statements of future probability should better match the provided maps.

- In general, the discussion of the location of hazard events could be stronger. In lieu of quantitative data, future plan updates should include a qualitative description of where hazard events have occurred or are expected to occur in the future. Where a hazard impacts the entire community equally, the plan should state so in the hazard profiles themselves, not just in the Vulnerability Assessment section of the plan (as it currently does in the Severe Weather profile).
- Many maps were small and difficult to read. Grayling’s location was not noted on all maps. Consider larger maps with the jurisdiction marked on each one for future plan updates. On the wildfire map, there was no indication on the legend what the color-coding of events meant.
- “Severe Weather” as a single hazard encompasses a great deal of different kinds of hazard events that strike at very different times of the year, geographies, scales, and ranges of magnitude. Consider separating this hazard out in future plan updates.
- Almost all of the hazards are expected to impact 100% of the planning area when they occur. Consider incorporating some kind of ranking or rating for hazards to identify which are more pressing concerns to mitigate.

ELEMENT C. MITIGATION STRATEGY

Plan Strengths

- Plan provides a detailed list of potential funders for hazard mitigation activities, and the associated Appendix provides good baseline descriptions of funding sources that can be used as a starting point for identifying funds.

Opportunities for Improvement

- The discussion of the integration could be stronger. For example, include the update schedule for the Comprehensive Plan, Capital Improvement Project List, Transportation Improvement Plan, and other mechanisms so it is clear when integration will occur in the future. Where are the current planning mechanisms aligned? Where are there gaps that integrating planning mechanisms would fill?
- As time goes on, the Mitigation Action Plan should get progressively more refined. During the next plan update, focus on making actions more specific. For example, instead of “Elevate residential, public, or critical facilities at least two feet above the BFE,” identify and state which residences, public buildings, and/or critical facilities should be prioritized for elevation. Future plans should include a column for each action stating the progress made since the previous plan update.
- Mitigation Action Plan includes “City Mayor’s Office or Tribal Council Office, as applicable” as the Responsible Department for all actions. Consider creating specific action that will be led by the City or the Tribe or specifying the actions that are more appropriate for the Tribal Council to be responsible for.

B. Resources for Implementing Your Approved Plan

The **Local Mitigation Plan Review Guide and Tool** resource is available through FEMA's Library and should be referred to for the next plan update.

<http://www.fema.gov/library/viewRecord.do?id=4859>

The **Local Mitigation Planning Handbook** is available. While the requirements under §201.6 have not changed, the *Handbook* provides guidance to local governments on developing or updating hazard mitigation plans to meet the requirements is available through the FEMA Library website. <http://www.fema.gov/library/viewRecord.do?id=7209>

The **Mitigation Ideas: A Resource for Reducing Risk from Natural Hazards** resource presents ideas for how to mitigate the impacts of different natural hazards, from drought and sea level rise, to severe winter weather and wildfire. The document also includes ideas for actions that communities can take to reduce risk to multiple hazards, such as incorporating a hazard risk assessment into the local development review process. <http://www.fema.gov/library/viewRecord.do?id=6938>

The **Integrating Hazard Mitigation Into Local Planning: Case Studies and Tools for Community Officials** resource provides practical guidance on how to incorporate risk reduction strategies into existing local plans, policies, codes, and programs that guide community development or redevelopment patterns. It includes recommended steps and tools to assist with local integration efforts, along with ideas for overcoming possible impediments, and presents a series of case studies to demonstrate successful integration in practice.

<http://www.fema.gov/library/viewRecord.do?id=7130>

The FEMA Region X Risk Mapping, Analysis, and Planning program (RiskMAP) releases a monthly newsletter that includes information about upcoming events and training opportunities, as well as hazard and risk related news from around the Region. Past newsletters can be viewed at <http://www.starr-team.com/starr/RegionalWorkspaces/RegionX/Pages/default.aspx>. If you would like to receive future, email rxnewsletter@starr-team.com.

The mitigation strategy includes projects that are eligible for FEMA's grant programs. Contact the State Hazard Mitigation Officer, Ann Gravier, at ann.gravier@alaska.gov for application information.

Appendix C
City and Village HMP Adoption Resolutions

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RESOLUTION OF ADOPTION OF HAZARD MITIGATION PLAN

RESOLUTION 2015-4

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

WHEREAS a Hazard Mitigation Plan (HMP) was developed through the combined efforts of the City of Grayling Planning Team and interested parties within the Grayling area;

WHEREAS the plan recommends hazard mitigation actions that will protect people and property affected by natural hazards that could potentially affect the area, could potentially reduce future public, private, community, and personal disaster response and recovery costs; and that will reinforce the City Council's leadership in their emergency preparedness efforts;

WHEREAS the Disaster Mitigation Act of 2000 (P.L. 106-390) (DMA 2000) and associated Federal regulations published under 44 CFR 201.6 and 201.7 requires all jurisdictional participants to formally adopt a Hazard Mitigation Plan subject to approval of the Federal Emergency Management Agency to be eligible for federal hazard mitigation projects and activities funds;

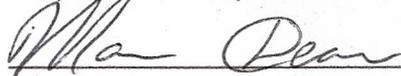
WHEREAS the City's planning team held public meetings to receive plan comments as required by DMA 2000;

NOW THEREFORE BE IT RESOLVED by the Grayling City Council that:

1. The 2015 Hazard Mitigation Plan is hereby adopted as an official plan for the City of Grayling.
2. The Grayling City Council officials identified by the planning process (section 3) and the Mitigation Action Plan (section 7) will implement the recommended actions assigned to them.
3. The Grayling HMP planning team will provide annual progress reports on the status of their implemented Mitigation Action Plans projects to the City Council annually by the Plan's adoption anniversary date.
4. The planning team member's will complete periodic updates of the HMP as indicated in the plan maintenance section (section 3) as needed, but no less frequently than every five years or as determined by the State and FEMA.

NOW THEREFORE BE IT RESOLVED that the Grayling City Council adopts the Grayling Hazard Mitigation Plan; October 2015 as this Jurisdiction's Hazard Mitigation Plan, and resolves to execute and abide by all CFR 44 regulatory actions and requirements within the HMP.

Adopted this 3rd day of November 2015



Marvin Deacon, Vice Mayor



Ann Short, City Clerk



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Appendix D
Public Outreach Activities

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From: Simmons, Scott
To: "mewest@alaska.edu"; "hdenny@anthc.org"; "tneal@usgs.gov"; "swhite@avcp.org"; "steve.heppner.bia.ak@gmail.com"; "kato_howard@ak.blm.gov"; "jneimeyer@denali.gov"; "leslie.pearson@alaska.gov"; "ryan.anderson@alaska.gov"; "Alice.Edwards@alaska.gov"; "taunnie.boothby@alaska.gov"; "scott.nelsen@alaska.gov"; "alan.wien@alaska.gov"; "terri.lomax@alaska.gov"; "Soderlund.Dianne@epamail.epa.gov"; "john.lingaas@noaa.gov"; "joel.curtis@noaa.gov"; "sam.albanese@noaa.gov"; "meg.mueller@ak.usda.gov"; "merlaine.kruse@ak.usda.gov"; "greg.magee@alaska.gov"; "Anna.Plager@dnr.state.ak.us"; "kerry.walsh@dnr.state.ak.us"; "John.Dunker@dnr.state.ak.us"; "Steve.Clautice@dnr.state.ak.us"; "patricia.burns@dnr.state.ak.us"; "Steve.McGroarty@dnr.state.ak.us"; "Mac.McLean@dnr.state.ak.us"; "Margie.Goatley@dnr.state.ak.us"; "Bruce.R.Sexauer@poa02.usace.army.mil"; "colleen.bickford@hud.gov"; "ak_le@fws.gov"
Cc: Eileen Bechtol (erbechtol@gmail.com); DHSEM Scott Nelsen; Evans, Jessica; Appleby, Elizabeth; URS Evan Wasserman
Subject: Hazard Mitigation Plan Development Project Initial Notice
Date: Thursday, November 20, 2014 11:18:00 AM
Attachments: [image002.png](#)

Dear Potential HMP Development Participants,
URS Corporation has received a 2014 contract from the State Division of Homeland Security and Emergency Management (DHS&EM) to develop 21 Local/Tribal All-Hazard Mitigation Plans for the following communities:

New HMP Development

- Atmautlauk (Unorganized)
- Chitina (Unorganized)
- Copper Center (Unorganized)
- Grayling (Unorganized)
- Kongiganak (Unorganized)
- Kwigillingok (Unorganized)
- City of Merkoryuk (2nd Class City)
- City of Nightmute (2nd Class City)
- Tuntutuliak (Unorganized)
- Tununak (Unorganized)
- City of Wales (2nd Class city)

HMP Update Required

- Newtok (Unorganized)
- City of Aniak (2nd Class City)
- City of Dillingham (1st Class City)
- City of Golovin (2nd Class City)
- Lake and Peninsula Borough, MJHMP
- City of Hooper Bay (2nd Class City)
- City of Kivalina (2nd Class City)
- City of Saint Paul (2nd Class City)
- City of Unalakleet (2nd Class City)
- City and Borough of Yakutat

The Lake and Peninsula Borough (L&PB) Multi-Jurisdictional HMP (MJHMP) consists of six organized cities and 12 unorganized communities:

The Lake and Peninsula Borough, MJHMP

Organized Cities

- City of Chignik (2nd Class City)
- City of Egegik (2nd Class City)
- City of Newhalen (2nd Class City)
- City of Nondalton (2nd Class City)
- City of Pilot Point (2nd Class City)
- City of Port Heiden (2nd Class City)

Unorganized Communities

- Chignik Lagoon
- Chignik Lake
- Igiugig
- Iliamna
- Ivanof Bay
- Kokhanok

We invite you to participate in this important community planning effort during the development process. Community newsletters will be located on the DHS&EM Local/Tribal All Hazard Mitigation Plan Development website at:

<http://ready.alaska.gov/plans/localhazmitplans> as the communities finalize them.

Please feel free to contact me and to forward this email to the most appropriate person within your agency involved with hazard assessments, hazard mitigation plan development or community specific hazard information or planning suggestions. (Please cc me so I may update the contact list)

I encourage you to acknowledge receiving this invitation at your earliest convenience to allow me to include your participation (with appropriate acknowledgments) within the Draft and Final HMPs prior to State and FEMA review and subsequent approvals.

Kind Regards

-Scott-

R. Scott Simmons, CFM, CPM

AECOM + URS

700 G Street, Suite 500 | Anchorage, AK 99501

Ph: 907.261.9706 | 800.909.6787 | Personal Mobile: 841.1832 | Fax: 907.562.1297

eMail Address: scott.simmons@urs.com

This e-mail and any attachments contain URS Corporation confidential information that may be proprietary or privileged. If you receive this message in error or are not the intended recipient, you should not retain, distribute, disclose or use any of this information and you should destroy the e-mail and any attachments or copies.

From: Simmons, Scott
To: ["cityofgrayling@yahoo.com"](mailto:cityofgrayling@yahoo.com)
Subject: City of Grayling Hazard Mitigation Plan Development Project
Date: Friday, November 21, 2014 1:52:00 PM
Attachments: [GraylingDraftNewsletter1_11-14.pdf](#)
[image002.png](#)

Good Afternoon Mayor Clark,

I am writing to introduce myself, Scott Simmons, URS Corporation. We were contracted by the Division of Homeland Security and Emergency Management (DHS* &EM) to develop a Hazard Mitigation Plan for eleven communities. The City of Grayling is one of the eleven Cities selected.

It is important to note that the City does not have to pay anything for this project. This is an important project for your community funded by FEMA through the (DHS&EM. URS worked with your neighboring communities Akiachak, Akiak, Tuluksak, Lower Kalskag, and Upper Kalskag during last year's hazard mitigation plan development project.

URS has been developing HMPs nationwide since 2000. Our Alaska office has completed approximately 60 State, Borough (County) and local community, State reviewed, and FEMA approved Hazard Mitigation Plans to-date.

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

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

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

Our task is to write the plan while guiding you through the hazard mitigation plan development process using a community planning team process. URS will write the plan. The community Planning Team will assist the process by working with URS to:

- Describe the plan's development process, include interested community members as plan participants or plan reviewers,.
- Identify which hazards routinely impact your community,
- Help us explain your historical damages,
- Identify the community's critical facilities and their location within each identified hazard's impact area,
- Determine their "estimated" replacement costs,
- Define the community's population risk and critical facility vulnerabilities,
- Develop hazard mitigation goals,
- Select a few potential projects which could reduce or eliminate future disaster related damages,
- We will provide a detailed list of agency and other potential funding sources with their websites,

Our first goal for the community is to encourage you to select a planning team leader and a

few team members. Who do you recommend? Team members should have knowledge of natural hazards that continually cause damages; what facilities are critical for protection from these hazards; as well as, what Grayling resources and capabilities are available within the community to mitigate those hazards.

We suggest you look for team members from the City, Village elders, the health clinic, school, volunteer fire fighters, law enforcement, and other potential members. We suggest no more than four or five members on this team.

There will be opportunities for the entire community to review the team's work during the public involvement process because FEMA requires at least two public involvement activities. These activities can include distributing or posting newsletters to enable community wide knowledge, providing information during City Council Meeting or other public meetings, and working with us over the phone as we capture needed information.

URS will provide two (2) newsletters. The first newsletter will introduce the project and explain the planning process, encourage public involvement; ask the community to identify known hazards, and to confirm their critical infrastructure as identified by DHS&EM's statewide small community Critical Facility Database. The second, will introduce the draft HMP and encourage the community to review and provide comments to make the plan better or more usable to mitigate your hazards. I have attached the draft Newsletter for your review. Please write me back with the names of the team leader and members so I can update the draft and return it to you for distribution throughout your community.

I would like to schedule an introductory meeting with the team leader and team members to introduce the project and the process letting you know what information we will need to allow us to proceed. You will be able to call into a teleconference using a speaker phone to simplify the discussions.

We would like to schedule this teleconference by the end of next week if feasible. Please let me know which day and time is convenient for you. We will then provide you the toll-free number which you can pass to each essential participant.

- Please provide us a list of names for your Planning Team to include on the first newsletter and the name of the Planning Team Leader.
- Please also provide a date that we can schedule the project Kick-Off Teleconference to enable us to begin the plan's development.

I look forward to working with you and your Team. Thank you for your time.

Kind Regards
-Scott-

R. Scott Simmons, CFM, CPM

AECOM + URS

700 G Street, Suite 500 | Anchorage, AK 99501

Ph: 907.261.9706 | 800.909.6787 | Personal Mobile: 841.1832 | Fax: 907.562.1297

eMail Address: scott.simmons@urs.com

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700 G Street, Suite 500
Anchorage, Alaska 99501

FAX TRANSMISSION

Phone: 907.261.9706
Fax: 907.562.1297

TO:

Name: Mayor Clark	Fax Number 907. 453.5223	Date: 03/25/2015
City of Grayling	Telephone: 907. 5148	Number of Pages: 2 with coversheet

FROM:

Name: Scott Simmons	Fax: 907.562.1297	Phone: Toll Free: 800.909.6787 Direct: 907.261.9706
Subject: Critical Facilities List Data Needed		

Comments:

Hello Mayor Clark,

We are nearly complete with your draft hazard mitigation plan (HMP).

The attached critical facilities spreadsheet is a vital component to developing your hazard HMP's vulnerability assessment. I have attached the spreadsheet that I would like to work on with you as soon as possible.

This will more specifically identify which facilities impacted by your identified hazards (earthquake, flood/erosion, ground failure (permafrost, subsidence), and wildland (tundra) fire. We will use this information as the basis for the Village's hazard vulnerability assessment.

I will also send this to you via email.

Thank you for making time for this portion of the project.

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**City of Grayling
Critical Facility
Hazard Analysis**

Facility Type	Estimated No. of Occupants	Facilities	Address	Latitude	Longitude	Estimated Value	Building Type	Earthquake	Flood	Ground Failure	Severe Weather	Wildland Fire
Government		City Office	E Street	62.90759	-160.06426		Log structure	X		X	X	X
		IRA Council Office	Third Street	62.90759	-160.06426		Log structure	X		X	X	X
		Village Corp. Office	Third Street	62.90759	-160.06426		W2	X		X	X	X
		Post Office		62.90585	-160.0648		Log structure	X		X	X	X
Emergency Response		Police VPSO Office				\$100,000						
		Fire Response Office										
Education		Iditrarod Area REAA School	D Street	62.90631	-160.06354	\$534,866	W2	X		X	X	X
		School Mechanical Building	D Street									
		Head Start Preschool	C Street			\$100,000						
Medical Care		Grayling Clinic	E Street	62.90759	-160.06426	\$2,118,159	W1	X		X	X	X
Community		Arctic Mission Church	Third Street	62.90555	-160.06489			X		X	X	X
		Episcopal Church	C Street	62.90544	-160.06132			X		X	X	X
		Episcopal Building	C Street									
		IRA Multi-Purpose Community Center	C Street	62.90556	-160.0623	\$410,000	Log Cabin	X		X	X	X
		Community Center				\$189,064						
		Grayling Native Store	C Street	62.90568	-160.06351		wood frame	X		X	X	X
		Bingo Hall	Third Street									
		Teen Center	E Street			\$37,500						
		Baseball Field		62.90631	-160.06352	\$52,058		X		X	X	X
		Cemetery		62.91428	-160.06737			X		X	X	X
Roads		Total road miles:				\$1,441,639						
	0	Airport Road					Gravel	X		X	X	X
		1st Street					Gravel	X		X	X	X
		2nd Street					Gravel	X		X	X	X
		3rd Street					Gravel	X		X	X	X
		4th Street					Gravel	X		X	X	X
		A Street					Gravel					
		B Street					Gravel					
		C Street					Gravel	X		X	X	X
		D Street					Gravel	X		X	X	X
		E Street					Gravel	X		X	X	X
		F Street					Gravel					
		G Street					Gravel	X		X	X	X
		Cemetery Lane					Gravel					
		Gravel Pit Road					Gravel	X		X	X	X
		Hill Street					Gravel	X		X	X	X
		Landfill Road					Gravel					
		Pumphouse Road					Gravel	X		X	X	X
		School Road					Gravel	X		X	X	X
		Winter Trail					Gravel	X		X	X	X
Bridge		Airport Road Bridge		62.90096	-160.06753	\$2,200,000		X		X	X	X
Transportation	0	Airport	N/A	62.8976	-160.0644	\$17,177,855	AFO	X		X	X	X
		City Maintenance Shop	Third Street	62.90631	-160.06402	\$40,000	W1	X		X	X	X
		City Shop	Hill Street									
		City Dock	Yukon River Waterfront									
Utilities		AVEC Power Generation Facility		62.9074	-160.06298		EPPS	X		X	X	X
	0	AVEC Fuel Storage	Hill Street	62.90739	-160.06265	\$1,100,000	OTF	X		X	X	X
	0	School Generator		62.90631	-160.06352		EPPS	X		X	X	X
		Community Building/Washeteria		62.90705	-160.06328	\$82,415		X		X	X	X
		Water Treatment Plant				\$644,700						
	0	Grayling Water System Well		62.90679	-160.0663			X		X	X	X
	0	PHS Pumphouse	E Street	62.90679	-160.06272			X		X	X	X
	0	Piped Water System										
	0	Landfill		62.89231	-160.06448	\$500,000		X		X	X	X
		Potable Water Production and Treatment Facility		62.90705	-160.06328		PWTM	X		X	X	X
0	Sewage Lagoon		62.91428	-160.06737		WWP1	X		X	X	X	
0	Satellite		62.90759	-160.06426		CBO	X		X	X	X	
0	Telephone (Bush-Tel Inc.)	Third Street	62.90759	-160.06426		CBO	X		X	X	X	
Total Occ	0					Total Damages:						
						\$26,728,256						

**City of Grayling
Critical Facility
Hazard Analysis**

*DCRA 2014 Pop: 191 or Number of residents based on Census average of 3 per household.

** Value of residential structures based on 2010 Census data for 67 structures is \$133,900 average cost. City of Grayling estimates average residential structure replacement cost at approximately \$250,000.

*** Value of Critical Facilities (and Occupancy) based on information provided by the City for each structure.

	# People in Residential Structures*	# Residential Structures Potentially Impacted	Estimated Damages**				
EQ	191	67	\$16,750,000	X			
Flood			\$0		X		
Ground Failure	191	67	\$16,750,000			X	
Severe Wx	191	67	\$16,750,000				X
Wildfire	191	67	\$16,750,000				X

	# People in Critical Facilities*	# Critical Facilities Potentially Impacted	Estimated Damages				
EQ	0		\$26,728,256	X			
Flood					X		
Ground Failure	0		\$0			X	
Severe Wx	0		\$0				X
Wildfire	0		\$67				X

CITY OF GRAYLING HAZARD MITIGATION PLAN NEWSLETTER

Newsletter #1

November 2014

This newsletter describes the City of Grayling's Hazard Mitigation Planning project development processes. This newsletter will explain the planning project to all interested agencies, stakeholders, and the public and to solicit comments. It can also be viewed on the State of Alaska Division of Homeland Security and Emergency Management Website at: <http://www.ready.alaska.gov/plans/localhazmitplans.htm>.

The State of Alaska, Department of Military and Veterans Affairs, Division of Homeland Security and Emergency Management (DHS&EM) was awarded a Pre-Disaster Mitigation Program grant from the Federal Emergency Management Agency (FEMA) to prepare Hazard Mitigation Plans (HMP) for fifteen Alaskan Communities. The City of Grayling was selected for participation in this effort.

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

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

What is Hazard Mitigation?

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

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

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

Why Do We Need A Hazard Mitigation Plan?

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

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

The Pre-Disaster Mitigation (PDM) and the National Insurance Program's Flood Mitigation Assistance (FMA), grant programs are nationally competitive funding programs. These grants use the same application process and eligibility requirements.

The Planning Process

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

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

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

FEMA has prepared a Local Planning Review Guide) and (available at:

<http://www.fema.gov/library/viewRecord.do?fromSearch=fromsearch&id=4859>). It explains how the HMP meets each of the DMA2000 requirements.

FEMA has prepared a “Mitigation Planning Guidance and “How to” Guides (available at: <http://www.fema.gov/hazard-mitigation-planning-resources>.) The City’s Hazard Mitigation Plan will follow those guidelines.

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

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

We Need Your Help

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

Grayling's Hazard Worksheet		
Hazard	Iditarod Area REAA*	City of Grayling
Earthquake	Yes - Low	
Erosion	Yes (1)	
Flood	Yes (High - 6)	
Ground Failure	Yes - Low	
Severe Weather	Yes - High	
Tsunami & Seiche	No	No
Volcanic	No	
Wildland / Tundra Fire	Yes (2)	

*Hazard Matrix from the 2010 State of Alaska Hazard Mitigation Plan for the Iditarod Area REAA. (Parentheses indicate threat probability and number of historical events)

The Planning Team

The planning team is being led by Mayor Shirley Clark, Team Leader, with assistance from City Clerk Ann Short, and the City Council. URS Corporation has been contracted by DHS&EM to provide assistance and guidance to the planning team throughout the planning process.

Public Participation

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

DHS&EM identified critical facilities within the City of Grayling as part of the Alaska Critical Facilities Inventory, but the list of critical facilities needs to be updated and the estimated value and location (latitude/longitude) determined. The following table lists the City’s identified critical facilities.

Grayling's Critical Facilities*	
City Office	Airport
Traditional Council Office	City Maintenance Shop
Village Corp. Office	AVEC Power Generation Facility
Post Office	AVEC Fuel Storage
Iditarod Area REAA School	School Generator
Grayling Clinic	Community Building/Washeteria
Arctic Mission Church	Grayling Water System Well
Episcopal Church	Public Health Service (PHS) Pump House
Community Hall	Landfill
Grayling Native Store	Potable Water Production and Treatment Facility
Baseball Field	Sewage Lagoon
Cemetery	Satellite
Bridge	Telephone

* Alaska Critical Facilities Inventory

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

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

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

**City of Grayling
Planning Team Leader**
_____, (Title)
P.O. Box _____
_____, AK 99_____
Phone: _____
eMail: _____

URS Corporation
Scott Simmons, Hazard Mitigation,
Emergency Management, and Climate
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Anchorage, AK 99505-5750
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Mitigation Goals

Table 7-x Mitigation Goals

No.	Goal Description
Multi-Hazards (MH)	
MH 1	Provide outreach activities to educate and promote recognizing and mitigating all natural and manmade hazards that affect the City of Grayling (City) □
MH 2	Cross-reference mitigation goals and actions with other City planning mechanisms and projects.
MH 3	Develop construction activities that reduce possibility of losses from all natural and manmade hazards that affect the City.
Natural Hazards	
EQ 4	Reduce potential vulnerability to earthquake (EQ) damage and loss.
FL 5	Reduce potential flood (FL) and erosive scour damage and loss.
GF 6	Reduce potential ground failure (GF) damage and loss.
SW 7	Reduce potential vulnerability to severe weather (SW) damage and loss.
WF 8	Reduce potential vulnerability to wildland / tundra fire (WF) damage and loss.

Mitigation Action Items to consider, select, or identify as ongoing community projects

7-4 Mitigation Action Items for Selection

Hazard	Status <i>Considered</i> <i>Selected</i> <i>Ongoing</i>	Description
Multi-Hazards (MH)		
MH 1	S	Identify and pursue funding opportunities to implement mitigation actions.
		Hold an annual or biennial “hazard meeting” to provide information to residents about recognition and mitigation of all natural hazards that affect the City of Grayling.
		Establish a formal role for the Hazard Mitigation Planning Team to develop a sustainable process to implement, monitor, review, and evaluate community wide mitigation actions.
		Develop, produce, and distribute information materials concerning mitigation, preparedness, and safety procedures for all identified natural hazards.
		Develop and implement strategies and educational outreach programs for debris management from natural hazard events.
	S	Disseminate FEMA pamphlets to educate and encourage homeowners concerning structural and non-structural retrofit benefits.
		Develop outreach program to educate residents concerning benefits of increased seismic resistance and modern building code compliance during rehabilitation or major repairs for residences or businesses.
		Develop outreach program with school district contests having students develop, display, and explain mitigation projects or initiatives.
		Investigate benefits of, and potentially Join the National Flood Insurance Program to reduce monetary losses to individuals and the community.
		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.



7-4 Mitigation Action Items for Selection

Hazard	Status <i>Considered</i> <i>Selected</i> <i>Ongoing</i>	Description
		Develop outreach program to educate residents concerning flood proofed wells, sewer/septic or other non-residential facilities.
	C	Identify critical facilities and vulnerable populations based on identified (and/or mapped where applicable) high hazard areas.
		Identify evacuation routes away from high hazard areas and develop outreach program to educate the public concerning warnings and evacuation procedures.
		Acquire emergency warning sirens to communicate critical emergency warnings and alerts.
		Update public emergency notification procedures and develop an outreach program for potential hazard impacts or events.
MH 2	S	The City will strive to manage their existing plans to coordinate and incorporate mitigation planning provisions into all community planning processes such as comprehensive, capital improvement, and land use plans, etc. to demonstrate multi-benefit considerations and facilitate using multiple funding source consideration.
		Develop land use ordinances or guidelines to minimize hazard impacts and damages such as: reducing vegetation removal to keep or maintain slope stability from rain, snowmelt run-off, and erosion impacts.
		Review ordinances and develop outreach programs to assure propane tanks are properly anchored; and hazardous materials are properly stored and protected from; known natural hazards such as flood or seismic events.
	C	Integrate the Mitigation Plan hazard analysis findings for enhanced emergency planning.
		Develop, incorporate, and enforce building ordinances commensurate with building codes to reflect survivability from flood, fire, wind, seismic, and other hazards to ensure occupant safety.
	C	Develop and incorporate mitigation provisions and recommendations into all community plans and community development processes to maintain protect critical infrastructure, residences, and population from natural hazard impacts.
		Update or develop, implement, and maintain jurisdictional debris management plans.
	S	Prohibit new construction in identified mitigatable hazard impact areas (avalanche, flood, erosion, ground failure etc.) or require building to applicable building codes for other hazard impacts (earthquake, volcanic ash, weather, etc.).
		Identify and list repetitively flooded structures and infrastructure, analyze the threat to these facilities, and raise mitigation action priorities to protect the threatened population.
		Perform hydrologic and hydraulic engineering, and drainage studies and analyses. Use information obtained for feasibility determination and project design. This information should be a key component, directly related to a proposed project.
		Develop prioritized list of mitigation actions for threatened critical facilities and other buildings or infrastructure.
		Develop process to regulate future development in high hazard impact areas (For example, require permitting, geotechnical review, and soil stabilization technique implementation, etc.).



7-4 Mitigation Action Items for Selection

Hazard	Status <i>Considered</i> <i>Selected</i> <i>Ongoing</i>	Description
		Update Emergency Response Plans to discuss volcanic ashfall, tsunamis, and stormwater event management, prioritize response actions, and initiate actions to fill capability gaps.
MH 3		Increase power line wire size and incorporate quick disconnects (break---away devices) to reduce ice load and windstorm power-line failure during severe wind or winter ice storm events.
	C	Encourage utility companies to evaluate and harden vulnerable infrastructure elements for sustainability.
	S	Acquire (buy-out), demolish, elevate, or relocate structures from hazard prone areas (erosion, flood, ground failure, etc.) <i>* Property deeds "must be" restricted for open space uses for perpetuity to keep people from rebuilding in known hazard areas.</i>
		Harden utility headers located along river embankments to mitigate potential flood, debris, and high water flow or erosive scour damages.
		Purchase and install generators with main power distribution disconnect switches for identified and prioritized critical facilities susceptible to short term power disruption. (i.e. first responder, medical facilities, schools, correctional facilities, and water and sewage treatment plants, etc.)
		Develop vegetation projects to restore erosion, ground failure, or other hazard impact damages and to provide slope stability in avalanche or landslide areas.
		Develop, implement, and enforce floodplain management ordinances.
		Update the Storm-Water Management Plan to include regulations to control flood runoff and to minimize ground failure from saturated soils, steep slope collapse, and erosion or scour.
		Develop a vegetation management plan addressing slope-stabilizing root strength to maintain or encourage precipitation containment.
Natural Hazards		
EQ 4		Evaluate critical public facilities with significant seismic vulnerabilities and complete retrofit. (e.g. evaluate fire stations, public works buildings, potable water systems, wastewater systems, electric power systems, and bridges, etc.)
		Inspect, prioritize, and retrofit any critical facility or public infrastructure that does not meet current State Adopted Building Codes.
	None	Install non-structural seismic restraints for large furniture such as bookcases, filing cabinets, heavy televisions, and appliances to prevent toppling damage and resultant injuries to small children, elderly, and pets.
FL 6	S	Determine and implement most cost beneficial and feasible mitigation actions for locations with repetitive flooding, significant historical damages, or road closures.
		Develop and maintain NFIP compliant Repetitive Loss, Severe Repetitive Loss, and Repetitive Flood Claim (RFC) property inventory. Inventory should include



7-4 Mitigation Action Items for Selection

Hazard	Status <i>Considered</i> <i>Selected</i> <i>Ongoing</i>	Description
		property type, structure type, number of buildings, and their geo-referenced locations.
		Establish flood mitigation priorities for critical facilities, residential structures, and commercial buildings located within the identified flood hazard area(s) (100- and 500-year floodplains, stormwater, etc.) based on current base flood elevation (BFE) survey elevation data.
	S	Elevate residential, public, or critical facilities at least two feet above the base flood elevation (BFE).
		Dry flood-proof non-residential, historical, and/or residential structures. (Make watertight or impermeable to flood water).
		<ul style="list-style-type: none"> • <i>Anchor building to prevent flotation, collapse, or lateral movement.</i> • <i>Install watertight closure doors and windows.</i> • <i>Reinforce walls to withstand floodwater pressures and impact forces generated by floating debris.</i> • <i>Use membranes and other sealants during construction to reduce floodwater seepage through walls and wall openings.</i> • <i>Install pumps to control interior water levels</i> • <i>Install check valves to prevent floodwater or sewage flow entrance through utilities openings.</i> • <i>Locate electrical, mechanical, utility, and other valuable-damageable equipment and contents above the expected flood level.</i> • <i>Construct protective berm, floodwall, or small levee around a building to prevent floodwater intrusion.</i>
	C	Increase culvert sizes to increase their drainage capacity or efficiency.
		Construct debris basins to retain debris in order to prevent downstream drainage structure clogging.
		Install debris cribs over culvert inlets to prevent inflow of coarse bed-load and light floating debris.
		Create detention debris basin, storage basin, retention pond, reservoirs etc. to allow water to accumulate temporarily excess water to reduce pressure on culverts; and construct low water crossings to allow water to ultimately return to its watercourse at a reduced flow rate.
		Create relief drainage ditch-openings using culverts or bridges to relieve rapid water accumulation during high water-flow events.
	C	Harden culvert entrance bottoms with asphalt, concrete, rock, or similar material to reduce erosion or scour.
		Install walls at the end of a drainage structure to prevent embankment erosion at its entrance or outlet. (end- or wing-walls).
	S	Develop mitigation initiatives such as: Rip-rap (large rocks), sheet pilings, gabion baskets, articulated matting, concrete, asphalt, vegetation, or other armoring or protective materials to provide river bank protection.
		Provide wastewater treatment systems flood protection to prevent erosion or flooding damage and sewage lagoon out-wash.
		Install NOAA/NWS stream flow and rainfall measuring gauges.
GF 7	None	Complete a ground failure location inventory (avalanche, landslide, permafrost, sink holes, subsidence, etc.); identify and potentially map threatened critical facilities, residential buildings, infrastructure, and other essential buildings.



7-4 Mitigation Action Items for Selection

Hazard	Status <i>Considered</i> <i>Selected</i> <i>Ongoing</i>	Description
		Develop, implement, and enforce a property development “ground failure” risk assessment for any structure that may be sited in potentially vulnerable locations.
		Identify and seasonally restrict recreational and construction activities in high avalanche and landslide areas.
		Promote permafrost sensitive construction practices in permafrost areas.
SW 8	S	Develop and implement programs to coordinate maintenance and mitigation activities to reduce risk to public infrastructure from severe winter storms (snow load, ice, and wind).
	S	Increase power line wire size and incorporate quick disconnects (break---away devices) to reduce ice load and windstorm power-line failure during severe wind or winter ice storm events.
		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.
		Develop personal use and educational outreach training for a “safe tree harvesting” program. Implement along utility and road corridors to prevent or reduce potential winter storm damage.
		Develop and implement tree clearing mitigation programs to keep trees from threatening lives, property, and public infrastructure from severe weather events.
WF 9		Develop Community Wildland Fire Protection Plan to mitigate wildland fire threat.
		Hold FireWise workshop to educate residents and contractors concerning fire resistant landscaping.
	S	Promote FireWise building siting, design, and construction processes and materials.
		Provide wildland fire hazard outreach information in an easily distributed format for all residents.
	S	Develop, adopt, and enforce burn ordinances that controls outdoor burning, require burn permits, and restricts open campfires during identified weather periods (windy, dry, etc.).
	C	Develop outreach program to educate and encourage fire-safe construction practices for existing and new construction in high-risk areas.
		Identify, develop, implement, and enforce mitigation actions such as fuel breaks and reduction zones for potential wildland fire hazard areas.
	O	Community continually expanding a 15’ fire break around the community

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CITY OF GRAYLING HAZARD MITIGATION PLAN (HMP)

June 2015

Newsletter 2

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

HMP Development

The City of Grayling was one of 21 communities selected by the State of Alaska, Division of Homeland Security and Emergency Management (DHS&EM) for a Hazard Mitigation Planning (HMP) development project. The plan identifies natural hazards that affect the community including earthquake, erosion, flood, ground failure, severe weather, and tundra/wildland fire. The HMP also identifies the people and facilities potentially at risk and potential actions to mitigate community hazards. The public participation and planning process is documented as part of the project.

What is Hazard Mitigation?

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

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

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

Why Do We Need A Hazard Mitigation Plan?

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

The Planning Process

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

The DMA2000 requires the plan to document the following topics:

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

FEMA has prepared a Local Planning Review Guide) and (available at: <http://www.fema.gov/library/viewRecord.do?fromSearch=fromsearch&id=4859>). It explains how the HMP meets each of the DMA2000 requirements. FEMA has prepared and “Mitigation Planning Guidance” and “How to Guides” (available at: <http://www.fema.gov/hazard-mitigation-planning-resources>). The City’s Hazard Mitigation Plan will follow those guidelines.

The planning process kicked-off on November 21, 2014 by establishing a local planning committee and holding a public meeting. The planning committee examined the full spectrum of hazards listed in the State Hazard Mitigation Plan and identified five hazards the HMP would address.

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

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

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

Mitigation goals are defined as general guidelines that explain what a community wants to achieve in terms of hazard and loss prevention. Goals are positively stated future situations that are typically long-range, policy-oriented statements representing community-wide visions. Mitigation actions and projects are undertaken in order to achieve your stated objectives. On June 24, 2015, the local planning committee identified projects and/or actions for each hazard that focus on six categories: prevention, property protection, public education and awareness, natural resource protection, emergency services, and structural projects. A representative sample of the mitigation actions identified as a priority by the planning team are listed below, and explained in more detail in the plan.

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

The draft plan is available in the City and Tribal offices for public review and comment. Comments should be made via email, fax, or phone to Scott Simmons (listed below) and be received no later than July 14, 2015. The plan will be provided to DHS&EM and FEMA for their preliminary approval and returned to Grayling’s City Council for formal adoption.

The Planning Committee

The plan was developed with the assistance from the community’s planning committee consisting of a cross section from the community. Planning Team members who helped with developing the plan include Mayor Shirley Clark, Team Leader, with assistance from City Clerk Ann Short, the City Council, and AECOM.

Sample of the City of Grayling’s Mitigation Actions. Review the draft HMP for a complete list.		
Identify and pursue funding opportunities to implement mitigation actions.	Disseminate FEMA pamphlets to educate and encourage homeowners concerning structural and non-structural retrofit benefits.	Elevate residential, public, or critical facilities at least two feet above the base flood elevation (BFE).
The City will strive to manage their existing plans to coordinate and incorporate mitigation planning provisions into all community planning processes such as comprehensive, capital improvement, and land use plans, etc. to demonstrate multi-benefit considerations and facilitate using multiple funding source consideration.	Acquire (buy-out), demolish, elevate, or relocate structures from hazard prone areas (erosion, flood, ground failure, etc.) * Property deeds “must be” restricted for open space uses for perpetuity to keep people from rebuilding in known hazard areas.	Prohibit new construction in identified mitigatable hazard impact areas (avalanche, flood, erosion, ground failure etc.) or require building to applicable building codes for other hazard impacts (earthquake, volcanic ash, weather, etc.).
Determine and implement most cost beneficial and feasible mitigation actions for locations with repetitive flooding, significant historical damages, or road closures.	Install hardened bank protection such as Rip-rap (large rocks), sheet pilings, gabion baskets, articulated matting, concrete, asphalt, vegetation, or other armoring or protective materials to provide river bank protection.	Develop and implement programs to coordinate maintenance and mitigation activities to reduce risk to public infrastructure from severe winter storms (snow load, ice, and wind).
Promote FireWise building siting, design, and construction processes and materials.	Develop outreach program to educate and encourage fire-safe construction practices for existing and new construction in high-risk areas.	Develop, adopt, and enforce burn ordinances that controls outdoor burning, require burn permits, and restricts open campfires during identified weather periods (windy, dry, etc.).

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

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Appendix E
Benefit–Cost Analysis Fact Sheet

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Benefit-Cost Analysis Fact Sheet

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

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

All Benefit-Costs must be:

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

General Data Requirements:

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

Damage and Benefit Data

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

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

Building Data

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

Use Correct Occupancy Data

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

Questions to Be Answered

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

Common Shortcomings

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

Appendix F
Plan Maintenance Documents

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Annual Review Questionnaire

PLAN SECTION	QUESTIONS	YES	NO	COMMENTS
PLANNING PROCESS	Are there internal or external organizations and agencies that have been invaluable to the planning process or to mitigation action			
	Are there procedures (e.g. meeting announcements, plan updates) that can be done more efficiently?			
	Has the Planning Team undertaken any public outreach activities regarding the HMP or implementation of mitigation actions?			
HAZARD PROFILES	Has a natural and/or manmade/ technologically caused disaster occurred during this reporting period?			
	Are there natural and/or manmade/ technologically 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 critical facilities or infrastructure need to be added to the asset lists?			
	Have there been development patterns changes 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 City or Village as applicable?			
	Are the goals still applicable?			
	Should new mitigation actions be added to the Mitigation Action Plan (MAP)?			
	Do existing mitigation actions listed in the Mitigation Strategies' MAP need to be reprioritized			
	Are the mitigation actions listed in the MAP appropriate for available resources?			

MITIGATION ACTION PROGRESS REPORT

2 of 2

Plan Goal(s) Addressed: _____

Goal: _____

Success Indicators: _____

Project Status

- On Schedule
- Completed
- Delayed*

* Explain: _____

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 accomplish over the next reporting period?

Other Comments: _____
